Transmitting Development

Global Networks and Local Grids in the Electrification of East Africa, 1906-1970

Vom Fachbereich 2, Gesellschafts- und Geschichtswissenschaften,
der Technischen Universität Darmstadt

zur Erlangung des Grades Doktor philosophiae (Dr. phil.)
genehmigte Dissertation von Jonas van der Straeten M. A. aus Berlin

1. Referent: Prof. Dr. Mikael Hård
2. Referent: Prof. Dr. Dieter Schott

1. Prüfer: Prof. Ronen Shamir
2. Prüfer: Prof Dr. Jochen Monstadt

Tag der Einreichung: 27.04.2017

Darmstadt 2017
D 17

van der Straeten, Jonas : Transmitting Development: Global Networks and Local Grids in the Electrification of East Africa, 1906-1970
Darmstadt, Technische Universität Darmstadt,
Jahr der Veröffentlichung der Dissertation auf TUprints: 2023
URN: urn:nbn:de:tuda-tuprints-243465
Tag der mündlichen Prüfung: 19.09.2017
Veröffentlicht unter CC BY-SA 4.0 International
https://creativecommons.org/licenses/

بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

Zusammenfassung in deutscher Sprache

Im Gegensatz zu den Ländern des globalen Nordens, wo Elektrizität allgegenwärtig und alltäglich geworden ist, bleibt die netzgebundene Stromversorgung im Osten Afrikas bis heute weitgehend ein Privileg der städtischen Bevölkerung. In Tansania lag die Elektrifizierungsrate im Jahr 2016 bei insgesamt 38 %, in ländlichen Gebieten bei 18 % – und dies über ein Jahrhundert nachdem dort die ersten Stromgeneratoren in Betrieb genommen wurden. Offensichtlich hat der historische Prozess der Elektrifizierung in Ostafrika zu einem fragmentierten Zustand der Stromversorgung geführt, der nicht mehr als Zwischenphase entlang eines Modernisierungspfades in Richtung eines vollständigen Zugangs zu Netzstrom erklärt werden kann. Für eine Technikgeschichtsschreibung, die Elektrifizierungsprozesse bisher weitgehend mithilfe allgemeiner Modelle der Systemevolution und entlang klar strukturierter, progressiver Narrative beschrieben hat, bleibt Afrika ein Rätsel.

Diese Arbeit rekonstruiert den historischen Prozess der Elektrifizierung Ostafrikas (hier: Kenia, Tansania und Uganda) unter britischer Kolonialherrschaft und derjenigen Tansanias nach der Unabhängigkeit und adressiert damit eine empirische und theoretische Lücke der Technikgeschichtsschreibung zur Elektrizität: Da bisher kaum Studien zur Elektrizitätsgeschichte von Ländern des globalen Südens existieren, ist wenig über die Entstehung und den Wandel großtechnischer Systeme zur Stromversorgung in jenen Ländern bekannt, die dabei fast ausschließlich auf Kapital und Wissen von außen angewiesen sind. Ein Modell der Systemevolution, das ein Stromnetz anhand seiner eigenen Systemlogik sowie im Hinblick auf seine Interaktion mit der es umgebenden Gesellschaft untersucht, stößt bei diesen Ländern an seine Grenzen. Globale Zusammenhänge und Einflüsse, so das Argument dieser Arbeit, müssen deshalb in den Fokus der Analyse rücken, statt als äußere Einflussfaktoren konzeptioniert zu werden.

Daher folgt diese Arbeit den globalen Netzwerken von Akteuren, die die Elektrifizierung in Ostafrika mitprägten und -gestalteten. Dieser Ansatz erlaubt es, Elektrifizierungsgeschichten Ostafrikas mit jenen aus verschiedenen anderen Teilen der Welt in Verbindung zu bringen, z. B. aus Malaysia, Palästina oder Indien unter Britischer Kolonialherrschaft, aus Großbritannien selbst oder anderen europäischen Ländern wie Schweden. Dabei zeigt sich eine erstaunlich globale Mobilität von Kapital, Personen, Wissen und Ideen in Bezug auf Elektrizität, die durch die Netzwerke kolonialer Herrschaft, Wirtschaft und Verwaltung oder später der internationalen Entwicklungshilfe zirkulierten. Um im Kontext der Kolonien, oder später „Entwicklungsländer“, Handlungsmacht zu entfalten, d.h. politische Entscheidungen zu

festigen und Kapital zu mobilisieren, mussten diese Ideen von Elektrizität an ein anderes Konzept angebunden werden, nämlich das der *Entwicklung*.

Änderungen der Geschwindigkeit und Richtung von historischen Elektrifizierungsprozessen in Ostafrika fielen immer mit einem Bedeutungswandel des Entwicklungsbegriffes – oder vielmehr mit dem Hinzukommen neuer Bedeutungsebenen – und der Vorstellung über die Rolle der Elektrizität für die Entwicklung zusammen. Die Analyse des Aufbaus und Wandels von Elektrizitätsinfrastrukturen in Ostafrika wird deshalb in dieser Arbeit mit einer globalen Geschichte von Entwicklungsdiskursen in Beziehung gesetzt. Aus dieser Perspektive lassen sich für den von mir untersuchten Zeitraum drei Perioden ableiten, für die sich jeweils eigene empirische Schlussfolgerung ziehen lassen.

1. Von ihrem Beginn im Jahre 1906 bis zum Zweiten Weltkrieg war die Elektrifizierung Ostafrikas von einer Laisser-Faire-Politik der Britischen Kolonialverwaltung geprägt. Trotz der Rhetorik von den unerschöpflichen „Colonial Estates", die man mithilfe von Technik und Wissenschaft nutzbar machen müsse, blieb die Doktrin von der finanziellen Autonomie der Kolonien handlungsweisend. Bei den ohnehin geringen Investitionen in Infrastrukturen in Afrika blieb die Elektrizität an hinterer Stelle – sie zählte nicht zum Ensemble der „Tools of Empire". Die Britische Kolonialverwaltung überließ die Stromversorgung privaten Unternehmern, an die sie Konzessionen vergab. Diese „system builders" beschränkten die Versorgung jedoch ausschließlich auf kleine „Enklaven" europäischen Lebens und Wirtschaftens in den Kolonien, in denen sie jene Prinzipien der Stromversorgung und Erzeugung anwenden konnten, die in Europa bekannt und erprobt waren. Wie in Europa wurde die Stromversorgung als Annehmlichkeit einer städtischen Elite eingeführt, in diesem Fall einer Elite ausschließlich europäischer oder indischer Herkunft. Aber anders als in Europa wurden die einzelnen Versorgungsnetze nicht kontinuierlich ausgeweitet und verbunden, vielmehr stagnierte die Elektrifizierung vor dem zweiten Weltkrieg weitgehend.

Der Grund dafür liegt in der Rolle Ostafrikas im Zusammenhang mit dem Aufstieg eines globalen Kapitalismus und multinationaler Unternehmenstätigkeiten in der Stromversorgungsindustrie. Mehr als von einer politischen Agenda wurde der Elektrifizierungsprozess von Aktionärsinteressen in London bestimmt. Diese verlangten eine Unternehmenspolitik, die auf hohe Profitraten und kleinteilige, risikoarme Investitionen ausgerichtet war. Die Britischen Kolonialverwaltungen in Afrika waren durch ihren Mangel an eigenem Know-how und Kapital zumeist weder in der Lage noch willens, die Stromversorgung zu kontrollieren und entlang ihrer eigenen Entwicklungspolitik

auszurichten. Eher noch als unmittelbar durch die koloniale Identitätspolitik blieb die „afrikanische Bevölkerungsmehrheit“ durch die Unternehmenspolitik der privaten Versorgungsunternehmen bis zum Zweiten Weltkrieg vollständig vom Zugang zu Elektrizität ausgeschlossen.

2. Erst in den frühen 1940er-Jahren übernahmen Kolonialregierungen gänzlich die Vorstellung von der Elektrizität als Triebkraft der Modernisierung und Voraussetzung für das Wirtschaftswachstum in Afrika, die sich bis heute im Entwicklungsdiskurs behauptet hat. Dieser Bedeutungswandel hing mit einem Wandel der kolonialen Entwicklungspolitik zusammen. Im „Colonial Development and Welfare Act“ verpflichtete sich Großbritannien dazu, mehr eigene Ressourcen für die wirtschaftliche Entwicklung und die Verbesserung der Lebensbedingungen in seinen Kolonien bereitzustellen. Meine Untersuchung der Elektrifizierung Ostafrikas in den beiden Nachkriegsjahrzehnten illustriert jedoch die inhärenten Spannungen, Widersprüche und Kontingenz der britischen Entwicklungspolitik während der späten Kolonialzeit. Während in Europa die Verstaatlichung der Elektrizitätswirtschaft und ihre Ausrichtung an nationalen Interessen in vollem Gange war, hatten die britischen Kolonialverwaltungen in Afrika große Mühe, ihre politischen Versprechen bezüglich der Stromversorgung umzusetzen. In Ländern wie Tanganyika und Kenia fehlten ihnen immer noch die Autorität, die Ressourcen und manchmal die Bereitschaft, Pläne für einen systematischen und koordinierten Ausbau der Stromversorgung gegen die Aktionärsinteressen aus Großbritannien durchzusetzen. Erste Versuche, Institutionen der Regulierung und Verbraucherbeteiligung zu schaffen, blieben in den Kinderschuhen stecken.

Wenn es staatliche Eingriffe in den Stromsektor gab, so waren diese weitgehend durch Interessen der britischen Metropole motiviert. Die politischen Beweggründe hinter der Verstaatlichung der rudimentären Stromversorgung und dem Bau des ersten Großwasserkraftwerks Ostafrikas in Uganda hingen mit der Rolle der kolonialen Wirtschaft für den Wiederaufbau Großbritanniens nach dem Krieg zusammen und nicht mit dem Wunsch, eine lokale Stromversorgung zu etablieren. Die aus den Erfahrungen großer Entwicklungsprojekte in den USA abgeleitete angebotsorientierte Strategie der Planer, die sich durch die günstige Wasserkraft eine zügige Industrialisierung erhofft hatten, ging jedoch nicht auf. Ironischerweise verdanken sich die ersten systematischen Versuche zum Anschluss „afrikanischer“ Ugander an das Stromnetz der Notwendigkeit, Abnehmer für den Strom aus Großwasserkraft zu finden, nachdem industrielle Kunden ausgeblieben waren. Obwohl Elektrizität nach dem Zweiten Weltkrieg in der Kolonialverwaltung als Versorgungsleistung

für „Afrikaner“ diskutiert wurde, blieb die tatsächliche Zahl afrikanischer Stromkunden bis zum Ende der Kolonialherrschaft unbedeutend.

3. Mit der politischen Unabhängigkeit der ostafrikanischen Kolonien in den frühen 1960er-Jahren veränderte sich die Bedeutung von Elektrizität grundlegend. Strom wurde nun nicht nur als eine Versorgungsleistung definiert, auf die alle Staatsbürger – zumindest in der Theorie – Anspruch hatten, sondern auch als Voraussetzung und treibende Kraft für die ambitionierten Entwicklungspläne der jungen ostafrikanischen Nationen. Diese wurden durch die sukzessive Verstaatlichung der Stromversorgung nun selbst zu „system builders“. Am Beispiel von Tansania untersucht diese Arbeit die Kontinuitäten und Brüche im Stromsektor während des Übergangs von den bilateralen Beziehungen der kolonialen Entwicklungspolitik zu den multilateralen Beziehungen der Entwicklungshilfe nach der Unabhängigkeit. Die Dekolonialisierung beschleunigte den Rückzug von privatem Kapital aus Infrastrukturinvestitionen und den Aufstieg der internationalen Entwicklungsfinanzierung und der technischen Zusammenarbeit in Afrika. Zwar erreichten britische Entwicklungsgelder für den tansanischen Stromsektor ihren Höchstwert nach der Unabhängigkeit, jedoch fielen sie dann einem diplomatischen Bruch zwischen beiden Ländern zum Opfer. Bei ihrem Versuch, sich vom britischen Einfluss zu befreien und die Elektrizitätsversorgung entlang einer eigenen Entwicklungsagenda des „afrikanischen Sozialismus“ auszurichten, begab sich die tansanische Regierung aber notwendigerweise in neue Abhängigkeit von ausländischem Kapital und Fachwissen.

Die Folgen dieser Abhängigkeit lassen sich am Bau von großen Wasserkraft-Dämmen zur Stromerzeugung verdeutlichen, die zum Rückgrat der Elektrizitätsinfrastruktur in Tansania avancieren sollten: Die Finanzierung dieser Projekte hing von der Weltbank und deren Präferenzen ab. Zunächst galt deren Aufmerksamkeit Mehrzweckdämmen, die neben der Stromerzeugung auch der Bewässerung und dem Hochwasserschutz dienten – die bevorzugte Option der tansanischen Regierung, deren Politik sich vor allem auf das Versprechen stützte, landwirtschaftliche Produktivität und damit rurale Lebensbedingungen zu verbessern. In den 1960er-Jahren wandelte sich diese Präferenz jedoch zugunsten von Dämmen zur reinen Stromerzeugung. Anders als bei der Bewässerung ließ sich die erzeugte Strommenge hier exakt messen und die Auswirkungen auf die gesamtwirtschaftlichen Kenngrößen quantifizieren. Diese Eigenschaft war entscheidend in einer Zeit in der sich die Entwicklungsökonomie als neue Disziplin etabliert hatte und den Anspruch erhob, wirtschaftliche Entwicklung durch exakte Wissenschaft erfassbar und planbar zumachen. Für die Planung und Umsetzung stützte sich die Weltbank auf internationale

Entwicklungsagenturen, deren technische Entscheidungen wiederum von der politischen Vorgabe beeinflusst waren, neue Exportmärkte für die heimische Wasserkraftindustrie zu erschließen. Vielmehr als die nationale Entwicklungspolitik spiegeln sich in den großen Wasserkraftprojekten der 1960er- und 1970er-Jahre die Interessen, Begriffe und Konzepte von Entwicklung innerhalb der internationalen Gebergemeinschaft wieder. Den Großteil der Projektplanung und -implementierung führten internationale Berater mit wenig Kenntnis der lokalen sozialen und ökologischen Bedingungen durch – teilweise mit verheerenden Folgen, wie sich am Beispiel des Great Ruaha Power Projects zeigen sollte.

Der staatliche Stromversorger in Tansania richtete den weiteren Ausbau der Strominfrastruktur im Land am zeitgenössischen Paradigma der Elektrifizierung aus, das auf einer Top-down-Planung und abstrakten Modellierung von Elektrizitätssystemen beruhte. Obwohl dieser Ansatz eine beträchtliche Ausweitung des Zugangs zu elektrischem Strom in den urbanen Zentren und einigen kleineren Städten auf dem Land ermöglichte, ließen sich auf diese Weise keine effektiven Ansätze zur ländlichen Elektrifizierung entwickeln. Die aufkommende Bewegung von „small is beautiful“ und „angepasster Technik“ der 1970er-Jahre wurde in Tansania zwar rezipiert, blieb im Hinblick auf die Stromversorgung aber völlig unbedeutend. Die ländliche Bevölkerung, ursprünglich die Hauptadressaten im Entwicklungsmodell des „afrikanischen Sozialismus“, blieben somit bei der Elektrifizierung Tansanias fast völlig außen vor. Im Jahr 1990 war weniger als 1 % dieser Gruppe an das Stromnetz angeschlossen.

Weder die ökologischen und sozialen Auswirkungen der Stromerzeugung und -verteilung, noch Fragen der Governance, wie Transparenz, Rechenschaftspflicht und Partizipation, waren in der staatlich-gelenkten Elektrifizierung der 1970er- und 1980er-Jahren von zentraler Bedeutung. Das historische Erbe an wetteranfälligen Wasserkraftprojekten, abstrakten makroökonomischen Konzepten und Begriffen zur Planung von Systemen sowie fehlende institutionelle Kapazitäten machten den tansanischen Energiesektor besonders anfällig für die Anforderungen der 1990er-Jahre, als die strukturellen Anpassungsprogramme und Marktreformen auch die Stromversorgung erreichten. Die vorliegende Arbeit leistet daher nicht nur einen Beitrag zur Technikgeschichte Außereuropas, der Kolonialgeschichte und Geschichte der Entwicklung, sondern hilft auch dem Verständnis der Ursachen für die aktuelle Krise des Modells der zentralen Stromversorgung und die gescheiterte ländliche Elektrifizierung in vielen Ländern Afrikas.

Table of Contents

Acknowledgements

While writing this dissertation, I had the privilege of receiving inspiration, support and guidance from many different people. It is not always a given, especially in the German academic landscape, that the supervisor is one of them. In my case, it most definitely was. I am deeply grateful to Prof. Mikael Hård for keeping balance between indulgence und pressure, the personal and the professional. I thank him for reading and commenting on all my chapter drafts; and for reviving the wonderful German academic tradition of "Salonseminare" – long and productive meetings at his home, together with his other PhD candidates, Frank Edwards and Jethron Akallah, the frontrunners of a new generation of historians from East Africa. Mikael Hård has opened my eyes to many more of the positive and inspiring sides of academic work.

This dissertation project is one of many fruits of the seeds sown by Noara Kebir and Daniel Philipp, two graduates of the Technische Universität Berlin. They are not only the founders of Microenergy International, a pioneering company in the field of energy access, but also initiated the postgraduate programme Microenergy Systems (MES) that I had the privilege to become a part of. They have inspired me, a student of history and economics, and many others to explore the off-grid world. When first talking about this world at conferences and seminars, I felt like the author Karl May, whose stories about the Wild West are known to every child in Germany. May, however, never set foot on the American continent. If I can substantiate my stories (a bit) better by now, I owe this to the many opportunities to work and do research in that field, which Noara and Daniel created for me. Being a historian at heart, I decided to continue telling stories for a while to come – hopefully well-informed, empirically substantiated and theoretically relevant ones. The more I admire them and my other friends and colleagues, Sebastian, Hannes, Natalia, Setu, Mathias and many more, who have not only talked the talk, but walked the walk of energy access. I deeply admire them for what they have achieved as entrepreneurs, engineers, and consultants, but most of all as partners, friends and parents in the last years.

The same holds true for Kathrin, Alex, Ariane, Klara, and Stoyan, with whom I had the chance to spend countless hours in (and fortunately also outside) our MES-office. I am deeply grateful for the many inspiring conversations we had and for becoming friends over the last years. Our PhD projects were only made possible by the financial and ideational support of the Hans Böckler Foundation (HBS) and particularly by the faith and trust Werner Fiedler has put in us and our programme, and by the guidance of Prof. Martina Schäfer, the speaker of

our PhD programme. I was lucky to have Prof. Jochen Monstadt, one of the leading scholars on urban infrastructures in the Global South, assigned to me as liaison professor of the HBS. I thank him for our instructive conversations, which were of great help for conceptualising my dissertation project.

I found the small but emerging group of scholars working on electricity in the former colonies to be a congenial and cooperative community. Most of all, I thank Rebecca Ghanadan who introduced me to the intricacies of the Tanzanian power sector. I got a taste of her profound knowledge on energy policies in Africa and – as I understood only later – her excellent coaching skills, when I met her in Berkeley. I remember well our conversation during a walking tour through the Tilden Park. I am grateful to Ute Hasenöhrl for inviting me to jointly explore and map out the research debate on infrastructures, environment and (post)colonialism. At a professional and personal level, I learned a lot from working with her on a special issue regarding that topic. I feel indebted to Ronen Shamir, whose research on the electrification of British colonial Palestine was formative for my own approach, and to May-Britt Öhman, whose meticulous study on the Great Ruaha Power Project in Tanzania forms an important empirical and theoretical base for my work. I furthermore profited a lot from exchanging ideas with Patrick Hege, Ivan Cuesta, Lukas Hermwille and Dr. Mattijs Smits when writing joint papers or preparing joint conference panels and workshops.

During my field research in Tanzania, I received a lot of support and trust from different sides. I thank engineer Aaron Nanyaro from TANESCO for welcoming me warmly and opening the doors at TANESCO and the Ministry of Energy and Minerals for me. For over six years now, Matthew Matimbwi, the Executive Secretary of the Tanzania Renewable Energy Association, has been an excellent contact person and trustful partner for questions and projects in Tanzania. One of my most pleasant encounters while doing research in East Africa was with an *mzee* working in the Kenya National Archives. Unfortunately, I do not remember his name, but I do remember his helpfulness and passion for his work. Whoever reads this and will visit the archive in the future – please send my warmest greetings to him.

The gratefulness I feel towards my family and my wife Nasrin is beyond words. Nasrin, thank you for taking me on a path that I haven't known before. This path has also led me to understand that ultimately, all thanks go to one. الحمد لله

List of Figures

List of Abbreviations

AC	Alternating current
AEG	Allgemeine Elektricitäts-Gesellschaft
BCGA	British Cotton Grower's Association
BEAMA	British Electrical and Allied Manufacturers' Association
BRALUP	Bureau of Resource Assessment and Land Use Planning
CDC	Colonial Development Cooperation
CDFC	Colonial Development and Food Corporation
CEO	Chief Executive Officer
CIDA	Canadian International Development Agency
CO	Colonial Office
CRO	Commonwealth Relations Office
DARESCO	Dar-es-Salaam and District Electric Supply Company Limited
DANIDA	Danish International Development Agency
DC	Direct current
DOAEG	East African Railroad Company
DPA	Direct productive activities
EAP&L	East African Power and Lighting Company
FAO	Food and Agriculture Organization of the United Nations
FMS	Federated Malay States
FRELIMO	Mozambique Liberation Front
GDP	Gross Domestic Product
IPP	Independent Power Producer
IPTL	Independent Power Tanzania Ltd.
JETRO	Overseas Technical Agency of the Japanese government
KNFU	Kenyan National Farmers' Union
KPC	Kenya Power Company
kWh	Kilowatt hour

LED	Light-emitting diode
MW	Megawatt
MEM	Ministry of Energy and Minerals (Tanzania)
MES	Microenergy Systems (Postgraduate program and research group)
MELP	Mombasa Electric Light and Power Company Limited
NEP&L	Nairobi Electric Power and Lighting Company
NORAD	Norwegian Agency for Development Cooperation
ODC	Overseas Food Corporation
PPA	Power Purchasing Agreement
PSC	Power Securities Corporation
PRHEP	Perak River Hydro Electric Power Company
RUBADA	Rufiji Basin Development Authority
SDG	Sustainable Development Goals
SIDA	Swedish International Development Cooperation Agency – Sida
SOC	Social overhead capital
TANESCO	Tanzania Electric Supply Company Limited (before 1968: Tanganyika Electric Supply Company, Limited)
TANU	Tanganyika African National Union
TAZARA	Tanzania-Zambia Railway Authority
TNGA	Tanganyika Coffee Growers Association
TVA	Tennessee Valley Authority
UDSM	University of Dar es Salaam
UEB	Uganda Electricity Board
USAID	United States Agency for International Development
V	Volt
VBB	Vattenbyggnadsbyrån (Swedish company in the hydropower sector)
WWI	World War I

WWII	World War II

Preface

Between 2013 and 2017, during the four years of writing this dissertation on East Africa, I have witnessed an energy landscape in transition.[1] These changes might be a prelude to a transformation process that is unprecedented in the history of the region and will – hopefully – result in a more inclusive mode of energy provision. Changes can be observed on all levels: On the global development agenda, "access to affordable, reliable, sustainable and modern energy" was declared one of the Sustainable Development Goals (SDGs) in 2015.[2] In Tanzania, where I did most of my fieldwork, the number of people who had access to the grid increased considerably in recent years: After a standstill between the late 1990s and early 2000s, when electrification of the country stagnated at a mere 10-14 per cent, the access rate has risen to 38 per cent in 2016 according to the International Energy Agency's Energy Access Database.[3] The most striking changes in rural life, however, are taking place off the centralized grids and off the state infrastructure policy. By 2015 private companies in East Africa have sold more than 700,000 solar home systems which allow for the use of small electronic devices such as LED lamps, mobile phones, fans or small TVs.[4]

These recent changes catalyse a trend that has started around the turn of the millennium among rural populations in Africa towards gaining mass access to telecommunication and electric lighting – services that for a century had been the privilege of urban elites in most sub-Saharan countries. Not only has the price drop of mobile phones and LED-lamps turned rural dwellers into electricity consumers, but the increasing dissemination of solar technology through bottom-of-the-pyramid entrepreneurs also creates hundreds of thousands of small-scale power producers. By leapfrogging the construction of grid-based infrastructures, these processes may lead into patterns of "modern" energy use that have been unprecedented in the

---

[1] For the sake of brevity, I use the term "East Africa" in this dissertation for the three former British colonies of Kenya, Uganda and Tanganyika, the mainland part of what today constitutes the United Republic of Tanzania. Common definitions of East Africa along geographical or geopolitical criteria comprise up to twenty territories in the easterly region of the African continent.

[2] "Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all," United Nations, accessed December 30, 2016, http://www.un.org/sustainabledevelopment/energy.

[3] International Energy Agency, *World Energy Outlook, Energy Access database.* Available online. Accessed March 20, 2017, http://www.worldenergyoutlook.org/resources/energydevelopment/energyaccessdatabase/; The official figure by Tanzania's Rural Energy Agency of 58 percent by June 2016 appears to be grossly exaggerated. I found this figure in: Katare Mbashiru, "Tanzania: Mainland Power Supply Status Sought," *AllAfrica Global Media,* October 13, 2016, accessed December 30, 2016, http://allafrica.com/stories/201610140180.html.

[4] Itamar Orlandi, Nico Tyabji and Jenny Chase, *Off-Grid Solar Market Trends Report*. (Bloomberg New Energy Finance), accessed December 30, 2016, https://data.bloomberglp.com/bnef/sites/4/2016/03/20160303_BNEF_WorldBankIFC_Off-GridSolarReport_.pdf.

Global North and arguably help to overcome recurrent crises of electricity infrastructures.[5] Will Africa, the supposedly rural continent, become a playing ground for innovation in infrastructure provision, leading the way for other world regions in their attempt to decentralize and democratise their energy systems?

Seven years ago, this was one of the questions that inspired me to join the emerging community of professionals and scholars working on access to sustainable and clean energy in the Global South; first as consultant, later also as an academic. Inspired by a few recent anthropological studies on electricity in the Global South, my master's thesis was an attempt to trace the history of the electrification in a district in Tanzania and its impact on local lifestyles and the rural economy and society.[6] In my fieldwork in Tanzania, during which I conducted many biographical interviews, I first encountered the challenges of doing historical research in Africa. At the same time, it was a fascinating exposure to the novel material environments these electrification trajectories lead into, which are characterised by the coexistence of solar systems and three stone fires, weather apps and spiritual beliefs, e-commerce and subsistence farming. It became apparent to me that regarding electricity, the modernity-in-the-making in Africa deserves an investigation of its own, especially as it might imply a (partial) departure from the centralised, state-owned or closely state-regulated electricity infrastructures that the electrification of Europe or the US has produced.

I conducted this dissertation project as part of the postgraduate programme Microenergy Systems (MES) at Technische Universität Berlin, an interdisciplinary research group devoted to analysing the planning, the potential assessment, the design of products and services, the implementation, the use and the impacts of *microenergy systems* – defined as small scale, decentralised energy systems at household or community level, in which production and consumption of energy are spatially interlinked.[7] As a result, my academic work of the last four years has been a balancing act between two communities: On the one hand, a community

---

[5] In absence of any better term, I use the metaphor of "Global South" to refer broadly to the regions of Latin America, Asia, Africa, and Oceania. The term has replaced other concepts such as "developing countries": "The use of the phrase "Global South" marks a shift from a focus on development or cultural difference toward an emphasis on geopolitical power relations." Nour Dados and Raewyn Connell, "The Global South," *Contexts* 11 (2012): 12, accessed March 23, 2017, doi:10.1177/1536504212436479.

[6] Harold Wilhite, "Why Energy Needs Anthropology," Anthropology Today 21 (2005): 1–2; Tanja Winther, *The Impact of Electricity: Development, Desires and Dilemmas* (Berghahn Books, Oxford, New York 2008); Jonas van der Straeten, "Eine 'afrikanische' Geschichte von Elektrizität und elektrischen Geräten? Das Beispiel des Distrikts Kondoa in Tansania" (MA thesis, Technische Universität Berlin, 2013). For a more recent review of relevant anthropological literature, see Tanja Winther and Harold Wilhite, "Tentacles of Modernity: Why Electricity Needs Anthropology," Cultural Anthropology 30 (2015).

[7] Jonas van der Straeten et al., "Taking a Micro-Perspective on the Global Challenge of Climate Change: The 'Microenergy Systems' Research Focus at the Technische Universität Berlin," in *International Perspectives on Climate Change*, ed. Walter Leal Filho et al. (Berlin, Springer International Publishing, 2014).

of mostly engineers and economists devoted to addressing energy poverty through practice-oriented research and technology development; on the other hand, a small but growing community of historians looking into the emergence and evolution of infrastructures in the former colonies.[8] Both communities have only few connecting points. At the international conferences on energy access, history may serve as ornamentation of keynote speeches but rarely, if ever, as an analytical perspective.

When discussing how to achieve SDG 7, universal access to clean and affordable energy by 2030, surprisingly few scholars have raised the reverse question, namely, why today, about 120 years after electricity first became commercially available, 1.2 billion people worldwide remain without access to the grid.[9] The questions of appropriate policies and technological pathways to universal access, as I argue here, cannot be answered without investigating the historical root causes for the core problems of many power sectors in countries of the Global South.

During my fieldwork in Tanzania, I have again and again seen the symptoms of what Stephen Karekezi described as the crisis of the centralised power model in Africa.[10] Recurring droughts painfully revealed the vulnerability of a centralised power system, which until recently relied on the giant hydro-electric dams in the Rufiji Basin for more than half of its power. Not only did TANESCO, the state electricity utility, have to ration electricity and cut millions temporarily from the grid during those times, for example in 2011 and in 2015.[11] But whenever water levels are low at Mtera, TANESCO also enters into a "financial limbo", as the Tanzanian Minister of Energy and Minerals put it at a conference I attended in 2014: While selling electricity at around 12 US cents per kWh, TANESCO had to buy it at rates between 34 US cents and 50 US cents from private operators of "emergency power plants", with whom it had power purchasing agreements.[12] These losses deprived the state utility of

[8] For an overview of the current debate, see Jonas van der Straeten and Ute Hasenöhrl, "Connecting the Empire – New Research Perspectives on Technological Infrastructures and the Environment in the Colonial World," NTM Journal for the History of Science, Technology and Medicine 24 (2016).
[9] International Energy Agency, *Energy Access database.* The figure is widely estimated to remain constant as growing access rates are compensated by population growth.
[10] Stephen Karekezi and John Kimani, "Status of Power Sector Reform in Africa: Impact on the Poor, " *Energy Policy* 30 (2002).
[11] "Tanzania Turns off Hydropower as Drought Bites," *The Telegraph*, October 9, 2015, accessed December 30, 2016, http://www.telegraph.co.uk/news/worldnews/africaandindianocean/tanzania/11923748/Tanzania-turns-off-hydropower-as-drought-bites.html; "East Africa Drought: Power Cuts in Tanzania," *BBC News*, July 18, 2011, accessed December 30, 2016, http://www.bbc.com/news/world-africa-14192896.
[12] Quoted from a keynote at the Powering Africa: Tanzania conference in January 2014 in Dar es Salaam, own notes.

the capital it would have urgently needed for maintaining the power system, let alone for rural electrification.[13]

The deals around "emergency" power supply by independent power producers, which were made in the 1990s in an opaque and hasty way, opened the door for vested interests, state-capture and corruption – and they have been shaking the political landscape of Tanzania to date. Electricity supply has become highly political: In 2006, Tanzania's prime minister resigned over charges of improperly awarding a contract to a US electricity company.[14] In 2014, cafés and bars in Dar es Salaam were crowded with people watching the parliamentary debates over a huge corruption scandal in connection with a legal dispute between the government and an independent power producer.[15] In a survey among Tanzanian companies in 2006, electricity problems were named as the major constraint to growth – far ahead of any other factors including taxes or access to finance.[16]

At the same time, I saw that many government officials – despite all issues with large-scale hydropower – were putting their hope in the next silver bullet to solve the country's energy crisis. A series of consecutive discoveries of natural gas beginning in 2011 suddenly put Tanzania on the world energy map. Yet, it remains far from sure that the gas bonanza will be a blessing for Tanzania. It carries the danger of creating new path dependencies and locking the country's energy sector onto a "carbonisation pathway".[17] Why invest into solar power, the minister of energy and minerals asked at a conference in 2014, if we will have cheap electricity from gas?[18] Meanwhile, conflicts over the new wealth are already looming: The construction of a natural gas pipeline to connect offshore reserves in the country's South near Mtwara to its commercial capital Dar es Salaam was overshadowed by violent upheaval in late 2012/early 2013, when protesters demanding to see local benefits from the gas

---

[13] Rebecca Hansing Ghanadan, "Public Service or Commodity Goods? Electricity Reforms, Access, and the Politics of Development in Tanzania," (PhD diss., University of California, 2008): 227.

[14] "Tanzanian PM to Resign over Graft," *BBC News*, February 7, 2008, accessed December 30, 2016, http://news.bbc.co.uk/2/hi/africa/7232141.stm.

[15] "Tegeta escrow will go down in history as a major scandal," *The Citizen*, January 1, 2015, accessed March 20, 2017, http://www.thecitizen.co.tz/News/national/-Tegeta-escrow-will-go-down-in-history-as-a-major-scandal-/-/1840392/2575094/-/nou8fsz/-/index.html.

[16] Arthur Mwakapugi et. al., "The Tanzanian Energy Sector: The Potential for Job Creation and Productivity Gains Through Expanded Electrification," special paper, Research on Poverty Alleviation 10/3, Dar es salaam, 2010, 23.

[17] This contrasts with the "Deep Decarbonization Pathways" that have been formulated as a way to reduce greenhouse gas emissions on the national scale. See Chris Bataille et. al., "The Deep Decarbonization Pathways Project (DDPP): Insights and Emerging Issues." *Climate Policy* 16 (2016), accessed March 20, 2017, doi:10.1080/14693062.2016.1179620.

[18] Answer to a question at the Powering Africa: Tanzania conference in January 2014 in Dar es Salaam, own notes.

exploitation clashed with security forces.[19] Tanzania's next stride in the footsteps of the industrialised world might not be less controversial: In October 2016, the government signed an agreement with the Russian nuclear energy agency Rosatom on the construction of a nuclear reactor which is to be fuelled with uranium from the South of the country.[20]

The case of Tanzania vividly illustrates the ambiguities of electricity in sub-Saharan Africa – the disparities between the everyday life of service provision and the political visions of electricity and between the "politics of the kilowatts" on the local level and the national "politics of the megawatts".[21] It seems impossible to make sense of these ambiguities without understanding the historical legacies that have produced them: the very material legacy of large-hydropower dams, built with international money, know-how and an unyielding faith in the power of mega-engineering but unsuited for local environmental and social conditions; high-tension transmission lines which connect these dams with the industrial centres over the heads of non-electrified villages; urban grid layouts which still privilege those quarters where the former colonial rulers lived. Four decades of under-investment into infrastructure in Tanzania under British colonial rule have left their traces as much as half a century of conditional finance and technical assistance from the international donor community. Finally, what might determine the future of the country's electricity infrastructure even more is the legacy on a discursive level: The shared terms and concepts as well as the measures and planning principles associated with electricity supply, which delineate the scope for decision-making and political action in energy policy today.[22]

In his critique of the concept of "development", James Ferguson described the development discourse as an "anti-politics machine", which makes blatantly political decisions about the allocation of resources appear to be "technical solutions".[23] In a similar manner, Tenenbaum et. al. recently wrote in their widely-acknowledged report on decentralised electrification in Africa that "in most studies of rural electrification, regulatory policies are often described in neutral, analytical terms that obscure or ignore the underlying controversies. [...] If progress is

---

[19] "Chaos hits Mtwara after gas project confirmation," *The Citizen*, May 22, 2013, accessed March 20, 2017, http://www.thecitizen.co.tz/News/national/-/1840392/1860180/-/11wdmm0z/-/index.html.

[20] "Tanzania: Russian Firm to Build Nuclear Reactor in Tanzania," *AllAfrica Global Media*, October 31, 2016, accessed December 30, 2016, http://allafrica.com/stories/201611010711.html.

[21] Ongoing dissertation project by Ivan Cuesta, accessed March 20, 2017, https://electricterritorialities.wordpress.com/author/ivancuestafernandez/.

[22] Emil Urhammer and Inge Røpke, "Macroeconomic Narratives in a World of Crises: An Analysis of Stories about Solving the System Crisis," *Ecological Economics* 96 (2013): 64.

[23] James Ferguson, *The Anti-Politics Machine: "Development," Depoliticization and Bureaucratic Power in Lesotho* (Cambridge et. al.: Cambridge University Press, 1990), 87.

going to be made, real-world controversies need to be highlighted rather than hidden."[24] A historiography of electricity in Africa can help to unpack some of these technical terms, understand the historical situatedness and contingency of their origin and therefore allow for a critical reflection of taken-for-granted categories and measures in electrification. As I argue for the case of Tanzania, much of the country's energy policy can be explained by the fact that Tanzania inherited a model of top-down planning, large-scale generation and centralised transmission which focuses on large energy consumers with direct impact on macro-economic indicators like GNP, blinding out alternative electrification pathways and the particular needs of electricity users.[25]

In his pioneering book "Networks of Power," Thomas Hughes wrote in 1983, that "The historian must take the broad perspective to get to the roof of the things […] and comprehend the complex, multifaceted relations of these systems and the changes that take place in them over time."[26] Hughes' metaphor of "getting to the roof of the things" might be the best way to describe the approach I have chosen for this thesis. From this perspective, it becomes immediately clear that since German engineers installed the first power generator in 1906, electrification in Tanzania has been subjected to technical and economic ideas and policy statements as well as studies and programs devised outside Africa, as the political scientist Rebecca Ghanadan noted earlier.[27] While for the industrial world, national histories of electrification predominate, the particular characteristics of electrification processes in former colonies call for an analysis beyond the scope of the nation state.[28] For the colonial period, I have therefore decided to cover the three British East African colonial territories of Kenya, Uganda and Tanzania, all of which were supplied by a single company based in Nairobi and its subsidiaries. I have tried to trace the flow of ideas, knowledge and money through multi-layered global networks associated with the electrification of East Africa. Naturally, the scope of this endeavour was determined by the limited availability of archival material, which allows to shed light on some of the connections and knots in this web – predominantly those

[24] Bernard Tenenbaum et al., *From the Bottom Up: How Small Power Producers and Mini-Grids Can Deliver Electrification and Renewable Energy in Africa* (Washington, DC: World Bank, 2014), 24.
[25] Compare Kate B Showers, "Electrifying Africa: An Environmental History with Policy Implications," *Geografiska Annaler: Series B, Human Geography* 93 (2011).
[26] Thomas P. Hughes, *Networks of Power. Electrification in Western Society 1880–1930* (Baltimore: Johns Hopkins University Press), 1-2.
[27] Ghanadan, "Public Service or Commodity Goods," 73.
[28] David L Morton Jr, "Reviewing the History of Electric Power and Electrification," *Endeavour* 26 (2002): 60. „The interest of American and European historians of electric power have tended to be confined to within their own nations borders, despite the international nature of the technology itself", ibid.

in the context of colonial rule and international development aid – but leaves other aspects in the dark; most notably the politics, distribution and use of electricity on the local micro-level.

Readers will find that the structure of this thesis is rather determined by my decision to zoom in at certain points and follow some of the ends of the networks that I considered particularly relevant or interesting and not by a single guiding theoretical question. I do not offer sweeping theories on the emergence and evolution of electricity infrastructures. Instead, I have aimed at providing detailed and well-founded accounts of how ideas about electrification circulated, how political decisions were made, how capital was mobilised and distributed and how grids were assembled within specific parameters of time, place and culture. My approach of following the actor-networks allows to relate the electrification process in East Africa with that in other parts of the world, including Malaysia, Palestine or India under British colonial rule, the British metropole itself or other European countries, for example Sweden.

My accounts provide some key insights into how financial and political interests as well as distinct ideas about electricity from abroad have not only enabled but also corrupted electrification in East Africa throughout its entire history. They furthermore allow to reconstruct a process of system building that was impaired by a lack of knowledge of the local social and natural environments among the key decision makers outside of Africa and the inability of the state to control major aspects of electrification, even after the nationalisation of the power sector. This combination of factors resulted in specific electrification patterns in different periods:

1. Before WWII, system builders exclusively targeted "enclaves" of European life and economic activity in the East African colonies, where they could apply those principles of electricity supply and generation that had been well established since the early phase of electrification in Europe or the US.[29] As in the British metropole, public electricity supply started out as a small-scale luxury industry. Electricity companies focussed on a small group of affluent urban customers of European or Indian origin and a few small industries and plantations. In contrast to the industrial countries, however, electricity supply was not significantly scaled-up in the 1920s and 1930s. The main cause for this stagnation, I argue, was a combination of two factors: the emerging global capitalist networks in the electric utility industry and the unwillingness, or inability, of the British colonial states in East Africa to control electrification. Stuck between the sweeping rhetoric of developing

[29] For the definition of an "enclave form" of electrification in the colonial world, see William J. Hausman et. al., eds., *Global Electrification: Multinational Enterprise and International Finance in the History of Light and Power,* 1878-2007 (New York: Cambridge University Press, 2008), 50.

imperial "estates" and the doctrine of financial self-sufficiency of the colonies, colonial governments adopted a laissez-fair approach towards electrification. They granted concessions to local companies affiliated with multinational enterprises which subordinated electrification to shareholder interests in London. The latter enforced corporate policies that were narrowly focussed on high profit rates and piecemeal, low-risk investment. Arguably, more than colonial identity politics, this corporate policy almost entirely excluded "Africans" from access to electricity during that period. This period was characterised by a complete absence of attempts to develop service provision models for rural and "African" customers.

2. It was only in the early 1940s that colonial governments fully adopted the image of electricity as a modernising force and precondition for economic growth in Africa, which it has maintained in the development discourse until today. In its "Colonial Development and Welfare Act," Britain had committed to spending metropolitan resources on economic development and improvement of living conditions in its colonies. My account of the electrification of East Africa during the two post-WWII decades, however, illustrates the inherent tensions, contradictions and contingencies of British development policy during the late colonial period. While the "domestication" – the nationalisation of the electricity industry and its alignment under national development goals – was in full swing in Europe, British colonial administrations struggled to fulfil the commitments regarding electricity as laid down in the reformed colonial development doctrine.[30] In Tanganyika and Kenya, they still lacked the authority, resources and sometimes the willingness to enforce plans for a systematic and coordinated expansion of electricity provision against the shareholder interests from Britain. First attempts to create regulatory bodies and introduce public participation remained in their infancy and without effect on the service provision. State interventions were largely motivated by metropolitan interests. In Uganda, the demands of post-war reconstruction in Britain, rather than local service provision, led the government to nationalise electricity supply and embark on East Africa's first large-scale hydropower project shortly after WWII. The top-down, building-ahead-of-demand strategy failed to fulfil the project planners' ambitious goals of boosting the colony's industry. Ironically, the first electrification schemes for "Africans" were motivated by the need to compensate for the lack of industrial demand. Yet, although colonial administrators had started to discuss electricity as a basic service for "Africans,"

[30] For a summary of the „domestication" of electricity utility industries around the world, see Hausman et. al., *Global Electrification,* 233-61.

the number of users among the mostly African population remained insignificant until the end of colonial rule.

3. The political independence of the East African colonies in the early 1960s entailed the redefinition of electricity as a public good provided to the citizens as a basic utility service by the state. By the example of Tanzania, I examine the opportunities and challenges that post-independence African states faced when engaging as system builders: decolonisation had catalysed the retreat of private capital from infrastructure investments and the rise of international development finance and technical cooperation in Africa. Ironically, British development finance for the Tanzanian power sector peaked shortly after independence but, then, fell victim to a diplomatic crisis between the countries. In its attempt to break free from British influence and align electricity provision with its own "African socialist" development agenda, the government created new dependencies on foreign capital and expertise. I illustrate these dependencies with the construction of large hydropower dams, which became to account for most of the country's generation capacity. Their financing depended on the preference of the World Bank. During the 1960s, there was a change in preference from multipurpose dams allowing for irrigation and flood control – the preferred option of the Tanzanian government – to single-purpose projects for the production of electricity as the only measurable output in economic terms. For planning and implementation, the World Bank relied on international development agencies, whose technical decisions, in turn, were biased by the want to open up export markets to their hydropower industry. Hence, some of the major electricity projects at the time can be considered as materialisations of international interests and skewed ideas of electricity rather than of national development goals.

   The negotiations on electrification were characterised by the ontological dominance of a development discourse focussed on macro-economic indicators like GDP and, thus, favouring large industrial customers over domestic service provision. International consultants conducted most of the project planning and design, with little knowledge of the local social and environmental conditions. Under state-led development, Tanzania's electricity utility adopted what had become a widely accepted paradigm of electrification and was based on top-down planning and abstract modelling of electricity systems, as illustrated by contemporary load forecasts, power sector studies and development plans. While this approach allowed for a considerable extension of the access in the cities and to a few smaller towns, it failed to develop effective models for the electrification of villages. Thus, rural farmers, who were originally intended to be the main beneficiaries of

the "African socialist" development model, were entirely left out in the country's electrification process and largely remain so until today. For better or worse, neither environmental and social impacts nor governance issues such as transparency, accountability and participation were given central importance in state-led electrification in the 1970s and 1980s. The material, discursive and institutional legacies from this period left the Tanzanian power sector in a highly vulnerable state when the structural adjustment programmes reached the energy sector in the 1990s and sparked extensive but ill-conceived market reforms.

This periodisation follows the shifting meanings of the concept development, which reverberated in electrification: The pre-WWII doctrine of colonial financial self-sufficiency implied a laisser-faire policy on electricity; the Colonial Development and Welfare agenda of the late colonial period led to the first far-reaching, yet often unsuccessful, state interventions in electrification; and the government of Tanzania after independence adopted a "post-colonial model" of state-led and largely donor-financed development, which laid the foundation for the nationalisation of the sector, the construction of large-scale hydropower dams and the establishment of a centralised national grid. I carve out the discontinuities and continuities between each period and the previous one, particularly the material and institutional legacies that often presented a main barrier for subsequent electrification processes. These include the relative weak and underfunded colonial states during the British post-WWII development campaign or the material and discursive legacies left by the period of state-led development for the market reforms in the 1990s. In this thesis, I will discuss the implications of these findings for various debates within the historiography of technology in the non-Western world, colonial history or the history of development; and I will outline pathways for further research.

Electrification histories of the Global South are timely not only for the academic world. In the context of a second wave of international finance and market liberalisation in the electric utility industry since the 1990s, Ghanadan argues, "history is important, because grounded understandings are needed to reveal the actual terms and relations underlying African energy reforms."[31] At present, many countries in Asia and Africa stand at a crossroads regarding the future of their energy infrastructures. Considering the "return of 'high modernism'," which some scholars have identified for electricity in Africa, more detailed and balanced historical

[31] Ghanadan, "Public Service or Commodity Goods," 36. For the notion of a second wave of global finance in the electric utility industry after 1990, see Hausman et. al., *Global Electrification,* 272-75.

narratives can present lessons learned and fresh arguments in the ideology-laden political debates on electricity.[32]

[32] Barnaby Dye, "The Return of 'high Modernism'? Exploring the Changing Development Paradigm through a Rwandan Case Study of Dam Construction," *Journal of Eastern African Studies* 10 (2016): 303–24.

Introduction

1) Stories

Among the many small and big stories about the jumbled up timelines of progress in Africa, the case of electrification is one of the most striking. On the one hand, the continent is the site of some of the most ambitious mega-engineering projects for power generation worldwide: DESERTEC, a project for large-scale power generation Sahara desert by means of concentrated solar plants and its transmission to the consumption centres in Middle East and North Africa and – most of all Europe – has provoked the comparison with the megalomaniac Atlantropa project.[33] In sub-Saharan Africa, the Southern African Development Community is pushing the construction of what is to become the world's largest hydropower project: With a projected output of 40,000 MW, the Grand Inga hydropower project in the Democratic Republic of Congo would produce twice the amount of electricity of the Three Gorges dam in China.[34] The project would be a new superlative within a number of large dams all over the continent.

Yet, usually within eyeshot of these emblems of modernity, the material worlds of household energy use are largely characterized by an ensemble of seemingly "traditional" technologies: charcoal stoves, kerosene lamps and candles. Ironically, they are increasingly complemented by technologies which allow for enjoying some of the amenities of electricity *without* being connected to the grid: battery powered power radios, torches and mobile phones or small solar systems.[35] In 2011, more than 120 years after electricity first arrived on the continent, only 14 percent of rural households in Sub-Saharan Africa (excluding South Africa) were connected to the electric grid. 78 percent relied on solid fuels like firewood for cooking. On a global scale, indoor air pollution cause causes more premature deaths than Malaria and Tuberculosis. Even in comparison with other regions of the "Global South" like South Asia, these figures for Africa are particularly alarming.[36]

---

[33] Alexander Gall, "Mediterrane Stromvisionen. Von Atlantropa zu DESERTEC?" in *Technology fiction: technische Visionen und Utopien in der Hochmoderne*, ed. Uwe Fraunholz and Anke Woschech (transcript: Bielefeld 2012).

[34] Daniel Wesangula, "From Cape Town to Kinshasa: could the Great Inga dam power half of Africa?" The Guardian, September 19, 2014, accessed December 30, 2016, http://www.theguardian.com/global-development-professionals-network/2014/sep/19/south-africa-drc-grand-inga-dam.

[35] See van der Straeten, "Eine "afrikanische" Geschichte von Elektrizität."

[36] International Energy Agency, "Energy for All. Financing Access for the Poor. Special early excerpt of the World Energy Outlook 2011," Paris 2012, accessed December 30, 2016, http://www.worldenergyoutlook.org/resources/energydevelopment/accesstoelectricity/

Obviously, the historical processes of electrification in Africa have led into a splintered and highly ambiguous state of electricity provision, which can no longer be explained as an intermediate phase on a universal pathway towards ubiquitous access to grid electricity. For a historiography of technology which has described electrification processes in terms of evolutionary models of system growth, tidy timelines of invention and dissemination, fundamental economic principles of electricity provision and cultural acceptance of electricity and its penetration of all spheres of life, Africa remains a puzzle.

Its key role for the project of Western modernity has guaranteed electricity a prominent place in the history of technology and science. Nearly all major works on the emergence and evolution of electricity grids, however, focus on Europe and the United States, where electricity was first generated and utilised and gradually became ubiquitous form of energy. In difference, for historians dedicated to electricity, most of the non-western world has remained terra incognita, especially the African continent. In 2003 Catherine Coquery-Vidrovitch lamented that „Electricity in Africa has been very little studied. Bibliographical material is nearly non-existent. Works that treat the history of urban electricity are rare."[37] In fact, much of what is known about the electrification of Africa has been written by scholars from neighbouring disciplines, or can be found only in corporate histories of power utilities.

In their book *Hubris and Hybrids*, Mikael Hard and Andrew Jamison differentiate between two ways of telling stories about technology and science, both of which can be found in accounts of the electrification in Africa:[38] the first is a kind of romance, a heroic tale of the supposedly inevitable and triumphant march of electrical power throughout modern African history, most vividly illustrated by some corporate histories of national utilities written in the decades after independence. In a book on the history of electricity development in Nigeria, the engineer Marcel N.A. Manafa in wrote in 1979:

> However, on the attainment of Independence (sic!), Nigeria suddenly awakened to the realisation of its backwardness and like a sleeping giant, strode forward into the era of light. All hands were on deck to salvage mass relegation to the darkness of the electrical world. The doors of the electrical world were flung open to an industrial

[37] Catherine Coquery-Vidrovitch, "Electricity Networks in Africa: A Comparative Study, or How to Write Social History from Economic Sources," in *Sources and Methods in African History*, ed. Toyin Falola and Christian Jennings (Rochester, NY: University Rochester Press, 2003), 346.
[38] Mikael Hard and Andrew Jamison, *Hubris and Hybrids* (New York: Routledge, 2005).

> boom and soon, Lagos had to start the campaign of beating the waters back to the ocean in order to reclaim land for industry.[39]

This quote signifies a narrative in which electrification appears as a result of a combination of its imminent technological superiority, the individual efforts of prominent engineers and managers and the collective struggle for modernisation and progress of colonized and post-independence societies.[40]Although this narrative has been either superseded or simply rejected by more recent studies in its different assumptions – e.g. the inherent technological superiority of large-scale generation and centralized networks in terms of efficiency, rationality, and cost-effectiveness[41] or the inevitable acceptance of electricity by domestic users[42] - it has survived to date not only in the brochures of large utility companies but in also in academic scholarship, as a recent paper by Suvobrata Sarkar on the electrification of colonial Calcutta shows.[43]

Most of the academic literature on electricity in Africa, however, falls in the second category of stories, the tragedy. These studies consider the history of electrification through the prism of today's insufficiencies, injustices of energy provision in Africa: as a result, historical accounts are framed in a way, that the underlying narrative leads to the key issue under investigation. The culprits of these stories vary: colonial rulers, exploiting the resources of their overseas possessions and segregating infrastructure provision[44]; authoritarian post-independence governments, who enforce their brutal modernizing agendas regardless of environmental and social consequences or market disruptions[45]; international funding and development agencies, who finance and implement development projects largely detached from local conditions and requirements[46] or international corporations, such as the South-

---

[39] Marcel N. Azodo Manafa, *Electricity Development in Nigeria (1896-1972)* (Yaba: Raheem Publishers, 1979).
[40] Charles Hayes, *Stima: An Informal History of EAP&L* (Nairobi: East African Power and Lighting Co., 1983).
[41] Bernhard Stier, *Staat und Strom: die politische Steuerung des Elektrizitätssystems in Deutschland 1890 – 1950*, (Ubstadt-Weiher: Verlag Regionalkultur, 1999); Norbert Gilson, *Konzepte von Elektrizitätsversorgung und Elektrizitätswirtschaft: Zur Entstehung eines neuen Fachgebietes der Technikwissenschaften zwischen 1880 und 1945* (Stuttgart: Verlag für Geschichte der Naturwissenschaften und der Technik, 1994).
[42] David E. Nye, *Consuming Power: A Social History of American Energies* (Cambridge, Mass.: MIT Press, 1998); Beate Binder, *Elektrifizierung Als Vision. Zur Symbolgeschichte Einer Technik Im Alltag.* (Tübingen: Tübinger Vereinigung für Volkskunde, 1999).
[43] Suvobrata Sarkar. "Domesticating Electric Power: Growth of Industry, Utilities and Research in Colonial Calcutta," *The Indian Economic & Social History Review* 52 (2015); see also an unpublished review of the article by Animesh Chatterjee, available online, accessed March 20, 2017, https://idolsofthetheatre.wordpress.com/.
[44] Moses Chikowero, "Subalternating Currents: Electrification and Power Politics in Bulawayo, Colonial Zimbabwe, 1894–1939," *Journal of Southern African Studies* 33 (2007).
[45] E.g. Hussein M. Fahim, *Dams, People and Development: The Aswan High Dam Case* (Amsterdam: Pergamon, 1981).
[46] Heather J. Hoag, "Transplanting the TVA? International Contributions to Postwar River Development in Tanzania," *Comparative Technology Transfer and Society* 4 (2006).

African minerals-energy complex, who aim at "recolonizing Africa on the power grid".[47] More comprehensive analyses of how electricity networks have evolved and developed over time in sub Saharan Africa remain to be written – with the exception of Kate Showers' overview article of the environmental history of electrification in Africa and some works on South Africa.[48]

In 2005, Hard and Jamison called for "new stories" reflecting the ambivalent character of technology and science in history.[49] For the historiography of electricity, a broad and long-term investigation of a region of Sub-Saharan Africa might, in fact, tell new stories of the origins and evolution of electrical infrastructures. Clearly, electrification in Africa does not conform to the narrative how electricity was negotiated and culturally appropriated in all strata of society and gradually penetrated all spheres of life. In most parts of the continent, electricity has not done so until today. Hence, to make sense of the uneven and incomplete electrification processes in the Global South, it is imperative to critically reflect the concepts and models which have been derived from the historical experience the industrialized world.

2) Approaches

Evolution

Electrification in Africa, for example, does not fit in neatly into Thomas Hughes' widely accepted "overall model of system evolution", according to which electricity systems go through the four phases of "invention and development", "technology transfer", "system growth", and "substantial momentum".[50] When electricity first became commercially available in most parts of the African continent, it had already been past the first two phases in Europe or the US. In the "growth phase", then, the dynamics of the system evolution in most of Africa differed fundamentally from those Hughes had delineated for the industrial centres in Europe and US: Hughes' key argument was that the growth of electricity systems cannot be explained *solely* in terms of efficiency, rationality or cost-effectiveness and that the growth path of the systems under investigation was never linear. To explain this unevenness, he introduced the metaphor of reverse salient: critical problems which prevented or slowed

[47] David A. McDonald, "Electric Capitalism: Conceptualising electricity and capital accumulation in (South) Africa," in *Electric Capitalism: Recolonising Africa on the Power Grid,* ed. David A. McDonald (New York: Routledge, 2008).
[48] Showers, "Electrifying Africa." The terms "Africa" and "African", of course, need critical reflection. While Africa as a geographic entity can be assigned distinct boundaries, the notion of Africa of a cultural space has been critically discussed. For an overview of the debate see Leonhard Harding, Geschichte *Afrikas im 19. und 20. Jahrhundert* (München: Oldenbourg 2006).
[49]Hard and Jamison, *Hubris and Hybrids.*
[50] Hughes, *Networks of Power,* 14-15.

down expansion of a technological system that was otherwise determined to grow under the given techno-economic conditions.

This latter assumption makes it so difficult to apply Hughes' interpretative framework to Africa: For his theory of system growth, Hughes presupposed a social and material environment that would be able to absorb the generated electricity. For the colonies and the periphery of the industrial world, where other basic infrastructures, industrial and domestic customers were largely absent, Ronen Shamir convincingly argued in his history of the electrification of British-Palestine that "electricity had to discover viable directions of flow and create from the scratch its sources of demand."[51] It is for the same reason that many systems in colonial cities did not acquire substantial momentum, the fourth phase in Hughes model, which is understood as a process that kicks in when systems have accumulated a certain mass and start to grow with velocity and in a particular direction. In the colonies, however, the accumulation of "machines, devices, structures, other physical artefacts", which constitute the mass of the system, was a slow and unpredictable process.[52] The same was true for the involvement of organizations and persons with professional skills in electrification. Hence, for a long time these systems didn't reach a perceptible and accelerating rate of growth or velocity.

The systems in many colonies also differed from those in Europe and the US regarding the factors that determined the direction of their growth. Generally, Hughes differentiated between young and old systems. Whereas the development of young systems tended to follow predefined goals, the momentum in old systems provided an inertia of directed motion.[53] Hughes acknowledged, however, that contingencies can push the system in new directions. In his model, these contingencies take the form of "external forces", for example the impact of World War I on electric power systems in Europe.[54] For systems in most colonial and post-independence African countries, as I argue here, the distinction between the electricity system with its internal dynamics and the external factors outside the system boundaries, or the "context", is of little use. To understand the pace of scope of electrification in East Africa, the multitude of "external" factors need to be moved into the centre of the analysis.

---

[51] Ronen Shamir, *Current Flow: The Electrification of Palestine* (Stanford, California: Stanford University Press, 2013), 4.
[52] Hughes, *Networks of Power*, 15.
[53] Hughes, *Networks of Power*, *ibid.*
[54] Hughes, *Networks of Power*, 16.

The electrification of Tanganyika under British colonial rule in the interwar period illustrates this well: The public utilities' management consisted of British and other European expatriates; key decisions were taken in Nairobi by the board of its parent company, which in turn was controlled by a group of shareholders in London. The plant and machinery had been taken over from the former German colonial rulers or was imported from Britain. Consulting engineers, with professional careers that had led them all over the British Empire provided the know-how which informed key investment decisions. At the same time, the Colonial Office in London increasingly attempted to control the electrification process and aligned it with its own strategic goals. Fragmented markets for electricity in East Africa and the cross-border flows of rivers and of goods as well as people along transportation networks necessitated diplomacy, coordination of service provision and electricity trade at a very early stage of the system growth. This "outside" influence did neither substantially change after independence, when development banks, organisations and consultants from all over the world replaced those of the former British colonial rulers, nor in the 1990, when a new wave of foreign private companies, for example from Malaysia, entered the East African power sector.

In her article on the environmental history of electrification in Africa, Kate Showers therefore called for a "global history of electrical power in which Europe, North America and Africa have been intertwined".[55] To date, such a perspective is rare in the history of electricity. During the period of the world wide "domestication" of electricity provision from the 1940s onwards, the role of national governments strengthened and the influence of international private capital declined.[56] It might be for this reason that most historical studies are either national electrification histories or (often comparative) studies of regions or cities. Only recently, the resurgence of international finance in electricity has encouraged research into the global interconnections and interdependencies in historical electrification processes. In a comprehensive volume from 2008 titled "Global Electrification", William J Hausman et. al. present a wealth of empirical material delineating the interplay of multi-national enterprise and international finance in the globalisation of electrical light and power.[57]

Yet, former colonies in Africa and Asia do not feature prominently in the volume and sub-Saharan Africa is only mentioned in passing. Apart from general data on international investments, corporate ownership and governance, little is known about the nature of the

[55] Showers, "Electrifying Africa," 193.
[56] William J. Hausman, foreword to *Global Electrification: Multinational Enterprise and International Finance in the History of Light and Power,* 1878-2007, eds. William J. Hausman et. al., (New York: Cambridge University Press, 2008), xviii. See also chapter 6 of the volume.
[57] Hausman et. al., *Global Electrification.*

global connections associated with electricity provision. For the project of a truly global history analysing "the circulation and exchange of things, people, ideas and institutions", as Sebastian Conrad put it, historiography of electricity yet has relatively little to offer.[58] Fortunately, a number of recent case studies on the electrification of former colonies, for example Chikowero's study on colonial Zimbabwe, Shamir's work on British mandated Palestine and Kale's research on India, allows for first comparisons and for the identification of cross-Empire links which connect the different electrification histories.[59] This thesis, in short, is a first step towards a global history perspective of the electrification of East Africa.

Methodological approach

The methodological challenge of this endeavour is, first, to reconsider the boundaries between the system and its "context" and, second, to adopt a perspective that makes the analysis on the local and the global level commensurable with each other. Taking up Latour's imagery of a "flattened topography", Ronen Shamir proposes to regard electrification as an outcome of a network of connections of different types.[60] These can be labelled, for example, "ideological", "imperial", "diplomatic", "personal", "administrative" as well as "financial" or "technical".[61] This categorisation, of course, is heuristic. What is of interest here are not only the connections themselves but the way they are interdependent and how they induce and influence each other over time. In this study, I have tried to trace these connections through an actor network that might span from a hydropower project in Malaya to the Tanganyikan colonial administration and reaches down to the financial and legal relationships between local utilities and their customers in the colony. I argue that this approach can often better explain the pace and scope of the growth of electricity systems in sub-Saharan Africa than an evolutionary model. This is not to say that internal system dynamics are irrelevant, but the systems' components appear as connections and nodes in a larger network of relationships. The perspective furthermore allows for unpacking the abstract notion of a *context*. Instead of focussing on anonymous external macro "forces" that impact on the system, it zeroes in on the particular actions and movements that connect the sites of the big and the small. "If

---

[58] Sebastian Conrad, *What Is Global History?* (Princeton: Princeton University Press, 2016), 5.

[59] Chikowero, "Subalternating Currents;" Ronen Shamir, "Electricity and Empire in 1920s Palestine under British Rule," NTM Zeitschrift für Geschichte der Wissenschaften, Technik und Medizin 24 (2016); Shamir, *Current Flow*; Sunila S. Kale, *Electrifying India: Regional Political Economies of Development* (Stanford, California: Stanford University Press, 2014); Sunila S. Kale, "Structures of Power: Electrification in Colonial India," Comparative Studies of South Asia, Africa and the Middle East 34 (2015).

[60] Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory*, (Oxford: Oxford University Press, 2005), 154; Shamir, *Current Flow*, 7.

[61] Shamir, *Current Flow.*

context matters," Shamir argues, "let it make itself present in and through these movements".[62]

I write this account as an historian of technology. My key interest is to explore new and well-founded narratives of electrification in Africa and not to postulate any general theory about the formation and evolution of electric power systems. This approach pays tribute to the notion that the Actor-Network-Theory, which inspires this approach, is not an actual theory in a fundamental sense but a descriptive "toolbox, perhaps best captured as 'sensibility'."[63] In fact, this "sensibility" changes the way the stories are told – for example regarding the question of periodisation. In my account, phases of relative stability of relationships alternate with transition periods, during which a key set of connections was destabilised or reconfigured. These shifts often did not correspond with those in the political history of the country. A focus on specific types of relationships often reveals surprising continuities, like the personal networks of British consultants and managers before and after the independence of Tanzania.

Secondly, this sensibility implies openness for all different kinds of connections, not privileging *a priori* some types of connections and directions of action over others. My case study on Owen Falls for example shows that electrification, the assembly of a material grid, cannot be regarded only as an outcome of existing political or economic factors; rather it itself had far-reaching repercussions as it induced and reconfigured a set of material and non-material – administrative, economic, cultural – connections. "Do Artifacts Have Politics?", Langdon Winner asked in his classic essay in 1980. In the essay, he refers to artefacts that correlate with particular kinds of political relationships and can therefore be regarded as inherently political artefacts.[64] The way the inherently techno-economic rationale of the Owen Falls grids shaped the course of events suggests going one step further even. Along with Shamir's work on Palestine, I argue that the grid had a social life of its own, it "made politics".[65]

Flows of ideas

Yet, I have structured my accounts along a particular order of different types of connections. The first set of relationships I will examine are those which are induced on a discursive level.

---

[62] Shamir, *Current Flow*, 7.
[63] Shamir, *Current Flow*, 10; John Law, Actor-Network Theory and Material Semiotics," in *The New Blackwell Companion to Social Theory*, ed. Bryan Turner (Oxford: Wiley-Blackwell, 2008), 142.
[64] Langdon Winner, "Do Artifacts Have Politics? " *Daedalus* 109 (1980).
[65] Shamir, *Current Flow.*

They might be termed “ideological” or “cultural” and they are decisive for the circulation and acceptance of ideas about electrification. Inspired by a more general “cultural turn” in historiography, research on the history of electricity has directed its attention towards these non-technical and non-economic aspects of electricity 20 years ago. Going beyond the widely accepted role of social networks in the creation of technical infrastructures, recent works have looked at electrification at the level of symbols and language.[66] The title of a much debated study on the electrification of Switzerland by David Gugerli from 1996 is telling: “Redeströme” alludes to the German term for electricity, “Strom”, and might be roughly translated as “flows of speech”. In his book, he analyses electro-technical and economic discourses and examines their role for streamlining perceptions of electrification, thus making them the determining factor in the process.[67] Gugerli dismisses all structuralist narratives. The electrification of Switzerland, he claims, was not at all determined by the country’s hydropower potential and the absence of coal, its highly-developed capital market, the skills of its engineers or the audacity of its entrepreneurs. Rather, it was essentially a result of societal communication about potentials, needs and consequences of electricity.[68]

The decisive role of shared terms and concepts in shaping electricity infrastructures is also the key argument in Norbert Gilson’s extensive study on the emergence of “Elektrizitätswirtschaftslehre”, an autonomous and influential field of study in Germany dealing with the economics of power systems. Gilson argued that the development of concepts for the economic analysis of electricity supply was closely interlinked with the factual construction of a centralised supply via superpower stations (Großkraftversorgung).[69] Economic analyses were anchored in the instruction of electrical engineers and a powerful pressure group made up of political institutions, large-scale electro-industry and financial capital had their share in establishing a “dogma of the economic superiority” of the centralised power model in academia.[70] It was this supposedly objective category of technical-economic rationality that made contemporary planners and politicians believe that centralised generation was an inherent necessity for efficient electricity systems.

---

[66] For an overview of Germany see Bernhard Stier, “Die neue Elektrizitätsgeschichte zwischen kulturhistorischer Erweiterung und kommunikationspolitischer Instrumentalisierung. Anmerkungen zum Forschungsstand am Ende des langen 20. Jahrhunderts der Elektrizität,” *Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte* 87 (2000); Binder, *Elektrifizierung als Vision*; Nye, *Consuming Power*; Graeme Gooday, *Domesticating Electricity: Technology, Uncertainty and Gender, 1880 – 1914* (London: Pickering & Chatto, 2008).
[67] David Gugerli, *Redeströme: Zur Elektrifizierung der Schweiz 1880-1914* (Zürich: Chronos, 1996).
[68] For criticism on Gugerli see Stier, “Die neue Elektrizitätsgeschichte,” 479-81.
[69] Gilson, *Konzepte von Elektrizitätsversorgung*. „Elektrizitätswirtschaftslehre" can be translated as the “course of study dealing with the business economics of electricity-producing plants.”
[70] Ibid., 150.

Not only has the importance of discourses and narratives received more attention in the more recent historical analysis of electricity. Social scientists dedicated to economic and infrastructure transition processes have also increasingly turned to collective processes of speaking about and assigning meaning to certain parts of reality since "[a]t the broadest, most 'macro' level, institutional projects are complex amalgams of past trajectories and current aims and aspirations"[71], as Shove et al. remind us.

As a first step, I will therefore look into discourses on electricity supply in the colonies or – as they were later called – the "developing countries" in East Africa and the shared narratives these discourses produced. I will follow the communicative networks through which ideas, concepts and terms associated with electricity travelled and I will investigate how ideas about electricity interacted with or became part of other concepts, like imperialism or – most notably – concepts of "development". In his recent book on *Framing African Development*, Kjell Havnevik, who has extensively studied the history of development projects in Tanzania, writes that "the concepts that are used to understand and define the world in general and Africa in particular are not economic and political processes and events; they are also largely framing these very same processes."[72] As will be shown, in the course of the twentieth century, electricity gradually became a key element in political narratives of development and related concepts of industrialisation, modernisation and economic growth, which were devised outside Africa. These shared narratives can be traced by analysing the use of specific terms, references or quotations in letters, reports, conferences and meeting minutes or journal articles. They were an important catalyst for turning ideas and ambitions related to electrification into performative speech acts which induced a set of new connections.[73]

Flows of people and money

For "flows of speech" to turn into flows of electrons through a grid of copper wires, however, they must bring together several key actors – government officials, investors, entrepreneurs, engineers, expert advisors – and mobilise the resources needed for the assembly of grids, above all capital and knowledge. The next step of the analysis therefore follows the trajectories of people, knowledge and money circulating through the multi-layered networks

---

[71] Elizabeth Shove, "Putting Practice into Policy: Reconfiguring Questions of Consumption and Climate Change," *Contemporary Social Science* 9 (2014): 157; see also Urhammer and Røpke, "Macroeconomic Narratives," 64.

[72] Kjell J. Havnevik, *Framing African Development. Challenging Concepts* (Leiden: Koninklijke Brill NV, 2015), abstract.

[73] On the "performative turn" in social sciences see for example: Michel Callon, "What Does It Mean to Say That Economics Is Performative?" in *Do Economists Make Markets? On the Performativity of Economics*, ed. Donald A MacKenzie et. al. (Princeton: Princeton University Press, 2007).

within and across empires and the post-colonial world.[74] This endeavour includes, first, delineating the network of people concerned with electricity during these periods. This approach is not new in the history of electricity. In their historical analysis of the American electrical industry Mark Granovetter and Patrick McGuire focus on "identifiable social networks" and arrive at the conclusion that these networks determined the development of the industry much more than any inherent technical or economic rationale.[75] For electricity systems in Tanzania, Rebecca Ghanadan emphasized:

> Although, in immediate terms, services are managed by national utilities, regulators, and energy ministries, through finance (and reforms), energy is also situated in even more narrow and elite negotiations among a small subset of government officials, donors, private investors, and international consultants, who control and manage many of the most sensitive aspects of infrastructure development.[76]

In my analysis, I therefore concentrate on a relatively small group of key actors, their international biographies and careers, their travels and encounters as well as their personal and professional networks. This limitation should not be confused with earlier ways of writing the history of technology as a story of a few "heroic" inventors and entrepreneurs. Rather, it gives credit to the fact that the key decisions were (and are) made by a very small elite, which adds another element of contingency to the process.

The movement of and communication between these individuals can be traced by looking at a set of documents that flowed through the circuits of colonial administration, corporate management or development aid. They flowed in the form of personal and official letters, telegrams, hand-delivered notes and drafts or dispatches, which often came with more comprehensive documents attached, such as reports, memoranda, meeting minutes, requests or other textual forms. These sources provide insights into how ideas, plans and future visions of electricity supply mobilised monetary resources by attracting private investors or channelling funds from governments or development banks into electrification projects and, thus, inducing or reconfiguring sets of financial relations. They also show how electrification became enmeshed in a network of diplomatic relations both within the British Empire and

---

[74] For networked conceptions of Empire, see David Lambert and Alan Lester, *Colonial Lives across the British Empire: Imperial Careering in the Long Nineteenth Century* (Cambridge, UK, and New York: Cambridge University Press, 2006); Tony Ballantyne and Antoinette M Burton, *Empires and the Reach of the Global, 1870-1945* (Cambridge, Massachusetts: Harvard University Press, 2012); James Beattie et al., *Eco-Cultural Networks and the British Empire: New Views on Environmental History* (London: Bloomsbury Academic 2015).

[75] Mark Granovetter and Patrick McGuire, "The Making of an Industry: Electricity in the United States," *The Sociological Review* 46 (1998): 148.

[76] Ghanadan, "Public Service or Commodity Goods," 41.

between post-independence Tanzania and the multitude of countries taking interest in the young nation. Hence, a variety of discourses, power relations and social interactions within a complex actor network have materialised in the electricity infrastructures in East Africa.

Flows of electrons: Materialities, lock-ins and repercussions.

Yet, looking at physical infrastructures only in terms of their social constructions misses out on a vital aspect of the interactions between the different types of connections. The pace and scope of electrification in East Africa, as I will show, cannot solely be explained by the political or economic agenda of individuals, companies or institutions but was also determined by environmental conditions as well as the inherent techno-economic rationale of electricity systems. The construction and management of energy infrastructures, for example, was also essentially determined by the specific requirements of the energy sources used. The materiality of different sources and forms of energy exerts its own effects on the temporality and spatiality of these processes. In his anthropological study of "time, ethics and electricity in post-socialist Tanzania" Michael Degani illustrates this with a comparison between oil and hydropower as energy sources for electricity generation. "Oil", he writes, "runs fast and hot. A highly concentrated source of energy, it can be transported swiftly and in large volumes, a testament to the fast capitalism and global supply chains in which human condition is now suspended. … But oil's fluid materiality makes for slippery politics."[77]

Hydropower, in contrast, requires more foresight in its management, especially in the wet and dry season ecology that is central to East Africa. It must be addressed by countercyclical infrastructures, including reservoir storage and spinning reserve capacity.[78] The construction of hydropower dams, one could add, does not only require large amounts of capital and long-term planning horizons but, from a certain point onwards, it is also pre-configured by environmental conditions. Once the site for a hydropower plant is selected, its specific geology and topography define the dimensions of the dam – and therefore, to a certain extent, the layout and size of the transmission and distribution grids, which constitute the technical link between the generation plant and the users of electricity.

This differentiation is of great relevance in East Africa where, after World War II, a transition from distributed electricity generation in small-scale thermal power plants to large-scale, centralised hydropower generation started – all at once in Uganda and gradually in Kenya and

[77] Michael Degani, "Emergency Power: Time, Ethics, and Electricity in Postsocialist Tanzania," in *Cultures of Energy Power, Practices, Technologies*, ed. Sarah Strauss et. al. (Walnut Creek, California: Left Coast Press, 2013), 184.
[78] Ibid.

Tanganyika. In my thesis, I consider the repercussions of this material transition for the set of other connections in the actor network associated with electricity provision. For this purpose, I reconstructed the technical and economic characteristics of electricity infrastructures in East Africa at different points in time with the help of technical reports, maps, schemes, yearly reports of utilities or contemporary academic literature.

In the absence of large loads, Shamir argued, the grid had to find a direction.[79] The example of the Owen Falls dam in Uganda presented in part two of this thesis illustrates this direction of movement well. Due to the over-dimensioned scheme of the dam, outlets for the large amounts of electricity produced at the dam site had to be found through an assembly of poles, wires, transformers and meters. This involved customer contracts and sales staff and entailed a set of new connections which transcended racial, national and ideological borders. It resulted, for example, in electrification programs for Africans who had previously been ruled out as electricity customers or in the export of electricity though a long-distance transmission line to Kenya, undermining the original plans to industrialise Uganda by means of cheap electricity.

Through the obduracy of physical structures, the social and environmental injustices perpetuated through them persist through phases of social change.[80] The materialities of infrastructure "(re-)emerge then in the political negotiations thereby necessitated, more than in the physical process of deploying networks and services", Colin McFarlane and Jonathan Rutherford write, "From this perspective, engineering ... and sanitation 'solutions' … immediately and inherently mobilize conflictual political ideals, ideologies and relations."[81] My long-term historical analysis of electricity infrastructures in East Africa offers the chance to trace this interplay between infrastructures as materialisations of social processes and their re-emergence in public discourses over time.

A note on archival sources

To understand the scope and limitations of this study, it is imperative to reflect on the archival sources that form the empirical base for my analysis. For this reason, I provide a detailed account of the written (and to a small extent oral) sources I have used and of the places where they can be found. To a great degree, this dissertation project was explorative. Thus, I hope to

---

[79] Shamir, *Current Flow*, 4. See also, Hughes, *Networks of Power*, 15.

[80] See, e.g., Jochen Monstadt, „Großtechnische Systeme der Infrastrukturversorgung: Übergreifende Merkmale und räumlicher Wandel," in *Wandel der Stromversorgung und räumliche Politik*, ed. Dieter Gust (Hannover: Verlag der Akademie für Raumforschung und Landesplanung, 2007).

[81] Colin McFarlane and Jonathan Rutherford, "Political Infrastructures: Governing and Experiencing the Fabric of the City," *International Journal of Urban and Regional Research* 32 (2008), 370.

encourage and facilitate further research on the history of (electrical) infrastructures in Africa by helping scholars to navigate around dead ends and by pointing out promising avenues for further investigation which I was not able to pursue within the framework of my thesis.

When I started my dissertation project I had a vague idea of the challenges of doing archival research in East Africa in general and on electricity in particular.[82] Yet, my three visits to Tanzania and Kenya in 2012, 2014 and 2016, which added up to a total of about five months spent in the region, were full of surprises. Archival work in Tanzania is unpredictable and laborious in a very physical sense; it can be at times frustrating but at times also very rewarding.

My research at the Tanzanian national electricity utility, TANESCO, illustrates this well. There is a library room in the company's headquarters at Ubungo in Dar es Salaam which contains a handful of shelves full of project documents, none of which is dated earlier that the 1980s. A larger stock of documents is stored in containers in the yard of the company's premises, together with old machinery and furniture.[83] Getting the boxes with documents out took me the resolute help of two ladies from TANESCO staff. Yet, to my disappointment I discovered that, again, few of the documents date back to before 1980. After several conversations with long-serving TANESCO managers, it seems certain that all earlier documents were disposed of or got lost, when the company moved from its old headquarters in Kurasini to the current one in 2000.

The Ministry of Energy and Minerals (MEM) is a dead end for any archival research. When, after countless requests, I finally got access to their "archive", it turned out to be an unused meeting room containing a few binders from the last 5-10 years and personal books of a former permanent secretary. Considering that the ministry employs paid archivists, this came as a surprise to me. There appears to have been no organised transfer of documents from the MEM to other archives, such as the national archive.

The Tanzania National Archives (TNA) in Dar es Salaam contain a few records from German colonial times (pre-1916/17) and British records (pre-1962) related to electricity provision. [84] They include, for example, correspondences from the public works department or the

[82] See, e.g., the respective section in May-Britt Öhman, "Taming Exotic Beauties: Swedish Hydropower Constructions in Tanzania in the Era of Development Assistance, 1960s – 1990s" (PhD diss., Royal Institute of Technology, 2007), 200.

[83] TANESCO staff was unable to find the key for these containers. We broke the lock and replaced it with a new one to which I have a set of keys.

[84] The abbreviation TNA is commonly used for the National Archive in Britain. In this thesis, however, I have given precedence to the Tanganyika archives.

provincial and district commissioners. It turned out, however, that many of the most promising records were either lost or inaccessible for other reasons.[85] I was unable to find any relevant records from the administration of post-independence Tanzania at the TNA. A research at the East Africana section of the University of Dar es Salaam Library (UDSL) produced much more relevant material, including contemporary academic literature and reports, Hansards of parliamentary debates, yearbooks of the power utility, newspaper articles, many of which date back to the colonial period. The small but very well kept archive of the Rufiji Basin Development Authority (RUBADA) contains a wealth of reports and studies associated with the planning and implementation of hydropower generation and river basin development projects in Tanzania since the 1970s.

I also conducted archival research in Nairobi, from where EAP&L directly or through its subsidiaries controlled the electricity supply in Kenya, in Tanganyika (for a shorter time) and in Uganda (for one decade under colonial rule). The Kenyan National Archives (KNA) are much better organised than the Tanzania ones. A search in the library's computer database produces several files from the British colonial administration on electricity. For any further research on the electrification of Kenya, there is possibly relevant archival material available at one of the three successor companies of EAP&L, especially Kenya Power.[86] A corporate history of EAP&L, the book "Stima" by Charles Hayes from 1983, is by far the most comprehensive and detailed historical work on electricity in East Africa. Although he does not explicitly elaborate on his sources, Hayes "informal" history of the company is obviously based on personal interviews with EAP&L staff and a considerable body of internal documents.[87] Although not a primary source in the strict sense, I made extensive use of Hayes account for my own analysis – of course with the necessary caution and source criticism towards corporate histories.

A large bulk of my archival sources, however, is taken from archives outside East Africa. The great wealth of relevant and easily accessible records make the British National Archives in Kew, London, (here: BNA) a prime address for any research on the electrification of the British Empire. I returned from three visits to London with a total of 8,000 photographs of

[85] Doing research in the Tanzania National Archives can be tedious for various reasons. Ironically, my research on electricity was regularly interrupted by power cuts, which made it impossible for the archive's staff to work in the electrically-lit rooms where the files are stored. Generally, most of the staff at the TNA consists of university students with little training on the workings and structure of the archive.

[86] The other two are Kenya Electricity Generating Company (KenGen) and Kenya Electricity Transmission Company (KETRACO).

[87] Hayes, *Stima.* A copy can be found in the Kenyan National Archives, Nairobi, and the Bodleian Library at Oxford University.

archival files, most of them containing correspondence of the Colonial Office on the electrification and economic development of the three British East African colonies. Complementary to this material, the Bodleian library at Oxford, keeps many relevant collections, for example private correspondence of colonial administrators, advisors and engineers. Though not being able to conduct research in its physical archive in Washington, I made use of the World Bank's extensive online archive.[88]

In addition to the written sources, I conducted a few personal interviews with TANESCO staff, former staff, including former TANESCO CEO, and the former and current head of the research department. These interviews helped me learn about the perspective on the electrification of Tanzania during the last 35-40 years from within the state utility and a range of valuable – although anecdotal – insights.

3) Literature review and discussion

Unsurprisingly, a study of the evolution of electric power systems, which spans about seven decades, relates to several supposedly unrelated objects of study: the sisal industry of Tanganyika, electrical engineering in Britain, hydropower projects in Malaysia, India or Canada, housing schemes for African civil servants in Kenya, African nationalism, and development economics – all of which are usually treated in separate fields of study or even disciplines. Hence, when following the different types of connections associated with electrification in East Africa, my account touches upon several theoretical debates at the intersections of history of technology, economic history, imperial history, history of development. They can be summarised under three major questions that run through this thesis: 1) What role did electrification play in the project of global imperialism? 2) How did electrification interrelate with the rise, fall, and resurrection of global capitalism and multinational enterprise in the electric utility industry? 3) What links can be traced between global electrification and the career of the concept of "development"? In the following section, I will introduce the relevant theoretical debates and discuss what contribution this thesis can make to these debates.

Situating electricity in the "Tools of Empire" debate

Like most industrial technologies, electricity arrived on the African continent during the imperial age of the nineteenth and twentieth centuries. To a certain extent, it can safely be assumed that electricity supply reflected and reproduced the "unequitable and (…) very

[88] Accessed March 26, 2017, https://archivesholdings.worldbank.org/.

hierarchical relationship between a metropole and a periphery", which, according to political historian Ronald G. Suny, constitutes an empire.[89] This relationship may be termed "colonial" insofar as it entails a set of actions and relations that serve metropolitan interests above all: the extraction of resources, the assignment of ethnic identity and cultural attributes, and the concentration of political power. My analysis of the electrification of East Africa therefore adds to a larger debate on the interaction of infrastructures and colonial rule.[90]

Until a decade ago, the master narrative for this debate was Daniel Headrick's *The Tools of Empire* from 1981. With broad brush strokes, Headrick had painted a picture of technology as an instrument for advancing the colonial project of exploitation and subordination of non-European peoples and environments. His key thesis was that industrial technologies such as steamboats, machine guns, transport and telecommunications networks provided fresh means to a "new imperialism" for (cost-) effective expansion and consequently influenced the timing, location and nature of imperialism.[91] In *The Tentacles of Progress* from 1988, Headrick developed his argument further, linking it to the debate on the causes of underdevelopment in Africa and Asia. He explains the latter by the fact that the massive geographical relocation of European equipment, techniques, and experts to the colonies had not been accompanied by the necessary transfer of skills and culture associated with the respective technologies.[92]

This debate on the technological preconditions of imperial power politics on a material level has been complemented by studies looking into the role of technology and science in the "cultural constructions of difference relating to ethnicity, gender, intellect, and organizational capacity", which form the ideological foundation of imperialism.[93] One of the central works on this topic is Michael Adas' *Machines as the Measure of Men: Science, Technology, and Ideologies of Western Dominance*.[94] His key argument is that those involved in the colonial project came to view scientific thought and technological achievements not only as the key attributes of European – and hence their own – superiority but also as the most meaningful

---

[89] Ronald Grigor Suny and Terry Martin, *A State of Nations: Empire and Nation-Making in the Age of Lenin and Stalin* (Oxford: Oxford University Press, 2001), 29.
[90] For an overview, see van der Straeten and Hasenöhrl, "Connecting the Empire."
[91] Daniel R. Headrick, *The Tools of Empire: Technology and European Imperialism in the Nineteenth Century* (New York et. al.: Oxford University Press, 1981).
[92] Daniel R. Headrick, *The Tentacles of Progress: Technology Transfer in the Age of Imperialism, 1850-1940* (Delhi: Oxford University Press, 1988).
[93] Suny and Martin, A State of Nations, 1; George Steinmetz, *The Devil's Handwriting: Precoloniality and the German Colonial State in Qingdao, Samoa, and Southwest Africa* (Chicago: University of Chicago Press, 2008).
[94] Michael Adas, *Machines as the Measure of Men: Science, Technology, and Ideologies of Western Dominance*. New York et. al.: Cornell University Press, 1990).

measures by which non-Western societies might be evaluated, classified and ranked. In this ideological construction Adas sees the root for modernisation theory's claim that Western ideas on rationalising production, management and application of modern technologies will bring economic development to "third world" countries.

What role, then, does electricity play in this narrative of modern technology as an instrument of epistemological and physical subjugation of non-European people? For an analysis of electricity within colonial settings, it is important to understand that the collective process of assigning meaning to electricity first took place in Europe and the US before it was transferred to the non-Western world. At the time, when the first generators were installed in German East Africa, the energetic thinking that shaped the electricity systems in the German Reich reflected the rationality that progressive intellectuals and critics saw as an integral part of Western capitalist societies.[95] A study of colonial electrification therefore needs to take into account planners', engineers' and users' perceptions of electricity's symbolic meanings and the discourses in industrial Europe and North America that produced them.

Fortunately, these aspects have received much attention in historical research on electricity in the last two decades. In her study of discourses and interpretative contexts of electricity in Germany from 1880 to 1930, Barbara Binder concludes that the equation of electricity with progressiveness and modernity formed a consistent societal image.[96] These symbols paved the way for the entry of electricity and electrical appliances into the everyday life of users. In a recent study, Greame Gooday describes the huge efforts of companies and proponents of electricity to demonstrate that electricity could be "domesticated", hence used in the household without insecurities or aesthetic concerns. According to Gooday, it was only this deliberate production of electricity's image in the media that rendered it an alternative to the long-established technology of gas lighting.[97]

Being so closely associated with Western modernity, electricity came to signify the latter term along the binary concepts of primitive/civilized, tribal/Western, traditional/modern and pre-capitalist/capitalist, which structured the thinking of many Europeans about the colonial "other".[98] It doesn't come as a surprise that colonial identity politics has become the lens through which most of the few existing studies look at urban electrification processes in the

---

[95] Stier, *Staat und Strom*, 49.
[96] Binder, *Elektrifizierung als Vision*, 25-26.
[97] Gooday, *Domesticating Electricity*, 17; Goodays study also criticises the perspective of earlier studies in which the demand for electricity is assumed as given, for example, Hughes, *Networks of Power*.
[98] See also Andrew Byerley, *Becoming Jinja: The Production of Space and Making of Place in an African Industrial Town* (Stockholm: Almqvist & Wiksell International, 2005), 201.

former African colonies. In his work on the electrification of Bulawayo in colonial Zimbabwe (South Rhodesia) between 1894 and 1939 Moses Chikowero shows how the town council deliberately promoted household electrification along racial lines serving only the European settler community, while at the same time discouraging the African population from using it.[99]

Modern colonial states, as George Steinmetz writes, "were permeated by the assumption of an unbridgeable difference between themselves and their subjects and of the ineradicable inferiority of the colonized".[100] At night times, electric lighting was not only the most visible marker of this "rule of difference". It was also used in a much more direct way to control and police the underprivileged by means of "safety" lighting and electric fencing of African neighbourhoods suspected of political agitation.[101] The study of electricity grids in colonial cities therefore adds to a larger debate on the co-evolution of colonial cities and technical infrastructures, with contributions from historians[102], urban geographers[103] as well as scholars from land management and urban planning.[104] All of these works emphasise the role of large technological systems in accentuating and (re)producing racial segregation of colonial cities.

My case studies on the electrification of urban areas in East Africa provide further empirical material to support this general claim. By delineating zones with different building regulations, colonial administrators in cities like Dar es Salaam and Nairobi not only created factual segregation but also predetermined connectivity to infrastructures, which in turn depended on property rights, stable tenure conditions and building standards. These fragmented patterns of provision are still visible today in the urban geographies of these cities. Yet, as I will also show, the picture in most East African cities is more complex than, for example, in colonial Bulawayo.[105] The competition and resentment between the European political elite and the Asian, mostly Indian, merchant class is another important dimension. In

---

[99] Chikowero, "Subalternating Currents."
[100] Steinmetz, *Devil's Handwriting*, 36. For an overview of the debate, see Patrick Hege, "The German variation. A sketch of colonial Städtebau in Africa, 1884-1919," in *Urban Planning in Sub-Saharan Africa. Colonial and Postcolonial Planning Cultures*, ed. Carlos Nunes Silva (New York: Routledge, 2015).
[101] Mark J. Bouman, "Luxury and Control: The Urbanity of Street Lighting in Nineteenth-Century Cities," *Journal of Urban History* 14 (1987); Chikowero, "Subalternating Currents," 302-304.
[102] Michael Mann, "Delhi's Belly: On the Management of Water, Sewage and Excreta in a Changing Urban Environment during the Nineteenth Century," *Studies in History* 23 (2007).
[103] Colin McFarlane, "Governing the Contaminated City. Infrastructure and Sanitation in Colonial and Post-Colonial Bombay," *International Journal of Urban and Regional Research* 32 (2008). Matthew Gandy, "Planning, Anti-Planning and the Infrastructure Crisis Facing Metropolitan Lagos. *Urban Studies* 43 (2006).
[104] Robert Home, *Of Planting and Planning. The Making of British Colonial Cities* (London: Routledge, 2013); Ambe Njoh, *Planning Power: Town Planning and Social Control in Colonial Africa* (Aldershot and Burlington: CRC Press, 2007).
[105] See, Jonas van der Straeten and Patrick Hege, "Enclaves of LightThe electrification of Dar es Salaam under German and British colonial rule, 1908-1950," in *Translating the networked city: Urban Infrastructures in Nairobi and Dar es Salaam, ed.* Jochen Monstadt et. al. (forthcoming).

my analysis, I do not only look at the connectivity of users to the material grid, but also at access to a much wider set of connections: these include access to knowledge, education and technical training, to the management and shareholding of electric utilities as well as to the political arenas where electricity supply was regulated.

Beyond the debate on large technical infrastructures as "Tools of Empire" for conquest and penetration and their role for the socio-cultural *division* of colonial spaces, more scholars have recently turned their attention to the question of how infrastructures served the political and economic *integration* of colonial spaces. "Technology", as historian Gyan Prakash put it, "was not only the instrument but also the substance of state power".[106] In his book on science and the imagination of modern India, he called attention "to the structures in which the lives of peoples are enmeshed". By means of various technologies, such as railroads, mining, irrigation, hydroelectric projects or telecommunications, colonial governments created a grid, "a coherent strategy of power and identity, underpinned by an ideology of modernity that is legitimated in the last instance by science."[107] In this grid, electricity deserves particular attention, as Srinivasa Rao and John Lourdusamy argued in their study on the electrification of Madras Presidency, because it "served as motive power to the technology grid itself."[108]

The increasing interest in the topic of human-spatial relations, the "spatial turn" in political science and history around the turn of the millennium, has given new impetus to this debate. Manu Goswami's study of the foundations of colonial rule in India outlines how new technologies of infrastructure, communications, and irrigation transformed the "geographical space of colonial India into an internal component of the imperial economy."[109] Frank Meiton applied this concept of the British Empire as a "scale-making project" in his recent article on the electrification of British Palestine. He shows that the Mandate's first large electric grid "was central to the making of modern Palestine as a precisely defined geographical-political entity."[110] The question of the relationship between electrification and state territoriality is equally relevant for East Africa today, as studies from neighbouring disciplines on more recent processes of electrification in the region suggest. Ivan Cuesta's comparative analysis of

---

[106] Gyan Prakash, *Another Reason: Science and the Imagination of Modern India (*Princeton, N.J.: Princeton University Press, 1999), 160.
[107] Prakash, *Another Reason*, 3.
[108] Srinivasa Rao and John Lourdusamy, "Colonialism and the Development of Electricity. The Case of Madras Presidency, 1900–472," *Science Technology & Society* 15 (2010), 30.
[109] Manu Goswami: *Producing India: From Colonial Economy to National Space (*Chicago: University of Chicago Press, 2004), 49.
[110] Fredrik Meiton, "The Radiance of the Jewish National Home: Technocapitalism, Electrification, and the Making of Modern Palestine", *Comparative Studies in Society and History* 57 (2015), 97.

electrification in Northern Ghana and Southern Tanzania as well as Tanja Winther's ethnography on the impacts of electricity in rural Zanzibar both offer inspiring insights into this question. Electricity provision, as they show, is widely used by governments to penetrate spaces on all levels and exert power "at a distance" in remote rural areas or to access private spaces.[111]

Did the same apply to the colonial state? What was the importance and function of electricity provision for colonial rule in East Africa? In fact, the large-scale hydropower projects in Africa built in the 1950s and 1960s – not least to showcase the benefits of colonial rule – should not obscure the fact that electricity provision generally ranked low on the colonial administration's priority list. In most of sub-Saharan Africa, except for South Africa, systems of substantial size and scale appeared only after World War II, financed by sums of capital which were modest in comparison to those put into railroads and irrigation works.[112] The British doctrine of indirect rule and financial self-sufficiency of the colonies did not provide for the investment of large amounts of metropolitan funds into electricity projects. Heather Hoag, who dedicated a chapter of her book on African rivers to the electrification of British colonies, found that the Colonial Office and the governments in the colonies initially adopted a laisser-faire approach regarding electrification, granting concessions to private utilities.[113]

The networked approach I have adopted in this study helps to further unpack the broad and unspecific "tools of empire"-metaphor. Unsurprisingly, many of the connections under investigation were "colonial" in nature and entailed the extraction of resources, the assignment of cultural attributes, or the creation and exploitation of power asymmetries for the benefit of individuals or groups on the side of the "colonisers". Yet, my analysis of electricity rejects the understanding of "technology transfer" from the colonial metropolitan to the periphery as a directed collective action, organised and controlled by the colonial state. Following David Arnold's suggestion to replace diffusionist ideas of a one-directional, top-down "transfer" or "dissemination" with metaphors like "travelling", "flowing", "circulating" to describe the global movement of technologies, it becomes clear that the agency of the state needs to be reconsidered.[114] In fact, my analysis of the British Empire shows that the

---

[111] Winther, *Impact of Electricity*, 108-111; ongoing dissertation project by Ivan Cuesta, accessed March 20, 2017, https://electricterritorialities.wordpress.com/author/ivancuestafernandez/.
[112] Kale, "Structures of Power," 455. "Substantial" here means power plance with a generation capacity of more than 10 MW.
[113] Heather J. Hoag, *Developing the Rivers of East and West Africa: An Environmental History* (London: Bloomsbury, 2013), 138.
[114] David Arnold, "Europe, Technology, and Colonialism in the 20th Century," *History and Technology* 21 (2005): 87.

metropolitan state was often unable to manage and regulate the electrification of its colonies. These efforts were frequently undermined by individuals and groups outside the realm of colonial administration – ironically often British companies – who made use of the increasing global mobility of knowledge, capital and people.

Electricity, (global) capitalism and the state

The second major thread running through this dissertation is the interplay between electrification in East Africa, the formation of global capitalist networks and the rise and decline of international private investment in electricity supply. Within the British Empire, as elsewhere, capital and infrastructure, of course, share a much longer history than that. Colonial joint-stock companies, like the British East India Company, had already channelled the flow of money into the building of long-distance trading networks and overseas settlements. During the nineteenth century, this corporate form was adapted to the financing needs of new infrastructure technologies like railways, large ship canals or sanitary systems. "Modern infrastructure", as Timothy Mitchell concludes, "gave birth to corporate power and modern banking, which grew by selling shares, not just in commercial ventures or the ownership of a physical apparatus, but in the future flow of income that this long-lived equipment seemed to guarantee."[115]

Within the ensemble of different modern infrastructures, electricity stands out for its extraordinarily high capital intensity. From its inception in the late nineteenth century up to World War I, the capital intensity of the electric power industry was unmatched by any other public utility of the manufacturing industry, except for the steam railway in its formative years.[116] In an academic debate on the origins of globalisation and global capitalism, electrification makes a particularly interesting case.[117] As Hausman et al. show, the distinct financing requirements of electricity gave rise to diverse forms of multinational enterprises in that sector, ranging from manufacturers' satellite, holding and operating companies to free-standing companies.[118] These multinational enterprises constituted the organisational foundations of an increasingly globalised economy at the beginning of the twentieth century.

How does this relate to an analysis at local level? The particular economics of the evolving electrical technologies, as will be shown, are also key to understanding the formation of the

[115] Timothy Mitchell, "Introduction: Life of Infrastructure," *Comparative Studies of South Asia, Africa and the Middle East* 34 (2014): 437-38.
[116] Hausman et. al., *Global Electrification*, 19.
[117] See, e.g., Magee and Thompson, *Empire and Globalisation;* Sven Beckert, *Empire of Cotton: A Global History* (New York: Alfred A. Knopf, 2015).
[118] For an overview, see Hausman et. al., *Global Electrification*, chapter 2, 35ff.

actor network associated with the electrification of East Africa. It is important to take into account the large amounts of capital investment that must be made in the colony before a single watt can be transmitted and sold to households or enterprises. This includes the purchase and import of expensive equipment as well as the interest costs, which had to be paid before any revenue was generated. Thus, from the start, electricity provision was a risky undertaking that only governments, international companies, or a small group of affluent businessmen and families could afford to venture into. In addition, rapid subsequent expansions that would allow for economies of scale could simply not be financed out of retained earnings.[119]

These characteristics of electricity infrastructures limited the scope of any form of local entrepreneurship. To expand their business and keep pace with the rising demand and growing expectations of customers and colonial governments alike, entrepreneurs had to look for outside – usually international – sources of capital. This led to the creation of different new channels through which capital, technology and knowledge could flow between Britain and its colonies. Whichever form these channels would assume, the connection never remained purely financial. My case study of the East African Power & Lighting Company (EAP&L) shows how closely financing and management were interlinked. Shareholders in the metropolis had other interests than local entrepreneurs and managers and called for narrow orientation of corporate policy towards profit-generation as well as a professionalisation and rationalisation of the management. In this conflict of interests, the original founders were forced to hand over control to directors, who were to be appointed from London. The increasing need for external technical and managerial knowledge tied electricity supply in East Africa closer to established companies and business groups from Britain, e.g. in the form of management contracts. In effect, the pace and scope of electricity provision in East Africa until World War II, and in some countries far beyond that, was largely dictated by the investment policy of London shareholders and heavily relied on technical and managerial know-how from Britain.

Yet, this process of the formation of international networks was by no means the product of "anonymous" forces of global capitalism and strictly rational decisions by the actors involved. Following the networks of people, goods and capital in the Empire, Magee and Thompson showed how culture and economics were entangled in what has been more recently coined the "British World" – a term that refers to the distinct qualities and shared characteristics of

[119] Hausman et. al., *Global Electrification*, 19.

British settler colonies regarding their commercial, cultural and political experience of Empire in the nineteenth and twentieth centuries.[120] The authors argue that globalisation – understood as the worldwide dissemination of goods, capital, labour, information and culture – had its origins in the mass outward migration of British settlers in the second half of the nineteenth century and up until World War I. Their collective identity of "Britishness" gave them a decisive edge in the competition with other businessmen. Magee and Thompson document several "non-market advantages" in the settler-colonies, including professional diasporas, patent systems, business associations, and established lending practices and networks.[121]

In East Africa, especially the large settler population in Kenya must be regarded as part of the "British World". In fact, my study shows that access to the professional and commercial networks controlling and managing electricity provision in East Africa was tied to being "British" after World War I until independence. For example, my accounts show deliberate attempts by British managers in Kenya to keep away ethnic Indian merchants from the management and shareholding of electricity companies. By sanctioning power utilities verbally and sometimes legally for "unpatriotic" purchase of electrical equipment or plant from Germany or the US, the British colonial administrations aimed – with varying success – at compensating for Britain's lack of competitiveness in the field of electrical engineering in the first decades of the twentieth century. Hoag explains the absence of any attempts by electricity companies in East Africa to develop markets for domestic electricity among African customers with the racial bias of utility managers, who dismissed Africans as being generally "uninterested" in electricity.[122] My analysis shows that this is only part of the story. At the interface between economic and imperial history, the challenge is therefore to provide a nuanced account of electrification in colonial Africa that discards both the notion that imperialism was *entirely* about cultural and racial dualism on the one hand the conception that globalisation was "a culturally blind, technology-driven phenomenon" on the other.[123]

In sum, it seems safe to assume that private capital interest determined much of the pace and scope of electricity supply in East Africa before WWII. Yet, as elsewhere, electricity supply was also a political story from the beginning, even if utilities were not in public hands. The relatively small marginal costs and high share of fixed financing costs in electricity provision generally favour monopolistic patterns. The threat posed by utilities, which can use their

---

[120] Gary Bryan Magee and Andrew S. Thompson, *Empire and Globalisation: Networks of People, Goods and Capital in the British World, c.1850-1914 (*Cambridge and New York: Cambridge University Press, 2010.
[121] Magee and Thompson, *Empire and Globalisation*, 133.
[122] Hoag, *Developing the Rivers.*
[123] Quote from Magee and Thompson, *Empire and Globalisation*, 233.

monopolistic position for excessive rent-seeking and price discrimination, their electrification and customer policies and their dependence on the use of public resources and public land, e.g. for transmission lines, necessitates mediation between utility and community and, thus, regulation by public authorities.[124]

In the footsteps of Thomas Hughes' pioneering study on Berlin, London and Chicago, many scholars have set out to understand the cross regional or national variations in how different political and social environments shaped the early development of electricity systems. In his very comprehensive comparative study of three German regions, Bernhard Stier, for example, shows how the availability of hydropower potential and early public-private conflicts over its exploitation in one of the regions, Baden, were formative for a distinct electricity policy.[125] As we will see, the availability of hydropower resources in the colonies and the lack thereof on the British Isles was an important factor in the electrification policy of colonial administrations in the Empire.

Dieter Schott, who has compared the municipal energy policies in three German cities during the early phase of electrification, highlights the importance of shared ideas about what constitutes a "modern city". Mediated through municipal authorities, these city-specific images resulted in very different municipal policies and produced different modes of supply in each of the three cases.[126]

For the non-Western world, Sunila Kale's comparative article on the different patterns of electric development in three provinces of India (Princely Mysore, Bombay Presidency, and Madras Presidency) under colonial rule, is an insightful – and the only – study of this kind.[127] In Bombay, large private utilities, many of them furnished with Indian capital, controlled electricity provision and prevented the regional state from entering the sector. However, the privately-owned systems, though large in generation capacity, faced extreme limitations in terms of spatial reach and connecting rural customers. By contrast, the princely state of Mysore early adopted a model of state-led electrification and industrial development policy and gradually built an electricity infrastructure in the first five decades of the twentieth

---

[124] See, e.g., Hausman et. al., *Global Electrification*, 23; Stier, *Staat und Strom.*

[125] Stier, *Staat und Strom,* 39. In contrast, in the state of Württemberg, where these resources were lacking, the supply was organised in largely autonomous systems operated by municipalities. The regional government limited its role to coordinating prices and investments in what was called Germany's "electricity balcans" in the 1920s.

[126] See Dieter Schott, *Die Vernetzung der Stadt: kommunale Energiepolitik, öffentlicher Nahverkehr und die 'Produktion' der modernen Stadt; Darmstadt - Mannheim - Mainz 1880-1918* (Darmstadt: Wissenschaftliche Buchgesellschaft, 1995); Hughes, *Networks of Power.*

[127] Kale, "Structures of Power."

century. In Madras, a latecomer in electrification, provincial administrators ventured more aggressively into the sector from the 1930s onwards and adopted a comprehensive approach, simultaneously building capacity and extending access.[128] Kale's study is also one of the few which traces the long-term dynamics and path dependencies of electric power systems in the Global South. She outlines how earlier choices constrained the way systems evolved over time. Along with her earlier book on "Electrifying India", her article sheds light on the historical causes for the high variation of access rates to electricity between the different Indian states.[129]

A close look on Kale's case studies does not only allow for comparisons with the power sector in the British East African colonies, it also reveals several cross-colonial links regarding electricity. Within the Empire, India often served as a testing ground for new technologies. In Tanganyika Territory, the Indian Electricity Act of 1910 served as the legal framework for the electricity sector until 1931.[130] As I will show later, engineers and technical advisors with work experience in India were in great demand throughout the Empire, as they were among the very few who had expertise in operating and maintaining electricity systems in tropical areas.

Kale's work shows that electricity differed from other infrastructure technologies not only in terms of financing but also in the way it was related to state power.

> If public discourse about railroads and canals revealed a uniform sense of the colonial state as an engine of "development," the far messier political economy around electrification revealed a mixed understanding of state power itself, complicated by not one model of governance but many models operating at once.[131]

This observation certainly holds true for the early decades of electrification. When shared ideas about the state's responsibility for promoting and managing "development" change over time, this impacts on the governance model of electricity provision. In East Africa, this was the case after WWII, notably after Britain had lost its colonial possessions in India, when the colonial administration embarked on extensive development plans in Africa. Hence, there is another important story to tell in this dissertation. It deals with the success and failures of the state – first the colonial and then the post-independence national state – to intervene in East

[128] Kale, "Structures of Power," 456-57.
[129] Kale, *Electrifying India.*
[130] Electricity Ordinance, 31. Comparative table. Enclosed in despatch from Symes to Cunliffe-Lister, May 30, BNA CO 691/120/4.
[131] Kale, "Structures of Power," 456.

African power sectors under the banner of "development" and the far-reaching implications of this endeavour for the evolution of centralised power grids. Electrification, as it seems, needs to be explained in terms of "development".

Electricity and development

What is development? The term development is complex and slippery and so is the academic debate revolving around it. Its countless, highly ambiguous and often contested nature make it a particularly complex analytical concept. This is also true for the current trend in many disciplines to study the role of *energy* in *development*.[132] Notably, many of the contributions to this debate fail to provide a clear and coherent definition of the term: Is it an intentional action or an unintentional process? Or is it a goal or an outcome of a process?[133] Many studies use the concept so broadly that it lacks any analytical substance; others reduce it to a narrow set of macro-economic indicators like GDP, which are, by now, highly contested as a measure of human welfare. In this thesis, I do not attempt to make any statement on whether, how, and to what extent electricity contributed to *development* in East Africa. Yet, I argue that one of the key determinants for the formation of electric power infrastructures in East Africa is the way electricity became inextricably linked with the concept of "development".

Development, as Joseph M. Hodge reminds us, is not a term which we can afford to take for granted – or, as Nick Cullather pointedly stated in a research note in 2000: "Development? It's History".[134] Since then, a range of scholars have contributed to historicising *development* by tracing the career of the term itself and engaging with the various theories, practices, actors and institutions that are associated with it. This field of research includes debates on the history of colonial development as well as that of multilateral development cooperation, including studies on international donors, national development agencies as well as local development initiatives and projects.[135] Together, they form a large body of knowledge this study draws on and relates to. In this debate, electricity mainly features in the form of case studies of large dam projects for hydropower generation. Their exposed nature, their emblematic visual appearance and their huge impacts on social and natural environments have

---

[132] A search for the combination of the two keywords on the online portal Science Direct shows 117,478 results for the year 2016 alone, up from 27,382 in 1999. Accessed March 24, 2017, http://www.sciencedirect.com/.

[133] For an introduction into the conceptual history of development, see Sharad Chari, *The Development Reader* (London and New York: Routledge, 2008).

[134] Joseph M. Hodge and Gerald Hödl, "Introduction," in: *Developing Africa. Concepts and Practices in Twentieth-Century Colonialism*, ed. Joseph M. Hodge et. al. (Manchester: Manchester University Press 2013); Nick Cullather, "Development? It's History," *Diplomatic History* 24 (2000): 641–53.

[135] For an overview
e.g., Marc Frey and Sönke Kunkel, "Writing the History of Development. A Review of the Recent Literature," *Contemporary European History* 20 (2011).

not only made them a projection screen for contemporary ideas and visions about development but also earn them much scholarly attention today.[136] What is yet missing is an analysis relating concepts of development to the wider ensemble of artefacts, institutions and people that constitute an electricity infrastructure.

As I argue here, there is in fact a lot to gain from analysing the synchronicities of two processes over the course of the twentieth century. First, the global dissemination and expansion of electric infrastructures and, second, the career of the concept of "development" itself from an "embryonic" stage at the turn of the century to a "central orthodoxy of national planning and United Nations thinking" in the final quarter of that century.[137] These processes, as I will show, are closely entwined. The phases during which the concept of development attained new layers of meaning strikingly correspond to the changes in the way electricity infrastructures were planned, built and expanded in East Africa. In the next paragraphs, I will briefly outline these phases and their implications for electrification.

Colonial histories of development

The first two parts of this dissertation focus on the ideological connections between colonial metropole and periphery that arose from the changing concepts and practices of development in East Africa under British colonial rule. In current debates on the discursive side of development, the colonial history of development has been widely neglected or eclipsed by an analysis of the concept in connection with the rise of the United States to global hegemony and the Cold War, as Joseph Hodge complains. Historians of colonial development have their share in this imbalance. "Rather than enquire into the various and changing meanings of development, they have largely taken the idea as given and treated it as just another, if only more recent, administrative task performed by colonial administrations."[138] The discourses which produced the different meanings and ideas of development took place outside East

---

[136] Allen F Isaacman and Barbara Isaacman, *Dams, Displacement, and the Delusion of Development Cahora Bassa and Its Legacies in Mozambique, 1965/2007* (Athens: Ohio University Press, 2013); Julia Tischler, *Light and Power for a Multiracial Nation: The Kariba Dam Scheme in the Central African Federation* (Basingstoke and New York: Palgrave Macmillan, 2013); David Hart, The Volta River Project: a case study in politics and technology (Edinburgh: Edinburgh University Press, 1980); For an overview of earlier literature, see Patrick McCully, *Silenced Rivers: The Ecology and Politics of Large Dams* (London: Zed Books, Limited, 1996); Öhman, "Taming Exotic Beauties;" Hoag, "Transplanting the TVA?;" Heather J. Hoag, "Designing the Delta: A History of Water and Development in the Lower Rufiji River Basin, Tanzania, 1945-1985" (PhD diss., Boston University, 2003); Heather J. Hoag and May-Britt Öhman, "Turning Water into Power: Debates over the Development of Tanzania's Rufiji River Basin, 1945–1985," *Technology and Culture* 49 (2008), Hoag, *Developing the Rivers*.

[137] Joseph M. Hodge and Gerald Hödl, general editors' introduction to *Developing Africa. Concepts and Practices in Twentieth-Century Colonialism*, ed. Joseph M. Hodge et. al. (Manchester: Manchester University Press 2013); x.

[138] Hodge and Hödl, "Introduction," 23.

Africa. In following the networks concerned with the electrification of the region under British colonial administration, I aim to comprehend how these ideas travelled within the Empire and how they influenced and reconfigured other sets of connections.

Ideas of transforming colonial territories and managing colonial resources through the application of Western science and technology, of course, had existed before development became a widely used term. To a certain extent, all colonial powers, after an initial predatory phase of conquest and plunder, adopted concepts of more constructive ways of exploitation. These concepts, which found their programmatic expressions in terms like "mise en valeur" in France or Chamberlain's doctrine of "constructive imperialism" for Britain, already included plans for the generation and use of electricity. Particularly the possibility of harnessing the rivers of Africa for large-scale electricity generational fascinated colonial officials during their visits to the continent.[139]

Colonial administrators were convinced that these doctrines of transforming natural and social environments in Africa and Asia were not only in their own interest but also in that of the colonised subjects themselves. These doctrines formed part of a moral imperative that derived from the principle of trusteeship and served as a main argument to legitimise colonial rule: the idea that, because of their cultural and political superiority, Europeans had an obligation to lift non-European societies out of a life stuck in tradition and "backwardness". This "mission civilisatrice" as it was called in France, already marked out the two distinct poles, between which the term development is oscillating until today: making more efficient use of resources on the one hand; and improving living conditions on the other.[140] The tension between these poles is a main thread than spans the entire history of development and electrification.

When the term "development" was used in the debate on how to make better use of the "imperial estates", as Chamberlain referred to the British overseas possessions, its connotation differed from earlier meanings. Whereas, for example, the Marxian notion of economic development described a historical process that happened without being consciously willed by anyone, colonial "development" was derived from the transitive meaning of the verb „to develop" and describes an activity. In an official memorandum in 1921, Lord Milner warned that "it is more than ever necessary that the economic resources of the Empire should be developed to the utmost".[141] When we read files of the British administration from this period,

---

[139] See, e.g., Winston Churchill, *My African Journey*, (Toronto: W. Briggs, 1909), 133.
[140] Hodge and Hödl, "Introduction," 3.
[141] Quoted in Frederick J. D. Lugard, *The Dual Mandate in British Tropical Africa* (Edinburgh. William Blackwell and Sons, 1922): 489.

with titles such as "development of electric power", we have to understand development in that same transitive meaning, as an action directed at something clearly defined – in this case the electricity system – but not necessarily as part of a broader process.[142]

Before WWII, colonial administrations in East Africa didn't give high priority to electricity regarding both "poles" of development mentioned above. Rather than a necessity for improving the standard of living, first, they saw it as a luxury, which would remain a privilege of Europeans and some Asians in urban areas for a while to come. Therefore, they saw little reason to intervene when utilities were running their business as "a small-scale luxury industry, closely geared to non-African needs".[143] Second, while Britain embarked on a few large-scale development projects in Africa, for example the £3 million Gezira irrigation scheme in Sudan, the plans for grandiose hydropower projects in the region remained rhetoric due to lack of financial resources in the colonies and of political will to invest metropolitan resources.

After all, British colonial administrators had not only adopted a system of indirect rule in their colonies, but there was also a wide consensus in Britain that the colonies should pay for themselves. This doctrine of financial self-sufficiency together with the colonial economic policy entailed the exploitation of mineral resources and the farming of cash-crops for export. The revenues thus generated should balance the notoriously tight state budgets in the colonies. In part one of my thesis I illustrate the consequences of this economic policy for electricity supply. Outside the urban areas, which received a moderate level of public supply, only enclaves of the extractive industries were electrified. Hausman et. al. generally describe electricity supply in colonial Africa as an "enclave form" of electrification.[144] Usually, mining companies or large plantations were operating their own electricity generators. In East Africa, the first-generation project for public supply outside the cities, the Pangani Falls hydropower project, was built with private capital and with support of the government to supply the nearby sisal plantations – the producers of the colonies' main export crop.

A substantial change in the pace and scope of building and expanding infrastructures in East Africa only came with the shift from the "preservationist colonialism" of the 1930s to the

[142] See, e.g., the files on "Development of electric power" in Tanganyika, BNA CO 691/98/1; BNA CO 691/93/9.
[143] Gail Wilson, *Owen Falls: Electricity in a Developing Country* (Nairobi, East African Publishing House, 1967), 25.
[144] Hausman et. al., *Global Electrification.* 50.

"developmentalist colonialism" of the 1940s and 1950s.[145] This shift was a reaction to a crisis of British colonial rule in the 1930s. With their export-oriented and trade-dependent economies, many African colonies had been hit particularly hard by the collapse of world commodity prices following the Great Depression in 1929. The following erosion of living and working conditions had increased social tensions, which escalated in numerous strikes, demonstrations and riots – for example the dock workers strikes in Dar es Salaam and Mombasa in the late 1930s.[146] Faced with increasing pressure in the colonies, Britain started to reform its colonial policies in the late 1930s. The most important outcome of this reform was the Colonial Development and Welfare Act 1940 in which Britain committed itself to spending more metropolitan resources to raise living standards in the colonies.[147]

Development now assumed a broader significance than before. It became a "framing device bringing together a range of interventionist policies and metropolitan finance", which was set up explicitly to implement the new economic agenda for the colonies.[148] Electricity supply in East Africa was integrated into a larger network of connections that might be termed "developmental". This network included a completely novel institutional set-up for planning, financing and managing *development* and consisted of various committees and commissions, public development corporations such as the Colonial Development Cooperation (CDC) and the Overseas Food Corporation (OFC) as well as research institutes and commissions, all of which were supported by a network of advisors and technical experts. In parallel to the advancement of public development finance, private capital for financing infrastructures in overseas territories was increasingly withdrawn, as will be shown at the end of the second part.

The crisis and reform of the colonial development policy and the implications of World War II reverberated in the power sector in East Africa. In my analysis, I dedicate a relatively large amount of space to the immediate post WWII years. There is a particularly intriguing story to tell about this period, during which contingent changes on the global level translated into a substantial reconfiguration of the networks associated with electricity supply at local level. This happened as the local infrastructure became incompatible with the novel requirements created by these new sets of relationships. In the case of East Africa, the small-scale

---

[145] Frederick Cooper, *Africa Since 1940: The Past of the Present* (Cambridge et. al.: Cambridge University Press, 2002), 20.
[146] John Iliffe, "A History of the Dockworkers of Dar es Salaam," Tanzania Notes and Records 71 (1970).
[147] Hodge and Hödl, "Introduction," 14.
[148] Frederick Cooper and Randall M. Packard, "Introduction," in International Development and the Social Sciences: Essays on the History and Politics of Knowledge, eds. Frederick Cooper and Randall M. Packard (Berkeley: University of California Press, 1998), 7.

distributed electricity systems, which had been designed such that the generation capacity would just slightly exceed the demand, partially broke down despite the new loads created by war-time activities. And so did the "gentle and gentlemanly" relationships between the private utilities and colonial governments, which had by and large shaped the day-to-day business of electricity supply before. Ultimately, flows of investment capital from Britain drained, as did flows of machinery and equipment.

The destabilisation and partial dissolution of the existing network concerned with power supply collided with British colonial administrators' ambitious goals for post-war development in East Africa. Within the new layers of significance that the concept of development had gathered, electricity became more important in regard to both poles of development. In the archival material on East Africa for this period, there are, for the first time, instances of colonial administrators discussing electricity, in particular electric lighting, as part of the basic infrastructure services that African were to receive – although only those who worked for the government. More importantly, however, electricity generation was at the core of extensive industrialisation plans for the three East African territories, which – as the British planners and administrators believed – would translate into a general rise of living standards.

In the post-war years, colonial governments in East Africa therefore initiated a planning process to develop more comprehensive electricity infrastructures, which included surveys for large-scale hydropower generation and first schemes for long-distance transmission – notably about 30 years after they had been built in Europe and US. The technical advisors from Britain who were commissioned for these studies therefore brought a set of well-established principles and assumptions about electricity supply, one of which was that only the state had the capacity to plan and manage electricity system in a way that would serve the overall interest in economic development and reconstruction after the war. For the same reason, the British electricity sector had been nationalised in 1947. In the public-private conflicts in the East African power sector described earlier, shared terms and concepts of state-led development therefore served as a rhetorical catalyser for mobilising proponents of nationalisation or closer state regulation of electricity supply. In effect, the two post-war decades marked the departure from the previous system of private, small-scale distributed

supply and laisser-faire energy policy in East Africa – and the ascent of the authoritarian development state.[149]

Seeing like a state, seeing like a donor – the rise of the authoritarian development state and Africa's entry into the era of large dam construction

During the two post-war decades, electricity supply in East Africa became an undisputed domain of the state and remained so until the late 1980s. This process was closely interlinked with an increasingly unwavering belief in the state's agency in "executing" development – and not only managing or inducing it – by engineering natural and social environments. The authoritarian development state has become an emerging field of investigation in the historiography of development throughout the last two decades. The pioneering and most referenced work in this debate is James Scott's book *Seeing like a state* from 1998. The narrative behind his account takes the form of a tragedy: Scott presents several case studies that illustrate "how certain schemes to improve the human conditions have failed", as the subtitle of his book reads.[150]

Scott explains these failures with a "pernicious combination of four elements": As the main driver behind the increasing state interventionism under the banner of development, he sees, first, the ideology of "high modernism", defined as a "particularly sweeping vision of how the benefits of technical and scientific progress might be applied – usually through the state in every field of human activity".[151] According to Scott, the "high modernist" ideology also implies a second element: the administrative ordering of nature and society by simplification and aggregation of facts to make them "legible" to central authorities, i.e. by manipulating complex circumstances into simplified and aggregated data. When these two elements are combined, and joined by a third one, an authoritarian state, they can become lethal – especially when, as a fourth factor, a "prostrate civil society" does not serve as a corrective.[152]

In my account of the post-World War II electrification of East Africa, I will discuss whether Scott's analytical framework can explain the transition towards a new model of electricity supply, which is characterised by a large-scale hydropower generation, centralised long-distance transmission networks and a high-degree of state control. Particularly the gigantic

---

[149] Christopher Gore, "Electricity and privatisation in Uganda: The origins of the crisis and problems with the response," in *Electric Capitalism: Recolonising Africa on the Power Grid*, ed. David Alexander McDonald (London: Earthscan, 2009, 368).
[150] James C. Scott, *Seeing like a State – How Certain Schemes to Improve the Human Conditions Have Failed* (New Haven et. al.: Yale Univ. Press, 1998).
[151] Scott, *Seeing like a State, 90.*
[152] Scott, *Seeing like a State,* 4.

hydroelectric dams are usually pictured in the historiography of development as prime examples of authoritarian states' high modernist visions and appetite for mega-engineering projects. Large dams were often the centrepiece of river basin development projects in Africa, which were initiated to replicate the success of the Tennessee Valley Authority (TVA), "the granddaddy of all regional development projects", following its formation in 1933.[153] The late colonial period marked Africa's entry into the era of large dam construction – an era which lasted well into the 1980s as governments of post-independent states and international development organisations readily took up the euphoria for hydropower generation and river basin development.[154]

There is a large body of historiographic literature on the most prominent African hydropower projects. Studies exist for the Akosombo Dam in Ghana, Aswan High Dam in Egypt, the Kariba dam in Mozambique/Zambia, the Cahora Bassa dam in Mozambique, Great Ruaha and Stiegler's Gorge in Tanzania and the Owen Falls in Uganda.[155] Following Scott and other critical scholars of development, these studies look at dam construction as a result of human hubris and focus on the – often detrimental – environmental and social legacy these projects have left to present-day African states: Displacement, resource conflicts over water, power crises in times of drought.[156] Few of these studies, however, looked beyond the project boundaries to consider the role of these large dams in shaping electricity infrastructures in Africa. There is, in fact, little to add to Hoag's and Öhman's detailed accounts of the genesis and impacts of the two major post-independence hydropower projects in Tanzania and Stiegler's Gorge and Great Ruaha.[157] In my analysis, I rather look at these dams as nodes in a wider network associated with electrification, which encompasses these large projects but also a few smaller generation and transmission projects. Once more, my aim is to trace how these networks were reconfigured in the wake of decolonisation and development policy transition from the bilateral relationships of colonial development policy to the multilateralism of international development aid.

---

[153] Scott, *Seeing like a State*, 6

[154] Showers, "Electrifying Africa," 200.

[155] On the Akosombo Dam, see Hart, *The Volta River Project; o*n the Aswan High Dam, see Fahim, *Dams, People and Development;* on Cahora Bassa, see Isaacman and Isaacman, *Dams, Displacement;* on Kariba dam, see*:* Tischler, *Light and Power*; on Great Ruaha hydropower project, see Öhman, "Taming Exotic Beauties;" Hoag and Öhman, "Turning Water into Power."; on Stiegler's Gorge, see Hoag, "Transplanting the TVA?" Hoag, "Designing the Delta;" for an overview, see: McCully, *Silenced Rivers*.

[156] Martin Walsh, "The Not-so-Great Ruaha and Hidden Histories of an Environmental Panic in Tanzania," *Journal of Eastern African Studies* 6 (2012).

[157] Öhman, "Taming Exotic Beauties;" Hoag, "Transplanting the TVA?" Hoag, "Designing the Delta;": Hoag and Öhman, "Turning Water into Power."

During the two post-war decades, the development of the continent's hydroelectric potentials increasingly became a focal point of British colonial development policy in Africa. The enthusiasm for large hydropower projects was fuelled by colonial governments' growing appetite for high prestige and capital-intensive projects. The economic and ideological aspects of the British development agenda, however, are only part of the explanation. Especially from the 1950s onwards, hydropower development became increasingly enmeshed in the political frictions that were caused by emerging nationalist movements in the colonies. As Kate Showers showed for Southern Africa, white settlers deliberately used the construction of large dams to increase regional cooperation despite the burgeoning nationalist movement.[158]At a time when the promise of managing economic development for the benefit of all became the major "raison d'être" for the colonial state, the construction of large dams seemed particularly well-suited to showcase the benefits of colonial rule. Furthermore, in light of the negotiations on the timing and terms of political independence, colonial administrators hoped that through their large-size and long planning horizons hydropower projects would safeguard British engineering and manufacturing interests for some time to come.[159]

My account of different hydropower projects in East Africa shows how the discourse on development became increasingly politicised. In the communication on the initiation and planning of the Owen Falls hydropower scheme in Uganda, economic and ideological issues were paramount. During the construction phase of the dam in the early 1950s, the colonial office made sure that the project received sufficient media coverage highlighting British commitment to the economic development of the region.

After the gradual political independence of most African states in the early 1960s, large dams had lost nothing of their appeal. For the leaders of the new nation states, dam projects were prime icons of development, symbolising the young states' capability to harness African resources for the benefit of African citizens. Many post-independence governments readily took up and implemented blueprints for hydropower projects from their former colonial rulers or commissioned new surveys on hydropower development – all with financing and technical assistance from the numerous national and international organisations that started to venture into the new "market" for development aid in Africa. Looking at them through the lens of the symbols and political rhetoric of that time, large dams seem to be a prime example of the materialisation of the authoritarian development states' high modernist visions. When looking

[158] Hoag, *Developing the Rivers*, 163, citing Showers.
[159] Hoag, *Developing the Rivers*, 163.

at the global network of actors concerned with electricity supply in East Africa, the picture becomes more complex, as I will show, especially regarding the agency of the states.

For the post-independence time, I have narrowed down the focus to Tanganyika, or Tanzania as the country was called after 1964, when it was united with Zanzibar. After the nationalisation of electricity supply in Uganda in 1947 and in Tanzania in 1964 and after political independence of the East African colonies in the early 1960s, the nation state became the undisputed framework for the planning and governance of electricity system in the region. This included deliberate attempts by the respective governments to reduce or remove all technical and organisational interconnections regarding electricity supply between the three states. Among the three post-independence states, Tanzania was a particularly interesting and well documented case of a "development state": Tanzania's experiment with "African Socialism" fascinated academics and politicians from the beginning and made it a well-documented case study of a "developing country."[160]

British colonial Tanganyika had been one of the most fertile grounds for the high modernist ideology and was the site of some of exemplary cases of state-induced engineering of social and natural environments. After World War II the British Colonial regime turned to planning large-scale agricultural development projects and mobilising the necessary labour. The most ambitious one was the gigantic groundnut scheme in Tanganyika, which was initiated in 1946. In this project, the ideology of "welfare colonialism" met with the colonial state's authoritarian power to enforce measures like resettlement and mechanisation. Because of the narrowly agronomic and abstract design and the planners' "blind faith in machinery and large-scale operation", the project turned into one of the biggest failures in the history of development cooperation and a massive financial loss for the British metropole.[161] Although the scheme was abandoned as unworkable in 1951, the idea that economic development required the intervention of a strong state remained well beyond independence.

A key pillar of Julius Nyerere's policy of African Socialism was the nationalisation of the country's natural, industrial, and communications resources as laid down in the Arusha Declaration of 1967. As a striking continuity to colonial regimes, coercion and occasionally

---

[160] See, e.g., Andrew Coulson, *Tanzania: A Political Economy* (Oxford: Oxford University Press, 2013); Kjell J. Havnevik, *Tanzania: The Limits to Development from Above* (Uppsala, Nordic Africa Institute, 1993); Henry Bienen, *Tanzania: Party Transformation and Economic Development* (Princeton N.J.: Princeton University Press, 1967); Goran Hyden, *No shortcuts to progress: African development management in perspective* (London: Heinemann, 1983), Justinian Rweyemamu, *Underdevelopment and industrialization in Tanzania: a study of perverse capitalist industrial development* (Nairobi: Oxford University Press, 1978).
[161] Scott, *Seeing like a State*, 229.

violence continued to accompany the introduction of modernising practices in post-independence African states. Tanzania's "ujamaa" villagisation programme in the early 1970s sets a classic and well-documented example of how a seemingly harmless principle like community development would become a vehicle of repression even under relatively benign leaders, such as Julius Nyerere. During the campaign, more than 5 million Tanzanians were resettled in villages whose layouts, housing designs, and local economies were planned, partly or wholly, by officials of the central government. With archival sources from local districts, Hubertus Büschel has recently illustrated the complex processes of social exclusion, control and punishment associated with the programme.[162]

These accounts suggest considering the construction of large hydroelectric dams and long-distance transmission networks in Tanzania primarily as a result of an authoritarian state's high modernist development agenda. If "Communism is Soviet power plus the electrification of the whole country", as Lenin's famous quote says, there is reason to believe that electricity had the same appeal to African Socialist leaders. In fact, the more efficient delivery of services, including electricity, was a key rationale of the villagisation program, as this quote from a speech by Julius Nyerere suggests:

> And if you ask me why the government wants us to live in villages, the answer is just as simple: unless we do we shall not be able to provide ourselves with the things we need to develop our land and to raise our standard of living. We shall not be able to use tractors; we shall not be able to provide schools for our children; we shall not be able to build hospitals, or have clean drinking water; it will be quite impossible to start small village industries, and instead we shall have to go on depending on the towns for all our requirements; and if we had a plentiful supply of electric power we should never be able to connect it up to each isolated homestead.[163]

Drawing a parallel with Lenin and his well-documented fascination for electricity, Scott commented that it is "[l]ittle wonder that electrification and tractors, those emblems of development, were on the tip of Nyerere's tongue as well as Lenin's."[164]

---

[162] Hubertus Büschel, „Eine Brücke am Mount Meru - Zur Globalgeschichte von Hilfe zur Selbsthilfe und Gewalt in Tanganjika," in *Entwicklungswelten - Zur Globalgeschichte der Entwicklungszusammenarbeit*, eds. Hubertus Büschel and Daniel Speich (Frankfurt/M.: Campus, 2009).

[163] Julius Nyerere, Inauguration speech 1962, quoted in: Andreas Eckert, *Herrschen und Verwalten: afrikanische Bürokraten, staatliche Ordnung und Politik in Tanzania, 1920-1970* (München: Oldenbourg, 2007), 254.

[164] Scott, *Seeing like a State*, 231; for an extensive treatment of the electrification of Russia, see Jonathan Coppersmith, *The Electrification of Russia, 1880-1926* (Ithaca: Cornell University Press, 1992).

Yet, I argue that, after independence, rather than any state ideology, the formation of a novel actor network associated with "development" and the shared concepts and measures of these actors shaped Tanzania's transition towards a model of large-scale (hydro)power production.

After independence, Tanganyika became an arena of competition for political and economic influence between the former British colonial rulers and several newcomers on the "market" for development aid, for example the Nordic countries or the German Democratic Republic. Cold war rivalries added another layer to this complex set of power relations between local and international actors. Despite the remarkable diplomatic skills, with which president Nyerere manoeuvred the country through the international diplomatic landscape, Tanzania's dependency from foreign aid limited its scope of action. At a formal level, sovereignty turned Tanzania's foreign relations into ones among equals; but, as Cooper suggested, independence had also "turned entitlement into supplication".[165]

In the third part of my thesis, I will delineate the profoundly reconfigured network of global connections and power relations in which electricity provision in Tanzania became enmeshed after independence. Within these networks, I have traced the personal and institutional continuities and discontinuities as well as the biographies, movements and encounters of a novel group of actors: African bureaucrats concerned with the governance of electricity as well as international aid workers and consultants working in Tanzania under the banner of "development" and serving a variety of interests. In this complex setting of different – often conflicting – interests and visions about electricity supply, I have investigated the key factors that decided which and how the various circulating ideas and project proposals materialised.

Along with other existing studies, my analysis proves the authority of scientific knowledge in the discussions and negotiations on electricity. The increasing scientification of development, particularly the rise of development economics as a sub-discipline of an abstract and formalistic field of studies, produced a set of terms and methods that came to be the lens through which electricity was regarded. They reverberated, for example, in the methods that the World Bank, the biggest international funding organisation of power projects in Tanzania from the late 1960s onwards, used to appraise development projects. These terms and methods consequently informed fundamental technological decisions, for example the decision to invest into the Great Ruaha hydropower project, which locked the country into specific electrification pathways for decades to come.

---

[165] Cooper, *Africa since 1940. The Past of the Present*, 88.

My analysis therefore connects to these and a few other recent careful investigations into the nexus between (post)colonialism, development and the production and application of scientific knowledge. One of the most formative contributions to this debate is Joseph Morgan Hodge's work *Triumph of the Expert. Agrarian Doctrines of Development and the Legacies of British Colonialism.*[166] Using the example of agricultural development and focussing on sub-Saharan Africa, Hodge shows that "hand in hand with this was the depoliticization of poverty and power achieved by recasting social and economic problems as technical ones that could be fixed by rational planning and expert knowledge".[167] My account describes a similar process. Regarding electricity provision in Tanzania, it situates the origins of Ferguson's "anti-politics machine" in the two post-independence decades. Ever since, electricity has rarely been discussed in terms of service provision but mostly in terms of its impacts on a set of macro-economic indicators.

[166] Joseph Morgan Hodge: *Triumph of the Expert. Agrarian Doctrines of Development and the Legacies of British Colonialism* (Athens: Ohio University Press, 2007).
[167] Hodge, *Triumph of the Expert,* 18f. On the aspect of depoliticisation, see also: James Ferguson, *The Anti-Politics Machine.*

Part I: Corporate power and domestic luxury in a low-energy Empire – Electrification during the interwar period, 1918-1940

For two weeks in July 1924, London was the centre of the growing global energy industry when it hosted the First World Power Conference. The Conference Halls at the Palace of Engineering, a huge sprawling concrete building at the site of the Empire Exhibition for the conference, were crowded with 1,700 delegates from 40 countries – scientists, engineers, manufacturers, financiers and politicians concerned with energy. This gathering signified the inexorable globalisation of electricity, transcending even the diplomatic trenches left by World War I. In fact, it was the first international conference after the war assembling both German and Russian delegates.[168] Besides the many delegates from Europe, the United States, Canada and Japan, there were also several representatives from different British Colonies. One of them was Mr. A.G. Bush, Executive Engineer of the public works department of Kenya Colony.[169]

The participation of a public works director, responsible for the supply of a handful of government buildings in a distant corner of the Empire, at an international conference on electricity seems somewhat remarkable. Britain, as some of the conference organisers and attending domestic politicians and industrialists hoped, would slowly start to take on a more active role in the electrification of its overseas Empire. Hitherto, regarding its potential to advance the imperial project, the relatively young technology had been completely outshone by other well established infrastructures, such as railways or irrigation. The slowly burgeoning interest in managing electricity provision in the Empire was essentially fuelled by two sentiments: first, a growing enthusiasm for the possibility of harnessing the Empire's rivers through large hydroelectric dams for the benefit of the British metropole and, second, a growing anxiety about the British electro-technical companies' lagging behind their international competitors in an increasingly globalised market for electric light and power.

The ascent of electricity as a viable and widely accessible service in the late nineteenth century had been paralleled by a surge in global communications. People and capital were more mobile than ever. Banking and trading at the stock markets in the economically more advanced European countries and in the United Stated became more and more international. The modern multinational enterprise came of age and contributed decisively to the spread of

---

[168] Rebecca Wright et. al. *From World Power Conference to World Energy Council: 90 Years of Energy Cooperation, 1923-2013* (London: World Energy Council, 2013), 13-14.

[169] "List of delegates and members," in *The Transactions of the First World Power Conference, London, June 30th to July 12th, 1924, Vol. I* (London: Percy Lund Humphries, 1924): 1496.

the capital-intensive electricity systems. World War I, then, had been a "turning point in the evolution of global electrification" as it shook the world economy markedly.[170] The war had spurred a new nationalism and new government intervention everywhere, including in the electricity sector. It had also shifted the weights in the global economy. After suspending the Gold Standard, Britain had lost its status as a pillar for international finance. The war had furthermore accelerated the deterioration of Britain's strategic position in the world economy. Yet, with the takeover of former German colonial territories after the war, the British Empire was politically at the height of its expansion.

As I will show in this part of my thesis, the tension between Britain's political (and cultural) power and its technological and economic backlog, particularly in electric engineering, reverberated in the negotiation processes of electricity provision in its East African colonies. My analysis of East Africa connects to a recent debate on how "metropolitan experiences influenced decisions about colonial electricity supply systems, or, conversely, how colonial experiences influenced the sector in Britain."[171] In a book chapter dedicated to this question, Heather Hoag traces how hydropower exploitation in the overseas territories gradually entered the scope of British colonial administration. She shows how the planning and implementation processes were influenced by colonialist preconceptions about and biases against African people and environments as well as by political motives. Yet, her chapter reveals little about the personal, economic and financial connections between the power sectors in Britain and Africa, especially those established by the numerous British electro-technical and engineering companies that ventured into the African colonies.

These and other non-state actors deserve specific attention, as Shamir has questioned the ability of colonial authorities to control the electrification processes considering the increasingly globalised market for infrastructure technology and enhanced technological and entrepreneurial capacities of the colonial subjects. In his recent study on British colonial Palestine, he concludes that, despite their political and legal facilitation of the electrification process, the British Government of Palestine and the Colonial Office "by and large lacked effective control over the actual technological, industrial, and ecological aspects of the process."[172] His detailed account constitutes a conceptual departure from sweeping explanations about the introduction of new technologies and infrastructures in the colonies.

---

[170] Hausman et. al., *Global Electrification*, 35, 125 (quote).
[171] Hoag, *Developing the Rivers*, 137.
[172] Shamir, "Electricity and Empire," 452.

In the same manner, I aim at a grounded account of electrification processes and related cross-imperial networks, localizing the macro processes described in the beginning of this chapter and their implications at different levels of the empire.[173] In the first section, I start out with an overview of the shared terms, concepts and narratives that informed the debates on electrification of the Empire – particularly the development of hydroelectric resources – among British engineers, industrialists, (economic) policy makers and colonial administrators in the early 1920s. These discourses reveal a discrepancy between the industrial and colonial stances towards electrification. On the one hand, the idea that electricity would become a major motive force in the future was widely-accepted; however, Britain was lagging behind other European countries and the US in terms of electrification and the coordinated planning of infrastructures and it was slower in adopting the doctrine of making better use of the "imperial estates" as suppliers of raw materials for the Britain metropole. These were the arguments put forward by some British engineers to promote coordinated efforts for the development of hydropower in the Empire and they informed the decision of the British Board of Trade to commission a study on the hydroelectric potentials of the Empire.

On the other hand, those institutions responsible for the administration of the colonies – above all the Colonial Office – showed little enthusiasm for the new technology. Far from using it as a "tool of empire", the Colonial office adopted a laisser-faire approach on hydropower development and left the initiative to the individual colonies. Struggling with budget constraints that arose from the British doctrine of financial self-sufficiency, the colonial governments, in turn, refrained from any financial commitment for hydropower development. Instead, they gave concessions for electricity supply, including hydropower development, to private enterprises. For the colonial administrations, the granting of concessions was instrumental for ensuring that electrification would still be in line with their political goals, such as advancing imperial trade, promoting the extractive industries in the colonies, and securing overseas markets for the British industry.

For Palestine, Shamir has argued that in light of the co-ability of local entrepreneurs and German electric engineers to bypass these attempts to control the process in favour of the British metropole, "the rise of electricity and Britain's late response this rise, may well have anticipated the decline of Empire."[174] The story I tell for East Africa in this chapter is quite a different one. In the second section of this chapter, I give a detailed account of how private

[173] On Barak: *On Time: Technology and Temporality in Modern Egypt* (Berkeley: University of California Press, 2013).
[174] Shamir, "Electricity and Empire," 459.

investors from London, in the early 1920s, gradually took control of the electrification of Kenya which had previously been in the hands of local entrepreneurs of British and Asian origin. This episode shows how the need for investment capital limited the scope of local entrepreneurship and gave advantage to multinational companies who enjoyed the trust of the financial markets and brought the necessary management know-how. From the mid-1920s on, well paid directors, contracted managers and consulting engineers from Britain ensured that the corporate policy of the East African Power and Lighting Company would first and foremost serve shareholder interest in the metropole.

A closer look at the network of key actors in this process, engineers and businessmen, their biographies, their movements and interactions illustrates that despite all economic considerations their relationships were overlaid with a cultural and political component. In the post-WWI world, the collective identity of "Britishness" entailed an implicit or explicit obligation to turn electrification in the colonies into an exclusively British project, ruling out foreign suppliers of plant and equipment or managers and shareholders of non-British descent – in the case of Kenya that implied Asian descent. In 1921, the British Parliament had passed the Trade Facilities Act to promote its stumbling industry.[175]

This also applied to the planning and financing of hydropower projects. Until the mid-1920s, gradually an Empire-wide network of a small subset of British engineers, entrepreneurs and colonial administrators had formed, through which ideas and experiences with the new technology circulated. By then, the big engineering companies in Britain had begun to see hydropower as a feasible and lucrative business opportunity. Technical advances made the transmission of electricity over longer distances possible, which allowed for connecting potential loads that were further away from the hydropower stations.[176] New data about the hydroelectric potential in some of the colonies was available from published government reports. Yet, despite the policy of the Board of Trade to facilitate exports of the electro-technical industries, the Colonial Office maintained its laisser-faire policy on the grounds that private business needed no further incentives. In fact, among the large British engineering companies, a veritable scramble for hydropower concessions in the colonies had started.

In the fourth section of this chapter I look at one specific example of a tendering process for hydropower concessions in the colonies – the case of the Pangani hydropower scheme in Tanganyika Territory. I follow the networks of communication, through which "multiple

[175] Stephen Constantine, *The Making of British Colonial Development Policy 1914-1940* (London: Frank Cass, 1984): 80-83; Hausman et. al., *Global Electrification*, 141.
[176] Showers, "Electrifying Africa," 198.

meanings, projects, material practices, performances and experience of colonial relations" were shaped and circulated and which connected corners of the Empire far away from each other – from India and Malaya to the British colonies in Africa.[177] Throughout the planning process, ideas, capital and individuals did not simply travel from London offices to the colonies. They moved vertically and horizontally through the empire, with London being a main knot in a web-like structure of relationships. This networked character of the Empire has been largely neglected in recent works on the history of electricity supply in Africa, which look at power generation projects independently from each other.[178] Consequently, these works tend to ignore the contingency and instability of colonial relations. The case of the Pangani hydropower scheme shows that large power generation projects were not only determined by the availability of resources, markets and technical possibilities but often by individual relations and contingent encounters that decided if and how much capital could be mobilised for a project.

The fifth section, then, is an examination of the electrification process in East Africa during the 1930s, after EAP&L had consolidated its monopoly in Kenya and Tanganyika. In this section, I turn to the question, why the rush to expand and interconnect systems in Europe and the US at the same time did not reach East Africa. Quite on the contrary, electricity provision in Kenya and Tanganyika expanded very slowly and – especially in Kenya – was plagued by regular supply shortages and political conflicts. Uganda did not receive public electricity supply before 1938 at all, after plans for a hydropower dam at the Victoria Nile had failed to materialise for nearly three decades. The reason for this sluggish electrification process, I argue, was a combination of several factors: Controlled by shareholder interests in London, EAP&L adopted a low-risk, piecemeal investment strategy geared at addressing the demand for electricity as an urban "luxury" and motive power for the few industries and plantations and not at building new markets. For an intervention of the state in the electrification, colonial administrations lacked the funds, expertise and the willingness – after all, the metropolitan economic policy for East Africa in the interwar period was characterised by reluctance towards, if not disdain for, industrialisation. This lack of backing from the state resulted in electrification often being subordinated to other political goals in the competition for

[177] Alan Lester, "Imperial Circuits and Networks: Geographies of the British Empire," *History Compass* 4 (2006): 131.
[178] See, e.g., Showers, "Electrifying Africa." An exeption is Hausman et. al., *Global Electrification*, see, e.g., page 35. Hausman et. al., however, focus on the "Western" World. For the networked structure of Empire, see Magee and Thompson, *Empire and Globalisation*, e.g. chapter 5: Information and investment, 170ff, especially: 204 on social webs.

resources and land. In Hughes terms, electricity systems in East Africa did not gain momentum.

1) Electric power for an Empire running out of steam? Colonial electrification and the distant promise of hydropower, 1917-1927

"In the age of steam this country led the way, whereas in the age of electricity, we seem to follow America and other countries."[179] This complaint by a British factory inspector in 1901 reflects a general anxiety at the time that the British electrical industry was falling behind in the international competition. During the first two decades of the twentieth century, this gap even widened as the pioneer British electric engineering manufacturers were struggling to meet the new market needs of the second phase of wider-scale electrification – the transition from small-scale local power stations supplying DC; to larger interconnected systems using three-phase AC transmission technology. Even on the domestic market, foreign companies readily filled the gap left by the sluggish British development. By the eve of World War I, three of the four leading firms in Britain were subsidiaries of German and US-American firms.[180]

The reasons for the comparatively slow and fragmented growth of the electricity system in Britain have received much attention by historians of technology.[181] For the subsequent electrification of the colonies, not only the backwardness of Britain's electro-technical industry was a poor prerequisite but also the legal framework for electricity supply in Britain. The Electricity Bill of 1882, for example, reserved the local authority the statutory right of acquiring control of an electrical utility operating within that authority's area. Among the manifold risks, which young electricity enterprises were facing at home and abroad, was the constant fear of having to engage in legal battles with local authorities who threatened to take control over the operations.[182]

As the country's backwardness in electrical manufacturing became increasingly apparent, British policy makers and industrialists tried to respond ideologically and politically. One of the most prominent figures was the Scottish entrepreneur Daniel Nicol Dunlop. He had spent

---

[179] Cited in Leslie Hannah, *Electricity Before Nationalisation* (Baltimore, John Hopkins University Press, 1979), 37.
[180] These firms were Siemens, British Westinghouse and British Thompson-Houston; see Hannah, *Electricity Before Nationalisation,* 37.
[181] Hannah, *Electricity Before Nationalisation;* Hughes, *Networks of Power;* Henry Self, *Electricity Supply in Great Britain, Its Development and Organization* (London: Allen and Unwin, 1952); I. C. R Byatt, *The British Electrical Industry, 1875-1914: The Economic Returns to a New Technology* (Oxford: Clarendon Press, 1979.)
[182] Hayes, *Stima, 47.*

three years, from 1896 to 1899, in the United States, where he was employed by the American Westinghouse Electric Company and worked his way up to the position of assistant manager and then manager of its European Publicity Department. After having returned to Britain in this capacity, he became one of the progressive thinkers of the British electrical industry. Together with Sebastian Ziani de Ferranti and others, he founded the British Electrical and Allied Manufacturers' Association (BEAMA) and became its first director.[183] The BEAMA was one of the most powerful trade associations of its time. It grouped all the major electrical companies in Britain under a common organisational umbrella, including German and American subsidiaries even. One of the major goals of the association was to increase the profitability of the industry, mainly through price fixing.[184] In addition, the BEAMA became the body through which Dunlop attempted to execute his visions of the future energy supply in the country and beyond.

In 1916, while World War I was raging, Dunlop outlined this vision in a small book titled *British Destiny: The Principle of Progress*.[185] In the book, he put forward a spiritual argument for close international industrial cooperation. Like any biological organism, he put forward, world unity would require a balance between individualism (or nationalism) and cooperation.[186] In contrast to the "Germanic methods of thought", following the principle of the survival of the fittest, he advocated a closer international cooperation through the "magic of Industry" which he saw as "the direct application of energy, under the control of the Will."[187] In his view, the British Empire was to lead the way towards greater cooperation between the nations after the War. Not surprisingly, one of the areas for which he saw international cooperation as crucial was energy, the prerequisite for any industrial activity. The creation of an international technical body on energy under the lead of the British Empire was therefore one of the main reasons for the BEAMA to organise what it claimed to be the "First World Power Conference" in 1924 – probably not accidentally ignoring much earlier events like the International Electrotechnical Exhibition in Frankfurt in 1891.[188] In Dunlop's words, the objective of the World Power Conference was to bring together experts from all

[183] J. F. Wilson, *Ferranti and the British Electrical Industry, 1864-1930* (Manchester, Manchester University Press, 1988), 106; Wright et. al. *From World Power Conference,* 10.
[184] Wilson, *Ferranti*, 106.
[185] D. N. Dunlop, *British Destiny: The Principles of Progress* (London: Path Publishing Company, 1916).
[186] Dunlop, *British Destiny*, 35ff.
[187] Dunlop, *British Destiny*, 81.
[188] Wright et. al. *World Power Conference*, 10; Jürgen Stehen et. al., *'Eine neue Zeit ...!' die Internationale elektrotechnische Ausstellung 1891* (Frankfurt am Main: Historisches Museum Frankfurt am Main, 1991).

over the world "to consider the utilization of the forces of nature [...] and to attempt to discover a means by which the nations of the world [...] might all advance together".[189]

International observers, however, were sceptical as to whether the "new internationalism" after the War, which Dunlop proclaimed to be the organisers main motive in the preface to the conference transactions, could be separated from British imperial ambitions. As one of the old coal producing nations, now rapidly churning through her stock, an American magazine commented, Britain should have a vital interest in learning from the countries that made more effective use of their different available energy resources and in pooling information about colonial reserves.[190] The fact, that the first of the four conference volumes was concerned with "power resources of the world, available and utilised" and one of the first conference sessions titled "British Empire and USA resources" emphasised the importance of the colonies for Britain's future prosperity seemed to confirm this scepticism.[191]

Yet, the administrative bodies that were responsible for overseeing Britain's overseas colonies did not attach much importance to the topic of the conference. The Colonial Office, supposedly one of the main beneficiaries of the attempts to gather information on energy resources in the colonies, remained unexcited about the conference, fearing that it might be overtly technical to directly benefit. In dealing with the colonies in Africa, the West Indies and the Mediterranean, the Colonial Office held a purely administrative mandate – contrary to the Indian Office, which had considerable authority over legislative bodies and local governments in India that was only gradually curtailed by the India Acts of 1919 and 1935. In their communication with the conference organisers, the Colonial Office pointed out that most power plants in the colonies were dealt with by the Crown Agents. The Colonial Office itself therefore confined its role to sending out invitations to representatives from the colonies.[192]

Among the papers presented at the conference were therefore also contributions from the British colonies: Among them was a paper on coal reserves in Southern Rhodesia as well as several papers on water power resources, for example in British Guiana, Southern Rhodesia,

---

[189] Daniel Nicol Dunlop, foreword to *The Transactions of the First World Power Conference, London, June 30th to July 12th, 1924, Vol. I* (London: Percy Lund Humphries, 1924): vii.
[190] Cited in Wright et. al., *World Power Conference*, 15.
[191] *Transactions of the First World Power Conference, Vol. I*, 1ff.
[192] For the respective correspondence, see BNA CO 323/915/31, cited in Wright et. al. *World Power Conference*, 16. The Crown Agents oversaw infrastructure projects on behalf of the British Colonial Office in the "dependent" colonies (most of British Africa, India, and the West Indies), see van der Straeten and Hasenöhrl, *Connecting the Empire*, 369. See also David Sunderland, *Managing the British Empire: The Crown Agents*, 1833–1914 (Woodbridge, UK: Boydell & Brewer, 2004); David Sunderland, *Managing British Colonial and Post-Colonial Development. The Crown Agents, 1914–1974* (Suffolk: Boydell & Brewer, 2007). They didn't play a role in the electrification of the British East African territories, except for occasionally being asked for experiences with hydropower projects in other colonies.

and the Indian Empire. The focus on hydropower potentials reflected a general trend at the conference: While only two papers among all contributions dealt with oil resources and nine papers with coal resources of different countries, twenty-six contributions were concerned with water power resources all around the world.[193] If electricity was the "wonder worker of the day and generation", as the Chairman of the session on energy resources in Europe, Asia and South America put it, water power seemed to be the most promising resource to produce it.[194]

By the time the conference took place, the existence of large hydropower resources in the colonies had been a well-known fact among British engineers, industrialists and colonial administrators for some time. The respective passages for East Africa from Winston Churchill's travel report "My African Journey" from 1908, for example, were probably familiar to nearly every colonial administrator.[195] In 1907, Churchill had visited Uganda Protectorate in his function as under-Secretary of State. At the sight of the Ripon Falls at the upper course of River Nile, he was fascinated with the idea that the site held enough power ready "to gin all the cotton and saw all the wood in Uganda".[196] Churchill's words illustrate how the idea of harnessing the Empire's rivers for hydropower generation connected to Chamberlain's "Imperial Estates" doctrine. "[W]hat fun," Churchill had mused, "to make the immemorial Nile begin its journey by diving through a turbine".[197]

These visions, however, stood in contrast to Britain's experience with hydroelectric generation at home. The British Isles themselves offered little potential for large scale hydropower generation, except for some waterways in the Scottish Highlands. In the early 1920s, a mere 0.6% of total electricity generated in Britain came from hydropower, whereas throughout continental Europe the share was as high as 27%.[198] The lack of domestic experience with hydropower generation projects did not only entail a deficit in the related technical expertise in civil and electrical engineering among British companies. It also seems to partly explain, why specific forms of the governance of electricity systems evolved in Britain.

---

[193] Contents of *Transactions of the First World Power Conference, Vol. I,* xv-xxi.
[194] Quote by the Chairman of the panel on Resource of European, Asiatic and South American Countries, Dar George Otis Smith in *Transactions of the First World Power Conference, Vol. I,* 1417.
[195] This is what Hayes suggests in *Stima*, 329.
[196] Winston Churchill, *My African Journey*, (Toronto: W. Briggs, 1908), 74.
[197] Churchill, *African Journey*, 133.
[198] Dugald Clerk and A. H. Gibson, *Water-Power in the British Empire; the Reports of the Water-Power Committee of the Conjoint Board of Scientific Societies* (London: Constable & Co., 1922).

As Bernhard Stier's comparative study on three regions in Germany shows, the availability of large hydropower potential was in many regards formative in the early phase of electrification. The region of Baden, for example, where the biggest run-of-the-river hydroelectricity plant in Europe at the time had commenced operations in 1898, had become a pioneer in state electrification policy. Based on the experiences with these first privately operated hydropower plants on the High Rhine, the government had developed a distinct policy in the first decade of the twentieth century and advocated rigid state control and centralised management of the electricity system through large-scale state corporations.[199] The state in Britain, in contrast, left the development of water power resources to private enterprise, but without setting up a transparent legal framework, for example regarding water rights. In a paper on the "Water Power Problem in Great Britain and Ireland," presented by A.H. Gibson at the first World Power Conference, the author wrote that one of the major obstacles to private hydropower development was multiplicity of interests and of authorities involved. As the state didn't claim any ownership of water rights, many project schemes had been abandoned because of the fear of law suits with riparian owners.[200]

The first sign of any organised interest in water power in Britain was a direct response to the shortages caused by World War I and the foreseen need for economic recovery after war.[201] In 1917, the Conjoint Board of Scientific Societies appointed a committee on the issue, which was followed by a Water Power Committee of the Board of Trade in 1918. This committee was commissioned to conduct a survey on existing hydropower plants and potential sites throughout the British Empire and to make recommendations on how the procedures to develop these schemes could be made simpler and cheaper.[202] Other governments of the Empire followed. As a direct result of the war, both the Supreme and the Local governments in India declared their policy to encourage indigenous industries and start new ones. A report of the Indian Industrial Commission on this issue recognised the potential benefits of cheap electricity from hydropower plants and the possible need for a more interventionist state policy. Upon recommendation of the Commission, the government of India hence decided to conduct a comprehensive survey on the hydropower resources of the country, which were

[199] Stier, *Staat und Strom,* 39.
[200] A.H. Gibson contribution in the discussion of the panel on British Empire and U.S.A. resources, in: *Transactions of the First World Power Conference, Vol. I,* 669; A.H. Gibson, "Water Power Problem in Great Britain and Ireland," in *The Transactions of the First World Power Conference, London, June 30th to July 12th, 1924, Vol. I* (London: Percy Lund Humphries, 1924).
[201] It was a policy of the Imperial War Conferences, see Hoag, *Developing the Rivers,* 141.
[202] *Transactions of the First World Power Conference, Vol. I*, 669; Hoag, *Developing the Rivers,* 141, 137.

practically unknown at the time. The work for the survey started in 1919.[203] The government of British Kenya had appointed a special water engineer to organise and carry out a hydrographical survey of the protectorate.[204] In many other colonial territories, large potentials for hydropower generation were known but their investigation hadn't started yet.

In 1922, the British committee's report on "Water-power in the British Empire" was published. It was the first document to provide a general overview of what was known about the hydropower resources in the different parts of the Empire. The authors lamented that, while continental European countries had developed 18% and the United States 20.3% of their available hydropower resources, the British Empire made use of only 5% of available resources. Of all the total developed resources in the Empire, Canada, where the hydropower development was far more advanced than in any other part, alone accounted for 72%. When removing Canada from the calculation, the authors stated, the rate of utilisation of resources in the Empire dropped to a dismal 1.7%.[205]

In the British "tropical" colonies, India was the only territory where large hydropower plants had been built. There, private capital had paved the way. In 1915, the Tata Power Company commissioned a hydropower plant with a generation capacity of 72 MW in Khopoli in the Western Ghats near Mumbai. In 1919 and 1922, two more hydropower plants were installed, the first in Bhivpuri, with a capacity of 78 MW, and the second one in Bhira, with a capacity of 300 MW.[206] On the African continent, only a handful of run-of-the-river hydro-electric generators had been installed. One of them was the small Ruiru Hydro Electric Plant in Kenya, which had been built by NEP&L in 1908 to supply electricity to Nairobi.[207] In Nigeria, mining consultants had recommended the N'gell River's Kwall Falls for hydropower production in 1910, but it was not before 1923 that a 2 MW run-of-the-river hydro-electric generator was installed.[208]

---

[203] J. Willoughby Meares, "National Review of the Water Power Resources of the Indian Empire," in *The Transactions of the First World Power Conference, London, June 30th to July 12th, 1924, Vol. I* (London: Percy Lund Humphries, 1924): 451; a preliminary report was compiled by Meares in 1919, see Kale, "Structures of Power," 467.

[204] Clerk and Gibson, *Water-Power*, 21.

[205] Clerk and Gibson, *Water-Power*, 14.

[206] For details on the project, see Pierre Lanthier, "L'électrification de Bombay avant 1920. Le projet de Jamsetji N. Tata," *Outre-mers* 89 (2002).
Clerk and Gibson, *Water-Power*, 18.

[207] E. V. Richards, *Report on the Hydro-Electric Resources of East Africa* (London: Cook, Hammond & Kell Printers, 1947), Hayes, *Stima.*

[208] E.S. Simpson, "Electricity production in Nigeria," *Economic Geography* 45 (1969); Showers, "Electrifying Africa," 197.

One major obstacle for the construction of hydropower plants in Africa was the high seasonal flow variation of most African rivers as opposed to most rivers in Europe. Some of the first power plants, for example the Ruiru power plant in Kenya, proved to be so unreliable that they were dismantled later.[209] Struggling with a lack of knowledge about local hydrological conditions, British engineers were not only disadvantaged by having much less practical experience in large scale hydroelectric engineering than their Canadian, US-American and European continental counterparts. There was also a lack of training facilities for hydro-electric engineering and of respective classes at the British engineering schools.[210] In India, lecture courses in hydro-electric engineering had been instituted in all major colleges controlled by the government by 1920.[211]

As Britain's industrial policy-makers were slowly stepping up their efforts to assess and manage the Empire's waterpower resources, the debate on developing them reached the public. On May 25th, 1921, the Financial Times published a contribution by Douglas Spencer. Spencer was the manager of the Hydro Electric Department at W.G. Armstrong Whitworth's Company, a manufacturer with a portfolio ranging from armaments and ships to aircraft, which had recently started to produce water turbines. Spencer's article was introduced as a "timely review of the future international industry" laying particular emphasis on the "fundamental fact that in the forthcoming era of acute competition cheap power must play an indispensable part in establishing our imperial position."[212] Together with the reports from the hydropower surveys, conference papers and correspondences, this article offers insights into the shared presumptions and narratives about electricity as a form of energy, hydropower generation and its role for the imperial industrial policy in Britain in the early 1920s. Entrepreneurs, engineers, financiers and officials drew on these narratives when circulating their ideas and project plans within the networks of colonial administration.

In his article, Spencer clearly addressed a general anxiety in Britain, contrasting the situation of the country's industry to the one in Belgium and Germany, "the two nations which are enjoying the highest conditions of industrial happiness and prosperity" – notably only three years after the war had ended. While these countries had managed to "pull together" and "get going again", Britain was still stuck in its "own chaos of problems".

---

[209] Showers, "Electrifying Africa*,"* 197.
[210] Clerk and Gibson, *Water-Power*, 51.
[211] Clerk and Gibson, *Water-Power*, 51.
[212] Douglas Spencer, "Hydro-Electric Power in the British Empire," *Financial Times*, May 25, 1921, BNA CO 323/885/55.

According to Spencer, the root cause of these problems was that Britain had not yet managed to address the challenges stemming from "three undeniable truths": first, the necessary decentralisation of industry, which, second, needed to relocate to places where cheap motive power – in particular hydropower – was available since, third, coal was economically inferior to hydropower, as Spencer tried to demonstrate in exemplary financial calculations. This reverberated with the report of the Water Power Committee, which had highlighted that coal was becoming increasingly scarce and therefore more expensive on a global scale. Against this backdrop, the report had stated that "it might be of advantage to consider our position in a coalless and oilless world."[213]

Both documents shared the view that developing the Empire's hydropower resources was a necessary precondition for tapping the "latent wealth" of its "tropical dependencies", for example by operating railroads, developing irrigation schemes or exploiting mineral deposits.[214] "We have entered on an era of acute industrial competition,", Spencer concluded his article, "in which victory will rest with those nations who can most economically combine these three fundamental components of all industrial commodities – raw material, power and labour." Against this background, he argued, Britain needed to revise its perspective on its overseas dominions and possessions as "being a mere outlet for our manufactures and a source of comparatively raw material." As the British Isles had little to offer regarding their hydropower potential, he recommended that those industries which did not involve highly skilled labour should be moved to those parts of the Empire that offered cheap motive power.[215]

In October 1921, Spencer sent a letter to the Colonial Office, attaching a copy of the newspaper article, which, as he explained, he had written in order "to stimulate interest in this matter amongst financial circles in the City". The main purpose of his letter was to advertise his idea of an Empire-wide conference on hydropower development, which would be aimed at pooling data on available resources, compiling capital costs for their development, examining markets and discuss means of raising capital. This was in line with the central recommendation in the Committee's report which also advocated the formation of a permanent "Imperial Water Power Board" with the same function.[216]

---

[213] Clerk and Gibson, *Water-Power*, v-vi.
[214] Clerk and Gibson, *Water-Power*, 49, 2.
[215] Spencer, "Hydro-Electric Power."
[216] Clerk and Gibson, *Water-Power*, 51.

Although the business interests behind his letter were obvious, the way Spencer presented his arguments seem remarkable in different regards: first, he tied them to the political discourse by referring to a speech Churchill had recently held before the Gold Coast Civil Society, which Spencer believed to have "drawn close attention to the question of raising capital for sound works of public utility." Second, his letter suggests a vivid and Empire-wide circulation of ideas among engineers from private companies and government institutions alike: Although his wording raises suspicion of exaggeration, Spencer claimed that for some years he and the Chief Government Engineers responsible for hydro-electric work in Canada, India, New Zealand and Australia had been corresponding with each other regarding the possibility of an Empire conference on water power development.[217]

At the Colonial Office, however, Spencer's proposal was dismissed because "it is of little use to know water power is running to waste in a Colony of there is nothing particular to do with the water power, when you have got it", as one official comments. "First of all," he demanded, "find something for which we want the power." Earlier discussions on the topic at the Colonial Office had been "fairly conclusive about it".[218] Other officials suspected that Spencer was simply trying to obtain work and were rather worried about "the Colonial Office being dragged into any useless schemes".[219]

In fact, the option of investing scarce government funds into the facilitation of hydropower development must have looked risky for the Colonial Office in the early 1920s. The technology itself was new; few experiences with hydropower had been made in the British metropole and its costs were comparatively high and difficult to predict – as was the demand for electricity in the colonial territories. "At present not even an approximately complete inventory exists, much less the practical and commercial information that would assist development of this important national resource", the British "water-power" report had concluded.[220] Most potential sites for hydropower generation were located far away from industrial areas and supported the agricultural base of most colonies' economies; hydroelectricity generation didn't seem to be the adequate use of rivers. In a paper on water power in India, Meares concluded that by and large, "[w]ater, rather than water-power, is the prime need of the country", although he considered that the newly built dams for irrigation

[217] Spencer to Masterton Smith, October 3, 1921, BNA CO 323/885/55.
[218] Minute by Fiddian, October 17, 1921, BNA CO 323/885755. Unfortunately, it was impossible to retrieve the minutes of these earlier discussions, which date back to 1918. Report of the Water Power Resources Committee:
[219] Note, unknown author at Colonial Office, October 26, 1921, BNA CO 323/885/55.
[220] Clerk and Gibson, *Water-Power*, 49.

could be used for electricity generation as well. These, however, were "developments which cannot now be even dimly foreseen."[221]

The short correspondence between Spencer and the Colonial Office illustrates the discrepancies between rhetoric and ideas related to development and electricity on the one hand, and the actual scope of imperial policy on the other. In his book "Taxing Colonial Africa", Leigh A. Gardner argues that "it is difficult to understand any colonial period through decolonisation without considering the resource constraints of the colonial state".[222] After all, the Colonial Office was operating within the boundaries of a British colonial development policy, which was aimed at governing the British overseas possessions with a minimum input of metropolitan resources.[223] On the side of the colonies themselves, their tight state budgets did not allow for making large financial commitments to subsidise the planning and construction of hydropower projects.

In the course of the 1920s, the hopes of British engineers to harness the Empire's rivers for hydropower generation was nurtured by the fact that the British government began to revise its economic policy for the colonies. Hodge characterises this period as "a transitional phase from the predatory, if increasingly more systematic, economic exploitation of the colonies, to a significantly reformed and modified system of colonial governance."[224] Among British administrators, there was a growing recognition of the need for closer imperial economic integration and hence for a more coordinated colonial development policy. Britain's relationship to "Tropical Africa" was primarily defined by the concept of the "Dual Mandate", laid down by Sir Frederick Lugard in 1922, who saw a dual responsibility both for the well-being of indigenous people and the economic exploitation of the continent for the benefit of all.[225]

East Africa was selected as one of the areas where this concept was to materialise. In 1925, a parliamentary commission on East Africa headed by William Ormsby-Gore recommended the expansion of the transportation and communication networks to increase the production of primary products for export. The commission's report was not only received with enthusiasm

---

[221] Meares, "Water Power Resources of the Indian Empire," 458.
[222] Leigh Gardner, *Taxing Colonial Africa: The Political Economy of British Imperialism* (Oxford: Oxford University Press 2012): 1.
[223] Hoag, *Developing the Rivers, 144.* For an overview of British colonial development policy, see Constantine, *British Colonial Development Policy.*
[224] Hodge and Hödl, "Introduction," 7.
[225] Lugard, *The Dual Mandate.*

by the British scientific press but also by the colonial secretary Leopold Amery.[226] The report shows, however, that electricity did not rank high on the priority list of the British administration for the colonies. Funds were made available for other infrastructures: London agreed to guarantee a £10 million East African Transport Loan over ten years for the extension of railway networks, the expansion of harbours, road construction and mechanical transport.[227] A £3 million loan was granted for one of Britain's most prominent colonial development projects, the Gezira Cotton Scheme in Sudan, which included the construction of the massive Sennar dam and several irrigation canals.

The Gezira scheme was one of the first British experiments in public-private cooperation for colonial development. While the Sudanese state was responsible for the construction works, the Sudan Plantation Syndicate, a commercial consortium, managed the dam and operated the ginneries.[228] The case of Gezira shows that infrastructures were not rolled out easily and evenly over colonised landscapes and societies. In his recent study of the scheme, Maurits Ertsen argues that its classical portrayal as "a centrally planned, British colonial effort...continuously based on strong control over tenants and production" tells only part of the story.[229] He regards the project rather as a prime example of "contested development", showing how realities on the ground were constantly being negotiated at all levels: between different governmental agencies and the Syndicate, between management and inspectors within the company as well as between tenants and field staff.

By and large, the doctrine of a dual mandate, however, remained rhetoric rather than actual policy and did not translate into public investment into large-scale electricity projects in the overseas territories. Britain still lacked the political will of spending metropolitan money on its overseas possessions and the limited funds available for infrastructure projects were earmarked for purposes other than electricity. At the same time, colonial governments were still bound to the strict spending limits imposed on the colonies.[230]

Another key aim of the British development policy in the 1920s was the intensification and coordination of scientific research by the imperial and local governments. The idea of a strategic engagement of science and expertise to solve the problems of tropical development was not new. Efforts of the Colonial Office to build up an advisory network dated back to

---

[226] Constantine, *British Colonial Development Policy,* 119.
[227] Hodge and Hödl, "Introduction," 10.
[228] Hodge and Hödl, "Introduction," 10.
[229] Maurits W. Ertsen, *Improvising Planned Development on the Gezira Plain, Sudan, 1900-1980* (Basingstoke: Palgrave Macmillan, 2015): 7.
[230] Hodge and Hödl, "Introduction," 11.

Chamberlain, but it was not before the interwar period that a substantial expansion of technical expertise began. Professional advisors and standing committees covered those areas, which were perceived as essential for tropical development: health and sanitation, education, agriculture and animal health, fisheries, nutrition and labour, and mineral resources.[231] Among these, Amery considered tropical agricultural research and expertise as the domain that was most in need of support. Under Amery, the Colonial Office also attempted to centralise and coordinate knowledge across the geographical departments, which were operating as self-contained units with little exchange of ideas and staff among each other. For this purpose, pan-colonial forums were organised, for example the 1927 Colonial Office Conference.[232]

In the aftermath of the conference, Douglas Spencer saw a new opportunity arising for promoting his ideas on coordinated development of hydropower resources in the colonies. The correspondence between Spencer and the Colonial Office gives an idea on how the discourse on the electrification of the Empire had advanced and added the new layers of meaning to the concept of development.[233] It started with a letter from Spencer to the department of overseas trade from May 1927 in which he suggested, with reference to the reports of the conference, that "the scientific organisation, which (...) Mr Amery is proposing, could surely also include electro-metallurgical and electro-chemical subjects within its studies."[234] The department for overseas trade referred the matter to the colonial secretary Amery. In his further correspondence with the Colonial Office, Spencer specified his idea on how to coordinate "investigation in Imperial Development, from the Industrial point of view" and "on what lines various forms of Engineering can co-operate with Science towards a speedier Imperial Development".[235] He suggested setting up an "Institution of Imperial Development" with the help of engineering firms and institutions, with a committee consisting of the members of the committee of a number of British engineering institutions.[236]

---

[231] Overview at Hodge, *Triumph of the Expert*, 9-10, 44.
[232] Hodge, *Triumph of the Expert*, 97.
[233] Spencer was associated with the company James Gordon Waterpower Engineers and Contractors and had previously worked for Armstrong Whitworth, a major British manufacturing company (see note by Jardiner, July 28, 1927; Spencer to Under Secretary of State, December 19, 1927, written on letterhead of James Gordon company), BNA CO 323/983/8.
[234] Spencer to Samuel, May 16, 1927, BNA CO 323/983/8.
[235] Spencer, letter to Secretary of State for the Dominion, July 20, 1927; Spencer to Under Secretary of State, December 19, 1927, CO 323/983/8.
[236] Spencer mentions the institutions of Civil Engineers, of Electrical Engineers, of Mechanical Engineers, of Mining Engineers and of Chemical Engineers, as well as British Electrical & Allied Manufacturers Association and the British Empire Producers Organisation. Spencer to Samuel, May 16, 1927, BNA CO 323/983/8.

Spencer supported his arguments with several enclosed articles he had published in the *Financial Times* and in the journals *The Electrical Review* and *The Engineer*.[237]

In these articles, he had delineated a wider vision of imperial development in which the metropole systematically investigates its colonial territories' natural resources and coordinates their exploitation for the metropole. Spencer lamented that "[at] present we develop our Empire in the same manner as we have in the past repaired our London streets – piecemeal."[238] He praised the "German's method of looking at a country as being capable of development by a programme and 'according to a plan'" as "economical and speedy", contrasting it to the British policy of indirect rule. This, Spencer hoped, was about to change as the Colonial Office had adopted a more interventionist development policy. His key argument took up the recent revitalisation of the Chamberlainite development doctrine under Amery. This doctrine had painted an image of colonial territories as vast unutilised estates. By means of metropolitan capital, technology and scientific knowledge, these estates could be turned into suppliers of raw materials and foodstuffs and markets for manufactured goods from Britain.[239]

In Spencer's article, this image blended with a recently established technological ideal of electricity infrastructures as single, unified systems connecting large power plants to loads across huge regions, entire nations or, someday, a whole continent. This ideal had been associated with the "interconnection" movements of electricity provision in some industrial countries, for example in the USA or in some parts of Germany. There, electric power companies had started consolidating their business operations in 1910 and linked municipalities, and later entire regions, into single systems.[240] This process had been facilitated by advances in long-distance transmission, which made efficient transmission over distances up to 322 km possible.[241] In addition, improvements in metallurgy and fertiliser production had further added to the list of potential applications for electricity.[242] Spencer's

---

[237] Spencer to Samuel, May 16, 1927, BNA CO 323/983/8.
[238] Douglas Spencer, "Empire Development and the Engineer," *The Engineer*, December 6, 1927, BNA CO 323/983/8.
[239] Herward Sieberg, *Colonial Development: die Grundlegung moderner Entwicklungspolitik durch Grossbritannien*, 1919-1949 (Stuttgart: Steiner, 1985): 9; Hodge, *Triumph of the Expert*, 55. See also: David John Morgan, *The Official History of Colonial Development: The Origins of British Aid Policy, 1924-1945* (London and Basingstoke: Macmillan, 1980), chapters 10 and 15. See also the extensive documentation in S. R. Ashton and S. E. Stockwell, eds., *British Documents on the End of Empire*, series A, vol. 1: Imperial Policy and Colonial Practice 1925–1945, part 2: Economic Policy, Social Policies and Colonial Research (London: HMSO for the Institute of Commonwealth Studies in the University of London, 1996).
[240] See, e.g., Morton Jr, "Reviewing the History," 60; Stier, *Staat und Strom, 442.*
[241] Showers, "Electrifying Africa," 198.
[242] Hoag, *Developing the Rivers*, 140.

articles are among the first sources in Britain explicitly suggesting the export of a model of power supply to the colonies, which was abstracted from the experiences in the industrialised West. "Development engineers" in the colonies, he demanded, should "investigate the knowledge which the older world has acquired in the development of its own resources and building up its industries, and apply that knowledge in the development on systematic and co-ordinated lines of his own particular territory."[243]

To support his general argument that "power means prosperity", he gave examples from the metropole itself as well as from its "white" dominions: "There is not a Canadian power scheme which has failed to prove this in the increased wealth of the surrounding country." Industrial development, Spencer stated, "invariably follows water power development, just as industry has congregated in the coal raising district of Britain."[244] To support his argument, Spencer drew a striking analogy: Except for the climatic conditions, "a very distinct resemblance" could be traced to the conditions in Norway.[245] Spencer remarks that "the less developed countries are a very fruitful field for research. The Rjukan hydro-electric developments in Norway were not caused by population or anything already in existence".[246] The selection of the remote Norwegian valley of Rjukan at the European periphery as his primary example illustrates the imagination of colonial territories as "empty spaces" waiting to be engineered for development – an imagination he shared not only with many contemporaries but also with later hydropower planners and engineers in Africa.[247]

Spencer saw no reason to doubt that "the adoption of the super-station [which] in this country is accepted as the proper method of power" will work for the periphery of the Empire as well. Though he acknowledges the difficulties to "find a super-load in sparsely populated areas" and the variety of load profiles in the different parts of the Empire, he advocated a broad, supply-driven planning of large-scale power projects. Rather than looking only at the local population as a load and potential market for electricity, project developers were supposed to think in terms of establishing large industries and creating synergetic potentials with other sectors, for example through railway electrification. His ideas were probably informed by the

[243] Douglas Spencer, "Imperial Development and Co-ordinated Investigation," *The Electrical Review*, May 6, 1927, May 6, 1927, BNA CO 323/983/8.
[244] Douglas Spencer, "Hydro-Electric Problems", *The Financial Times*, May 7, 1927, BNA CO 323/983/8. As a concrete example, he mentions the Southern Canada Power company in the Drummondville area.
[245] Spencer, "Hydro-Electric Problems."
[246] Spencer, "Imperial Development and Co-ordinated Investigation."
[247] See Hodge on the "Imagination of tropical lands as vast, undeveloped states, full of untapped resources." Hodge, *Triumph of the Expert,* 54.

experiences from the United States and France, where advances in long distance transmission had spurred the electrification of railways.[248]

> One of the first questions a pioneer Government must ask is: "Is it not possible to build an electric railway in the first instance? Can heavy power using electro-metallurgy and electrochemical industries be established to form a large basic market for power, or can other industries be fostered to help in creating a market for power, so that we may have cheap and efficient transport?"[249]

What was at stake, Spencer claimed, was no less than the fulfilment of Norway's "alchemist's dream" for the British Empire. With the Empire's periphery as processing areas for British companies, "we could work up our own Imperial raw material by using Imperial water powers rather than by sending our raw materials to Norway to be reduced there and then sent to us."[250] Large power projects in the colonies would compensate for the absence of hydropower potentials in Britain, which Spencer considered the main reason for Britain's lagging behind its European competitors in Germany, France, Scandinavia and Italy regarding the knowledge on electro-metallurgy and electro-chemistry.[251]

Spencer had a clear idea of who would take the lead in this process. In the journal "The Engineer", he dedicated a full article to the "development engineer" – a new type of engineer, who would play the central role in "pioneering governments'" quest of coordinated investigation. Contrary to other types of engineers, which he defined as "(1) The engineer who knows how to make machinery or to construct engineering works" and "(2) The engineer who can sell products from the first", the development engineer as a third category "has a particular gift for wide and general observation, and (...) can see how his profession can assist in providing means for the utilisation of the resources of nature".[252] This engineer, Spencer proposed, should compile knowledge from industrial engineers in different areas and "he is the one man to whom all go, should they feel that their own particular development would be made easier if a more general development of the district were proceeded with, which is undoubtedly often the case".[253] Throughout the empire, Spencer stated, this type of

---

[248] Hoag, *Developing the Rivers*, 140.
[249] Spencer, "Imperial Development and Co-ordinated Investigation."
[250] Douglas Spencer, "Hydro-Electric Problems."
[251] Spencer to Samuel, May 16, 1927; Douglas Spencer, "Hydro-Electric Problems."
[252] Spencer, "Empire Development and the Engineer."
[253] Douglas Spencer, „Empire Development and the Engineer."

development engineer was only to be found among the industrial engineers working for the Indian government.[254]

Once again, Spencer's enthusiasm was in stark contrast to the lukewarm reception of his ideas at the Colonial Office. Similarly to his earlier requests from 1921, his initiative for an "Institution of Imperial Development" left colonial administrators puzzled about "what exactly they are going to discuss there (...)." Unwilling to send an own representative to any meeting organised by Spencer, the Colonial Office referred the matter to the Empire Marketing Board.[255] This correspondence once again shows that British administrators still regarded the electrification of the colonies as a matter of trade policy rather than imperial policy. The Empire Marketing Board had only recently been founded, in 1926, to promote intra-Empire trade by persuading consumers to "Buy Empire" and support the export of British-manufactured goods.[256] In one of his articles, Spencer had lauded the foundation of the Empire Marketing Board, highlighting the importance of the Dominions and the Crown Colony market, which he considered "obvious to all interested in industrial manufacture".[257] In its first year of operation the board had published a poster, proclaiming in broad letters that "[o]ur electrical industry exported £20.000.000 worth of goods in 1923. 63% went to the Empire overseas."[258]

[254] Douglas Spencer, „Empire Development and the Engineer."
[255] Note, unknown author at Colonial Office, July 26, 1927, BNA CO 323/983/8.
[256] Hodge, *Triumph of the Expert*, 304; Sieberg, *Colonial Development*, 124-31.
[257] Spencer, "Imperial Development and Co-ordinated Investigation."
[258] Clive Gardiner (artist), Our electrical industry, 1926. BNA CO 956/261.

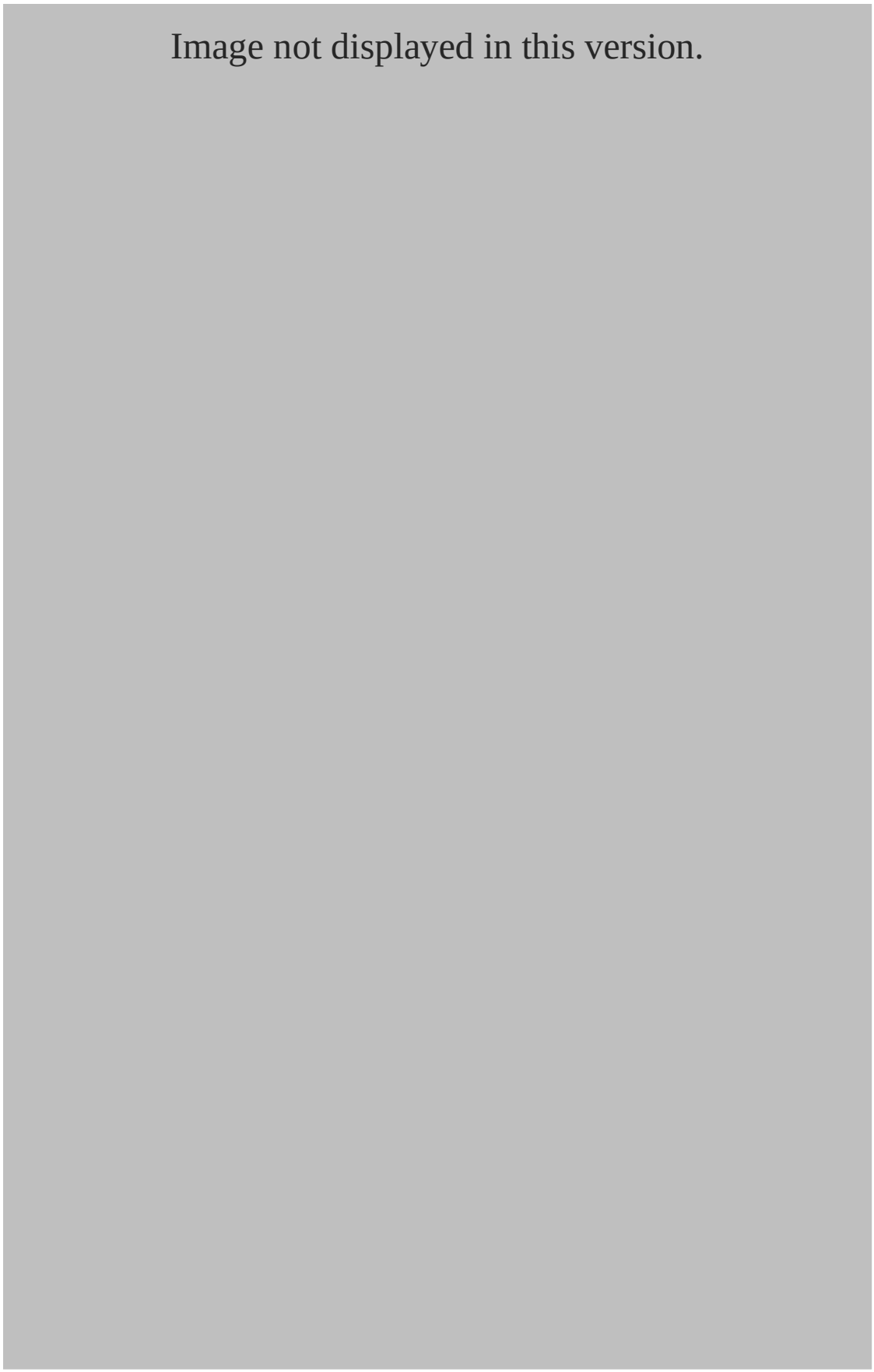


Figure 1. Clive Gardiner, artist, „Our electrical industry,” poster of the Empire Marketing Board, 1926. Source: BNA CO 956/261.

With the establishment of the Empire Marketing Board, the British government continued a policy that was aimed at regaining its position in global trade, which had been deteriorating during and after the War. To promote and protect the exports of its tumbling industry, the British parliament had passed the first of a series of Trade Facilities Acts in 1921. These authorised the British Treasury to give loan guarantees, if funds were being used to purchase British goods.[259] The Trade Facility Act also applied to the electricity sector: Companies that wanted to use government loan guarantees to invest in electrical works and utilities had to commit to buying materials exclusively from British suppliers.[260]

2) Controlling the flows of money – Local entrepreneurship and London finance taking over control in East Africa, 1921-1926

While attempts to coordinate and facilitate the electrification of the empire centrally were still in an embryonic phase in Britain, the corporate structure of electricity supply in the colony was in transition – a process which mostly took place beyond the reach of the Colonial Office and the governments in the colonies themselves. The first private companies providing public electricity services in colonial cities had been set up by individuals or families; sometimes as an auxiliary business selling surplus power from generators used to supply a different core business, sometimes as spin-offs of local (family) business networks, or as "free standing companies" – companies that were registered in Britain but usually set up and managed by local individuals who enjoyed the trust of their British funders.[261] Many of these companies had been able to obtain concessions with generous terms from colonial administrations which were inexperienced with the new technology and seldom had other bidders to choose from. After the first and second decade of operation had proven that electricity supply in colonial urban areas was a viable and profitable business model, more people and companies got ready to reap the benefits of electrification – profits from operations, orders for equipment and plant, well-paid jobs, lucrative consulting and management contracts or shareholding.

At the same time, prior to World War I, British companies had been competing on increasingly globalised markets. Not surprisingly, in their competition with companies from continental Europe or the United States for markets in the colonies, British electrical manufacturing companies were facing the same competitive drawbacks that they faced at home. In East Africa, British companies had painfully learned this lesson. In 1912, the young

[259]Hausman et. al., *Global Electrification*, 141.
[260] Shamir, *Current Flow*, 119f.
[261] Hausman et. al., *Global Electrification*, 56.

Nairobi Power and Lighting Company, which had been originally founded with the backing of a British electro-technical company, forsake its loyalty to metropolitan suppliers and ordered a generator in rival Germany. The academic literature and contemporary reports document several other instances throughout the Empire, when market advantages of non-British companies prevailed over political or cultural allegiance to the British metropole.

In her study of the electrification of three Indian provinces, Kale found concerns about the weak market position of British companies in a report written by H.R. Speyer, an English electrical engineer who spent time in India in the 1910s.[262] In 1915, Speyer summarised his experiences in an article on Indian electrification, which was published in the Journal of the Institution of Electrical Engineers.[263] As "a matter of regret", Speyer found that, among the five most important public electricity supply undertakings in India, Britain had been far surpassed by Swiss, German and US companies. British manufactured prime movers and generating plant accounted for only about a tenth of total plant installed.[264]

The reasons for the British electro-technical industry's lack of competitiveness overseas were manifold. For India, Speyer listed: the lack of British capital and the hesitation of British companies to invest in the region's electrification; the maladjustment of British electric industries to the standardisation of voltage between 220-6000 V, which resulted in higher costs and time for adjustments; and the pricing policy for electrical equipment, which did not include the costs for proper assembly and maintenance.[265] The main problem he identified, however, was the fact that British manufacturers and suppliers of electrical equipment had a poor understanding of local conditions. While continental companies invested into expert teams on the ground and conducted experiments before they decided on the standardisation plant for export, British firms lacked crucial knowledge on how local factors, especially climatic conditions, impacted the installation and maintenance of engines, turbines, and wiring.[266]

The difficulties British suppliers had with adapting their equipment to local conditions in tropical countries were far from being solved in the 1920s, as accounts from another example in East Africa show. In a Britain-manufactured plant in Mombasa, the rheostats were reported as faulty even before the installation was taken over from the contractors in 1924 and once the

---

[262] Kale, "Structures of Power", 457.
[263] H. R. Speyer, "The Development of Electric Power for Industrial Purposes in India," *Journal of the Institution of Electrical Engineers* 53 (1915).
[264] Speyer, "The Development of Electric Power," 598, cited in Shamir, "Electricity and Empire," 474-75.
[265] Speyer, "The Development of Electric Power," 599.
[266] Speyer, "The Development of Electric Power," 597-99.

plant was operating, the directors of the power utility learned that the new engines were eating "an excessive amount of lubricating oil".[267] In his company history, Hayes remarked, that "[w]ith hindsight, it is possible to conjecture that the power station designers had omitted to take into account the immense heat of Mombasa and that a more efficient air conditioning system could have solved some of the problems."[268] The plant broke down after only a year of operation, causing years of correspondence with the contractors, who became increasingly fierce after some of the engines needed to be completely overhauled and rebuilt in 1927.[269]

After World War I, however, the competitive situation within the Empire had changed in favour of British companies, not least because of the Trade Facility Acts. Still, as a British administrator admitted in 1932, if the ability of the Colonial Office to control the origin of materials for hydropower construction remained limited, "[i]t is impossible to insist upon the use of British materials. A condition of this kind cannot in the nature of things be enforced, and evasion is easy; the concessionaires will place sub-contracts (....) sometimes even manufacturers themselves are not in a position to guarantee the origin of the materials which the use."[270] Shamir's study of the electrification of British-ruled Palestine shows that the problems of the British electrical industry in gaining a foothold in overseas markets remained and undermined the growing political interest in promoting British exports in this field. After the British government in Palestine had granted a concession to a Jewish entrepreneur to electrify Jaffa and Tel Aviv in 1921, the newly established company commissioned the German AEG (Allgemeine Elektricitäts-Gesellschaft) with the planning, supervision and execution of the enterprise. The choice of diesel technology of German-origin and the orders of electrical equipment from German suppliers caused political fallout in Britain. Shamir attributes the co ability of local Palestinian entrepreneurs and German electric engineers to bypass Great Britain and its electrical industries to the latter's lack of knowledge about local topographical, hydrological and economic conditions.[271]

Did Britain lose control over the electrification of its colonies? The following episode on EAP&L and its predecessors suggests quite the opposite for East Africa. In this section, I trace how a group of London-based investors and multinational companies tightened their grip on the electrification of Kenya during the 1920s, and later also in Tanganyika and Uganda, and gradually seized all the above-mentioned benefits. Rather than describing these

---

[267] EAP&L, Minutes of the Board Meeting, October 1924, cited in Hayes, *Stima*, 207.
[268] Ibid.
[269] Hayes, *Stima*, 219-20.
[270] Note of Sir Henry Lambert, date unknown (ca. January 1932), CO/536/165/14.
[271] Shamir, "Electricity and Empire," 452.

processes in terms of anonymous forces of global capitalism, I follow the trajectories of people and money through the networks of Empire and take a closer look at the individuals involved – their careers, their professional and educational backgrounds and their motives. In the case of EAP&L, well-networked professionals, who were experienced in the workings of international management and finance and had excellent personal networks in Britain, came to replace the older type of engineers-entrepreneurs, who had managed the electricity company in its initial phase. They shaped a new corporate culture and business rationale of the utility company for decades to come.

At the end of World War I, electricity supply in Kenya was in the hands of two utility companies that could hardly differ more regarding their ownership structure and management. On the one hand, there was the Kenya-registered Mombasa Electric Light and Power Company Ltd., which had been created out of the business network of the Zanzibari-Indian Jinvanjee family in 1908. Its shares were in the hand of a small group of local merchants of British, Indian and Arab origin who, except for three, were also directors of the company.[272] Supplying Mombasa with second-hand plant that it had bought from Zanzibar, including a German Siemens & Halske dynamo, the company generated relatively small profits but also faced few conflicts with the local colonial administration.[273] On the other hand, the Nairobi Electric Power and Lighting Company (NEP&L) had been founded and was registered in the British metropole. It is a typical example of what Hausman et al. have termed "free standing company": a special form of multinational enterprise which was not spun off any existing holding company but was set up anew to do business abroad. For their overseas operations, these companies typically relied on individuals with professional experience in the respective environments. Yet, free standing companies were closely entangled with the British electro-technical industry through a cluster of individuals and other firms, who served on the boards and owned shares of the company.[274]

The initiative for the foundation of NEP&L had come from Clement Hirtzel, a young British electrical engineer, who had previously worked as appointed engineer and manager of the Lourenco Marques electric tramway system in Portuguese Mozambique. After a visit to Nairobi in 1904, Hirtzel managed to secure a concession for lighting the railway workshops and township of Nairobi by 1906 – against the fierce resistance of the government railway organisation, which heavily disagreed with giving responsibility for lighting to private hands.

[272] Hayes, *Stima*, 87-88, 92-93.
[273] Hayes, *Stima*, 174.
[274] Hausman et. al., *Global Electrification*, 55-56.

The Colonial Office, however, following its hand-off approach regarding electricity generation in the colonies, was generally sympathetic to Hirtzel's plans. In addition, NEP&L was backed by Crompton, one of the leading manufacturers of electro-technical equipment in Britain, who did not only purchase 10,000 shares in the new company but also provided the plant for the company's first small hydropower installation at Ruiru River.[275]

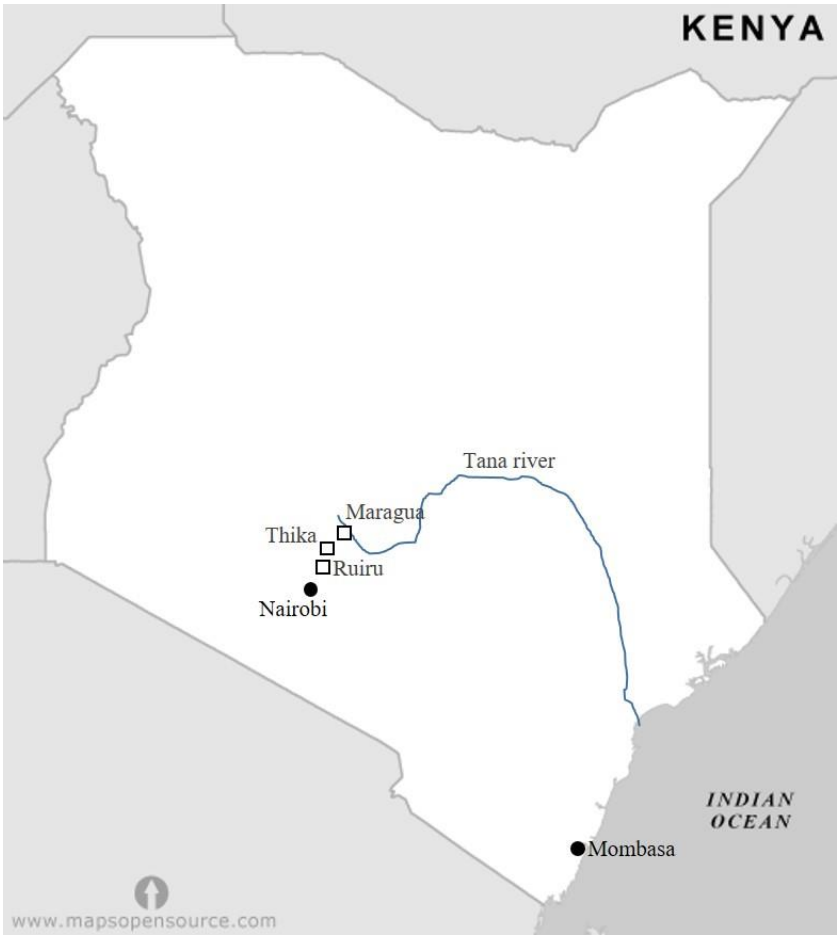


Figure 2. Supplied towns and hydropower sites in Kenya, 1906-1920s. Source: Author.

According to Hayes, the negotiations on the concession had taken a day only and had resulted in very favourable terms for Hirtzel. The negotiation position of colonial government was a weak one, as British administrators were as inexperienced with the novel technology as most other clients of the electricity company. This even held true for William McGregor Ross, the director of Public Works Department, whose private correspondence has been archived at the Bodleian library. In a letter to his mother he wrote in 1910:

[275] Hayes, *Stima,* 58-59, there is brief mention of "a British free standing electric light and power company in Nairobi, British East Africa (Kenya)" in Hausman et. al., *Global Electrification,* 123.

> Dear Missis,
>
> Tonight for the first time I have not got an oil lamp burning in my house, but electric light only. When I have had bills sent in for a month or two I shall be able to decide whether it will be economical to spend £4 or so on the 'transformer" that I was enquiring about when I was at home, or whether it is not worth while sinking that much ready money for a slow ultimate saving. In addition to my monthly charges for current by meter, I pay a fixed sum of 2/8 a month for a connection to which I can attach the iron I brought out. So I can go on ironing all day and all night for a month for 2/-or use the iron as a bed warmer if necessary![276]

While the company had been steadily generating high profits, most of which were channelled to its shareholders in London, it had been facing enormous difficulties with maintaining reliable services to its customers in Nairobi. These problems were not least stemming from the circumstance that the engineers who had planned the company's hydropower plant at Ruiru had not sufficiently anticipated the seasonal flow variation of the river.[277] The regular power cuts together with the fact that NEP&L continued to charge the full flat rate, calculated by the number of connected devices rather than consumed units, caused irritation among customers and led to critical articles in the Kenyan newspapers in the first half of the 1910s.[278] Tensions grew during war time when delays in the shipping of equipment and droughts further increased the supply problems and escalated in tumultuous meetings with customers and administrators and even a brief government takeover of the company in 1919. The organisational structure of NEP&L limited the company's capacity to act. Charles Udall, an electrical engineer who had succeeded Hirtzel as director, "found himself sole Nairobi representative of a London based concern, to which all accounts were despatched and money went out."[279]

Somewhat envious, British colonial administrators in Kenya must have at looked at the electricity supply in capital of German East Africa, one of the few colonial possessions of Britain's rival in Europe, the German Kaiserreich. Visitors of the colonial exhibition in Dar es Salaam were impressed by the streetlights which blazed along the Kaiserhof Esplanade and

---

[276] William McGregor Ross to his mother, April 21, 1910, BLL MSS. Afr. S. 1876/6/1.
[277] Showers writes that the "East African Ruiru Hydro-electric Plant was credited with having 'revealed' to the British the difference between African and European rivers, and was dismantled in 1933", Showers, "Electrifying Africa," 197, referring to Richards, *Hydro-Electric Resources*.
[278] "There was power and lighting even if it was a little uncertain during the dry spells" Kenya Year book 1912, cited in Hayes, *Stima*, 123-24.
[279] Hayes, *Stima* 157-59, for the government takeover see Hayes, *Stima*, 159.

the broad business street, the Bara Rasta, and by the electric cranes in the harbours of Dar es Salaam and Tanga.[280] As in Nairobi, public supply had started in 1906 by a limited utility of the private East African Railroad Company (DOAEG) and was initially restricted by the tight budget and economic impotency of the company. In 1907, however, the electrification got a boost when new reforms known as "scientific colonialism" encouraged a shift to large-scale schemes of economic development and infrastructure modernization in the German colonies. As a result, the private DOAEG was almost entirely nationalized, whereby the Colonial Office in Berlin assumed 90% of the company's stocks, appointed numerous supervisors to the company's board of operations and funded the company generously. After the negotiations between the European Citizens' Association, the DOAEG, and the local administration in 1907, a subsidy agreement was solidified which would facilitate the special privilege of European civilians; stipulating that "all European homes were automatically networked and connected to the power grid".[281] Until the First World War put an end to German colonial rule in Dar es Salaam, the municipality left no occasion out for staging electricity, for example the celebration Kaiser's Birthday in 1908, when the Bismarkplatz was illuminated to complete daylight by arc lamps.[282]

In Nairobi, electricity supply remained somewhat more mundane and detached from the metropolitan state. When Udall seized the initiative to found a new power company in Kenya in 1921, one of his main motives was to break free from metropolitan control. After the end of the war, the prospect of such an enterprise seemed promising. With all three East African territories under British administration, markets for industrial goods and, thus, the demand for electricity were likely to grow. To meet this growing demand, a company was needed which could cover the heavy capital expenditures and scale up operations beyond Nairobi. In 1921, Udall secured an option to purchase the assets of the Mombasa power company.[283] With the financial assistance of Ernest Carr, a wealthy English businessman who had recently moved to Nairobi, Udall acquired all shares of the Nairobi and Mombasa companies and then made it available to a new company, which was founded in January 1922 under the name East African Power and Lighting Company.[284]

---

[280] Hayes, *Stima*
[281] Cited in van der Straeten and Hege, "Enclaves of Light." For a detailed study of the electrification of Dar es Salaam, see ibid.
[282] Ibid.
[283] Hayes, *Stima*, 174.
[284] Hayes, *Stima*, 177-78.

In a period in which the European population, especially the white farmers, were anxiously following the ascent of Asian-owned businesses in Kenya, the merger of the two companies was a particularly delicate issue. The local Mombasa Company with its multi-ethnical shareholder structure and directorate had been taken over by a company that, according to its statutes, allowed "only directors of pure European descent".[285] This was true for the board of the newly founded EAP&L as well: It consisted of Udall himself, Marcuswell Maxwell, an electrical engineer who had spent most of his life in Australia and had served as Royal Engineer during the war and Major Victor Marra Newland, a Kenyan entrepreneur also of Australian descent. Udall also tried to keep away "Asians" from any shareholding of the company: When two Nairobi merchants with Arab (or Indian) names each applied for 100 of the 70,000 shares issued, their applications were refused on the grounds of alleged over-subscription.[286]

In reality, the young company's directors were unable to find any investor in East Africa willing to purchase the shares issued. In Aril 1922, two of the EAP&L directors, Udall and Newland, left for London to acquire financing for the company. Their stay, which lasted until the end of the year, however, did not produce any results. The financial market had not yet recovered from the war-time constraints and potential investors from London regarded with scepticism that Carr, as a local financier, controlled 10% of the assets.[287] When in 1922, Udall found an interested stockbroker in London, John Stone, the latter only agreed to purchase shares of the company under the condition that Carr was bought out. Stone bought 50,000 shares of EAP&L on behalf of a group of investors consisting of 25 British corporations. Upon Stone's instructions, the company's Articles of Association were amended, which effectively turned the Kenya-registered EAP&L into a much higher capitalised company that could be managed from London. Not only were the company's borrowing limits raised through these amendments, but they also allowed for setting up local boards or agencies for managing it from abroad. In April 1923, a complementary Board of Directors was set up in London, whose members were paid a luxurious compensation of a minimum of 500£ per year and soon earned more than the Nairobi Board.[288]

The relationship between the EAP&L's London and Nairobi boards vividly illustrate the tensions between individuals from professional cultures with different areas of knowledge and

[285] Cited in Hayes, *Stima*, 174. See also 189-93.
[286] Hayes, *Stima*, 180-82.
[287] Hayes, *Stima*, 195.
[288] Hayes, *Stima*, 197-98.

different interests. They accompanied the processes that connected the Kenyan company to international finance: John Stone, the chairman of the London Board, was not only a professional stockbroker, he was also chairman of an internationally operating company specialised in electricity undertakings in India and Africa. Udall, managing director of EAP&L and chairman of its Nairobi board, an engineer through and through, hadn't seen London for a decade before his trip in 1922 and had little knowledge about the workings of financial markets.[289]

This became apparent, when EAP&L decided to issue shares worth 200,000£ to finance capital outlay for a planned hydropower station at Thika Falls close to Nairobi and for the replacement of equipment in Mombasa. The company's first venture to the financial markets in London turned into a disaster. It attracted only buyers in Britain, who acquired 11,590 of the 200,000 shares, for which the London Board had to give a personal payment guarantee.[290] Irritated by the poor response to the company's issue of shares and several decisions taken by Udall without consultation from Britain, the London board contracted another Nairobi firm as company secretary of EAP&L in Kenya. Freddie H. Ward, the company's owner spoke the language of the London investors and was to become their right hand in Nairobi. After the London Board pushed Ward's appointment as a company director through in 1924, it had effectively started to take over control of the Kenyan company.[291]

When, after some accounting delays, it became obvious that the company's profits had decreased in 1923 and that the company could only pay low dividends of 5 per cent, the London Board undertook the next changes in the management of the company.[292] In October 1924, it appointed Balfour and Beatty, a London-based engineering firm with corporate and consulting interests in public utilities all over the world as the new "London Managers" of EAP&L.[293] Between 1905 and 1909, Balfour and Beatty had also developed the first major hydroelectric scheme in Britain, which powered the Kinlochleven aluminium smelter in the Scottish Highlands.[294] Its founder, George Balfour, had earned a reputation as a staunch opponent of any state intervention in electricity provision.[295] The decision to contract Balfour

---

[289] For a characterisation of Udall, see Hayes, *Stima*, 212.
[290] Hayes, *Stima*, 199-201.
[291] Hayes, *Stima*, 201-04.
[292] Hayes, *Stima*, 207.
[293] A.O. Cosgrove, "Report on the East African Power & Lighting Co., Ltd. with particular reference to its failure to fulfil its obligations under the Kenya Electric Power Ordinance, Vol. II – Appendices," Nairobi, March 7, 1944, Appendix No. 73, BNA CO 533/533/4.
[294] Hannah, *Electricity Before Nationalisation*, 72, 81; Accessed March 27, 2007, http://www.engineering-timelines.com/scripts/engineeringItem.asp?id=1242.
[295] Hannah, *Electricity Before Nationalisation*, 97.

and Beatty, as John Stone explained, was "[d]ictated by the desires of the parties interested in the Finance of the Company".[296] Giving managerial control to a renowned multinational enterprise, they hoped, would make the small overseas company more attractive to other investors, and Balfour and Beatty's accumulated management knowledge was considered indispensable for scaling up EAP&L. Eventually, they assumed, services of the London firm would bring in the experience and capacity of handling big contracts, streamlining the company along international standards and rationalising it for higher efficiency. Grudgingly, the Nairobi board had to accept the decision.[297]

Not surprisingly, the following years of operation took place in an atmosphere of constant tension and disagreement between the London network and the local group of directors around Charles Udall. The London managers noted with suspicion that Udall had taken the position of major of Nairobi parallel to his job at the company.[298] For 1925, EAP&L was still only able to offer a mere 3 per cent dividend, which increased to 5 per cent for 1926, but new investment opportunities were coming up. Disagreements regarding the company's investment strategy, however, escalated the conflict between Nairobi and London in 1926 and the London board seized the opportunity to consolidate their control of the company. In March 1927, Ward replaced Udall as chairman of the company and in November 1927, Udall resigned as a director.[299]

The cases of the early Mombasa and Nairobi companies and of EAP&L under Charles Udall show the limitations of local entrepreneurship in the electricity sector. The construction of new thermal plants or hydro power stations, which had become an increasingly attractive option for power generation, required amounts of capital that the companies were unable to raise domestically. The case of EAP&L furthermore illustrates the interdependency of management and financing in the accelerating globalisation of electricity provision in the 1920s. Investments were far more than financial flows; they were accompanied by far-reaching interventions in the management of the local companies.[300] Conversely, as overseas investments were generally considered risky, the acquisition of capital heavily depended on the investors' trust in the management of the companies. With their ability to concentrate knowledge and with their reputation, multinational enterprises like Balfour and Beatty

[296] Cited in Hayes, *Stima*, 207.
[297] Hayes, *Stima*, 208.
[298] Hayes, *Stima*, 204, 213.
[299] Hayes, *Stima*, 218-19.
[300] Hausman et. al., *Global Electrification*, 36-37.

successfully ventured into overseas electricity undertakings as shareholders or, as is the case of EAP&L, as contracted managers and consulting engineers.

The story of EAP&L illustrates one of the ironies of the electrification of the British colonies after World War I. Data collected by the British economist Sir Robert Kindersley in 1931 revealed a general trend towards foreign registration of electric light and power companies in the course of the 1920s – despite the fact that they had a lower return to British investors than companies registered at home, as Mira Wilkins calculated.[301] Why then, did foreign registration prevail? Registration abroad, Kindersley concluded, often served to avoid the income tax for Britain registered companies, which had risen after the war, and to undermine British influence. It seems highly plausible that this was also the motive behind the specific arrangement for EAP&L, a Kenya-registered company that channelled much of its profits to business network in London through management and consulting contracts. The case of EAP&L in Kenya therefore tells another fascinating story of how the electrification of the British metropole and its colonies was interlinked – not only the promotion of British exports but also stricter regulation and higher taxes in the metropole led British multinational companies to venture into overseas markets.

The takeover of EAP&L by the London investor network paved the way for the company's investment policy, which determined the pace and scope of electrification in East Africa for decades to come. This policy refrained from building markets for African clients in the urban centres and for rural clients in general. Instead, it targeted a small subset of domestic and industrial customers with secure loads, which offered the prospect of high profits and low risks. The policy correspondingly avoided investments in large-scale generation and transmission projects for which the loads would have had to be built up and kept just ahead of the rising demand through successively adding small power plants to its grid. This piecemeal investment strategy was already foreshadowed by the dispute that had led to the dismissal of Charles Udall in 1926.

This dispute had been triggered by the news that Swift Rutherford & Co., a local Sisal company which was operating a hydroelectric plant at Maragua River, was giving up their electricity supply to other sisal estates along the river and was about to relinquish a distributing licence. The EAP&L London board recommended to buy the licence and take over the small hydropower station to attract new power customers from sisal estates. Based on

[301] Hausman et. al., *Global Electrification*, 157, based on Robert M. Kindersley, „British Foreign investments in 1929", *The Economic Journal* 41 (1931).

his detailed knowledge of the local conditions, Udall warned that neither was the plant suitable for the integration into the EAP&L system nor would his company be ready to serve the new customers adequately. Instead of what he considered to be a piecemeal approach, he suggested harnessing the Tana River with a larger hydropower station and commissioned a survey of the river.[302] Irritated at the high expenses for the survey, Ward lobbied against Udall's plans and pressured the company into proceeding with the purchase of the station at Maragua River and of the licence. The decision was also made against the background that another company, Armstrong Whitworth, was also keeping an eye on the licence.[303] Apparently, by the mid 1920s, hydropower development in the overseas territories had begun to look like an attractive investment opportunity for the British industry.

3) Networks of power and money – the scramble for hydropower concessions from Malaya to Tanganyika, 1926-31

The growing competition among British companies for investments into electrical works and utilities in the colonies during the 1920s increased the leverage of colonial governments to influence electrification in their interest. Within the British system of indirect rule, the granting of concessions was an important tool for exerting political influence. Based on liberal economic principles, concessions were a long-established and widespread instrument to attract and channel private investment and to restrict and direct the operations of markets. British officials and agents of the Crown promoted the system of granting concessions as a way to modernise the colonies without spending large sums of money from British taxpayers and colonial state budgets.[304] By including specific clauses and conditions, colonial administrations tried to align the concessions with their political goals: promoting extractive industries to boost exports and advance imperial trade, assuring a level of basic service provision for European residents and particularly government officials, supporting British industries and safeguarding British labour at home.

Yet, in the eyes of some British engineers, the system of concessions often proved ineffective as an instrument of colonial rule and coordinated development. In an article in the British Journal *The Electrical Review* from 1927, Douglas Spencer criticised Britain's "old system of giving large concessions of territory to syndicates or companies for them to develop as they will" as inefficient and "far from producing the speedy development which (...) all of us must

[302] Hayes, *Stima*, 217, 249.
[303] Hayes, *Stima*, 213.
[304] Sunderland, *Managing the British Empire*, 237–39.

strive after and assist to bring about."[305] The electrification of the Empire, he claimed, needed much more direct government facilitation and funding. As evidence for his argument, he put forward his own experience at Armstrong, Witworth & Co., which at that time was building a large hydro-electric plant at the Perak River in British Malaya. The company, he asserted, had to set the scheme "on foot" after the Crown Agents had given up on it in 1922.[306] An administrator from the Far Eastern Department, however, whom the Colonial Office asked for consultation told a different version of the story: There was no lack of interest from the side of other private firms after the government had cancelled the financing for the project, he wrote, and referred to inquiries from Balfour, Beatty & Company and the Power and Traction Finance Company.[307] The scramble for concessions in the colonies among British electro-technical companies was already in full swing.

This section reflects a cross-imperial episode about the scramble for hydropower concessions. It starts with the public-private negotiations on the Chenderoh dam in British Malaya, one of the Empire's largest hydropower plants at the time of its construction between 1927 and 1930; and it ends with the granting of a concession for Pangani Falls hydropower scheme in Tanganyika, which entailed the privatisation of the whole power sector in the mandated territory in 1931. What linked these projects? Once again, my analysis follows the Empire-wide networks through which individuals, projects, knowledge and capital circulated. In more recent scholarship, this networked conception has replaced the older spokes-in-the-wheel metaphor to describe the direction of movements and transfers within the Empire.[308] In fact, my account of cross-Empire hydropower development rejects the notion of a bidirectional "technology transfer" from offices and factories in metropolitan Britain to the colonial periphery. Instead, it shows a high mobility of ideas, capital and individuals, moving vertically and horizontally through the spaces and layers of Empire.

This notion, however, does not ignore that London was the main node in the web-like structure of relationships. Using the example of civil engineering, Caspar Andersen has studied the ways in which the engineering profession in London shaped, and was shaped by, Britain's colonial engagement in Africa.[309] In London, the headquarters of the engineering institutions and firms, especially of those which were hired as consulting engineers for the

[305] Spencer, "Imperial Development and Co-ordinated Investigation."
[306] Spencer to Secretary of State for the Dominions, July 20, 1927, BNA CO 323/983/8.
[307] Note by Gardiner, July 28, 1927, BNA CO 323/983/8.
[308] Magee and Thompson, *Empire and Globalisation,* 17-19; Casper Andersen, *British Engineers and Africa, 1875-1914* (London and Brookfield: Pickering & Chatto, 2011): 163.
[309] Andersen, *British Engineers and Africa.*

colonial administrations, were in geographical and social proximity to Britain's political elite. As will be shown in this section, the biographies and activities of individuals like Douglas Spencer or Sir Montague Barlow illustrate the interpersonal, finely ramified but far-reaching relationships between private electro-technical and engineering firms and various imperial offices of government. My accounts furthermore show that the electrification of the British Empire was a process that was controlled by a small technical elite and characterised by a lack of transparency, information asymmetries and the contingency and instability of colonial relations. Large power generation projects were not only determined by the availability of resources, markets and technical possibilities, but often by individual relations and contingent encounters, which decided if and how much capital and political support could be mobilised for a project. This was also the case for one of Britain's largest overseas hydropower projects of the 1920s, at the Perak River in British Malaya.

At the end of World War I, electricity supply in the Federated Malay States (FMS), along with most colonial territories, was restricted to a few small systems in a handful of towns. The deficiencies of these systems had become even more apparent in face of war-time supply embargos for strategic materials. In addition, a few private plants were operated in the industrial enclaves – in the case of the FMS mainly to supply mines exploiting the colony's rich deposits of tin. As in other parts of the Empire, industrialists and colonial administrators grew increasingly anxious about the lack of availability of fuels and were looking for alternatives for the depleting supply of firewood.[310] In 1919, the British colonial government of the FMS decided to seek external expert advice to conduct a study on the possibilities for centralised development of electricity supply in the peninsula. Apparently, the pool of engineers with the necessary expertise in the British Empire was small. "[O]n account of his tropical experience", the FMS government's first choice fell on W.J. Meares, the electrical advisor of the government of India, who was introduced earlier as author of a report on hydropower resources in India. As Meares was not available, the government commissioned Frederick Bolton, a hydropower engineer from Britain.[311]

The results of Bolton's visit to the FMS in 1920, which were published in an interim report in 1921 and a final report in 1922, created excitement among the electro-technical companies in Britain and officials in the FMS alike. Bolton was intrigued by the country's tin reserves and

[310] Muzaffar Tate, *Power Builds the Nation: The National Electricity Board of the States of Malaya and Its Predecessors. The Formative Years* (Kuala Lumpur: National Electricity Board of the States of Malaya, 1989), 99.
[311] Tate, *Power Builds the Nation*, 98.

envisioned the tin mines of the Kinta Valley as the major load for a large hydropower plant he suggested to build at the Sungai Perak River. After his return to Britain, he promoted the project in business and professional circles in London and discussed it with a few influential people – among them Douglas Spencer from Armstrong, Whitsworth & Co.[312] It is very likely that this conversation had also inspired Spencer's article in the *Financial Times* and his inquiry at the Colonial Office described earlier. The FMS was captivated by Bolton's straightforward recommendation to coordinate and standardise electricity supply and bring it under control of a central, government-controlled authority.[313] Plans for the large-scale state-managed exploitation of hydropower resources, however, vanished into thin air when the deplorable state of the government budget became manifest by 1922, after a period of unsound financial policies. As a result, the plans for the development of electricity supply in the FMS, along with all other development plans, had to be slashed.[314]

As it became clear that there was no development funding to expect, Bolton argued that the only viable alternative would be the granting of a concession with financial backing from the FMS government. When confronted with this proposal, however, the Colonial Office in London once again showed reluctance to engage in any commitment regarding electricity development in the colonies and put the matter on hold. Only after pressure from the High Commissioner, it decided to invite tenders for private concessionaires. Among the five British companies that applied, only Armstrong-Witworth agreed to the condition to develop the scheme without any financial guarantee from the FMS government.[315] Nonetheless, in the subsequent negotiations in London, the financing of the scheme itself and the necessary surveys remained the main point of contention. Despite the constant attempts at persuasion by Armstrong-Witworth, seconded by the Colonial Office, the Crown Agents and the consulting engineers of Preece, Cardew & Rider, and despite the British Board of Trade's commitment to co-funding, the FMS government persistently maintained its position to not provide any financial guarantees.[316]

The negotiations came to a head when one of the directors of Armstrong-Witworth, Sir Montague Barlow, was sent to Malaya in September 1925. As a Conservative Party politician and Minister of Labour in Britain between 1922 and 1924, he had an excellent political

---

[312] Note by Gardiner, July 28, 1927, BNA CO 323/983/8. Tate, *Power Builds the Nation*, 215. The Perak hydropower plant was supposed to provide power for what was the world's richest tin field, see Tate, *Power Builds the Nation*, 197.
[313] Tate, *Power Builds the Nation*, 101.
[314] Tate, *Power Builds the Nation*, 106.
[315] Tate, *Power Builds the Nation*, 216-18.
[316] Tate, *Power Builds the Nation*, 225.

network in Britain. In addition, he also happened to be related to a family that owned one of the leading rubber plantations of British Malaya. Working his way through the European expatriate establishment of the colony, Barlow, who is described as an excellent diplomat and amiable personality, managed to gain support for the project. In his negotiation with the government, he also enjoyed the sympathies of the FMS high court, all judges of which were Englishmen and had a reputation of being anti-government.[317] Consequently, at the end of his stay in December 1925, Barlow had managed to negotiate terms that were most favourable for his company and he signed an agreement on the concession of the Sultan of Perak.[318]

Barlow had subsequently convinced the FMS government to put up £ 500,000 in exchange for preference shares of the same value. The government's preference shares were more expensive than the debentures emitted to other shareholders but ranked lower. In effect, the government "would never back more than the sum which it had subscribed but carried the highest risk in the undertaking", an official from the Colonial Office later complained in a correspondence on electricity supply in Tanganyika. In effect, profits were privatised, risks socialised: "If by any chance the undertaking were a failure, it is highly probable that the Government would lose the whole of its money." [319] Moreover, the total amount of capital to be raised was much larger than what the government itself would have had to cover if it had carried out the project itself.[320] The model of the Perak scheme, the official concluded, was not to be recommended for other projects in Empire. "The question of Empire water-power finance", Spencer also concluded in his article in the *Financial Times*, "is undoubtedly a question to which a solution will have to be found."[321]

In 1926, Barlow launched a new company, the Perak River Hydro Electric Power Company (PRHEP), to manage the concession. In line with the terms of the concession, the dam project was entirely in British hands, both in terms of management and manufacturing. The company's headquarters was in Britain and its chairman and the majority of the directors were to be "at all time British subjects". The same was true for the plant, machinery and equipment, which were "entirely of British manufacture". When PRHEP recruited a Swedish hydropower engineer, this provoked an angry letter to the editors of a Malay newspaper, accusing the

---

[317] Tate, *Power Builds the Nation*, 229.

[318] Accessed March 27, 2017, http://www.malaysiahistory.net/?option=com_content&view=article&id=60:shedding-light-on-the-first-dam&catid=47:economic-history&fontstyle=f-larger, , http://sembangkuala.wordpress.com/2010/08/22/chenderoh-dam/

[319] Unknown author to Wilson, November 12, 1927, BNA CO 691/93/9.

[320] Ibid.

[321] Spencer, "Hydro-Electric Problems."

company of a lack of patriotism. On paper, the Perak hydropower project was in accordance with the British export policy. Yet, the officials in London understood that profits and rents for the small elite of British industrialists were the main driving force behind the Perak scheme. Commenting on certain figures in the director's report of PRHEP, Walter Ellis, Head of the Far Eastern Department, Colonial Office wrote: "And, of course, there would be no promoters if there were no plunder, People don't promote companies to save themselves from starving but that they may ride in Rolls-Royces, etc."[322]

The construction of the Chenderoh Dam started in 1927 and took three years.[323] In fact, Armstrong-Whitworth's commitment turned into a financial disaster. In 1929, the company's severe financial difficulties, resulting from poor budgeting and management, became public. Without additional funds from the government, the company would have been unable to proceed with the construction. After a year of fierce correspondence, the FMS came to rescue with money it reallocated from the Opium Reserve Fund: This step, although questioned by the Colonial Office for its moral implications, resulted in the FMS government holding a controlling majority of the company's stock. When its financial situation further aggravated in the wake of the Great Depression, the Armstrong-Whitworth directors and managers had to leave PRHEP upon pressure of the British treasury and the FMS government, making place for their rival company, the Balfour and Beatty group.[324]

At that time, Barlow had long started to prepare the ground in London for a new project. In meetings with the governor of Tanganyika Territory, David Cameron, and other colonial officials in late 1927, he promoted the idea of a hydropower plant at Pangani River in the North of the mandated territory. The scramble for markets and concessions in the colonies among British electro-technical and engineering companies, which had started out in Britain's more valuable overseas possessions, now reached one of the most peripheral areas of the Empire's economy.

Tanganyika, with its comparatively small and multi-national European community, was economically overshadowed by the white settler colonies of Kenya in the North, with its plantation economy in the highlands and Nairobi as its industrial base, as well as Rhodesia in the South, with its rich mineral resources.[325] It was governed under a League of Nations

---

[322] Quoted in Tate, *Power Builds the Nation*, 212.
[323] Tate, *Power Builds the Nation.*
[324] Tate, *Power Builds the Nation*, 240-42.
[325] Martha Honey, "Asian Industrial Activities in Tanganyika", *Tanzania Notes and Records* 75 (1974), 55; Jochen Lohmeier, *Tanzania: eine politische Ökonomie der Regionalentwicklung* (Hamburg: Institut für Afrika-Kunde, 1982, 98.

mandate from 1922 which officially bound the British administration to promote "the material and moral well-being and the social progress of [its] inhabitants".[326] On the priority list of British colonial development policy, Tanganyika ranked low for several reasons. First, it was largely unimportant regarding taxation. In 1925, it had generated by far the lowest revenue collected per capita among 10 selected British colonies in Africa.[327] Second, since plenty of alternatives existed, Tanganyika was much less important as a supplier of raw materials than it had been to the German Reich before 1918. Third, as German claims for restitution of its former colonies were already growing louder, British administrators were afraid that money invested would be wasted in case the territory was handed back at some point. In addition, due to the open-door policy of the Permanent Mandate Commission, it was more difficult to protect British export interest. For the same reason, Tanganyika was much less attractive than its neighbours for private capital from Britain.[328] Except from Germany, which assisted German farmers in Tanganyika, investment from outside was nearly non-existent in the 1920s.[329]

Consequently, the situation in Tanganyika looked much different than in the neighbouring colony of Kenya regarding electricity supply. After the war, the government railway department had taken over the public supplies left by the Germans and operated them with a newly formed electricity department. It had inherited two small steam-powered electricity plants adjacent to railway workshops at the upcountry towns of Tabora and Kigoma along the Central Railway and a war-damaged steam plant in the capital of Dar es Salaam. The latter had been replaced with a new station running completely on forest wood in 1922. The initial satisfaction about fuel costs "being lower than any figures given for small stations having similar output in England", however, soon faded as timber and fuel wood near Dar es Salaam became increasingly scarce.[330] After all, apart from its purpose to satisfy the town's slowly growing demand for electricity, the station was supposed to generate some additional revenue for the government.[331] Yet, as a report of the Chief Engineer and Manager of the electricity

---

[326] Andrew Burton, *African Underclass: Urbanisation, Crime & Colonial Order in Dar Es Salaam* (Oxford: James Currey 2006), 41; Hodge, *Triumph of the Expert*, 117.
[327] Gardner, *Taxing Colonial Africa*, 6-7.
[328] Lohmeier, *Tanzania*, 99-100. On the importance of secure status for investments, see Magee and Thompson, *Empire and Globalisation*, 210. See also Havnevik, *Tanzania*, 32.
[329] Hayes, *Stima*, 320.
[330] S. H. King, Report on the First Years' Working of New Power Station, Dar-es-Salaam, 1923, BNA T 161/1049.
[331] S. H. King, Report on existing plant and future requirements, June 1, 1920, 4, enclosed in Byatt to Secretary of State for the Colonies, June 9, 1920, BNA T 161/1049.

department in Dar es Salaam from 1923 suggests, business perspectives for the supply to urban areas in Tanganyika were meagre:

> [T]he possibility of making a large profit is remote, the area of supply is mostly filled with Government Works which are supplied at Works Cost and the balance to cover interest has to be extracted from the paying consumer of whom none are rich and many are poor, in fact it is only among the commercial community that anything approaching an Eastern standard of living exists. The greatest expansion of business will be in the direction of power supply, cooking and water heating, each of these demands are being carefully catered for.[332]

If there were any opportunities for the electro-technical industry to be found in Tanganyika they lay outside its urban areas in the fertile region around Pangani in the North, where the colony's main extractive industry was located, namely the sisal industry. Sisal, a species of agave native to Southern Mexico, yields a stiff fibre that is traditionally used for rope and twine. In East Africa, it grew in areas too dry or poor to cultivate more profitable crops like coffee.[333] By 1913, twenty years after it had first been brought to the region by the *German East Africa Company* (Deutsch-Ostafrikanische Gesellschaft), it had become the colony's main export commodity.[334] After the war, British and Greek settlers, Asian businessmen and a few – mostly British – plantation companies had bought estates from expropriated German farmers. Acknowledging its importance as the territories primary economic sector, the British administration encouraged entrepreneurship in the sisal industry. In 1924, Germans were allowed to return and several bought back their estates.[335] Encouraged by high world market prices, sisal exports grew rapidly from 22,000 tons to 62,000 tons per year between 1923 and 1929.[336]

Even more than other cash crop farms, Sisal plantations were capitalist "enclaves" in the colony's economy. Whereas cotton plantations competed with local peasant producers, Sisal was an estate crop solely and an almost exclusive domain of European settlers.[337] This was not least due to the characteristics of its production. Sisal was easy to grow but the profits

---

[332] King, Report on the First Years' Working.
[333] Nicholas Westcott, "The East African Sisal Industry, 1929-1949: The Marketing of a Colonial Commodity during Depression and War," *The Journal of African History* 25 (1984): 446.
[334] Rainer Tetzlaff, *Koloniale Entwicklung und Ausbeutung* (Berlin: Duncker u. Humblot, 1970), 118-19.
[335] Honey, Asian industrial activities, 61.
[336] Westcott, *Sisal Industry*, 446-47.
[337] Nicholas Westcott describes the sisal industry is an "example of the successful development of capitalist production in a Third World country (...) it followed the pattern of ' enclave development'", Westcott, *Sisal Industry*, 459.

were too low and the work of cutting and transporting too hard to attract African peasant producers. Before it could be marketed, Sisal also required extensive processing by machines, including decorticators, brushing and baling machines as well and pumps for the washing facilities.[338] Hence, sisal plantations had a high demand for power to run their machinery.

Colonial administrators and electricity companies in East Africa had therefore carefully read studies of the hydropower potentials at Pangani River, conducted by the Germans, which was in proximity to the territory's main plantation areas in the Tanga-Pangani-Korogwe triangle close to the Kenyan border.[339] The scramble for licenses for hydropower generation at the river began in the mid-1920s. In 1925, the Tanganyikan government received the first application for concessions for the supply of electricity in the area.[340] In early 1927, after consulting with the General Manager of the Railways, who was responsible for the electricity department, and the Chief Electrical Engineer, the Governor of Tanganyika, Donald Cameron, decided to start looking proactively for private investors and had a tender published in major newspapers.[341] Hydropower concessions were not a new topic for him; in his previous occupation as central secretary in Nigeria, Cameron had gained first experiences in connection with the Kwall Falls scheme – a concession which he considered successful.[342]

[338] Westcott, *Sisal Industry*, 446; Tetzlaff, *Koloniale Entwicklung*, 119; "The Pangani Hydro-Electric Scheme. Power Development in Tanganyika," *Civil Engineering*, July 1936, 225, BNA CO 691/151/12.
[339] Reference to German surveys is made in A. M. Telford, *Report on the Development of the Rufiji and Kilombero Valley* (London: Crown Agents 1929), 1-5, 35.
[340] For example, from the company *Messrs Gill& Johnson, Chartered Accountant, Mombasa, Kenya Protectorate*, see Keith to Secretary of State for the Colonies, September 23, 1931, BNA CO 691/114/5; 1931; Gill&Johnson to Secretary of State for the Colonies, January 26, 1927, BNA CO 691/88/10.
[341] "The government does not desire to utilise the power itself", Jardiner to Amery, August 17, 1927; Lambert to Green, September 14, 1927, BNA CO 691/88/10.
[342] Cameron to Green, September 13, 1927, BNA CO 691/93/9.

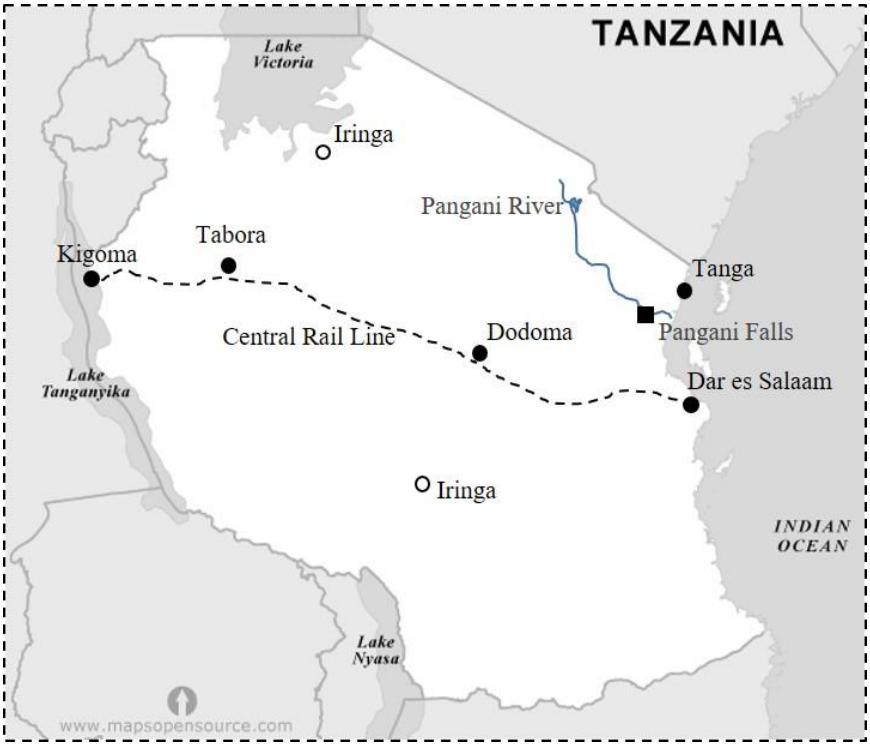


Figure 3. Supplied towns and hydropower sites in Tanzania, 1906-1930s. Source: Author.

Cameron was "not satisfied with the present position of electrical undertakings under the Government of Tanganyika", as he reported to the Colonial Office in September 1927.[343] He blamed the management of the public electricity department of being "inefficient and wasteful" and considered it unable to fulfil the "important task of building and equipping new stations and reconditioning the services generally".[344] This included the expansion of supply in Dar es Salaam to meet the town's growing demand for electricity, especially in connection with the port; the construction of new stations in upcountry towns like Mwanza and Iringa; and – most important of all – the investigation of a hydropower scheme at Pangani Falls, to supply electricity to the sisal estates, the railway workshops and for electric lighting in Tanga.[345] In addition to its alleged lack of expertise, the department constantly hampered with insufficient capital.[346] With its small budget, the Tanganyikan government had no money to put into projects for electricity supply and there was little chance of raising loans from the British government for purposes other than transport. The question was, how to find private

[343] Cameron to Green, September 13, 1927, BNA CO 691/93/9.
[344] Cameron to Amery, February 29, 1928, BNA CO 691/98/1.
[345] On the different projects, see: Barlow to Cameron, September 7, 1927; Cameron to Green, September 13, BNA CO 691/93/9; Cameron to Amery, February 29, 1928, BNA CO 691/98/1.
[346] Cameron to Amery, February 29, 1928, BNA CO 691/98/1.

investors since "in the past we have tended rather to discourage British capitalists by our methods."[347]

Consequently, Governor Cameron made provisions for the formation of a public-private company that was to take over the electricity supplies of Tanganyika Territory. This company should take the form of a "controlled agency" within the meaning of the League of Nations Mandate. "Controlled" in this context meant that the Tanganyikan government would keep a share of the capital and it would retain the right of enlarging the promoting body; another part of the capital would be offered in Britain. As Cameron remarked "for political reasons it is important that as much British capital as possible should be invested in the mandated Territory".[348]

Cameron's plans for the partial privatisation of the Tanganyikan power sector took shape during a stay in London in autumn 1927. In September 1927, Cameron had a conversation about the electricity supply in Tanganyika with a first potential investor, Sir Montague Barlow. This conversation led to semi-official correspondence and subsequent meetings with colonial officials, among them William Ormsby-Gore, Under-Secretary of State for the Colonies, and George Ernest Schuster, Economic and Financial Advisor to the Secretary of State for the Colonies, who had previous experience in the financing of dams from a previous position in Sudan.[349] These meetings vividly illustrate that power projects in the Empire were initiated, negotiated and planned by a very small technical elite, essentially consisting of colonial officials, technical consultants and industrialist, who were well networked across the Empire.

Barlow tried to convince the Colonial Office to agree to an arrangement following the model of the Perak hydropower project.[350] To win the support of the Tanganyikan government, he chose the strategy he had earlier used in Malaya. As there were no suitable experts on the ground in Tanganyika Territory, Barlow offered Governor Cameron to send an expert from Britain at his own expense to assess the potentials for electricity development. In exchange, he asked Cameron to withdraw a public notice calling for tenders for a hydropower plant at Pangani and that "we, and any friends we might associate with ourselves, should be given first priority of taking up the undertaking, and organising the proposed Public Private

[347] Wilson to Lambert, November 17, 1927, BNA CO 691/93/9.
[348] Quote in Cameron to Amery, February 29, 1928, BNA CO 691/98/1, BNA CO 691/98/1. See also Cameron to Green, September 13, 1927, BNA CO 691/93/9.
[349] Lamber to Undersecretary of State, October 11; Bottomley to Schuster, December 20, 1927, BNA CO 691/93/9.
[350] Unknown author to Wilson, November 12, 1927, BNA CO 691/93/9.

Company."[351] A company, set up by Barlow with the programmatic name African General Development Company Ltd., was supposed to enjoy priority rights. After two months of negotiations, Cameron and the Colonial Office reached an agreement with Barlow on the assessment study and Cameron withdrew the public call for tenders. In December 1927, Barlow himself left for Tanganyika, accompanied by two engineers.[352]

These two engineers had previously worked for the large hydropower projects in Asia. The first, C.P. Sparks, electrical engineer and senior partner of a consultancy, had been electrical advisor for the Perak Company. The second, E.V. Richards, was a civil engineer, who had previously worked for the Tata hydropower project in India for nine years.[353] During their stay in Tanganyika, they were instructed to inspect existing power plants, evaluate the annual reports of the electricity department and assess potentials for new plants in upcountry towns and for hydropower development of the Pangani River.[354] In the meantime, Barlow met with the sisal planters in the region, the main prospective customers of the hydropower plant, to secure their support for the project and propose future tariffs.[355]

The Sparks and Partners report was completed in April 1928 and sent to Cameron and the Colonial Office in London.[356] The consultants found a considerable market potential for grid-based electricity. In most of the plantations, power for machinery came from non-condensing steam engines burning wood. They stated, however, that "whilst this was an economic method of drive when the factories were first established, with the increasing radius of fuel collection it is no longer economic to use wood and in many cases impossible".[357] For this reason, about half of the 32 surveyed estates had already adopted new methods of power supply, including oil engines, using crude oil, suction or producer gas engines and water turbines with a direct drive. A few plantations also had small hydropower plants to generate electricity to power their machines. Sparks and Partners suggested a slight cost advantage of grid electricity in comparison to the oil engines.[358]

However, as power costs were not the determining factor in the sisal industry, the consultants named further advantages of an electric drive: supply with electricity would enable

---

[351] Barlow to Cameron, September 7, 1927, BNA CO 691/93/9.
[352] Bottomley to Schuster, December 20, 1927, BNA CO 691/93/9.
[353] Barlow to Wilson, November 23, 1927, BNA CO 691/93/9.
[354] "Instructions to engineers and approved by the Colonial Office in letter of 8th December 1927," marked as private and confidential, December 12, 1928, BNA CO 691/93/9.
[355] Telegram from Barlow to Cameron, February 15, 1928, BNA CO 691/98/1.
[356] Barlow to Wilson, April 20, 1928, BNA CO 691/98/1. Sparks&Partners, *untitled report*, BNA CO 691/98/3.
[357] Sparks&Partners, *untitled report*, 12.
[358] They were, however, assuming a relatively high tariff of 15 pence for electricity. Barlow later lowered his proposed tariffs.

decentralising of the decortication of the sisal, which could then be done in several plants spread over the plantation, saving costs and labour for transport to a central factory; plantations that were not directly adjacent to the river would no longer need a second plant to drive the pumps; electric pumps could also be switched on and off from the central factory; an electric drive would increase the hourly output of a decorticator and factories could be worked double shift, as electric supply would be available for light; in contrast to oil engines, which gradually deteriorate, efficiency could be maintained over long period of years; finally, the consultants argued, the management of the power supply could be delegated to the electric utility and the plantation owners could focus their attention on their core business.[359]

Consequently, the sisal industry was seen as the main potential customer for hydroelectricity in the Pangani area, although the consultants discussed other potential industrial uses of electricity, for example the manufacturing of cement and lime, the electrification of the Tanga railway, and even electro-chemical development such as the production of artificial fertilisers.[360] In addition to the Sisal industry, a relatively small supply would be required from the town and port of Tanga. The two hydropower schemes of 1250 KW and 2500 KW, respectively, proposed by the consultants – more than the Dar es Salaam station could generate at that time.[361] The report of Sparks&Partners was positively evaluated by the consulting engineers Preece, Cardew and Rider, who formed part of the advisory network of the Colonial Office. Founded in 1893 as an electric power and telecommunications specialist, the company evaluated power projects all over the British Empire and had compiled a considerable knowledge base.[362]

At the time when the report was finished, Barlow had already prepared a confidential draft agreement and licence and sent it to Cameron. The draft agreement envisioned that Barlow's African General Development Company and the government of Tanganyika would form a new company within 12 months, the Tanganyika Light and Power Company Limited, which was to be registered in Great Britain. This company would be issued two licences: License "A" would grant the company the exclusive right to provide electricity in the towns of Dar es Salaam, Tabora, Mwanza, Tanga, Dodoma and Kigoma and within a radius of 60 miles around the town. Licence "B" would include the operation of a hydroelectric installation at Pangani Falls and a monopoly for electricity provision in an area of 60 miles from each side

[359] Sparks&Partners, *untitled report*, 15-16.
[360] Sparks&Partners, *untitled report*, 12.
[361] Sparks&Partners, *untitled report*, 18, the Dar es Salaam station had a capacity of 1020 KW.
[362] On the history of Preece, Cardew and Rider: Accessed March 28, 2017, https://www.mottmac.com/our-heritage. See also a current research project by Ronen Shamir, no published works yet.

of Pangani River.[363] Whereas the licence for Pangani Falls was the more lucrative one, it would also take several years to build the hydropower plant. By taking over the supplies at Dar es Salaam, Barlow hoped to generate enough profit for the company during the development period of the area around Pangani Falls.[364] Once the hydropower station was operating, however, it would be a source of steady high profits for Barlow's company, as he was proposing a relatively high tariff of 15 cents per kWh for the supply of the sisal plantations.[365]

Within the small and well-networked community of East African businessmen and internationally operating British power companies, Cameron's exclusive treatment of Barlow and his companies did not go unnoticed for long. In spring 1928, the Colonial Office in London received protest notes from different senders who had obviously formed a coalition to thwart the deal with Barlow and submitted an own proposal for the lucrative Pangani hydropower project. This coalition included the EAP&L in Kenya. Its chairman assured the Colonial Department in a letter that his company had had "Pangani Falls under consideration for some time" as "[t]he German reports have been available, and reports since the War have been submitted to us from time to time," and he had sent own engineers to assess the site.[366]Another company, which was part of the same business group, like EAP&L was ready to submit an own proposal for the scheme: the Power Securities Corporation (PSC) had been founded by George Balfour in 1922, with controlling interests held by three British engineering companies. This consortium had taken over Balfour & Beatty's interests but appointed them as consulting engineers and managers. This way, it had become the largest holding company in the British power supply industry, with the ability to raise large amounts of capital – in fact, larger amounts than Barlow's company.

The consortium had found support among local plantation owners, represented by Major Conrad Walsh, director of several plantation companies in Tanganyika Territory and "very closely concerned" with one of the directors of Balfour and Beatty. On behalf of Bird and Allied Companies, the largest British group of sisal growers and other plantation owners, he protested emphatically against the withdrawal of the tender and against "granting monopolistic terms at Pangani Falls".[367] Even if Barlow's company sold electricity at 10 cents

[363] Draft licenses enclosed in Barlow to Cameron, February 10, 1928, BNA CO 691/98/1.
[364] This is what Preece and Cardew & Rider suggest in an expert opinion to Crown Agents, June 6, 1928, BNA CO 691/98/1.
[365] Barlow offers Cameron to revise the tariff proposition, Barlow to Cameron, June 7, 1928, BNA CO 691/98/1.
[366] Ward to Bottomley, March 27, 1928, BNA CO 691/98/1.
[367] Telegram Walsh to Bottomley, May 28, 1928, BNA CO 691/98/1.

per kWh, he threatened, he would set up his own supply. Their concerted efforts showed effect. Although Barlow offered lower tariffs than in his first proposal he didn't gain the support among the planters of the region. In August 1928, the Power Securities Company submitted an own offer for the Pangani Falls scheme, which the consulting engineers from Preece, Cardew and Rider deemed preferable to Barlow's scheme.[368] Under increasing pressure from the Colonial Office, Cameron had to reconsider the arrangement with Barlow. While continuing its commitment to the Dar es Salaam scheme, the Tanganyikan government separated the Pangani Falls scheme from it and put it up for tender again.[369] In 1929, Major Walsh and his planters' association lobbied against the scheme for Dar es Salaam and the upcountry towns, announcing that the plantation owners along the central railway lines would not buy electricity from Barlow's company.[370]

The Wall Street crash in October 1929 and the following crisis of the financial markets finally put an end to Barlow's plans. In a letter to the colonial office, he admitted, that due to the financial crisis it "will be by no means so easy to raise capital for a project of this character as it would have been a year and a half ago" and that he would therefore apply for a grant at the Colonial Development Fund.[371] His application was refused on the ground that it was "opposed to the Governments of the Territories undertaking any work which private enterprise is willing and well fitted to carry out."[372] Barlow's inability to access financial guarantees led the Colonial Office to cease negotiations with him after two years and to turn to the PSC in January 1930.[373] By late 1930 the negotiations were concluded and the Tanganyikan government signed two agreements with the PSC, one on the supply of Pangani Falls and, in January 1931, another one on the supply of Dar es Salaam and other upcountry towns.[374]

The agreements specified that PSC would set up two companies to serve each of the two licences: The first was the Tanganyika Electric Supply Company (TANESCO) for the Pangani Falls scheme with an authorised capital of £500,000. The second, the Dar-es-Salaam and District Electric Supply Company (DARESCO), was formed as a subsidiary of

[368] Preece and Cardew & Rider expert opinion to Crown Agents, June 6, 1928, BNA CO 691/98/1.
[369] General notice No. S.M.P. 10571/156, Concession for Development of Electric Power, Pangani River Falls, Tanganyika Territory, Nov. 6th 1928, BNA CO 691/98/1.
[370] Walsh to Undersecretary of State, Colonial Office, July 11, 1929, BNA CO 691/101/4.
[371] Barlow to Wilson, November 18, BNA CO 691/101/4, 1929.
[372] Secretary of London Chamber of Commerce to Passfield, February 15, 1930, BNA CO 691/108/1.
[373] Boyd to Undersecretary of State, Colonial Office, January 10, 1930, BNA CO 691/108/3.
[374] "Draft agreement between the Crown Agents for the Colonies and the Power Securites Corporation," enclosed in Crown Agents to Undersecretary of State, Colonial Office, January 28, 1931, BNA CO 691/114/4.

TANESCO with an authorized capital of £300,000 of which £100,000 were at once subscribed at par. Then, 20,000 preference shares and 25,000 ordinary shares were given to the government of Tanganyika, which corresponded to the value of assets handed over from the electricity department.[375] The companies held an exclusive right to supply the areas specified in the licences. DARESCO furthermore committed to set up a compulsory supply to an area included in a radius of 1,5 miles from the post office. In addition, the company held the option of including the towns of Arusha, Morogoro and Moshi in the concession area. DARESCO was given the "first refusal" for all electrical development in all other parts of the territory outside the concession area, so that private companies who wanted to supply electricity in that area would need to obtain the company's permission first.[376] In July 1931, DARESCO was incorporated and registered in Tanganyika and supplies and staff of the electricity department were taken over by the company.[377]After the transfer of the electricity undertakings, the government passed a new regulatory framework for the generation of supply of electricity. The new Electricity Ordinance for Tanganyika Territory of 1931 and the Electricity rules of 1932 were essentially a compilation of clauses from the Indian Electricity Act of 1910 and the Palestine Electricity Ordinance of 1928.[378]

TANESCO started the construction of the hydropower plant at Pangani Falls in 1932. A report in the journal *Civil Engineering* describes the difficulties of the European engineers with dense jungle and the absence of all-weather roads, which made transport to the site difficult, as well as the unhealthy climate. The report also reveals the racialised division of labour at the construction site: "As the local natives are unsuitable for work on works, better class native labour had to be recruited from the interior of Tanganyika and Kenya, and semi-skilled linesmen were employed under European supervision."[379]

---

[375] "Draft agreement between the Crown Agents for the Colonies and the Power Securites Corporation."
[376] The schedule referred to in the "Draft agreement between the Crown Agents for the Colonies and the Power Securites Corporation."
[377] Crown Agents to Undersecretary of State, Colonial Office, August 6, 1931, BNA CO 691/114/4, 1931; for the correspondence on the transfer of staff, see BNA CO 691/116/3.
[378] „An Ordinance to Facilitate and Regulate the Generation, Transmission, Transformation, Distribution, Supply and Use of Electric Energy for Lighting and other purposes," October 30, 1931, enclosed Symes to Cunliffe-Lister, December 7, 1931, BNA CO 691/120/4.
[379] "The Pangani Hydro-Electric Scheme. Power Development in Tanganyika," *Civil Engineering*, July 1936, 225, BNA CO 691/151/12.

4) Piecemeal for profits and dams that never were – EAP&L and the "lost decade" for electrification? 1931-1938

In 1936, the Nairobi municipality had had enough. Frustrated with the way EAP&L provided its services, the municipal council set up a sub-committee to prepare a takeover of the company's operations in Nairobi and its environs.[380] The stand-off between the municipality and EAP&L was preceded by longstanding public complaints about the high dividends the company paid to its shareholders in London and the consulting fees it paid to its management from Balfour and Beatty, while customers in Kenya suffered from high electricity rates and low service quality.[381] EAP&L found itself regularly criticised and ridiculed by the national press and independent magazines of the settlers in the Rift Valley. Betting on how long the light would last in the evenings without going out, the Kenyan Weekly News wrote, had become the favourite sport of settlers in Nakuru and Eldoret.[382] EAP&L passed the blame to the Kenyan Government. By denying the company an extension of its supply licences and the water rights necessary for the development of a large hydropower plant near Nairobi, EAP&L put forward, the government had forced the company into piecemeal and expensive thermal power generation.

"The practice of electricity development in all progressive countries is to consolidate rather that decentralise", EAP&L's secretary George Reed pointed out.[383] In fact, in the mid 1930s, the electric utility industry in Europe and the US was a maturing industry. The proportion of households connected to the grid had grown at a tremendous rate in the industrialised world. Almost all factories were electrified. In urban areas, electricity had gradually turned from a luxury commodity to a basic urban service. While in 1914, only 5.5% of the households in Berlin were connected to the electricity grid, this figure rose to 76% in 1933.[384] At the same time, rural areas were increasingly integrated into the grids in some countries. In the Western European countries, for example, between 75% and 100% of the population were living in areas supplied with electricity in the years 1933-34, as data from the statistical yearbook of the World Power conference shows.[385] For those areas not connected to the grid, for example a substantial part of the rural areas in the US, governments started to embark on rural

[380] Hayes, *Stima*, 261-62.
[381] Notes of a meeting held on 24th June, enclosed in Cosgrove, "Report on the East African Power & Lighting Co., Ltd., Vol. II – Appendices," Appendix No.73.
[382] Hayes, *Stima*, 271.
[383] Hayes, *Stima*, 268.
[384] Hughes, *Networks of Power*, 190.
[385] Frederick Brown, ed., *Statistical Year Book, 1933&1934* (London: World Power Conference, 1936), 102.

electrification schemes in the 1930s. The substantial expansion of electric networks beyond urban centres was not confined to the industrial world. In the Madras presidency in India, investments in electric generation capacity were matched by public investments into transmission and distribution systems, resulting in a swift electrification of rural areas throughout the 1930s.[386] In Mysore, many of the towns and larger villages in the South and South-eastern parts of the princely state were electrified by 1935.[387]

The transition towards large-scale, centralised generation and distribution produced a new set of widely accepted principles of electricity systems in the political and academic discourse. As Gilson has shown for Germany, scientific analyses were anchored in the instruction of electrical engineers and the data obtained from the large utility companies.[388] Among policy makers, utility managers, engineers and scientists in the US and Europe, the economic superiority of centralised electricity supply had become a largely unchallenged paradigm in the late 1920s. Grand plans for large and interconnected systems came to dominate the political and scientific discourse on electricity provision in the industrialised countries.[389] The British Government created the Central Electricity Board in 1926 to set up a synchronised, nationwide AC grid. When the grid started to operate in 1933, running at 133 kV, 50 Hz, it was hailed as the "largest electrical achievement in the world" by the scientific journal *Nature*.[390] Yet, if electricity was to be produced on an increasingly grand scale, utilities needed to build up loads among industrial and domestic customers. As Conor Harrison showed for a utility in North Carolina in the United States, utility managers tinkered with electricity rates to identify optimal rates to boost electricity consumption. Low "inducement rates" were designed to increase per capita household consumption rather than to be cost-recovery or profitable in the first place.[391]

In Britain, economies of scale, standardisation of systems and voltages and monopolistic structures had become the key principles of energy policy. Towards the Kenyan administration, George Reed from EAP&L cited a report of a committee on electricity distribution, submitted to the British Ministry of Transport in May 1936, which praised the advantages of putting geographically separated undertakings under the control of a single

[386] Kale, "Structures of Power," 470.
[387] Kale, "Structures of Power," 461.
[388] Gilson, *Konzepte von Elektrizitätsversorgung*, 150.
[389] Gilson, *Konzepte von Elektrizitätsversorgung*.
[390] Quote in „The British Electrical and Allied Manufacturers' Association ('Beama')," *Nature* 132 (1933): 23. See also Hausman et. al., *Global Electrification, 27.* Hannah, *Electricity Before Nationalisation,* 105-6.
[391] Conor Harrison, "The Historical–geographical Construction of Power: Electricity in Eastern North Carolina," *Local Environment* 18 (2013): 480.

company.[392] In fact, this was already the case in East Africa. After having acquired the licences for the Pangani Falls as well as Dar es Salaam and other towns in 1931, EAP&L together with its subsidiaries TANESCO and DARESCO effectively held the monopoly over public electricity supply in Kenya and Tanganyika. Uganda was soon to follow. The monopoly remained unchallenged for some time to come – in early 1937, the Nairobi municipality dropped its plans to take over EAP&L's supply.

Why then, it remains to be asked, did the electrification of East Africa in the 1930s follow a very different trajectory than in the industrial countries or other parts of the Empire? Even though EAP&L and its subsidiary companies completed two hydropower projects, electricity remained an exclusive privilege of a small urban elite in Dar es Salaam, Nairobi and Mombasa and a handful of smaller towns in Tanganyika and Kenya. Throughout the 1930s, electricity was not brought closer within reach of rural dwellers or urban Africans. This section portrays an electric utility industry in East Africa that was stagnating rather than maturing during the decade before World War II. Why, I ask, did EAP&L not make any substantial attempt to integrate new areas into its networks or build up demands for electricity among African customers? What explains the impotency of the colonial administration regarding the electrification?

In this section, I identify three major reasons why electricity supply was not expanded beyond a few small urban enclaves of supply plus the Pangani grid in Tanganyika's North, which mainly served sisal plantations. First, as the power companies relied on hydropower generation, electrification became increasingly enmeshed in the complex conflicts for resources and land, as exemplified by two hydro-electric projects in Kenya and Tanganyika. The second barrier was a metropolitan development policy for the British African territories that was characterised by inconsistencies and disagreements between different levels of colonial administration, an emphasis on cash-crop agriculture, and scepticism towards, if not disdain for, the establishment of secondary industries. The failed attempt of building a hydropower dam at the Victoria Nile in the 1930s, as described in this section, illustrates this policy. The third and probably most important obstacle was that the East African power companies were controlled by interests of stakeholders in London, who imposed a piecemeal and low-risk investment strategy.

Contemporary utility managers, of course, would put the blame for the sluggish expansion of power supply on political barriers as well as adverse economic and environmental conditions.

[392] Hayes, *Stima*, 268-69. Identify original quote, BNA POWE 12?

The districts which had to be served in the two countries were widely scattered and the population density was low. Even Nairobi, where the biggest demand in Kenya lay, had a very low load density compared to Britain.[393] Tropical rainstorms, climbing vegetation and grassland fires regularly caused damages in the distribution network. Moreover, the first hydropower plants of a more substantial size built by EAP&L and its subsidiaries in the early 1930s – the Maragua scheme in Kenya and the Pangani hydropower plant Tanganyika – constituted the first substantial outreach of their associated electricity systems into the social and natural environments outside the urban centres. As a result, the electricity companies were confronted with their first major conflicts for land and resources, most notably water. In the case of the Maragua scheme in Kenya, these conflicts became entangled in a wider political dispute between local Kikuyu and the colonial government, thus turning into a major obstacle for the implementation of the project.

In 1926, EAP&L's chairman Charles Udall had commissioned an expensive study on potential sites for hydroelectric plants at the confluence of the Maragua and Tana rivers close to Nairobi. In 1927, EAP&L made an application to the Kenyan governor for the construction of a hydropower scheme, but it was not before December 1929 that the government set up a tribunal consisting of four Europeans and four "natives" to advise the colonial administration on a decision.[394] The most sensitive point was the question of land exchange. A large share of the land alongside the Maragua River was owned by local Kikuyu, except for a small plot used by the Maragua Electric Power Company to operate a small hydropower plant to supply nearby sisal plantations. Fearing an escalation of the tensions with the local Kikuyu population, the government rejected EAP&L's plan for a hydropower plant at the river, according to which 65.5 acres of land along the river had to be flooded. As a reaction, EAP&L engineers and Balfour Beatty technicians drafted a revised plant for a smaller and less efficient station for which only a small but essential area of 3.8 acres within the African land unit needed to be flooded.[395] In December 1930, EAP&L submitted a revised application and in 1932 negotiations for the purchase of the Maragua Electric Supply Company and the transfer of its licences to EAP&L were concluded.[396]

The negotiations around the scheme show that, for the colonial administration, the expansion of electricity supply was still subordinate to political stability. Rather than becoming agents of

[393] Cited in Hayes, *Stima*, 254, 259.
[394] Hayes, *Stima*, 249-50.
[395] Ibid.
[396] Hayes, *Stima*, 252.

infrastructural change, electricity companies manoeuvred between the interests of colonial administrations, customers and shareholders in the metropole. East Africa's first big hydro scheme, however, turned into a large failure for EAP&L. As in the earlier case of a hydropower plant at Ruiru River, the British engineers had incorrectly assessed the river's hydrological characteristics. As the river flow was dropping, the Maragua scheme did not produce the anticipated amount of electricity.[397] Growing demands of upstream farmers to use the river's water for irrigation purposes posed a further threat to hydropower generation. At the same time, the Kenyan government lacked the necessary data on the territory's rivers to formulate a consistent water policy.[398]

EAP&L's subsidiary in Tanganyika, TANESCO, faced similar problems. As the British Commissioner for Social Development, J.P. Moffett wrote later, "Tanganyika was undoubtedly slow in appreciating the necessity for dealing with the problems connected with water, its supply, and its conservation.[399] A major dispute over water rights of Pangani River arose shortly after the commissioning of the Pangani Falls power station. This dispute preceded countless conflicts for water associated with hydropower in Tanzania and elsewhere on the continent. In May 1937, TANESCO sent the Colonial Office a complaint about the abstraction of water for irrigation purposes above Pangani Falls.[400] It suspected that irrigation grants made by the government in upriver areas accounted for the diminution in the flow of the river at the falls.[401] Though not affecting power generation, the flow rate was below the rate of 850 cusecs guaranteed to TANESCO in the 1931 agreement. Throughout the 1930s, the Tanganyikan government began to realise that this guarantee was based on inadequate data and that it had overestimated the flow of the river.[402] A confidential report on the control of the natural water of Tanganyika from 1937 criticised this clause for virtually granting TANESCO a monopoly for the use of water at Pangani river, leaving little scope for irrigation

[397] Hayes, *Stima*, 262.
[398] Hayes, *Stima*, 266-67.
[399] John Perry Moffett, ed. *Tanganyika: A Review of Its Resources and Their Development* (Dar es Salaam: Government of Tanganyika, 1955) 334; Not until 1928, Clemens Gillman.
[400] Local secretary, TANESCO to Crown Agents, May 27, 1937, BNA CO 691/157/12.
[401] London Secretary, TANESCO to Undersecretary of State, Colonial Office, August 17, BNA CO 691/157/12.
[402] Lee to Boyd, December 16, 1937, BNA CO 691/157/12.

works.[403] In early 1937, the Tanganyikan government therefore pressured TANESCO to change this "most obnoxious clause" of the concession.[404]

The arguments put forward by TANESCO in the negotiations with the Tanganyikan government and the Colonial Office are particularly noteworthy as they reflected the concepts and terms of the discourse on the development of "imperial estates", which was still prevalent in the late 1930s. Power generation, TANESCO argued, should be given priority over irrigation to increase the territory's export value.

> The Company does not profess to be able to assess the relative value from a national-economic point of view of the merits of the respective claims in regard to the available water resources for irrigation and power purposes; but priority for the power was undoubtedly given under the Concession in the national interests as primarily benefiting the sisal hemp industry of which export value constitutes nearly 33% of the total export from the territory.[405]

At the same time, TANESCO proposed the construction of a storage dam upstream for the conservation of flood water which would serve both purposes – an idea that was impossible to finance and was taken up much later only.[406] It took until 1944 before the dispute on water rights was settled. The clause in the agreement was finally revised and the minimum flow at Pangani Falls reduced to 400 cusecs.[407]

The electricity system that received its electricity from the Pangani Falls hydropower station and was operated by TANESCO marks the only instance in pre-WWII East Africa, when power companies made substantial efforts to build up markets beyond the urban supply "enclaves". In the first years of operation, TANESCO adopted a progressive sales policy and consumption soon began to rise as more sisal estates were connected. Still, the generation capacity of the plant and its potential extensions allowed for more customers and the company started looking for new markets for electricity.[408] TANESCO was also the first company to

---

[403] Extract from the Confidential Report of Mr. Kanthack on the Control of the Natural Water of Tanganyika, enclosed in letter draft Calder to unknown recipient, July 8, *1937;* Mayers to Ormsby-Gore, September 30, 1937, BNA CO 691/157/12. *Reference to report by Messrs. Teale and Gillman dated February 1935 discloses that the Water Boards as at present constituted are severely handicapped (see Öhman)*.
[404] Letter draft Lee to unknown recipient, October 27, 1937, BNA CO 691/157/12, Crown Agents to London secretary, TANESCO, March 19, 1937.
[405] London Secretary, TANESCO to Undersecretary of State, Colonial Office, August 17, BNA CO 691/157/12.
[406] Ibid.
[407] Note Thomas, Colonial Office, August 15, 1944, BNA CO 691/189/2.
[408] Moffett, *Tanganyika*, 710.

connect African customers in the peri-urban areas of Tanga to their grid.[409] Unfortunately, these efforts are not documented in detail.

Another typical way of increasing the load factor of electrical systems was to connect them with other distributed systems to form larger grids. In East Africa, however, an interconnection across borders was impeded by political obstacles. Tanganyika, as a mandated territory, was under international scrutiny. The supervisory committee in Geneva eyed all British attempts to establish centralised services for all three East African territories under British control with suspicion – for example the establishment of a postal union. The provisions made in the treaty of Versailles regarding mandated territories made the emergence of a commercially-operated electricity grid covering all of East Africa almost impossible.[410]

Yet, for TANESCO, selling surplus electricity for the Pangani Falls dam over the border to Kenya was an attractive option. Mombasa, with its big sea harbour, was located only about 100 miles north of Pangani. By selling power to Kenya, TANESCO also expected to mitigate the risk of its "one crop"-load, which was highly dependent on the economic well-being of the connected sisal plantations.[411] In January 1937, the company submitted an official request for a concession to export power to plantations across the border in Kenya and to build a transmission line to Mombasa.[412] As this transmission line required the enactment of legislation in both territories, the concession became a welcome means for the Tanganyikan government to incentivise, or exert pressure on, TANESCO – for example in the negotiations on the water use at Pangani River. It took until 1945 before TANESCO obtained the permission to export electricity to Mombasa.[413]

The Pangani grid remained an exception in the pre-WWII power sector in East Africa, where the small-scale, distributed supply of electricity to urban areas remained the prevalent model of provision. Structural reasons, as I argue, cannot fully explain this circumstance. Once again, the way the electricity systems in East Africa related to business as well as developmental interests outside the region was a major cause for stagnation and crisis of supply. EAP&L directors and shareholders in Britain pressed for consolidation of the company's monopoly in the licence areas, thereby putting an end to pre-existing private electricity suppliers and the informal arrangements. In the town of Tanga in Tanganyika, for

---

[409] Hayes, *Stima*, 312.
[410] Hayes, *Stima* 238-39, 243.
[411] Moffett, *Tanganyika*, 710.
[412] Postmaster General, Kenya, Uganda & Tanganyika to Colonial Secretary, Nairobi and Attorney General, Nairobi, January 5, 1937, BNA CO 691/157/12.
[413] Moffett, *Tanganyika*, 710.

example, a German entrepreneur had been operating an unregulated public supply since 1906, using the surplus electricity of a generator that drove a sawmill and an oil mill.[414] Among the customers of this informal system of supply were the institutions of the colonial administration. After TANESCO had obtained the monopoly for the town, however, he was forced to shut down the plant and Tanga was connected to TANESCO's new Pangani grid.[415]

At the same time, the two electricity companies in Tanganyika had supply areas where no quick returns on their investments could be expected. This policy increasingly collided with the government's goals of bringing electricity to smaller and more remote townships. Colonial governments became increasingly aware of the "disadvantages which may result from entrusting electrical development in the Territory to subsidiaries of a large holding Company, whose interest it must be to maintain the value of their shares on the London market", as an official from the Colonial Office remarked in a correspondence about the situation in Tanganyika in 1937.[416]

Awarding the concession for the supply of Dar es Salaam to DARESCO had been motivated by the hope that the company would successively electrify smaller upcountry towns in Tanganyika. This hope, however, turned out to be wrong. During the first years of business, DARESCO directed its efforts on completing the new power station in Dar es Salaam. Except for opening a new branch in Mwanza in 1936, to which the company had legally committed in the licence, DARESCO limited its activity in the upcountry branches to maintaining the supplies.[417] Being a shareholder itself the Tanganyikan government faced a conflict of objectives between its financial interests and the provision of services. On the one hand, to a limited extent, it benefited from the high dividends of 7% paid by DARESCO which was operating profitably with a return on investment of 16% in 1936.[418] On the other hand, this profitability came at the expense of the small upcountry branches. Only 12% of the company's total revenue came from upcountry branches and business that were small scale and loss-making or, at least, less profitable than in Dar es Salaam.

Especially regarding the electrification of smaller townships, the second clause of the licence, which gave DARESCO preferential rights for the electrification of all areas outside the

---

[414] Sparks&Partners, *untitled report*, 27-28.
[415] This is suggested in a memorandum by the Attorney General, April 25, 1933, BNA CO 691/131/5. Negotiations on the closure of Mr. Bauer's supply.
[416] Crown Agents to Undersecretary of State, Colonial Office, November 18, 1937, BNA CO 691/159/12.
[417] "License to the Dar es Salaam and Distric Electric Supply Company," 12, enclosed in Symes to Thomas, October 3, 1931, BNA CO 691/114/4; Moffett, *Tanganyika*, 707.
[418] Crown Agents to Undersecretary of State, Colonial Office, November 18, 1937, BNA CO 691/159/12.

concession area, was to "delay the progress of electrification of the Territory – a progress that is already tardy in comparison with that of other scantily populated countries such as Canada or South Africa," the Governor's deputy noted.[419] Together with the Colonial Office and its consulting engineers, the Tanganyikan government discussed options of giving short-term licences to small power producers who were willing to invest into electricity undertakings in small townships. In this discussion, they also consulted governments in other parts of the Empire, which had similar existing loan schemes, such as the "Local Lighting Scheme" of the Ceylon Local Loans & Development Fund, which provided loans for small electricity undertakings.[420] It was presumed that prospective electricity entrepreneurs in Tanganyika would "normally be 'small men' – garage proprietors, petty tradesmen, mill owners. These persons, subjected of course to inspection, could well serve present needs in a number of areas and they should be given sufficient security to enable them to amortise their capital without being forced to charge the consumers unreasonable rates."[421]

One of these private entrepreneurs was Mr. Bueb, a German who owned a large coffee plantation near Moshi. In 1934, he had already applied for a licence to provide electricity from a small hydropower plant, which he was planning to establish on his estate.[422] Initially, DARESCO opposed his plans, especially as Moshi was within its license area, but was reluctant to initiate any scheme of their own. In 1937, the company finally reached an agreement with Mr. Bueb for a small electricity scheme in the area. As a result Mr. Bueb provided electricity from his power plant to the township of Moshi until his undertaking was purchased in 1950.[423] Mr. Bueb, however, remained the only private business to provide electricity to the public even though there was more private electricity generation in Tanganyika Territory: In 1937, private owners of power plants with a capacity of over 25 KW were required to obtain a licence according to an Amendment of the Electricity Ordinance.[424] By 1942, thirty one licences had been issued, most of them to sisal estates along the Central Line which were not connected to the Pangani grid as well as tea estates in the Southern Highlands and mines in different areas. The generation capacity of these stations varied

[419] Mayers to Ormsby-Gore, July 30, 1937, BNA CO 691/159/12.
[420] Copy of letter from Brazel, Colombo, November 2, 1937, enclosed in Preece, Cardew and Rider to Crown Agents, BNA CO 691/159/12.
[421] Kennedy to Boyd, November 19, 1939, BNA CO 691/159/12.
[422] See correspondence in BNA CO 691/140/18.
[423] Lee to Boyd, September 25, 1937. CO 691/159/12; Moffett, *Tanganyika*, 707; see also Hayes, *Stima*, 322-23.
[424] Moffett, *Tanganyika*, 711.

considerably, from 25 kW to 2,500 kW, with the larger plants supplying the country's big mines.[425]

Another barrier to substantial expansion of electricity supply was the reluctant and often inconsistent development policy Britain had adopted for its East African colonies. As the public budgets of the colonies themselves were strained by the fallout of the global economic crisis in the early 1930s, the British government had little interest in investing metropolitan funds into public infrastructure in its overseas territories. Moreover, it was generally sceptical of the development of secondary industries in the colonies, fearing to create competition for its own manufacturers, as King and Zwanenberg argue.[426] In some cases, it actively resisted industrialisation and suppressed private capital from entering the sector. In Tanganyika, for example, a factory for binder twine had to close in 1936 after protests of rope, twine and net makers in Britain.[427] As long as electricity generation in the colonies would benefit the production of primary goods for export, however, it was endorsed by administrators in Britain.

The following account of a planned dam project for hydropower generation at the upper Nile in Uganda reveals the ambiguities of this policy and its detrimental effects on electrification. Discussions of harnessing the rivers hydroelectric potential had started as early as 1904 and intensified in the late 1920s due to the growing public desire for electric lighting and power. However, anxious that the Ugandan government would give away the right to develop the colony's exquisite hydropower resources to a private company to satisfy short-term demands, the Colonial Office delayed any decision on the project for 15 years. At the end of the negotiation process, the hydropower dam didn't materialise at all. Uganda received its first public electricity supply as late as 1938 – generated by small thermal power plants which were operated by EAP&L.

In the early 1930s, the European residents in Uganda were enviously looking at their counterparts in Mombasa, Nairobi, Nakuru or Eldoret, where EAP&L was now operating public electricity supply. In 1931, William Gowers, the Ugandan governor, complained in a letter to the Colonial Office that "[t]here is a growing feeling of dissatisfaction among the unofficial residents of Kampala at the attitude of the Government which has the effect of withholding from the amenities available to their neighbours in Kenya, and I must confer that

[425] Moffett, *Tanganyika*, 711.
[426] Anne King and R. M. A. Van Zwanenberg, *An Economic History of Kenya and Uganda, 1800-1970*, (Atlantic Highlands, N.J.: Humanities Press, 1975): 125; see also Byerley, *Becoming Jinja*, 243.
[427] For the debate on Tanganyika, see the chapter on non-industrialisation, in Coulson, *Tanzania*, 101-11.

I find it impossible to explain or to justify the differentiation."[428] Electric lighting was only accessible for government officials and institutions, which were supplied by the Public Works department, and a handful of very affluent individuals who could afford small generators for their own houses. The governor noted with concern that the use of small plants was rapidly extending. The necessity of installing own electricity generators added high costs to other services, like health care, which, as in Kenya and Tanganyika, were provided along racial lines. The planned addition of an "Asiatic ward" to the "non-native hospital" in Kampala, for example, required the installation of a new plant to serve the whole hospital as the capacity of the old one was insufficient. In light of this case, the governor lamented that "it is an anachronism that Kampala should still be without a general electric lighting and power system."[429]

The absence of any public electricity supply in Uganda in 1931 surprises at first glance. Geographically and economically, Uganda was closely linked to neighbouring Kenya. Separated only by a low-lying land and lake border and with all its goods for international trade transiting through Kenya, Uganda was a much more obvious trading partner than Tanganyika. Since its completion in 1901, the Uganda Railway connected the coast at Mombasa with the Lake Victoria port of Kisumu. Yet, some fundamental differences existed between the two colonial territories. Through its status as a protectorate, Uganda retained a degree of self-government under the Baganda, who served as administrators to the British. Unlike the "White Highlands" in Kenya, Uganda had never seen large-scale European settlement and because it had plenty of fertile land to offer, conflicts for land were rare. While in Kenya, Africans were denied the cultivation of the major cash-crop, in Uganda, African peasant producers had become the backbone of its agricultural economy.[430] They produced most of Uganda's cotton, the protectorate's main export crop. Unlike the European-owned sisal farms in Tanganyika and Kenya, motive power for the local processing of the produce was not needed and unlike Sudan, man-made irrigation was not a major issue. Hence, as long as British administrators regarded Uganda mainly as a source of raw cotton to the British metropole, major infrastructure projects, except for the transport infrastructure, ranked low on the priority list. "The country is fertile and the inhabitants are able, with little effort, to

[428] Gowers to Secretary of State for the Colonies, November 12, 1931, BNA CO 536/165/14.
[429] Ibid.
[430] King and Van Zwanenberg, *Economic History,* 60.

produce all their requirements," a British consultant stated, characterising Uganda as late as 1947.[431]

Yet, the first plans for electricity generation for industrial purposes in Uganda had been closely linked to the introduction of cash crops. In a way, Uganda was a prototypical case of the Chamberlainite "Imperial estates" doctrine. In 1902, the British Cotton Grower's Association (BCGA) had been formed to identify suitable areas for the cultivation of cotton within the Empire so that the British manufacturers' dependency from the United States could be reduced. Uganda became one of the most promising territories for cotton production. For the distribution of cottonseed to local Ganda chiefs who, in turn, controlled the smallholder farmers, the BCGA collaborated with the "Uganda Company". This company had been founded as an outlet of for the commercial activities of the industrial missions in 1904. It therefore served as a link between industrial interests in Britain, the Christian mission, the colonial government, and the population.[432] Already in its foundation prospectus, the company mentioned the possibility of harnessing the river Nile for hydropower generation: "For the supply of power, it would be possible to erect an electric generating station to be worked by water from the Ripon Falls. A cheap supply of power and light would lead to the establishment of various other industries."[433] Churchill's comments about Ripon Falls during his visit to Uganda in 1907 were well-known.

Yet, it was not until more than a decade later that the colonial administration took any further steps to facilitate hydropower generation at the River Nile. Between 1919 and 1921, Mr. Blain, the Government Electrical Engineer from Kenya, studied the river's hydroelectric potential. Based on his report, the Ugandan government issued an invitation to tender for a 21-year concession for the generation and distribution of electricity in the district and for the supply of electricity to Kampala, about 50 km away from the Falls, and possibly Entebbe. At that time, a hydropower concession for Uganda didn't attract much interest, neither from the small electricity companies in Nairobi and Mombasa nor from companies in Britain. After not having received a single tender, the government dropped the matter.[434] In 1923, the newly formed EAP&L contacted the Ugandan government through their solicitors in Nairobi, asking

[431] Richards, *Hydro-Electric Resources*, 19. As the only exception, he mentioned the Jinja and Kampala area as well as deposits of copper in the West and phosphate in the East of the country, which were yet to be developed.
[432] King and Van Zwanenberg, *Economic History*, 60.
[433] Cited in Hayes, *Stima*, 329.
[434] C.F. Jeffries to unknown recipient, February 1, 1927, BNA CO 534/144/5.

for a licence for Ripon Falls and the supply of Kampala and Jinja over a period of 42 years but did not receive an answer.[435]

The Ugandan government only seemed to take the EAP&L's expression of interest serious when, in 1926, the new governor William Frederik Gowers, who had taken office in 1925, discussed it with EAP&L's London chairman John Stone. For the governor, "[t]he financial interests represented by Mr. Stone", added some weight to the application. If they "were to make the necessary survey and submit a satisfactory scheme, you might consider that they, being first in the field, should have priority."[436] The Colonial Office, however, opposed the idea of imprudently giving the concession for Ripon Falls to EAP&L or someone else "who wants to hawk the concession about, or, if he does not intend to sell now, sees very large profits in the future." Before the local government parted "with an asset which is worthless now (for it is no use to develop electricity if there is no one to take the juice) but may be extremely valuable later on," administrators in London would rather leave Britain's Uganda Protectorate without public electricity supply for a while to come.[437] Alternatively, the Colonial Office suggested, Kampala and Entebbe could be supplied more cost-effectively with steam or petrol for the time being.[438]

For the years to come, the Colonial Office stuck to its view that "[n]othing is to be gained by rushing the matter now". If Uganda wanted a hydropower plant at the Nile, the administrators in London suggested that it could use recent surpluses of its government budget.[439] They were seconded by the Crown Agent's consulting engineers from Coode, Fitzmaurice, Wilson & Mitchell, who visited the site in connection with a proposed road bridge over the Nile close to Ripon Falls in 1927 and used the opportunity to comment on its hydropower potentials. Like railways in a tropical African Colony of Protectorate, they stated, large hydropower projects "should ordinarily be built by the Government at its own expense".[440] Unsurprisingly, when, in 1930, the Governor started a new initiative for finding private capital, the reaction from the Colonial Office was less than enthusiastic. In the course of the correspondence, however, the Ugandan government's financial position deteriorated in the wake of the worldwide economic

[435] Messrs Allen & Hamilton Solicitors to Chief Secretary Uganda, April 6, 1923, BNA CO 536/142/2; Hayes, *Stima*, 329-30.
[436] Gowers to Secretary of State for the Colonies, April 7, 1926, BNA CO 536/142/2.
[437] Lambert to Bottomley, August 24, 1926, BNA CO 536/142/2.
[438] Lambert to Bottomley, August 24, 1926, BNA CO 536/142/2.
[439] Jeffries to unknown recipient, February 1, 1927, BNA CO 534/144/5.
[440] Carmicheal to Jeffries, February 10, 1927, BNA CO 536/144/5.

depression.[441] Acknowledging that the "Uganda Government cannot bear the cost of this scheme, and that it is unfair to withhold the amenities of electric light and power from the community if private enterprise is willing to supply them," the Colonial Office finally agreed to the governor's plan of inviting tenders in 1931. With the help of the consulting engineers of Preece, Cardew and Rider and the Crown Agents, the Ugandan government began drafting legislation under which private electricity companies would be operating.[442]

The new Electricity Ordinance was enacted in 1933.[443] Yet, the negotiations between the Colonial Office and the new governor, Bernhard H. Bourdillon, were far from being concluded. Their main point of disagreement were their different ideas of the potential and the timelines for industrial development in the protectorate. In a book on Uganda by H.B. Thomas and Robert Scott, for which Bourdillon had written the introduction, the authors emphasised "that the Protectorate is unsuited to intensive industrial development" because of its landlocked position. They also feared that industrialisation would take away labour from the strategically important cotton sector.[444] For this reason, the Ugandan government was generally hesitant to spend public money on infrastructure development. In the first Development Plan for Uganda, for example, published in 1936, no government financing was earmarked for major public works.[445]

[441] Gowers to Secretary of State for the Colonies, November 12, 1931; Gowers to Secretary of State for the Colonies, December 2, 1931, BNA CO/536/165/14.
[442] Preece, Cardew and Rider to Crown Agents, October 31, 1931; Preece, Cardew and Rider to Crown Agents, January 12, 1933, BNA CO 536/165/5.
[443] Bourdillon to Secretary of State for the Colonies, November 11, 1933, BNA CO 536/165/5.
[444] Harold B. Thomas and Robert Scott, *Uganda* (London: Oxford University Press, 1935): 352, cited in Byerley, *Becoming Jinja*, 242. According to 1934 Naylor report, Hoag, *Developing the Rivers*, 151.
[445]Byerley, *Becoming Jinja*, 230. Elkan 1961, 47. The Development Of Uganda.

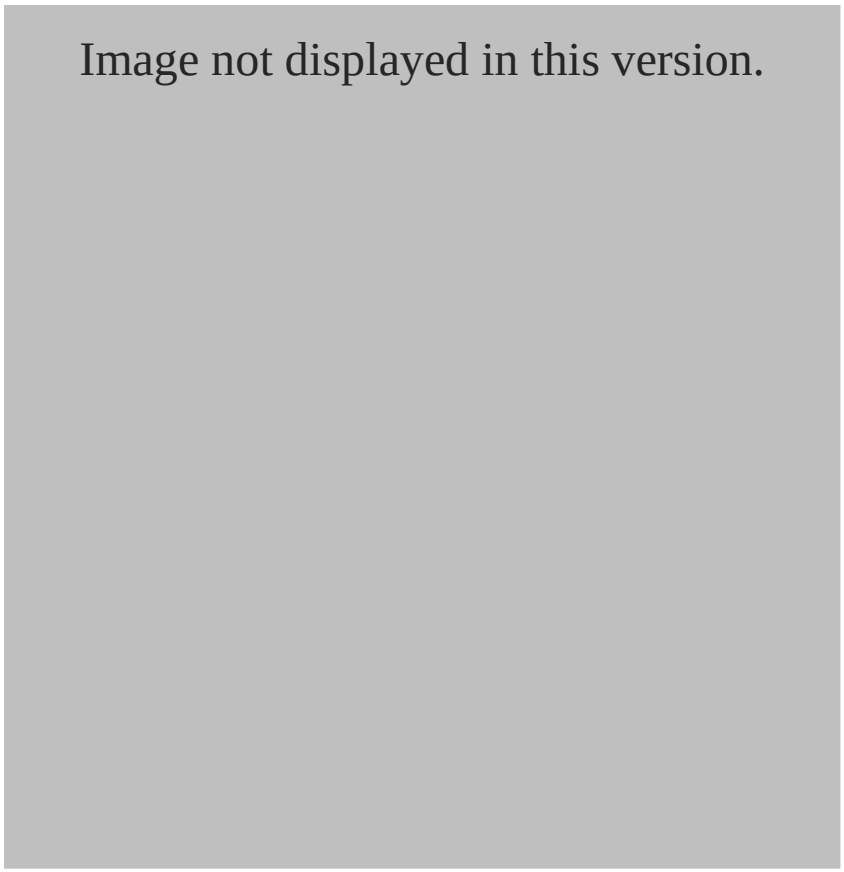


Figure 4. Map of the hydropower sites under discussion at the Victoria Nile. Source: Gore, "Electricity and privatisation," 360.

Against this background, Bourdillon wrote to the Colonial Office that inviting private capital to develop the Protectorate's hydropower resources was not "so embarrassing as has been suggested." Assuming that no large-scale industrialisation process would start within the next decade, he suggested to include a licence to build a small hydropower plant at Ripon Falls in the concession. In case that large industrial demands evolved in the future, he suggested, a large hydropower plant could be built further downstream at the Murchison Falls.[446] In contrast, the administrators at the Colonial Office envisioned "[t]hat the Kampala-Entebbe-Jinja area may become an important industrial region." Consequently, "the Ripon Falls should be safe guarded as being the potential source of a future supply of cheap power," they insisted.[447]

"This is getting complicated," another colonial administrator complained in late 1933.[448] Fearing that the governor would rush a decision before the full potential of the dam was known, the Colonial Office and its consulting engineers pressed to delay a decision and

[446] Bourdillon to Secretary of State for the Colonies, August 8, 1933, BNA CO 536/165/5.
[447] Note, date and author unknown, BNA CO 536/165/5.
[448] Flood to unknown recipient at Colonial Office, September 29, 1933, BNA CO 536/165/5.

commissioned a study of the hydropower potentials at different sites of the Victoria Nile.[449] The Colonial Development fund provided £2000 to the study, which was conducted by the consulting engineers for questions regarding electricity supply, Preece, Cardew and Rider, in cooperation with the consulting engineers in the field of civil engineering, Coode, Wilson, Mitchell and Vaughan-Lee.[450] The report by the consulting engineers was published in June 1935. Its conclusions were of little surprise: The Protectorate possessed high potentials for hydropower generation, but the investment for a hydropower plant at one of the three visited sites would amount to a sum of between one and two million pounds – far more than what existing loads would justify.[451]

In February 1935, while the study was still under way, the Ugandan government had published tenders for the right to develop hydropower at any river in Uganda – under the condition that these projects would not restrain the full developments of the site at a later stage.[452] Once more, the business network around EAP&L sensed an opportunity to expand beyond Kenya and Tanganyika. While EAP&L expressed its interest for the supply of Kampala, Entebbe and Jinja, its much larger partner, the Power Securities Company from Britain, offered to further investigate the possibilities for large-scale hydropower generation in exchange for preferential rights to implement a potential scheme.[453]

Their offer reached the Ugandan government prior to another change in government. In summer 1935, Philip Euen Mitchell took over office as governor.[454] Unlike his predecessor, Mitchell was enthusiastic about developing hydropower on the large scale in Uganda and he was a staunch supporter of private sector-led development. Mitchell was dismayed by the fact that, "[c]orrespondence on the question of supplying electric power in Uganda has been proceeding for many years, but this essential service is not yet available, to the detriment of the Protectorate and the exasperation of the public."[455] In order to accelerate the process, the consulting engineers proposed that the granting of the licence to EAP&L should be tied to the

[449] Unknown author to Flood, November 28, 1933. For a cost estimate for the study, see Preece Cardew & Rider to Colonial Office, November 24, 1933, BNA CO 536/165/5.
[450] Preece Cardew & Rider to Colonial Office, November 14, 1933, BNA CO 536/165/5.
[451] "Report by Preece Uganda Protectorate Hydro-Electric Investigation of the Victoria Nile, Report by Preece, Cardew & Rider and Coode Wilson, Mitchel & Vaughan Lee," BNA CO 536/184/17.
[452] See BNA CO 536/185/1.
[453] Power Securities Corporation to Bourdillon, July 19, 1935, BNA CO 536/184/16; East Africa Power and Ligthting, London Secretary to Crown Agents, May 24, 1935, BNA CO 536/185/1.
[454] For more details on Mitchell's career, see the section *Reconsidering Development: Welfare, industrialization and the promises of electricity, 1940-1945.*
[455] Mitchell to Secretary of State for the Colonies, November 8, 1935, BNA CO 536/184/16.

condition that supply to Kampala would be made available until early 1937 – if necessary, with a temporary thermal power station.[456]

If one follows the accounts of EAP&L chronicler Hayes, it was one of the innumerable personal encounters that took place along the main routes and nodes of travelling within the British Empire which marked the decisive turn in the negotiations. Harold Odam, the head of EAP&L had met A.C. Wilmot, Uganda's Director of Public Works, on a boat returning to East Africa. As a result of this encounter, which had developed into a "ship-board friendship", Odam and Wilmot scheduled a joint meeting with Mitchell, to discuss opportunities for power sector development in the Protectorate.[457]

The negotiations between the governor and the EAP&L chairman once more illustrate the difficulties of colonial officials in inducing and controlling "development" by means of private capital. Once the concession was granted, Mitchell had hoped, private investment for hydropower development would be flowing in. Odam, however, pursued a very different agenda. His company's stakeholders demanded low risks and quick returns on investment and no vague visions of industrial development. All Uganda had to offer, in Odam's view, were a few hundred potential urban customers. Even the few cash-crop estates could not all be expected to become power customers. To Mitchell's surprise, he proposed the construction of small thermal power stations in Kampala, Entebbe and Jinja while maintaining preferential rights for the development of hydropower in the future.[458] Grudgingly, Mitchell finally had to accept the proposal.

In 1937, EAP&L was granted licences for Kampala and Entebbe and in 1938 the commercial service started there. The small thermal station, which was run by wood and waste products, such as bagasse of cotton seed, supplied the government offices and residences in Entebbe as well the township of Kampala, where it also provided power for running the pumps for the local water infrastructure. By the end of World War II, the peak load of the small grid did not exceed 840 kW. After Kampala and Entebbe, a second isolated grid in Jinja soon started with the supply of the township and the King's African Rifles Camp, with its peak load not exceeding 240 kW.[459]

More than 30 years after the first plans for hydropower generation in Uganda had started circulating and 15 years after EAP&L had sent its first expression of interest to the Ugandan

[456] Preece, Cardew and Rider to Crown Agents, November 29, 1935, BNA CO 536/184/16.
[457] Hayes, *Stima*, 329; Mitchell held office from 1935 to 1940.
[458] Hayes, *Stima*, 330.
[459] Richards, *Hydro-Electric Resources*, 18-19.

government, the sweeping hydropower visions had not materialised. Instead, Kampala and Entebbe were finally supplied by the same model that EAP&L had applied in Tanganyika and Kenya. From a management perspective, Uganda was integrated into the EAP&L's private, small-scale, distributed system of supplying electricity exclusively to wealthier European and Asian clients in urban centres, who could afford the relatively high tariffs, while relying on largely outdated plant, which led to occasional interruptions but made operation highly profitable.[460] The installation of electricity supplies in Uganda marked the zenith of EAP&L's expansion to all three British East African colonies. The following paragraphs provide a snapshot of the system three decades of electrification had produced in East Africa.

[460] Richards, *Hydro-Electric Resources*, 19 on interruptions.

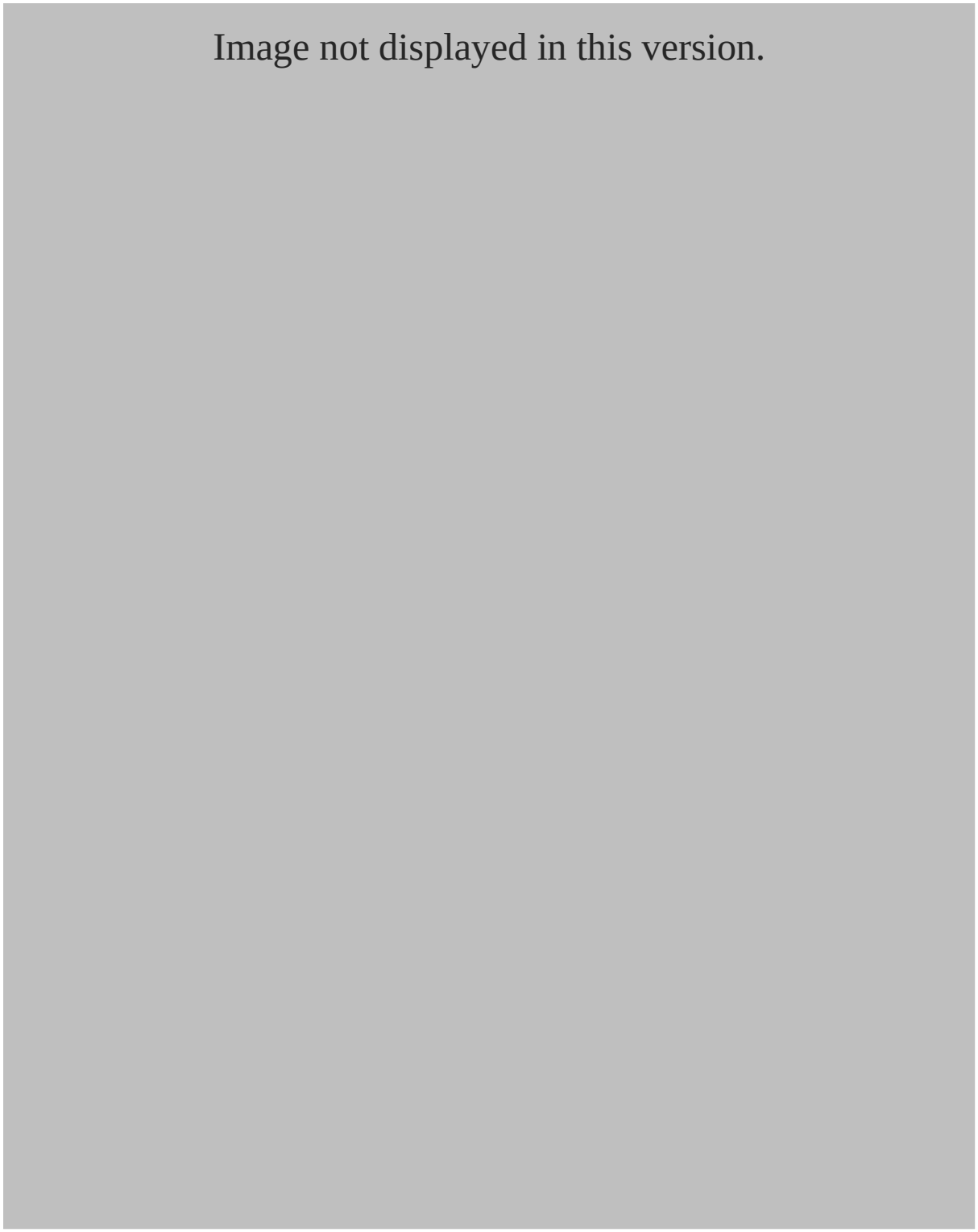


Figure 5. Supplied towns and licence areas of EAP&L (red) in East Africa. Source: Richards, *Hydro-Electric Resources*.

In Kenya, EAP&L operated distributed grids in four towns. The largest grid in Nairobi supplied electricity from the two hydroelectric stations at Maragua (total rating of 4.4 MW) and Ndula (2 MW), from an old Ruston diesel generator (170 kW) and two newer ones (436 kW and 800 kW), which were installed in 1938 and 1940, after the Maragua scheme had

failed to produce sufficient electricity. In Mombasa, EAP&L operated one thermal power plant with four Ruston diesel generators (total rating of 1.1 MW) and a Metrovick steam turbine (1.5 MW). In Nakuru the company had been running a small grid with a capacity of 240 kW since 1931, provided by three Ruston diesel generators. In Eldoret, EAP&L was relying on three Garrett locomobile steam engines (360 kW), which had been transferred from Nairobi in 1933. In Uganda, the towns of Kampala and Jinja had only recently, in 1938, received the first public supply by EAP&L. In Kampala, two Metrovick steam turbines provided a total capacity of 1 MW, and in Jinja, two Marshall locomobile steam engines added up to 100 kW.

In Tanganyika, a total of five towns were supplied with electricity by DARESCO, one by TANESCO and one by a private operator. DARESCO supplied Dar es Salaam with two Ruston and National diesel generators with an effective plant capacity of 1.6 MW. Along the central railway, the three towns of Tabora, Dodoma and Kigoma had already been electrified under German colonial rule. Tabora had a gas and a steam engine (110 kW and 100 kW), Dodoma a small steam and oil engine (total capacity 32 kW) and in Kigoma, DARESCO was still operating a Lanz-Siemens steam plant from the time of German rule with an effective capacity of 30 kW. In 1938, DARESCO had started operations in Mwanza with two Marshall steam engines with a total rating of 150 kW. In Moshi, a private entrepreneur of German origin operated a small hydropower station with two Voith Siemens hydropower generators with a total rating of 560 kW. TANESCO operated the comparatively large hydropower plant at the Pangani Falls with two Boving generators that could produce a total of 5 MW and were supplemented by a small diesel generator (rating of 250 kW) as a back-up. Apart from the sisal plantations in the area, TANESCO also supplied the town of Tanga.[461]

EAP&L's strategy of piecemeal investment and demand-driven expansion of generation capacity is illustrated by a graph showing the annual growth of demand and minimum generation plant capacity during the dry season in Nairobi. Over the course of ten years, between 1929 and 1939, the minimum generation capacity increased only slightly from 1,500 kW to 2,000 kW while the total demand doubled from about 1,500 kW to 3000 kW.[462]

---

[461] Richards, *Hydro-Electric Resources, schedule 2,* CO 852/844/1, Cosgrove, "Report on the East African Power & Lighting Co., Ltd., Vol. II – Appendices," *appendix No.78,* 46.

[462] Cosgrove, "Report on the East African Power & Lighting Co., Ltd., Vol. II – Appendices," appendix No. 39; A.O. Cosgrove, "Report on the East African Power & Lighting Co., Ltd. with particular reference to its failure to fulfil its obligations under the Kenya Electric Power Ordinance, Vol. I – Report," Nairobi, March 7, 1944, paragraph 200ff., BNA CO 533/533/4.

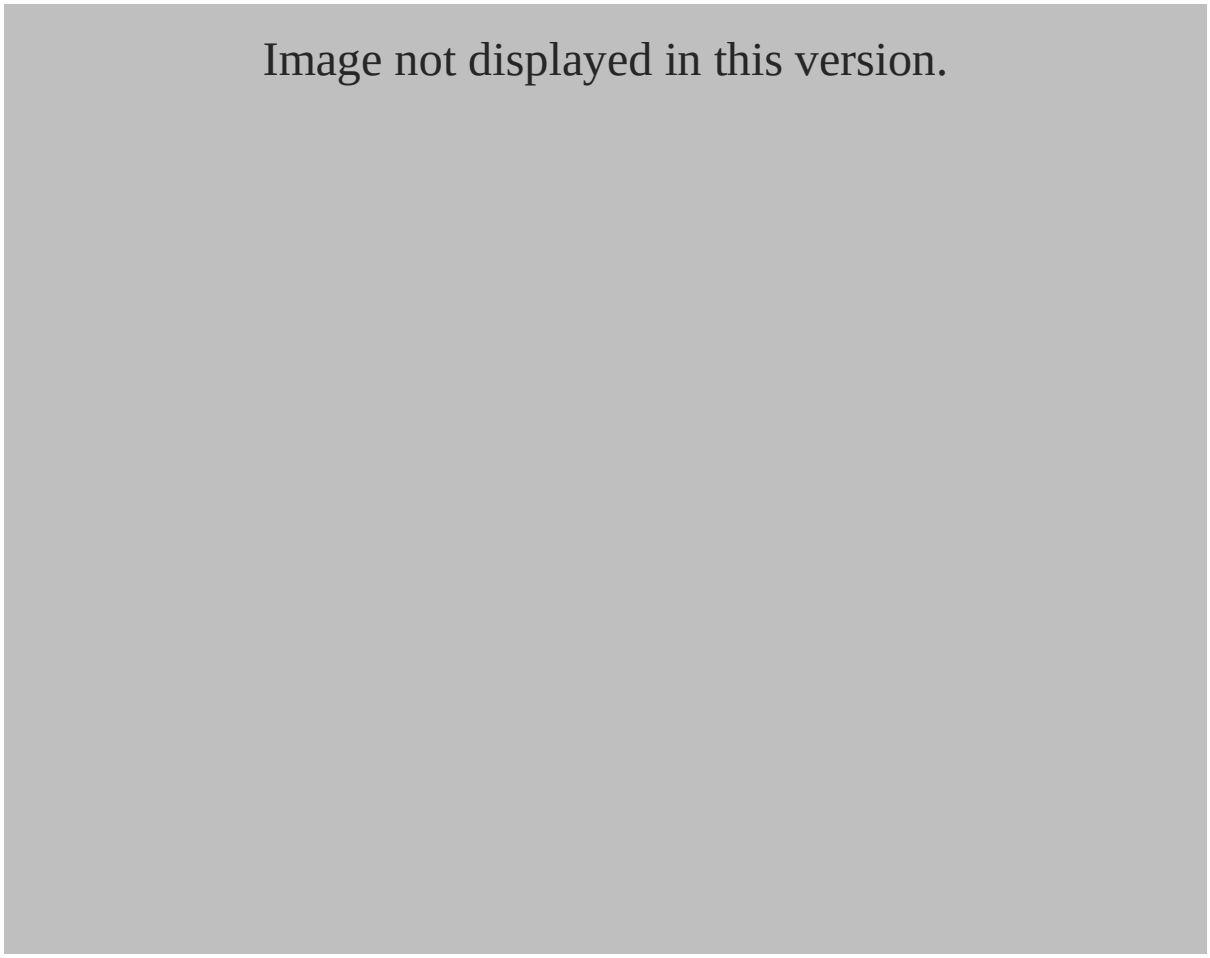


Figure 6. Annual growth of demand and maximum „dry-season“ generating plant capacity. Source: Cosgrove, "Report on the East African Power & Lighting Co., Ltd., Vol. II – Appendices."

EAP&L managed to meet the demand during most of the 1930s on a daily basis, for example by disconnecting sisal plantations during peak-load hours of the day and by building up daily storage capacity at the hydropower dams.[463] A sharp increase of demand after the outbreak of WWII, however, caused regular system breakdowns. The impacts of this power crisis will be shown in the next section. The difference between the maximum and minimum generation capacity can be explained by the fact that power generation by the Maragua hydroelectric station remained far behind expectations.[464]

[463] Cosgrove, "Report on the East African Power & Lighting Co., Ltd., Vol. I – Report," paragraph 174-75, BNA CO533/533/4.
[464] Hayes, *Stima*, 262.

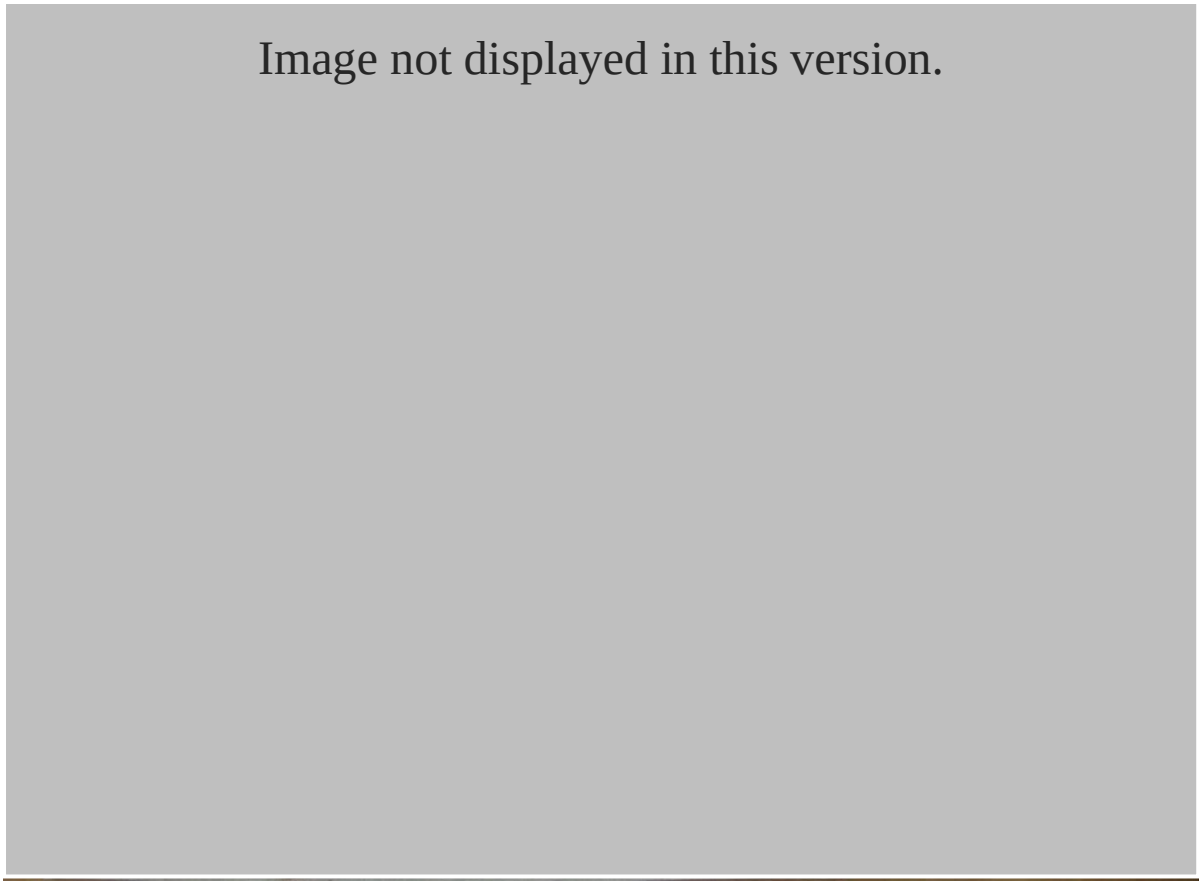


Figure 7. Installed plant rating. Highest maximum demand and lowest generation capacity in each month. Source: Cosgrove, "Report on the East African Power & Lighting Co., Ltd., Vol. II – Appendices."

The load growth in East African cities was very moderate in comparison to cities in Europe or the US, where electricity had already sharply risen in the 1920s, not least because of a steep rise of household electricity consumption.[465] Even in some colonial cities, like Bulawayo in neighbouring Rhodesia, the number of kWh sold had already increased more than tenfold between 1925 and 1932, as figures from Chikowero show.[466] There, the town council had boosted the use of electricity among Europeans by introducing special low electricity rates for private customers and hire-purchase schemes for electric household devices as well as favourable terms for their import or by hosting electrical exhibitions.[467] In contrast, administrations in Kenya or Tanganyika had not intervened to promote the use of electricity among the European population or even their own staff. In a letter to the Colonial Office from 1939, the General manager of DARESCO complained that in the government quarters of Dar es Salaam, houses were only wired for lighting, lacking the "the now standard electric appliances," such as electric bath heaters, water heaters, refrigerators, ceiling fans and

[465] For Berlin, see for example, Hughes, *Networks of Power*, 190.
[466] Chikowero, "Subalternating Currents," 294.
[467] Chikowero, "Subalternating Currents."

cookers. “In ordinary circumstances,” he added, domestic loads “can be built up and developed by normal business propaganda but conditions here are unique, in so far as the European community which we have to serve are, for the most part, officials living in furnished Government quarters. They are also liable to be transferred on duty to various parts of the Territory during their service.”[468]

With a broad variety of tariffs, tailored to different types of electricity uses, EAP&L tried to maximise the profitability of its operations and its load factor. Each individual branch offered up to eleven different tariffs, including offers for “shop window and display lighting”, “off-peak water heating” or specific tariffs for theatres and cinemas.[469] The complicated system of tariffs, which were relatively high compared to Britain, created confusion and disgruntlement among many customers and colonial administrators alike but proved to be a lucrative business model for the company. The company’s return on investment for most of the 1930s was slightly below 10%.[470] In addition to the management fees paid to Balfour and Beatty, most of the dividends were remitted to the company’s shareholders in London.

Nairobi’s municipal administrators became increasingly irritated, seeing nearly all profits from operating an electricity supply in the country flowing to the British metropole. The argument that those dividends amounted roughly to the same sums as the new investment capital flowing in from Britain, as EAP&L put forward, did little to appease them.[471] The municipality demanded that a share of EAP&L’s high profits should be redistributed to customers in Nairobi, for example through tariff reductions. In the negotiation, the municipality’s most important lever was that EAP&L depended on an extension of its distributing licence for Kenya to raise capital on the market. More than half of the licence period of 25 years it had been granted in 1922 was over and the company demanded an extension to 42 years.[472] In 1938, EAP&L finally obtained the extension of the licence in exchange for a tariff reduction, which offset the sales increase in the same year.[473] The tough confrontation with the municipality, however, had demanded its tribute. As Hayes wrote, H.R.

---

[468] General Manager DARESCO to Chief Secretary to Government, May 6, 1939, BNA CO 691/175/2.
[469] Richards, *Hydro-Electric Resources*, 1; Cosgrove, “Report on the East African Power & Lighting Co., Ltd., Vol. II – Appendices,” Appendix No. 7. For a detailed critique of the cost-oriented tariff system of EAP&L and its subsidiaries in East Africa during colonial rule, see Hans Amann, *Energy Supply and Economic Development in East Africa* (München: Weltforum Verlag, 1969), 126-27.
[470] See “Schedule of percentage of gross profits to capital expenditure on works after providing for depreciation but not for other reserves” in Cosgrove, “Report on the East African Power & Lighting Co., Ltd., Vol. II – Appendices,” Appendix No. 6.
[471] Hayes, *Stima* 254.
[472] Hayes, *Stima*, 265.
[473] Hayes, *Stima*, 265.

Odam, EAP&L's managing director started drinking heavily and had to resign due to ill health in 1938.[474]

This part illustrated how Britain, at the territorial peak of its Empire, struggled with finding its place in the "age of electricity". Electricity reached most of Britain's colonial periphery not as a "tool of empire" in the sense Headrick used the term for steamships, railways or machine guns, but as a "luxury industry" or motive power for enclaves of European-style living and economic activity – the European quarters of colonial cities or mines and plantations.[475] Hence, even though electricity gradually gained importance within the ensemble of urban technologies in the colonial cities, as Rao and Lourdusamy argue for India – what deserves attention regarding the British colonies in Africa are the reasons for and results of the colonial administrator's relative indifference towards electricity, given its ever-rising importance "at home". I have examined this question for the case of one of the remotest parts of the Empire's periphery, the British colonies in East Africa.

As my accounts show, the British colonial administration struggled – and in fact never fully managed – to control public electricity supply in East Africa. As a service that was guaranteed by the state, electricity provision was limited to a few selected government civil servants and institutions. Outside the realm of colonial administration, electricity was either privately generated or sold as a commodity – in fact, a luxury commodity – by private companies to everyone who could afford it. The relatively high margins that could be obtained for electricity among the small but affluent groups of European bureaucrats and settlers and Asian merchants in the cities and the sisal plantations in the rural areas first attracted local engineers-entrepreneurs and then multinational electricity companies. They competed for the concessions granted by colonial administrations, who were unwilling or, due to a lack of capital and expertise, unable to set up public electricity utilities.

The stories of the first electricity companies in Kenya and Tanganyika presented in this part of my dissertation help to unpack the notion of a first era of globalisation in electricity provision, which began in the late 1880s and ended either in 1914 or 1930, according to differing accounts.[476] The case of British East African colonies demonstrates a specific manifestation of the emerging multinational enterprise that Hausman et. al. have termed "enclave form". Before WWI, engineer-entrepreneurs like Clement Hirtzel, who pioneered the new technology in Africa, secured access to these "enclave" markets and profited from the

[474] Hayes, *Stima*, 277.
[475] Headrick, *The Tools of Empire.*
[476] Hausman et. al., *Global Electrification*, 272.

colonial administrations' lack of experience in negotiating terms for the concessions. In the 1920s, a group of investors and multinational companies in the engineering and public utilities sector from Britain with more know-how and better access to capital took over control of these enterprises in East Africa. My account of the scramble for hydropower concessions in Tanganyika reveals some of the particularities of the first wave of global finance in the electrification of the British Empire. It highlights the key role of a small group of well-connected and highly mobile individuals who moved through the networks of Empire in the search for new investment opportunities.

These individuals, I argue, were "system builders" only in the second place.[477] Rather than pursuing a broader vision of building and expanding electrical systems, they were driven by profit seeking and the expectations of shareholders in London. As a result, processes of system evolution in East Africa substantially differed from those in Europe or the United States. In the industrial world, electrification at the time can be described as a process of active system building guided by the principle of economies of scale and, thus, aimed at developing new markets. In contrast, electrification in East Africa in the 1920s and 1930s was – arguably except for TANESCO in Tanganyika – largely a reactive process of addressing the demand for an amenity that had become inextricable linked with European urban life and the colonial self-image of technical and thus cultural superiority.

While most countries in Europe and the US were enforcing plans for a systematic and coordinated expansion and consolidation of electricity system, attempts for state interventions in East Africa remained stuck between the sweeping rhetoric of developing imperial "estates" and the doctrine of financial self-sufficiency of the colonies. In light of a general scepticism towards the establishment of secondary industries in colonies Uganda and Tanganyika, colonial administrators also saw little immediate pressure to embark on large projects for electricity generation. As colonial administrations lacked the resources and knowledge to venture into electricity provision and devise projects themselves, they often found their interests often undermined by the private power companies. As will be shown, the resulting tensions escalated in the early 1940 and created novel constellations in the governance of electricity supply in East Africa

[477] For the concept of "system builders", see Thomas P. Hughes, "The Electrification of America: The System Builders," *Technology and Culture* 20 (1971).

Part II: Domesticating electricity for colonial development and welfare? State visions, private lobbies and the intricacies of (rural) electrification, 1940-1964

After its completion in 1954, the Owen Falls Dam at the upper Nile River sparked a wave of enthusiasm in Uganda and the British Empire. This dam, as one African journalist wrote, was no less than the '"the beginning of Uganda."[478] The landlocked protectorate with its small European settler population had become the site of what was by far the greatest undertaking of its kind in Africa South of the Sahara.[479] The project's transformative potential was too apparent: Since its beginning in 1938, public supplies in Uganda had consisted of a set of small isolated generators in Jinja, Kampala, and Entebbe, serving a peak load of about 1 MW in total.[480] The hydropower plant with its projected final capacity of 150 MW would be the jumpstart into a long-distance grid system that connected heavy industry, commercial and domestic consumers in urban and rural areas alike, while leaving enough capacity for the export of power to Kenya. The 831-meter-long and 31-meter-high dam transformed Lake Victoria into the largest reservoir in the world.[481]

The Owen Falls Dam was emblematic of a transition process of electrical infrastructures in some of the British colonies in Africa in the two post-WWII decades: from a model of small-scale generation and distributed provision in isolated grids to a large centralised grid supplied by a single large generating unit; from a strategy of gradually expanding the isolated distribution networks in the urban areas, to a top-down roll-out of a centralised grid; from a largely laisser-faire state attitude towards electrification to a direct involvement of the state in the form of a public utility; from a corporate policy of addressing an existing demand among urban users, willing to pay relative high tariffs, to a state-led attempt to create new markets for electricity in peri-urban and rural areas to absorb the boosted supply; from a shared understanding of electricity as an exclusive luxury for urban dwellers of European and Asian descent to its conceptualisation as a utility service that should be accessible for, at least a part of, the "native" population. With its final price tag of £21 million, the project also characterised the novel attitude of the metropolitan state towards its African possessions that

[478] Terje Tvedt, *The River Nile in the Age of the British: Political Ecology and the Quest for Economic Power* (London: I.B. Tauris, 2004): 224.
[479] Hayes, *Stima*, 332.
[480] Richards, *Hydro-Electric Resources*, 19.
[481] Tvedt, *River Nile*, 223.

encompassed in increased willingness to use metropolitan funds for their economic development.[482]

At the same time, the Owen Falls Dam revealed the limits and ambiguities of British infrastructure and development policy in Africa during the two post-WWII decades: While the ambitions of British planners and policy-makers to turn electrification into a state-led project succeeded in Uganda, they were thwarted in Kenya and Tanganyika, where an influential and well-connected private sector lobbied against plans for the nationalisation. While sweeping visions of industrialising the agriculture-based economy of Uganda had unlocked large amounts of British development funding for hydroelectric generation, the failure of many industries to materialise in the territory sparked disillusionment among officials. While colonial administrators and utility managers increasingly started to consider Africans in peri-urban and rural areas as potential electricity customers, the first rural electrification projects revealed the great difficulties for the utilities to make their technical, economic and legal routines and standards commensurable with the specific requirements and usage patterns of this group. For an overwhelming majority of Africans, electricity remained as far out of reach as it had been before.

The second part of this thesis maps out the beginnings of an infrastructural transition process in the three British East African colonies that would subsequently transform the small isolated urban electricity networks of the pre-war era to the national grid systems that we see today. WWII was a watershed for electrification in East Africa. The profound change of pace and scope with which electrical infrastructures were built in East Africa in the two post-WWII decades, as I will show in this part, was essentially triggered by a shift in the attitude of the British metropolis towards its colonial possessions in Africa and a reform of its development policy. Under the pressure of economic turmoil of the 1930s and the resulting social tensions in the colonies, it revised its extractive Chamberlainite development doctrine in favour of the more inclusive policy of development and social welfare in the colonies. Many analyses, as Hodge criticises, "have contented themselves with a vague notion of development oscillating somewhere between economic stimulus/exploitation and social welfare."[483] Based on correspondences on post-war development in East Africa and the numerous development plans that were drafted for the different colonial territories, I therefore map out the nuances and layers of significance of the idea of development at the time. Which different and

[482] Hoag, *Developing the Rivers,* 135, 162; Wilson indicates the total costs to have been £13 million. This sum was three times as much as the first estimates had calculated, see Wilson, *Owen Falls,* 7.
[483] Hodge and Hödl, "Introduction," 23.

sometimes competing ideas of development circulated? How did they interact with colonial motives? And finally: What role did electricity play in the different concepts of development? And what happened when these ideas

met with the complex reality on the ground?

As a framing device, the term development brought together different ideas for metropolitan intervention in the colonies. These ideas profoundly changed the way colonial administrators regarded the issue of electricity supply, albeit – as I will show –with a high degree of local variation. A major aspect of this paradigm change was a revision of colonial administrators' attitude towards industrialisation. While British officials had been sceptical or even openly dismissive of the industrialisation of Britain's African colonies they now considered it the key to economic development. Reviewing several plans, surveys and reports on colonial development, a memorandum to the East African Industrial Council concluded in 1944 that "[t]he need for secondary industries in East Africa is widely recognised, and has been emphasized in many published documents."[484] Not surprisingly, electricity as a motive power for many industries gained new significance.

The extensive post-war development programs also show another important dimension of the novel understanding of development: The essential need for state economic planning and allocation of resources during World War II had given rise to a renewed confidence in the ability of the state to plan and manage economic development. This confidence reverberated in the nationalisation of key industries in Britain under the new Labour government after the war, including the country's electricity sector. In the colonial context, the mission to induce and direct social and economic change became the main raison d'être for the British colonial state in what was left of its Empire. With their new development agenda, Hodge writes, British colonial officials and rulers "aimed not only to hold on to the colonial state, but to reinvigorate it by transforming it into a more effective instrument for development as a way of re-legitimising the colonial mission."[485] During the war, several expert committees and advisors started pumping out reports, memoranda surveys and plans on the post-war development and industrialisation of the African colonies. Among them were plans for a profound restructuring of the electricity sector in East Africa.

---

[484] "Memorandum addressed to the E.A. industial council on a proposal to establish a permanent research institute for East Africa," enclosed in Lockhart to Carstairs, December 14, 1944, BNA CO 582/579/1.
[485] Hodge and Hödl, "Introduction," 15.

How did this new set of connections, which might be termed "developmental", impact on other sets of relationships associated with electrification in East Africa? The six sections of this part will tell different stories about how the sites of the big and the small, the global and the local were connected in this process. These stories allow for insights into how ideas and concepts devised in the colonial metropole impacted on the evolution of electricity systems in Kenya, Tanganyika and Uganda but also how close the development in these three British colonial territories was interlinked. They were not only connected economically and institutionally through the region-wide monopoly of EAP&L but also materially through high-tension lines that, quite literally, transmitted the infrastructural transformation from one territory to another.

The first section details how the changes in the discourse on colonial development among British colonial politicians and planners and the post-war planning offensive of the early 1940s reverberated in the three British East African territories. An analysis of the development plans for Tanganyika, Kenya and Uganda and the associated correspondence shows that the new shared narratives about industrialisation and state-planning, as vehicles for economic development and social progress in Africa, blended with specific assumptions about the essential "nature" of the respective colony and its people and lead to distinct agendas for its future development. These agendas and their underlying assumptions did not remain unchallenged. As will be shown, they were constantly negotiated and disputed, illustrating the numerous tensions within the Empire – between colonial administrators in the metropole and the periphery, between colonial governments and European settler communities, between supporters of private and state-led development or even between different ministries of the colonial government.

Still, the development plans constituted an important discursive foundation for the later negotiations over electrification as they assigned different roles to electricity in the development process. In Tanganyika, it was supposed to boost agricultural productivity, not only as motive power for the processing of cash crops but also as an incentive for European farmers to settle in the small rural towns and – as planners imagined – guide a process of agricultural change there. In Uganda, where development planning connected to long existing visions of state-led development, large-scale hydropower generation was envisioned to set off a process of rapid industrialisation in the footsteps of the TVA in the USA. In Kenya, the supporters of private-led development prevailed in the heated debates on economic policy and did not only secure the support of the governor but also controlled the key government institutions, in particular the Ministry of Industry and Commerce. Consequently, the ministry

fended off any substantial state intervention into the affairs of EAP&L, the private monopoly holder for electricity supply, as well as any state subventions for electricity service provision beyond the four largest cities until the mid-1950s.

At the eve of WWII, EAP&L had consolidated its monopoly in all three British territories after having expanded to Uganda in 1938 and having secured an extension for its licence in Kenya in the same year. It had established a network of – personal, legal, economic, material – relationships that it hoped would allow maintaining its lucrative business model for a while to come. In the second section, however, I will show how the impacts of World War II as well as of the post-war invention of the state disrupted this network. As an immediate effect, the breakdown of the system due to the new war-time loads escalated the existing tensions between EAP&L and the government departments overseeing electricity supply in Kenya. To those colonial administrators concerned with economic development and industrial planning, these system failures furthermore revealed the limitations of a private monopoly in the power sector. They pressed for a systematic expansion of electricity infrastructures in East Africa, planned and coordinated by the state.

For this endeavour, the Colonial Office depended on the technical knowledge of external expert advisors. As in other fields, it had extended its advisory network of civil and electrical engineers. These advisors travelled between Britain and the colonies, they circulated ideas and concepts of electricity provision derived from their experience in Britain and challenged established arrangements and insider networks in the colonies. They hence became key agents of the infrastructural transition that took place in post-war East Africa. In this section, I will follow the trajectory of the most outstanding individual of this actor group in East Africa, Charles Redvers Westlake, who played a key role in the power sector of the region in the 1940s and 1950s. My account allows for detailed insights into the inner workings, but also the contingencies, of British colonial development policy of the late colonial period. Within this constellation, Westlake embodies the authority and political weight of expert advisors. Not only did he turn his consulting mission into a lobbying endeavour for the nationalisation of the electricity sector in all East African territories, but after he had achieved this goal in Uganda, he also became himself chairman of the newly founded public Ugandan Electricity Board (UEB).

The UEB had been set up to implement one of the most ambitious development projects in the British Empire at the time, the Owen Falls hydropower scheme. In the third section, I will zero in on this scheme and trace the intersecting circuits of communication that led to its

initiation. The project serves an illustrative case to gain a better understanding of the dynamics of infrastructure development in late-colonial Africa. It became a textbook example of the British top-down industrialisation offensive in its colonies, its underlying motives, its limitations and inherent contradictions. The project shows that despite the rhetoric of improving living standards in the colonies, British development policy was never disentangled from metropolitan economic motives. This also held true for electricity. Consultants from Britain, who were commissioned to conduct studies in the power sector, framed ideas of electricity in terms of a basic utility service. Yet, in practice, the major generation projects in East Africa were clearly devised for the supply of industries and not for service provision. Against the background of the Sterling crisis, the real attraction of hydropower dams in the colonies was the prospect of promoting industries that would produce goods for export to, or substitute imports from, the dollar zone.[486]

The project furthermore tells a fascinating story about the complex socio-technical relationships inherent in the large hydropower projects that came to dominate the electricity landscape in Africa in the late 1950s. The Owen Falls project exemplifies the power of discourses and shared narratives in shaping electricity infrastructures and the insufficiency of structuralist interpretations. At the time of its completion, hydropower generation at the Upper Nile had been under discussion for half a century. Yet, after Westlake had submitted the first proposals for the scheme in 1946, it took only three years for the construction to start – a remarkably short period for a project that was unprecedented in size in East Africa. My analysis shows how the discursive construction of a future vision of industrialisation as well as the suitability of the dam site at the River Nile as a projection screen for these visions determined the timing and location of the project.

At the same time, the course of events after the completion of the Owen Falls hydropower station shows that electrification cannot be solely explained in terms of its social construction. The characteristics of the dam as a technical artefact and the techno-economic rationale inherent in the electricity system it supplied both invoked a set of new connections which – in some cases – were diametrically opposed to the original motives of the project's planners and managers. The geological features of the site, the river Nile, had necessitated a design of the hydropower station that was highly over-dimensioned for the supply of existing loads in Uganda. As new industrial loads in the territory did not materialise as expected, the key

[486] On the key importance of promoting a "dollar earning industry" in the colonies for post-war reconstruction in Britain see: Nicholas J. White, "Reconstructing Europe through Rejuvenating Empire: The British, French, and Dutch Experiences Compared," *Past Present Past and Present* 210 (2011), 214.

determining factor for the electrification policy of the UEB was the necessity to find outlets for the large amounts of electricity produced. The utility was prompted to construct a long-distance transmission line to Kenya and sell its overcapacities at discount rates to its rival company, the EAP&L, thus undermining colonial administrators' original plans to industrialise Uganda by means of low-cost electricity.

As I will show in the fourth section, the need to create new markets for the surplus electricity generated by the Owen Falls dam was also the main driver behind what was to become East Africa's first rural electrification program. The section analyses the different colonial states' attempts – or, the lack thereof – to bring electricity to small townships and rural areas in Uganda, Kenya and Tanganyika during the two post-war decades. To make sense of the different ways in which electricity supply was expanded beyond the urban centres to the semi-urban peripheries or to the small towns and villages in the rural areas, the three stories need to be told from different perspectives. The first revolves around the top-down planning and assembly of a centralised grid in Uganda. After providing an overview of the economics of grid-based rural electricity provision, I will follow the electrons in their way from the generating plant at Owen falls through the transmission lines and distribution grids to the individual customers: the rural households or small industries. I delineate the technical and economic specifications that utilities had to consider when designing the grid. My accounts reveal the difficulties of the supply-driven strategy for creating electricity markets in rural Africa.

In Kenya and Tanganyika, the rationale of extending supplies to rural areas was, in a sense, diametrically opposed to that in Uganda. EAP&L and its subsidies continued their demand-driven strategy of supplying electricity only in areas where quick returns on investment were guaranteed. This strategy was increasingly at odds with the renewed understanding of many government officials of how to develop and modernise the colonies. Based on archival files from Kenya and Tanzania I will trace the negotiations on building up supplies in small towns and rural areas. As electricity increasingly became a key feature of urban social life, district councils and township committees in the more rural areas approached their district commissioners to put pressure on the government to obtain an electricity supply. European farmers living off-grid made their calls for connections to the grid heard through their lobbying organisations.

The reactions of the colonial governments in Kenya and Tanganyika varied. While in Kenya, the responsible ministry warded of requests for subsidising grid connections and refused to

make electricity a priority in development planning, the Tanganyikan government enforced the installation of supplies in a handful of small towns. A short case study on a rural electrification project and the Chagas people in Moshi will provide the first archival evidence of Africans trying to get access to electricity through their political representatives – even though it became clear that the Chagga council regarded electricity as a "luxury rather than a necessity" and was not willing to invest the large sum of money demanded by the utility in order to receive a connection.[487] In general, the attempts to connect rural areas in Kenya and Tanganyika remained inconsequential and negligible until the end of colonial rule.

In the fifth section, I will show that the failure to expand electricity services was also due to the difficulties in "producing" a novel type of electricity customer: the overwhelming majority of "native" Africans – in fact everyone in this group except for a few of the most senior government officials – who were not able to pay the high electricity tariffs that were clearly tailored to the needs of non-African customers. As was shown earlier, utility managers and colonial administrators had largely dismissed Africans as being uninterested in electricity prior to WWII. It had been only in the context of CD&W policy in the early 1940s that the lack of electric lighting in government institutions for Africans or in African housing schemes was perceived as a deficiency and a problem that needed to be solved. Yet, as a short digression into discourses on "native" housing in the British colonies will illustrate, the provision of social services remained a highly biased endeavour. Racial biases in development planning did not cease to exist, but were increasingly supplemented and sometimes overlaid by other binaries, such as capitalist vs. pre-capitalist, formal vs. informal, wage-work vs. subsistence farming. Development planning was following a wider vision of a social transformation that – under the guidance of colonial governments and/or European settlers – would turn "unproductive natives" into productive African wageworkers or state employees. Many colonial administrators considered domestic electricity supply a part of this endeavour.

Putting these ideas into practice, however, proved to be impossible in most cases. The funds set aside for the connection of African neighbourhoods remained infinitesimal. Engineers and utility managers were struggling to establish the technical, legal and financial connections that would allow to make most African customers and their specific requirements commensurate with the utility's technical standards, legal routines and business model. A handful of pilot projects illustrate that utilities as well as government engineers were markedly unprepared to perform this task as, for nearly half a century, they had operated electricity systems nearly

[487] Marealle to District Commissioner, Moshi, May 4, 1959, TNA Acc. Nr 5, File 318.

exclusively in enclaves, where technologies and standards imported from Europe could be applied.

The sixth section, then, outlines the hesitant and largely unsuccessful attempts of the two remaining colonies, Tanganyika and Kenya, to enforce the consolidation and coordinate the expansion of electricity infrastructures by means of private ownership of the electricity utilities and to set up independent institutions for regulation and customer participation. It furthermore outlines the structural reasons for the imminent demise of private capitalism in the power sector of the two colonies, which foreshadowed its nationalisation after independence. Rather than by state interventionism, the main cause for this demise was the withdrawal of international private capital from infrastructure investments overseas and the entry of international development assistance, as signified by the engagement of the World Bank in the Ugandan and Kenyan power sectors. Because of their statutory limitations, private companies were increasingly unsuited to deal with the requirements of the international organisations.

1) Reconsidering Development: Welfare, industrialisation and the promises of electricity, 1940-1945

During the 1930ies, the principles of British colonial development policies were challenged by the global economic and social turmoil following the Great Depression in 1929. The collapse of world commodity prices confronted the Empire with the fatal consequences of its market and export-oriented development policy, which had focused on cash-crop monocultures and the exploitation of mineral resources.[488] Coupled with a perceived "surplus population", the permanent economic stagnation in many colonies evoked neo-Malthusian crisis narratives among colonial officials.[489] In the pre-war years the social tensions stemming from the erosion of the living and working conditions escalated in numerous strikes, demonstrations and riots. Tanganyika for example was shaken by a series of dock workers strikes in Dar es Salaam from 1939 on. In face of the crisis, the Colonial Office realised that a substantial revision of Amery's "constructive imperialist" policy and a shift away from the Chamberlainite "Imperial Estates" doctrine to a more inclusive approach to development were inevitable to (re-)legitimise the colonial project.[490] Unless Britain committed to investing more in its colonies, the Colonial Secretary argued, there was no prospect of renewing the

[488] Sieberg, *Colonial Development*, 75; Hodge, *Triumph of the Expert*, 8: Morgan, *The Official History* 80; Cooper, *Africa Since 1940*, 30-31.
[489] Hodge, *Triumph of the Expert*, 166, 180.
[490] Hodge, *Triumph of the Expert*, 179.

loyalty of colonial subjects or tempering the growing criticism from the United States. Britain, he warned, ran danger of losing its colonies and thus undermining its global defence strategy.[491] The Colonial Office initiated a far-reaching process of policy reform which resulted in the Colonial Development and Welfare (CD&W) Act of 1940.

In the CD&W Act, Great Britain committed itself to spending metropolitan resources to raise the living standards of the entire population in the colonies. The Act was paradigmatic as it renounced the earlier doctrines of indirect rule and colonial self-sufficiency. It earmarked funds from the metropolitan state budget that could be loaned or granted for social welfare and development projects in the colonies.[492] The Act focused on programs for the improvement of housing, water supply, education and on other social projects, most of which addressed African wage workers and state bureaucrats. It also stipulated state subventions for infrastructure and directly productive projects. The motives behind the social reforms were not philanthropic. They were rather aimed at producing a healthier and more efficient workforce and, above all, a less erratic and rebellious one.[493] Not so much for the actual sums spent on the colonies in the first years but regarding the fundamental premises of colonial development policy, the CD&W Act marked a turning point as it introduced a more inclusive vision of economic development, which attributed to the state the central agency in making development happen through systematic and planned intervention.[494]

Throughout WWII, Britain had been confronted with the necessity of coordinating its different economic sectors and distributing strategic resources to meet war requirements both in Europe and overseas. The renewed confidence in state-planning reverberated with the post-war colonial development policy. From the late 1930s on, an increasing number of central development committees and planning commissions produced reports for the different territories of the Empire.[495] For these reports, detailed inventories and analyses of the colonies' different sectors were prepared and collected. They served as a basis for comprehensive and systematic development plans that were supposed to set the ground for

[491] P.J. Cain and Anthony G. Hopkins, *British Imperialism: Crisis and Deconstruction. 1914-1990* (London and New York: Longman, 1993), 232; Byerley, *Becoming Jinja*, 210.
[492] John Fage, *A History of Africa* (London and New York: Routledge, 2002), 422, Byerley, *Becoming Jinja*, 211.
[493] Cooper, *Africa Since 1940*, 31.
[494] Hodge, *Triumph of the Expert*, 180.
[495] Sieberg, *Colonial Development*.

welfare and development campaigns starting after the war, when resources would be available.[496]

Furthermore, there was a wide consensus among colonial planners that technical knowledge and expertise had to be mobilised and better coordinated to remedy the lack of fundamental information, which in many cases was seen as a major constraint for development. The new state planning initiative of the 1940s gave impetus to a substantial expansion of the Colonial Offices' advisory network.[497] During the 1940s, the Colonial Offices included nearly two dozen principal advisors and consultants and an equal number of specialised advisory councils and committees. The reports and memoranda, produced by these advisory experts, deserve attention as they underpinned the conceptual framework not only of the early British post-war colonial development offensive but also much of later practices of international development and environmental policy, as Hodge shows for the agricultural sector.[498]

In these reports, technocratic ideas of state-led planning blended with reactionary assumptions about the "nature" of the colony and led to country-specific narratives of development. As a result, the development plans for the different colonies delineated very different pathways for modernisation and economic development. Within the British Empire, the Tanganyikan government was the first to commission a comprehensive development program. In 1938, the new governor Sir Mark Young initiated a "Central Development Committee" which represented the interests of different departments and the white settler community.[499] In 1939, the committee collected memoranda on various issues from provincial committees and completed the report by May 1940. The document, which was celebrated as an "excellent report" in the colonial press, and the discussions it triggered show how the new colonial welfare and development rhetoric mixed with old racial stereotypes of the nature of the territory and its residents:

> We want to see a healthy, prosperous, industrious, and self-reliant population resident in the Territory; we want to see such use made of Tanganyika's resource as will place prosperity beyond doubt, we want to see a greatly increased non-native and native population and greatly improved standard of living.[500]

---

[496] Hodge, *Triumph of the Expert*, 9.
[497] Hodge, *Triumph of the Expert*, 180, 202.
[498] Hodge, *Triumph of the Expert*, 180.
[499] The committee included seven members, among them the financial secretary, the railways manager, the agricultural director and representative of the settlers but no African or Asian representatives.
[500] Tanganyika Territory, *Report of the Central Development Committee* (Dar es Salaam: Government Printer, 1940), 7, enclosed in Young to Lloyd of Dolobran, August 21, 1940, BNA CO 691/179/15.

In line with their wide definition of development, the authors proclaimed that their objective was "to make Tanganyika a country".[501] Yet, the details of the report clearly show that this statement did not allude to a process of political emancipation but, on the contrary, to a mission of economic education and disciplining with white settlers at its forefront.[502]

The authors presumed that economic progress "can only be achieved by inculcating into Africans a desire to do more work."[503] Still, the authors stated that "native development is bound to be inadequate and they are driven to urge very large European development". They considered non-native settlements to be of "high moral value", which needed to be promoted by provision of necessary infrastructure to increase the value of lands.[504] The development policy for Tanganyika, they argued, should focus on those cash crops and mineral resources that were considered as "European" among colonial administrators: sisal, gold, and, to a smaller extent, cotton and coffee.[505] Consequently, almost the entire development plan focused on state interventions in the agricultural sector. The proposed measures aimed at resettling "native" Africans from unfertile to more fertile areas and promoting the settlement of "non-natives". While for many years to come, all the territory's manpower should be concentrated on "agricultural production under proper supervision", the authors argued, "[i]ndustrialisation should be left to those countries where the hostile forces of nature are less formidable or the population so dense that men can easily be spared from land. "[506] Only a single page of the report was dedicated to some general comments about measures that would benefit the establishment of secondary industries.[507]

Consequently, as far as the development of infrastructures was concerned, the committee stressed the need for road construction to connect the production centres in the rural areas to the commercial cities where the produce could be marketed. Most of the proposed expenditures for specific projects was earmarked for road construction. Electricity, to the

[501] Sieberg, *Colonial Development*, 248.
[502] John Iliffe, *A Modern History of Tanganyika* (Cambridge: Cambridge University Press, 1979), 439.
[503] See Chapter 2 of Tanganyika Territory, *Report of the Central Development Committee*, 7-21.
[504] Electricity is not mentioned in connection with increasing value of land, e.g. by road construction, see Tanganyika Territory, *Report of the Central Development Committee*, 77, 84.
[505] See, e.g., a note by an unknown author at the Colonial Office to Parkinson, May 26, 1941, BNA CO 691/179/15.
[506] Scott to unknown recipient, Colonial Office, March 31, 1941, BNA CO 691/179/15.
[507] Tanganyika Territory, *Report of the Central Development Committee*, 97-98.

contrary, was not mentioned in the entire report, except where it concerned the supply of government institutions in Dar es Salaam.[508]

The report clearly shows that post-war development planning for Tanganyika did not set the stage for a large-scale state intervention in the electricity sector. It rather indicated that electricity supply would become enmeshed in colonial settlement policy. As will be shown later, the pattern of electrifying a relatively large number of small towns in rural areas, unlike in Kenya, suggests a policy of trying to bring those infrastructure services to rural areas which European settlers demanded – although there is no direct reference to the development plan in the correspondence on electrification .

In Kenya, the situation was much different. More than in the other East African colonies, social tensions in Kenya had steadily increased since the mid 1930s and throughout World War II. The deterioration of African reserves, the growth of squatter numbers, the tension between squatters and European farmers, the urbanisation and burgeoning labour agitation were well registered among the colonial elites, and all sides consented that economic progress was urgently needed to avoid political and social uprising.[509] There was, however, a controversial debate about the most effective methods of promoting economic growth.

In Kenya, Philip Euen took office in December 1944. As was shown earlier, Mitchell had previously served as Governor of Uganda, where he had been an advocate of private-led development. In the historiography on Kenya, Mitchell is described as a racist of the old school, who advocated a paternalistic form of development in Africa under the guidance of Europeans.[510] In 1945, Mitchell set up an autonomous Development and Reconstruction Authority that was funded externally from loans and grants and was entrusted with long-term, income-generating development projects.[511] In the early post-war years, the economic policy of all East African governments was characterised by feverish efforts for economic planning. In Kenya, two opposing groups heatedly debated the priorities for development and the right approaches to achieve the economic goals.

---

[508] For an overview of the sums for different types of items, see "Note with reference to Lord Chesham's motion for the 29th February, BNA CO 691/190/2; Reference to electricity in Tanganyika Territory, *Report of the Central Development Committee*, 213-14.

[509] Robert L. Tignor, *Capitalism and Nationalism at the End of Empire: State and Business in Decolonizing Egypt, Nigeria, and Kenya, 1945-1963* (Princeton, N.J.: Princeton University Press, 1998): 297.

[510] Tignor, *Capitalism and Nationalism*, 297. For a characterisation of Mitchell, see David Throup, Economic & Social Origins of Mau Mau 1945-53 (London: James Currey, 1987): 33.

[511] Tignor, *Capitalism and Nationalism*, 299. On the DARA, see also Hayes, *Stima*, 285.

Governor Mitchell and well-organised Kenyan business groups favoured an approach of private-sector led economic development, which was aimed at attracting private capital and privileged productionist strategies over social services.[512] During his term as governor in Kenya from 1944 to 1952, Mitchell was not only a close ally of the Kenyan business community in fending of nationalisation efforts but also gradually replaced the public sector advocates in the government with individuals who were committed to private sector-led development.[513]

This laisser-faire approach was opposed by many high-level colonial bureaucrats who were sceptical about the private sector's potential to solve the country's structural challenges. They opted for a state-induced process towards industrialisation in which the state took the key role in creating large-scale factories, for example, in the fields of food processing, textile cement or ceramics, fertilisers, sisal processing and heavy chemical industry. Drawing from the experience of war time exigencies, they highlighted the necessity and potential of economic planning. In their sweeping arguments for state-planned development, they referred to cases like the Ruhr industrial complex, the five-year plans of the Soviet Union and the Tennessee Valley Authority. The state bureaucrats' perspective was reflected in the Kenyan development plan of 1946, which largely focused on government activities.[514]

In the immediate post-war years, proponents of state-led development could rely on intellectual and political support from the metropole.[515] After its landslide victory in the 1945 general election, the Labour party in Great Britain introduced a socialist textbook policy implementing the theories of economist John Maynard Keynes. Major industries were nationalised, including the country's electricity sector, which had already been rigorously controlled and supervised by the state for many years.[516] British politicians and colonial bureaucrats were eager to apply the lessons learned from home to the colonies. In light of the "unsatisfactory condition of affairs in the Electrical World over here", Abraham Lyons, a member of the British parliament, wrote to the Colonial Office in 1943, farsighted planning would be needed for East Africa as "Electricity and Hydro-Electricity are bound to form an important part" of an upcoming "era of intensive development".[517] He suggested a review of "all existing legislation, official rules and regulations… regarding the supply and maintenance

[512] Tignor, *Capitalism and Nationalism*, 300.
[513] Tignor, *Capitalism and Nationalism*, 308.
[514] Tignor, *Capitalism and Nationalism*, 300-1.
[515] Tignor, *Capitalism and Nationalism*, 303.
[516] Hayes, *Stima*, 286.
[517] Quotes in Lyons to Stanley, November 2, 1943, BNA CO 822/112/6. See Rennie to Oliver Stanley, November 29, 1944, BNA CO 533/533/3.

of Electrical development, generation, equipment, transmission and distribution" in Uganda, Tanganyika and Kenya.[518]

His suggestions reflected a commonly shared assumption among British colonial politicians and administrators that the three British East African territories would be grouped into a "Union or Federation" after WWII.[519] In fact, the debate about supra-national legislation for the three colonies, which already were economically highly interdependent, continued after the war and resulted in the establishment of the East African High Commission in January 1948. New research institutions like the East Africa Industries Research Board, which was established in 1944, mapped out a plan for an integrated economic development of the region.[520] Against this background, it seemed appropriate to many colonial administrators in London that electricity provision in East Africa would be amalgamated on a regional level.[521] From its beginning, however, the High Commission struggled with the lack of joint planning and fiscal policy, the different political priorities regarding the colonies and with Kenya's dominant economic position. In fact, administrators on the local level remained focussed on the individual colony when they discussed infrastructure development.

It is for this reason that metropolitan ideas about electrification were taken up so differently. As will be shown in the second section, Kenya remained one of the few places worldwide where the electricity sector was still in private hands after World War II, while in neighbouring Uganda, British ideas of industrial development led to a profound transformation of the electricity infrastructure.[522]

2) Disrupted networks: War, British development policy and their implications for Kenya, Tanganyika and Uganda, 1940-1947

During the interwar period, the system of distributed supply, which EAP&L and its subsidiaries had established and consolidated, had largely been operated at its capacity limits in many places for most of the time. The system was therefore prone to disruptions when generation was falling short of forecasts or when unforeseen loads emerged. Hence, the impacts of World War II in East Africa plunged EAP&L in Kenya into a power crisis from

[518] Lyons to Stanley, November 2, BNA CO 822/112/6.
[519] Ibid.
[520] See East African Industrial Research Board, *First Annual Report, 1943* (Nairobi: The East African Standard, Ltd., 1944), BNA CO 582/579/1.
[521] Hayes, *Stima*, 285-86.
[522] For an overview of the different ways in which electricity provision was subordinated under national interests in different countries around the world between WWII and 1978, see chapter 6 in, Hausman et. al., Global Electrification, 233-261.

which it needed a decade to recover. With the outbreak of the war, East Africa had assumed an unprecedented strategic importance within the British Empire. Kenya served as a British military base, from where in 1941 the successful campaigns against Italy in Somaliland and Ethiopia were launched. After Britain had conquered Italian East Africa and thus eliminated the threat of an invasion from the North, its East African colonies became a crucial supplier of troops as well as raw materials and food to the Allied world, especially as supplies from lost territories in other parts of the world had to be compensated. The War triggered economic activity in the region in a way never seen before. Allied troops and the local "askaris" stationed in the region brought millions of pounds into circulation and increasing tax revenues enabled all East African states to build up surplus balances.[523]

In some areas of the region, the war requirements had some very direct effects on the development of electricity. After Manila and Java had fallen to the Japanese, the sisal plantations in Tanganyika and Kenya were the only available suppliers of hard hemp left for the Allied world.[524] The British Ministry of Supply, which saw itself under pressure from the United States to increase sisal production in East Africa, urged TANESCO to install a third 5000 kW alternator at Pangani Falls, the main source of power for the Tanga sisal growing areas.[525] The fact that the shipment of the generator from Britain to Tanganyika was approved despite the wartime shortage of heavy electrical equipment shows that high priority was given to the sisal supplies. Another incentive to expand the generation capacity of the Pangani Falls hydropower plant was the prospect of exporting electricity to the harbour town of Mombasa in Kenya, only about 200 km away.

The port of Mombasa had massively gained significance for the British Admiralty after Singapore had fallen to Japan in 1942. Suddenly, the EAP&L branch in Mombasa saw itself confronted with an electricity demand from fleets coming to the port, which by far exceeded the civil demand it had previously anticipated. The expanding demand hit the company unprepared. With the help of Balfour & Beatty, EAP&L tried to obtain a new 1,300 kW plant from Britain but the delivery was delayed until 1944. The operation of three old 250 kW diesel engines and alternators which had been captured from the Italians in Somalia contributed little to easing the situation as spare parts were missing. In mid 1943, a series of breakdowns began and power in Mombasa was rationed for 10 weeks. In early 1944, after

[523] Hayes, *Stima*, 278.
[524] Kennedy to Williams, August 18, 1943, BNA CO 852/415/8.
[525] Williams to TANESCO, August 17, 1943, BNA CO 852/415/8.

diminishing rainfall had eroded the capacities for hydropower generation, EAP&L also imposed a period of power rationing on Nairobi.[526]

The power crises in Mombasa and Nairobi, the chokepoints of the Kenyan economy, escalated the existing tensions between EAP&L and the Kenyan government. Before the war already, there had been complaints, particularly among large customers, that EAP&L and its subsidiaries in East Africa were using their quasi-monopolistic position to dictate the tariffs and conditions of supply. Customer dissatisfaction peaked during the war, when EAP&L started to ration supplies. Harsh criticism came from sisal growers, who had been forced to enter into an agreement that allowed EAP&L to disconnect their sisal plants during peak hours.[527] In a letter to colonial secretary Oliver Stanley, a sisal grower complained about the "arbitrary and dictatorial conduct" which, in his view, indicated "that they have a monopoly without control". EAP&L, he went on, would "use the country's water power not for giving service, but as a tool for extortion." Therefore, he demanded the regions entire power sector to be nationalised, citing South Africa as a precedent.[528]

Reacting to the complaints from the public, the Kenyan governor entrusted a Committee of Enquiry, called the Stoyle Committee after its chairman, with looking into the breakdowns in Mombasa. It accused EAP&L of being "grossly negligent", as it failed to maintain its plant in proper condition and to add additional plant sufficient to allow regular overhauls.[529] The Postmaster General joined the chorus of critics, stating that the conditions disclosed by the committee were not a result of the "war emergency" demands but of a "policy of a piecemeal development" that the company had already been pursuing for years.[530] His view was influenced by the position of the Electrical Engineer A. Owen Cosgrove, who was working under his department. The conflict between the Kenyan government and EAP&L had turned

[526] Hayes, *Stima*, 279.
[527] See, e.g., Munyu Sisal Estate to Rutherford, November 19, 1943; Nettlefold to Rutherford, November 17, 1943, BNA CO 533/533/4.
[528] Swift and Rutherford &Co to Stanley, November 6, 1943. CO 533/533/4. See also, Tignor, *Capitalism and Nationalism*, 304-5.
[529] Complaint by the Mombasa European Civilian Residents' Association to provincial commissioner, July 13, 1943, KNA CA/8/52; Not by Watherton, Colonial Office, November 11, 1943, BNA CO 852-415-8. Chairman of the Committee was Mr. H. Stoyle, Chief Mechanical Engineer of the Kenya and Uganda Railways and Harbours Administration.
[530] Acting Governor to Secretary of State, November 29, 1944, with reference to a telegram by the Postmaster General, October 20, 1943; Postmaster General to Hon-Chief Secretary Nairobi, July 4, 1943, BNA CO 533/533/3.

into "something in the nature of a vendetta" between Cosgrove and EAP&L's Kenyan manager "Don" Small, as observers in London remarked.[531]

During many hours of overtime, Cosgrove, who had also been part of the Stoyle Committee, produced a report "on the East African Power & Lighting Co. Ltd. with particular reference to its failure to fulfil its obligation under the Kenya Electric Power Ordinance."[532] In no less than 514 paragraphs plus annex, he built a case against EAP&L, meticulously listing all failures and shortcomings of electricity services in Kenya. Finally, he recommended that an independent commission of enquiry should be appointed to investigate the company's operations and the company itself and make a recommendation as regards to whether electricity supplies should be nationalised. Naturally, he was convinced that "a much improved services could be given, and probably at less costs, if the company's undertakings were taken over and operated by government", a solution which would also ensure that profits remained in the Colony and could be used to develop supplies in smaller towns.[533]

The report, of which EAP&L only received a summary, set off a cascade of comments and rejoinders between the opponents in Kenya. EAP&L dealt with the matter in a quite self-confident manner and "deliberately decided upon a policy of counter offensive both in Kenya and London" as GM. Rennie, the Kenyan acting governor, noted.[534] Rennie obviously had a good relationship to EAP&L's new director, Small, as an exchange of private confidential letters between the two shows. [535] Small, who is described as an energetic person, travelled to Britain and together with his London colleagues started an extensive lobbying campaign at the Colonial Office and the ministries.[536] In fact, the Kenyan executive council decided in November 1944 that a nationalisation of the electricity infrastructure in Kenya would not be practicable at that time, but the idea of appointing an independent commission of enquiry was taken up by the Colonial Office as well as the Kenyan government.[537]

Even though having decided against nationalisation of the power sector, colonial administrators in Kenya had understood the disadvantages of the current model of electricity

---

[531] Note by Seel, Colonial Office, December 15, 1944. He suggests that Cosgrove "seems to have made it his live work to build up a case against the company", ibid., BNA CO 533/533/3.
[532] "Mr. Cosgrove put in a great deal of time outside his normal office hours in the preparation of this report." Acting Governor to Secretary of State, November 29, 1944, BNA CO 533/533/3.
[533] Cosgrove, "Report on the East African Power & Lighting Co., Ltd., Vol. I – Report," 169.
[534] Rennie to Seel, June 27, 1944, BNA CO 533/533/3.
[535] Small to Rennie, June 9, 1944, BNA CO 533/533/3.
[536] Rennie to Seel, June 27, Colonial Office, June 27, 1944, KNA AE/17/72; G.M. Rennie to Hon. C.S., June 21, 1944, BNA CO 533/533/4. For a characterisation of Don Small, see Tignor, *Capitalism and Nationalism*, 305.
[537] Acting Governor to Secretary of State, November 29, 1944; Acting Governor to Secretary of State, November 3, 1944, CO 533/533/3

supply. Hence, when they started implementing the ambitious plans for post-war economic development, the provision of electricity services was one of the first problems to be dealt with. Even before the official end of the war, on May 2nd 1945, the Kenyan Legislative Council passed a resolution requesting that the government "as an essential part of any development scheme" should investigate into the hydroelectric potential of the country "or any other possibilities which might ensure a supply of electric current throughout the Colony at the lowest possible cost to the consumer."[538] Governor Mitchell, whose political career had taken him through all East African colonies, decided to extend this task beyond its purely parochial context.[539] Through the Conference of Governors he addressed the British Colonial Secretary seeking for advice regarding an efficient generation of electricity in East Africa on a three-country basis.[540]

The Colonial Secretary appointed an investigatory team consisting of two civil engineers, Charles Redvers Westlake and his fellow electrical engineer J.G. Park. The choice in favour of the two advisors is noteworthy in several regards. In a long career in the British power sector, Westlake had gained profound knowledge of operating a utility under private and public control. Among other positions, he had worked as first Chief Engineer and manager of the Electricity Board in Northern Ireland and general manager of a utility company in London. There is no indication in the sources, however, that Westlake had worked outside Europe prior to his assignment in East Africa. The assignment of Westlake was clearly a political decision. EAP&L chronicler Hayes describes Westlake and Park as "front runners of what was known as 'the British Hydro-Electric Mission'".[541] His appointment signifies the Colonial Offices renewed willingness to apply planning and management knowledge derived from experiences in the British metropole in the colonies.

In February 1946, Westlake arrived in Nairobi. Hayes' account of Westlake's visit illustrates the tensions created between the metropole and the periphery as well as between the colonial administrations and the private sector regarding the new interventionist development policy. In the Nairobi business circles, Westlake was perceived as an intruder from Britain and he was treated with scant courtesy – especially, when it became apparent that he was about to challenge the well-established network that controlled the electricity sector.[542] Initially, however, Westlake was struggling with the practical challenges of conducting surveys in the

[538] Cited in Hayes, *Stima*, 287.
[539] For more details on the biography of Mitchell see Throup, *Economic & Social Origins of Mau Mau*, 33.
[540] Hayes, *Stima*, 287.
[541] Hayes, *Stima*, 289.
[542] Hayes, *Stima*, 287.

colonial periphery. His lack of professional experience in the colonies might explain his astonishment about the lack of draughtsmen, surveyors, clerks and typists, who he needed to fulfil the first three clauses of the terms of reference:[543] to examine the territories' water-power and fuel resources, assess future demand for electric power and make recommendations for the development of the power sector. In his preliminary report of September 1946, he had to leave it with some very general comments on these questions. He reported that in several meetings with representatives of different industries, he "failed to obtain any specific demand of any magnitude", but was optimistic that existing industrial demands would increase and encourage the setting up of new industries once "cheap and ample supplies" would be available. In addition, he saw "an almost untouched field of demand in the domestic sphere."[544]

Being unable to provide detailed information on the first three clauses, he turned to the last clause "to make recommendations as to the organisation required for the future development of electricity supplies."[545] He worked closely with Cosgrove, the Kenyan Government Electrical Engineer, on this question. Unsurprisingly, in his report, which was neither published nor officially shown to EAP&L, Westlake recommended the nationalisation of electricity supplies.[546] "NOW is the time to change the form of control and to secure that in the future the interests of the consumer shall come first," he emphatically concluded.[547] Shareholders were to be fully compensated and an "East African Electricity Board" was to take over the physical assets and reserve funds of the company. His recommendations were based on a calculation that suggested that the compulsory acquisition was a promising deal for the government, with an amortisation period of about 10 years.[548]

The reactions to Westlake's recommendations differed among the governments of the three East African Colonies. In Tanganyika and particularly in Kenya, he was confronted with a strong private sector lobby. Since the war, EAP&L had geared up its efforts to improve their public relations in the two countries. Don Small, the chairman, had become a respected member of the Nairobi business community. Often serving as the head of the Nairobi Chamber of Commerce, he had secured public support from its members. The most prominent person he had managed to win over to his opposition against a state takeover was Governor

[543] Westlake, "Preliminary Report," 8.
[544] Westlake, "Preliminary Report," 8.
[545] Westlake, "Preliminary Report," 8.
[546] On the publication: Hayes, *Stima,* 289.
[547] Westlake, "Preliminary Report," 17.
[548] Westlake, "Preliminary Report," 17.

Mitchell, a staunch supporter of private sector-led development. The "whole project of nationalisation might fall to the ground, owing to the lukewarmness particularly of the Kenya Government," Westlake complained in a confidential letter to Sir John Hathorn Hall, the Governor of Uganda in 1947.[549] His prospects regarding the Tanganyikan government were no different.[550] As will be shown in the next section, the colonial government in Uganda was the only one in East Africa which accepted Westlakes proposals.

Still, in Kenya, the discussion on the nationalisation of the power sector was kept alive by insufficient supplies and a series of new power cuts in the years from 1949 to 1952. Rising world-market prices for East Africa's main produce, coffee and sisal, had spurred economic growth in the post-war years and together with the establishment of new industries, e.g. in the food processing sector, had led to a rapid growth of electricity demand in Kenya. EAP&L, which had continued its narrowly profit-oriented and hesitant investment policy, did not keep pace with this development.[551] At the same time, the situation in the recently nationalised British electricity sector looked no better. In early 1947, for example, supply shortages of coal had forced the utilities to ration power in large parts of the country.[552] As a short article in the Liverpool times dated 8 March 1951 humorously noted, "it must be some consolation to electricity workers and consumers alike to know that the problems of our State-owned industry are, to some extent, shared by private undertakings overseas." Citing a Liverpool reader, who had received a letter from a friend in Kenya, it informed its readers about the power cuts in Kenya. "Their supplier" it added, "is the E.A. African Power and Lighting Company, but in view of recent experiences, it is now known as the Power and Darkness." The correspondent was reported to "always keep… a storm lantern ready for emergencies."[553]

In 1951, EAP&L finally reacted: It presented a program of expansion to meet the heavy load growth and began to raise the necessary capital by issuing ordinary shares in London and Nairobi.[554] The company's willingness to invest into new generation capacity appeased the Colonial Office in London, leading one official to the conclusion that "nationalisation now would not really serve any useful purpose, since the electricity firms are by large doing, what we want of them."[555] Accompanied by some delays and difficulties, the company increased its

[549] Westlake to Hall, unknown date, BNA CO 852/844/1.
[550] Bathorn Hall, Uganda to Westlake, CO 852-844-1. See also, *HC Deb 17 March 1948 vol 448 cc2068-9.*
[551] See the correspondence on power shortages in Kenya in BNA CO 822/148/4; Hayes, *Stima,* 304-6.
[552] Hayes, *Stima*, 293.
[553] "Power and Darkness," *Liverpool Post*, March 8, 1951, BNA CO 822/148/4.
[554] Hayes, *Stima,* 306. In 1949, other shares were already issued: see announcement of October 20, 1949 in CO 822/148/2; Hayes, *Stima,* 297.
[555] Rogers to Barnes and Cohen, Colonial Office, June 14, 1951, BNA CO 822/148/4.

thermal generation capacity in Nairobi in the following year.[556] In parallel, the company started to implement the Maragua-Tana hydroelectric complex close to Nairobi, which had been in the planning stage since before the war. Construction works for the Wanji and the Low Tana hydropower plants started in 1951 and 1952 respectively and with the different projects gradually starting operation, the supply situation in Nairobi eased from 1953 on. For the first time in more than a decade, in 1955, the company announced that it had been able to meet the demand fully in all areas in the previous year.[557]

3) The TVA in East Africa? The making of the Owen Falls Dam in Uganda, 1946-1954

Westlake's consulting mission in East Africa in 1946 was a dividing point for the evolution of electricity systems in East Africa. While in Tanganyika and Kenya, electricity provision largely remained in the hands of the private EAP&L and its subsidiaries until independence, Uganda nationalised its power sector in 1948, following Westlake's suggestion. The main motive behind this nationalisation was the creation of an institution which would become the largest power generation project in East Africa of its time, the Owen Falls hydropower scheme at the Victoria Nile. The damming of what was known to be the longest river in the world brought hydroelectricity generation in East Africa to a different level, both materially and symbolically. It invoked a set of material interdependencies that connected hydroelectricity generation in Uganda to cotton agriculture in Egypt, as well as technical discussions about the dam height to the complex diplomatic relations within the British Empire. At a discursive level, it connected the relatively mundane question of electricity provision with a broader and decade-old narrative of harnessing the River Nile to develop what Churchill had famously called Britain's "Pearl of Africa". Before turning to the actor networks and the circuits of communication associated with the initiation of the Owen Falls project, it is necessary to reflect on its site, the River Nile, as a physical space and discursive projection.

The River Nile, its hydrology, hydropolitics and the imaginations it has evoked throughout history have received considerable attention in academia. In his book on *The River Nile in the Age of the British. Political Ecology and the Quest for Economic Power*, Terje Tved warns of the fallacy of regarding "such physical space as simply a physical given for interaction, or explaining the spatial or the regional in only in terms of the social." Instead, he suggested that

[556] With two 2,500 kW gas turbines and a 1,700 kW diesel plant from Dar es Salaams, see Hayes, *Stima*, 304.
[557] Hayes, *Stima*, 305, 309.

the hydrology of the Nile, on the one hand, and the character of the basin-wide policies, on the other, were mutually dependent.[558] The Nile, the world's longest river, starts its journey to the Mediterranean Sea from the North of Lake Victoria in Uganda. At what today is the town of Jinja, the White Nile emerges from the lake and passes a series of rapids down to Lake Kyoga. Over 100 km, the river falls about 100 meters and passes through several rapids, one of which is the Ripon Falls directly at the outlet of Lake Victoria, where the river drops about 4.5 meters in direct fall. The lake acts as a natural regulator, making variations in the flows of the water more predictable than for most other rivers on the continent.[559]

In 1862, when an expedition led by John Hanning Speke, the first European one, reached the outlet of Lake Victoria, this physical setting moved into the scope of British interests. It was not only for the beauty of its scenery that Ripon Falls captured the imagination of subsequent visitors from Britain: In 1878, the Welsh journalist and explorer Henry Morton Stanley enthusiastically suggested the damming of Lake Victoria.[560] Winston Churchill's enthusiasm for the hydroelectric potential of the Victoria Nile has been described earlier, but it was only one of Uganda's features making the territory a projection screen for British development visions for him and later generations of colonial administrators. "Concentrate upon Uganda!" he formulated as his key takeaway from the journey. "Nowhere else in Africa will a little money go so far."[561] He imagined the town of Jinja as a centre in the future economy of Central Africa and Uganda as a testing ground for state-led development: "Indeed, it would be hard to find a country where the conditions were more favourable than in Uganda to a practical experiment in State Socialism."[562] If "[a]ll this waterpower belongs to the State", who would be responsible for developing it for the general benefit, he asked.

In the first decades of the twentieth century, however, the waters of the Nile were of further much more important use for the British: the irrigation of cotton fields. In his book *Colonising Egypt*, Timothy Mitchell traces the connection between the growth of the textile industry in Europe and its impacts in places as far afield as India and the Nile Valley.[563] An important stimulus for British interests in the territories adjacent to the River Nile was their suitability for, and the already existing production of cotton. The British demand for cotton deeply transformed the economy of these states: In Egypt, cotton accounted for 92 per cent of its total

[558] Tvedt, *River Nile*, 10.
[559] Wilson, *Owen Falls*, 5.
[560] Terje Oestigaard, *Dammed Divinities: The Water Powers at Bujagali Falls, Uganda* (Uppsala: The Nordic Africa Institute, 2015), 17-18.
[561] Churchill, *African Journey*, 209, 211.
[562] Churchill, *African Journey*, 123; See also Hayes, *Stima*, 68.
[563] Timothy Mitchell, *Colonising Egypt* (Cambridge: Cambridge University Press, 1988).

export earnings by the beginning of World War I. In many respects, what was happening at the source of the Nile was even more vital for the downstream users than for those living nearby. Located in the desert and drawing 97–98 per cent of its water from the Nile, Egypt was completely dependent from a flow of water coming from thousands of kilometres south of its territory. The interest of the downstream countries made the Nile probably the best documented river on the continent. As early as in 1896, the Physical Department of the Egyptian Ministry of Public Works started to keep records of the level of Lake Victoria – a fact that would later facilitate hydropower development.[564]

In the first decades of the twentieth century, Uganda protectorate underwent an economic transformation analogous to the one in Egypt and seemingly related: Disruptions and fluctuation in the flow of cotton from Egypt and the United States caused Britain to increase efforts to open new sources. Consequently, by 1924, cotton accounted for more than 90% of total export earnings in Uganda.[565] The prospect of utilising the waters of the Nile for irrigation, in particular for cotton farming, also mobilised the private and public capital for the construction of the first dams along the river. After the lowest Nile flood in 200 years, the Sennar Dam was constructed on the Blue Nile in Sudan and became the most ambitious British development project in Africa at the time. The dam was completed in 1925 and created a reservoir of water for the Gezira scheme, thus allowing for the creation of the biggest cotton farm of the world.[566]

Churchill's vision for hydropower generation at the river Nile from 1906 had not materialised yet, for reasons discussed above. During the immediate post-war years, however, things began to move fast. In 1949, only three years after Charles Westlake had written the first proposals for the Owen Falls hydropower scheme, the newly formed Uganda Electricity Board placed the first contracts with companies for the construction of the large dam. The archival sources from this period tell a story about the establishment of an actor-network linking the falls of the upper Nile with policy makers, consultants, and engineers, financing bodies, economic ideologies, British colonial interests and national interests of the colonies themselves to create an electrical infrastructure.

In my analysis, I do not only look at the sources in terms of their content. I argue that these textual and visual representations, texts, diagrams, maps, sketches can be credited with

[564] "Records had shown that the flow of the Nile at Jinja was directly related to the level of the lake and was therefore predictable." Wilson, *Owen Falls*, 3-5. See also, Richards, *Hydro-Electric Resources*, 14.
[565] Byerley, *Becoming Jinja*, 116.
[566] Ertsen, *Improvising Planned Developmen,* 131.

agency themselves. First, the consultancy projects commissioned by the colonial administration were always crystallisation points; they caused movements and encounters of people and the circulation of ideas. Second, these reports made politics beyond their mere content: As will be demonstrated later, the time, place and mode in which the reports (or their drafts) were circulated and published had a decisive impact on the course of events. By following the circles of communications in the next paragraphs, I try to offer new insights into how infrastructural projects took shape during the late British colonial period. I have identified three circuits of communication that led to the formation of the Owen Falls project.

The first one was comprised of those people who were concerned with the post-war general development planning for Uganda. The paradigm shift towards the "Development and Welfare" policy and the British post-war development offensive for the colonies has been described in the previous chapter. The case of Uganda illustrates that the way how this new policy direction implemented was highly dependent on the specific actor networks associated with development planning in the respective colony. Dispelling the myth of a "Manichean world of high colonialism," recent scholarship has highlighted the "tensions of and *within* the Empire."[567] This pertains for example to the different ideas held by Governors on what was the best route to "economic development". Though being generally bound to the guidelines from the metropolitan state, British colonial Governors had considerable latitude in formulating and implementing policy direction – much more than, for example, their French counterparts.[568] In Uganda, it was Sir John Hathorn Hall who, after a long colonial career which had taken him through Egypt, Palestine, Zanzibar and Aden, took office as Governor in January 1945.

In 1946, he appointed Dr. E.B. Worthington, a biologist and expert on the application of "scientific methods" in Africa, as Development Advisor. Worthington had published a book on *Science in Africa* in 1938 and *Middle East Science* in 1946.[569] In his *Development Plan for Uganda*, which was published in 1946, Worthington laid down what he considered to be the main barrier for development in Uganda – in agreement with most other colonial planners and administrators, along them Governor Hall, E.B. Worthington attested that the "vicious circle

---

[567] Quote in, Byerley, *Becoming Jinja*, 25. See also Frederick Cooper and Ann-Laura Stoler, "Between Metropole and Colony: Rethinking a Research Agenda, " in: *Tensions of Empire. Colonial Cultures in a Bourgeois World*, edited by Frederick Cooper and Ann-Laura Stoler (Berkeley et. al.: University of California Press, 1997).

[568] Fage, *History of Africa*, 412; District Commissioners also had significant autonomy. Byerley, *Becoming Jinja*, 233.

[569] "Dr E. B. Worthington: From a Silverspanner to Safeguarding the Balance of Nature," *New Scientist*, May 18, 1961, 381.

which depends on lack of education-malnutrition-disease-inefficient work-low production must be broken at some point." He added, however, that "in Uganda, as elsewhere, there is a difference on what was the weakest link. In general, there is healthy disposition for each department to regard its own work as of high importance in the general effort to serve and improve the African."[570]

Governor Hall, for his part, held the firm belief that the weakest link was the low productivity and efficiency of agricultural and industrial labour. Although many of his colleagues shared his presupposition that the African population was "inefficient", Hall had a distinct idea of how to tackle the problem complex, which Byerley has summarised under the term "health-wealth contradiction."[571] Dismissing the chance of any spontaneous development from within Uganda or driven by native Africans, he called for directing all efforts to the *productive* resources of Uganda. The first step was therefore to embark on an extensive state-lead programme of industrialisation by implementing top-down "scientific" methods into which Africans, as a second step, could then be integrated.[572] In his view that industrialisation was a route *to* social development, he differed from his successor as of 1952, Andrew Cohen, who believed that social development, especially education, was a necessary *precondition* for any economic (including any industrial) development.[573] His policy of state-led industrialisation furthermore distinguished him from Sir Philip Mitchell, his predecessor in Uganda (1935–1940), now Governor in Kenya.

A key document in the communication on development planning in Uganda was Worthington's influential *Development Plan for Uganda* from 1946. Like Hall, Worthington started from the premise that an increase in the low productivity and efficiency of agricultural and industrial labour was a necessary precondition for any social betterment. In his development plan, Worthington, a biologist by training, laid an emphasis on agriculture, which in his regard needed to be prioritised over any established industry. His argument was based on the well-known complaints about the lack of "skilled and semi-skilled labour" and the landlocked position of Uganda. "Nevertheless," he stated, "the development of some industries, especially those for processing primary products, is of great importance, not so

[570] E. B. Worthington, *A Development Plan for Uganda* (Entebbe, Uganda: Government Press, 1949), 45.
[571] Byerley, *Becoming Jinja*, 224, 234.
[572] Byerley, *Becoming Jinja*, 25.
[573] Byerley, *Becoming Jinja*, 234.

much in the increase of wealth which will result, as in providing one of the main stimulants to the development of an internal economy."[574]

In a short section, Worthington also dealt with the issue of hydropower generation in Uganda. Although he admitted that the investigations were premature and therefore unsuited for any detailed calculations, he speculated that "replacement of wood by electricity as a source of power … would probably be followed by many developments which are difficult to foresee." He added the remarkable assertion that "[e]xperience with electricity in other parts of the world has nearly always shown that the most optimistic estimates of consumption have been exceeded soon after the provision of a reliable and cheap supply."[575] Worthington concluded his short outline by noting that "[e]xpert examination of this major project [which] is now proceeding and the question of hydro-electric power should await its results."[576]

This "examination" was Charles Westlake's report on the power sector in East Africa, which has been described in the previous section. The report formed part of a second circuit of communication: In the post-war years, the Colonial Office in London, the colonial administrations in Nairobi, Dar es Salaam and Kampala and EAP&L circulated several letters, memoranda and reports on the development of the electricity sector in East Africa. Charles Westlake was the link between the first and the second circle of communication and he knew how to use this position for his own agenda. On the consultancy mission for his report in early 1946, he also came through Uganda. During his stay, a close personal relationship developed between him and the Ugandan Governor, which is reflected in the exchange of number of personal and confidential letters between the two in the subsequent months.[577]

Originally, the Kenyan government had commissioned Westlake and E.V. Richards, a civil engineer from Britain, to write a comprehensive joint civil and electrical engineering report on the development of the electricity sector in East Africa. The three reports that the team of British consultants in East Africa produced between 1946 and 1947 exemplify how written representations became agents in an actor network, not only by virtue of their respective content but also the timing and direction of their circulation. As was mentioned earlier, during his stay, Westlake had convinced the Kenyan Governor to revise the terms of reference and focus on the question of the future administration of electricity supplies. A second report on hydraulic investigations and load estimations by Mr. Richards was disassociated and its

[574] Worthington, *Development Plan*, 44.
[575] Worthington, *Development Plan*, 76.
[576] Worthington, *Development Plan*, 77.
[577] See the correspondence between them in BNA CO 852/844/1.

publication postponed. The two reports were of very different character: As was shown earlier, Westlake's preliminary report, which he published in September 1946, had turned into a collection of rather general theses on the purpose and organisation of electricity provision and on calculations to support his argument for the nationalisation of electricity supply in East Africa. The Richards report, published in January 1947, was far more comprehensive and diligent in its analysis of potentials, technical in its language, conservative in its assumptions and careful in its recommendations. For Uganda, Richards found that for most of the territory, "there is little prospect of any demand of power on a larger scale."[578] Regarding hydropower projects at the Victoria Nile he concluded that "[a]t the present moment, the load with its normal increase, would not justify the consideration of such programme" and that they would only become feasible if conditions changed in the future and a "very large increase in the demand of power" arose.[579]

However, by the time that the Richards report was published, Westlake's arguments had been circulating among colonial officials for some time. In his "Notes on the Economic Development of Uganda", Governor Hall claimed, obviously in reference to Westlake's report, that "[t]he use of the Ripon or the Owen Falls as a source of hydro-electric power has already been the subject of expert examination and favourable report, and is shortly to be re-examined by a technical commission which is about to visit East Africa. This project, if it materialises, should encourage the grouping and possibly the expansion of secondary industries in the neighbourhood of Jinja."[580] The "re-examination" which Hall announced was a second study by Charles Westlake. In late 1946, Westlake travelled to East Africa again to work on a new report that would support his ideas for a hydropower plant at Owen Falls with more details and illustrations.

Again, Westlake did not lose time. Even before his return to Britain, from his hotel in Kampala, he sent a short draft version of the report including a brief outline of stage I of his proposed scheme to the Colonial Office. In his calculation, he estimated a total capital expenditure of £4,265,700 for the scheme. A transmission diagram provided a first visual representation of the future grid. The interim report clearly conveyed a sense of urgency: As one of the biggest potential customers, the Uganda Sugar Works, had already placed a tender for an own power plant, Westlake pressed for an early decision of the Ugandan government to

[578] Richards, *Hydro-Electric Resources*, 19.
[579] Richards, *Hydro-Electric Resources*, 21.
[580] "Some Notes on the Economic Development of Uganda John Hathorn Hall," 1946, x, BNA CO 536/218, Cited in Byerley, *Becoming Jinja*, 248.

avoid the "tragedy" of losing this "valuable load."[581] Back in Britain, Westlake sent a copy of his "hurriedly written interim report" to the Colonial Office. In the meantime, he had obtained more information on prices for plant and equipment, which, as he admitted, "required an upwards adjustment of [his] estimates, but do not seriously affect the economic position.[582]

Westlake's report, which in the words of Gail Wilson was "as much a marketing survey as a technical report," helped to turn this circle of communication on electricity supply in Uganda into a coalition against the strong networks in Kenya and Tanganyika, which were lobbying against the nationalisation of electricity supplies in East Africa.[583] "We may (...) have to tread a lonely path," governor Hall wrote to Westlake in April 1947, but at the same time, he imagined it likely that the Secretary of State would support the recommendations Westlake had made in his report. "I have no doubt," he concluded, that "we shall find a way of extricating ourselves with your help and that of H.M. Government."[584]

In his initial outline of the Owen Falls scheme, Westlake based his calculations on a dam, which would ensure sufficient head to produce hydropower and to control the level of Lake Victoria, but not beyond its natural boundaries. In his proposal, however, Westlake also discussed a second option: By building the dam one meter higher, the level of Lake Victoria could be raised accordingly to one meter above its maximum recorded level, thus turning the lake into a huge man-made reservoir. This would not only allow for an increase of the generating capacity of the power plant from 75 MW to at least 110 MW (a figure later adjusted to 150 MW) but also to store and release water for the downstream territories, as required, at extremely low costs. Besides the additional capital expenditure, which Westlake estimated at around a million pounds, the adoption of the larger version of the dam would have other far-reaching implications: It linked the project with the international networks of Nile hydropolitics. According to the Nile Waters agreement of 1929, which stated that "His Majesty's Government are pledged to safeguard the historical rights of Egypt on the Nile,"[585] the larger version of the dam would require an approval by Egypt, while the smaller version could be carried out within the framework of the agreement.[586] The final size of the dam

[581] Westlake to Hall, February 23, 1947, BNA CO 852/844/1.
[582] Westlake to Monson, March 19, 1947, BNA CO 852/844/1.
[583] Wilson, *Owen Falls*, 3.
[584] Hall to Westlake, April 2, 1947, BNA CO 852/844/1.
[585] "Hydro Electric Projects in the Colonial Empire." Undated memorandum enclosed in unknown sender to Drake, August 26, 1948, BNA CO 852/889/2.
[586] Newton to Deane, July 23, 1948, BNA CO 852/889/2.

would depend on whether Egypt agreed to participate in the scheme and to compensate Uganda for the additional costs.[587]

The Egyptian and Ugandan administrations and the Colonial and Foreign Offices in London had been exchanging opinions about the possibility of controlling the River Nile upstream for some time by now. This third circuit of communication connected with the second one in spring 1947, when an Egyptian delegation visited Uganda. Its original intention was to discuss a building plan for a scheme at Lake Albert on the Victoria Nile at the border to Congo. This scheme, which was indented to create storage capacities for Egypt, entailed far-reaching ecological consequences for Uganda: The dam at the core of the scheme would raise the level of Lake Albert by 25 meters and flood an area of 1,100 square miles.[588] Not surprisingly, when the Ugandan Governor drew attention to the plans for the Owen Falls scheme, the delegation was "greatly interested in this alternative project."[589]

The Owen Falls project was entangled in a network of intricate colonial and diplomatic relationships in which Britain took a delicate position. As a broker on behalf of Uganda, Britain could not listen too much to Egypt without affecting Uganda negatively. In turn, Britain ran danger of alienating Egypt and Sudan more than was the case already and raise opposition there. The negotiations also revealed the conflict of interests and the tensions within the metropole: While the Colonial Office gave high priority to the electrification and industrialisation of Uganda, the Foreign Office looked at the project as a minor aspect of the much broader issue of Nile development and Nile diplomacy within which Egypt and Sudan were of much greater strategic importance.[590] In fact, the possibility of controlling the flow of river Nile gave the British a powerful political leverage, as became obvious later. According to official files, which only have been made public recently, Britain drew up secret plans to cut off the flow of river Nile to Egypt at Owen Falls in 1956, in an attempt to force president Gamal Abdel Nasser to give up the Suez Canal.[591]

While negotiations continued at international level, the Owen Falls scheme was discussed in the Ugandan Legislative Council. The prospect of a multimillion-pounds-scheme for harnessing the Nile at its outflow and industrialising the protectorate, as it was laid down in

---

[587] "Hydro Electric Projects in the Colonial Empire," 6.
[588] "Hydro Electric Projects in the Colonial Empire," 4.
[589] Hall to Westlake, April 2, 1947, BNA CO 852/844/1.
[590] Oestigaard, *Dammed Divinities*, 22; Tvedt, *River Nile*, 217.
[591] "Britain hatched plot to cut off River Nile amid crisis over Suez," The Yorkshire Post, November 30, 2006, accessed November 18, 2015, http://www.yorkshirepost.co.uk/news/main-topics/local-stories/britain-hatched-plot-to-cut-off-river-nile-amid-crisis-over-suez-1-2408379#ixzz3rkCwKQWJ.

Westlakes survey and promoted by himself and the Ugandan governor, fundamentally reconfigured the set of legal, administrative and financial relationships in the power sector within only a few months. In May 1947, Westlake's recommendations were presented to and adopted by the Legislative Council.[592] In December 1947, an ordinance setting up the Uganda Electricity Board (UEB) was passed, which was to acquire the existing EAP&L assets and was granted monopoly over the generation, transmission, distribution and supply of electricity within Uganda.[593] The board came into existence on January 18, 1948, with Charles Westlake as its chairman, and soon took operations from EAP&L. After only 10 years of private monopoly, the Owen Falls project had transferred control over the national electricity development in Uganda to the state.

What looked like the forced implementation of a state-socialist ideology and related fundamental beliefs regarding electricity provision from abroad was a process of much more situational character. Westlake himself was no ideological hardliner – or, at least, didn't present himself as one. Towards the administrators in the Colonial Office, he made it clear that "he has no axe to grind in regard to this question of nationalisation of the electricity undertakings in East Africa, that in actual fact in many ways he regarded private enterprise as being in a more favourable position than State ownership for the proper administration of electricity supply." Regarding the case of Uganda, he was however convinced that the "East Africa Power Company were not qualified to operate an industry, which was so vital to the development of East Africa."[594] Nonetheless, Westlake knew how to connect to existing narratives on state-led development and the emerging belief that the state was more effective than private enterprises in developing the Empire's electricity supplies. In a report on the project for the Colonial Office, the authors were convinced that the UEB's "aim was to make neither profit nor loss but to provide cheap electrical current – perhaps the cheapest in the world."[595]

The UEB was rather an institutional vehicle for the huge Owen Falls project than an end in itself. Still, its foundation marked a significant departure from the model of previous privately-owned, narrowly profit-oriented, small-scale, demand-drive, distributed electricity systems in East Africa, which have been described in the previous chapters.[596] This departure would reconfigure nearly all categories of relationships within the actor network associated

[592] Wilson, *Owen Falls*, 3, Hayes, *Stima*, 331.
[593] Gore, "Electricity and privatisation," 367.
[594] Note by unknown author at the Colonial Office, April 4, 1947, BNA CO 852/844/1.
[595] "Hydro-Electric Power Station, Owen Falls Dam, Uganda," undated report, 1949, 2, BNA CO 852/1359/1.
[596] Gore, "Electricity and privatisation," 368.

with electricity supply: ownership structures, decision making processes and -criteria, technical layout of the grids as well as tariffs. Uganda had become the first East African country to adopt what Albert Hirschman in his study of eleven development projects from 1964/1965 later called the "building-ahead-of-demand" strategy.[597]

As a result of the process described in the last chapters, by 1948, an actor network had formed at the intersection of three communication circles, which was geared towards constructing large hydropower stations on the Upper Nile without possessing any knowledge of the future market demand for electricity in Uganda. This constellation did not go unnoticed and did indeed create discomfort among some colonial administrators: When moving the Uganda Electricity Ordinance, the financial secretary in London referred to the scheme as "an act of faith."[598] Possibly under impression of the publicity fiasco that the Tanganyika groundnut scheme had become in Britain, the Colonial Office was hesitant to draw too much attention to the scheme in the early 1950s before its fate was foreseeable. In a letter to the director of the ministry's information service, a Colonial Office administrator wrote in 1951 that "[a]t the present stage of the scheme, we do not want to have full blast of publicity about it, since although the scheme itself is going admirably, its economic and financial success depends on the growth of industry in the neighbouring districts of Uganda."[599]

Soon after its formation, the UEB took over the lead in the planning of the project, which was unprecedented in its dimensions in East Africa. The process brought together consulting and construction firms, investors, academics, colonial administrators from Uganda and all over Europe. Two British firms of consulting engineers – Sir Alexander Gibbs & Partners and Kennedy & Donkin – had prepared a detailed report which was completed by July 1948. They concluded that the actual costs for the whole project, including the transmission system, would be £7,120,000.[600]

On 19th May 1949, an agreement on the construction of Owen Falls dam between the British Government, which had negotiated on behalf of Uganda, and the Egyptian government was announced by the foreign secretary in the House of Commons. The two governments also agreed to entrust the UEB with the invitation of tenders and placing of contracts. During the construction period, Egypt's interests would be secured by an Egyptian engineer who would reside with his staff at the dam site. After completion of the dam he would also instruct the

[597] Albert O. Hirschman, *Development projects observed* (Washington DC: Brookings Institution, 1967), 68.
[598] Cited in Wilson, *Owen Falls*, 2.
[599] Rogers to Carstairs, September 5, 1952, BNA CO 875/49/4.
[600] Wilson, *Owen Falls*, 3.

UEB on the discharges to be passed through the dam.[601] Egypt contributed a total of £4,500,000 to the project; most of it was used as compensation for interest and installations around Lake Victoria which would be affected by the rise in the level. According to a memo on the project, "Africans would be the main beneficiaries."[602]

In September 1949, the UEB placed a contract with the Danish firm Christiani and Nielsen Ltd. The contractor of the project was a consortium comprised of British and Dutch companies. While technicians from the Netherlands were working on the project, the Colonial Office assured that "no plant and materials will be supplied from non-British sources."[603]

Another important component of the actor network around the Owen Falls project were the financial links and their implications. Already in his Uganda Electricity Survey of 1947, Westlake had stated that low capital costs would be a necessary condition for the success of the project. He had assumed that the average interest rate would not rise above 3 per cent.[604] Because of its high share of capital costs, the project was particularly vulnerable to fluctuations on the capital market: A rise of 1 per cent in average interest, Westlake assumed, would result in a 10 per cent increase in the cost of production.[605] The rapid decision in favour of the project complicated its financing by public funds. No provision had been made for the project in the colonial loan requirements in 1946.[606] For this reason, the UEB had to connect the project to the market for private capital. In January 1949, the UEB received permission to borrow short term at the London capital market. This link, as will be shown later, determined the economic rationale of the project and, thus, was an important factor in determining the pace and direction of the electrification process in Uganda.

It is important to notice that the Owen Falls scheme, as it was conceptualised in the blueprints, memoranda and reports, was not designed as an "electrification" scheme in the sense that it would physically connect, and therefore "electrify", a great number of users, who – in the case of Uganda – would happen to be African. The records do not reveal that the electricity from Owen Falls was supposed to be used for street lights, lamps or electrical devices (since the small European population in Uganda was supplied by the former EAP&L systems). Rather, there is a direct line from the earlier "colonial estates" doctrine to the

---

[601] William McLean, "Hydro-Eletric Schemes in the colonies," memorandum, September 1949, BNA CO 852/1359/1.
[602] McLean, "Hydro-Eletric Schemes in the colonies," 2.
[603] McLean, "Hydro-Eletric Schemes in the colonies," 2.
[604] McLean, "Hydro-Eletric Schemes in the colonies," I.
[605] Wilson, *Owen Falls*, 3.
[606] Butters to Pitblado, March 17, 1948, BNA CO 852/889/2.

speeches and written accounts of the projects supporters. The metaphors and symbols they used evoked an imagination about the African environment – and Uganda in particular – as being full of "latent riches", which in the words of Westlake needed to be "liberated". It was the narrative of Owen Falls as a man-made intervention, an engineering effort of the civilised world to direct the "potent force" of the river Nile to the natural resources of the colony such as cotton, coffee and its mineral deposits, which mobilised the support of British officials. In financial terms, the project would connect British capital and the new industrial sites of productivity that were expected to follow the project, thus serving as a catalyst for economic development of the territory.

This way, the Owen Falls became compatible with the economic policy of the British metropole. As John Fage and Frederik Cooper have argued, the major European colonial powers increasingly regarded their colonial possessions as important economic assets and markets in their struggle to rebuild their economic bases, which had been heavily impaired by the effects of WWII.[607] The authors of the memorandum on hydroelectricity projects in the British colonies as from 1948 therefore emphasised that "[a]ny project to develop the resources of the Colonial Empire must be considered to-day against the background of the world economic situation."[608] Because of the sterling crisis, the authors saw it necessary that hydroelectric projects in the Empire needed to be linked with "proposals to work deposits of dollar-earning and dollar-saving minerals."[609] Consequently, scarce resources, such as cement and construction steel, for particular schemes would have had to be allocated on the basis of economic considerations. The authors assumed that the demand from domestic consumers and public utilities would not justify major investments."[610] They commenced their summary of the major hydropower projects in the British Empire with a succinct remark that "wider social implications are not discussed."[611]

The authors presented a range of actual and potential projects for hydroelectricity generation throughout the Empire, which they hoped would spark off large-scale mining and manufacturing industries for the benefit of the British metropole. Two dams in Rhodesia, at Kafue in the North and Kariba George in the South, were to lay the ground for the

---

[607] Frederick Cooper, "The Dialectics of Decolonisation: Nationalism and Labor Movements in Power French Africa," in: *Tensions of Empire. Colonial Cultures in a Bourgeois World,* edited Frederick Cooper and Ann-Laura Stoler, 406-35 (Berkeley et. al.: University of California Press 1997), 411; Fage, *History of Africa,* 420-21.
[608] Introduction to "Hydro Electric Projects in the Colonial Empire." Memorandum, undated, enclosed in unknown sender to Drake, August 26, 1948, BNA CO 852/889/2.
[609] Introduction to "Hydro Electric Projects in the Colonial Empire."
[610] "Hydro Electric Projects in the Colonial Empire." 9.
[611] "Hydro Electric Projects in the Colonial Empire." 9.

establishment of the metallurgical centre in East Rhodesia, including iron ore and copper smelting and the production of electrolytic copper.[612] Cheap hydroelectricity generated at the Volta River at the Gold Coast and the River Padas in North Borneo in combination with local bauxite deposits would allow for setting up an aluminium industry, thus freeing Britain from its dependency from Canada as almost the sole source of this strategically important resource.[613] The Owen Falls in Uganda particularly inspired the authors' visions for a state-induced "extensive industrial development". Among the proposed industrial projects was a cotton textile factory in Jinja, factories for the manufacturing of paper from local elephant grass, building materials such as bricks, tiles, and cement and the development of iron ore deposits.[614] In addition, the authors envisioned two projects for the manufacturing of nitrogenous fertilisers "by fixation of nitrogen from the air by the electric arc process, as it is done by the T.V.A."[615]

The success story of the TVA, the Tennessee Valley Authority, in the US had become one of the main points of reference for colonial planners' narrative of how states could manage natural resources to industrialise and modernise underdeveloped regions.[616] The TVA had been set up as a public corporation by the Roosevelt government in 1933 as part of the New Deal policy to harness the region's rivers. It included several hydropower generation and transmission projects, measures for flood control and navigation as well as reforestation and soil conservation programs. By the end of World War II it was regarded an epitome for a model for public resource management, rural electrification and multipurpose river planning.[617] The case of the TVA illustrates how ideas and models from the industrialised West were used by colonial planners to inspire and legitimise development projects, but were then modified in a way to serve their particular interests.

The idea of multipurpose river basin projects like the TVA was essentially a result of conservationists' demand to use the limited water resources in a more efficient manner and to balance the different ways in which rivers were used. The formation of the TVA was furthermore motivated by growing concerns about the state of rural areas in the US, particularly in the South. Social scientists conceptualised the region as a "colonial economy", which exported its wealth to the industrialised North while it itself remained trapped in

---

[612] "Hydro Electric Projects in the Colonial Empire." 1-4.
[613] "Hydro-Electricity Project in Borneo," memorandum draft, undated, 1948, BNA CO 852/889/2.
[614] "Hydro Electric Projects in the Colonial Empire." 7.
[615] "Hydro Electric Projects in the Colonial Empire." 6.
[616] See, e.g., John Nutman, "Development of Tanganyika: Western Portion of the W. Usambaras," memorandum, December 27, 1945, BNA CO 691/190/6.
[617] Hoag, *Developing the Rivers*, 148.

poverty.[618] Rural poverty was soon the root cause for a series of environmental problems, such as soil erosion, deforestation and bad land management. A massive rural electrification program, the core element of the TVA, was supposed to eradicate this core problem by lifting rural farmers and town dwellers out of poverty. Hoag emphasises the underlying notion of hydropower as a public good which necessitated greater government regulation.[619]

The British press readily took up the idea that Owen Falls would bring Great Britain on eye-level with the United States regarding river basin development and would become the Great Britain's Tennessee Valley Authority.[620] In the coverage, however, the TVA's conservationist aspects and rural poverty disappeared in the background. In late 1948, Westlake and three other engineers travelled to the United States to visit the TVA. They looked at the project through the lens of industrial development rather than rural electrification. They were interested in the possibilities of using hydropower for the industrial production of fertilisers rather than in the socioeconomic benefits.[621] The major concern of the UEB and colonial administrators was the need for establishing future loads for the 150 MW plant. Even before construction began, the UEB and colonial planners drafted sweeping plans for setting up heavy and secondary industry in Uganda.[622]

African Ugandans were not expected to benefit directly from the electricity generated but from the economic effects of the dam. In the planning documents, the contracted engineers claimed, that "[t]he scheme would contribute substantially to raising the standard of living of the African population, which was an over-riding consideration with the Government." In the course of the planning for the Owen Falls dam, however, Westlake, who had previously seen an "almost untouched field of demand in the domestic sphere," soon dismissed the idea of connecting African households as uneconomic.[623] In the planning process, African Ugandans were completely left out.[624] In a letter from the office of the hereditary Abataka of Busoga to the British Prime Minister Atlee in 1950, the author complains that "[t]he construction of the dam and the erection of the electric plant are not being done to benefit the African Busoga nor Uganda. But for the benefit of non-natives in Uganda. For we have no buildings in towns suiting the use of electricity. And more important, we have not been informed of the uses and

---

[618] Ibid.
[619] Hoag, *Developing the Rivers*, 149.
[620] Hoag, *Developing the Rivers*, 161.
[621] Hoag, *Developing the Rivers*, 161.
[622] "Hydro Electric Projects in the Colonial Empire." 6-7.
[623] Quote in C.R. Westlake, "Preliminary Report on Electricity Supply in East Africa," London, September 30, 1946, 8, BNA CO 822/148/2.
[624] Cited in Oestigaard, *Dammed Divinities,* 24.

the purposes for which the Dam and the electric power-plant are being carried out." The letter went unanswered and the policy of industrialisation proceeded without the consent of the chiefs and their subjects.[625]

If the project directly affected the lives of African Ugandans it was not through the electricity it was supposed to generate later but through the changes the construction of the dam brought to the town of Jinja. About 2500 workers were engaged during the peak phase of construction, 2000 of them Africans. To host them, the UEB started building a labour quarter at the banks of the Nile including a wide range of facilities.[626]

A project report of 1950 stated that "[t]here would be scope for employment of Africans as artisans and the Uganda Electricity Board had started a training scheme, with promising early results."[627] It is not yet clear from my sources to which extent this promise of training African industrial workers was fulfilled, but interviews conducted by Byerley suggest that the wages paid to African workers were high. Those Africans who were promoted to the ranks of permanent staff received wages which for Ugandans were "unheard of".[628] The construction of the dam fuelled the rapid growth in labour demand at Jinja between 1949 and 1953. Since a large proportion of the labour originated in areas distant from Jinja (e.g. Kenya, West Nile or Western Uganda), the demand for accommodation in the town rose accordingly.[629]

The Owen Falls dam, as the central element of a larger industrial complex, was one of the main drivers of a fundamental transition which the town of Jinja underwent starting around 1948. While at the end of World War II there had been almost no "formal" African urban housing in Jinja and only a few hundred "formal" industrial jobs, the town was now hosting "a large number of industrial work-places sponsored by the Uganda Development Corporation, the Walukuba 'African' Housing Estates, labour quarters, associated physical and social infrastructure/institutions and a model-modern configuration of agricultural production in Jinja's hinterland to supply food to the anticipated labour force."[630] The relatively small town at the banks of river Nile underwent what Ann-Evans Larimore several years later called a metamorphosis into "an equatorial prototype for a model modern urban

[625] Office of the Hereditary Abataka of Busoga to the Atlee, Prime Minister, June 20, 1950, CO536/221/5, cited in Byerley cited in *Becoming Jinja*, 264. See also Oestigaard, *Dammed Divinities*, 24.
[626] Hayes, *Stima*, 1983, 331; Wilson, *Owen Falls*, 6.
[627] "Hydro-Electric Power Station, Owen Falls Dam, Uganda," 2.
[628] The interviewee talks about a wage packet of of 100 shillings and some small change, though it is not clear for which period of work, see Byerley, *Becoming Jinja*, 39.
[629] Byerley, *Becoming Jinja*, 295.
[630] Byerley, *Becoming Jinja*, 26.

settlement based primarily upon specifically western urban processes of industrial production."[631]

In this regard, long before the first electrons were flowing from the generators at Owen Falls, the dam had started to make urban politics in Jinja. While colonial administrators had different conceptions of what the best route to "development" in Uganda was, it was the exceptional potential for hydropower generation by the River Nile at Owen Falls which effected that this route would lead through the town of Jinja. The dam was a central element of Governor Hall's programme for "industrialisation", which included the efforts "to manufacture Jinja as a manufacturing town."[632] From a purely economic point of view, Jinja had never presented itself as the most suitable site for this programme. Rather than "any actual industrial potential or locational advantages that did, or in most cases, did not exist at Jinja," Byerley argues, it was the political interests of the colonial and metropolitan state which formed the ground for the decision to go ahead with the plans for the construction of a state-managed industrial complex centred upon Jinja Town.[633]

The boom triggered by the Owen Falls construction, however, was short-lived. After the dam was completed, the labour force fell rapidly and stood at 600 at the end of 1955. Parts of Jinja were left with empty buildings and decaying streets. Although economic activity was higher than it had been in 1948, this rise was obscured by the fall from the height of construction in 1953.[634]

4) Assembling the grids: (Rural) electrification in Uganda, Tanganyika, Kenya, 1948-1961

The previous two sections have illustrated how the reform of the British colonial development policy in the early 1940s altered the shared terms and concepts of agricultural and industrial modernisation and produced new political visions for the electrification in East Africa. They trace how these visions, together with the experience of a power crisis during WWII, disrupted the established networks of relationships in the East African power sector and invoked new ones. And they tell the story of an interconnected, yet country-specific process that was influenced by the specific political narratives about the individual colony's essential

[631] A.E. Larimore, "The Alien Town. Patterns of Settlement in Busoga, Uganda. An Essay in Cultural Geography," Research Paper No. 55, Department of Geography, The University of Chicago Press, 1958, 2, cited in, Byerley, *Becoming Jinja*, 10.
[632] Byerley, *Becoming Jinja*, 25.
[633] Byerley, *Becoming Jinja*, 26.
[634] Wilson, *Owen Falls*, 11.

"nature" and therefore its economic future; as well as the agency of colonial administrators in the political economy of the respective colony. As was shown, Tanganyika, where colonial policy focused on European-led agricultural development, and Kenya, with its strong private-sector lobby, maintained the previous system of small-scale distributed supply under the private monopoly of EAP&L. In Uganda, however, sweeping political narratives of a state-led industrialisation process had resulted in the nationalisation of the power sector and triggered the construction of what was to become East Africa's large hydropower dam until then.

Yet, to understand how this reconfiguration impacted on the pace and scope of electrification in East Africa, it is necessary to explore in more detail how it translated (or didn't translate) into new materialities. This section looks into the evolution of electricity infrastructures in Uganda, Tanganyika and Kenya in the 1950s, in particular their expansion to the more rural areas. It tells three very different stories about the way politics, economics and materialities of electricity systems are connected.

The first one is about the assembly of what was to become East Africa's first integrated and centralised long-distance electricity grid in Uganda in conjunction with the construction of the Owen Falls dam. The story of this grid in the making is a particularly telling one: While the formation of Owen Falls dam has essentially been narrated as a story of the materialisation of colonial and metropolitan political interests, the pace and direction of its associated transmission and distribution grid was determined by its inherent techno-economic rationale.

Not long after construction works on the dam had started, it dawned to colonial administrators that the project was hardly justifiable in purely economic terms. By 1951, it became clear that the large industries which were envisioned in the original conceptions for the scheme would not materialise in the foreseeable future.[635] At the same time, rising prices for inputs and a devaluation of the pound sterling led to a spectacular rise of the project costs. By 1953, UEB adjusted its projection of the total costs from the revised estimate of £7.1 million, on which the decision to build the dam was based, to £13 million.[636] Consequently, the pressure to sell as much power as possible after completion of the dam increased further.

Considering this constellation, it seems plausible to follow Shamir's argumentation that the grid can be attributed an agency of itself. It had to find outlets for the large amounts of electricity produced at the dam site through an assembly of poles, wires, transformers and

[635] Quote in J.L. Leydon, "Owen Falls Scheme," paper, December 5, 1950, BNA CO 536/224, cited in Byerley, *Becoming Jinja*, 249.
[636] Wilson, *Owen Falls*, 7.

meters as well as contracts and sales staff. In this process of assembly, the grid had to find a direction. "Direction" as Shamir remarks, is the term which Hughes uses when discussing the goals of electric systems. In his "Networks of Power," Hughes writes that direction is more important for "a young system than for an old because momentum provides directed inertia for the later."[637]

Uganda, however, fundamentally differed from the countries Hughes was looking at. While the first large grids in the US and Europe had evolved in an economic environment in which pre-existing material and demographic infrastructures had created quantifiable demand for electricity, such an infrastructure was lacking in Uganda.[638] When building their first electric grids, companies in the industrial world concentrated on the densely populated and industrialised urban centres.[639] These grids were built to address the demand of street lighting, streetcars and industry before turning to the domestic market.[640] In Uganda, the grid took a different direction. As the small urban market for electricity would be quickly saturated and industrial loads were not emerging, the UEB was forced to look for customers wherever they existed. As the grid needed an outlet outside of the urban industrial centres, the Board had to carry its operations into rural areas to an increasing extent.[641]

[637] Hughes, *Networks of Power,* 15. Here cited in Shamir, *Current Flow*.
[638] Shamir, *Current Flow,* 104.
[639] Hughes, *Networks of Power,* 15.
[640] Ronald R. Kline, *Consumers in the Country: Technology and Social Change in Rural America* (Baltimore, MD: Johns Hopkins University Press, 2002), 132.
[641] Wilson, *Owen Falls,* 11.

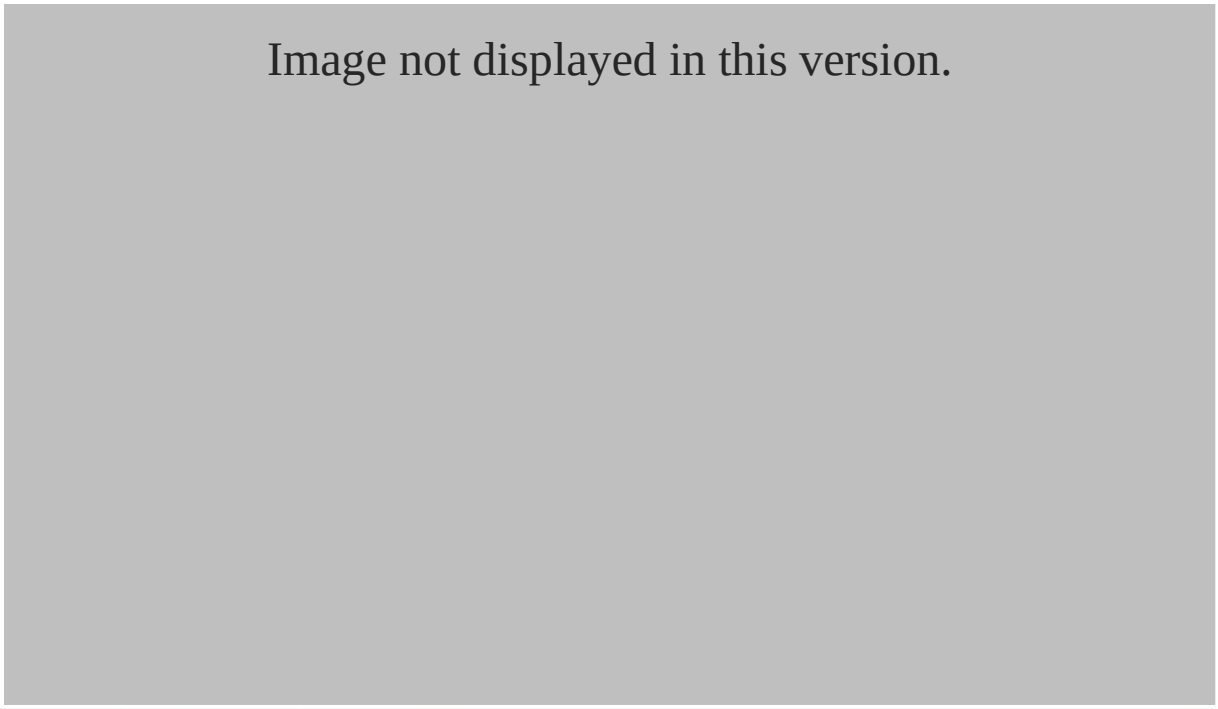


Figure 8. The first design of the Ugandan grid was sketched by Charles Westlake in a hotel room in Kampala in 1947. Source: BNA CO 852/844/1.

Before analysing more in-depth how the Ugandan grid found its way into the rural areas, it is necessary to recall the techno-economic rationale of grid extension. Assembling a grid means to establish a steady flow of electrons from the powerhouse to an end customer at minimum capital costs. In reverse, it means establishing a flow of money from the customer to the utility, which exceeds the operating expenditures and allows recovering the capital expenditures over a certain amount of time to ultimately generate profit. To understand the direction of the assembly of the Ugandan grid, it is helpful to follow the electrons on their way from Owen Falls to the different – domestic and industrial – loads, and examine the techno-economic rationale on the way. Wilson's study of the Owen Falls project from 1967 provides a wealth of data for this venture.

First, electricity needs to be transmitted from the powerhouse to the major sub-stations, which are located at the main load centres in the country. The transmission system usually consists of lines which operate at high voltages (132 kV and 66 kV) to minimise transmission losses. Most high voltages lines cut straight across country and are carried on steel towers. They are largely independent of natural features and do not connect to any users on the way. As the major load centres are usually known, the layout of the transmission system is more or less fixed and therefore a calculable factor in the cost projections.

At the major sub-stations, the electricity is transformed to a lower voltage and brought to the consumers through the distribution system. In Uganda, the distribution system was mainly at 11 kV, exceptionally some 33 kV lines, which functioned as part of both the transmission and the distribution system. Usually, distribution lines are carried by wood poles. They are therefore much more affected by physical and climatic features of the environment. In Uganda, which has one of the highest frequencies of thunderstorms in the world, the distribution system was disturbed by lighting, heavy downpours and occasional high winds. In some parts of the country, particularly in rural areas, the lines had to cross lush vegetation and swamps, they had to be regularly checked for creepers and termites.[642]

Along the distribution lines, sub-stations transform the current to the voltage that consumers require – the exception are large industries, which in some cases take power at a high voltage (11 kV) and thus minimise transformer costs. The vast majority of domestic and commercial customers, however, require low voltage power at 220 V. Expensive equipment is needed to transform power from one voltage to another – the bigger the change in voltage the more expensive the process. The ratings of the sub-station depend on the maximum likely demand measured in kVA. Consequently, the utility needs a reliable estimation of the expected demand, which becomes more difficult if experience values are missing. In Uganda, the substations ranged from 4 kVA to several hundreds. While smaller substations below 25 kVA were usually mounted on the poles, larger ones had to be put on the ground and fenced off.[643]

The number of potential customers per sub-station in turn was determined by the settlement pattern. Except for the urban centres, this pattern was badly suited for the supply of public utilities in Uganda. At the outskirts of the towns, the homes, whether Europeans or African, were widely scattered on their plot.[644] Still, while in the suburbs settlement was concentrated along roads, this pre-existing infrastructure was missing in the more remote rural areas. Most of the South of Uganda is covered by hills. There, people lived in isolated homesteads scattered along the middle slopes of rounded hills which were linked by winding paths and bypassed by the roads, making it very expensive to build transmission lines. In fact, until 1961, virtually all supply lines in rural areas in Uganda followed the road.[645]

---

[642] Wilson, *Owen Falls*, 9.
[643] Wilson, *Owen Falls*, 9-10. On a 33 kV line a substation below 25 kVA is not economic and therefore small consumers or groups can not be supplied.
[644] These areas were also defined "rural"! Wilson, *Owen Falls*, 11.
[645] Wilson, *Owen Falls*, 11.

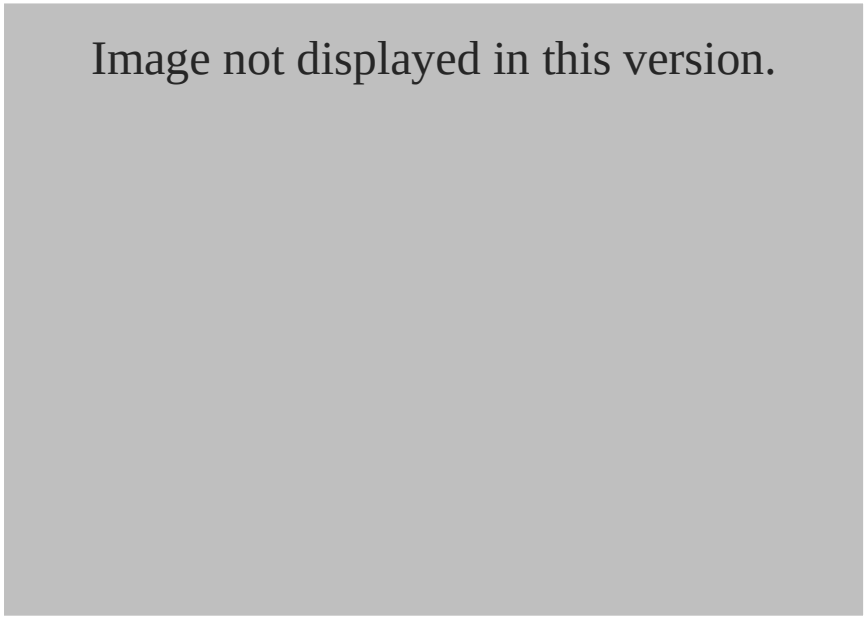
Finally, connecting end-consumers to the grid requires the establishment of technical, financial and legal relationships – the wiring of the houses, the installation of electricity meters and the employment of trained sales staff, the introduction of procedures and routines which are adapted to the specific customer group – all of which generates additional fixed and operational expenses.

It becomes apparent that an increasing mileage of distribution lines, especially in rural areas, would have increased the costs, complexity and vulnerability of the overall power system. Along with the managers' preconceptions about Africans' disinterest in electricity, this forms part of the explanation why EAP&L did not embark on rural electrification programmes in Kenya and Tanganyika. The early plans for the Ugandan grid left out rural areas as well. The Owen Falls dam was expected to supply electricity to industry and the wealthier part of Jinja. Through a transmission system which was to operate at 33 kV, electricity was to be taken to the towns of Kampala, which had a smaller industrial base than Jinja, to Entebbe, and later Masaka. Within these towns, the distribution system was planned to be compact and to serve the wealthier customers in the central areas only.[646]

Building up the demand for electricity is a gradual process that usually can only take off when a supply of electricity is already in place. For hydropower projects in Africa with the dimension of the Owen Falls dam, therefore, utilities started to build up loads before the plant went online and the generating capacity suddenly jumped up.[647] In Uganda, the assembly of the grid already started prior to the construction of the dam. Shortly after taking over plant and distribution system from EAP&L, the UEB started to extend the system, which had been regarded as unsatisfactory by the Legislative Council of Uganda in 1946 already.[648] In 1948, works on a transmission line between Jinja and Kampala began, the two towns that were to become the two biggest load centres of the future grid.[649] At the same time, the UEB started building a new distribution line in the North of Kampala, strengthened the existing systems in Jinja and Kampala and connected European suburbs there. In Mbale, a town in the east of Uganda with the third-largest number of non-African residents, the UEB installed a temporary diesel-generating station to build up a load in the town before being connected to the main grid. The transmission line from Jinja to Mbale was completed in 1951 and supplied two other towns on its way. Another new 33 kV line connected Jinja to Lugazi, where Uganda's second

[646] Wilson, *Owen Falls*, 9.
[647] This was, e.g., also the strategy in Tanganyika for the Pangani Falls dam, as shown in the previous part.
[648] Proceedings of the Uganda Legislative Council, February 19, 1946, cited in Wilson, *Owen Falls*, 13.
[649] The line was first operated at 33 kV, as long as electricity was generated with the old EAP&L generator. By 1953, it was operated at 66 kV and the survey for a 132-kV line had begun (Wilson, *Owen Falls*, 12).

largest sugar factory was located. In Kampala and Jinja, larger diesel stations for the temporary supply of the two towns replaced the old ones from EAP&L in 1950.[650]



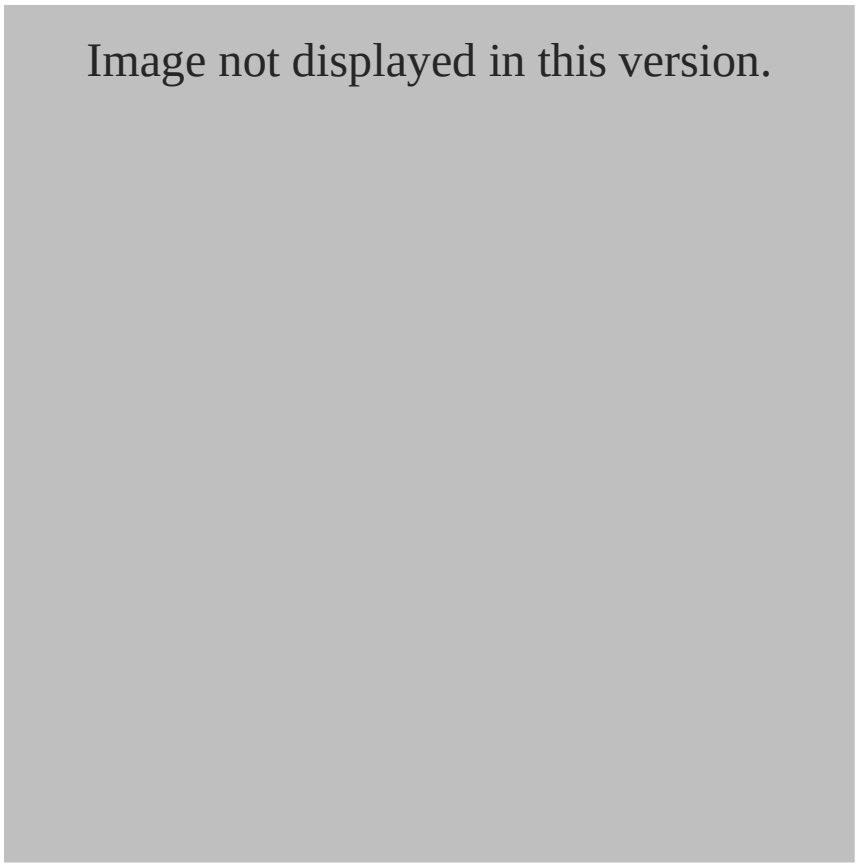


Figure 9. Electricity transmission and distribution in Uganda in 1954 and 1961. Source: Wilson, *Owen Falls*, 16, 21.

[650] Wilson, *Owen Falls*, 13.

Until 1950, the grid followed the direction Westlake and other planners had intended for it, connecting European and Indian quarters of the larger towns and the main industries to Jinja, where Owen Falls soon would start operation. This changed however in 1951 and 1952, when it became clear that no large industrial customers could be expected until 1956.[651] New expensive transmission lines were approved and almost immediately abandoned. In search of alternative outlets, the UEB turned to areas that had originally been out of its scope, first to the Asian residential areas in the four largest towns and then, for the first time, to African housing areas of different types. Katwe was an unplanned African commercial and residential area outside the boundary of Kampala. Naguru South, on the other hand, was part of a large municipal African Housing Estate in Kampala that had been designed for higher income groups.[652]

In 1954, the first generating set at Owen Falls went into operation with a generating capacity of 16 MV. As large customers had still not materialised, the UEB took an unprecedented step in rural electrification. So far, electrification schemes outside the urban areas had been geared at specific customers such as ginneries, missions, or larger trading centres. Potential consumers on the way were either connected at the same time or left out in the original planning process. In the case of Masaka, the UEB was rather "groping its way" into the rural areas. The project was the first to be based on a comprehensive survey of urban, suburban and rural potential demand. From the start, the distribution system connected to the main 33 kV transmission line was designed to include African commercial and residential areas inside and outside the town boundaries.[653]

In the following two years, due to the lack of industrial customers, the UEB embarked on other rural electrification schemes, which had been considered uneconomic before. In 1955, the main transmission line between Jinja and Kampala was completed.[654] From the same year on, the Owen Falls generating station produced virtually all the electricity sold by the Board.[655] In 1956-57, the pace of the extension of the Ugandan system accelerated. Finally, the first two large industrial customers, the copper smelter and textile factory at Jinja, had come online but still, only a fraction of the total generation capacity of Owen Falls was used.

---

[651] Wilson, *Owen Falls*, 13.
[652] Wilson, *Owen Falls*, 14.
[653] Wilson, *Owen Falls*, 14-15.
[654] Wilson, *Owen Falls*, 16-17.
[655] Wilson, *Owen Falls*, 24.

This was still the case when in 1960, virtually all industrial customers in southern Uganda as well as all major trading centres in the more densely populated areas were either connected to, or in reach of, the electricity grid. The only possibility to expand their supplies in Uganda left to UEB was to increase the number of rural and semi-rural domestic and small commercial customers, mainly Africans.[656]

In its attempt to connect domestic customers in suburban and rural areas, however, in particular African customers, the UEB encountered several obstacles. In his chapters on suburban and rural electrification, Wilson provides a wealth of information on consumption patterns, metering and billing, tariffs and legal issues. In the next section, I look into the difficulties of connecting "African" customers in more detail, using the example of a few projects in Uganda, Kenya and Tanganyika.

Before doing so, however, I map out the electrification of rural areas in Kenya and Tanganyika. There, the supply of small towns in rural areas followed a completely different rationale than in Uganda. As opposed to the assembly of a centralised grid in Uganda, EAP&L and its subsidiaries in Tanganyika and Kenya maintained the model of distributed small-scale generation. The electrification of a new town therefore required investment into completely new systems, which, in most cases, needed to be supplied by thermal generators. The high costs for the purchase and transportation of thermals fuels made the operation of these systems very costly. Tariffs that were designed to be cost-covering at minimum were only affordable for a small subset of affluent European and Asian customers and, thus, made it more difficult to improve the systems load factor and reach economies of scale. In short, the electrification of small towns was unattractive for a private electricity utility like EAP&L. At the company's 1954 annual general meeting, the director explained that "[i]t would be improper for us to debit subscribed capital to indefinitely unremunerative developments of this nature … as much as we sympathise with the natural desire of the inhabitants of these townships for a supply."[657]

Therefore, contrary to my account of rural electrification in Uganda, my analysis of Tanganyika and Kenya focuses on the negotiations between colonial administrators at different levels, customers and the electricity companies. In Kenya, EAP&L had made no attempt to expand public supplies to smaller upcountry towns during the war and the decade

[656] Wilson, *Owen Falls*, 19.
[657] Chief Electrical Engineer to Director of Public Works, November 27, 1954, TNA AE/17/53.

after, when it was struggling to meet the demand in its existing four branches.[658] From the mid 1950s on, this situation had given rise to grievances from different sides: With an envious glance at neighbouring Tanganyika, where EAP&Ls subsidiary company had opened branches in a number of small towns, Kenyan provincial commissioners became increasingly anxious regarding the "relatively backward condition of their areas."[659] They were themselves under pressure from township committees and district councils, who regarded the lack of power as a handicap for development.[660] The public works department, which was obliged to supply electricity to government institutions all over the country, faced high aggregated costs of running and maintaining countless small generators.[661] Equally, European farmers in remote areas complained about the high costs of running standalone generators on their farms.

The calls for the electrification of small towns had to be dealt with by the Ministry for Commerce and Industry. It had been created as a separate ministry in 1948 due to the pressure from the unofficial members of the Legislative Council. It was presided over by Minister Arthur Hope-Jones, an energetic supporter of private enterprise.[662] Not surprisingly, the ministry adopted a wait-and-see policy rather than pressing EAP&L to venture into electricity undertakings without the prospect of short-term return on investment or allocating large sums for government-sponsored projects.

In March 1954, the public works department sent a list of small townships with government institutions, such as schools and hospitals, and a "certain degree of public demand." Arguing with the high costs of running individual generators, it asked the ministry for its policy regarding the electrification of these townships as EAP&L "takes no interest" in them.[663] The ministry responded that in view of EAP&L's capital commitments in connection with a number of major schemes, "it would not be reasonable to request the Company to divert part of its resources to provide facilities which could only be uneconomic at present tariff levels."[664] It furthermore signalled that the government would not provide any finance for electricity supplies.[665] Instead, the ministry put its hopes in private persons or companies who

[658] The other branches were in Nakuru and Eldoret.
[659] Chief Electric Engineer to Secretary for Commerce and Industry, June 5, 1956, KNA AE/17/53.
[660] Ibid. For history of the establishment of the council system, see Iliffe, *Modern History of Tanganyika*, 555.
[661] Director of Public Works to Hon. Member for Commerce and Industry, March 17, 1954, KNA AE/17/53.
[662] Tignor, *Capitalism and Nationalism*, 308.
[663] Director of Public Works to Hon. Member for Commerce and Industry, March 17, 1954, KNA AE/17/53. The towns under discussion were Embu, Meru, Gilgil, Naivasha, Lamu, Machakos, Maseno, Kericho, Kakamega.
[664] Secretary for Commerce and Industry to Director of Public Works, undated, March 17, 1954, KNA AE/17/53.
[665] Note by J.H. Martin, March 31, 1954, KNA AE/17/53.

would apply for licences or authorisations in small towns, referring to an example of the Kenya Tea Company in Kericho.[666]

EAP&L was fully in agreement with the Ministry's position to prioritise the consolidation of supplies "in and around the towns, where supply is already given." As an immediate solution, the Deputy General Manager of EAP&L recommended to the public works department to install small lighting sets or small hydro units for essential government buildings, "the surrounding areas to use oil lamps until the load increases sufficiently for a centralised scheme to be considered. In most of the areas cited in your letter this situation will not arise for some considerable time."[667] It was clear to the director of the public works department that EAP&L would not show any ambition to provide electricity to customers in rural areas: "They have hitherto provided no such supplies and have adopted no tariff to suit African consumer. ... It is unlikely that this position will change in the near future."[668]

As to the provision of electricity to private customers, he considered it to be an "amenity or convenience to a comparatively small proportion of the community" rather than a basic service. He therefore didn't see an obligation of the government to fill the gap left by EAP&L as "[t]here is no over-riding factor such as might apply in the case of water supplies or road accesses."[669] At the same time, he dismissed the ministry's idea of supply by private companies as unrealistic. If smaller projects were not profitable for EAP&L, he argued, they would not be so for private firms. Larger private firms, he added, were not interested in public supplies as the financial return would be insignificant in relation to their core business and the trouble involved. Small firms or private individuals, on the other hand, would find it difficult to operate supplies that were at the same time profitable and conformed to public supply standards.[670]

Another powerful group that was getting increasingly anxious to get connected to the electricity grid were the European farmers in Kenya's "White Highlands". Their main political representation was the Kenyan National Farmers' Union (KNFU). In his book on *Markets and States in Tropical Africa*, Robert Bates names the KNFU as an example of an organisation that "lobbies for programs that chiefly benefit big agriculture, which in turn

[666] Secretary for Commerce and Industry to EAP&L General Manager, April 27, 1954, KNA AE/17/53.
[667] Deputy General Manager EAP&L to Secretary for Commerce and Industry, May 15, 1954, KNA AE/17/53.
[668] Director of Public Works to Secretary for Commerce and Industry, July 17, 1954, KNA AE/17/53.
[669] Director of Public Works to Secretary for Commerce and Industry, July 17, 1954, KNA AE/17/53.
[670] Director of Public Works to Secretary for Commerce and Industry, July 17, 1954, KNA AE/17/53.

creates a distinct bias in the allocation of public services in favour of large-scale farmers."[671] A planned high-tension transmission line from Uganda to Kenya, running through the Rift Valley, raised hopes among the KNFU members that they would receive cheap grid-electricity for their farms, replacing the costly generators. At the organisation's annual conference in October 1955, they passed a resolution requesting the Kenyan government to put pressure on EAP&L to distribute electricity to rural areas. They referred to the successful rural electrification programs in Southern Rhodesia. EAP&L responded with an article by its chairman Don Small on "Electricity and the Farmer", which was published in the Kenya Weekly News in 1956.[672] In this article, he compared the cost of supplying electricity in Rhodesia in Kenya. While, in Rhodesia, cheap coal was available, electricity generation in Kenya was so expensive, he argued, that it would be cheaper for farms to generate their own electricity.

The subsequent negotiations between the KNFU and the Kenyan government are noteworthy as they show how close some of the government institutions were working with EAP&L when they tried to fend off the union's demands. Before a meeting with representatives of the KNFU, the minister for commerce and industry received a file from the power company with detailed information that could be used to counter the union's arguments. In an internal letter, he asked the ministry's secretary to consult with the EAP&L chairman, Small, and "prepare any talking points which you consider appropriate."[673] A recent article by Small in the "Kenya Weekly News," he added "is, of course, the 'Bible' on this subject and gives most of the statistical information we need."[674] In the meeting, the representatives from the ministries made clear that the government supported electricity supply only in areas, where it could be done "through the medium of private enterprise" on a market base. In the absence of any government subsidies, the individual supply by diesel generators on the farms would be more cost-effective than stepping down the 132 kV transmission lines to connect them to the grid for some time to come.[675]

---

[671] Robert H. Bates, *Markets and States in Tropical Africa: The Political Basis of Agricultural Policies* (Berkeley: University of California Press, 1981), 94. See also Hayes, *Stima*, 335.
[672] Reference to the article from 13. January 1956 in a note by Maddison Secretary for Commerce and Industry, January 18, 1956; see also Maddison to Minister for Agriculture, Animal Husbandry and Water Resources, January 19, 1956, KNA AE/17/53.
[673] Note by Maddison, August 15, 1956, KNA AE/17/53.
[674] Note by Maddison, August 15, 1956, KNA AE/17/53.
[675] "Notes of a meeting held in the office of the minister for commerce and industry, Thursday 30th August 1956," KNA AE/17/53.

The minutes of the meeting reveal remarkable references to experiences from other countries regarding the drafting of a "national policy for future development." While the colonial administrators and managers of the state utility in neighbouring Uganda were pursuing their sweeping vision of creating an East African TVA, representatives from EAP&L in Kenya were looking elsewhere. After a visit to Turkey, the managers told their colleagues, United Nations expert had "advised its Government that small hydro plants would be more economical than a national grid system and the adoption of this advice was proving to be a vital factor in the development of this country."[676] Generally, electrification remained low on the priority list of the Kenyan government throughout the 1950s. When in 1956, several provincial commissioners handed in proposals for the installation of electricity supplies in their provinces as part of the development plan for the period from 1957 and 1960, the inclusion of all these proposals was rejected by the Ministry of Commerce and Industry.[677]

While EAP&L, under the constraints of constant crisis management and disputes with the Kenyan Government and its hesitant investment policy, did not expand its supply beyond its existing four branches in Kenya until the mid 1950s, the situation for its subsidiaries in Tanganyika looked quite different. Driven by a swiftly growing demand in the post-war years, the two utilities had adopted a progressive investment policy. In addition, the electricity policy of the Tanganyikan government had become much more interventionist after the war. In 1946, it began to exert pressure on DARESCO to establish public supplies in the smaller up-country townships falling within the ambit of the main licence held by the company.[678] "From time to time, an [*sic*] particularly in Tanganyika Territory, we are requested to undertake supplies in remote townships and villages which by virtue of the great distances involved cannot be connected with any of our existing developments," the EAP&L director stated at the company's annual meeting in 1954.[679] It is unfortunately not clear from the sources what the Tanganyikan government used as leverage, but its demands proved to be effective.

In 1947 DARESCO prepared to embark on an extensive development programme that was not only aimed at addressing the growing demand but also included the opening of new branches, which would be not profitable for some years. By the end of 1951, the company had

---

[676] Ibid., it is not fully clear who made the statements in the meeting.
[677] Paterson for Secretary for Commerce and Industry to Provincial Commissioner, Nyanza Province, July 4, 1956; Weaving, Assistant Secretary Ministry of Works to Provincial Commissioner, Rift Valley province, July 20, 1956, KNA AE/17/53.
[678] Moffett, *Tanganyika*, 712.
[679] Chief Electrical Engineer to Director of Public Works, November 27, 1954, KNA AE/17/53.

more than doubled its plant capacity and reconstructed the old plants in Tabora, Dodoma and Mwanza. In addition, it had opened new branches in smaller upcountry towns, in Mbeya, Iringa, Lindi and Dodoma.[680] Consequently, the number of units sold increased by an average of 24% per year in Dar es Salaam and 38.8% in other branches between 1946 and 1953.[681]

The expansion of supplies was, however, strictly limited to European and Asian customers. In the townships that had public supply, DARESCO had made no attempt to extend the grid to the African areas. The company defended this policy against complaints arguing that an extension of the distribution grid would not be cost-covering as potential demand would not meet the required capital costs.[682] In their exclusive policy regarding new customers, the utility saw the law on their side. They strictly enforced a clause of the Electricity Ordinance of 1931, stating that new customers had to "pay for a supply of energy for a period of seven years" with annual payments at minimum as high as one third of the initial outlay for the connection.[683] In addition to the high guaranteed minimum consumption, the utilities demanded excessive capital contributions which led many European and Asian customers to complain that they were "unfairly financing part of the cost of the Companies' distribution system on account of the mandatory provisions contained in the Ordinance and the Companies' licences."[684] For potential African customers of DARESCO, these conditions for supply of electricity were completely prohibitive.

In some cases, the Tanganyikan utilities had to subordinate their own interest to that of the parent company in Kenya.[685] From 1949 on, TANESCO exported electricity to Mombasa at an extremely low and not remunerative rate (4 cents per kWh), easing the tense supply situation in the Kenyan harbour city. This caused sisal growers in the Tanga area, where TANESCO was operating, to complain that they were effectively cross-subsidizing EAP&L in Kenya.[686]

There was a consensus within the Tanganyikan government that the electrification of smaller districts could not be left to the sole responsibility of the two private utilities. In 1949, it decided to review the possibility of establishing public supplies in areas in which DARESCO did not show any economic interest. A comprehensive financial plan for 24 districts was

[680] Moffett, *Tanganyika*, 707.
[681] F.P. Egerton, *Report on Electricity Supplies in Tanganyika* (Dar es Salaam: Government Printer, 1954), 31.
[682] Egerton, *Electricity Supplies in Tanganyika*, 7.
[683] Egerton, *Electricity Supplies in Tanganyika*, 8.
[684] Egerton, *Electricity Supplies in Tanganyika*, 8.
[685] Egerton, *Electricity Supplies in Tanganyika*, 10.
[686] Secretary to Advisory Board, December 6, 1959, TNA 469/CWC/55/38/01.

drawn up and forwarded to the Development Commissioner.[687] In a second step, detailed surveys were carried out at Bukoba, Mpwapwa, Kilosa, Songea, and Masasi.[688] For Bukoba, preparations were made for a government-sponsored grid, which was supplied by a steam engine with a generator that used coffee husks from the district's plantations as fuel.[689]

The electrification attempts of the Southern Province illustrate the practical and administrative obstacles that impeded the electrification of small districts. On a visit to the Southern Province, the Tanganyikan governor "expressed great interest" in the establishment of small government-run power plants in the districts of Ruponda, Masasi, Newala, Tunduru and Songea. In the proposal, provision was made for generators that would drive a water pump during the day and provide public supply of electricity for lighting in the evening hours. It envisaged that the maintenance and running of the plant might be undertaken by the government station's lorry drivers for an extra payment.[690] On request of the Government Electrical Engineer, the District Commissioners sent in lists of government offices, and of houses of government officials and potential private customers – European as well as Asian and African – which were to receive electricity.[691] The governor's initiative, which he renewed in 1951, and his promise of the provision of the necessary funds motivated some of the district commissioners to commit themselves to the supply of their districts.[692]

The "particularly energetic" district commissioner of Masasi prepared a very detailed electrification plan and started negotiations with the Overseas Food Corporation, which was located close to his station, on the purchase of a used generating set and other electrical equipment of the company.[693] "I feel that, as a result of a recent disillusioning experience on a local development project here, Government would well be advised to reserve the sets now," he stated in a letter to the provincial commissioner.[694] Discussions with the Government Electrical Engineer on whether the generator of the company should be bought or new generators should be ordered abroad lasted until 1952. The Government Electrical Engineer did not only doubt the reliability of the second-hand generators but also objected to its limited

---

[687] Provincial Commissioner to all District Commissioners Southern Province, March 27, 1950, TNA 16/11/269. Moffett speaks of 28 districts, see Moffett, *Tanganyika*, 712.
[688] Moffett, *Tanganyika*, 712.
[689] Moffett, *Tanganyika*, 712; Heinrich von Massow, *Industrialisierungsmöglichkeiten in Tanganyika* (Hamburg; Afrika-Verein, 1964), 94.
[690] Provincial Commissioner to Electrical Engineer, September 12, 1949, TNA 16/11/269.
[691] See, e.g., District Commissioner Songea to Electrical Engineer, February 3, 1950, TNA 16/11/269.
[692] District Commissioner to Senior Provincial Commissioner, Southern Province, November 14, 1949, TNA 16/11/269.
[693] District Commissioner to Provincial Commissioner, Southern Province, February 14, 1951, TNA 16/11/269.
[694] District Commissioner to Senior Provincial Commissioner, Southern Province, November 14, 1951, TNA 16/11/269.

expandability: "I think it must be admitted that, if a supply is to be introduced into a Township to foster development, that supply must be capable of following the development – otherwise it becomes a mere amenity for existing inhabitants." He criticised the lack of standby capacity and of electricity meters, as the government would not allow the use of flat-rate tariffs.[695] The government in Dar es Salaam, however, was not willing to allocate funds for a new generator and, in January 1953, the Member for Finance Economics informed the provincial commissioner that "it is regretted that there is at present no prospect of this supply being installed in view of the limitation of funds and the prior claim of other stations."[696]

Other district commissioners in the Southern Province chose different approaches for the electrification of their districts. In Kilwa Masoko, the owner of a local hotel submitted two schemes for an electricity undertaking, which would supply electricity for his own hotel as well as government institutions and private customers. The larger of the two schemes included the connection of African government servants and private customers. He promoted his scheme by arguing that the electrification of Kilwa would "not only encourage permanent settlement ... but would also encourage a higher standard of dwelling to be built."[697] In the Newala, electricity for public supply was also available from a hotel but the proposition of the hotel owner to supply the government buildings was rejected by the Provincial Commissioner.[698] Consequently, the district commissioner explored the possibility of installing a "wind-charger," a wind power plant, "as the strong wind is constant throughout the year," but was unable to obtain the necessary technical information.[699]

In Songea, the government offered a licence to DARESCO in 1951.[700] When in August 1952, the company asked to be relieved of the licence, the district commissioner considered buying and operating a plant from the Native Tobacco Board.[701] The electrical engineer estimated that the plant would run at a slight loss, assuming in his calculations that "roughly 100 Africans would also take a supply."[702] The matter rested until late 1953 when the governor visited Songea again and asked him to review the possibility of buying power directly from

---

[695] Electrical Engineer to Provincial Commissioner's Office, September 2, 1952, TNA 16/11/269.
[696] Ag. Member for Finance and Economics to Provincial Commissioner, Lindi, January 15, 1953, TNA 16/11/269.
[697] Kenneth Mortlock, "The Travellers", to District Commissioner, Kilwa Masoko, December 17, 1950, TNA 16/11/269.
[698] C.A. James for Senior Electrical Engineer to District Commissioner, Masasi, May 17, 1952, TNA 16/11/269.
[699] District Commissioner, Newala, to Government Electrical Engineer, December 29, 1951; Senior Electrical Manager to Office of Electrical Engineer, January 15, 1952, TNA 16/11/269.
[700] Senior Electrical Engineer to Provincial Commissioner, March 3, 1951, TNA 16/11/269.
[701] Provincial Commissioner to Senior Electrical Engineer, August 26, 1952, TNA 16/11/269.
[702] Electrical Engineer to Provincial Commissioner, Southern Province, September 2, 1952, TNA 16/11/269.

the Tobacco Board's plant, which would not only "increase the amenities of living in Songea to members of all races" but also help to reduce overheads of the Tobacco factory.[703] There is no evidence in the archival sources that the idea materialised.

The Kilimanjaro area in the North of Tanganyika with its prospering cash-crop agriculture was one of the few areas in East Africa, where Africans and their political representatives were involved in the negotiation of rural electrification projects as the negotiations on the electrification of some Chagga customers around Moshi show. The local Chagga people had switched from food to coffee cultivation during German colonial rule and had established a successful system of cash-crop farming, including cooperatives that enabled planters to sell directly to the London market, most notably the Kilimanjaro Native Planters' Association.[704] Coffee farming had made the Chagga arguably one of the most economically successful people of East Africa and had enabled them to invest in social services, primarily education, in the first half of the 1950s.[705]

In line with the British policy of establishing a machinery of local African governments in rural areas, the Chagga had formed a local council in 1951, which made recommendations to the local government.[706] As a political representative towards the British colonial administration, the Chagga had introduced the position of the Mangi Mkuu, a "Paramount Chief" who was to be elected for lifetime. In 1952, Thomas Marealle won the election for the Mangi Mkuu. In his book on African bureaucrats in colonial and post-colonial Tanzania, Andreas Eckert, describes Marealle, who had a university degree in Britain and reputation as moderniser with much administrative experience, as a prime example of a "cultural broker" of colonial rule.[707] As architectural emblems of his progressiveness, Marealle built a hyper-modern building for the Chagga Council, completed in 1954, as well as his own house, called the *Paramountcy Lodge*. In his lodge, Marealle received prominent visitors from all around the world – journalists, scientists, authors, politicians – among them the British Colonial Secretary Lennox Boyd and Princess Margaret.[708] Considering its representative function, it seems little surprising that the Chagga Council invested a considerable amount of money to

[703] Provincial Commissioner to Member of Finance and Economics, October 17, 1953, TNA 16/11/269.
[704] Andreas Eckert, "Comparing Coffee Production in Cameroon and Tanganyika, c. 1900 to 1960s," in *The Global Coffee Economy of Africa, Asia, and Latin America, 1500-1989*, eds. William G, Clarence-Smith and Steven Topik (Cambridge: Cambridge University Press. 2003): 290, 300.
[705] Eckert, *Herrschen und Verwalten*, 56, 185. See also chapter IV on "Kulturelle Makler".
[706] James Clagett Taylor, *The Political Development of Tanganyika* (Stanford, CA: Stanford University Press, 1970), 105.
[707] Eckert, *Herrschen und Verwalten*, 185.
[708] Eckert, *Herrschen und Verwalten*, 186.

equip it with electricity. After its headquarters had been connected to the grid, the Council made a capital contribution of £1,000 to extend the distribution line to the *Paramountcy Lodge* in 1953.[709]

When it came to the electrification of individual households of Chagga farmers, however, the council took a different stance. In 1955, the Tanganyika Coffee Growers Association (TNGA), a representation of the European coffee farmers in Tanganyika, agreed with DARESCO on the construction of a distribution line to a coffee research station at the slopes of Mount Kilimanjaro. The association turned to the local Chagga Council to get the support from local Chagga farmers. Their support was not only needed to negotiate the compensation to be paid for trees on the plots of African farmers that had to be cut for the construction of the electricity line. The association also hoped that the Chagga Council would participate in the project and contribute to the costs.[710] The initial reaction of the council was cautiously positive. In a finance meeting, the council decided that "funds could legitimately be expended provided that either now or in the reasonably near future, some direct benefit arising from the investment of such funds would accrue to the Chagga people." In the proposal made by the TNGA, however, the council didn't lay down many benefits for most Chagga people in relation to the proposed contribution of £3,700.[711] To connect a reasonable amount of Chagga customers, the Mangi Mkuu demanded that the grid be extended to the Machame district behind the coffee research station.[712] The concerns of the Chagga council were supported by the British district commissioner in Moshi.[713]

DARESCO, the power company, responded favourably to the Chagga engagement. After a visit to Moshi, the general manager lauded this "co-operative attitude of the consumers," which would allow the company to make extensions "[i]n the mountain area … which would not have been possible under other conditions as these extensions are by no means lucrative to the Company."[714] These connections, he claimed, would need to be subsidised by the more profitable areas of supply and shouldn't be stressed in the public discussion as he was sure that "the average consumer in Dar es Salaam would be horrified to think that he was in any way subsidizing rural supplies in sub-economic areas".[715] Yet, when the company, which had

[709] Marealle to District Engineer, November 15, 1957, TNA 5/318.
[710] Tanganyika Coffee Growers Association to President of the Chagga Council, November 22, 1955, TNA 5/318.
[711] District Commisioner to Tanganyika Coffee Growers Association, March 17, 1956, TNA 5/318.
[712] District Commisioner to Tanganyika Coffee Growers Association, March 17, 1956, TNA 5/318.
[713] District Commisioner to Tanganyika Coffee Growers Association, March 17, 1956, TNA 5/318.
[714] DARESCO General Manager to District Commissioner, Moshi, June 11, 1956, TNA 5/318.
[715] DARESCO General Manager to District Commissioner, Moshi, June 11, 1956, TNA 5/318.

merged with TANESCO in the meantime, had finally developed the plans for the grid extension, little was left of the companies social mission. The company's manager presented two possible routes for a transmission line to the coffee research station to the district commissioner of Moshi. One that was favoured by the company as the most cost-effective one and one that was favoured by the local Chagga chief and would allow for the connection of several Chagga customers along the way but was more expensive. If the company was to build the line along the latter route, the Chagga Council would have had to pay the difference of £3,000 as well as the compensation for cutting down trees along the way.[716]

While the Chagga Council had spent considerable money to electrify its representative building, the utility manager had obviously misjudged the council's readiness to do the same for individual farmers. "I think you are under misapprehension," the district commissioner responded to the general manager. While the council was ready to help with the negotiations between the company and the local farmers about questions of compensation related to the construction of the transmission line it, he wrote, it was "not prepared to spend a penny let alone £3,000 on either line."[717] He explained that "[t]hey are very businessminded about this and considered the whole project as a luxury rather than a necessity from the Chagga angle." From an economic point of view, the council saw the project "indeed as a poor investment in view of the very few who would be able to use the service and thereby return to the Council over years the enormous amount which would be spent."[718] In Tanganyika, electricity clearly maintained its status as an urban luxury until the end of colonial rule.

Throughout most of the 1950s, there was a not only a national but also an ideological border between two different models of supply in Uganda, on the one side, and Kenya and Tanganyika, on the other. Yet, in 1958, the two systems met in the most material way. In that year, a high-distance transmission line was completed that brought surplus electricity from the Ugandan grid to the major cities in Kenya. The following episode shows how the techno-economic rationale of grid extension in Uganda finally transcended the ideological and political divide regarding electricity supply in East Africa.

The nationalisation of the Ugandan electricity sector had created ideological as well as personal tensions with the Kenyan EAP&L, which had previously controlled the sector. As a consequence, in 1947, the Ugandan Governor Sir John Hathorn Hall had admitted in a letter to Westlake that, "... I do not see us selling any of our power from Jinja over the Kenya border

[716] Stringer, General Manager TANESCO, to District Commissioner, Moshi, March 2, 1959. TNA 5/318.
[717] Marealle to District Commissioner, May 4, 1959, TNA 5/318.
[718] Marealle to District Commissioner, May 4, 1959, TNA 5/318.

to a satellite company of Balfour and Beatty, who would naturally be resentful of having been deprived of their Uganda nest-egg."[719] Although the bulk supply to Kenya was discussed in the planning documents as a possible outlet for the electricity generated at Owen Falls, this option was not pursued further in the first years of planning. This changed, however, in 1952 after the sobering realisation that big industrial loads in Uganda would not materialise. The grids' techno-economic rationalities exerted pressure to transcend the national and ideological border to neighbouring Kenya and had far-reaching implications there.

In 1953, the UEB approached EAP&L, asking for the possibility to export power to Kenya through a high-voltage transmission line to Nairobi. The line would pass 300 miles from the Ugandan-Kenyan border through a few western Kenyan towns and the wealthy Rift Valley, where many European owned farms were located. The request reached EAP&L at the height of the struggle with "emergency power" and frequent power outages, which have been described in the previous chapter. Against this background, the offer was attractive to EAP&L as it obviated the pressure to invest into own supplies in the mentioned areas. The company was, however, also not in the position to raise the necessary capital for a high-voltage transmission line to Uganda. For a connection to the Ugandan system, Kenyan government money was needed. The Kenyan government asked EAP&L's parent company, the British Power Securities Company, to set up a joint company that would be partly government-owned. This company was to become the purchasing agency for the electricity coming from Uganda. The Owen Falls project had effected that, in Kenya, the government would become a shareholder of an electricity utility for the first time. In 1954, the new company called Kenya Power Company (KPC) was registered. It was also to acquire EAP&L's hydro-electric plants in Kenya at Wanji and Low Tana, leaving only the management of the distribution and thermal stations with EAP&L.[720]

EAP&L's chairman, Don Small, contested the plans for the bulk supply from Uganda even more as they represented a huge disincentive for the development of hydropower potential in Kenya. The Power Securities Company had obtained permission to prepare a 100 MW scheme at the Seven Forks area of the Tana River, just about 75 miles from Nairobi. The scheme was envisaged to be gradually expanded to 220 MW later. In the negotiations with Uganda, however, Kenya agreed to not develop the scheme to the detriment of Uganda.

[719] Hall to Westlake, April 2, BNA CO 852/844/1.
[720] Hayes, *Stima*, 332-33.

In 1958, the 132-kV transmission line from Uganda, which was carried by 1192 steel towers, went into operation. The Kenya Power Company immediately became an important customer of the UEB. Kenya's share in the total units sold from Owen Falls rose from one third in 1958 to nearly half in 1961. Nonetheless, the agreement was not popular in Uganda as the rates Kenya paid were perceived as low. Although exports to Kenya accounted for nearly as many kWh as consumption in Kenya (191.3 million compared to 209.2 million) the revenues from the exported electricity accounted for less than a sixth of those in Uganda (290,000 to 1,838,000 pounds).[721] An attempt to renegotiate tariffs in 1961 was met with fierce resistance and ultimately failed.[722]

The export of electricity from the centralised grid in Uganda to Kenya did not only mark the first substantial intervention of the state in electricity provision in Kenya. It also led EAP&L to revise its policy towards the connection of African customers to its small urban grids as now electricity was available at cheap prices.

5) Industrialising the tribesman, producing the wage-worker, electrifying the bureaucrat –the difficulties of connecting "Africans", 1942-1965

> I suggest you make further appeal – a school, with several hundred children of all races, whose parents have entrusted them to a Government School is affected. It can be stated that School lighting can be effected by other means - oil lanterns - and electricity is therefore unnecessary. A recent dreadful fire in a school building of an internees' camp in another African Colony presents a picture of the possible results of oil lanterns being used for lighting. The same case applies to the Hospitals - natives are slowly but surely trusting themselves and their relatives to these Government institutions and their safety therein should be ensured within our powers to do so.[723]

In his letter to the executive officer in Dar es Salaam in 1942, the Tanganyikan Government Electrical Engineer made an emphatic argument for the electrical lighting of a recently established government school in Arusha. The provision of electric lighting, although not "necessary," he argued, was "proper in the circumstances that Government should provide for public safety in public institutions and that this is the correct interpretation of Government policy."[724] His letter illustrates how the changing responsibilities of the colonial state towards its "native" citizens, propagated in the Colonial Development and Welfare policy, were taken

[721] See the graph in Wilson, *Owen Falls*, 31.
[722] Hayes, *Stima*, 335.
[723] Extract from E.C.B. file 76, Electrical engineer, December 12, 1942, TNA CL/29.
[724] Extract from E.C.B. file 76, Electrical engineer, December 12, 1942, TNA CL/29.

up by administrators on the ground. Electric lighting now became an important feature of government sponsored services for Africans – although only for the small privileged group of wage-workers and civil servants.

The provision of social services was an essential part of the "welfarist" dimension of the new modernising *Colonial Development and Welfare* policy, which the British had adopted in the post-WWII era. Yet, social welfare was not seen as disentangled from the other pole of the concept underlying this policy: industrialisation. Quite to the contrary, it was seen as an element of a wider attempt to incorporate "native" Africans into a system of capitalist production in the colonies, based on skilled industrial wage-labour. Tellingly, a debate on social housing in East and West Africa in the British House of Lords in 1944 mainly revolved around the question whether Africans were generally suited for industrial work. "There, I regret to say, a great many Europeans and a great many British settlers have commonly assumed that the East African was technically not fitted to do that sort of work. That is complete nonsense," Lord Rennell lamented, putting forward his experiences with African soldiers: "It has been borne out by our experience during this war that the crudest African labour straight from the Bush can be turned into a body of artisans and handicraftsmen ... in far more complicated employment such as the repair and maintenance of electrical machinery."[725]

Hence, as industrial development became the lens through which British politicians looked at the African colonies, the racial binaries that had previously guided much of the colonial development policy were overlapped with other goals: integrating Africans into capitalist domain. "[T]here is a dividing line between two classes of men, those in tribal institutions and those detribalized," Lord Faringdon delineated this new dichotomy in the same debate.[726] Therefore, he argued, colonial welfare policy needed to primarily address a "very small class that could be said to be actually industrialized or a very small class that could be said to have lost all interest in tribal affinities."[727]

The demobilisation of African soldiers – as much as it was a concern for colonial administrators regarding the social tensions it could potentially create – "has given us an opportunity which, if we use it rightly, will be of the greatest economic value to us."[728] Having experienced a set of services as soldiers in the British military, Faringdon assumed,

[725] Lord Rennell in HL Deb 19 July 1944, vol 132, cols 991-1031.
[726] Lord Faringdon in HL Deb 19 July 1944, vol 132, cols 991-1031.
[727] Lord Faringdon in HL Deb 19 July 1944, vol 132, cols 991-1031.
[728] Lord Faringdon in HL Deb 19 July 1944, vol 132, cols 991-1031.

thousands of "African" Ugandans, Kenyans and Tanganyikans would be unwilling to return to the primitive agriculture and social control of their own tribes. They would strive for a livelihood that "cannot be earned on remote Bush farms; it can only be earned in the towns and settled communities."[729] The training and employment of Africans would also help to challenge the monopoly of Indians in "so much of the trade and so much of the skilled employment," which was increasingly perceived as a problem by the British colonial administration.[730] Yet, it would presuppose the possibility for demobilised Africans to settle in the proximity of their potential working places in the cities – under housing conditions that would ensure a higher standard of living than provided at the time in the African areas of most East African cities.

Before WWII, colonial administrations in East Africa had permitted the unregulated and informal settlement of a relatively large and "indistinct" African population at the periphery of cities. It was only in the early 1940s that these areas were discursively framed as a problem, which was reflected in terms like "septic fringe."[731] In his study of the Walukuba housing Jinja in Uganda – the site of the large Owen Falls dam – Andrew Byerley describes African housing estates as an essential part of a colonial spatial strategy addressed to "de-tribalised," volatile and unproductive Africans.

> Indeed, in the period from the late-1930s to the late-1950s, the linear contours of "African" housing projects – or what may be arguably conceptualised as colonially emplaced apparatuses of anti-nomadic capture designed with the goal of ordering up (or striating) a perceived "wild disorder"– were to be produced throughout Eastern, Western, Northern and Southern colonial Africa.[732]

In his analysis of British colonial urban policy, Robert Home shows that concepts of "native" housing projects as they were applied in East Africa had originated in the West Indies.[733] In 1937, the Colonial Office set up the Forster Commission of Inquiry to investigate the causes of a series of urban riots that had taken place in Trinidad between 1935 and 1937. As the main trigger, the commission identified the appalling conditions found in urban areas. It formulated a range of recommendations for urban (re-)development that were to be subsequently

[729] Lord Faringdon in HL Deb 19 July 1944, vol 132, cols 991-1031.
[730] Lord Faringdon in HL Deb 19 July 1944, vol 132, cols 991-1031.
[731] See, e.g., Martha Grace Baker, "Citizenship on the Septic Fringe. Urban Social Policy and Peri-Urban Development in Kisumu, Kenya," PhD diss., University of Michigan, 2002; N. R. E. Fendall, "Housing, Health and Happiness," *East African Medical Journal* 36 (1959).
[732] Byerley, *Becoming Jinja*, 15.
[733] Home, *Of Planting and Planning.*

implemented in other British colonial territories.[734] These recommendations were largely based on the tenets of the English Town and Country Planning Act of 1932. Under the guidance of planning advisors and with funds from the CD&W Act, colonial administrations started to plan and implement government-funded housing schemes in several British African colonies.[735] The blueprint for many of these planned neighbourhoods was a design by Gardner-Medwin, a town-planning advisor appointed to the West Indies in 1944.

In East Africa, this applied to the Walakuba West African Housing Estate at Jinja – Byerley's case study – and two identical estates in Kampala. The Kenyan government obtained a large loan for improving its native quarters. In Nairobi and other cities, such as Eldoret, planners began to produce "African versions of what is recognizably a modern British housing estate."[736] In Tanganyika, experimental housing schemes were carried out in Dar es Salaam.[737] Yet, as Home argues, these schemes were not only marred by ideas about built environment as an instrument of social control but also by assumptions about the transferability of British methods and institutions to the colonial context.[738] Even contemporary observers, like the abovementioned Lord Rennell, blamed the planners for having the "wrong philosophy about the whole thing. Instead of building a true native town ... they have insisted on perfectly alien standards of building."[739] Using the example of Walukuba, Byerley shows that this planning policy "produced results which no-one intended or even surmised."[740]

In the early 1940s, British parliamentarians also started to become interested in the specific features of the planned African housing schemes. One of the most active members of parliament working on urban issues in Africa was Abraham Lyons.[741] In 1942, he asked the Under-Secretary of State for the Colonies whether "with a view to making the Nairobi housing scheme a well-thought-out model for other governments and local bodies in Central Africa," the Kenyan government was planning to make arrangements for outdoor recreational

---

[734] For an overview of research on the circulation of ideas about urban housing and town planning accross the empire, see Richard Harris and Alison Hay, "New Plans for Housing in Urban Kenya, 1939-63," *Planning Perspectives* 22 (2007), 196-97.
[735] Home, *Of Planting and Planning*, 397-410; 181-183; Byerley, *Becoming Jinja*, 212.
[736] Harris and Hay, "New Plans for Housing," 206.
[737] The Duke of Devonshire in HL Deb 19 July 1944, vol 132, cols 991-1031; Robertson to Darlow, December 22, 1943; Darlow to Blaxter, December 14, BNA CO 822/112/6.
[738] Robert Home, "Town Planning, Segregation and Indirect Rule in Colonial Nigeria," *Third World Planning Review* 5 (1983), 165-75.
[739] Lord Faringdon in HL Deb 19 July 1944, vol 132, cols 991-1031
[740] Robert D. Pearce, *The Turning Point in Africa. British Colonial Policy 1938-48* (London: Frank Cass, 1982), 210, cited in Byerley, *Becoming Jinja*, 212.
[741] See, e.g., Lyons in HC Deb 22 September 1943, vol 392 cols 186-87.

facilities and a community centre.[742] In 1943, he turned his attention to electricity supply. After having reviewed Kenyan Housing schemes in Africa, he commented that "insistence should be made on the necessity for installing electric light in all urban housing schemes for Africans. I notice this has been done in West Africa but I hear rumours that this is not the case in East Africa."[743] Consequently, he sent a letter to all governors in the Central and Eastern part of Africa, enquiring about the status quo of electricity provision to African government officials and the possibilities of including electricity in the new social housing programs for Africans as well as government institutions.[744] Replies came from Kenya, Tanganyika, Uganda, Zanzibar, Northern Rhodesia and Nyasaland.[745]

In none of these colonies, electric lighting had yet been installed in private homes within the "native" housing schemes although nearly all respondents considered it as desirable to do so. The Zanzibari government responded that "the type of building which recent experiments have shown to be best adapted to native requirements is not suitable for the installation of electricity, and it appears unlikely that residents would wish to change their present system of lighting by kerosene lamps for the more costly one of electricity."[746] The governor of Kenya explained the absence of any electricity supply in the African housing areas with the shortage of electrical wiring material and the power crisis resulting from war conditions. When, by 1947, the plans of the Kenyan government and the Nairobi Municipal Council to connect houses in their African quarters had still not been implemented, the government's electrical engineer argued in the same manner that "[i]t has been the shortage of the necessary wiring materials, and not policy, which has imposed delay in bringing those plans to fruition."[747]

In the meantime, the significance of the housing issue had increased; by the mid-1940s, it was getting more attention than any other aspect of the colonial development and welfare policy in Kenya.[748] Colonial authorities commissioned architects to develop designs for housing types that were relatively new in the colonial housing policy: the African family house.[749] Prior to

---

[742] Lyons in HC Deb 18 February 1942, vol 377, cols 1812W; HC Deb 04 February 1942, vol 377 cols 1179-80.
[743] Lyons to Stanley, December 14, 1943, BNA CO 822/112/6.
[744] Nairobi Extra Provincial District to Secretary of African Affairs, April 18, 1955, KNA OP/1/757.
[745] Robertson to Darlow, December 15, 1943; Lyons to Stanley, December 14, 1943 BNA CO 822/112/6.
A.O. Cosgrove, "Comments on the East African Power & Lighting Company's reply to Mr. Westlake's report on electricity supply in East Africa," Nairobi: Government Printer, August 11, 1947, 18, BNA CO 822/148/2.
[746] Memorandum July 1944, BNA CO 822/112/6.
[747] Cosgrove, "Comments," 18.
[748] Harris and Hay, "New Plans for Housing," 203.
[749] For an overview, see Harris, 2007; In particular, with reference to the mining districts of Natal and Northern Rhodesia, Robert Home has traced the steady evolution of house forms from barracks to cottages: Robert Home, "From barrack compounds to the single family house. Planning worker housing in colonial Natal and Northern Rhodesia," *Planning Perspectives* 15 (2000).

WWII, most housing programmes had focused on workers' barracks for single men. If Africans were now permitted to settle within the township boundaries on a permanent basis, Nairobi's assistant Municipal Engineer suggested, "it is now generally recognized that it is in the interests of both the Colony and the African worker himself that he should be accompanied by his family."[750] The glossy booklets on the African housing programmes in Kenya that were produced for publication in Britain showed the whitewashed family houses built out of permanent materials. The carefully posed interiors on the photos suggested a lifestyle that reminded one of that of a British working class family.[751] Against this background, it is not surprising that it became increasingly difficult for the Kenyan government to ignore the issue of providing domestic electricity to its African civil servants at least.

In 1950, the government laid down its policy regarding the electrification of African housing and decided that "only those houses which were to be occupied by senior Africans would be electrified."[752] After that, the public works department received "frequent requests from Africans for the installation of electrical light in African quarters."[753] The African Civil Service Housing Association demanded that electric light should be installed in all new houses. The pressure on the Kenyan government and the Nairobi municipality further increased after a provincial commissioner of the Rift Valley had arranged for the connection of several government quarters to the electricity grid in Nakuru. The "experiment has proven a success," he reported to the Secretary of African Affairs.[754]

In October 1954, the question of electricity supply for African neighbourhoods in Nairobi was raised in the Legislative Council. The discussion came at a time when the housing issue was more acute than ever. "[T]here is no more important social problem in Kenya than proper and sufficient housing for Africans ... especially in the urban areas," the *East African Standard*, Kenya's leading European daily newspaper, wrote in the same month.[755] The same provincial commissioner who had earlier experimented with electricity provision for Africans in Nakuru and was now working as officer-in-charge for the Nairobi province argued against any government subsidies for electricity supply until the housing crisis was solved, except for the

---

[750] Quote in G. C. W. Ogilvie, *The Housing of Africans in the Urban Areas of Kenya*. Nairobi, Kenya Information Office, 1946, cited in, Harris and Hay, "New Plans for Housing," 208.
[751] See picture in Harris and Hay, "New Plans for Housing," 207.
[752] Director of Public Works to Administrative Secretary, Nairobi, April 25, 1955, KNA OP/1/757.
[753] Director of Public Works to Administrative Secretary, Nairobi, April 25, 1955, KNA OP/1/757.
[754] Nairobi Extra Provincial District Commissioner to Secretary of African Affairs, April 18, 1955, KNA OP/1/757. The extra provincial district commissioner later became officer in charge for Nairobi.
[755] Quoted in, Harris and Hay, "New Plans for Housing," 203.

very senior civil servants. “The housing of unaccomodated African Civil servants,” he argued, “is of greater urgency than the provision of amenities for those who are fortunate enough to be in occupation of dwellings.”[756] The only households he proposed to connect to the grid were those of “better paid Africans who are unlikely to default in their monthly bills and that any agreements should be made directly between the Africans concerned and the supplier.”[757]

Yet, the colonial administrators began to realise that the African housing policy had become inseparable from government sponsored electricity supply. In early 1955, the public works department called for a review of the official government policy on the electrification of new buildings for Africans. One of the reasons was that more and more housing was provided in the form of multi-storey flats, “which in any case must have lighting to staircase and corridors.”[758] The department’s director recommended a policy that provided for electric lighting as a requirement for all new multi-storey African buildings and for those single-storey African family houses with three living rooms or more located in “economical distance” to the electricity grid. In individual cases, he also advocated the “[p]rovision for full European type power facilities, including electric cookers and immersion heaters to be provided in houses for very senior African staff.”[759] The plans were supported by some government officials. The provincial commissioner of the Rift Valley put forward several arguments in favour of the proposal. Electricity supply would substantially raise the African tenants’ standard of living as it was cheaper “than the alternative commonly available to African towns.” He was optimistic that the operation of the scheme would eventually be self-financing. In addition, he argued that a better lit location would mean more effective policing.[760] In December 1955, the proposals became official policy and a respective buildings branch directive was circulated among all government institutions concerned.[761]

As a consequence, the Kenyan government began to earmark more funds for the electrification of African housing areas. Still, the sums were just a fraction of the 50,000–£100,000 that the Chief Electrical Engineer estimated would be needed to wire all African quarters throughout the colony.[762] When the government provided £6,000 for a government quarter in Machakos, a town south of Nairobi, the public works director commented that

---

[756] Nairobi Extra Provincial District Commissioner to Administrative Secretary, May 12, 1955 KNA OP/1/757.
[757] Nairobi Extra Provincial District Commissioner to Secretary of African Affairs, April 18, 1955, KNA OP/1/757.
[758] Director of Public Works to Administrative Secretary, Nairobi, April 25, 1955, KNA OP/1/757.
[759] Director of Public Works to Administrative Secretary, Nairobi, April 25, 1955, KNA OP/1/757.
[760] Provincial Commissioner, Rift Valley Province, to Administrative Secretary, May 21, 1955, KNA OP/1/757.
[761] Public Works Department, December 17, 1955, KNA DC/KTI/3/20/18.
[762] Chief Electrical Engineer to Treasury, May 9, 1956, KNA OP/1/757.

"there seems to be little point in preparing a programme for the electrification of existing African houses unless more money is made available."[763] The selective electrification caused new problems for the colonial government, as an incident in Starehe, one of the oldest and most attractive housing areas for African staff in Nairobi, shows.[764] Some "officers have managed, through the efforts of their departments, to get their quarters wired," the officer in charge wrote, but "this has given rise to considerable heart-burning amongst their less fortunate neighbours." Yet, he argued, the "wiring of, say, twenty quarters a year, I think the effect on morale would be very good."[765]

Until the end of British colonial rule in Kenya, the advances of the colonial government's attempts to electrify African neighbourhoods remained negligible. Legal barriers, which will be detailed below, further complicated the relationship between the government, as owner, or the housing estates and EAP&L. In Nairobi, the discussions between the power company and the municipality dragged on into the 1960s, with occasional establishment of connections to the grid. As late as 1964, both sides had still not agreed on a legal arrangement for the electrification of electricity supply and street lighting in African quarters. In March 1965, the city council announced that it "has deferred consideration of the matter pending further discussions regarding future tariff and maintenance arrangements".[766] Even in the post-independence years, the large majority of African residents in Nairobi continued to live by lamplight.

After WWII, beyond supplying African housing estates in the urban areas, colonial administrators had also started to discuss connecting rural dwellers. In his report from 1946, Charles Westlake had suggested that "the farm lands of Kenya and elsewhere should be afforded an electricity supply and numerous villages should be served." This vision was informed by the political projects of rural electrification in European countries. In his argument in favour of state subsidies or guarantees for the electrification of rural areas that were not profitable in the short term, he referred to the case of Sweden. "In this connection, the recent developments in Sweden are of great interest. The Swedish Government has made substantial grants in aid of development of electricity supplies in rural areas."[767] The question how those schemes would be financed, he added, "must depend upon whether the Governments view electricity supply as a commercial service for those who can afford to pay

[763] For Director of Public Works to Administrative Secretary, March 24, 1956, KNA OP/1/757.
[764] On Starehe, see Harris and Hay, "New Plans for Housing," 198, 210.
[765] Nairobi Extra-Provincial District Commissioner to Administrative Secretary, March 7, 1956, KNA OP/1/757.
[766] Cited in Hayes, *Stima*, 316.
[767] Westlake, "Preliminary Report," 10.

for it, or as, what in truth it is, a fundamental public service vital to the economic and social progress of the three Territories."[768] In his comment on EAP&L in 1947, the government electrical engineer supported Westlake's view that "the extension of electricity supply facilities, which may be unprofitable in itself for some years, is an essential part of the general economic development of the East African Territories."[769]

The discussion, however, contributed little to eliminate the prejudices of utility managers. When, in 1949, DARESCO Deputy General Manager N. Ramsey was asked about the reaction of Africans on the company's street lighting programmes at a meeting of the Dar es Salaam Rotary Club, he responded that "[t]hey are quite stoic about it."[770] By the mid-1950s, the East African utilities still had made no efforts to approach African clients. Only in Nakuru, Kenya and Tanga in Tanganyika "had they been attracted to electric power," as EAP&L chronicler Hayes put it, "and then only in infinitesimal numbers."[771] In Nakuru, this had been the result of an "experiment" by the provincial commissioner.[772] Generally, African customers were never part of a demand-driven sales policy. They moved into the utilities' scope when excess energy from hydropower was available. This was the case in Tanga, where hydropower production from the Pangani Falls exceeded the demand, and in Kenya, after 1957, when hydropower from Owen Falls in Uganda had entered the market and "in view of the agreement between the two countries it had to be sold, whether Don Small liked it or not."[773] It was only then that EAP&L discovered that Africans in Kenya and Tanganyika were the "biggest remaining untapped market" and started to develop concepts for supplying domestic electricity to Africans in African peri-urban areas.[774] Now, it backfired that EAP&L had not developed any concepts for dealing with rural African customers, as the problems of its first pilot project at Ngecha village showed.

In Kenya, the Central Housing Board started an initiative to investigate the possibility of supplying electricity to African households in rural areas in 1954. It was based on the notion that "Africans pay out quite large amounts in buying paraffin, wood and charcoal in small quantities and it might well turn out that electricity would, in certain towns, be more economical."[775] The board approached the government's electrical engineer along with other

[768] Westlake, "Preliminary Report," 10.
[769] Cosgrove, "Comments," cited in Hayes, *Stima*, 291.
[770] "Problems and Prospects of Electricity in Tanganyika," *Tanganyika Standard*, June 18, 1949.
[771] Hayes, *Stima*, 312.
[772] Nairobi Extra Provincial District to Secretary of African Affairs, April 18, 1955, KNA OP/1/757.
[773] Hayes, *Stima*, 312.
[774] Hayes, *Stima*, 309.
[775] Chairman Central Housing Board to Government Electrical Engineer, June 22, 1954. KNA OP/1/757.

government institutions to inquire about their experiences with rural electrification projects. Even in urban areas, the electrification of African households was new ground to the government, as the chief electrical officer admitted, except for a few "odd cases of supplies to Senior African Government Employees" who had received government-financed connections to the EAP&L grid and paid the standard metered tariffs too as well as a few cases of senior African employees who were connected to government-run distribution systems.[776]

He did, however, provide a detailed report of a private company at Nyeri, which he considered the major learning case for rural electrification in Kenya. In 1940, the government had purchased a hydro-electric power station, which previously supplied a dried vegetable factory and now operated a pilot scheme, supplying electricity to a few entirely African trading centres of the South Nyeri Reserve situated close to their network.[777]

The discussion on rural electrification was not followed up until 1956, when African district councils began to press for electricity supplies to be provided in villages and trading centres of the African Land Unit. As a base for discussion between the Ministry for Commerce and Industry, the Ministry of Local Government, the public works department and EAP&L, the new chief electrical officer prepared a memorandum that, again, was largely building on the lessons learned in Nyeri.[778] The memorandum and the following correspondence illustrate the hopes that government officials placed on the electrification of rural African households, how they saw the various practical implementation challenges and, finally, which previous experiences inside and outside the colonies informed the debate.

The point of departure for the government was the general recognition that Africans were not only interested in electricity but were also eligible to receive it and generally able and willing to pay for it. In 1956, the chief electrical engineer stated that "[t]he Electric Power Ordinance is entirely non-racial in character" and therefore Africans could be supplied with electricity in licensed areas like anyone else.[779] Referring to experiences in the African housing estates owned by copper mining companies in Northern Rhodesia, the Chairman of the Central Housing Board remarked that "misgivings often expressed on the practicability of installing

[776] Chairman Central Housing Board to Government Electrical Engineer, June 22, 1954. KNA OP/1/757.
[777] The Karatina Dried Vegetable Factory, see Westlake, "Preliminary Report 11; Memorandum by Chief Electrical Officer, enclosed in letter to District Commissioner Kiambu, September 19, 1956.
[778] Chief Electrical Engineer to Secretary for Commerce and Industry, September 19, 1956, KNA KZ/5/12.
[779] Chief Electrical Engineer, "Electrification of the African Areas," memorandum, enclosed in, Chief Electrical Engineer to Secretary for Commerce and Industry, September 19, 1956, KNA KZ/5/12.

electricity supply" were groundless in most cases.[780] As the living conditions of Africans improved, so would the demand for electricity, the chief electrical engineer hoped: "[T]here seems to be no reason why his demand should not in the next generation compare with those of other races 25 years ago."[781] The potential revenue, he hoped, would be "very large and could influence the tempo of electrical development in the Colony."[782]

Electricity could also become an element of the government's land consolidation strategy in the reserves, which aimed at increasing concentration of Africans in villages. The provision of electricity supplies "would not only help to bring home to the African the advantages of village life but would, in due course, by providing a cheap and efficient source of power to foster small local industries and thus improve their standard of living."[783]

In the discussion, however, it was presumed that Africans – at least at an initial stage – formed a substantially different customer segment than Europeans and, thus, would have to be dealt with in a different way. In Nairobi, government engineers had been corresponding with EAP&L for some time to discuss the technical possibilities of limiting the electricity consumption of African government staff. Colonial administrators considered the use of a "satisfactory type of load limiting device which is reasonably priced" that would limit the use to two 60 W lamps or, alternatively, one 60 W lamp and one 60 W radio.[784] As far as quarters for more junior staff were concerned, they proposed that the rooms should be "equipped with low power bulbs which could be controlled from a central switch," whereby the monthly bill could be equally shared.[785]

The Nyeri undertaking, for example, charged an "African tariff" to its African customers which differed from the metered tariffs it charged to Europeans. This African tariff was a partially subsidised flat-rate tariff for lighting purposes only and was calculated with fixed charges per light bulb connected.[786] Generally, flat-rates had often been used earlier in the initial stage of electrification projects to build up demand, for example in the case of Zanzibar. Another advantage of flat-rate tariffs was that the companies avoided the capital costs for electric meters, which were very high in relation to the expected revenue from

[780] Chairman Central Housing Board to Government Electrical Engineer, June 22, 1954. He states further that "experience in the African housing estates owned by the copper mining companies in Northern Rhodesia has shown that many of the fears are groundless."
[781] Chief Electrical Engineer, "Electrification of the African Areas."
[782] Chief Electrical Engineer to Secretary for Commerce and Industry, September 19, 1956, KNA KZ/5/12.
[783] Chief Electrical Engineer, "Electrification of the African Areas."
[784] Secretary for Commerce & Industry to Secretary of African Affairs and Secretary for Local Government, Health and Housing, April 5, 1955, OP_1_757.
[785] Provincial Commissioner Rift Valley Province to Administrative Secretary, May 21, 1955, OP_1_757.
[786] Chief Electrical Engineer, "Electrification of the African Areas."

customers using electricity for lighting only. As long as customers adhered to the number of devices they had paid for, it was easy for the company to calculate the maximum load for the system. This was particularly important for small-scale, decentralised systems like the hydropower grid in Nyeri.

In his report on the project in 1954, however, the chief electrical engineer had listed several problems the Nyeri undertaking encountered with their African tariff. Customers had to pay the fixed rate for each light bulb installed, even if they used only one at a time. This discouraged the customer from making "as good use of the supply as he otherwise may" and led to users not switching off lights during daytime. This, in turn, did not affect the generation costs of the hydropower plants as long as peak loads occurred in the evening hours, but it became a problem for the company when the daytime peak loads increased due to new industrial loads. Furthermore, the grid operators feared that Africans would abuse the tariff, for example "by the connection of small appliances such as tailor's irons, kettles etc., which the consumer might use in the pursuit of his business."[787]

Consequently, the government institutions as well as EAP&L discussed and tested different technical solutions for demand control, including devices to control the payment, the maximum load and the hours of availability. The Central Housing Board suggested slot meters, which had been in extensive use in working class houses in the United Kingdom during the interwar years.[788] The chief electrical engineer dismissed the slot meters as too expensive to be used in the given setting and stated he was "not aware of them having been used in connection with supplies to working class houses amongst the more primitive people of Africa or other places."[789] Instead, he experimented with less costly solutions, such as magnetic circuit breakers and time switches. He also gave an account of "a combination of a demand limiting device and consumers circuit breaker which is in production in Holland and is said to be used extensively for lighting in purposes to working class houses in Indonesia" but also was too expensive in his view.[790] In 1956, EAP&L informed his successor about their intention to "import load limiters in various sizes if the initial experiments with this type of equipment meet with success."[791]

---

[787] Chief Electrical Engineer to Central Housing Board, June 25, 1954. See also, Reed, Joint Manager EAP&L, to Minister for Commerce and Industry, October 9, 1956, KNA KZ/5/12.
[788] Chairman Central Housing Board to Government Electrical Engineer, June 22, 1954, KNA KZ/5/12.
[789] Chief electrical Engineer to Central Housing Board, June 25, 1954, KNA KZ/5/12.
[790] Chief Electrical Engineer to Central Housing Board, June 25, 1954, KNA KZ/5/12.
[791] EAP&L Nairobi manager to Chief Electrical Engineer, September 29, 1956, KNA KZ/5/12.

In the same year, the new chief electrical engineer saw a quite realistic prospect that Africans could develop a substantial demand and move up to become "standard" customers in a short time. He supported his view with an account of recent experiences from Nyeri, where traders had started to buy sewing machines, irons and other small appliances, which necessitated the transfer to the standard metered tariff.[792] Despite his optimism regarding the development of consumption once a supply was set up, he did not obscure the fact that the key challenge was not yet solved: Who would be the driving force behind rural electrification projects, who would be willing to provide the initial investment and how could the financial risks be distributed among the different parties involved?

For places that were outside the licensed areas of EAP&L, he only considered African district councils or cooperatives capable of financing and operating small-scale systems. They would, however, face major difficulties in trying to venture into independent generation: He regarded small-scale grids viable only in areas where hydropower resources could be used for generation as diesel generation would result in charges too high to be cost-covering. Even if hydropower was used, considerable amounts of investments would be needed before revenues were high enough to cover operating costs and service the capital. In addition, he predicted that it would be "difficult if not impossible" for operators to find qualified staff with the technical knowledge and experience to develop and run such a system. The operator would have to rely on assistance by the government.[793] Within the licensed areas, the Kenyan Electricity Ordinance did not permit the establishment of independent producers. Here, rural electrification required the engagement of EAP&L as the authorised supplier.

From the beginning of the discussions, however, EAP&L had signalled that, despite its general interest in rural electrification schemes, it was highly reluctant in regard to their financial risk.[794] The company made it clear, that it was not willing to make any investment into electrification schemes for Africans unless a public body, either the government or the district councils, would take over at least part of the risk, for example by providing revenue guarantees.[795] EAP&L was furthermore deterred by the informality of rural areas as, for example, many of the villages were not yet regarded as permanent and the company was hesitant to enter into a direct client relationship with Africans.[796] The chief electrical engineer

[792] Chief Electrical Engineer, "Electrification of the African Areas."
[793] Chief Electrical Engineer, "Electrification of the African Areas."
[794] Chief Electrical Engineer to Chairman of the Central Housing Board, June 30, 1954, KNA KZ/5/12.
[795] J.C.V. Buckhurst, Chief Electrical Engineer to Secretary for Commerce & Industry, November 10, 1956, KNA KZ/5/12.
[796] Joint Manager, EAP&L, to Minister for Commerce and Industry, October 9, 1956, KNA KZ/5/12.

remarked that it "would obviously be impracticable for the Africans as individual consumers to enter into a joint guarantee of revenue."[797] Both parties therefore favoured a model where African district councils would serve as intermediaries between the supplier and the customers. According to this model, the supplier would only supply bulk electricity to a single distribution point and the council would be responsible for the distribution to the customers and the collection of cash from them.[798] EAP&L went a step further: To ensure that "African District Councils are encouraged to take the greatest possible interest in the electrical development of their villages," they urged the district councils to give a guarantee "even in cases where revenue might exceed the required guarantees".[799]

This arrangement of bulk supply to villages was, of course, unfavourable for the local communities. As the chief electrical engineer remarked, "the African is placed at a disadvantage, as compared to other races," since the villagers would directly or indirectly have to pay for the service lines and take supplies in bulk at a standard tariff.[800] Consequently, when, in 1956, EAP&L started preparations for a pilot project in the Kiambu District, north of Nairobi, conflicts with the district council arose. Confronted with the request for capital outlay and revenue guarantee, the district commissioner harshly rejected the idea towards the chief engineer: "May I say quite emphatically that there is no question whatsoever of the African District Council accepting any responsibility of this sort."[801] Nonetheless, as "we are fired with the electrical impulse now," he considered applying for an own generation and distribution license with the African District council if negotiations with EAP&L did not proceed.[802]

Despite these conflict of interests, EAP&L did proceed with a pilot installation in the village of Ngecha in the Kiambu district, which was completed in 1957.[803] The choice of Ngecha was a political one. Ngecha was inhabited by Kikuyu, the ethnic group whose members had been leading the bloody Mau Mau uprising against the British colonial administration since 1952. The African District Council had agreed to provide the money for the service lines in the village. In return, the EAP&L sales team in Ngecha provided free wiring up of straw-thatched rondavel houses and installed all kinds of electric accessories. Residents from around were

[797] Chief Electrical Engineer, "Electrification of the African Areas."
[798] Chief Electrical Engineer, "Electrification of the African Areas."
[799] Reed, Joint Manager EAP&L, to Minister for Commerce and Industry, October 9, 1956, KNA KZ/5/12.
[800] Chief Electrical Engineer, "Electrification of the African Areas."
[801] District Commissioner Kiambu to Chief Electrical Engineer, November 6, 1956, KNA KZ/5/12.
[802] District Commissioner Kiambu to Chief Electrical Engineer, November 19, 1956, KNA KZ/5/12.
[803] A demonstration for the Chief Electrical Engineer was carried out in May or June 1957. See Chief Electrical Engineer to Joint Manager EAP&L, June 7, 1957, KNA KZ/5/12.

invited to see the marvels of electricity – electric razors, stoves, refrigerators, fans, suction cleaners, washing machines, convex heaters for cold nights. As even the EAP&L's own company historian Hayes writes, "[i]n the conditions of the time, with curfew operating and thousands, in detention and outside, reduced to the barrest necessities, it was an exercise of incredibly bad taste but it was swallowed along with the other indignities of the fifties."[804]

For a long time, the Ngecha project remained the only one of its kind for EAP&L in Kenya. When, in 1959, the provincial commissioner of the Central Province approached EAP&L regarding the electrification of two other villages in the district, Gatundu and Githunguri, the company asked for annual guarantees for which the chief electrical engineer saw "not the slightest possibility of the revenue from sales of electricity reaching the figures given."[805] Furthermore, the pilot installations in Nyeri had obviously raised expectations of African residents in the other villages. When the project was discussed in *barazas*, the villages' deliberation meetings, people "quite openly stated that they would only consider accepting a supply if the A.D.C. [African District Council, J.S.] initially provided the necessary cash for service lines such as was the case in Ngecha area."[806] In the end, the pilot installation at Ngecha rather discouraged the government and EAP&L from any further attempts at rural electrification projects. In 1961, a representative from the treasury in Nairobi, expressed his serious doubts that "village lighting schemes would be a success at present," referring to experience from the Ngecha scheme, "which is not going too well as it is attracting insufficient patronage to pay its way."[807]

Even though the connection of African urban households remained a rare exception, the increasing visibility of electricity in the towns became the distinguishing feature between urban and rural life – for Africans and Europeans alike. Following the opening of upcountry branches of the electrical utilities and clubs with electric light became a common site even in smaller towns.[808] They were increasingly perceived as a central feature of urban social life – by Europeans as well as by a small privileged class of educated Africans with an urban employment. In an African resident's account from Dar es Salaam in 1955, the "conquering hero" returning to his village ask his relatives: "What you live in a village without electricity?

[804] Hayes, *Stima*, 313.
[805] Chief Electrical Engineer to Provincial Commissioner Nyeri, March 25, 1959, KNA KZ/5/12, see also Development superintendend EAP&L to Chief Electrical Engineer, March 27, 1961, KNA KZ/5/12.
[806] Development Superintendend EAP&L to Chief Electrical Engineer, March 27, 1961, KNA KZ/5/12.
[807] J.H. Butter esq., Treasury, Nairobi, to Mr. Garland, June 26, 1961, KNA OP/1/757.
[808] For a detailled list, see Moffett, *Tanganyika*, 806.

No cinemas? No dance hall? No bands? What a dump?"[809] In a volume called "Life in Tanganyika in the Fifties" in which Godfrey Mwakagile narrates his memories and collects those of others, including Africans and Europeans, the lack of electricity outside the major towns is a recurrent theme.[810] Even in the towns, electricity supply was often limited to some hours per day, forcing wealthier residents to run refrigerators on kerosene and use Tilley lamps and Hurricane lanterns for lighting.[811]

6) The dawn of private capitalism in the East African power sector, 1954 – 1962

A decade after the end of WWII, the British enthusiasm about its grandiose post-war development offensive in East Africa had begun to dissipate. For the most part, its results had been sobering. The dismal failure of the groundnut scheme in Tanganyika had become a political scandal in Britain.[812] The costs for the Owen Falls project in Uganda had skyrocketed and the project's benefits were increasingly dubious, as was shown earlier. "Ironically," Thomas, Moore and Butler write, "'development', the touchstone of British colonial policy after 1940, failed either to raise living standards as quickly as colonial populations had been encouraged to expect, or to lay down the material and other foundations on which political reform could be securely built."[813] As a consequence, the pressure on Britain, both from African nationalists within the colonies as well as the United Nations, to support its East African territories to become economically more self-reliant was rising.[814] Throughout the 1950s, neither colonial administrators nor the nationalist opposition in the East African colonies expected political independence to be achieved at any time soon. Nonetheless, economic experts at the Colonial Office, the governors, and the financial secretaries in the colonies, later called ministers of finance, became increasingly aware that the African colonies would need to become economically more independent to ultimately be ready for independence.

With respect to electricity, the laisser-faire policy that the colonial administrations in Kenya and Tanganyika had maintained throughout the first post-WWII decade ran contrary to that demand. This section portraits the hesitant – and in some regards unsuccessful – attempts of

---

[809] Cited in, James R. Brennan et. al., *Dar Es Salaam: Histories from an Emerging African Metropolis* (Dar es Salaam: Mkuki na Nyota Publishers and Nairobi: British Institute in Eastern Africa, 2007), 44.
[810] Godfrey Mwakikagile, *Life in Tanganyika in the Fifties* (Dar es Salaam: New Africa Press, 2009), 214, 289-90, 313, 339, 350.
[811] Mwakikagile, *Life in Tanganyika*, 350, 403.
[812] Alan Wood, *The Groundnut Affair* (London: The Bodley Head, 1950), 32.
[813] Martin Thomas et. al., *Crises of Empire: Decolonization and Europe's Imperial States* (London: Bloomsbury Publishing, 2015), 16.
[814] Ullrich Lohrmann, *Voices from Tanganyika: Great Britain, the United Nations and the Decolonization of a Trust Territory, 1946-1961* (Berlin: Lit, 2007).

both governments to enter a phase of consolidation and planned development of electricity infrastructures. It furthermore gives an impression of the imminent demise of private capitalism in the power sector of the two colonies that foreshadowed its nationalisation after independence. The private power companies in East Africa became overwhelmed by the demands of the increasing internationalisation of capital markets and development assistance, signified by the engagement of the World Bank in the Ugandan and Kenyan power sectors. In Kenya, EAP&L's corporate policies were increasingly deflected by the demand to import power from Uganda and by international development agencies, which had little sensibility towards the delicate political relationships within the region.

In Tanganyika, the demand for electricity had been growing at an increasing pace after the war. In the early 1950s, the government started to press for a technical and financial consolidation of electricity supplies at a territory-wide level. The existence of two closely associated power companies, each of which held the monopoly for different concession areas, seemed unsuited to meet the future electricity demand of the territory: one of the companies, DARESCO, served the more dynamic urban market of Dar es Salaam and other towns but largely relied on expensive imported diesel for generation, while the other, TANESCO, had overcapacities of cheaply generated hydroelectricity from Pangani Falls, which it exported at discount rates to Kenya. Consequently, DARESCO was unable to pay a dividend in 1952, while TANESCO paid a dividend of 6.5% on its issued capital. In 1953, DARESCO therefore had to substantially raise its rates in Dar es Salaam and the district areas.[815]

In agreement with both companies, the Tanganyikan government commissioned F.P. Egerton, a consultant from Great Britain, to conduct a study on the potential for a merger of the two companies. Between October and November 1953, Egerton travelled over 2,000 miles throughout the territory to discuss the electricity supplies with District and Provincial Commissioners, Members of the Chamber of Commerce, Secretaries and Members of Town Boards, the Water Development Board, the Government Town Planner and representatives of the Sisal Grower's Association.[816] In February 1954, Egerton published his "Report on Electricity Supplies in Tanganyika." The document was written in a very technical language.

After studying the companies' operating and financial records, Egerton found the technical and operational efficiency to be generally satisfactory. A main point of criticism, however, was the tariff policy of the two companies. Though describing them as generally "sound,"

[815] Egerton, *Electricity Supplies in Tanganyika*, 1.
[816] Egerton, *Electricity Supplies in Tanganyika*, 1.

Egerton reported that the tariff structures were complicated and unpopular among users. Both companies had adopted a tariff policy that was "similar to the principles followed in the United Kingdom and other industrialized countries" but placed in a completely different environment.[817] As only a low percentage of the population used electricity and the costs for imported fuel were high, electricity users in Tanganyika were charged much higher rates than their counterparts in the industrialised world. Particularly the fuel surcharges, which DARESCO applied on all units sold for lighting and domestic use, caused irritation among consumers. Egerton recommended to withdraw them, along with the meter rents.

Egerton estimated that the demand for electricity in Tanganyika, which at the time had one of the lowest per-capita electricity consumptions of electricity in the world, would more than double in the coming decade. To meet this demand, he proposed to build two additional hydropower stations on the Pangani River and a connection from these stations to Dar es Salaam. Egerton suggested that "the amalgamation of the two Companies should result in greater expansion of electricity facilities throughout Tanganyika."[818] The Tanganyikan government accepted Egerton's proposal and began to prepare the legal formalities for the merger of the two utilities.

Not only colonial officials but also utility managers were hoping, or at least expressing the hope, that the planned merger would release new resources for rural electrification. In his negotiations with the Chagga council in Moshi, described earlier in this part, the DARESCO general manager raised hope that "the combined earnings of these two Companies, especially the latter [TANESCO, J.S.], with its enormous loadings supplied from a hydro-electric source, may permit of sub-economic development in the rural areas of Tanganyika financed, in part, from the increased ability of the one Tanganyika Company, as it will then be, to earn and set aside more adequate reserves."[819] In 1957, the appropriate legislation was passed and DARESCO was merged with TANESCO, which received a new licence for all of Tanganyika.[820] The colonial administration hoped that the merger of the two companies and the interconnection of the territories' major isolated grids would become the foundation of a national electricity infrastructure.

Still, the government soon realised that the corporate policy of the newly merged utility did not only run contrary to its plans for a more inclusive and more forward-thinking economic

[817] Egerton, *Electricity Supplies in Tanganyika*, 6.
[818] Egerton, *Electricity Supplies in Tanganyika*, 2; more details in Hayes, *Stima*, 325.
[819] DARESCO General Manager to District Commissioner Moshi, June 11, 1956, TNA 5/318.
[820] Hayes, *Stima*, 325.

policy but also provoked protests against tariff raises among customers. In 1956, the District Commissioner in Moshi forwarded to DARESCO complaints from members of the Moshi District Advisory Council about the high lighting rates and the standing charges in particular.[821] However, they defended themselves by replying that a reduction of tariffs was not possible.[822] In 1958, a group of influential electricity customers in Tanga, most of them organised in the Tanga Province Chamber of Commerce and Agriculture, were more persistent in their struggle against high tariffs. Through the elected members for Tanga in the Tanganyikan Legislative Council, they lobbied for a stricter regulation of electricity companies by the Government.[823] In a discussion on planned tariff increases in the Tanga region in the Legislative Council meeting in December 1958, they "alleged that TANESCO was taking arbitrary decisions which vitally affected power consumers, and that the calibre of Government's professional advisors was not high enough to counteract the Company's technical advisers – with the result that the consumers suffered."[824] Although he did not accept the contentions, the minister for communications and works promised to explore the possibilities of creating an advisory board on the issue of electricity supply in the territory.

Neighbouring Kenya had set a precedent for such a government institution that was entrusted with the task of mediating between the government, the power companies and the consumers.[825] In 1949, Governor Mitchell had agreed to create an Electric Power Advisory Board but continued to shield EAP&L from any substantial government intervention until his retirement in 1952.[826] Under his successor, Sir Evelyn Baring, the board's influence remained insignificant and its activities were restricted to the discussion of petty issues.[827] According to Tignor, it didn't become a forceful regulatory body until the end of the 1950s.[828]

To set up a similar board in Tanganyika, different departments of the government and TANESCO, together with its parent companies, started to exchange letters on the composition and competencies of the board that was to be established. The "Electricity Advisory Board" was, in fact, not the first governmental board to be concerned with electricity supplies in

---

[821] District Commissioner to General Manager DARESCO (copy to DARESCO Manager, Moshi), April 21, 1956, TNA 5/318.
[822] DARESCO General Manager to District Commissioner Moshi, April 25, 1956, TNA 5/318.
[823] Unfortunately, I wasn't able to access the minutes of the Legislative Council.
[824] Note by unknown author, February 16, 1959, TNA 469/CWC/55/38/01.
[825] Hayes, *Stima*, 311, 362.
[826] Tignor, *Capitalism and Nationalism*, 306, Hayes, *Stima*, 307. Also on the advisory board: letter of January 16, 1959, to Woodrow, C.B.E., Director of Public Works, Dar es Salaam, TNA 469/CWC/55/38/01.
[827] See the board's minutes in: KNA AE/17/6, Boards Committees electric power advisory board agenda and papers.
[828] Tignor, *Capitalism and Nationalism*, 306.

Tanganyika: in 1945, an Electricity Board consisting of the Minister for Communications and Works, the Director of Public Works and the Land Officer had been set up but had limited its functions to the "passing of files". The "Electricity Appeals Board" that had been enacted in 1957 to discuss appeals regarding the provision of supply had never met nor even been constituted.[829] Soon it became obvious, however, that the newly formed board would be limited to giving advice and would hold no executive powers. After reviewing the files from neighbouring Kenya, the Director of Public Works concluded that the board should not be entrusted with any technical matters. He also warned that the board should not develop into a "consumers' protection society" but give "a balanced opinion" on matters like tariffs.[830] The Minister for Communication and Works envisioned the board to be a "buffer between the consumer and TANESCO, and between TANESCO and the Government."[831]

Nonetheless, the London Board of TANESCO's parent company EAP&L was alarmed about the plans of the Tanganyika Government, fearing that it would scare away investors. In a letter to the director of public works, the Minister for Communication and Works in Tanganyika reported that Don Small, the director of EAP&L, "had flown down from Kenya with a message from the London Board that they considered the particular points to which attention was drawn in our proposed terms of reference so dangerous that they would not be prepared to go to the market for new capital if these particular matters were mentioned publicly."[832] The threat unsettled the Tanganyikan government. When the Executive Council of Tanganyika enacted the non-statutory Electricity Advisory Board in March 1959, it adopted the short but broad terms proposed by EAP&L.[833] According to them, the board was only allowed "to advise the Minister and any licensee under the Ordinance on any matters relating to the maintenance and development of the supply of electrical energy in Tanganyika which may be referred to it by the Minister."[834]

The members of the board comprised the director of public works, a representative from the department of commerce and industry, a nominee of the board of TANESCO, as well as five unofficial members from the different regions. Because he "would like to have one African representative on the Board," the minister for communication and works proposed that one of them should be "a fairly senior Chagga member of the K.N.C.U. who are one of the larger

[829] Memorandum by Minister for Communication and Works, February 28, 1959, TNA 469/CWC/55/38/01.
[830] Rolleston to Woodrow, Director of Public Works, January 16, 1959, TNA 469/CWC/55/38/01.
[831] Memorandum by Minister for Communication and Works, February 28, 1959, TNA 469/CWC/55/38/01.
[832] Rolleston to Woodrow, Director of Public Works, January 16, 1959, TNA 469/CWC/55/38/01.
[833] Memorandum by Minister for Communication and Works, February 28, 1959, TNA 469/CWC/55/38/01.
[834] Molohan, Provincial Commissioner to unknown recipient, March 15, 1959, TNA 469/CWC/55/38/01.

consumers of electricity."[835] The Kilimanjaro Native Co-Operative Union was the successor of the Kilimanjaro Native Planters Association mentioned earlier in this part. As was shown, it was a controlled by the Chagga chiefs, who were in a symbiotic relationship with the colonial state, and would later, during the struggle for independence, cross swords with the Tanganyika African National Union (TANU) at the local level in Kilimanjaro and later became one of the most prominent "African" Tanganyikan opponents of Julius Nyerere.[836] When, in a short article announcing the new board, the *Tanganyika Standard* dated April 20, 1959, titled that the "Public now has a say," this clearly applied only to those representatives of the "native" African population who were loyal to the colonial government.[837]

One of the most important issues that were discussed in the meetings of the Electricity Board was the supply of upcountry towns, which still had no or insufficient access to electricity. One of them was Bukoba, at the shore of Lake Victoria, the headquarters of the West Lake province. In a letter dated May 18, 1959, which was published in the *Tanganyika Standard* the Chamber of Commerce of Bukoba had complained that "due to our distance from the country's capital, Bukoba has tended to be forgotten when funds for development have been allocated."[838] The government was operating a small electricity grid in Bukoba, which was supplied by a steam engine with a generator using coffee husks from the district's plantations as fuel.[839] The demand for electricity in the town, however, by far exceeded the system's capacity by 1959, so that many applicants for connection to the grid remained unserved. In the same year, TANESCO went into negotiations with the Tanganyikan government over a license for Bukoba and made an offer for Government assets, but "it would appear that these negotiations have got 'bogged-down' in the usual Government manner, a representative of the Bukoba Chamber of Commerce lamented in another letter to the Tanganyika Standard.[840] In his words, Bukoba was still the "Territory's 'dark town'." This was about to change, when, in 1960, an agreement between TANESCO and the government on the value of the assets in Bukoba was reached and a license was issued to the company.[841]

---

[835] Molohan, Provincial Commissioner to unknown recipient, March 15, 1959, Note by M.C.W., February 25, 1959, TNA 469/CWC/55/38/01.
[836] Eckert, *Herrschen und Verwalten*, 188-89.
[837] "Public now has a say," *Tanganyika Standard*, April 20, 1959, TNA 469/CWC/55/38/01.
[838] Reader's letter in *Tanganyika Standard*, May 18, 1959.
[839] Hill, Tanganyika, 712; von Massow, *Industrialisierungsmöglichkeiten*, 94.
[840] "Bukoba still Territory's dark town," reader's letter in Tanganyika Standard, February 2, 1960, TNA 469/CWC/55/38/01.
[841] "Minutes of the fourth meeting of the Electricity Advisory Board", July 18, 1961, TNA 469/CWC/55/38/01.

The electricity tariffs in Tanga, however, remained a highly contested issue. In the letters that were regularly sent by the Tanga Chamber of Commerce and Agriculture to the Minister for Communication and Works, the tone became increasingly harsh. In February 1960, K.R. Patel from the chamber emphasised that "all sections of Tanga public are unanimous on the issue and want a speedy solution of the situation, being unable to bear the burden of the increase for an indefinite time."[842] In December 1959, the chamber deplored that "[p]ersons of low income (from Shs.150/- to 400/- per month) find it extremely difficult to maintain themselves on account of the present-day high costs of living."[843] The author of the letter ascribed the increase of consumer rates in Tanga mainly to the fact that TANESCO was exporting electricity to EAP&L in Kenya at extremely low rates, which in turn sold it to its customers with a luxurious margin. "The income of this company should be looked into before penalising the consumers of Tanga province," he demanded. "How undemocratic it is," he asked rhetorically, "to inflict an abnormal increase on the consumers, and that too for an unlimited period, just for the sake of providing capital for a monopoly-holding company. "[844] TANESCO reacted to the complaints with a memorandum defending their tariffs in Tanga along the line that they were still cheaper than those in Dar es Salaam or the tariffs charged by the UEB in Uganda.[845] Matters essentially remained as they were.

The example of the electricity boards in Kenya and Tanganyika during the 1950s illustrates the inability or unwillingness of the colonial administrations to establish effective regulatory authorities for the power sector. On a small scale, the composition of the board in Tanganyika, consisting of those representatives from the three race groups who were conservative and loyal to the British administration, reflected the colonial government's attempt to create a system of multiracial governance – an attempt that ultimately failed, as will be shown later. Considering the limited competencies of the Tanganyikan board, the thin-skinned reaction of the EAP&L's director to its foundation seems surprising. His fears, however, can be understood in light of a transition on the global financial markets that was taking place at the time: The flows of private capital were being redirected and they were increasingly bypassing East Africa's power sector.

---

[842] K.R. Patel & Co., Tanga Province Chamber of Commerce and Agriculture to Ministry for Communication and Works, February 9, 1959, TNA 469/CWC/55/38/01.
[843] Secretary to Advisory Board, December 6, 1959, TNA 469/CWC/55/38/01.
[844] Secretary to Advisory Board, December 6, 1959, TNA 469/CWC/55/38/01.
[845] Memorandum on the Tanga Province Chamber of Commerce & Agriculture's letter of December 6, 1959, undated, TNA 469/CWC/55/38/01.

After one of the first meetings of the advisory board, D.J. Stringer, the TANESCO nominee, circulated an article in the *Financial Times* to all other members.[846] The article, dated May 1959, was based on an interview with the president of the World Bank, Eugene Black.[847] Founded in 1944 at the Bretton Woods conference, the World Bank had increasingly turned to infrastructure financing in the so-called "developing countries" of Asia, Africa and Latin America. Lending to these three continents amounted to 80% of all World Bank loans between 1950 and 1959, while in its initial years of operation, between 1946 and 1949, 81% of all World Bank loans had gone to Europe. While infrastructure had accounted for only 21% of the loans disbursed in the 1940s, it made up 61% in the 1950s.[848] Yet, this type of infrastructure lending came with some difficulties for the World Bank. The newspaper article credited Black for his efforts in "drawing the attention of developing countries to the need for them to ensure that public utility undertakings are given a square deal" – alluding to Theodore Roosevelt's domestic programme in the US at the beginning of the twentieth century, which was directed against plutocracy and bad trusts while, at the same, time protecting companies from the more radical demands of organised labour.[849]

Black explained that, in the nineteenth century, a large proportion of private money from capital-exporting countries in Europe had been flowing into overseas infrastructure investment, such as railway projects, tramway concerns, water undertakings and other public utilities. Since the end of World War II, however, private investors were increasingly staying away from infrastructure investments abroad and most of their money was channelled through the international capital markets into the exploitation of natural resources and secondary industry. This gap in public development finance had to be filled with loans from foreign governments and from official institutions like the U.S. Export-Import Bank, the U.K.'s Export Credits Guarantee Department and the World Bank.

While infrastructure investments were once considered one of the safest and most profitable methods of employing capital in overseas development, Black explained that the experience of the past decades had proven that it was far less safe and profitable than assumed. Black traced this back to the factual or proposed nationalisation of utilities in many countries, which in many cases was carried out under unfair conditions for the investors. Secondly, he criticised the tendency of governments to use their power to control the tariffs of the public

---

[846] Stringer to Chairman of the Board, October 14, 1959, TNA 469/CWC/55/38/01.
[847] "Square deals for public utilities," *Financial Times*, May 4, 1959, TNA 469/CWC/55/38/01.
[848] Devesh Kapur, John P. Lewis, Richard C. Webb, *The World Bank: Its First Half Century*, Volume 1, 6.
[849] "Square deals for public utilities."

utility undertakings, a practice that translated into financial damage for the utilities if inflation was high.

Black complained that in its 12 years of existence, the World Bank "has had to lend vast sums for rehabilitating public utilities that have been run down, almost to a standstill by past financial neglect." To raise additional enormous sums needed for utilities to keep pace with the rapidly rising demands, he demanded that "old-fashioned emotional attitudes towards the financing of these undertakings will have to be discarded and replaced by common-sense economics – meaning more adequate rates, prompt adjustment of rates at times of rising prices, realistic valuation of assets and normal depreciation of allowances."[850]

The article sparked a controversial discussion between the members of the Tanganyikan Electricity Advisory Board on the question whether Black's theses applied to the Territory.[851] In this discussion, the member of the legislative council, Donaldson, reminded the ministers that after full depreciation and dividends of 10%, TANESCO still spent around 13% on increasing their plant annually, which meant that the company was earning a net profit of nearly 25% on its capital." I can see no reason," he concluded, "why, as an investment, it should be made more attractive at the expense of the consumers in this territory."[852]

Yet, the mid-1950s had already marked the gradual decline of private capitalism in the East African power sector.[853] As individual projects – and hence the need for capital – were becoming bigger, the organisational form of the private-owned electricity companies proved to be increasingly unsuited to handle them. EAP&L, for example, was bound by many statutory limitations that had most likely been introduced to cover the shareholders' interests. They covered the company's area of operation, its borrowing power and its profitability.[854] When it came to international agreements and large projects, these limitations now seriously restricted the company, as the example of the transmission line from Uganda to Kenya illustrates. As was described earlier, the company didn't have enough statutory borrowing power to raise the 7.5 million pound needed for the project. For this reason, it had to clear the way for the government to become a substantial shareholder in the electricity sector through the public-private Kenya Power Company, even though the management of the new-founded company remained in the hands of EAP&L and Power Securities Company.[855]

---

[850] "Square deals for public utilities."
[851] See, e.g., General Manager TANESCO to Advisory Board, October 28, 1959, TNA 469/CWC/55/38/01.
[852] Donaldson to Minister for Local Development, November 9, 1959, TNA 469/CWC/55/38/01.
[853] See also Hausman et. al., *Global Electrification*, 251.
[854] Hayes, *Stima*, 374.
[855] Hayes, *Stima*, 332-33.

Along with its increasing importance as a funding body for infrastructure projects in the "developing world," the World Bank also became a new factor in the complex set of relationships between Britain and its colonies in Africa. This became apparent in the dispute between the British government and EAP&L concerning the development of hydroelectric resources in Kenya in the late 1950s. In his opposition against the import of electricity from Uganda, an arrangement that enjoyed support from the British government, Don Small of EAP&L called for expansion of Kenya's own hydroelectricity generation.[856] With backing from the Kenyan government, EAP&L approached the World Bank to obtain financial assistance for the construction of a hydropower plant at "Seven Forks" at the Tana River, close to Nairobi, in 1959.[857] By that time, however, industrial planning for East Africa was moving to a regional scale. An industrial planning board of the East African High Commission aimed at distributing new industries more equally among the three territories and the World Bank drew up comprehensive development plans for the region that showed little consideration for the political intricacies on the ground. The report of a World Bank mission on East Africa from 1962 baldly stated: "We cannot see the justification for proceeding with the Seven Forks scheme at this stage."[858] Instead it suggested negotiating an increase of electricity imports from Uganda. As will be shown in the next part, the entry of international development aid and finance became a determining factor for the electrification of East Africa in the 1960s.

Most of the historiography on Africa during late colonial rule has looked at colonial development policy through the lens of the grandiose attempts at economic and social engineering, motivated by what Scott has termed "high modernism."[859] In *Seeing like a State*, he wrote that

> Colonial regimes, particularly late colonial regimes, have often been sites of extensive experiments in social engineering. An ideology of "welfare colonialism" combined with the authoritarian power inherent in colonial rule have encouraged ambitious schemes to remake native societies.[860]

The analysis of electrification in East Africa during the two post-war decades in this part of the thesis helps to unpack and critically assess some of the assumptions underlying this

[856] Hayes, *Stima*, 334.
[857] See correspondence in BNA CO 822/1410.
[858] Cited in Hayes, *Stima*, 338.
[859] Hodge and Hödl, "Introduction," 15.
[860] Scott, *Seeing like a State*, 97.

characterisation of late colonial rule. Referring to primarily agricultural schemes, Scott explains that "[b]eginning during World War II and especially after it, the British in East Africa turned to planning large-scale development projects and mobilizing the required labor."[861]

Taking into account the "nearly mythical appeal" electricity had for high-modernist visions from the Soviet Union to the United States, the somewhat reluctant electrification policy in Kenya or Tanganyika – the site of the gigantic Groundnut Scheme – seems surprising.[862] As has been shown, the intervention of the colonial governments in the electricity sector was largely confined to the mundane and often unsuccessful struggles for lower tariffs, more inclusive and expansionist electrification policy or minor regulatory issues. Regarding electricity, many colonial governments still lacked funding and authority to impose their own agenda, especially as electricity concerned the most influential strata of colonial societies.

Certainly, as has been shown, East Africa's electricity landscape had its own grandiose state-led engineering projects in the post-war years – the Owen Falls dam in Uganda bears witness to the fact that "British colonialists were the most ardent dam builders outside Europe and North America."[863] Its final price tag of £21 million puts it nearly into the same category of large scale projects as the ill-fated Groundnut Scheme in Tanganyika, which finally cost £37 million in direct project funds.[864] As contemporary observers in the Colonial Office noted, the aspirations of the planners and engineers behind the project, most notably Charles Westlake, resembled an unwavering faith in the power of planning economic development as an inherent component of "high modernism". Moreover, the project stood for a paradigm change in electrification policy towards build-ahead-of-demand-strategy in "developing countries" – a strategy which sustained even amid the issues regarding building up markets in its first years of operation. In 1957, a report by a group of international development consultants recommended not only a new second dam at Bujagali Falls, but also two additional dams downstream from Bujagali.[865] As Gore writes, the report's recommendations were based on "trickle-down theory of economic development," assuming that African's would profit not

---

[861] Scott, *Seeing like a State*, 225.
[862] Compare, for example, Lenin's famous quote that "Communism is Soviet Power plus the Electrification of the whole countryside." For an analysis of the reasons for electricity's appeal to high modernists, see Scott, *Seeing like a State*, 166.
[863] McCully, *Silenced Rivers*, 18.
[864] Matteo Rizzo, "What Was Left of the Groundnut Scheme? Development Disaster and Labour Market in Southern Tanganyika 1946-1952," *Journal of Agrarian Change* 6 (2006), 208.
[865] Economist Intelligence Unit, *Power in Uganda. 1957-1970. A study of economic growth prospects for Uganda with special reference to the potential demand for electricity* (London: Economist Intelligence Unit Ltd, 1957), cited in Gore, "Electricity and privatisation," 369.

directly as users of electricity but indirectly through the industrialisation and wage labour that the projects were supposed to bring.[866] Owen Fall became one of the most cited cases in the emerging discipline of development economics, as will be shown.

Yet, the projects can neither be regarded as exemplary for the great disasters caused by high-modernism ideology nor as a typical case of the sweeping visions for river basin development that came to be regarded as one of the prime instruments for development in Africa. Even though the planners overestimated the demand for electricity and, thus, turned the project initially into a financial failure, the dam's impact on social and natural environment remained comparatively modest. The specific characteristics of the dam site at the outflow of Lake Victoria, which already formed a gigantic reservoir, made it possible to design the dam to generate hydroelectric power without disrupting the natural flow of water from the lake. Hence, the project could circumvent the most pernicious effects of large-dam construction in Africa, such as large-scale displacement or generation shortfalls in times of drought.[867] Moreover, unlike its model, the TVA, the Owen Falls scheme was designed primarily as part of a broader vision of developing an entire river basin but had a narrow focus of supplying electricity to the "dollar earning" and "dollar saving" industries.[868] If later hydropower projects in East Africa were about "transplanting the TVA," as Hoag and Öhman claimed for the Great Ruaha and Stiegler's Gorge projects in post-independence Tanzania, Owen Falls was rather about "translating the TVA" to the demands of British post-war reconstruction. [869]

In fact, the breakthrough of the ideology of river basin development in East Africa was closely associated with the entry of international development aid in Tanganyika in the 1950s. In 1952, Governor Twining approached the newly formed Food and Agriculture Organization of the United Nations to request support for a survey of the Rufiji Basin. Covering 68,500 square miles, approximately one fifth of Tanganyika's total area, the river basin inspired colonial planners' visions for some time, but a detailed survey exceeded the capacity of the colonial administration.[870] The FAO Rufiji Basin Survey became the largest survey of its kind in Tanganyika. According to Hoag and Öhman, it signified a transition from "colonial

[866] Gore, "Electricity and privatisation," 371.
[867] This has changed, however, after completion of the Kiira hydroelectric power complex in Jinja in 2002, which created a second outlet at a lower gradient than the natural barrier. The drought in 2006 reduced both dams' capacity for hydropower generation. See Tony Akaki, *Mabira Forest Giveaway: A Path to Degenerative Development* (Bloomington, IN: iUniverse, 2011), 32.
[868] White, "Reconstructing Europe," 214.
[869] Hoag, "Transplanting the TVA."
[870] Hoag, "Designing the Delta," 91.

science" to "development science"[871]: The corps of Western-trained engineers, surveyors, hydrologists, and agronomists that led the exploration of the basin used modern scientific methods, but, unlike the advisors to the British colonial administration had very little specific knowledge of the local environment they were studying.[872] While the focus of the survey was on agricultural development, the possibility of hydropower generation was included later as a possible ancillary use of storage dams for irrigation and flood control.[873] Still, as will be shown in the next part, the report of the FAO survey, which was completed in 1961, would not only define the development agenda of the Lower Rufiji Basin, it would also impact on the country's electrification for decades to come.

In this part, I have traced the electrification of East Africa under late British colonial rule in the 1940s and 1950s, a phase that was characterised by a profound shift in the meaning and content of the term development.[874] Britain's commitment to "Colonial Development and Welfare" was irreconcilable with the exclusive electricity supply to European and Asian enclaves. Moreover, the intellectual roots of electricity as an instrument for state-led development can arguably be situated in the Fabian colonial development offensive during the immediate post-war years. As in Europe, colonial governments set out to "domesticate" electricity, namely to intervene in its provision and align it with their development policy.[875] As my accounts show, this endeavour was largely incompatible with the condition of the late colonial state, its limited authority and legitimacy, its internal and external tensions and its obligations towards and dependency on the colonial metropole. In Kenya and Tanganyika, colonial governments struggled to enforce their ideas of systematic and coordinated expansion against the shareholder interests from Britain and the local private sector lobbies, which had maintained their strong influence in the two territories. The attempts to set up institutions for regulation and customer participation remained insignificant.

Britain continued to regard the colonies as integral parts of its economy. When Uganda, in contrast to its neighbours, nationalised its young and minuscule power sector and embarked on a large hydropower scheme in the late 1940s, this state intervention was not motivated by the idea of improving and extending service provision in the colony. Its underlying rationale was Britain's requirement on the colonies to contribute to the metropole's post-war reconstruction. Hence, the design of the first interconnected electricity grid in East Africa,

---

[871] Öhman, "Taming Exotic Beauties," 251.
[872] Hoag, "Designing the Delta," 89-128,
[873] Öhman, "Taming Exotic Beauties," 259; Havnevik, *Tanzania*, 266.
[874] Hodge and Hödl, "Introduction," 24.
[875] See Hausman et. al., *Global Electrification*, 233-61.

which was rolled out over Uganda during the 1950s and reached Kenya at the end of the decade, was a materialisation of metropolitan interests rather than the result of local system building in the Hughesian understanding. Even though colonial administrators started to discuss electricity service for those "Africans" who could be integrated into the capitalist system of production as wage labourers or who worked for the state, the state's attempts to facilitate the electrification of its African population majority remained, at best, half-hearted. The first electrification schemes for rural "Africans" were motivated by the need to develop markets for the surplus electricity from the large hydropower plants but remained ineffective and insignificant – not least because utilities were unable to find ways to "connect" Africans technically, legally and economically to their modes of provision. Legitimising colonial rule by improving living conditions in the colonies while at the same time exploiting colonial resources for the metropole – regarding electricity, this aspiration of late colonial governments produced inherent contradictions that proved to be irresolvable until the formal end of colonialism in East Africa.

Part III: Measuring progress in megawatts – Electricity supply in post-independence East Africa, 1964-1970

"Kupanga ni Kuchagua"- "planning is choosing". These words became a topos in the speeches of the charismatic leader of the young nation of Tanzania, Julius Nyerere. Considering the modest human and financial resources available for modernising the country's economy, Nyerere didn't become tired of emphasising that Tanzania would have to make choices. Yet, some of the choices made seem astonishing in retrospective: In a press release from 14th December 1970, the World Bank announced its decision to finance the "largest electric power project ever to be undertaken" in Tanzania. Together with Sweden, the World Bank would provide an equivalent of $43 million in financial assistance for the Great Ruaha Power Project, a large hydropower scheme that would add 200 MW until 1980 to Tanzania's existing generation capacity of around 80 MW. A 300 km long high-tension transmission line would take the electricity straight to a control centre in Dar es Salaam, where it would be further distributed.[876]

Considering Nyerere's state ideology of "African socialism", which propagated a development policy based on rural productivity increase, however, it is worth noting what the project was *not* supposed to do. None of the rural villages along the transmission line would be electrified. Apart from hydroelectricity generation, the reservoir created by a dam that was

[876] Öhman, "Taming Exotic Beauties," 133.

planned to be build further upstream at Mtera at a later stage of the project would be of little or no use for fisheries, for settlement or for watering animals, stock or game, as A. Buchanan, a British senior executive engineer at the Tanzanian Ministry of Water Development and Power warned in 1971. The dam would neither be able to contain large floods nor would the water from the reservoir be used for irrigation of agricultural land. On the contrary, the dam would flood 600 km^2 of fertile land.[877] In the long run, Buchanan predicted, extreme evaporation of the reservoir would even diminish the dam's capacity for electricity production.[878] Warnings, such as those expressed by Buchanan, fell on deaf ears among all the other parties involved in the project – SIDA, the Swedish development aid agency, the World Bank, and the Tanzanian government.[879] After all, the decision in favour of the large dam signalled the departure from Tanzania's 50-year-long dependency on British capital and know-how for its economic development – personified by Buchanan – to a new era of state-led development and international development cooperation.

For Tanganyika, the 1960s had started with a bang. The unexpectedly quick but peaceful stride into formal independence in 1961, as was clear, would profoundly impact on the way infrastructure services were to be provided in the future. More than ever, electricity would be required as a motive power for the establishment of a secondary industry in a country that was nearly completely dependent on smallholder agriculture. Yet, as Williams and Dubash write in regard to the post-colonial developing countries of Asia, electricity "was more than a practical necessity of industrialization. It also played an important role in national ideology, symbolizing a new type of social compact between state and citizen."[880] Electricity, as was shown earlier, represented the "good" urban life of Europeans and Asians, which the vast majority of Africans had been denied for more than half a century. Although the provision of electricity services was certainly not a prime concern of the young nation's government, it was bound to become a long-term claim of citizens and a potential source of discontent. As was shown in the first part, the efficient delivery of services, including electricity, was a key rationale of the African Socialists' ambitious social engineering visions, which resulted in the large-scale villagisation programme of the early 1970s.

Still, political independence did not cause a clear break or even a major rupture in the Tanganyikan power sector. It rather catalysed several more long-term processes that had

[877] Cited in Öhman, "Taming Exotic Beauties," 223.
[878] Öhman, "Taming Exotic Beauties," 226.
[879] Öhman, "Taming Exotic Beauties," 224.
[880] James H. Williams and Navroz K. Dubash, "Asian Electricity Reform in Historical Perspective," *Pacific Affairs* 77 (2004), 412.

started after World War II: the increasing state intervention in electricity, the cold war rivalries and the rise of international development organisations and banks, in particular the World Bank, and their growing engagement in infrastructure financing. The third part of this thesis aims at unpacking the profound changes of the electricity infrastructure that took place in Tanzania during the 1960s and situating them within these long-term processes. It traces the continuities and discontinuities at the different levels of electricity provision during the transition from the private, London-controlled "small scale luxury industry" of the late colonial period to a state utility industry that – supported by international know-how – was to become a key agent for economic modernisation and social advancement.

While political independence soon sparked new configurations in the Tanzanian power sector, it did not imply a sudden break of the ties with Britain. As was shown in the last part, the growing inside and outside pressures in the 1950s had led the colonial government to intensify its half-hearted attempts of consolidating and expanding electricity infrastructures. Ironically, at the time of political independence, British metropolitan spending on electricity infrastructures in Tanganyika was at its peak. In the early 1960s, the Colonial Development Corporation and the Commonwealth Relations Office (CRO) provided a total of nearly £4 million in loans for two hydroelectric projects in Tanganyika. The correspondence on the two projects shows, how the colonial development agencies, the Colonial Office and the CRO, and the engineering companies worked together to maintain a foothold for the British industry in the East African power sector after independence and contain the influence of international organisations like the World Bank.

The early 1960s can therefore be regarded a transitory period, in which Britain maintained its high level of influence. "In the early post-colonial period, the policy of modernisation was strongly associated with continued dependence on the colonial power, Great Britain, both for civil manpower and investments," Havnevik writes in his study on top-down development policy in Tanzania.[881] The inauguration ceremonies of the two hydropower dams, however, already indicate how, at a discursive level, dams increasingly became part of the self-confident vision of the young African states, harnessing their own hydropower resources for development.

Electricity was to become a key industry of what Havnevik calls the "post-colonial model" in Tanzania.[882] He identified three phases of the post-colonial model. The first phase between

[881] Havnevik, *Tanzania*, 37.
[882] Havnevik, *Tanzania*, 29.

1961 and 67 was characterised by the modernisation of the economy and consolidation of the post-colonial state. The Arusha declaration of 1967 and the following period until 1972/73 marked a shift towards a modified version of the post-colonial model, which was geared towards the provision of social services. The nationalisation of key industries in the Arusha declaration, and in the case of the electricity industry in 1964 already, was to pave the way for their Africanisation on the grand scale – the replacement of expatriate staff by African Tanzanians. The third stage, between 1973 and 1978/79, saw a strengthening of authoritarian leadership and fully-fledged statism – not least as a response to the problems in implementing the Arusha policies. This was the time of the large-scale villagisation programme presented by Scott as a prime example of high-modernist social engineering.[883] The period between 1978/79 and 1983/84, then, marked the breakdown of the post-colonial model, resulting in the deterioration of social services and economic crisis. The reduction of state intervention and the retirement of Julius Nyerere set the stage for a fundamental policy change, signified by Tanzania's commitment to the structural adjustment programmes imposed by the World Bank and IMF.[884]

The second section of this part looks at the role that electricity was to play within the post-colonial model, in particular its first phase during which the Tanganyikan government initiated a profound reform of the power sector. The section outlines the different aspects of a transition that was supposed to turn TANESCO, a subsidiary of the private EAP&L in Kenya, into a public utility and an effective instrument of the state for achieving its diverging goals; the Africanisation of state institutions both in terms of control and management; the establishment of secondary industries; the provision of social services, particularly in the rural areas; and finally, the accumulation of capital in order to finance large projects for infrastructure development. The section highlights the successes, but also inherent contradictions and limitations of this restructuring process. The accounts suggest that, at least in the first years after independence, planners and policy-makers were discussing this restructuring rather in terms of a gradual transition than in terms of radical changes – quite different from the high-modernist visions that were already dominating electricity policy in other African countries.

The two hydropower projects completed in Tanzania in the 1960s were of relatively modest size in comparison to the mega-dams of the late British colonial period in Africa, like the

[883] Scott, *Seeing like a State*, 223-261.
[884] Havnevik, *Tanzania*, 29-30.

Kariba dam at the border of today's states of Zambia and Zimbabwe, with a dam wall of 128 metres in height. When the dam was closed in 1959, it "was a technological breakthrough that confirmed Britain as major dam building nation."[885] In January 1960, the Tanganyika Standard showed a large picture of the impressive construction after it had started operations.[886] Tanzania's entry into the big dam era in the late 1960s, however, was characterised by a much different set of global relationships. While Kariba dam can be considered a prime example of what Sarah Pritchard has called a "hydroimperialism" that took place within explicit colonial relations, the two large-scale hydropower projects in Tanzania during the development aid period in the Rufiji basin can be seen as expressions of what I suggest to term "hydro-developmentalism".[887]

Hydro-developmentalism, I argue, had its origins in the convergence of lofty concepts and visions of hydropower dams, development economics and costs-benefit analyses for development projects in the early and mid 1960s. Earlier large hydropower projects in East Africa, notably the Owen Falls dam in Uganda were rooted in a transitive understanding of "developing" British colonial territories by methods of deliberate state planning. What gave rise to the large hydropower projects in the era of development, I argue, was the way dams started to "make sense" in the models of development economists, which abstracted intransitive processes of economic growth, and in the project appraisal methods of international development finance, most notably the World Bank. For this reason, hydropower construction in post-independence Tanzania needs to be tied in with a wider global discourse on development, particularly its underlying economic principles, and compared with the global knowledge base on this topic in the 1960s.

The third section first traces the career of the terms and concepts shared by planners, state officials and the consultants of international development assistance agencies working in the field of electricity in the 1960s. This career began with the transformation of economics into an abstract and formalistic science, signified by the ascent of national accounting and its key index, the Gross National Product (GNP). Especially for African countries, national accounting emphasised some economic activities but rendered others invisible, such as subsistence agriculture and all informal economic activities. Within the internationally consolidating operational framework for development aid in fields like education, health and

[885] Showers, "Electrifying Africa," 199. See also Tischler, *Light and Power*.
[886] "Kariba Dam goes into production," *Tanganyika Standard*, January 27, 1960.
[887] Sara B. Pritchard, "From Hydroimperialism to Hydrocapitalism: 'French' Hydraulics in France, North Africa, and beyond," *Social Studies of Science* 42 (2012).

others, technical abstractions came to dominate the discursive framing of problems. The tendency to aggregate and to simplify also shifted the weight of development priorities. Notably, hydro-developmentalism produced a specific form of large dams: single-purpose projects for electricity generation, as presented in the introduction of this part. As I will show, electricity's characteristics gave it an important advantage over other development goals. As Shower remarks, "electricity's mercurial form and invisible transmission facilitates its conceptualisation as a purely economic entity while obscuring fundamental environmental interactions, dependencies and consequences surrounding its production."[888]

Another important feature of large hydropower projects was their high capital-intensity, which had become a focal point in the scholarly debate on the "primum mobile" for economic growth. With the concept of "forward and backward linkage", a school of economists around Albert Hirschman challenged the orthodox planning paradigm aimed at balanced growth in the late 1950s. They suggested that induced investments into one sector could trigger an upward spiral of economic disequilibria. In the discussion on the right ingredients for industrial growth, these authors put a strong faith in the "initiatory role" of capital, which they deemed more important than local entrepreneurship and technical and managerial knowledge.[889] In fact, they believed that through the inherent technical complexity, the capital-intensive projects themselves would have a disciplinary and educational effect on the people in developing countries in regard to decision making, management as well as efficiency of labour.

The theory of unbalanced growth helped to reconcile the "high modernist" appetites for grandiose projects with traditions of economic planning, which had become quite sceptical of the "showpiece" development projects of colonial and independent governments. It enabled the proponents of these projects to frame their assessments and feasibility studies in a way that they were compatible with existing theories of economic growth. This can be illustrated by the example of the power sector. The inclusion of specific external assumptions in the costs-benefit analyses gave large, capital-intensive hydropower projects a decisive edge over technological alternatives and, thus, mobilised the large credits needed for their materialisation on favourable terms.

The international development discourse also resonated in development planning in Tanzania. Using the example of the first and second development plan for Tanzania after independence,

[888] Showers, "Electrifying Africa," 215.
[889] Albert O. Hirschman, *The Strategy of Economic Development* (New Haven: Yale University Press, 1958), 3.

I will outline the transition from the British planning paradigms of the late colonial period to those within the "post-colonial model" in Tanzania, which were rooted in a modernisation theory. The focus of these plans, however, was the modernisation of the agricultural sector, while the plan did not attach particular importance to the power sector.

As I will show in the fourth section, the breakthrough of a "hydro-developmentalism", which was narrowly focused on electricity production in Tanzania, came with the entry of new players on the "market" for development aid in the mid-1960s. The fourth section maps out the complex and multi-dimensional struggle for political and economic influence in post-independence Tanzania between different countries and its effects on the power sector. It focuses on the role of Sweden, which, after having gained a foothold in the country through rural water projects, sought to supersede Britain as Tanzania's main partner for hydropower development. The example of Swedish development assistance in Tanzania illustrates how, behind the façade of untied aid, governments, development agencies and the industry of a certain country closely collaborated to open up new export markets. With its expertise of hydropower engineering but decreasing domestic market for the technology, Sweden took particular interest in the development of Tanzania's rivers. As the different rivers offered a multitude of options for projects of different sizes and purposes, each of the international development agencies tried to get hold of its own development project.

Within the negotiations between the Tanzanian government and the international development aid agencies on the question which project to proceed with, the entry of the World Bank marked a decisive turn. While the Tanzanian government was in favour of multipurpose dams which would allow for irrigation, the World Bank had changed its preference from irrigation to hydropower generation, which was much easier to assess in monetary terms. Based on existing academic literature on the history of hydropower development in post-independence Tanzania, most notably the study by Öhman on the Great Ruaha Power Project, as well as on documents from the World Bank archive, I will trace the processes through which political preferences and ideology were translated into the technical language of "scientific" surveys, pre-investment studies or project appraisals. In doing so, I connect the contemporary discourses on hydropower and development planning with the detailed accounts on the formation of the single purpose Great Ruaha hydropower project – a project which would shape the electrification of Tanzanian for decades to come.

The fifth section, then, provides an overview of two decades of state-led electrification and international development finance in the Tanzanian power sector during the 1970s and 1980s.

This period was characterised by the nation's entry into the big dam era, which locked the electricity infrastructure into hydropower as a main generation source for decades to come. This process was paralleled by a further rise and, then, fall of a "hydro-developmentalism" that was narrowly focussed on electricity provision as a driver of industrial growth. The chapter discusses the legacies of the terms and concepts for planning and managing electrification, illustrated by abstract models for forecasts, power sector studies and development plans, which were closely tied to macro-economic indicators. These methods became the dominant paradigm, whereas the emerging "appropriate technology"-movement remained without impact in the power sector. The section shows that electrification during that period was a top-down process of expanding grids and setting up new systems in smaller rural towns. Except for a handful of showcase projects in Ujamaa villages, which only supplied electricity to a small fraction of the population, rural electrification at village level remained almost inexistent. Finally, the section explores the economic and political origins of the structural adjustment programmes in the late 1980s that set the stage for a recommercialisation of the power sector in the 1990s.

1) Writing off British power? Decolonisation, development finance and hydroelectricity in Tanganyika, 1954 – 1964

Throughout the 1950s, the negotiations on the electrification of East Africa had remained the exclusive domain of a small technical elite comprised of European-origin administrators, engineers, utility managers and advisors. The sources do not suggest that they attached much importance to the political changes that were looming in Britain's African colonies, in particular the emerging nationalist movements. The transition processes in the colonial world after World War II, which ultimately resulted in the political independence of most colonies in the early 1960s, are described with the term decolonisation. It is a problematic term as, after all, it is "a construction of historians and political scientists rather than a word in common usage among the policymakers, nationalists, and anti-colonial protesters."[890] For the case of East Africa, as for many other colonial territories, it is therefore not a suitable term to understand the motivations of the actors on both sides, the colonial administrations and local opposition movements, at least during the first post-WWII decade. Rather than preparing for the end of the Empire, reconstruction and reform was aimed at making governance more effective. These goals were joined by more short-term economic pressures, as has been shown in the previous sections.

[890] Thomas et. al., *Crises of Empire*, 3.

Yet, there is much to gain from examining both transitions in contrast – the processes behind the analytical frame called "decolonisation" and the processes of infrastructural change that took place in East Africa from the early 1960s on. Decolonisation was not a controlled process; its uncertainties, is global scale and interconnectedness, its vulnerability to contingent events and processes at different places and levels, its disruptions and changing time horizons made it not a favourable condition for the consolidation and expansion of infrastructures – a task that governments in East Africa before and after the dates of formal independence regarded as increasingly pressing. The development of electricity infrastructures, after all, relies on planning security for long-term investments and technological decisions that can produce lock-ins for decades. Nonetheless, it was the decade before and after independence in many African colonies that lay the foundation for the national electricity grids, as they exist today.

This section, therefore, takes a closer look at the continuities and discontinuities in the power sector during the transition from colonial rule to an independent African government. How did the rise of nationalism and, later, state-socialism, the withdrawal of private investment, the "racial question", the inauguration of a government with a deficit in technical know-how and experts or the growing influence of organisations that came from outside the colonial regime, like the World Bank, impact on electrification in East Africa? In reverse: What role did electricity infrastructures, especially their most prominent visual representations, the big hydropower dams, play for different actors in achieving their political goals during decolonisation? The section starts with a short digression on the political history of Tanzania, outlining the events that ultimately led to its formal independence in 1961. By example of two dam projects, the Hale and Nyumba ya Mungu schemes, both of which were planned and implemented parallel to political independence, I will show how these changes reverberated in the power sector. Amidst the uncertainty and contingency of decolonisation, British colonial administrators struggled to maintain the confidence of British investors and development corporations in Tanzania. At the same time, they staged Britain's aid, signal its continuing commitment to its former mandated territory.

The first sign of a profound political change in Tanganyika was the creation of a nationalist movement in the years 1954 and 1955. Local political movements had already been emerging out of what had remained from the Tanganyikan African Association (TAA) in the northeast of the country and in the Lake Province in the early 1950s. It was, however, only in 1954 and

1955, when leadership was forming in Dar es Salaam, that they could produce an effective nationalist movement.[891]

A key figure in this process was Julius Nyerere. Grown up and educated as an "archetypical mission boy" in the remote region of Mara at the eastern shore of Lake Tanganyika, his academic career had carried him from primary school to the renowned Tabora Government School and Makerere University in Uganda, where he became first president of the local African Association. From 1949-52 he had studied at the University of Edinburgh with a government scholarship. In Edinburgh, he had encountered the Fabian vision of gradualist socialism, joined the Fabian Colonial Bureau and developed his own ideas of connecting socialism with traditional African communal living.[892]

After his return to Tanganyika in late 1952, Nyerere resumed his political engagement.[893] In April 1953, he was elected president of the TAA and together with other activists started to reorganise the association and redefine its goals. According to its new constitution, the central aim of the TAA would be "to prepare the people of Tanganyika for self-Government and Independence, and to fight relentlessly until Tanganyika is self-governing and independent." It would seek to fight against tribalism as well as "to build up a united nationalism" and to secure elected African majorities in public bodies.[894] As in the former TAA, membership would be open to Africans only. In a territorial conference of the TAA in June 1954, the new constitution was approved and the name altered to Tanganyika African National Union. Its characteristics and its goal to ultimately usurp central control of the territory and make Tanganyika a nation state distinguished TANU from all previous political movements in Tanganyika.[895]

While Nyerere and his fellow activists were consolidating the organisation by incorporating local branches of the old TAA into the Union, it received some unexpected support from outside. When a UN mission visited Tanganyika in August 1954, it held great sympathy for the movement. In its 1955 report, the UN acknowledged that self-government could be achieved within one generation and described it as "a national movement". Its recognition by the UN gave new impetus to TANU's mission, yet independence remained a long-term goal; Nyerere envisioned a time horizon of about 20-25 years. In March 1955, Nyerere travelled to

---

[891] See Iliffe, *Modern History of Tanganyika*, 487-503 (on the north-east), 503-7 (on lake province).
[892] For an account this period of Nyerere's life, see Thomas Molony, *Nyerere: The Early Years* (London: James Currey, 2014).
[893] Iliffe, *Modern History of Tanganyika*, 508-9.
[894] Cited in Iliffe, *Modern History of Tanganyika*, 511-12.
[895] Iliffe, *Modern History of Tanganyika*, 485, 512-13.

New York to make a statement at the UN Trusteeship Council in which he stressed that Tanganyika was primarily an African country. His international recognition as a national leader increased his support at home.[896] Following a successful enrolment campaign in 1955, TANU gradually grew into a mass movement.[897] In the years from 1955 to 58, it gained support – to a varying degree – from all social groups of Tanganyikan Africans. The colonial administration attempted to challenge the TANU's political dominance among Africans by promoting the foundation of the multi-racial conservative United Tanganyika Party (UTP).[898] Another attempt to counter TANU's growing power at national level was the establishment of a *Territorial Chiefs' Convention* in 1957 – a step that had been proposed by Thomas Marealle, the paramount chief of the Chagga mentioned in the previous part. Internal divisions prevented the convention from becoming an effective political organ from the beginning. [899]

No electoral system, which would allow TANU to turn its broad support into political participation, was yet in place. This changed with the first elections to the Legislative Council in 1958. To that date, the Legislative Council, which had been opened in 1955, consisted of 10 nominated "unofficials" from each race and was therefore under government control. In 1956, however, Governor Twining announced elections in certain constituencies for 1958.[900] Having discussed the idea of boycotting the election due to its tripartite voting formula, TANU finally decided to compete and started mobilising its African supporters to register as voters.[901] Before the election, two-thirds of the voters – many more than previously expected by the government – were African. Now, TANU could not only gain the African seats but also decided to support candidates for the non-African seats.

This strategy offered the chance to assign leadership positions to those members from the Asian and European communities who either actively supported the nationalist struggle or could be useful to it. While the older Asian leaders declined, TANU reached the Asian Associations young professional men. The most prominent among them was Amir Jamal, a young businessman who had studied in India and was a fierce opponent of British rule and the old Asian establishment in Tanganyika. From the European community, the farmer Derek

[896] "Tanganyika's special status as a UN Trust Territory was a decisive factor in the timing, method and manner in which it became independent." Lohrmann, *Voices from Tanganyika,* PAGE.
[897] Iliffe, *Modern History of Tanganyika*, 517.
[898] Iliffe, *Modern History of Tanganyika*, 521-29, 542.
[899] Eckert, *Herrschen und Verwalten*, 188
[900] Iliffe, *Modern History of Tanganyika*, 555.
[901] Iliffe, *Modern History of Tanganyika*, 557.

Bryceson aligned himself with the TANU nationalists.[902] The elections of 1958/59, which were held in two stages in different parts of the country, marked a landslide victory for TANU. In the first election in September 1958, TANU and its allies won 13 of the first 15 seats. The UTP disbanded after its electoral defeat. The second election in February 1959 saw TANU winning all remaining 15 seats.[903]

The 1958 election catalysed and accelerated the political mission of the TANU. "Deliberately the British had made possible a transfer of power which by-passed the struggle over electoral formulae so common in East and Central Africa," John Iliffe summarises: "At one stroke TANU had won what might have taken a decade of negotiation and gradual advancement."[904] At the same time, several events had led Britain to reconsider its attitude towards its remaining colonial possessions and the pace of decolonisation. As Britain's trade with other industrial countries grew much faster than imperial trade, the economic benefits of retaining the colonies lost their decisive weight. The Suez-Crisis in late 1956 and early 1957 had been a harsh blow to British imperial power and had raised fears that the Soviet Union would support nationalist movements throughout the Empire unless decolonisation was accelerated.[905] Nonetheless, the British Prime Minister Harold Macmillan argued for a gradual decolonisation, focussing on only one area at a time. Independence in East Africa was still considered the process of a decade rather than a few years.[906]

In Tanganyika, the relationship between Nyerere and the government improved after Richard Turnbull succeeded Twining as Governor in 1958. In contrast to Twining, he was not committed to multi-racialism and was willing to include elected members in the new ministry. At a conference of the Colonial Office and other East African Governors in January 1959, Turnbull presented a timetable which would grant Tanganyika responsible government in 1963-64 and independence in 1970.[907] In March 1959, however, the situation in Tanganyika threatened to escalate as TANU demanded responsible government by the end of 1959 and some branches were pressing for positive action. This was more than Turnbull was willing to give. Instead, he offered the TANU leaders that five of the nine ministries would be given to the party. Nyerere and Turnbull agreed on five of TANU's more moderate and experienced representatives. Among them was Amir Jamal, who became Minister for Communications,

---

[902] Iliffe, *Modern History of Tanganyika*, 560.
[903] Iliffe, *Modern History of Tanganyika*, 561-62.
[904] Iliffe, *Modern History of Tanganyika*, 562.
[905] Iliffe, *Modern History of Tanganyika*, 563.
[906] Iliffe, *Modern History of Tanganyika*, 563.
[907] Thomas et. al., *Crises of Empire*, 92; Iliffe, *Modern History of Tanganyika*, 564.

Power and Works. Now, political responsibility for the power sector of Tanganyika was in the hands of the nationalist movement, while the capital and expertise was in British hands.[908]

Turnbull and Nyerere agreed on constitutional reforms and scheduled elections for September 1960. The question what would follow the election, however, remained to be decided in London. There, colonial policy took a new turn after the election of October 1959. Traditionally, the Conservative Party, which had continuously held office since 1951, regarded itself as guardian of Britain's imperial tradition, while the Labour party in the opposition increasingly sympathised with nationalist movements in the colonies. The large conservative majority in the 1959 election, however, brought several more liberal young politicians into parliament, who distanced themselves from the old gradualism of decolonisation politics. Ian Macleod, one of the younger conservative leaders succeeded the much-disputed Lennox Boyd in the Colonial Office. In face of the threat posed by the radicalisation of nationalist movements in Africa, he saw no time left for extensively training an efficient African bureaucracy and ensuring the protection of minorities before granting independence.[909]

Tanganyika with its well-reputed TANU movement was the first African territory to experience MacLeod's urgency. While most of Tanganyikan leaders still expected that independence was a matter of another five or ten years, Nyerere and Macleod agreed on a new schedule in London in March 1960: Responsible government would be granted in the same year, following elections which were planned for September 1960, and full independence in 1961. In the 1960 elections, TANU won all seats but one, enabling Nyerere to become chief minister and forming his first cabinet. The path to independence was now unobstructed. At a constitutional conference in March 1961, final formalities were clarified and, in agreement with MacLeod, Tanganyika achieved full independence in December 1961.[910]

The formal independence of many British colonies in Africa in the early 1960s was not only an outcome of emerging nationalist movements but also of economic and political changes in the metropole. Among historians of the Empire, the importance of economic aspects and the influence of organised business on ending the Empire remain disputed.[911] Scholars like David Fieldhouse see a clear primacy of political issues, arguing that business groups, even powerful

[908] Iliffe, *Modern History of Tanganyika,* 565.
[909] Iliffe, *Modern History of Tanganyika,* 566.
[910] Iliffe, *Modern History of Tanganyika,* 566.
[911] For an overview of the debate, see: Tignor, *Capitalism and Nationalism,* 10-18.

multinationals, were never more than subordinate actors to the political elites.[912] In contrast, a second group of historians has argued that British business entities and British large-scale capital were of decisive importance throughout the period of decolonisation. Some of them, like Cain and Hopkins, stress the role of the financial and service branches as the truly dynamic sectors of British capital. During the nineteenth century, an effective and expansive gentlemanly capitalism had emerged in Britain, which enjoyed prosperity in the interwar years of the twentieth century. Favouring Empire down to the post-war reconstruction of Britain, this group of capitalists withdrew from Africa and Asia and conceded independence when the Empire offered fewer economic inducements than investments in other parts of the world.[913]

In the case of Tanganyika, this chapter can draw some tentative conclusions about the role of large-scale organised capital. First, it is important to consider not only the geographical redirection of British capital – from the Empire to the rest of the world – but also the shift of capital flows between different sectors. For a long time, investments into infrastructures in the colonies had been considered one of the safest and most profitable investment opportunities. As the late colonial governments increasingly sought to control utilities, however, investors channelled their money into natural resources and secondary industry.

Tanganyika had undergone a peaceful transition to political independence in the course of roughly three years only – much shorter than almost any observer would have predicted in the mid-1950s. Unsurprisingly, the pace of political change created uncertainties and disrupted financial flows in a power sector that was still largely dependent on private capital from London. On the other hand, independence re-politicised electricity provision in Tanganyika in a way that was not all bad for infrastructure development in the young nation: Despite all political uncertainties for Britain, independence presented an opportunity to maintain or even strengthen economic relationships while being relieved of its financial obligations towards the former UN trust territory. At the same time, it was clear that in order to maintain its privileges in the former colonies, Britain would have to enter competition for political and economic influence with other European and North American countries and, even worse, with their ideological rivals on the other side of the iron curtain. Britain was under pressure to act.

---

[912] David Kenneth Fieldhouse, *Black Africa, 1945-80: Economic Decolonization & Arrested Development* (London: Allen & Unwin, 1986).

[913] Cain and Hopkins, *British Imperialism: Crisis and Deconstruction*, cited in Tignor, *Capitalism and Nationalism*, 12. He comments that "such a thoroughly rationalized an economistic view must, of course, arouse suspicion."

The large generation projects in the Tanganyikan power sector, which had been under consideration since the mid-1950s, presented a welcome opportunity to showcase Britain's commitment to its former mandated territory beyond independence. The projects were supposed to make a powerful argument against the calls for state socialism, which were growing louder with the TANU movement. An alliance between British colonial policy, development finance and private sector ensured that Britain's electro-technical industry would maintain its foothold in Africa. They rejected, for example, the option of approaching the World Bank for financing to avoid international tendering for engineering contracts. Yet, the Hale and Nyumba ya Mungu hydropower projects had little in common with the high-modernist mega-engineering projects that were being built in other parts of the disintegrating Empire, like the Akosombo Dam in Ghana. The underlying rationale was not a "building-ahead-of-demand" strategy but a fairly low-risk investment strategy for medium-sized generating stations addressing a demand that was relatively easy to project.

During the 1950s, electricity demand in Tanganyika steadily increased due to a boom in cash-crop production and Dar es Salaam's rapid growth.[914] Even though the capacity installed had risen by 200% from 1950 to 1962, and the number of units generated had risen by 585%, the demand for electricity was projected to exceed the supply by the mid 1960s.[915] At the core of the plans for the future electricity infrastructure in Tanganyika was the construction of a second hydropower station at the Pangani River. Earlier studies had identified the Hale Falls as a promising site, where a small hydro-electric station to supply a sisal factory at the bank of the river had already been constructed during German colonial rule. This station was only utilising a small part of the available potential.[916] From 1953 on, planners from EAP&L and colonial advisors had been discussing the potential of building a larger hydropower station there and the option of connecting it through a long-distance transmission line to Dar es Salaam to replace the thermal stations there.[917] At a time of steadily increasing oil prices, this project would make electricity supply in the capital much more cost-effective in the long run. Balfour&Beatty and Power Securities Company prepared a £5 million proposal for the project, which was supposed to be partially financed through a tariff increase. The Tanganyikan government countered with an offer to provide an interest-free loan for the £2 million needed for the transmission line to Dar es Salaam. In 1957, during negotiations,

[914] Iliffe, *Modern History of Tanganyika*, 454.
[915] Von Massow, *Industrialisierungsmöglichkeiten*, 94.
[916] Richards, *Hydro-Electric Resources*, 22.
[917] Press Release, issued by Tanganyika Information Services, May 11, 1961, BNA CO 822/2572 Tanganyika Development Plan 1955-60 (Electricity), see also Egerton, *Electricity Supplies in Tanganyika*, 2.

however, it withdrew its offer for budgetary reasons. TANESCO therefore had to invest into two thermal stations to meet the increasing demand in Dar es Salaam.[918]

Although negotiations were put to a halt, it was clear to both sides that the Hale Falls hydropower station remained the major investment project for the electricity sector. When, in 1959, the Tanganyikan government changed the water rights at Pangani, allowing the use of more water for hydropower generation, Power Securities Company reassessed the scheme. The higher allowance of water would make it possible to install a higher generation capacity. A new round of negotiations started. The correspondence related to the financing of the project illustrates how the dawning independence of Tanganyika reconfigured the relationship between the private sector, the Tanganyikan government and the Colonial Office in London.

TANESCO found itself in a predicament: On the one hand, the company was reluctant to approach the British development finance corporation as their involvement would invariably come along with greater public control of the company. In fact, for some time already, officials in the Colonial Office and the Tanganyikan government had been discussing "how TANESCO can be persuaded or forced into accepting outside financial aid."[919] On the other hand, any plans to raise private capital by issuing shares at the London financial market were deemed to fail in a climate of uncertainty about the political future of most African territories.

Private sector managers were following the debates in the Legislative Council. Citing statements or intimations of the council's African members which - in their view - would shake private investors' "complete confidence in the future of the territory," they called for institutional safeguards for them.[920] A guarantee from the British government for the capital invested in Tanganyika was, however, a demand which could not be fulfilled. After all, it would no longer be responsible for the territory once the latter had become independent.[921] Meanwhile, the Colonial Office and the Tanganyikan government were losing patience: Either TANESCO would undertake the investment for the Hale project itself, by getting financing from the development corporations, or it would have to retreat from its concession.[922] Pressured by the government, TANESCO entered into negotiations with the

[918] Hayes, *Stima*, 326.
[919] "Pangani Development General Picture as at December 1959," memo April 17, 1959, BNA CO 822/2572.
[920] Notice of a Meeting held in the Office of the Minister for Finance on Saturday 15th August 1959, BNA CO 822/2572; Don Small asked for example, what would happen to European Civil Servants after independence, see "Notice of a Meeting at 9:15 am on 5th December 1959," note, BNA CO 822/2571.
[921] Colonial Office to Robert Renwick, Power Securities Company, January 1960, BNA CO 822/2571.
[922] B.E. Rolfe, January 8, 1960; see also, "Note of a Meeting in Gorrell Barnes' Room at 11a.m. on the 25th March 1960," note, BNA CO 822/2571.

C.D.C. and C.D.F.C.[923] In January 1960, the new Tanganyikan Finance Minister, Sir Ernest Vasey travelled to the United Kingdom to facilitate the negotiations.

London was still the place where major decisions on the future of electricity supply in Tanganyika were made. The negotiations between the Colonial Office, the development corporations (C.D.C. and C.D.F.C.) and Power Securities Company, the main shareholder of E.A.P.L. and TANESCO, demonstrate the interplay between colonial and business interests. Industrialists like Sir Robert Renwick, member of the board of directors of P.S.C., embodied the close connection between the industry and public sector in Britain. He had been head of British electric utilities, such as County of London Electric. During World War II, he had additionally held some important public offices. After the war, the Labour Government nationalised all electric utilities, including Renwick's power companies. As board member of C.D.C., however, Renwick continued to lobby for British industrial interests. Consequently, when Vasey proposed to approach the World Bank for funding, he rejected the proposal on the grounds that it would have the "drawback of attracting German and Italian firms, particularly the former on their old and familiar fields of Tanganyika, to enter the lists to the disadvantage of British competitors."[924]

When Vasey returned to Tanganyika he confidently announced that the £5 million power scheme was "a step nearer", as the newspapers titled.[925] The British development finance corporations, however, had a different view on the matter: When the Hale scheme was discussed at the C.D.F.C. board, some of its members "took the line that East Africa was a complete write-off, and that nobody could reasonably expect private enterprise to put any further capital into that part of the world," as an official from the colonial office disgruntledly reported.[926] Towards the Colonial Office, the C.D.F.C. emphasised that, "like any other commercial entity, [it] must view its investments from the background of the normal commercial risks, without emotion. In this connection it seemed to us that it would be folly to assume that serious commercial risks did not exist in the territory concerned."[927] The Colonial Office was not at all pleased with the rejection. The officials felt that the British interests in East Africa and the markets for the British industry, "are bound to depend to some degree at any rate on the extent to which we keep our nerve and show faith during the difficult times,"

---

[923] Galsworthy to Webber, March 8, 1960, BNA CO 822/2571.
[924] INAAS to Webber, Galsworthy, March 1, 1960; Renwick to Colonial Office, March 21, 1960, BNA CO 822/2571. Vasey later started a career at the World Bank, see Waithaka Wanjiru and Majeni Evans, *A Profile of Kenyan Entrepreneurs* (Nairobi: East African Educational Publishers, 2014), 26-27.
[925] "5m. power scheme a step nearer", *Tanganyika Standard*, January 27, 1960, BNA CO 822/2571.
[926] Galsworthy to Gorell Barnes, May 18, 1960, BNA CO 822/2571.
[927] CDFC to Perth, May 26, 1960, BNA CO 822/2571.

as deputy Under Secretary Gorell Barnes put it, adding his opinion that "it will be a great pity if a country like Tanganyika is given the impression that private enterprise in the country has no faith in its future."[928]

In fact, the political debates in Tanganyika gave reason to assume that the electricity sector would be reorganised after independence. In a budget debate in the legislative council in May 1960, some African members, among them Paul Bomani, raised the question of nationalisation. In his rebuttal, Earnest Vasey, the Minister of Finance, put forward the "sad realities of finance," arguing that the "available resources of Tanganyika can be better employed in the things which it cannot get private enterprise to do" and the territory therefore couldn't afford scaring away private capital. Assuring the council that "in the City of London today of all the places up and down this run of Africa Tanganyika has the fairest name, Tanganyika is the place where an atmosphere of political and progressive stability is being established," he pointed out that it would take some time for the new government after independence to gain the trust of the financial markets.[929] For the moment, Vasey's argument convinced the T.A.N.U. party to refrain from their nationalisation demands, but still they were pressing for more government participation in TANESCO.[930]

The efforts in Tanganyika to maintain investors' confidence in the country were, however, thwarted by political unrest in other parts of the continent, in South Africa, Congo and in Kenya. The chairmen of the insurance companies in London signalled that not even a small part of the capital needed could be raised at the financial markets. In summer 1960, the Tanganyikan government also gave up its plan to apply for funding at the World Bank, fearing that the long process for international tendering would further delay the start of the project.[931] In addition, TANESCO had continued to insist that British firms could do the job much better.[932] After a successful budget year 1959/60, which had ended with a surplus, the Tanganyikan government decided to invest itself £1.75 million into the project, which would be converted into equity capital at par at the end of five years.[933] This could already be seen as the first step towards nationalisation. For the remaining £3 million, funding could finally be secured from the Colonial Development Corporation, which also secured an option to be

[928] Barnes to Hoar, May 20, 1960, BNA CO 822/2571.
[929] Proceedings of the Legislative Council, Thirty-Fifth Session, Third Meeting, Extract from Reply by the Minister of Finance, 18th May, 1960. BNA CO 852/844/1.
[930] W.L.G.B. to Galsworthy, September 20, 1960, BNA CO 822/2571.
[931] W.L.G.B. to Galsworthy, September 20, 1960, BNA CO 822/2571.
[932] Brook, TANESCO to Barnes, Colonial Office, July 19, 1960, BNA CO 822/2571.
[933] "Work on £4¼ million Hale hydro-electric project to begin next month," press release by Tanganyika Information Services, May 11, 1961, 2, BNA CO 822/2572.

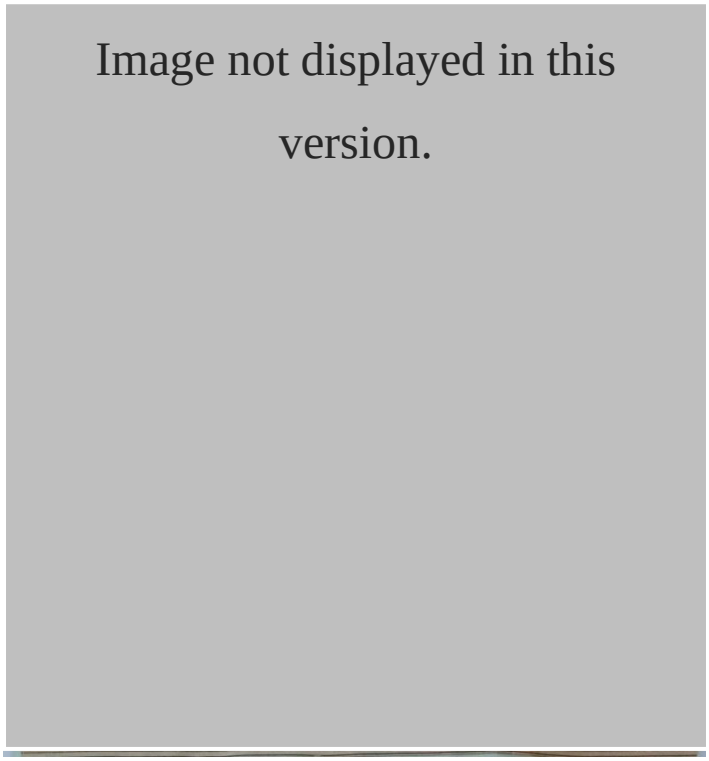
repaid in company shares.[934] The way was now open for what the Tanganyika Information Service heralded as "Tanganyika's biggest single development project to date."[935]

The press work for the project was part of a broader publicity strategy by the Colonial Office to highlight the benefits of British colonial rule. At occasions like the Overseas Publicity Conference in 1951, the information services discussed how to best promote the British development projects abroad, for example the Owen Falls dam.[936] During the construction phase of the dam, administrators were requested to send photos documenting the progress of the project in regular intervals for international distribution.[937] In Tanganyika, the colonial administration's press work for the Hale Falls project also did not miss its target. In mid-October 1960, the Tanganyikan Sunday News published an enthusiastic article with details on the Hale scheme titled "Power – Keynote of our future."[938]

The article on the "power house for Tanganyika" was illustrated with a collage of three photos, one showing an idyllic panorama of the Pangani River, the second the control room of a hydropower plant and the third the outlet of a dam from which the water flows out with high pressure – clearly an archive picture showing the outflow of a different dam. The captions of the three pictures read "before", "between", "after". The tripartite arrangement condensed the complexity of hydropower construction into a simple development narrative. The Hale hydropower plant would transform the waters of the Pangani River, leisurely flowing to waste into the Indian Ocean, into an energetic modernisation force. The photo in the middle depicted the control board of the dams, where this transformation process was to be controlled. In the picture, an African technician is operating the control board in a kneeling position, obviously under supervision of a European engineer who is holding a notebook. Under guidance of European experts, the picture seemed to suggest, Africans would be able to discipline and control the territory's rivers in the name of economic modernisation. At the same time, the newspaper page contained two large sub-headlines, obviously directed to the business-minded, European-origin readership of the English-language newspaper, promising that the "Sisal estates will benefit" and, despite the focus on hydropower, "oil supplies will be guaranteed."[939]

---

[934] Hayes, *Stima*, 328.
[935] Press release by Tanganyika Information Services, May 11, 1961, BNA CO 822/2572.
[936] See the respective correspondence in, BNA CO 875/49/4.
[937] Croft, Central Office of Information to Evans Information Department, Colonial Office, November 22, 1949, BNA CO 875/49/4.
[938] "Power – Keynote of our future. Hale Scheme – First Details," *Tanganyika Sunday News*, October 13, 1960, BNA CO 822/2572.
[939] Ibid.



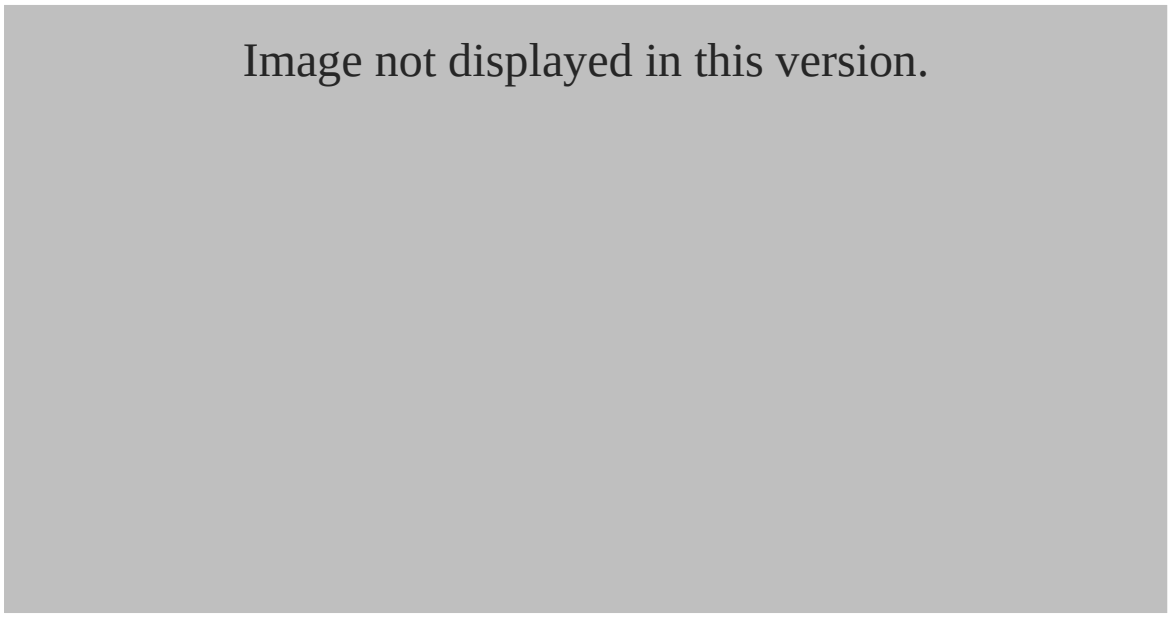


Figure 10. "Power – Keynote of our future. Hale Scheme – First Details." Newspaper article in the *Tanganyika Sunday News* of October 13, 1960.

In late October, the scheme was reported to be "tied up."[940] About a year later, in September 1961, Minister for Power and Communication Amir Jamal signed the construction

[940] "Hale Scheme 'tied up'," *Tanganyika Sunday News*, October 30, 1960, BNA CO 822/2572.

agreement.[941] The construction was carried out by the British Balfour&Beatty. It was an exceptional constellation as a British visitor remarked in 1964 – already after the nationalization of TANESCO – in a conversation with the utility's regional manager on the Hale project: "I asked whether it was not unusual for them to have been both consultants and main contractors for Hale. He explained that as they had in fact owned TANESCO before Government took it over, they had been consultants, contractors, buying agents and design experts for all TANESCO projects!"[942] During 1963, the 132 kV Hale-Dar es Salaam transmission line became operational.[943] With a delay of a few months due to a faulty generator, the Hale station was commissioned in 1965.[944]

Lately, the inauguration ceremonies of large-scale technological projects are receiving increasing attention in the history of technology.[945] As a first insight into his ongoing dissertation research on the role of dam projects in nation-(re-)building in Egypt, Spain and the US, Benjamin Brendel states that "inauguration ceremonies of Dams functioned as stage plays in which the political leaders personalized the dams and linked themselves with a 'modern' conception of the Future [*sic*]."[946] The story of the Hale power plant provides a striking example of the role of large dams in the symbolic construction of "modern" nations. In fact, the project perfectly exemplifies the dependencies on the former colonial rulers. It was financed by British development banks and built by British Balfour and Beatty, which had taken the role as projects consultants and contractors for the project as well as contracted managers of the parent company that had owned TANESCO. Yet, in his speech at the commissioning ceremony, Julius Nyerere reframed the dam's symbolic meaning, turning it into an emblem of his nation-building project:

> Schemes such as this one are in fact the bricks and mortar evidence of the revolution which our country is deliberately and purposefully undergoing. It represents the application of science to the needs of the people. And it does this in such a way that our whole country takes further steps out of the poverty which now imprisons it. For

---

[941] Hayes, *Stima,* 328; von Massow, *Industrialisierungsmöglichkeiten*, 95; Jamal later became Minister of Finance.
[942] "Notes on a Safari to Tanga and Nyumbuya Mungu Dam by the High Commissioner and Mrs. Fowler, 10th to 13th September 1964," September 14, 1964, 3, BNA DO 185/35.
[943] Hayes, *Stima*, 328.
[944] "Notes on a Safari," 3.
[945] See panel titled **"**Opening the Future. The Inauguration Ceremonies of Large-scale Technological Projects" at the European Social Science History Conference 2016, in Valencia, Spain, accessed March 21, 2017, https://esshc.socialhistory.org/esshc-user/programme/2016?day=53&time=134&session=3061&network=371.
[946] Ibid.

> this hydro-electric station is an example of the combination of brains, scientific knowledge, sweat and discipline which will in practice transform our nation. [947]

Throughout decolonisation, hydropower dams remained projection screens for the visions and goals of different actor groups, as the example of another dam project shows, which became a prime opportunity for staging British aid and promoting the benefits of maintaining close ties with the former colonial rulers. Throughout the early 1960s, the Pangani River Basin remained the focal point for British investments in Tanganyika. But conflicts over the water of the Pangani River had been looming for some time. As described above, it had only been after receiving a higher allowance for the use of water for hydropower generation that TANESCO resumed the planning of the Hale scheme. As the installation would involve a series of underground tunnels, the hydropower plant could not be expanded gradually – the scale had to be decided once and for all. At the same time, the demand for water for irrigation in the upstream areas was growing. To maintain the flow guaranteed to TANESCO for hydropower generation, a storage dam would have to be built further upstream.[948] A suitable site had been surveyed at a place called Nymba ya Mungu.

As the 1960 World Bank survey for Tanganyika remarked, "[t]he case of the Pangani Basin illustrates the need for advance planning of the long-term development of a river basin as a whole."[949] The situation was complicated: Irrigation alone would not necessitate the construction of a large storage dam and the financial returns from irrigation, for example through irrigation fees, were not only difficult to estimate and to levy but also unlikely to suffice to repay the investment.[950] At the same time, TANESCO had made no allowances for the costs of constructing the dam as the site only offered potential for the generation of a very limited amount of electricity, about 8 MW. If the flow available for power generation at Pangani Falls was to be maintained, the dam would have had to be built at government expense. Nyumba ya Mungu became one of the first power sector development projects of the independent nation's new government. In search of funding, it approached the governments of the United States, of West Germany as well as Great Britain.[951]

---

[947] "Mwalimu Opens Hydro-Electric Plant," *News Review*, 1965, cited in Hoag, "Transplanting the TVA?", 249.
[948] International Bank Reconstruction Development, *The Economic Development of Tanganyika: Report of a Mission Organized by the International Bank for Reconstruction and Development at the Request of the Governments of Tanganyika and the United Kingdom* (Baltimore: Johns Hopkins Press, 1961), 251.
[949] International Bank Reconstruction Development, *Economic Development*, 252; Water Development and Irrigation Division, Ministry of Agriculture, December 12, 1962, BNA DO 185/35.
[950] Reynolds, to Commonwealth Relations Office, February 18, 1963, BNA DO 185/35.
[951] Stanley to Molyneux, Commonwealth Relations Office, January 25, 1963, BNA DO 185/35.

Profiting from the established colonial networks and backed by the CRO, British engineering companies were soliciting orders for their ambitious development projects from the leaders of the newly independent states. One of them was the politician-industrialist John Howard, chairman and managing director of the civil engineering contractor John Howard and Co. Ltd., which had been founded in 1927. Howard was an active member of the Conservative Party and was appointed Chairman of the National Union of Conservative and Unionist Associations in 1962.[952] When the Tanganyikan Minister of Finance, Bomani, in a meeting with Andrew Cavendish, British Minister of State at the CRO and a conservative, too, mentioned his intention to approach the British Government for a loan for the Nyumba ya Mungu project, it didn't take long until Howard followed up. In January 1963, a representative from Howard's company visited Dar es Salaam and met with three Tanganyikan ministers to discuss the project.

To win the confidence of the Tanganyika ministers, he "made considerable play with the Company's good relations with the Ghana Government," as an official from the CRO remarked internally. The company had been involved in the construction of Tema Harbour in Ghana from the late 1950s until its commissioning in 1962.[953] At the end of his stay, he wrote a letter to Bomani, asking for a three-month exclusive option for his company to prepare proposals for the construction and financing of the Nyumba ya Mungu dam. He raised the hope that the company could finance the project with credits from the London market. "My Chairman, Sir John Howard," he assured to the ministers, "is deeply interested in contributing towards the development of the new African countries."[954]

The CRO commented with approval on Howard's initiative, not only because it would positively affect the relationship to the former colony. "[A] shot in the arm of this kind by overseas private investment," an official remarked, would help to stimulate and re-assure British commercial interests in the country. Representatives of the latter were observing with concern that "there is a body of less responsible and ill-informed opinion which regards capitalism as evil and needs to be held in check lest they begin to attack existing investment here." A flow of new private investments would strengthen those ministers who were in opposition to a path towards state socialism.[955] Another CRO official concluded that it would

[952] Accessed April 26, 2017, https://en.wikipedia.org/wiki/John_Howard_%28civil_engineer%29.
[953] Not by Collings, January 30, 1963, BNA DO 185/35.
[954] Humphrey Berkeley to Minister of Finance, Bomani, January 24,1963, BNA DO 185/35.
[955] Stanley to Molyneux, Commonwealth Relations Office, January 25, 1963, BNA DO 185/35.

obviously be "politically attractive if a British company undertook a project with the local glamour of Pangani scheme."[956]

Consequently, British and Tanganyikan representatives began to negotiate the terms of the Commonwealth Assistance Loan.[957] By autumn 1963, they had reached an agreement: Tanganyika would receive a £2 million loan from the CRO for hydroelectric and road projects, about £800,000 of which was earmarked for the Nyumba ya Mungu dam.[958] The credit was clearly geared to British export promotion. The terms of the loan specified that "[t]he dam should be constructed under the supervision of a reputable British firm of consultant engineers by a British contractor or an African subsidiary of a British contractor, the contract being awarded by open competitive tender. All imported requirements must be of British origin and all constructional plant must be British."[959] In response to the publication of the tender in October 1963, seven firms with a majority British shareholding submitted their proposals, which were then screened by Tanganyikan government's consulting engineer from London, Halcrow and Partners.[960] They finally awarded the contract to Richard Costain. The company had once been one of the largest speculative housebuilders and estate developers and then moved into civil engineering. During World War II it had become a major contractor for the British military. After the war, Costain took its wartime construction expertise overseas and by the mid-1950s, it earned most of its turnover in overseas territories.[961]

The company made every attempt to highlight this international expertise and its state-of-the-art planning methods in the Tanganyikan newspapers, which covered every step of the construction of the "biggest dam in East Africa", the arrival of the supervising engineer flying in from British Guiana and of the shipment and offloading of the dam equipment.[962] In a large feature on the dam, it praised the "'nuclear' planning at Pangani" adopted by Costain. The London correspondent of the newspaper heralded that "for the first time in East Africa the

---

[956] H.D.G. Collings, January 30, 1963, BNA DO 185/35.
[957] See correspondence in BNA DO 185/35.
[958] "U.K. loan to help build new dam," *Tanganyika Standard*, October 26, 1963; Press release by British News Service, October 28, 1963. For the acceptance of the loan see Treasury, Tanganyika, March 23, BNA DO 185/35.
[959] Lamarque, East Africa Department, Commonwealth Relations Office, January 14, 1964, BNA DO 185/35.
[960] Tender in: Export Service Bulletin, October 9, 1963; Halcrow and Partners to Director, Water Development and Irrigatin Division, Tanganyika, February 12, 1964; *Tanganyika Gazette*, April 17, 1964; General notice No. 864, April 7, 1964, BNA DO 185/35; See also correspondence in BNA DO 214/77.
[961] Howe to Kennaway, March 17, 1964, BNA DO 185/35. Accessed April 26, 2017, http://www.costain.com/who-we-are/our-history/.
[962] Quote in "Biggest dam should be ready early," *East African Standard*, June 20, 1964, see also: "Engineer flies in," *Tanganyika Standard*, May 5, 1964; "Dam machinery arrives," *Tanganyika Standard*, June 27, 1964, DO 185-35, 1. "£1,000,000 dam on the Pangani will be biggest in East Africa", TheSunday News, May17, 1964, BNA DO 214/77.

programming of a major development will be governed by a critical path system." The system, he explained, "was devised by the Americans for the Polaris and other nuclear projects and is gradually being adopted by leading contractors like the £22,000,000 Costain group." It would allow the company to complete the construction ahead of schedule. The article did not forget to mention that "London is footing the bill for the dam in loans and grants."[963]

Another aspect, which representatives of Costain stressed in their interviews with the press, was the training of Africans in the project. In the *Tanganyikan Standard*, D. Newell, the company's contract manager, assured that "[t]he company puts a tremendous emphasis on its training and education policy."[964] Through training on the job, many Tanganyikans would be given the opportunity "to acquire the skills and techniques of dam building and, even more important, the operation and maintenance of heavy constructional machines."[965]

The inauguration of the construction at Nyumba ya Mungu offered a new opportunity for the British former colonial rulers to receive publicity for their aid in Tanganyika. Indeed, the British Minister of State had expressed his concern towards the Tanganyikan Minister of Finance, Paul Bomani, that the British should be "given due credit in public by the Tanganyikan authorities" for their development in the country. The British reputation in Tanganyika had recently suffered from a "recent obnoxious series of articles in 'The Nationalist,' a newspaper owned by TANU.[966] Against this background, the different observers who reported to the CRO were all the more pleased with the inauguration ceremony at the dam site, not only because of the attendance of the Tanganyikan president, Julius Nyerere, various ministers and members of the diplomatic corps; the different British officials agreed that the ceremony was particularly remarkable because of Nyerere's speech, which was almost entirely an expression of gratitude towards the British companies involved and the Government.[967] In a very emphatic and explicit way, Nyerere commented on the role of the British after the independence of the country:

I said, when we became independent we should need a period of ten years in which to do much more for the development of the country than the British were able to do in their 40 years here. One would have thought that the British would have said "Very well, we shall go

[963] „Dam builders close time gap," *Tanganyika Standard*, June 19, 1964, BNA DO 185/35.
[964] „Dam builders close time gap," *Tanganyika Standard*, June 19, 1964, BNA DO 185/35.
[965] "Biggest dam should be ready early."
[966] Walsh Atkins to Fullerton, September 22, 1964, BNA DO 214/77.
[967] Fowler to Atkins, CRO, September 16, 1964, BNA DO 185/35.

away, stay away for ten years, and at the end of that time, we shall see if you have fulfilled your promise." They have not done this. They have said: "You have made this promise and we will send you some technicians to help, and pay for them. We will also, sometimes, give you loans and grants to help you show you can do in ten years what we failed to do in 40". Nothing could be more generous.[968]

The ceremony itself was loaded with symbolic meaning. At the end of his speech, Nyerere set off a charge of explosives to inaugurate the work at the dam, producing some handsome headlines for the Tanganyikan newspapers. "Look, it worked!", *The Nationalist* quoted Nyerere in the title of its article on the ceremony.[969] The *Sunday News* chose Nyerere's quote on "generous" Britain for their headline.[970] Diplomats from the Western countries also used the opportunity for a side blow against the states of the communist bloc, which was competing for political influence in Tanganyika through own development projects. As one British observer reported, a representative of the Australian High Commission commented on the successful start of the Nyumba ya Mungu project, saying "that this was in sharp contrast to the lack of progress with the East German Housing scheme in Zanzibar."[971] In Zanzibar, the German Democratic Republic had recently started their own development project with the socialist-friendly government under Abeid Karume.[972] Experts from East Germany helped formulate an overall plan for reconstructing Zanzibar homes and constructing tall, modern blocks. As will be shown in more detail in the fourth section of this part, the power sector had become an arena for the scramble for influence and shares in the emerging "market" for development aid.

A comparison between Nyerere's speeches at the inauguration ceremony of the works at Nyumba ya Mungu in September 1964 and the commissioning ceremony of the Hale Falls in January 1965 reveals the imminent changes in the Tanzanian power sector. While his earlier speech revolved around "generous" Britain fulfilling its commitments towards its former mandated territory, the later one conveyed a picture of dam projects as emblems of the new nation's ability to harness its own rivers for its project of modernisation. The next section

---

[968] Nyerere speech at inauguration ceremony, cited from "Work start on £1 m. Dam project," *East African Standard*, September 14, 1964, BNA DO 185/35.
[969] "Look it worked! President sets off Pangani Dam scheme with bang," *The Nationalist*, September 14, 1964, BNA DO 185/35.
[970] "Explosion starts off big dam – 'generous' Britain," *Sunday News*, September 13, 1964, BNA DO 185/35.
[971] "Notes on a Safari," 1.
[972] For an overview of the relationship between the GDR and Zanzibar, see Ulrich van der Heyden and Franziska Benger, *Kalter Krieg in Ostafrika: Die Beziehungen der DDR zu Sansibar und Tansania* (Berlin: LIT, 2009).

details the attempts of the Tanzanian government to control and direct the electrification of the post-independence nation.

2) From private power companies to agents of development and social change? The nationalisation of the Tanzanian and Kenyan power sectors, 1965-66

> We shall try to get aid from both East and West; we shall be particularly anxious to get help through the United Nations when we can. It is for the same reason that we have made clear in the Plan those sectors of the economy in which we shall welcome private enterprise, those in which we shall go into partnership, and those where we feel public ownership is essential. The recent arrangements, by which the Government has taken over ownership of the Electricity supply, and Port handling, have had this objective – the form control by the people of those sectors of the economy which regulate our advance.[973]

This address by President Julius Nyerere in the Tanzania development plan for the years 1964-1969 pointed the way for a profound realignment of the government's economic policy, in particular regarding infrastructure. For reasons described at the end of the last part, the private power companies in East Africa, which were controlled by shareholder interests in London and geared at operating distributed, small-scale and highly profitable systems, were incompatible with the independent nation's ambitious plans for economic modernisation and consolidation of the post-colonial state. The companies' limitations when it came to international agreements presented a major obstacle in the search for foreign development funding. In early 1964, the newspaper *Tanganyika Standard* reported on talks between the UK and the Tanganyika Government about how to "make the company structure more attuned to present day-conditions in the country."[974] Yet, when taking over the management of the electricity utilities, the new African government of Tanzania was confronted with an almost complete lack of adequate know-how and manpower. At the time of independence, the British colonial administrators had left Tanzania with an infinitesimal pool of educated Africans able to run the country. In the 1950s, it had been very hard to get Western education outside Kilimanjaro region. In 1956, a mere 20 African students were studying for degrees, another 59 were enrolled in different non-degree courses at universities or professional institutions.[975]

---

[973] Julius Nyerere, address to *Tanganyika five-year plan for economic and social development, 1st July 1964 - 30th June, 1969*, by United Republic of Tanganyika and Zanzibar (Dar es Salaam: Government Printer, 1964), xiv.
[974] "U.K. talks on changes in TANESCO," *Tanganyika Standard*, January 3, 1964.
[975] Havnevik, *Tanzania*, 32; quote in Coulson, *Tanzania*, 90.

This section describes the attempts of Tanzania's post-independence government to turn private power companies into "African" state utilities – agents of modernisation within the framework of the "post-colonial model." This analysis faces certain limits, especially regarding the availability of sources. As I have detailed in the introduction, few written documents of the state utility and ministries were archived in the two post-independence decades. To conduct interviews with the key decision-makers of that period is impossible today, as they have passed away by now. For that reason, it is difficult to reconstruct the intricacies and tensions inherent to this kind of transition process. The few available sources, the yearbooks of TANESCO, the contemporary academic literature and the archives of international organisations, however, provide a general picture.

The establishment of political control over TANESCO, it seems, went relatively smoothly. In May 1964, the same month in which the development plan was released, the Tanganyikan government had decided on the full acquisition of TANESCO.[976] From that point on, the utility's policy was decided upon by a board of directors consisting of eight members and a chairman who had to be a high official the Ministry of Commerce and Industries.[977] After 1964, all chairmen of the utility were African Tanzanians with close relations to the TANU party.[978] This constellation put TANESCO under closer government control – more even than the UEB in neighbouring Uganda, which was formally a parastatal organisation. As the German economist Hans Amman remarked in 1969, "the UEB seems independent compared with TANESCO in Tanzania where direct Government influence is noticeable through a totally Government-controlled Board of Directors."[979]

Regarding its operations, however, continuities prevailed. Although TANESCO was "considered to be the chief executive agent of the Government power policy throughout Tanzania," it was still to be run as a commercial organisation.[980] In late 1964, a British High Commissioner, who had visited Tanganyika, reported back home that the British-dominated management of the utility had arranged well with TANESCO's first African Tanzanian chairman. In a private conversation, a British regional manager of TANESCO told him that "the government take-over of TANESCO had gone very smoothly and had produced no

[976] The shares were bought in 24 half-yearly installments, Hayes, *Stima*, PAGE.
[977] Amann, *Energy Supply and Economic Development*, 29.
[978] Öhman, "Taming Exotic Beauties," 197.
[979] Amann, *Energy Supply and Economic Development*, 29.
[980] "Its policy has been outlined in an official letter (dated 18.03.1965) from the Ministry of Industries, Mineral Resources and Power (now the Ministry of Commerce and Industries)." Cited in Hans Amann, "The role of the energy sector in an agriculture-oriented economy - the Tanzania Case study," research paper, ERB Paper 67.14, Economic Research Bureau, University College, Dar es Salaam, 1967, 6.

problems so far as he was concerned. The chairman of the board (Mr. Nsekela) was very balanced and sensible and did not interfere in the technical aspects of management."[981]

In the initial years, the options of the utility's African board were limited. While political control had been easy to establish, the Africanisation of the utility's management went slow. In 1965, there were still 63 expatriates working in the higher management and the Board appointed the British F.S. Batty as General Manager of the Company. "We are fortunate," the chairman stated in the annual report, "in having Mr. Batty's wide expertise available to us during this time of rapid development."[982] For a remarkably long time, Batty remained in this position. His assignment to TANESCO survived a diplomatic dispute between Tanzania and Britain that broke out in 1965 due to a difference of opinions regarding the political situation in Rhodesia. As a result of this dispute, the diplomatic contacts between the two countries were interrupted between December 1965 and July 1968 and Great Britain withheld its development assistance.[983] After that, the World Bank requested that no changes would be made in TANESCO's general management and made it a condition for the credit to Great Ruaha Power Project. Only as late as 1971, Batty was abruptly discharged by the TANESCO Board. His successor was an African Tanzanian and member of the TANU party.[984]

Regarding all other manager and engineer positions, the government accelerated its policy of Africanising the utility. It adopted a policy of filling vacancies, where practicable, with citizens of Tanzania and promoting existing staff to fill senior vacancies on the base of merit. In 1965, the Tanzanian government published "A guide to careers in the Ministry of Industries, Mineral Resources and Power and the Tanganyika Electric Supply Company." In its introduction, J.S. Kasambala, the Minister for Industries, Mineral Resources and Power, promised to young African Tanzanians that "[n]ow that the Government has acquired the Tanganyika Supply Company, there are also rewarding openings in that organisation for young men with some experience and the necessary academic qualifications."[985] The problem remained the limited number of graduates.

A survey on high-level manpower requirements in Tanganyika from 1963 estimated, for example, that in order to fill new vacancies and fill the gap left by expatriates leaving the

---

[981] "Notes on a Safari," 2.
[982] TANESCO, report on the year 1965, 7.
[983] Coulson, *Tanzania*, 181; Öhman, "Taming Exotic Beauties," 195.
[984] Öhman, "Taming Exotic Beauties," 197.
[985] J.S. Kasambala, Minister for Industries, Mineral Resources and Power, introduction to *A Guide to Careers in the Ministry of Industries, Mineral Resources and Power and the Tanganyika Electric Supply Company* by United Republic of Tanzania, (Dar es Salaam: Government Printer, 1965), 5-6.

country in 1962, 391 new engineers would be needed – as many as were currently working in the country in total; 373 new electricians would be needed, as compared to 463 electricians already working in the country.[986] With an output of about ten graduates per year between 1953 and 1961, the country's trading schools would not produce enough graduates to fulfil this demand.[987] In 1964 and 1965, TANESCO mainly focused on "on-the-job" training in order to staff its new branches. In 1965, it began to sponsor ten students of electrical engineering and ten of mechanical engineering at the Dar es Salaam Technical Institute.[988] In 1966, the utility stepped up its training program. The company sponsored thirty students at the Dar es Salaam Technical College and six at the University College in Nairobi. Employees were also sent overseas for training, for example to West Germany, Canada and England.[989]

The Africanisation of TANESCO's former parent company, EAP&L in Kenya, seems to have been much more conflict-laden. While the Kenyan Ministry of Power and Communication was one of the first to be Africanised, the company's directorate didn't include a single African representative in 1960.[990] Increasing tensions between EAP&L's African employees and its British management escalated in 1962. The trade unions, which represented most of EAP&L's staff, blamed the management for its discriminatory personnel management. Despite the promise of introducing a merit-based job evaluation system, unionist put forward that Africans were not being promoted into higher posts. As opposed to many government departments and private companies, which had launched Africanisation schemes, EAP&L remained a British "island."[991] Fearing to lose the investor's confidence in the company in light of the political independence imminent in Kenya, EAP&L's chairman vehemently opposed any measures – including salary increases for African staff – that would reduce the shareholders' dividends. At the same time, Small did not want to touch the salaries of the higher-level European and Indian staff, arguing that they were already earning less than they would in Britain.[992]

---

[986] George Tobias, *High-Level Manpower Requirements and Resources in Tanganyika, 1962-1967* (Dar es Salaam: Government Printer, 1963), 24.
[987] Tobias, *High-Level Manpower Requirements*, 50.
[988] Tanganyika Electric Supply Company Limited, "Directors' Report and Accounts 1964," Dar es Salaam 1965, 6; Tanganyika Electric Supply Company Limited, "Directors' Report and Accounts 1965," Dar es Salaam 1966, 6.
[989] Tanganyika Electric Supply Company Limited, "Directors' Report and Accounts 1966," Dar es Salaam 1967, 6.
[990] Hayes, *Stima*, 336-37.
[991] Hayes, *Stima*, 360.
[992] Hayes, *Stima*, 351.

In the year following its nationalisation, the Tanzanian government began tightening its grip on TANESCO. A cabinet paper of 1965 specified that it considered the utility as a "chief executive agent of the Government power policy throughout Tanzania."[993] The responsible ministry in the government in an official letter in March 1965 stated that the utility was to be operated not only as an "economically viable organisation" but also as "an agent of development" and "a social service."[994] For a while to come, some of the profits earned from its operation as a commercial company would have to be used to pay the annuity to its former shareholder, EAP&L. In addition, the utility needed to build capital for upcoming investment projects and take up responsibility for "social" electrification schemes that would not pay for themselves. Regarding these highly divergent goals, target conflicts were inevitable.

This became apparent when TANESCO introduced an extensive revision of its tariff system a year later, in 1966. As the UEB had done earlier, after taking over supplies in Uganda, TANESCO repealed the highly-diversified system of locally adapted tariffs it had been using as a private company owned by EAP&L. It reduced the complicated variety to only four national tariffs and increased the average tariff level by 23%. The tariff raise, however, was not distributed equally among the different customer groups – the increase of the domestic and commercial tariffs was higher than that of the industrial tariff. Clearly, the tariff reform was primarily shaped by the government's renewed policy of economic modernisation which will be discussed in the next section. Low electricity tariffs, as the government hoped, would induce industrialisation – a hope that was rather based on general assumptions than on detailed knowledge about the impact of electricity input costs on the output prices of different industries, as a contemporary study criticised.[995]

Ironically, the tariff increase rather aggravated than balanced regional socio-economic differences in the country, thus running contrary to the overall policy of rural development. Whereas the high-income population in the economic centre, Dar es Salaam, could absorb the tariff increases to a certain extent, the poorer wage-earners in the more up-country regions were less able to do so.[996] For the year 1966, Amann found only a negligible reduction of electricity consumption in the coastal system but considerable reductions in the up-country

[993] Cited in Amann, "The role of the energy sector," 5.
[994] Cited in Amann, "The role of the energy sector," 5. The responsible ministry was the Ministry of Industries, Mineral Resources and Power, which then became the Ministry of Commerce and Industries.
[995] Amann, "The role of the energy sector," 8-11.
[996] Amann, "The role of the energy sector," 7-8.

systems.[997] In a later study, however, he lauded the new tariff system for its simplicity and positive impacts on large industries.[998]

In 1965, the Tanzanian government also started to deliver on its promise to provide electricity as a social service in rural areas. The first schemes, however, revealed that the high obstacles for rural electrification had remained. As TANESCO was still obliged to operate commercially it did not consider installing new systems in areas that could not be supplied in a cost-covering way. The Tanzanian government therefore initially adopted a model according to which TANESCO could be required to provide a supply to specific areas and the government compensated the losses in operation.[999] With a £107,000 loan from the US government, TANESCO installed the first rural grids in Tukuyu, Singida and Musoma in 1965, which were all supplied by diesel generators.[1000] The new systems turned out to be highly-subsidised showcase projects that had been planned top-down and were unsuited to identify more cost-efficient ways of providing electricity to the rural population. The high costs for transporting diesel to the remote areas resulted in exploding operation costs. The *deficit* per kWh supplied in Tukuyu, for example, was hundred times the *profit* per kWh supplied in Dar es Salaam.[1001] Rural electrification in Tanzania "remains in a very early stage of development which must be characterized as being just a wish or hope, formulated as a consequence of a rural-production-oriented development policy of 'self-reliance'," a study on the East African power sector from 1969 concluded.[1002]

This study, titled "Energy Supply and Economic Development in East Africa", was conducted by the German economists Hans Amann. It bears witness to the fact that the power sectors in East Africa did not only attract the attention of international development organisations but also of academics, who saw it as an opportunity to apply their state-of-the-art economic knowledge. For his extensive case study, Amann collected and interpreted a large amount of data on the region's power sector. His analysis was rooted in the economic models of Jean Fourastié or Colin Clark.[1003] "In fact," the authors wrote in their synopsis, "energy consumption per capita is widely accepted as an indicator of an economy's endowment with

[997] Amann, "The role of the energy sector," 8.
[998] Amann, *Energy Supply and Economic Development*, 126-30.
[999] Interview with Maneno Katyega.
[1000] Heinrich von Massow, *Industrialisierungsmöglichkeiten*, 95-96. TANESCO, "Director's Reports and Accounts 1964," 15.
[1001] Amann, *Energy Supply and Economic Development,* 85ff.
[1002] Amann, *Energy Supply and Economic Development.*
[1003] See Amann, *Energy Supply and Economic Development,* 69.

capital goods and advanced production methods, hence as a criterion of development."[1004] The following section outlines in more detail how energy, in particular electricity, came to be seen as a key driver for economic growth in the emerging field of development economics.

3) "Hydro-developmentalism" – making sense of large dam construction in international discourses on economic growth

Between 1964-65, the German-American economist Albert Hirschman visited eleven World Bank projects, among them the Owen Falls dam in Uganda, to find the magic formula for explaining and anticipating successes and failures of development projects in general. The results of Hirschman's in-depth study were published in 1967 under the title "Development projects observed."[1005] In his conclusion, however, he formulated the sobering insight that the earlier theories of economic development had failed to derive any useful recommendations for these projects.

> Unfortunately, all of these examples seem to take us back to the agriculture-industry dichotomy or to the sort of unhelpful advice – take a big jump and become capital- or machine-tool-intensive or otherwise advanced – that we are trying to get away from. It must be admitted here that by itself the linkage concept had led me to take up similarly unhelpful advice.[1006]

This rare case of an economist's self-criticism is telling. Hirschman was one of the most renowned development economists of his time. He was the author of "The Strategy of Economic Development," published in 1958, and according to the opinion of an American economist "the most important single book in this area."[1007] Hirschman was also one of the frequently cited authors in academic studies on the power sector in East Africa.[1008]

The experience from the Owen Falls project in Uganda, also raised scepticism among other scholars about the indiscriminate faith in hydropower generation, as it had been expressed in an earlier study: "There is ample evidence that power supplies are far more than a condition sine qua non of economic development, they are, in fact, its major stimulus."[1009] However, in

---

[1004] Amann, *Energy Supply and Economic Development*, 21.
[1005] Hirschman, *Development projects observed.*
[1006] Hirschman, *Development projects observed*, 184, with reference to Hirschman, *Strategy of Economic Development*, 109-10.
[1007] Timothy King, "Development Strategy and Investment Criteria: Complementary or Competitive?" *Quarterly Journal of Economics* 80 (1966), 110, footnote 2.
[1008] E.g. in Amann, *Energy Supply and Economic Development.*
[1009] Quoted in Anthony Michael O'Connor, *An Economic Geography of East Africa* (London: Bell, 1966), 266.

a book on the economic geography of East Africa, published in 1966, A.M. O'Connor rejected this sweeping statement:

As far as East Africa is concerned this seems an exaggeration. Provision of power supplies has been of great value to the region, assisting economic development in many ways; but there is little to suggest that they have stimulated it. Similarly, they have affected the location of some activities within the region, but in these underdeveloped countries, other factors are of much greater significance.[1010]

By the time Hirschman and O'Connor published their advice for caution towards an unwavering faith in hydropower projects, it had already been fully embraced by the international development community and leaders of the post-independence African states alike. Ironically, Hirschman's earlier books had contributed to the reconciliation of mega-engineering with the emerging field of development economics, which had become a kind of "salvation promise" for post-colonial African states.

In his book on "Seeing like a state", James Scott describes "state simplifications" as an important elements of development states' large-scale social engineering. State simplifications require the manipulation of complex circumstances into simplified and aggregated data to make them "legible" to central authorities, while often missing out vital aspects of the situation. Scott's concept of the "legibility" provides a useful interpretational framework to understand how technological and scientific knowledge was linked to statecraft in the (post-) colonial development state.

As will be shown in this chapter, the aspiring discipline of development economics provided the key instruments for the post-independence African states to make their natural and social environments legible for them and to deal with the various contingencies and uncertainties of decolonisation. It became the lens through which national governments, along with international donors, looked at the expansion of electricity infrastructures in the newly independent countries; and through which concepts and theories of development economists informed the major investment decisions in the power sector.

In the last decades of the nineteenth century and the first decades of the twentieth century, economics had transformed from a science of concrete historical and institutional facts to a formalistic science of universal and abstract truths.[1011] During the "age of economic

[1010] Connor, *Economic Geography*, 266.
[1011] Daniel Speich, „Der Entwicklungsautomatismus. Ökonomisches Wissen Als Heilsversprechen in Der Ostafrikanischen Dekolonisation," *Archiv Für Sozialgeschichte* 48 (2008), 186. See also Geoffrey Martin

measurement," quantification, mathematisation and modelling became the main approaches to the generation of economic knowledge, which now increasingly took the form of numbers and variables.[1012] When existing instruments for social accounting were applied to the emerging scientific community studying economic growth in the 1930s and 1940s, this marked the origin of development economics as an independent discipline. In 1933, the American Simon Kuznets first introduced the concept of the "Gross National Product" (GNP) as an aggregate of all economic activities of a country. Even though Kuznets himself had pointed out that the definition of an "economic activity" was highly contextual and international comparisons were therefore methodologically difficult, it didn't take long until the GNP started its career as a universal indicator for economic growth.

One of its most vehement promoters was the British economist Colin Clark, who held a much more uncritical attitude towards universalisation of the GNP. His 1940 publication titled "The conditions of economic progress" became a pioneering work in development economics. It was the first study to compare the economic power of all countries worldwide, using the method of national accounting. Though it was criticised for its data quality, its transparent, statistical accounts portrayed the world's economic situation in a way previously unknown. The world, Clark wrote in his foreword, was basically "a wretchedly poor place" with more than half of its population receiving an average income, which was less than a sixth of that of the United States.[1013]

Clark's work was in several regards formative for the United States' efforts to establish modern development aid as a political project after World War II. First, it provided evidence of the need for international development programmes, which already US-president Harry Truman had called for in his inauguration address in 1949, when he outlined his "Point Four Program".[1014] Second, development economic also became the major theoretical basis for interventions in development aid, with national accounting serving as an undisputed benchmark in the discourse on global economic inequalities.

The aggregation, quantification and abstraction of economic data created a statistical environment in which modern economics could become an experimental science. It inspired

---

Hodgson, *How Economics Forgot History: The Problem of Historical Specificity in Social Science* (London and New York: Routledge, 2002).

[1012] See, e.g., Heinz Wolfgang Arndt, *Economic Development: The History of an Idea* (Chicago: University of Chicago Press, 1987).

[1013] Speich, "Der Entwicklungsautomatismus," 188, citing Colin Clark, foreword to *The Conditions of Economic Progress,* by Colin Clark (London: Macmillan, 1957).

[1014] Speich, "Der Entwicklungsautomatismus," 188. See also: Dennis Merril, ed., *The Point Four Program: reaching out to help the less developed countries* (Bethesda, MD: University Publications of America, 1999).

the modelling of the economy as a closed system and conceptualisation as a kind of regulable machine. Economists thus turned their attention to the importance and function of different factors within the interdependent system, for example the relative importance of capital and labour as inputs in relation to production as output, described in 1928 in the Cobb–Douglas production function.[1015] These impulses were taken up in national accounting, which from the 1930s on no longer restricted itself to quantifying the total output of a national economy but differentiated between the institutional sectors and modes of economic activity. Besides the new forms of synchronous cross-country comparisons, this expansion of available data and methods allowed for diachronic comparison and renewed the interest in economic history.

In the 1950s, economic historians dedicated themselves to the new research field of cliometrics and set out to reconstruct the GNP of certain countries at different historical periods. This way, it became possible to quantify the successful industrialisation and modernisation process of Western industrialised countries in the nineteenth century and remodel it in an abstract way. Referring to studies of the economics of growth, such as the widely received works by Solow, Rostow or Lewis in the mid-1950s, development economists claimed that these growth models could be generalised and applied to the current situation of poor countries.[1016] Especially for the poor countries, this method of rendering their economies legible came at an expense: It resulted in a de-historisation of the assessment of the socio-economic situation in the countries and in Africa and it reproduced economic divisions along racial lines, as it rendered most of the largely informal economic activities of the native African population invisible.[1017] Although the methodological shortcomings did not go unnoticed, the majority of development economists were confident that they would become irrelevant in the transition to market economies.[1018]

The ascent of development economics had been paralleled by the reconfiguration of the global institutional setup. The foundation of the United Nations and its sub-organisations, for example the FAO, the realignment of older institutions such as the International Labour Union, the expansion of the World Bank's scope of activities, the formation of international

---

[1015] Charles W. Cobb and Paul H. Douglas, "A Theory of Production," *The American Economic Review* 18, (1928).
[1016] See, e.g., Robert M. Solow, "A Contribution to the Theory of Economic Growth," *The Quarterly Journal of Economics* 70 (1956); Robert M. Solow, "Technical Change and the Aggregate Production Function", *The Review of Economics and Statistics* 39 (1957); Walt W. Rostow, "The Take-Off Into Self-Sustained Growth," *The Economic Journal* 66 (1956); W. Arthur Lewis, *The Theory of Economic* Growth (London: Allen & Unwin, 1955).
[1017] Speich, "Der Entwicklungsautomatismus," 195, with reference to Phyllis Deane, *Colonial Social Accounting* (Cambridge, UK: Cambridge University Press, 1953), 115.
[1018] Speich, "Der Entwicklungsautomatismus," 196.

scientific associations and non-governmental organisations had led to the emergence and consolidation of a new global community. Within this new international operational framework, a global discourse on development emerged which reverberated at the national level. The main agent of this process of homogenisation was the new set of shared terms and categories and the wide use of technical abstractions in the discursive framing of problems.[1019]

Scholars working on the history of economics have shown that the theories and market models devised by economists were more than external analyses but shaped the very socio-economic realities that they were meant to represent.[1020] Daniel Speich has argued that the availability of the abstract economic models had similar effects within the political constellation of the decolonisation process. For the nationalists in the colonies and governments of newly independent states, these models attained the status of a "salvation promise" as they suggested that, regardless of their specific local conditions and historical legacy, they could achieve a high degree of economic independence.[1021] By reducing the various contingencies and uncertainties of decolonisation, they opened up a space action for action, in which the emerging nationalists saw a future horizon for their daily operations.[1022] In Scott's terms, they were the state simplifications that formed the basis for intervention for the authoritarian development state.

Representatives of the British school of planning who had gained their expertise from wartime planning were sceptical about economic long-range projections. Ely Devons, a British planning expert, who worked as Director of Statistics during wartimes, compared the "economists who prepare projections with the diviners of old who examined chicken entrails for advising on war and peace, when and where to hunt, and whether and whom to marry."[1023] In fact, when contrasting the British development plans for the colonies to the new planning approaches of development economists, the differences become apparent. As was shown in the last part, development economists' recommendations for public investment were limited to a compilation of project proposals which were largely unrelated to each other.[1024]

[1019] Speich, "Der Entwicklungsautomatismus," 193.
[1020] Donald A. MacKenzie, *An Engine, Not a Camera How Financial Models Shape Markets* (Cambridge, MA: MIT Press, 2006).
[1021] Speich, "Der Entwicklungsautomatismus," 184, 192.
[1022] Speich, "Der Entwicklungsautomatismus," 183-84.
[1023] Cited in Gerhard Colm, „Economic Projections: Tools of Economic Analysis and Decision Making," *The American Economic Review* 48 (1958), 178.
[1024] See the analysis of the development plans for Tanganyika, Kenya and Uganda in part II.

The amount of the available economic data for African countries increased when, in the late 1950s, economists set out to disaggregate the GNP for the countries which, for example in Clark's work, had been subsumed under the category "rest of Africa". In 1958, two economists from Edinburgh University, Alan T. Peacock and Douglas Dosser, published the first comprehensive statistical work on the national income of Tanganyika, which was much lauded in the scientific community.[1025] During their work on Tanganyika, Peacock and Dosser changed their attitudes on the potentials and limitations on the use of input-output analysis in developing countries. After Dosser had put forward a fundamental objection to the method in 1957, he recommended the techniques of input-output analysis in 1959, along with linear programming, stating they were "well designed for the calculation of total repercussions, both on the supply and demand sides."[1026] In the paper, Dosser formulated a critique of the British practice of development planning in the colonies on the grounds that, in the allocation of funds, they largely ignored the interdependencies between different sectors. To solve this problem, he suggested that "economic analysis could really come into greater play," even if it came with methodological problems.[1027]

One of the key concepts of development economics in the 1960s was the interpretation of economic development as a process of sectoral change, which had first been introduced by Clark and Fourastié.[1028] They had described economic development as a sequence of changing weights between the three productive sectors: the "primary" agricultural sector, the "secondary" industrial sector and the tertiary "service" sector. Within this concept, the productivity of labour was the key measure to assess technical progress – a term which became synonymous with economic development. As the industrial sector offered the largest potential for an increase in labour productivity through mechanisation, economic process was mainly to be achieved through a shift of economic weights from the primary and tertiary to the secondary sector. Hence, the concept implied a universal validity of the imperative for industrialisation as a means for economic development, regardless of the local conditions.

[1025]Alan T. Peacock and Douglas Dosser, *The National Income of Tanganyika, 1952-54* (London: Her Majesty's Stationery Office, 1958).

[1026] Speich, "Der Entwicklungsautomatismus," 202, citing Douglas Dosser, "The Formulation of Development Plans in the British Colonies," *The Economic Journal* 69 (1959), 255. See also Andrew Cohen, *British Policy in Changing Africa* (Evanston: Northwestern University Press 1959), chapters III and IV.

[1027] Dosser, "The Formulation of Development Plans," 255.

[1028] Colin Clark, *The conditions of economic progress*, (London: Macmillan, 1960); Jean Fourastié, *Le grand espoir du XXe siècle* (Paris: Presses universitaires de France, 1952). See also, Amann, *Energy Supply and Economic Development*, 69.

Furthermore, economists who studied the interdependencies of the global economic system like Hans Singer claimed that industrialisation was the only cure against the deterioration of the terms of trade of primary-product-based economies.[1029] In 1949, Singer praised the positive effects of manufacturing on "the general level of technology, skill, way of live, inventiveness, habits, store of technology, creation of new demand, etc."[1030] The sectoral disaggregation resulted in what Hirschman later called a "grand, but sterile agriculture-industry dichotomy," which lived on as a discursive concept. It did not take long, however, until studies found out that this broad formulation of the indirect effects of economic activities in the different sectors could not be empirically supported.[1031] Hence, economists now turned their attention to general characteristics that applied to all sectors. The new candidate for the key determinant for economic growth was capital intensity. Proponents of capital intensity, based their arguments on the assumption that because of the nature of production functions and of technical progress, high capital-labour ratios were particularly contributing to the rapid incorporation of technological innovations.

Economists now started to discuss which economic policies were best suited to promote growth. One position was the theory of "balanced growth" which had been developed and refined by Rosenstein-Rodan, Nurkse, Lewis und Scitovsky in the 1950s and had found many supporters among development economists. One of its key aspects was the emphasis put on the need to synchronise the growth of different elements of a developing economy to avoid supply difficulties. A new industrial venture, the authors argued, would be likely to fail due to a lack of domestic demand for its output as long as the rest of the country was caught in "underdevelopment equilibrium." They therefore saw it as the main responsibility of the state to assure the simultaneity of investments in a large variety of enterprises, which they believed to be a necessary condition for the success of the individual enterprises.[1032] Through centralised and rational investment planning, the state should ensure that the industry did not get too far ahead of agriculture or that the "social overhead capital," for example the basic

[1029] Prebisch–Singer hypothesis, Reprint of the original article from 1950: Hans W. Singer, "The Distribution of Gains between Investing and Borrowing Countries," in *Economic development and social change: the modernization of village communities,* ed. George Dalton (Garden City, N.Y.: The Natural History Press, 1971); Raúl Prebisch, "The Economic Development of Latin America and Its Principal Problems," UN document no. E/CN.12/89/Rev.1. (Lake Success, N.Y.: United Nations, 1950).
[1030] Hans W. Singer, *International Development: Growth and Change* (New York: McGraw-Hill, 1964), cited in, Hirschman, *Development projects observed*, 181.
[1031] Hirschman, *Development projects observed*, 181. Evidence!
[1032] Hirschman, *Strategy of Economic Development*, 55.

facilities in transportation power or water supply, would be provided in adequate amounts to support and stimulate industrial growth.[1033]

Not surprisingly, proponents of rational planning took a critical view on the gigantic, "showpiece" development projects, which were being implemented in the developing world far ahead of any realistic demand.[1034] Among them were the Swedish economist and executive secretary of the United Nations Economic Commission for Europe, Gunnar Myrdal or the US-American economists Buchanan and Ellis who wrote that „Planners for underdeveloped countries often betray a Marxian fascination and implicit faith in the economics of large scale production."[1035] Before venturing into financing investments in infrastructure projects in developing countries, the World Bank, in its report for 1951/52, expressed the view that especially those countries that lacked "basic facilities" should be industrialised through a number of small enterprises. "Village industries," the report stated, were better adapted to the specific market conditions and small demand in developing countries.[1036] In terms of energy infrastructures, the United Nations Economic and Social Commission for Asia and the Pacific warned in a report from 1951 that no country in the region could afford the luxury of investing its foreign exchange reserves into large power plants and wait for the capacity to be used optimally.[1037]

One of the most widely known and cited works among development economists in the late 1950s and early 1960s, however, was a spirited critique of the theory of balanced growth. In his 1958 book on "The strategy of economic development," Albert Hirschman put forward arguments in support of induced investments into selected industries, which would lead to temporary economic imbalances but eventually force other sectors to keep up. According to Hirschman, development had to be regarded as a chain of disequilibria. His espousal of unbalanced growth was substantiated by the concept of backward and forward linkage of industries. Through the interdependencies of different economic sectors, Hirschman argued, an investment in one project would encourage investments through its need to purchase inputs

---

[1033] Hirschman, *Strategy of Economic Development*, 51.
[1034] Abdul Ghanie Ghaussy, *Die Rolle des Energiesektors in der Entwicklungspolitik* (Köln: Westdeutscher Verlag, 1960), 135.
[1035] Norman S. Buchanan and Howard Sylvester Ellis, *Approaches to Economic Development* (New York: Twentieth Century Fund, 1955), cited in, Ghaussy, *Die Rolle des Energiesektors*, 134; Gunnar Myrdal, *Economic Theory and under-Developed Regions* (London: G. Duckworth, 1957), 72-73, cited in Ghaussy, *Die Rolle des Energiesektors*, 133. See also, Hirschman, *Strategy of Economic Development*, 12-13.
[1036] International Bank for Reconstruction and Development, *Seventh Annual Report 1951/52* (Washington: International Bank for Reconstruction and Development, 1952), 10-11, cited in, Ghaussy, *Die Rolle des Energiesektors in der Entwicklungspolitik*, 134.
[1037] Cited in Ghaussy, Die Rolle des Energiesektors, 135.

from other sectors (backward linkage) and sell its outputs to other sectors (forward linkage).[1038]

Poor countries, Hirschman formulated the paradoxes of development, could not afford to be economical. Dismissing the balanced-growth supporters' idea of a "big push" through heavy investments in *all* sectors as delusive, he advised governments of developing countries to invest all or most of their available resources in one class of investments; *either* in "social overhead capital" (SOC) *or* in the "direct productive activities" (DPA) of certain industrial sectors.[1039] Hirschman adopted a narrow definition of only the SOC, which was characterised by its "lumpiness" (technical indivisibilities) as well as measurable high capital output ratio. This definition narrowed down the perspective to ports, highways and electricity, or, in short, to those activities financed by the World Bank, and excluded fields like health and education.[1040] In SOC, Hirschman stated, "at least, we have a field where economists have given full recognition to the principal of 'efficient sequence'."[1041] A number of studies on economic history in the 1950s had shown the large share of foreign investment that went into SOC, particularly railroads, during the nineteenth and early twentieth centuries.[1042] From the 60s on, however, it became wide consensus that this held true for industrial countries but not so much for capital poor "pre-take-off" countries.[1043] Referring to the example of railways in Africa, Hirschman later wrote in his 1967 study on development projects that "by the time the notion of building infrastructure ahead of demand as a key to development had been debunked, it had done considerable damage."[1044] In his study on the energy supply and economic development from 1969, Amann discusses the Owen Falls hydropower project in Uganda as a prime example of unbalanced growth.[1045]

Yet, there was another line of argument put forward in Hirschman's book, which set the tone in the debate on investment planning for large-scale power projects. While he dedicated most

---

[1038] Hirschman, *Strategy of Economic Development*, 98-119; example of the
[1039] Hirschman, *Strategy of Economic Development*, 83.
[1040] Hirschman, *Strategy of Economic Development*, 83-84.
[1041] Hirschman, *Strategy of Economic Development*, 84. He warned though of a general bias towards SOC in comparison to DPA.
[1042] A. K. Cairncross, „The Place of capital in economic progress," in *Economic progress: Proceedings of a Conference held by the International Economic Association at Santa Margherita Ligure, Italy*, ed. Léon H. Dupriez (Lauvain: International Economic Association, 1955), Ragnar Nurkse, "International Investment today in the light of nineteenth century experience," *Economic Journal* 64 (1954), Ragnar Nurkse, *Problems of capital formation in underdeveloped countries* (Oxford: Blackwell, 1964), 152-54, see also, Hirschman, *Strategy of Economic Development*, 84.
[1043] Hirschman, *Development projects observed*, 182; Amann, *Energy Supply and Economic Development*. 153-59.
[1044] Hirschman, *Development projects observed*, 67-68.
[1045] Amann, *Energy Supply and Economic Development*, chapter FII, "Unbalanced Growth in East Africa, the Uganda Example."

of his book to the interlinkages between different sectors and their effects, in one chapter he addressed the question on the conditions under which an individual venture could be expected to prosper as an efficient dynamic unit of the economic system. This question had become increasingly relevant in view of the numerous examples of investment projects in "underdeveloped countries" that, after a hopeful start, had stagnated and deteriorated. Hirschman's answers were quite diametrically opposed to the scepticism of many of his colleagues towards grandiose projects. In the tradition of authors like Clark, Hirschman, at the time, held a firm belief in the educational and disciplinary effects of capital on people in the developing world. "Certain types of modern technology," he wrote, "perform a crucial function in aiding management in the performance of new, unfamiliar, and perhaps somewhat uncongenial tasks."[1046]

These effects, he argued, resulted, for example, in the fact that ventures with "complicated technology" were often better suited to solve the ubiquitous problem of maintenance than "simple" ones. His explanation was that more sophisticated technological systems had a compulsion to maintain, as harsh penalties for lack of maintenance could result in system breakdowns. He illustrated this with the consequences of non-maintenance in the transport sector. While it led to disasters for airlines, the effects were less serious for railways or for highways, which could be left to deteriorate for a long time until they became impassable.[1047] Generalising his argument in favour of projects which required careful planning because of their complex nature, he concluded that "under certain circumstances, it may be rational for governments in underdeveloped countries to concentrate on 'show-pieces': When a government undertakes the construction of a large hydroelectric station or of a steel mill, it simply cannot afford to let such ventures go wrong – it places itself under a far stronger compulsion to 'deliver' than if it were to spend the same funds on a large number of small projects."[1048] Hirschman even recommended a certain degree of additional capital intensity for some projects as it "safeguards the task from miscalculation and inertia and prevents decay."[1049]

Even when attempting to take "rational" economic decisions for or against large investments and related technologies in the power sector, planners could rely on two separate traditions of economic controversy that implied different, sometimes contradicting, investment rationales.

[1046] Hirschman, *Strategy of Economic Development*, 146, Citing
[1047] Hirschman, *Strategy of Economic Development*, 141.
[1048] Hirschman, *Strategy of Economic Development*, 144.
[1049] Hirschman, *Strategy of Economic Development*, 149.

The one was the cost-benefit analysis and the other was the growing literature on economic development which has been presented in the previous subchapters. In the late 1950s, the sizeable body of literature dealing with the cost-benefit analysis was rooted in the classical study of profit criteria and had been largely devised for investment decisions in developing countries. Its application consequently presupposed the framework of a fully-employed market economy, in which an objective economic policy aims at a (statistically) efficient allocation of resources.[1050] With virtual unanimity, the literature on cost-benefit analyses took a highly critical view of the very notion of the secondary benefits, which were highlighted so much in the works on economic development. Some authors even called for the elimination of all secondary benefits from the analysis.[1051]

Following the tradition of cost-benefit analysis, an internal report of the World Bank from 1957 critically assessed the costs of capital in the choice between hydro and thermal power. The report suggested that the nominal cost comparisons of hydroelectric and thermal plants tended to underestimate the real costs of the larger investment required for hydropower projects, thus giving hydropower an undeserved edge in nominal costs comparisons.[1052] The report found many cases in which capital for hydropower projects was provided on favourable terms, a practice which, from the perspective of economic efficiency, resulted in the distortion of the allocation of investment resources.[1053] While this did little harm to developed countries like the U.S., it could become a problem for countries with scarce capital. The report therefore advised governments not to sacrifice higher yielding investment opportunities elsewhere when obtaining additional capital for hydroelectric projects.[1054] The report generally accepted the incorporation of non-power benefits into the calculation if their return could be determined – a nearly impossible task for most irrigation projects, though.[1055] The report, however, did not address any benefits beyond the immediate monetary return.

A completely different picture arose from analyses of the same issue of choosing between hydro- and thermal power from development economists. In an article in the *Political Science Quarterly* from 1965, comparing thermal and hydropower in regard to their contributions to effects on economic development, Judith Tendler applied Hirschman's ideas of complex technologies' disciplining effects to the power sector. She contrasted the long-term planning

[1050] King, "Development Strategy," 118.
[1051] King, "Development Strategy," 118.
[1052] Robert Sadove, "Cost of Capital in the Choice between Hydro and Thermal Power," report for the International Bank for Reconstruction and Development, January 17, 1957, 3.
[1053] Sadove, "Cost of Capital," 5.
[1054] Sadove, "Cost of Capital," 3.
[1055] Sadove, "Cost of Capital," 11.

processes associated with building and operating hydropower stations to those of thermal stations. The latter were characterised by a higher internal technological complexity but could simply be purchased as "package plants" from industrial countries and constructed in a relatively short amount of time. Through this flexibility, thermal power does not come with a compulsion for planning. As hydro forced its managers to plan, Tendler suggested, "then it instils planning as a habit."[1056] In addition "power planning is good training for economic planning in general," she wrote, so these training effects could well be applied to other fields as well.[1057]

In Tendler's view, the grandiose oversized hydropower plants, which were known to have been built all over the world, did not challenge this argument but rather supported it. Although hydropower potentials "may first lure water supply leaders who are looking for impressive projects," sooner or later they would require from them a "more pedestrian planning necessary to make their monuments work. …What is important about hydro, then, is not that it leads its planners along a zigzag path, but that it leads them, via this path, to eventual mastery of their problem."[1058]

Another argument centred around the availability of local human resources was that in most developing countries, there were more civil and electrical than mechanical engineers among the small total number of trained engineers. Hence, hydropower construction could employ and train more local engineers instead of importing foreign experts. [1059] "The country with hydro, then, is more capable of entering the field of power production."[1060] Tendler saw an additional advantage of hydropower on the level of general infrastructure development. Her idea of the desirable infrastructure topography in developing countries was clearly that of interconnected grids. Hydropower, by its very nature of spinning out expensive transmission lines, was better adapted to achieve this complex and expensive task.[1061]

One of the characteristics, which Tendler highlighted, was the catalysing effects of hydro power on decision-making processes. "On the system level," the technology itself is "pacing and coordinating investment decisions, impelling and encouraging refinement and growth of

[1056] Judith D, Tendler, "Technology and Economic Development: The Case of Hydro vs. Thermal Power," *Political Science Quarterly* 80 (1965), 241. Hirschman exchanged ideas and drafts with Tendler, when writing his book on "development projects observed" from February to July 1966.
[1057] Tendler, "Technology and Economic Development," 240.
[1058] Tendler, "Technology and Economic Development," 248.
[1059] Tendler, "Technology and Economic Development," 238.
[1060] Tendler, "Technology and Economic Development," 239.
[1061] Tendler, "Technology and Economic Development," 246.

the system."[1062] As hydro power projects are site-bound, location – an important component of political decision-making – does not have to be discussed at length. The narrative of "free" natural resources waiting to be harnessed exerts attraction on engineers, politicians and the public alike, she argued. Through its very aesthetics and symbolism, hydropower is fine political capital:

> The hydro complex has drama and style, and there is an air of the extravagance in its hugeness and grace which is awesome in a country trying to mobilize scarce resources for development. Though hydro supplies a basic necessity, it creates the aura of a country which no longer has to scrimp and save, but can spend with largesse. Its hugeness and its taming of a wild river bespeak a technological victory, and it imparts dignity to the people and the country who conceive it. …The thermal plant, in contrast, is another industrial installation at the edge of the city. It is no political eyecatcher.[1063]

Although Tendler admitted that the "mystique" of hydropower would give it an irrational edge, leading to a gross exaggeration of the comparative costs of hydro and thermal, she rather regarded this as a "source of strength for a government-sponsored power program. It recruits sponsors dedicated to the realization of certain projects, its eases the process of budgetary appropriation for power, and it attracts managerial talent to the field of power development."[1064]

The theories on economic growth increasingly resonated in Tanganyika in the first three post-independence years when the country began to formulate its own long-term development policy. Tanganyika's first development plan covering the years 1961-64 had still been prepared by British civil servants under the minister of finance Ernest Vasey. The plan was essentially a compilation of individual projects that had been collected from the different ministries.[1065] Three years after independence, the preparation for the second development plan for the years 1964-1969 was completed and in May 1964, President Julius Nyerere presented it to the public. Although an expatriate team under the French planner M.J. Vaudon

---

[1062] Hirschman, *Strategy of Economic Development,* 146-47, here cited in Tendler, "Technology and Economic Development," 237.
[1063] Tendler, "Technology and Economic Development," 250-51.
[1064] Tendler, "Technology and Economic Development," 252-53. Later, after having studied the World Bank projects, Hirschman, rejected this argument.
[1065] Havnevik, *Tanzania,* 37; see also Iliffe, *Modern History of Tanganyika*. The emphasis of the plan was on import substitution.

had taken the lead in its preparation, it was the first plan that Tanzanians considered to be their own.[1066]

This plan, as Nyerere emphasised in an address to the parliament, was "comprehensive and ambitious."[1067] Rather than a list of Government projects, this plan was devised to assess development possibilities in the different sectors; in industry, in agriculture, in commerce, and in all other public and social services.[1068] Its objectives were to be measured in the internationally standardised figures like per capita income and life expectancy.[1069] Instead of gradually improving the existing economic structure, the plan proposed two fundamental measures to achieve these goals: first, an inter-sectoral shift of economic weights from the agricultural to the industrial and commercial sector and, second, a profound intra-sectoral transformation in the agricultural sector.

The former was to resolve what was perceived as an appalling structural imbalance, the country's dependency of agriculture. By only expanding agricultural output, Nyerere warned, the country would be condemned to permanent economic inferiority in the world.[1070] To create an industrial base the plan envisioned a rate of growth of the industrial sector which would be twice the rate of industry.[1071] Clearly, the analysis was rooted in the balanced growth doctrine. In his foreword on the approach to economic planning, the Minister of State, A.Z.N. Swai, stressed that "the whole exercise has been based on the observance of various equilibria in the economy which are regarded as essential for orderly and successful development. Without these there can be no real and lasting progress. In the national field equilibrium consists in balancing production with consumption."[1072] Swai held a firm belief in the omnipotence of economic planning as the "most effective method for achieving the desired result since it is essentially a means of organizing all human and material resources to achieve, within a given period the maximum development possible at the lowest cost and in accordance with the social and political aims of this country."[1073]

Yet, it was the agricultural sector, where the government held the most ambitious "high-modernist" visions for development. As Coulson pointed out, the institutional policies

---

[1066] United Republic of Tanganyika and Zanzibar, *Tanganyika five-year plan for economic and social development, 1st July 1964 - 30th June, 1969* (Dar es Salaam: Government Printer, 1964).
[1067] Nyerere, address, i.
[1068] Nyerere, address, vii.
[1069] Nyerere, address, viii.
[1070] Nyerere, address, x; United Republic of Tanganyika and Zanzibar, *Tanganyika five-year plan 1964 – 196*, 8.
[1071] Nyerere, address, xi.
[1072] United Republic of Tanganyika and Zanzibar, *Tanganyika five-year plan 1964 – 1969*, 2.
[1073] United Republic of Tanganyika and Zanzibar, *Tanganyika five-year plan 1964 – 1969*, 1.

proposed in the plan were largely justified by an appeal to modernisation theory.[1074] To modernise the "primitive methods of production and inadequate equipment" of the Tanganyikan peasant agriculture, the report vowed to continue their organisation in cooperatives and provide technical advice from the Government staff. The paternalistic approach included cash incentives in the form of semi-durable and durable consumer goods to educate rural people.[1075] Nyerere clearly formulated the direction in which the government would be taken: "All government activities as regards agriculture will be designed to help farmers increase their output."[1076] These government policies took two forms. The "improvement approach" was about giving more farmers access to the institutions and services that had been applied successfully for capitalist farming during colonial rule.[1077] These policies would be rather incremental, as a continuation of existing policies without the requirements for large injections of capital. This could not be said about the second set of policies, called the "transformation approach." These far-reaching policies for agricultural change could take different forms: one was the reorganisation and mapping of peasant holdings to give each farmer a single plot, another was the creation of settlement schemes on unoccupied land which was tied to a condition requiring farmers to use "modern" agricultural techniques. Of particular relevance in connection with electricity generation was the third form of the transformation approach, the development of Tanganyika's river basins for planned irrigation farming.[1078]

In fact, these plans were rooted in a long history of discussions of how to develop the territory as a means for development, with extensive plans for flood control, irrigation and irrigated cultivation. Several studies in this sector had been made and a World Bank mission, which had visited Tanganyika to assess its economic needs and development potentials, had concluded that

[t]he main development task in Tanganyika is to improve the methods of peasant agriculture and cattle keeping, or to transform present methods and organization into systems making more productive use of the land … the Mission proposes that the next five years or so in irrigation and flood control work should be predominantly a period of investigation, planning and building up of staff. Thereafter a rather considerable program of investment in irrigation

[1074] Coulson, *Tanzania*, 199.
[1075] United Republic of Tanganyika and Zanzibar, *Tanganyika five-year plan 1964 – 1969,* 19.
[1076] Nyerere, address, ix.
[1077] Coulson, *Tanzania*, 185.
[1078] United Republic of Tanganyika and Zanzibar, *Tanganyika five-year plan 1964 – 1969,* 3.

works should be undertaken, as soon as the necessary preparations are completed and financial considerations allow.[1079]

Notably, the development plan for the years 1964-1969 did not attach special significance to electricity. As the publication of a comprehensive study on the long-term power requirements of the country was pending, the plan tentatively estimated a yearly growth of the electricity demand by over 12%, after it had been growing by 10% annually in the years between 1953 and 1962. To meet this future demand, the plan projected the duplication of the power line to Dar es Salaam from the Hale Falls hydropower station, which was soon to be completed. Additionally, the installation of an additional diesel power plant in the Dar es Salaam area, a further hydropower plant on the Pangani River or new hydro station at the Wami River were to be completed towards the end of the decade.[1080]

4) "Money should be made to talk" – Power relations in international development aid for Tanzania,

The ascent of development economics, as was shown in the previous section, had produced a set of terms and concepts that was shared by both the emerging global community centred on "development aid" and politicians and planners in the post-independence nation states in Africa. These terms and concepts constituted the ontological foundation for the discourse on the economic modernisation of Tanzania in the mid-1960s. A central point of controversy in this discourse was the way Tanzania's rivers could be utilised in the name of economic development and modernisation. With the growing popularity of river basin development, rivers had become the projection screen for different kinds of large-scale engineering visions. Even though the Tanzanian development plan of 1964 advocated the establishment of an indigenous secondary industry, the African Socialist ideology primarily revolved around agricultural modernisation and a profound transformation of the rural communities. Hence, many decision-makers in Tanzania initially looked into the river's potentials for irrigation and flood control – although they were unquestionably fascinated by the large hydroelectric projects in other parts of Africa, like the Akosombo dam in Ghana.[1081]

To understand which of these heterogeneous and sometimes conflicting visions of large-development projects finally materialised, it is important to understand the profound

[1079] International Bank for Reconstruction and Development, *The Economic Development of Tanganyika* (Baltimore, John Hopkins University Press, 1961), 5, 7.
[1080] The United Republic of Tanganyika and Zanzibar, 1964, 52. See also Volume II, 57-58.
[1081] See, e.g., "Nkrumah Switches on Volta River Power," *The Nationalist*. January 24, 1966, cited in Hoag, "Transplanting the TVA?" 249.

reconfiguration of different financial, political, ideological and diplomatic relationships in the Tanzanian power sector during decolonisation. After its ties with the former colonial rulers had weakened or completely broken, Tanzania became the arena of a complex and multidimensional competition for political and economic influence. One dimension was the covert but deeply pervasive struggle for influence between the West and the Eastern bloc in post-colonial Africa, a rivalry that was fought out with aid and assistance in Tanzania.[1082] In Zanzibar, which had merged with mainland Tanganyika into the United Republic of Tanzania in April 1964, the German Democratic Republic had a strong foothold and was advancing a project for the construction of multi-storey apartment blocks in Zanzibar town.[1083] Of even bigger concern to the Western countries was Nyerere's visit to communist China in February 1965, which had resulted in the signature of a ten year Sino-Tanzanian Treaty of Friendship and China's promise to sponsor the construction of a railway link between Tanzania and Zambia.[1084]

Yet, even in sectors with little or no involvement of socialist countries like the power sector, Western countries were competing for their share on the new "market" for development aid. In the scramble for attractive technical assistance consultancies, engineering contracts or new export opportunities for the domestic industry, governments, development agencies and companies from the respective countries cooperated closely, using different strategies. Britain, as was shown earlier, tried to build on its long-established connections and networks from its time of colonial rule. In competition with Britain, the Nordic countries, especially Sweden, tried to turn their alleged absence of colonial heritage into political capital. The Tanzanian government under Nyerere gained some room for manoeuvre by skilfully playing the different international "partners" off against each other.[1085] Even so, what previously could be framed as entitlement, under the British mandate, had turned into supplication when it came to the search for development capital. In regard to decision-making on projects and priorities, the ultimate authority lay with the large donors.

In the communication associated with projects in the power sector, these conflicts largely remained hidden behind the technical language of the development discourse. Based on

---

[1082] Ongoing book project: Anderson, David M. (In Press), Red continent: a history of the Cold War in Africa. London: Faber & Faber. (In Press), work by Anne

[1083] See earlier reference

[1084] Alicia N. Altorfer-Ong, "Old comrades and new brothers: a historical re-examination of the Sino-Zanzibari and Sino-Tanzanian bilateral relationships in the 1960s*"* (PhD diss., London School of Economics and Political Science, 2014), 189. See alsom Jamie Monson, *Africa's Freedom Railway: How a Chinese Development Project Changed Lives and Livelihoods in Tanzania* (Bloomington: Indiana University Press, 2009).

[1085] For an analysis of Nyerere's handling of different donor countries see Coulson, *Tanzania*, 364-67.

earlier studies and archival documents from the World Bank, this section aims at unpacking the interrelationship between the political and the technical in the initiation and planning of the two largest hydro-power projects in Tanzania to date, the Great Ruaha Power Project and the Stiegler's Gorge Dam. It maps out some of the continuities and discontinuities at the transition from the bilateral relationships of colonial rule to the complex multilateral relationships of development aid. It shows how, on one side, personal continuities existed as British expert still held many position in the Tanzanian government organisations or accepted new jobs as consultants for international development agencies. On the other side, these agencies engaged experts from other countries, such as Sweden, who had little or no previous work experience in the former colonies and looked at local conditions through a different lens than their British counterparts. They brought a set of novel paradigms into technoscientific decision-making and the design of development project. What Öhman has called the "technoscientific paradigm" of the Swedish engineering consultants, for example, had been derived from experiences with large-scale hydropower generation in Sweden and translated into a generalised and abstract approach to the planning of dam projects.[1086]

In the negotiations between the Tanzanian government and the international development aid agencies on the different options for dam constructions, the entry of the World Bank in the Tanzanian power sector was a game changer. This section traces the techno-political discourses in which the World Bank and Swedish development agencies overruled the Tanzanian government's desire to utilise the country's river for large-scale irrigation and scientifically legitimised the construction of a single-purpose hydropower scheme at the Great Ruaha River.

In the post-independence scramble for influence in Tanzania, one of the losers was the formal colonial power Britain. In late 1965, only one year after Nyerere had praised "generous" Britain for its engagement at the inauguration of the construction of the Nyumba ya Mungu, diplomatic relations between the two countries broke over Nyerere's support of the FRELIMO movement in Mozambique and froze all development assistance to Tanzania. As a result, the Tanzanian government was looking for an alternative to British influence in the power sector. In 1965, many executives within TANESCO were still British, among them the position of the general manager. Furthermore, the utility was still tied to agreements with the British Balfour Beatty&Co, and its subsidiary Engineering & Power Consultants Ltd.[1087] In

[1086] Öhman, "Taming Exotic Beauties," 41.
[1087] Öhman, "Taming Exotic Beauties," 197.

light of the Cold War rivalries, Tanzania's foreign policy disputes with Britain but also with the US, and West Germany in the late 1960s created anxiety among the Western powers about the growing influence of the socialist countries in East Africa. For these reasons, they urged Canada to a greater involvement in Tanzania as a counterweight to growing Chinese aid.[1088] Canada became the first country after Britain to provide substantial resources to Tanzania for the expansion of its electricity infrastructure. In 1965, the Canadian Government approved a loan of up to 2 million Canadian dollars on very favourable terms for financing the import costs of transmission line networks.[1089]

The major competition for British influence in the Tanzanian power sector, however, was Sweden. For Sweden, which had given up any colonial ambitions in the late nineteenth century, the post-World War II era of development aid offered new possibilities for entering the global stage.[1090] State-funded development assistance had been institutionalised in Sweden in the 1950s with the establishment of two committees to deal with Swedish bilateral and multilateral aid respectively.[1091] As Öhman has shown, strong links between development and private sector interests existed from the beginning, not least through the involvement of business actors in these committees and their official and unofficial networks.

During the 1950s, the Swedish government made efforts to communicate the idea of state-funded development assistance in the country. To raise public support, it launched state-funded campaigns that were built on the colonial binaries (sender/recipient, rich/poor, modern/primitive). To the Swedish business community, state-funded development assistance was promoted as a way to jointly open up new markets for Swedish exports. Representatives of the Swedish General Export Association tried to convince Swedish companies to venture into the former colonies to compete with the former colonial powers. One example was Pakistan, where Swedish experts already had been employed to support the hydropower sector.[1092] In their official communication, proponents of Swedish development assistance emphasised the country's neutrality policy and its lack of "colonial embarrassment."[1093] In meeting with Swedish industrialists, Ulla Lindström, the Swedish Minister responsible for development assistance, argued that in global competition with other industrial nations for overseas markets, Sweden enjoyed "unique good-will especially amongst the coloured

---

[1088] David R Morrison, *Aid and Ebb Tide a History of CIDA and Canadian Development Assistance* (Waterloo, Canada: Wilfrid Laurier University Press, 1998), 48.
[1089] TANESCO, "Directors' Report and Accounts 1965," 5; Morrison, *Aid and Ebb Tide*, 48.
[1090] Öhman, "Taming Exotic Beauties," 95.
[1091] Öhman, "Taming Exotic Beauties," 97.
[1092] Öhman, "Taming Exotic Beauties," 102.
[1093] Cited in Öhman, "Taming Exotic Beauties," 125-26.

peoples."[1094] The notion that this claim entailed a special responsibility but also opportunities to assist, was crucial for the formation of what Öhman calls the Swedish development assistance paradigm.

Swedish state-funded development assistance entered Tanganyika in the early 1960s, when the territory's decolonisation was in full swing. Öhman has pointed out that the initiative to do so came from Sweden, along with other Nordic countries, without any formal request from the independent Tanzania.[1095] She has furthermore suggested that rather than by any official discussion on selection criteria, the choice of Tanganyika as a recipient country was facilitated by two other aspects. The first were close personal contacts through the Swedish state church mission, which had been represented in Tanganyika since 1941. The key mediator between the two country's governments was Babro Johansson, a Swedish missionary who had been living in Tanganyika for 15 years, who was a close friend of Julius Nyerere and had herself become representative of the TANU party in the Tanganyikan parliament.[1096]

The second aspect were the existing connections between Sweden and East Africa in the field of water technology, which offered an excellent entry point for the Swedish export industry. Öhman describes the development assistance policy of the Swedish Social Democrat government in the 1960s as "double-edged". On the one hand, the government distanced itself rhetorically from Swedish commercial interests in developing countries by including in its first government bill of 1962 the guiding principle that the assistance should have no strings attached. On the other hand, it initiated a gradual shift from multilateral aid to bilateral aid, mostly in the field of infrastructures and with the clear requirement that technologies that were of use in Sweden should be the ones to be used in the bilateral projects.[1097] The only relevant commercial interests and links to technology within Tanganyika focused on the water sector as there were a few Swedish enterprises, which had been drilling for water in East Africa.[1098] The drilling of wells in Tanganyika was not only well-suited to incorporate Swedish enterprises and Swedish technological competence, it was an excellent project to communicate to the Swedish public. Unfortunately, it wasn't anything that the Tanganyikan government had ever asked for.

[1094] Cited in Öhman, "Taming Exotic Beauties," 136.
[1095] Öhman, "Taming Exotic Beauties," 141.
[1096] Öhman, "Taming Exotic Beauties," 144.
[1097] Öhman, "Taming Exotic Beauties," 142-43.
[1098] Öhman, "Taming Exotic Beauties," 147-48.

During their reconnaissance trips to Tanganyika, the Swedish delegations learned that the priorities of the Tanganyikan government were different. On their list were agriculture, education, health care and vocational training. As shown above, the top single infrastructure development mentioned in the first development plan were irrigation systems for agriculture. With little enthusiasm, President Nyerere decided that, as a Swedish consultant later put it, the "nice Swedes could go ahead" with their programme for drinking water and Tanganyika issued a formal request for credits for water provision in 1964.[1099] The signature for a credit of 10 million Swedish crowns in September 1965 was the first major bilateral agreement between Sweden and Tanzania. Most of it was earmarked for the "Rural water development program," 1964/65-1965/66, a programme for the drilling of wells, construction of pipelines and small dams to serve as reservoirs for household water. This project was the entry point for Swedish companies that would later play a key role for hydropower development in Tanzania: After a round of international tendering, which took place pro forma due to the official policy of untied aid, the Swedish company SWECO got the contract for the project. SWECO was a subsidiary of VBB, at the time the largest hydropower contractor in Sweden.[1100]

At the same time, euphoria for river basins was growing within the Tanzanian government. In April 1966, two Tanzanian officials were invited to the Unites States to view first-hand the wonders of American river basin planning. The US-sponsored tour revived Tanzania interest in the development of the Rufiji River Basin.[1101] The river basin had been investigated by the FAO Rufiji River Basin survey in the 1950s, which resulted in a report on irrigational development in 1961, indicating a few potential large hydropower sites in the Rufiji Basin.[1102]

[1099] Öhman, "Taming Exotic Beauties," 149.
[1100] Öhman, "Taming Exotic Beauties," 150.
[1101] The two officials were Iddi Simba, at the time senior planning officer at the Tanzanian Ministry of Economics and Development Planning – DEVPLAN and Jerry Sam Kasambala, former Minister for Industries, Mineral Resources and Power at this time chairman of the Tanzanian Development Finance Corporation, see Hoag, "Designing the Delta," 172-73; Öhman, "Taming Exotic Beauties," 157.
[1102] Hoag, "Designing the Delta," 89-115.

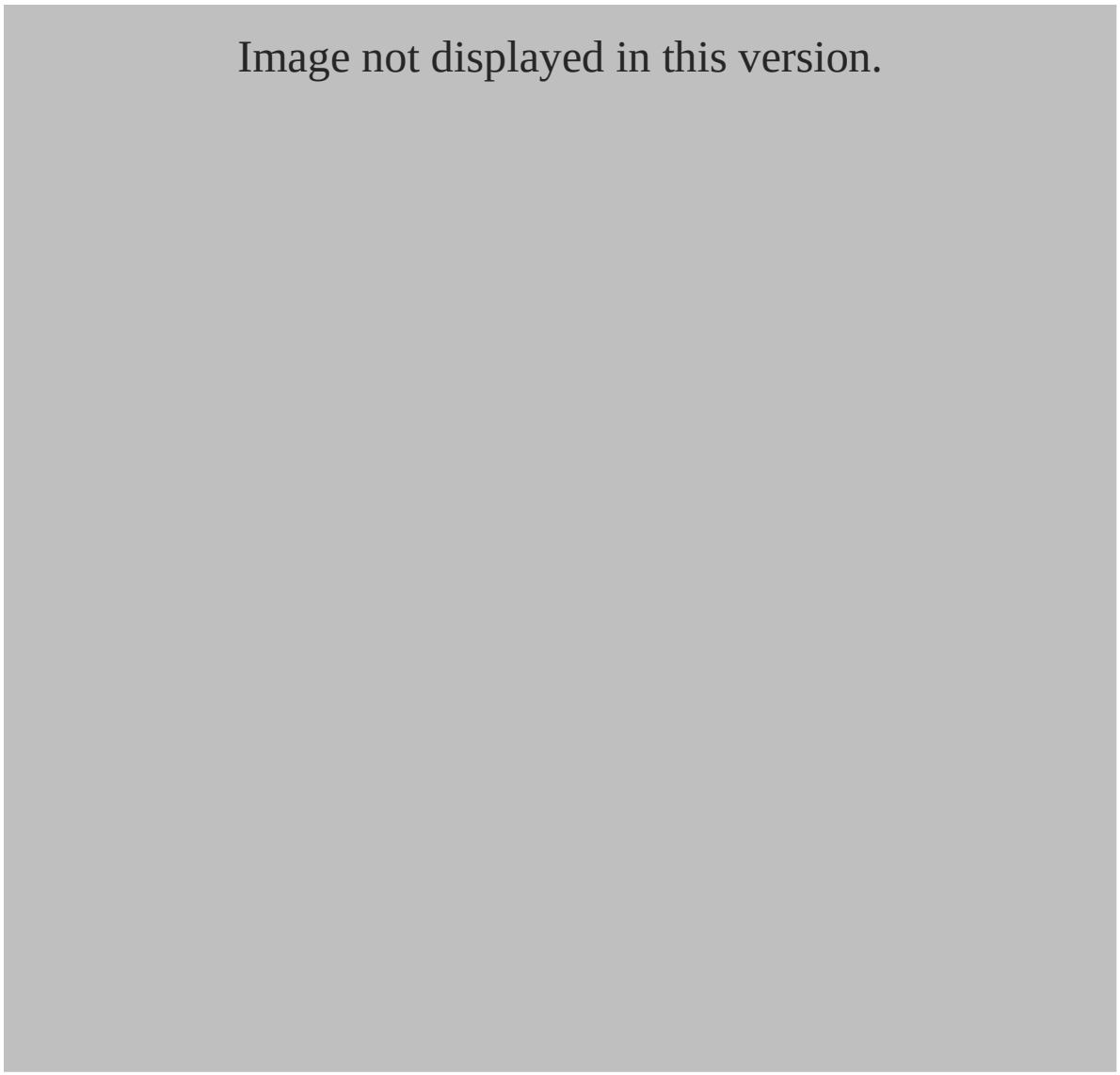


Figure 11. Map of the areas supplied by TANESCO in 1967. Source: International Bank for Reconstruction and Development, "Appraisal of the Development Program," Annex 13.

Several sites for hydropower generation were already under discussion. Each of them had different characteristics regarding their potential for hydropower generation, irrigation and flood control and each had different local and foreign proponents. By far the largest of them was the Stiegler's Gorge project in the Rufiji River Basin. It was "an example of a type of river basin project that had developed in the United States and been carried by international agencies like the FAO and USAID to all parts of the world."[1103] It fascinated Tanzanian officials, not least for its huge potentials for irrigation and flood control, and American engineers because of the prospect of generating up to 2,100 MW of firm energy each year, once the project was completed. During 1966 and 1967, the American development agency,

[1103] Hoag, "Designing the Delta," 176.

USAID, assessed the potentials and facilitated the discussions on financing.[1104] Although it was on top of the Tanzanian government's wish list, an appraisal of the project was yet far out of sight.

Two other projects were closer in reach. TANESCO, which despite its nationalisation was still very much controlled by British interests, recommended harnessing the Great Ruaha, which was also located in the Rufiji River Basin. The Great Ruaha project offered considerable potential for hydropower generation but could not be combined with any irrigation projects. Another option was the Wami River which had already been investigated, and it had been listed in Tanzania's five-year development plan. The Wami project was set up as a multipurpose project in which one part of the water would be used for hydropower generation and the other for irrigation. As the first two projects were already supported by other donor nations, the Wami River could become the entry point for Sweden into the hydropower sector.[1105] The opportunity for opening new export markets came at the right time, namely as hydropower construction in Sweden was facing increasing opposition in the 1960s.[1106]

In 1966, the development of Tanzanian rivers was contested among the different parties involved. The Tanzanian government under Nyerere, whose primary concern was water for irrigation for agricultural purposes, and the Water Authority, WD&ID, whose general manager since 1965 had been an African Tanzanian, were in favour of the Wami project. TANESCO and its British in-house consultants were more interested in pure power production and, thus, supported the Great Ruaha project. The grandiose Stiegler's Gorge project was the Tanzanian government's preferred long-term option after completion of the Wami scheme and enjoyed the support of US-American development assistance.

In 1966, the Swedish development agency SIDA approached John Fletcher, asking for his opinion on a recently completed study on the Wami River by two Swedish consultants from SWECO. Fletcher was the general manager of a power company in Sweden and senior member of the Swedish hydropower sector community.[1107] In his report on the study, Fletcher wrote:

> Money should be made to talk: each one of the parties should be made to weigh the money value of their wishes against the costs to be covered. – In this respect power

[1104] Hoag, "Designing the Delta," 181-92; Havnevik, *Tanzania*, 267.
[1105] Öhman, "Taming Exotic Beauties," 161.
[1106] Öhman, "Taming Exotic Beauties," 169.
[1107] Öhman, "Taming Exotic Beauties," 173.

> seems to be superior. Opinions are divided as to the relative benefits in the future, but one thing is absolutely certain: plans for power are much more definite and much more accessible to assessments of costs and benefits, in a word much more tangible, than plans for flood control and irrigation; however important the latter may be in the future, they are at present, to say the least of it, slightly vague. – The important thing is that money should be permitted to talk and to dictate decisions, and so it does: it talks to TANESCO the way it always talks to power enterprises, and in the course of the procedure outlined WDID will also have to convert their wishes into terms of money if they want them to materialize.[1108]

Taking into account his position as a utility manager, his general opinion does not seem surprising but his line of argumentation is remarkable. Electricity generation, he argued should enjoy priority over other development goals because it would be easier to measure the benefits in monetary terms. In fact, money *came* to talk to the different institutions involved in the same year already, when the World Bank entered the Tanzanian power sector. As was shown earlier, the World Bank had already been a financing power in Kenya and Uganda and now sent a mission to the whole region in November/December 1966. The goal of the "East African power sector mission" was to assess the electrical power situation in East Africa and its prospects. In the case of Tanzania, it was also commissioned to review a request for credit from TANESCO for several other generation and transmission projects.[1109]

Fletcher took part in the mission, now as an official consultant to SIDA.[1110] The World Bank consultants reacted with some irritation to the Tanzanian government's and WD&ID's insistence on conducting the Wami project.[1111] The World Bank turned to SIDA, asking whether Sweden would give up their support for Wami if Great Ruaha proved a better alternative. SIDA agreed under the condition that Swedish consultants would be commissioned for the comparative study on the two projects. If Sweden could get a foothold in the Great Ruaha project, it would even be the more attractive option for promoting its export industry, as Sweden lacked technological competence in the irrigation sector. [1112] In May 1967, SIDA rejected the Tanzanian government's formal request for a multi-purpose hydro-electric scheme at Wami that would have included an irrigation component. As

---

[1108] Cited in Öhman, "Taming Exotic Beauties," 186.
[1109] Öhman, "Taming Exotic Beauties," 178.
[1110] John Fletcher, "Report on Study of power problems in Uganda, Kenya and Tanzania, 1966, 2, cited in, Öhman, "Taming Exotic Beauties," 188, 174.
[1111] Öhman, "Taming Exotic Beauties," 192.
[1112] Öhman, "Taming Exotic Beauties," 190. Condition: Swedish consultants – where?

Stiegler's Gorge had been put on hold but the government still wanted a hydropower project, it grudgingly accepted that a comparative study with Great Ruaha would be made.[1113]

Meanwhile, SIDA had contracted Fletcher to conduct a preliminary internal study on the two rivers and develop recommendations. During his stay in Tanzania, however, Fletcher had neither visited the two rivers nor did he learn about previous studies from colonial times, except for the UN's FAO study. According to Öhman, his somewhat creative approach to compensating this lack of information is a prime example of Swedish "development science" and its detachment from conditions on the ground: in absence of long-term hydrologic data from the Wami and Ruaha rivers, Fletcher used the well-documented Swedish River Klar, which flew nearby his office, as a base to understand the long-term flow patterns of the Tanzanian rivers. His report "Klarälven, Wami and Great Ruaha – a comparative study of three rivers" was sent to SIDA in September 1967. Based on Fletcher's findings, SIDA decided to proceed with the comparative study and contracted him to supervise it.[1114]

In August 1967, while preparations for the joint comparative study were underway, the World Bank completed an internal report on the "Prospects for Economic Development in East Africa," which was only for use within the bank and its affiliated organisations.[1115] The report reflected the World Banks increasing scepticism towards the economic use of irrigation. The report's volume on Tanzania stated that "[t]here is little evidence that the more costly type public investments on 'transformation,' such as irrigation and village settlement schemes, have contributed much to the growth of the agricultural sector."[1116] The World Bank appraisal document for the development programme of TANESCO, dated October 1967, took up the recommendations from the economic mission:

The Wami project is a multipurpose scheme to irrigate the lower Wami basin and provide about 150 MW of electric power. The building of new irrigation schemes in the foreseeable future is not recommended by the Bank's recent economic mission to East Africa and it is doubtful whether this project could compete economically with Kidatu or the thermal alternative, if developed for power only. For this reason, TANESCO's consultants have rejected the project for the next stage of hydroelectric development in favour of the 150 MW

[1113] Öhman, "Taming Exotic Beauties," 197-81.
[1114] Öhman, "Taming Exotic Beauties," 267-68, According to Fletcher only 12 years of recordings available, no knowledge of earlier data. Fletcher's methods were later questioned by SWECO's consultants who preferred to do their own estimating. (Öhman, "Taming Exotic Beauties," 268).
[1115] International Bank of Reconstruction and Development, "Prospects for Economic Development in East Africa, Vol. 11," report, August 31, 1967, 21.
[1116] International Bank for Reconstruction and Development, "Prospects for Economic Development, Vol. 11," 21.

Kidatu project, on which they have prepared a preliminary report recommending further detailed investigation.[1117]

The World Bank, it seems, had dropped the Wami option before the comparative study had even started. When in October 1967, representatives from all parties involved met in Stockholm to discuss the terms of references for the study, the irrigation aspect was significantly reduced.[1118] SIDA had to carry out the study jointly with the British company Balfour&Beatty as the World Bank had insisted on the involvement of a third party – yet, overseeing its coordination, SIDA controlled major aspects of the study. The comparative study was conducted nearly as detached from local conditions as the earlier study by Fletcher. The difficulties in accessing documentation from the colonial period remained. The consultants reduced field visits to a minimum and didn't conduct any on-site study on irrigation potentials.[1119]

The joint report, which was completed in July 1968, discussed three alternatives: Kidatu at Great Ruaha/Wami and a 210 MW diesel power plant in Dar es Salaam.[1120] The report illustrates how political and economic interests of the Swedish development agency and the World Bank were translated into a technical language to make them compatible with the prevailing paradigms of "rational" planning and "scientific" development. The World Bank used a specific form of economic calculation for the appraisal of the different options, the "discounted cash flow." To compute the net present value of a project, this method calculates future input cash flows and discounts them at a certain rate. Possible revenues from irrigation or flood control, however, were excluded from the calculation of the annual cash flows. As a result, the Wami project was dropped, while the Great Ruaha and Diesel options rendered the same "present value". The authors, however, gave a decisive edge to the hydropower option by calculating a lower interest rate for it and argued that this would attract foreign credits.[1121] Ironically, this was exactly what the earlier Word Bank paper on cost-benefit analysis for power projects had advised against.[1122]

[1117] International Bank for Reconstruction and Development, International Development Association, "Appraisal of the Development Program of the Tanganyika Electric Supply Company Limited, 1967," report, November 13, 1967, 6; "Loan Agreement (Power Project) between International Bank for Reconstruction and Development and Tanganyika Electric Supply Company, Limited," November 13, 1967, World Bank Digital Archive.
[1118] Öhman, "Taming Exotic Beauties," 182-83.
[1119] Öhman, "Taming Exotic Beauties," 276-80.
[1120] F.W. Adams, N. Wretblad & A. Hardmark, Comparative Study of the Wami River and The Great Ruaha River Developments in Tanzania, Joint Report, SWECO – Balfour, Beatty & Co, Ltd., July 1968, cited in Öhman, "Taming Exotic Beauties," 183.
[1121] Öhman, "Taming Exotic Beauties," 183-84.
[1122] King, "Development Strategy."

Based on the recommendations of the joint comparative study, the World Bank decided to proceed with the Great Ruaha. The hydropower project was to be implemented in two phases. The first phase envisioned the construction of a hydropower plant at Kidatu and the second phase another control dam further upstream at Mtera.[1123] In late 1968, SIDA commissioned SWECO for a pre-investment study on Kidatu and for an ecological impact study which, according to Öhman, "was no more than window dressing."[1124] In December 1970, the World Bank announced its formal decision to finance the first phase of the Great Ruaha power project at Kidatu and, together with the Swedish government, signed the loan agreement with the Tanzanian government and TANESCO.[1125] In its appraisal of the project, the World Bank had used the same "discounted cash" flow method as in the joint comparative study but had added an extra aspect: The higher costs of labour for the hydropower option were offset by the assumption that the hydropower project would create more jobs in Tanzania than the diesel power plant.

5) The peak and demise of "hydro-developmentalism" and the outcomes of state-led development – Tanzania's power sector in the 1970s and 80s

After the nationalisation of TANESCO in 1964 had marked the beginning of state-led and largely donor-financed development in the Tanzanian power sector, the beginning of construction for the Kidatu plant on the Great Ruaha River in 1969 paved the way for the country's entry into the big dam era. Both trends continued to characterise the electrification of Tanzania in the following two decades until the early 1990s. Based on documents from the archives of RUBADA, TANESCO, the library of the Dar es Salaam University and contemporary academic literature, this section sketches out the major lines of development in the Tanzanian power sector during that period and, thus, helps to understand the infrastructural legacies that have led into the recurring electricity crises from the 1990s until today.

One of these lines is the zenith and demise of a "hydro-developmentalism," which was narrowly focussed on electricity provision as a driver of industrial growth – a trend that can be best illustrated by example of the grandiose Stiegler's Gorge project. Parallel to the construction of the Great Ruaha project, the Tanganyikan government and a group of international development agencies pursued the planning of Stiegler's Gorge, which they

[1123] Öhman, "Taming Exotic Beauties," 280.
[1124] Öhman, "Taming Exotic Beauties," 205.
[1125] Öhman, "Taming Exotic Beauties," 173, 206.

envisioned to become the giant leap forward for power generation and electricity-induced industrialisation. The project lost its international support in the 1980s, when both its ecological impacts and the limited demand for the electricity it would generate became apparent and the general enthusiasm for large hydropower construction had begun to cool off. What remained from the multitude of load forecasts, power sector studies and development plans of the period, however, was the abstract modelling of electricity as a function of economic growth and the top-down planning processes that dominate the discourse on electricity until today. The emerging attempts of reconceptualising access to energy based on its actual uses in the rural areas remained unnoticed in the planning of electricity systems in Tanzania.

The section furthermore outlines the electrification policy within the Tanzanian model of state-led development that fully unfolded after the Arusha declaration. During the 1970s and 1980s, the state utility TANESCO pursued a top-down approach of systematically consolidating and expanding electricity supply on two levels: first, the two centralised grids, one of which covered Dar es Salaam and the coastal area and the other Arusha and Moshi; and, second, the isolated systems that were installed in the more rural and remote towns. With international funding, TANESCO had a equipped a total 15 rural towns with small grids supplied by diesel generators by 1992.[1126] Access to these grids, however, remained limited to a small fraction of the population – often not more than 10% of the town population and less than 1% of the total district population.[1127] Rural electrification for small villages, as I will show, was restricted to the installation and state-subsidised operation of generators in a few model ujamaa villages and remained insignificant.

For its programme of expanding electricity supplies, Tanzania remained highly dependent on loans and grants from international aid agencies. According to Brian Cooksey, from the late 1970s to the late 1990s, foreign direct investment was virtually non-existent in Tanzania.[1128] The considerable amount of international funding also accounted for the fact that in times of declining rural incomes and famine relief in the 1970s, electricity was among the fastest growing sectors in the Tanzanian economy.[1129] In the mid- and late 1980s, however, electricity provision suffered from a deep economic crisis that caused the collapse of

---

[1126] Kjellström et. al., *Rural Electrification in Tanzania, 1*.
[1127] Calculated from the figures in Kjellström et. al., *Rural Electrification in Tanzania,* Table 1-1. 1-2.
[1128] Brian Cooksey, "The Power and the Vainglory: Anatomy of a $100 Million Malaysian IPP in Tanzania," in *Ugly Malaysians? South-South investments abused,* ed. K.S. Jomo (Durban: Institute for Black Research, 2002). It seems to have been in fact slightly more than zero. For exact figures, see Ghanadan, "Public Service," 21.
[1129] Coulson, *Tanzania*, 230-31.

Tanzania's post-colonial model of development and led to the introduction of a structural adjustment program under the pressure of the international donor community. Despite their successes in terms of service provision, two decades of state-led development left Tanzania largely unprepared to deal with the market reforms that were imposed on the country in the 1990s.

In 1971, construction works on the hydropower plant and reservoir at Kidatu began. The project planners had contracted only European and Canadian for the works and non-African-led Tanzanian enterprise.[1130] The works were completed in 1975 and in November of the same year, Julius Nyerere inaugurated the hydropower station.[1131] To reach the final capacity of the Great Ruaha Power station, however, a dam further upstream at Mtera was required. Ignoring earlier warnings both from some of its own contracted engineers and from Tanzanian a government engineer, who was cited at the beginning of this part, SIDA proceeded with the planning for the Mtera dam. After the environmental and social risks of the dam were revealed through several ecological impact studies, which were required by the World Bank, SIDA financed further documents that were in line with its agenda.[1132] Öhman's accounts furthermore show how in the planning process for the dam, local residents in the river basin were neglected and the necessary displacement of people was downplayed and tied in with the resettlement programmes of the Tanzanian government.[1133] Construction started in 1976 and in 1981, a few years before the reservoir reached its full extent, the dam was inaugurated. In 1989, a hydropower plant with a capacity of 80 MW was added.[1134]

In the meantime, however, the Tanzanian government was dreaming of a much larger hydropower project: "After 1983 an additional major power source will be required. The most promising is the development of the power potential of Stiegler's Gorge."[1135] In its second Five-Year Development for the years 1969-1974, the Tanzanian government emphasised once more its preference for the largest of all potential dam projects in the country. At the same time, it admitted that "in order to justify the project a very high rate of growth of demand will be required during the 1980s."[1136] As was the case with the Volta River Authority in Ghana, the construction of the Stiegler's Gorge dam would need to be accompanied by the creation of

[1130] Öhman, "Taming Exotic Beauties," 210.
[1131] Öhman, "Taming Exotic Beauties," 132.
[1132] Öhman, "Taming Exotic Beauties," 312.
[1133] Öhman, "Taming Exotic Beauties," 293-313.
[1134] Öhman, "Taming Exotic Beauties," 296.
[1135] United Republic of Tanzania, *Second Five-Year Development Plan for Economic and Social Development, 1 July 1969 – 30th June 1974, Vol. 1: General Analysis* (Dar es Salaam: Government Printer, 1969), 126.
[1136] Ibid.

an energy-intensive industry from scratch. Hence, the project lent itself perfectly to the industrialisation paradigm dominating the development discourse in the early and mid-1960s. After the publication of the FAO study in 1961, Stiegler's Gorge had not only become the darling of the Tanzanian government but also of many international development organisations, including USAID from the United States, NORAD from Norway or the Japanese JETRO.

In comparison to the Great Ruaha Power Project, Stiegler's Gorge was a few sizes larger and the planned dam meant an even more profound intervention in the ecosystem of the Rufiji river basin upstream and downstream of the dam site. Consequently, the project called for a comprehensive planning process that would assess the benefits and potential impacts on different levels. Yet, in his book on the *Limits to Development from Above*, Havnevik calls the project a "striking example of a large-scale multipurpose project for which single-purpose planning of hydropower generation was carried out."[1137] He dedicates a chapter to the analysis of the numerous studies which were devised in connection with the project.[1138] I have been able to access these studies in the RUBADA archive in Dar es Salaam. Havnevik suggests that the reason for the study's inability to grasp the multidimensional character of its object was the limited availability of reference studies rather than the quality of the research performed.[1139] In short: The studies tell more about the biases and interests of those individuals or organisations who devised them than about the skills of those who carried them out. Within the framework of this thesis, I do not provide a full analysis of the more than 30 studies that have been conducted on various aspects of the project between 1961 and 1984.[1140] An analysis of some of the terms, concepts and references used in the major studies, however, reveals much about the career of the "hydro-developmentalist" paradigm for Tanzania between the late 1960s and early 1980s.

The most formative study for the Stiegler's Gorge project was the FAO study from 1961. Although its terms of reference had been concerned with the control of water for land use, the study's authors had commented on the hydropower potential of the river in the final report.[1141] After the more immediate demands following independence had temporarily pushed the

---

[1137] Havnevik, *Tanzania*, 282. It is important to consider that Havnevik himself was involved as researcher of BRALUP, see Hoag, "Designing the Delta," 175.
[1138] Havnevik, *Tanzania*, 263-83-chapter pages.
[1139] Havnevik, *Tanzania*, 266.
[1140] Hoag, "Designing the Delta," 174.
[1141] Nicholas Simansky et al., "Tanganyika, the Rufiji basin," Report to the government, Vol 1, general report , Rome, 1961, 66-67. For a good analysis of the report regarding its consideration of hydropower aspects see Öhman, *Taming Exotic Beauties*, 259-62; Havnevik, *Tanzania*, 266-67.

project to the background, the US-American development agency USAID took up the FAO's recommendations in 1967. It devised the "Land Water and Resource Plan and Potential," which was primarily aimed at the formation of a strong institution to direct and coordinate the development of the river basin after a blueprint of the TVA – the Rufiji Basin Development Authority. According to Havnevik, this study shifted the focus of subsequent studies to hydropower development. [1142] Between 1967 and 1968, the Japanese technical agency JETRO conducted a pre-feasibility study of the hydroelectricity component of the project, which was mainly concerned with building up industrial loads for the projects, for example from aluminium refining.[1143] The Tanzanian government then contracted Kaiser Engineering International, Inc., the same company that had consulted Ghana for its Volta River project to work out a proposal for the development of aluminium and steel refineries in the Rufiji Basin.[1144]

The focus of project planning on hydropower soon attracted new partners: Norway, like Sweden, was looking for new markets for its well-developed hydropower industry after the domestic potential was already being largely exploited. In the early 1970s, NORAD, the Norwegian Agency for Development Cooperation, came to take the central role in the Stiegler's Gorge project. Until the late 1980s, Norway spend over USD 24 million on the project, most of it for design and consulting studies and made sure that most of these studies were conducted by Norwegian consultancy firms.[1145] Not surprisingly, a preliminary report on "Stiegler's Gorge Hydropower Utilisation" by Norconsult from 1972 exclusively focused on the generation of hydroelectricity suggesting it was "mainly used in power-consuming industries" and only to a small extent for domestic purposes.[1146] The authors based their study on the assumption that "that flood control and irrigation will not entail a net income for the project in the near future."[1147] The very first sentence of the report's introduction conveys the impression that electricity generation was increasingly becoming an end in itself in the project planning: "It is a widely accepted axiom that the industrial development of a country is proportional to its consumption of electric energy."[1148]

[1142] Havnevik, *Tanzania*, 267; Hoag, "Designing the Delta," 181-82.
[1143] Havnevik, *Tanzania*, 267; Hoag, "Designing the Delta," 183.
[1144] Hoag, "Designing the Delta," 194.
[1145] Hoag, "Designing the Delta," 184; Hoag, *Developing the Rivers*, 193; As a result, Tanzania became the largest recipient of Norwegian development aid.
[1146] Norconsult A.S., "Stiegler's Gorge Hydropower Utilisation," report prepared for the United Republic of Tanzania, October 1972, 123, RUBADA archive.
[1147] Norconsult A.S., "Stiegler's Gorge Hydropower Utilisation," 63.
[1148] Norconsult A.S., "Stiegler's Gorge Hydropower Utilisation," 5.

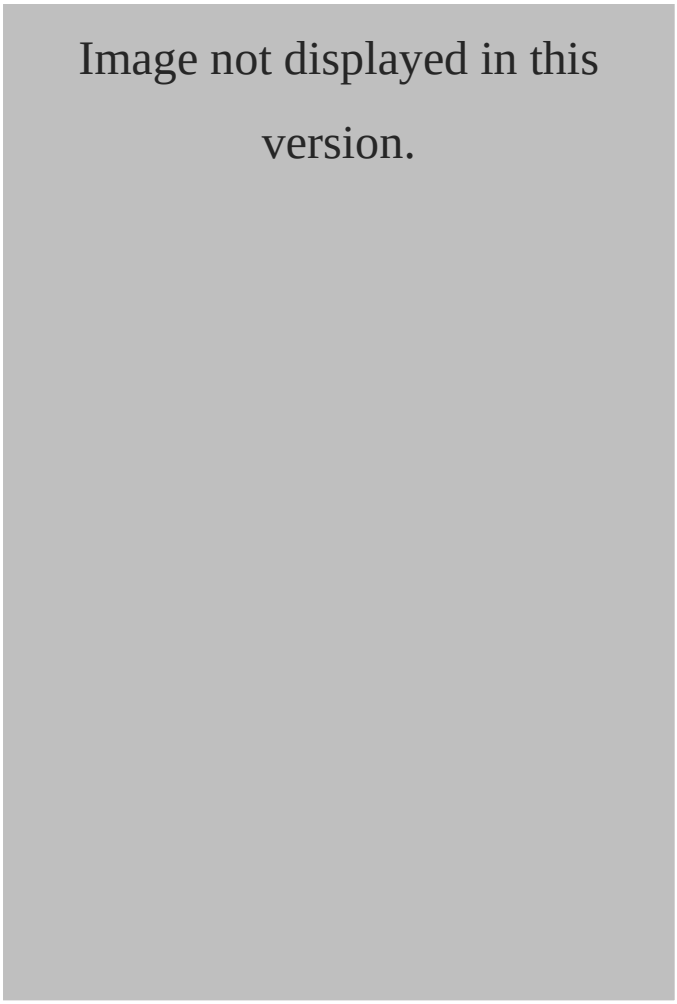


Figure 12. Map of the Great Ruaha catchment area and planned hydropower plants in 1972. Source: Norconsult A.S., "Stiegler's Gorge Hydropower Utilisation," Figure 2-02.

As the dam complex was to be designed in a way that it would maximise hydroelectricity generation, the uncertainty about the demand for power in Tanzania became one of the main obstacles to realising the project.[1149] In the course of the 1970s, demand forecasting by means of statistical methods gained unprecedented significance in Tanzania's power sector.[1150] TANESCO contracted the consultancy firm Acres International Ltd. from Canada to draft a long-term power sector master plan up to the year 1995. The preliminary version of the report, which was published in 1978, shows that the planning of power systems had methodologically and conceptually moved closer to economics as an academic discipline. For

[1149] Havnevik, *Tanzania*, 271.

[1150] Earlier studies had been already conducted in the 1960s. In 1964, for example, the British company Merz & McLellan had at TANESCO's request made a long-term estimate of the future market, see Öhman, „Taming exotic beauties," 196. Earlier studies had overestimated load growth, see George Joseph, "A econometric approach to forecasting demand for electricity in Tanzania to the year 2000 A.D.," research report no. 38, Bureau of Resources Assessmetn and Land Use Planning, University of Dar es Salaam, undated (ca. 1978), 11-12, RUBADA archive.

their grid system forecast, the authors used a model that related the gross domestic product to the total energy generation and sales.[1151]

The proponents of the Stiegler's Gorge project within the Tanzanian government, however, rejected the results of the Acres report. The authors had concluded that Tanzania would need only 225 MW additional capacity until 1995 – far too little to give priority to Stiegler's Gorge with its projected capacity of about 600 to 1000 MW.[1152] In 1978, RUBADA initiated another forecast study conducted by George Joseph of the Department of Statistics at the University of Dar es Salaam.[1153] Using a "well-defined econometric methodology," Joseph calculated the electricity demand in different sectors until the year 2000.[1154] He criticised the Acres report not only for subsuming different demand types in its aggregate GDP model but also for being too conservative in regard to its underlying assumptions about economic growth. Tanzania, Joseph suggested, was to expect high growth rates in the coming decade, fuelled by its investments in basic services and its emphasis on industrialisation, as laid down in the Third Five Year plan.[1155] Within the next decade, he expected additional demands from an iron/steel complex (75 MW), paper and pulp complex (21 MW), sugar, textiles, ginneries, foundries, machinery and electronics industry (60-75 MW) and, finally, the TAZARA railway (up to 200 MW).[1156]

Despite the differences regarding their methods and results, the forecast studies of the 1970s consolidated a supply-driven, macro-level approach, which still characterises power system planning in Tanzania today.[1157] According to Maneno Katyega, the former head of TANESCO's research department, the gap between power sector master planning up to substation level and distribution planning exists to date. Attempts to merge the two plans were at first underway at the time of my interview with him.[1158]

Criticism of Stiegler's Gorge, however, was not restricted to the doubts regarding the demand for the electricity it would produce. Since the late 1960s, researchers from the Bureau of Resource Assessment and Land Use Planning (BRALUP) at the University of Dar es Salaam

---

[1151] Havnevik, *Tanzania*, 271, "The forecast of an additional 17 isolated branches was based on a time trend analysis ob both industrial and non-industrial demand that was planned at each load centre," (ibid.).
[1152] Ibid.
[1153] Joseph, "A econometric approach to forecasting demand." Another study was conducted for the Ministry of Industry and the Ministry of Water, Energy and Minerals, by M.D. Segal of the Ministry of Industries and S.L. Mosha of TANESCO, see Havnevik, *Tanzania*, 272.
[1154] Joseph, "A econometric approach to forecasting demand," 2.
[1155] Joseph, "A econometric approach to forecasting demand," 13-16.
[1156] Joseph, "A econometric approach to forecasting demand," 16.
[1157] Ghanadan, "Public Service or Commodity Goods," 57; Showers, "Electrifying Africa," 214.
[1158] Interview with Maneno Katyega, who started working with TANESCO in 1977. Distribution planning was traditionally done by the branches (Interview Katyega).

had been raising concerns about the ecological and social impacts of the project. A number of studies conducted by international researchers who were not working for the government or NORAD confirmed these concerns in the early 1970s and accused the project-developers of ignoring them.[1159] In fact, the terms of reference in 1976 for a comprehensive study, which was to be conducted by the Norwegian consultancy Hafslund A/S, did not include any reference to these studies and remained focused on the maximisation of power output.[1160] By this time, however, the growing criticism regarding the ecological and human risks had led the US government and institutions like the World Bank to reconsider their policy on large dam projects. From 1969 on, the US government required that environmental impact assessments be conducted before the construction of large-scale projects could start. International funding organisation soon followed.[1161] In 1977, the World Bank communicated to NORAD that it would not endorse a single-purpose project for funding. [1162]

NORAD frenetically attempted to rectify the project planning, which was very advanced in terms of the technical design of the dam but largely ignored its downstream impacts. The following ecological impact study, however, was overshadowed by the project developer's attempt to exclude the non-supportive institutes of the UDSM from the planning process. What was originally supposed to become a programme for enhancing the capacity of Tanzanian institutions, Havnevik concludes, became a more or less closed circuit comprising external consultants, RUBADA and NORAD.[1163] When NORAD came up with the "Lower Rufiji Valley Integration Study" in 1984, in a final effort to straighten out the project planning, the excitement of the international funding organisations for the project had dissipated.[1164] In addition to the growing criticism towards large dam construction, the worsening economic crisis in Tanzania made it even more unlikely that its industry would consume the power output of the dam in the foreseeable future.[1165] As a result, the Tanzanian government postponed the construction of the dam indefinitely.[1166]

During the two post-independence decades, large dam projects in Tanzania received a great, arguably a disproportionate, amount of attention and resources as the episode of the Stiegler's

---

[1159] Havnevik, *Tanzania*, 274-75; Hoag, *Developing the Rivers*, 196.
[1160] Havnevik, *Tanzania*, 269-70.
[1161] Hoag, *Developing the Rivers*, 196.
[1162] Havnevik, *Tanzania*, 275.
[1163] Havnevik, *Tanzania*, 276-78.
[1164] Prepared by another Norwegian consultancy, Norplan, Havnevik, Tanzania, 279; Hoag, *Developing the Rivers*, 197-98.
[1165] Havnevik, Tanzania, 281-82; Hoag, *Developing the Rivers*, 198.
[1166] Hoag, *Developing the Rivers*, 199. In 2011, however, Tanzania signed an agreement with Brazil to continue the planning for the project, see ibid.

Gorge indicates – a project which failed to materialise after three decades of detailed and costly planning and impact studies. The discourse on electrification in Tanzania during this period was dominated by the potential industrialisation benefits as well as the environmental risks of large dams rather than by service provision.

Arguably, this bias made it more difficult for an emerging discourse on alternative approaches to energy service provision to find its way into the agenda of Tanzanian policy-makers at the time. In 1972, Ernst Friedrich Schumacher published the influential book *Small is Beautiful. A Study of Economics as if People Mattered.* It was a passionate critique of the "bigger is better" ideology and a plea for small-scale, appropriate technologies as means for the improving living conditions and empowering people in rural areas of the "Third World."[1167] Schumacher's theses reverberated in the international development community and, along with the ascent of a "basic needs approach," they inspired a new trend in the research on energy provision in "developing countries." Throughout the 1970s, a number of international scholars as well as Tanzanian academics from the UDSM studied the availability and consumption of energy resources in the rural areas of Tanzania, primarily of charcoal, firewood, and kerosene.[1168] In workshops in Dar es Salaam and Nairobi, they furthermore discussed solutions for the decentralised electrification of rural villages, such as solar and small hydropower.[1169] One of the most productive researchers in the field was Prof. Simon Nkokoni from the Institute of Development studies of the UDSM. In 1981, he published a report of a survey of rural energy consumption in Tanzania, titled "The Poor Man's Energy Crisis."[1170] In this study, he reviewed the potentials of different decentralised, alternative energy systems in the rural areas, including mini-hydro, solar and wind.[1171]

Nkokoni's report is remarkable for its critique of the Western perspective on energy poverty in the "developing world" – a critique he repeated nearly literally at a regional workshop on "Energy for Development" in Arusha in 1983. He complained that

---

[1167] Ernst Friedrich Schumacher, *Small is beautiful: Economics as if people mattered* (New York: Harper and Row, 1973).
[1168] See, e.g., the bibliography of Simon R. Nkokoni, "The Poor Man's Energy Crisis. A Research Report of the Tanzania Rural Energy Consumption Survey," Dar es Salaam, 1981, 78-81.
[1169] Tanzania National Research Council, and U.S. National Academy of Sciences, Proceeding of a Workshop on Solar Energy for Villages of Tanzania, Dar es Salaam 1977, Dar es Salaam 1978; E.C. Njau, "Hydropower and Rural Electrification," in *Proceedings of East African Academy on Energy Resources of East Africa (*Kenya National Academy for the Advancement of Arts and Sciences: Nairobi 1979). See also: International Institute for Environment and Development, "Energy policy in Tanzania," Report to the Government of the United Republic of Tanzania, August 1980.
[1170] Nkokoni, "Poor Man's Energy Crisis". The study was funded by the Rockefeller Foundation.
[1171] Nkokoni, "Poor Man's Energy Crisis", 60-61, 64-67.

> the Energy Crisis has too often been seen in the context of the needs of industrialized, developed countries and urban centres of the third world. Hence, there is an over emphasis on ways and means to provide the urban residents with oil and electricity, usually from the grid, and in the near future perhaps an enhanced construction and operation of Nuclear Reactors. While conventional, centralized energy systems will no doubt continue to play a crucial role in the soci-economic [*sic*] development process in the Third World Countries, many scholars of development have started to view seriously the energy crisis of the Third World from a different angle. Between 85% and 98% of people in Third World countries live in rural areas.[1172]

Obviously, this criticism did not remain unnoticed among the international agencies involved in the planning for Stiegler's Gorge. The text of a presentation, delivered by the Norwegian consulting firm Norplan in 1983, mentions that „Tanzania has addressed the question of whether power supply should come from decentralized mini-schemes, or centralized larger scale projects with transmission to the load centres." In reaction to these considerations, the consultants from Norplan made an emphatic argument in favour of their approach, emphasising that "to meet existing and forthcoming committed loads, centralized generation with transmission is the solution proposed in all studies."[1173]

In any case, TANESCO was little receptive to approaches that took the energy needs of rural dwellers as a point of departure. During the 1970s, the Tanzanian government had continued its top-down electrification policy at different levels: Its first priority was the expansion and consolidation of its two main grid systems, the "coastal system", which comprised Dar es Salaam, Tanga and Morogoro and accounted for about 75%-80% of all electricity sales, and the Arusha-Moshi system in the North, where around 10% of the total electricity was sold.[1174] In 1970, TANESCO extended its diesel station at Ubungo raising its capacity from 32 to 47 MW to stay ahead of demand in the coastal grid until the Kidatu hydropower plant was expected to go online in 1975.[1175] It furthermore supplied small- and medium-sized provincial towns by extending the smaller grid systems (at Mtwara-Lindi and Arusha) or installing small isolated grids supplied by diesel generators.[1176] These systems, whose total number rose to 17

[1172] Siman R. Nkokoni "Rural Energy End-Use and Resource Crisis in Tanzania," in *Energy for Development - Proceedings from a conference in Arusha, Vol 2,* 154, see poor man's energy crisis, 23.
[1173] Norplan, "Hydro-electricity in Tanzania's economy," presentation text, undated (ca. 1983) slide 11, RUBADA archive.
[1174] Joseph, "A econometric approach to forecasting demand," 5.
[1175] TANESCO report fort the year 1970, 4.
[1176] Tanzania Electric Supply Company Limited, "Directors' Report and Accounts 1970," Dar es Salaam 1971,6.

by 1978, accounted for a total of 9 to 13% of the total electricity sold.[1177] With financing from the German Federal Republic, seven furhter towns received electricity by 1980.[1178]

What in today's terminology would be called "rural electrification" was embedded in the villagisation policy of the Tanzanian government. Up to 1972/73, the government attempted to implement the policies of the Arusha Declaration from 1967 in a "basically benevolent way," as Havnevik writes.[1179] At least in some of the early ujamaa campaigns of the time, the administration under Nyerere tried to rely on discussion and persuasion rather than forced settlement. One of the key arguments for convincing subsidiary farmers to move into nucleated villages was the improved service provision.[1180] In 1971/72, the Tanzanian government started a programme for the electrification of five ujamaa villages. Not surprisingly, the choice fell on some of the model villages that were closely associated with members of the TANU party or the president himself. Among the selected villages, for example, was Butiama, Nyerere's ancestral home. His childhood experiences in Butiama had influenced his vision of Ujamaa in his early years in power, Molony suggests in his biography of Nyerere.[1181] Another village was Chamwino, located about 30 kilometres away from Dodoma, the town in central Tanzania that was to become the new capital in 1974. Nyerere himself stayed in Chamwino for a while in the early 1970s. Chamwino was equipped with electric power even before the district capital Kondoa.[1182]

The projects were heavily subsidised by the government to which TANESCO invoiced the difference between its costs and revenues of operation. The electrification of ujamaa villages remained a showcase programme, which benefited only a small fraction of the population in the respective area. Most households were deterred by the high initial installation costs, which could amount to USD 1,000, as Nkokoni calculated for the village of Kikara in 1980.[1183] In 1990, TANESCO had a mere 46 clients in Chamwino, now a town with a population of 19,507. Of the 42,628 residents of Butiama (and neighbouring Kiabakari), 118 were clients of the utility.[1184] In total, rural electrification in Tanzania remained minuscule. A study by Kjellström et. al. found that in 1992, TANESCO's rural electrification programme had

[1177] Joseph, "A econometric approach to forecasting demand," 5.
[1178] *TANESCO News, 1st quarter, 1977,* 19.
[1179] Havnevik, *Tanzania*, 43.
[1180] Havnevik, *Tanzania*, 44.
[1181] See Molony, *Nyerere*, chapter 1 on Butiama, 11-36, 20; Kemal Mustafa, "The Development of Ujamaa in Musoma: A case study of Butiama Ujamaa Village" (MA thesis, University of Dar es salaam, 1975).
[1182] Coulson, *Tanzania*, 294. Mr Katyega confirmed in an interview, that Chamwino was a political choice.
[1183] Nkokoni, "Poor Man's Energy Crisis", 100-1.
[1184] Kjellström et. al., *Rural Electrification in Tanzania,* Table 1-1.

reached "more than 14 rural villages" – out of 8,600 villages in total.[1185] "It is also evident," the authors concluded, "that radical modifications of the TANESCO approach to rural electrification are necessary to improve the situation significantly."[1186]

During the early 1970, however, the government's ability to subsidise the rural electrification began to deteriorate as economic indicators were worsening. From 1970 on, the country's trade balance began to drop sharply. In 1971, massive grain imports started, while domestic production and export tonnages decreased. The rise in oil prices in 1973 further aggravated the situation. At the same time, the inflation rate rose steeply from an average of 2.1% per annum between 1961 and 1971 to 22.5% between 1971 and 1977. The trade deficit almost completely depleted Tanzania's foreign reserves towards the end of 1975.[1187] The crisis affected TANESCO in multiple ways. "1974 turned out to be a very difficult year in the Company's history," its annual report noted.[1188] The high costs for fuel caused TANESCO's operating expenses for the new gas turbines at the Ubungo station to explode.[1189] The high inflation made it difficult to forecast project costs and miscalculations in the government's cash projections caused severe liquidity problems.[1190] In the history of the company, 1974 became the first year for which it paid no dividend to its shareholders.[1191]

During the rest of the 1970s, Tanzania's economic and political landscape was characterised by two trends that are seemingly contradictory. On the one hand, the government under Nyerere adopted increasingly authoritarian methods to enforce its Arusha policies, in particular villagisation. After its voluntary approach had increased the population registered as living in villages only by a few ten thousand to about 2 million between 1972 and 1973, the government turned to forced resettlement. By 1977, the number of people living in villages had increased to 13 million.[1192] On the other hand, Tanzania attracted an ever-increasing amount of foreign aid. In terms of non-military foreign aid per capita, the country ranked among the top two or three countries in Africa by 1980.[1193] A snapshot of the situation in Tanzania in 1980 reveals the paradoxes of the outcome of these processes, which also became apparent in electricity provision: The failure of the villagisation programme to raise

---

[1185] Kjellström et. al., *Rural Electrification in Tanzania,* 2.
[1186] Kjellström et. al., *Rural Electrification in Tanzania,* 12.
[1187] Coulson, *Tanzania*, 228; Havnevik, *Tanzania*, 46.
[1188] Tanzania Electric Supply Company Limited, "Directors' Report and Accounts 1974," Dar es Salaam 1975, 8.
[1189] TANESCO, "Directors' Report and Accounts 1974," 8.
[1190] TANESCO, "Directors' Report and Accounts 1974," 10.
[1191] TANESCO, "Directors' Report and Accounts 1974," 11.
[1192] Havnevik, *Tanzania*, 48.
[1193] Coulson, *Tanzania*, 349.

productivity and increase incomes, especially in the rural areas, had led to a situation in which "rural producers, urban workers, and upper income earners were all worse off at the end of the 1970s than they had been at the beginning," as Coulson summarises.[1194] A study by Paul Collier for the World Bank states that "really serious poverty became a problem for the first time" during this period.[1195]

At the same time, the government had expanded access to basic services, such as primary education and health and – at a much more moderate level and nearly exclusively in urban areas – electricity provision.[1196] Between 1961, the year of independence, and 1971, the number of electricity customers had risen from about 31,000 to 56,000.[1197] Until 1981, TANESCO more than doubled this number to 129,000 – a considerable increase – yet only a small fraction of the 20 million people living in the country at that time.[1198] The completion of the first stage of the hydropower plant at Kidatu in 1975 and of the second stage including the extension of Kidatu and the construction of the Mtera reservoir in 1980/1981 had made the state utility largely independent from fuel imports. With international funding TANESCO installed isolated grids in several upcountry towns.[1199] One of them was Kondoa, where I conducted the oral history study for this master's thesis. The case of Kondoa also illustrates the ambiguities of state-led electrification in Tanzania during yet another economic crisis, which was more severe than the one in the early 1970s. In 1980, TANESCO started operating a small electricity system in Kondoa, supplied by a diesel generator, which had been funded by the Danish agency DANIDA. In 1982, the town's main road was equipped with street lamps. The metamorphosis of Kondoa's nocturnal lightscapes, however, didn't last for long. Only two years later, in 1984, the street lamps were dismantled after the district administration had failed to pay its electricity bills to TANESCO. Until today, street lighting has not returned to Kondoa.[1200]

The year 1984 marked the low point of a severe economic crisis in Tanzania which had led to the collapse of the "post-colonial model" between 1978/79 and 1983/84.[1201] The crisis was triggered by a combination of external shocks and internal imbalances. Because of the forced

---

[1194] Coulson, *Tanzania*, 240.
[1195] Paul Collier, "Labour Market Allocation and Income Distribution," Annex III, Basic Economic Report, International Bank for Reconstruction and Development, 1977, 16.
[1196] Coulson, *Tanzania*, 244-68.
[1197] TANESCO, "General Manager's Annual Report 1961," Dar es Salaam 1962, 2; Tanzania Electric Supply Company Limited, "Directors' Report and Accounts 1973," Dar es Salaam 1973, 8.
[1198] "Opening Speech," in: *Energy for Development - Proceedings from a conference in Arusha, Vol 2,* 65.
[1199] *TANESCO News,* 1st quarter, 1977, 19.
[1200] van der Straeten, "Eine "afrikanische" Geschichte," 36-37, 45.
[1201] Havnevik, *Tanzania*, 29; Ghanadan, "Public Service or Commodity Goods," 63-64.

resettlement in the 1970s, exports in the agricultural sector had fallen sharply. The oil price shocks, a global decline in agricultural prices, and recurring droughts, which caused food and water scarcities, further exacerbated the situation. In 1978, Tanzania was drawn into a costly war with Uganda's military after Idi Amin, Ugandan president at the time, occupied a part of its north-western region. Although Tanzania retook the territory and forced Amin into exile, it had to spend scarce resources on military equipment.[1202] After the disintegration of the East African Community in 1977, Tanzania's budget was further strained by necessary investments into aviation, harbour administration, railways and telecommunications.

As the crisis unfolded, international organisations became increasingly critical of Tanzania's development model. In the early 1980s, the World Bank began to tie its loans to Tanzania to the condition that it initiated a structural adjustment programme. These structural adjustment programs (SAPs) came in the form of macroeconomic interventions aimed at alleviating the debt crises of many "developing countries." This was to be achieved by drastically cutting public spending, privatising state enterprises, deregulating different sectors of the economy, expanding exports and trade and reducing foreign exchange restrictions. Their long-term goal was a reorientation of the economic system towards market principles. In Africa, Tanzania under Nyerere was one of the earliest and most ardent opponents of the SAPs.[1203] He regarded some demands for spending cuts by International Monetary Fund (IMF) as assaults on indispensable parts of his state budget, especially in education and health. The standoff between Nyerere and the IMF lasted five years until the mid-1980s, when the Tanzanian government was hardly able to carry out its basic functions. Attempts of the Tanzanian government to raise support from more sympathetic donors failed when the Nordic countries aligned themselves with the IMF/World Banks conditionality. In 1985, Nyerere quietly stepped down, clearing the way for a president who would implement the requirements of the international donor community.[1204]

Nyerere's successor, president Ali Hassan Mwinyi, soon had a reputation of barely having an agenda of his own, which earned him the nickname "Baba Ruksa" meaning "Father of anything goes."[1205] Under Mwinyi, Tanzania's government adopted the Economic Recovery Programme that was supported by the World Bank and IMF. Its main objectives were an increase in exports and in industrial capacity utilisation, the rehabilitation of the physical

[1202] Coulson, *Tanzania*, 309-10.
[1203] Ghanadan, "Public Service or Commodity Goods," 64-65.
[1204] For a more detailed account on the negotions over the SAPs in Tanzania see Ghanadan, "Public Service or Commodity Goods," 63-66; Havnevik, *Tanzania*, 287-90.
[1205] Ghanadan, "Public Service or Commodity Goods," 66.

infrastructure, and the restoration of external and internal balances through prudent fiscal, monetary and trade policies.[1206] While the reforms triggered macro-economic changes, they were also marred by growing corruption and self-enrichment of public officials who were well positioned to get hold of the profits from privatisations, land reforms, and real estate liberalisation and now constituted Tanzania's emerging business elite.[1207] The reforms were furthermore criticised for their technocratic design, which left little room for building the necessary capacities in Tanzania. As Havnevik writes,

> [t]he design and implementation of the industrial rehabilitation programme are similar to those of new projects and tend to reinforce the same features of dependency and low technological learning observed during earlier ill-designed industrialisation initiatives.[1208]

As a result, the Tanzanian government found itself ill-prepared, when, in the early 1990s, the SAPs, which had started out as emergency measures, developed into a long-term reform programme and extended into the energy sector.

[1206] Havnevik, *Tanzania*, 290.
[1207] Ghanadan, "Public Service or Commodity Goods," 66.
[1208] S.M. Wangwe," Industrial Development in Tanzania: Are Infant Industries Maturing?" paper presented to the Sixth Economic Workshop, Dar es Salaam, January 2-4, 1990 cited in Havnevik, *Tanzania*, 292.

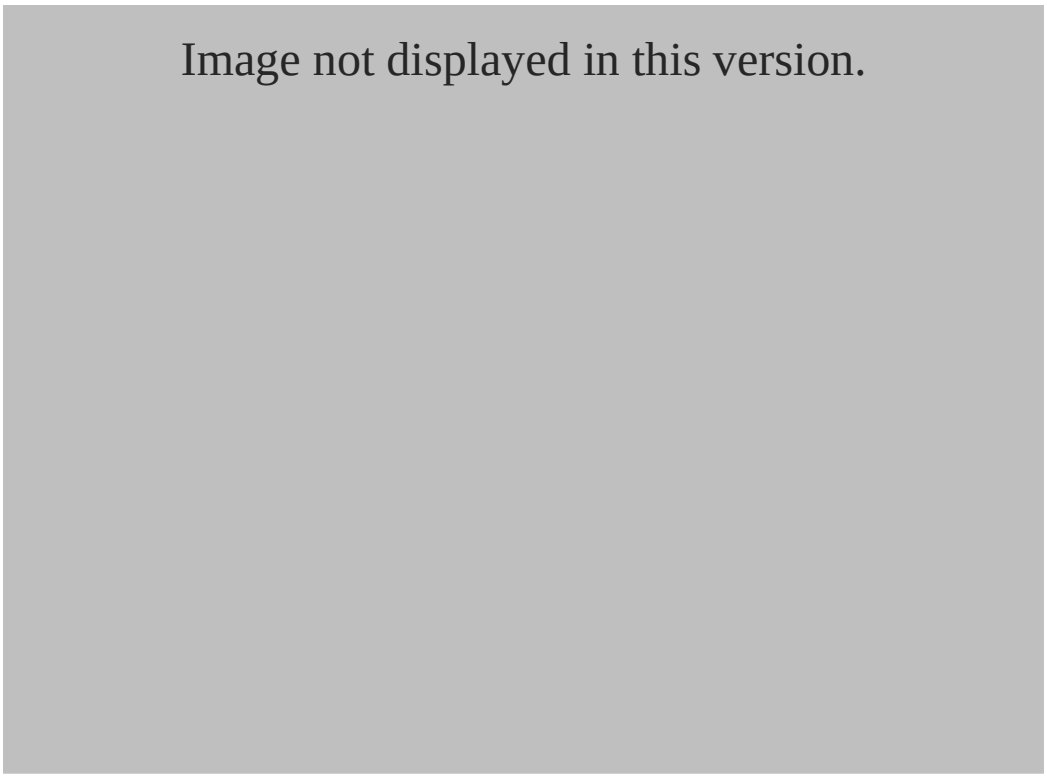


Figure 13. Map of areas supplied by TANESCO in 1992. Source: Kjellström et. al. 1992, 43.

In this part of the dissertation, I have reconstructed the transition of electricity supply in Tanzania during the 1960s: from a model of private-managed, distributed, small-scale electricity supply, financed by private capital from London, to a model of state-controlled, top-down electrification, financed by international donors. This process was paralleled by, and closely interrelated with, decolonisation and political independence from Britain, the formulation and enforcement of an "African socialist" model of state-led development, and the entry of multilateral development aid and finance into the country on a grand scale. I have furthermore summarised and discussed the impacts of this transition on the pace and scope of electrification during three decades of state-led development in the power sector from 1965 to 1995.

Self-government encompassed the obligation to end the formal or informal discrimination of service provision along racial lines. The promise to provide basic services to all Tanzanians was one of the main pillars on which the rule of the "African socialist" TANU party, with Nyerere at its top, was based upon. Certainly, domestic electricity provision was not at the core of this set of basic services, ranking far behind health or education. Nonetheless, electricity was one of the first sectors to be nationalised, even before the Arusha declaration. Rather than the prospect of expanding services, I argue, the main reason for the state's early and extensive engagement in the power sector lay in the conceptualisation of electricity as a

modernising force for economic growth and industrialisation. This enthusiasm for electricity seems to be at odds with the African socialist rhetoric of raising the living standard in rural areas by increasing agricultural productivity.

It makes more sense, however, when looking at the new configuration of global networks associated with electricity supply in Tanzania. The power sector soon attracted international development agencies and financing organisations, who came to replace British know-how and capital after Britain's relationship with Tanzania had rapidly deteriorated. The potential of Tanzania's rivers for large-scale hydropower generation particularly appealed to countries in search of new markets for they hydropower industry, such as Sweden and Norway. Big dams for river basin development became projection screens for high-modernist development visions among post-independence African governments and international donor nations alike. Designed according to the model of the TVA, they seemed to reconcile the Tanzanian government's desire for irrigation to increase agricultural productivity with the appetite of international development agencies for electricity generation.

By the example of the large hydro-power projects at the Great Ruaha River, I have illustrated the new dependencies that the shift to multilateral development aid encompassed. Ultimately, Tanzania was at the mercy of international financial institutions and their changing tastes, which, in turn, were derived from the shared terms and concepts in the global discourse on development. Its conceptualisation as an economic entity and its measurable impacts on macro-economic indicators led to a bias in the planning of dam projects. In the end, international agencies and the World Bank imposed their own versions of "development" on the Tanzanian power sectors. These ideas materialised in the large single-purpose dams and, thus, blocked the country, which was highly vulnerable to environmental changes, mismanagement and prone to conflicts for water.

During the 1970s and early 1980s, the electrification policy of the state-controlled utility in Tanzania followed a widely accepted paradigm of top-down electrification, including the gradual expansion and consolidation of the centralised grids and the gradual expansion of supplies to rural towns with isolated grids. In doing so, it followed an approach of abstract macro-level planning of power systems. Judging from the perspective of contemporary conventional wisdom about the electricity sector, international observers agreed that Tanzania was doing its homework. TANESCO was seen as a utility in a strong financial situation in the

1960s and 1970s.[1209] In 1980, a report by a British research institute on energy policy in Tanzania lauded TANESCO as a "large well-staffed and competent organization."[1210]

The Kidatu and Mtera plants in the Great Ruaha river basin substantially transformed the Tanzanian electricity infrastructure. At the time of independence, it consisted of a few isolated grids in larger cities and a low-voltage grid supplying hydropower from Pangani Falls to the sisal plantations in the North. In 1990, high voltage transmission lines connected the key hydropower sites at Pangani and Greater Ruaha rivers with the coastal grid system around Dar es Salaam and most of the bigger cities in the northern part of the country.[1211] Hydropower development dramatically increased the country's total installed capacity, which had been below 50 MW in 1960 – a low figure even for a developing country.[1212] Between 1960 and 1990, 380 MW of hydropower were added to the grid, about 200 MW of which from Great Ruaha, and by 1990 hydropower contributed 95% of the country's total electricity generation.[1213]

The state-led approach of electrification, however, also had its downsides. The top-down planning approach focussing on abstract-models and macro-economic indicators often proved to be blind for conditions on the ground. This held true for the potential social and environmental impacts of large projects, in particular hydropower dams. Furthermore, it impeded the development of effective models for the electrification of rural areas. While access to electricity in urban areas, especially in Dar es Salaam, was considerably deepened, rural farmers, supposedly the main beneficiaries of the "African socialist" development policy, remained almost completely without connection to the grid. Within its top-down model of electricity governance, the Tanzanian state refrained from creating explicit institutions for regulation, customer participation or access.[1214] As will be shown in the concluding discussion, this institutional set-up, the high dependency on international funding and the material, discursive legacies left the Tanzanian power sector ill-prepared when the structural adjustment programmes reached the energy sector in the 1990s and electricity was to be rewritten along market lines.

[1209] H. Collier, *Developing Electric Power: Thirty Years of World Bank Experience* (Baltimore: Johns Hopkins University Press, 1984), 154-55.
[1210] International Institute for Environment and Development, "Energy policy in Tanzania," 7, RUBADA archive (commissioned by the Commonwealth Secretariat through the Commonwealth Fund for Technical Cooperation London), ibid. 37.
[1211] In fact, some cities especially in the western and southern parts of the country are not connected to the national grid and are supplied by isolated grids until today.
[1212] Amann, *Energy Supply and Economic Development.*
[1213] Ghanadan, "Public Service or Commodity Goods," 59.
[1214] Ghanadan, "Connected geographies," 405.

Discussion and outlook

1) The past of the present: (Post-)colonial legacies and corrupted reforms, 1992-2006

> "Kama huu ndiyo ushirikiano wa nchi za kusini, bora ukoloni urudi."
>
> ("If this is 'South-South co-operation', then it is better if colonialism returns.")[1215]

The judgement of former president Julius Nyerere regarding a deal between the Malaysian-Tanzanian joint-venture IPTL and TANESCO in 1995 could hardly have been formulated harsher. In fact, it looked as though the state utility would emerge as the loser of a profound reform process in the Tanzanian power sector which had started in the early 1990s. Electricity provision was to be "rewritten along market lines" and, once again, the terms of this infrastructure transition were largely dictated from outside the country.[1216] Tanzania became an arena for a new scramble for the benefits of electrification, which now included a set of new players from the "Global South." In 1930, a British industrialist, who was looking for new investment opportunities after he had constructed a dam in colonial Malaya, had triggered the first privatisation of the Tanzanian power sector. Now, the former colonial subjects in Malaya entered the power sector in Tanzania – and they did so in a manner that Nyerere, the man who had led Tanzania into independence, called colonialism a preferable option.

The story that opens my concluding discussion links one age of global capitalism in the power sector to the next. It is the story of IPTL, an "emergency" power plant of 100 MW which, as Brian Cooksey put it in 2014, "has been the tail wagging the electric dog (TANESCO) for the last 20 years."[1217] The IPTL case is only one but probably the most striking symptom of the ill-conceived reforms in the Tanzanian power sector, which started in the early 1990s and were focussed on market liberalisation. Investigators from watchdog groups, such as Cooksey, who worked for Amnesty International, have meticulously reconstructed the cases of state-capture, rent-seeking and political finance that have accompanied the reform process.[1218] Within a wider debate on energy policies in Africa, academics have studied the

---

[1215] Julius Nyerere, cited in, Cooksey, "The Power and the Vainglory." Own translation. (Original translation by Cooksey: "If this is 'South-South co-operation', then colonialism is preferable.")
[1216] Quote in, Rebecca Ghanadan, "Connected geographies and struggles over access: Electricity commercialisation in Tanzania," in *Electric Capitalism: Recolonising Africa on the Power Grid*, ed. David A. McDonald (New York: Routledge, 2008), 400.
[1217] Email from Brian Cooksey, October 10, 2014.
[1218] Cooksey, "The Power and the Vainglory."

reforms in Tanzania and their impacts on service provision and access.[1219] Their results have fed into a more technical discussion on the design of "reform models" for African power sectors.[1220] With my historical analysis of East Africa/Tanzania, I make a case for grounding these debates in a better understanding of the country-specific infrastructure legacies, most notably from the late-colonial period and the age of state-led development, when the foundations of today's centralised electricity systems were laid. In the case of Tanzania, these factors are essential to explain the recent course of events in the power sector – in some aspects arguably more than abstract models of system evolution or infrastructure governance. These legacies re-emerge at all levels – ideological, environmental, technical or institutional – and they shape electrification until today, as the story of IPTL shows.

It starts at the Mtera dam, the pride of Tanzania's national power utility and prime example of an electricity project under state-led development, supported by international funding and technical assistance. In the late 1980s, the dams at Great Ruaha River accounted for half of Tanzania's total installed generating capacity and over three-quarters of its hydropower generation.[1221] In 1991, however, only ten years after the completion of the dam and only two years after the hydroelectric plant was put into operation, water levels in the Mtera reservoir did not recover during the wet season as they normally would have. The pattern repeated itself in the following years until, in 1994, the reservoir was nearly empty.[1222] In 1992 already, the unprecedented fall in the water level began to limit hydropower generation downstream. TANESCO started power rationing. Blackouts and load shedding continued until 1995.[1223] It looked like the earlier warnings of the hydropower projects' vulnerabilities, for example the high evaporation at Mtera reservoir predicted by Buchanan in 1972, had become reality.[1224] In government newspapers, TANESCO blamed the crisis on extraordinary drought and low rainfall in the catchment of Great Ruaha. In fact, the real cause for the problems at Mtera was mismanagement of the reservoir by TANESCO, as Walsh reconstructed. The centralised grid transmitted the problems at Mtera to the economic and political centre of the country. The power crisis had detrimental effects on the industry in Dar es Salaam. It occurred at a

[1219] See e.g. Ghanadan, "Connected geographies;" Ghanadan, "Public Service;" Degani, "Emergency Power."
[1220] See e.g. Katharine Nawaal Gratwick and Anton Eberhard, „Demise of the standard model for power sector reform and the emergence of hybrid power markets," *Energy Policy* 36 (2008); Rebecca Ghanadan and Anton Eberhard, "Electricity Utility Management Contracts in Africa: Lessons and Experience from the TANESCO-NETGroup Management Contract in Tanzania, 2002-2006," MIR Working Paper, Cape Town 2007
[1221] Walsh, "Not-so-Great Ruaha," 306.
[1222] Walsh, "Not-so-Great Ruaha," 306.
[1223] Walsh, "Not-so-Great Ruaha," 306.
[1224] Öhman, „Taming exotic beauties," 226. The FAO report from 1961 had already warned of high evaporation in the river basin, see Öhman, „Taming exotic beauties," 261,

politically delicate time, as the Chama Cha Mapinduzi (CCM), the ruling party that had emerged from a merger of TANU and the Afro-Shirazi Party of Zanzibar in 1977, was in the run-up for the first multi-party elections in 1995.[1225]

The critical condition of the electricity infrastructure under state-led development put the Tanzanian government under pressure to accelerate a reform process of the power utility industry, which was already in full swing in other countries. By the end of the 1980s and throughout the 1990s, governments all around the world implemented policies of liberalisation, privatisation and utility restructuring. These reforms with their emphasis on markets sparked a second wave of multinational enterprise activity and international direct investment in the electric utility sector, which had nearly come to a complete halt in the mid-1970s.[1226] International organisations like the International Energy Agency or the World Bank enthusiastically endorsed the structural reforms as a means to improve technology and knowledge transfer, technical and economic efficiency and capital availability.[1227] Especially for Africa, where many countries were suffering from an economic malaise since the 1980s, a small but influential community of private consultants and think tanks associated with the international finance institutions promoted market reforms as a cure against the notoriously low rates of access, the high technical loss, and underinvestment.[1228] During the 1990s, this idea became codified in a "standard model" of power reform which the international organisations prescribed to many governments in Africa by making it a condition for electricity loans.[1229] One of the key aims of this standard model was the gradual unbundling of state power monopolists into private generation, transmission, and distribution elements. Starting with the generation part, the model suggested contracting independent power producers (IPPs) to generate and sell electricity to state power companies.[1230]

In 1992, Tanzania started the reform process of the electricity sector, not least to regain support and resources from international donors.[1231] To recommercialise electricity services, the government lifted the monopoly in electricity generation and invited private investors to establish IPPs in the country.[1232] Arguably, the standard reform model that was imposed on

---

[1225] Walsh, "Not-so-Great Ruaha," 307-9.
[1226] Hausman et. al., *Global Electrification*, 270.
[1227] Hausman et. al., *Global Electrification*, 262-63, 274.
[1228] Gratwick and Eberhard, „Demise of the standard model, 3949.
[1229] Degani, "Emergency Power," 179. For a systematic comparison between the state-led development model and the liberal market development model in electricity, see Ghanadan, 2009, 404.
[1230] Degani, "Emergency Power," 179.
[1231] For a detailed overview of the conditions for the reforms expanding into energy, see Ghanaden, 2008, 67-8; Ghanadan, 2009, 406-7.
[1232] For a detailed overview of key elements of Tanzania's market reforms, see Ghanadan 2009, 405.

Tanzania in 1992/93, was devised with little knowledge about local conditions and the infrastructure legacies. Furthermore, the timing of its introduction proved to be pernicious. As Degani comments, "[t]he onset of the multiparty elections and the Mtera 'drought' pushed government players into a reactive and crisis-driven version of the energy reform process – a process and narrative of crisis open to political exploitation."[1233] What emerged from the search for alternatives for the failing hydropower plants at Great Ruaha was a highly corrupted deal that has been troubling Tanzania's power sector until today.[1234]

To mitigate the country's power crisis, TANESCO hastily began to look for emergency solutions in 1994. In a large process lacking transparency, it began negotiations with the IPP Independent Power Tanzania Ltd. (IPTL), a newly established joint venture between a Tanzanian firm and a Malaysian trading and marketing company with no previous experience in large power projects. In 1995, TANESCO and IPTL signed a twenty-year Power Purchasing Agreement (PPA) to build a 100 MW slow-speed diesel in Dar es Salaam. As IPTL, however, did not only place orders for a different and cheaper technology than contractually agreed on but also failed to justify cost structure and some obscure payments, TANESCO and IPTL entered a series of legal disputes in the late 1990s, which delayed the completion of the power plant. In 2000, a Tanzanian official admitted having taken a bribe from the IPTL director, and two others claimed that they had been offered bribes. At that time, the crisis in power generation was long over, after the addition of 75 MW at TANESCO's main plant in Dar es Salaam in 1995 and a further 180 MW donor-funded hydro scheme at Kihansi were under construction.[1235] When the IPTL power station went online in 2002, it was one of the most expensive of its kind in the world.[1236] Songas, another IPP operating a gas power plant, followed in 2004 – also after costly delays.

The next step of the standard model was the privatisation of TANESCO itself. In 1997, TANESCO was specified for privatisation and put under the Parastatal Sector Reform Commission, which had been founded to expedite the privatisation of parastatals.[1237] However, the privatisation of the sector proceeded much more slowly than anticipated. For the Tanzanian public, "[s]ervices as electricity and water represent some of the last frontiers of state-led development and embody resources, as well as promises, for redistribution and

[1233] Degani, "Emergency Power," 180.
[1234] Walsh, "Not-so-Great Ruaha," 309.
[1235] Cooksey, "The Power and the Vainglory."
[1236] Ghanadan, "Public Service," 139.
[1237] Ghanadan, "Public Service," 67-68; Ghanadan, "Connected Geographies," 409.

social development – such as jobs, subsidies and low-costs services," Ghanadan states.[1238] In 2002, the government stepped up its efforts and entered a management contract with the South African consultancy company NETGroup Solutions. The contract was met with fierce resistance within TANESCO and from the Tanzanian public. The protests culminated in April/May 2002, when workers blocked the entrance of the headquarters and prevented the white South African managers from entering. In their demonstration, they evoked the legacy of Nyerere. Their placards read: "TANESCO, its dams, and electricity supply are the hard efforts of Nyerere and Tanzanian Citizens."[1239] The protest remained without effect. Between 2002 and 2006, TANESCO was managed by NETGroup. [1240]

A snapshot of the Tanzanian power sector during the years 2005 and 2006 reveals the devastating results of a market reform that was prescribed form outside to cure symptoms of a structural crisis without understanding their causes including Tanzania's infrastructural legacy: Tanzania was again suffering from a drought. This time, however, the IPPs had profoundly transformed the structure of generation in the Tanzanian grid. In 2005 and 2006, TANESCO sold more electricity from gas and diesel than from hydropower. In 2005, TANESCO had to spend a staggering 69% of its total annual revenue to purchase electricity from the IPPs and compensate for the shortfall in hydropower, as Ghanadan found.[1241] Still, the country was suffering from power shortages. Once again, the country's unfortunate hydroelectric legacy shook up its political landscape. In 2006, Tanzania's Prime Minister Edward Lowassa resigned over charges of improperly awarding a contract to a US-based electricity company, DOWANS, which failed to provide adequate emergency power during a drought.[1242]

Putting the blame for the continuous desiccation of the Great Ruaha on upstream uses of the water, the government enforced a mass expulsion of livestock keepers from the river's catchment area in 2006/2007. NGOs and the national and international media condemned the largest eviction of its kind in recent Tanzanian history.[1243] The expulsion was a reverberation of the first joint financing agreement for the Great Ruaha power project, signed in 1970 by the

---

[1238] Ghanadan, "Connected Geographies," 409.
[1239] "May day and Tanesco workers yesterday," *Wananchi*, May 2, 2002, Cited in Ghanadan, „Connected Geographies," 212.
[1240] Ghanadan, „Connected Geographies," 412-413.
[1241] Katharine Nawaal Gratwick et. al., "Generating Power and Controversy, Understanding Tanzania's Independent Power Projects," *Journal of Energy in Southern Africa* 17 (2006), 46; Mwakapugi et. al., "The Tanzanian Energy Sector," 8.
[1242] "Tanzanian PM to resign over graft," *BBC*, February 7, 2008, last accessed April 14, 2014, http://news.bbc.co.uk/2/hi/africa/7232141.stm.
[1243] Walsh, "Not-so-Great Ruaha," 303.

World Bank, Sweden, TANESCO and the government, which had stipulated that upstream use of water must be restricted to allow for the hydropower generation.[1244]

The large sums TANESCO had to spend to fulfil its PPAs further increased the pressure on the revenue side: Under the management of NETGroup, electricity rates tripled and cross-subsidies that dated back to the period of state-led development were drastically reduced. The threshold for the subsidized "Lifeline" tariffs for poor households were reduced from 100 to 50 kWh. The South African management tried to increase payment rates by installing prepaid electricity meters, a technology that had been first introduced in the black townships of South Africa to counter largely politically motivated non-payment and started a disconnection campaign of customers who defaulted on their electricity bills.[1245] At the same time, technical support and the customer service remained dismal and neither the technical nor commercial losses could be significantly improved.[1246] The number of new customers increased only at a sluggish 6% during the time of the management contract as opposed to an average 11% between 1980 and 2002.[1247]

Somewhat ironically, the Great Ruaha Power Project, originally devised to relieve the country from fuel imports for power generation, had ultimately led the country into a contractual dependency on one of the continent's most expensive diesel-powered plants. The liberalisation of generation by means of PPAs, which were aimed at increasing the utility's efficiency and access to capital, ultimately resulted in a national utility being stripped of the investment capital it urgently needed to consolidate its finances, improve service, and extend grid access. Rather than facilitating the privatisation of TANESCO, which was the long-term goal of the structural reforms, the IPPs turned out to be its major obstacle. As TANESCO's financial situation had deteriorated and it had accumulated a large investment backlog, private investors lost their interest in the utility.[1248] In 2006, the Tanzanian government decided not to extend the contract with the South African consultancy as, one year before, the international donor community had quietly dropped the privatisation plans for TANESCO, clearing the path for more flexible models of cooperation between the state and the private sector.[1249]

[1244] Öhman, "Taming exotic beauties," 302.
[1245] Ghanadan and Eberhard, "Electricity Utility Management Contracts," 30; Ghanadan, "Connected Geographies," 415. For short history of the prepaid meter in Africa, see van der Straeten, "Eine 'afrikanische' Geschichte von Elektrizität," 72-76.
[1246] Ghanadan and Eberhard, "Electricity Utility Management Contracts," 28; Mwakapugi et. al., "The Tanzanian Energy Sector," 6.
[1247] Ghanadan, Public Service, 231.
[1248] Mwakapugi et. al., "The Tanzanian Energy Sector," 7.
[1249] Ghanadan, Connected Geographies, 413.

2) Of old stories and new lock-ins – historical perspectives for current debates on electrification

The story of the ill-conceived reforms is only latest chapter in a long history of outside interventions in the electrification of East Africa, which have failed in their original objectives or even produced the opposite effects. This thesis has shown how global actor networks have not only influenced but profoundly shaped the emergence and evolution of electricity systems on the African continent. Within the process of global electrification, British colonial East Africa and post-independence Tanzania were among the most peripheral sites and, thus, most affected by the asymmetries in knowledge, capital and political power that characterised colonial rule and multilateral development aid. Hence, electricity systems in these countries need to be analysed in terms of their appeal for highly mobile individuals, companies and institutions who capitalised on these asymmetries.

East Africa constituted a small but lucrative "enclave" market for an emerging global financial capitalism in electricity and for a tumbling British electrical engineering industry during colonial rule. After independence, they were followed by foreign consultants, engineering firms and manufacturers, competing for the funds from international donors, for example the Scandinavian hydropower industry which was in search of new export markets. Power sectors in East Africa were projection screens of different development visions, including: the "Imperial Estates" doctrine of the early twentieth century; the "Colonial Development and Welfare" agenda of the late British colonial era; the abstract models of the emerging discipline of development economics since the 1950s; the high modernist visions of hydropower development shared by international development agencies and African post-independence national governments in the 1960 and 1970s; and the neoliberal market reform doctrine of the 1980s and 1990s. In the 1990s, they became targets of state-capture and rent-seeking by a criminal network that exploited the chaotic and crisis-driven transition from state-led development to market capitalism in the power sector. In fact, the inability (or unwillingness) of the state to contain and direct foreign involvement is a constant in the history of the electrification in East Africa, even under state-led development.

The evolution of electricity systems in most of Africa until today, I argue, followed a different trajectory than the evolution of the small, intercity lighting systems of the 1880s in Europe and the US, which turned into the interconnected regional and national power grids of the

1930s, as Hughes described.[1250] Hence, for Africa, his overall model of system evolution needs to be adapted or complemented, particularly in regard to what Hughes has called "old" systems. In fact, the momentum in large technical systems in Europe provided an inertia of motion that entailed high continuity in their topology, generation structure and governance – at least until recently.[1251] In contrast, electricity systems in East Africa always remained highly susceptible to "external forces." As my accounts show, they have been characterised by recurring and sometimes abrupt changes in the pace and scope of system growth (or, sometimes even decline) and remain so until today. To make sense, of the changes in the configuration of electric power systems in East Africa, I argue, it is important not only to acknowledge, but to unpack the metaphor of "external forces" and follow the global actor networks that shape electrification in Africa.

Hughes wrote his pioneering book in 1983. What was conventional wisdom about the electricity sector at that time – public ownership and integrated utilities – has been challenged by a new model of private ownership and unbundled utilities, which emerged in the 1990s.[1252] As was shown, in countries like Tanzania, this new model has deeply shaken but never completely superseded the "old" model of state-led development in the power sector. At the same time, alternatives to the conventional technologies for electricity generation have emerged. More recently, dramatic efficiency increases of wind and solar technologies for electricity generation have not only challenged a century old paradigm of the economic superiority of fossil fuels, nuclear power or large-scale hydropower generation. They have also sparked a debate on alternatives to electrification by extending centralised grids.

In 2011, the International Energy Agency developed a scenario for the most cost-effective way of universal access to electricity worldwide. In this scenario, only 30% of rural areas were projected to be electrified via connection to centralised grids, whereas 70% of rural areas are either supplied by microgrids or by small stand-alone off-grid solutions.[1253] Another recent debate centres on the metrics for measuring access to "modern" or "sustainable" energy. Rejecting the binary notion of on-grid/off-grid, academics and international development institutions have developed new criteria, which are based on the quality of services rather than the number of kWh consumed. In consultation with several stakeholders

---

[1250] Hughes, *Networks of Power*, 2.
[1251] Hughes, *Networks of Power*, 15.
[1252] N.K. Dubash, *Power Politics: Equity and Environment in Electricity Reform* (Washington DC: World Resources Institute, 2002), ix.
[1253] International Energy Agency, "Energy for all: Financing access for the poor," special early excerpt of the World Energy Outlook, Paris, 2011; Sebastian Groh, et. al., eds., *Decentralized Solutions for Developing Economies* (Cham: Springer, 2015).

the World Bank's Energy Sector Management Assistance Program recently put forward a multi-tier framework, heralded as a new "milestone" in energy measurement.[1254] An electrification policy based on these criteria would be diametrically opposed to current planning methods for energy systems.

At the same time, alternative electrification approaches have received critique from a group of mostly US-based scholars, who are calling for "Debunking Microenergy," as the title of a recent article in "Foreign Affairs" by Nordhaus et al. suggests.[1255] The authors accuse many initiatives that address energy poverty of fetishising very low levels of household electricity consumption. "Energy consumption, not energy access," they put forward, "is the metric that is strongly correlated with positive human development outcomes."[1256] While off-grid electricity can only remain a niche solution, the key to ending energy poverty is, therefore, mass migration from "the wood economy" of the rural areas to the urban and industrial core, where "economies of scale and population density allow electrification to be achieved at lower cost." Only rising societal wealth in the urban and industrial centre, the authors argue, can generate the funds required for subsidised rural electrification approaches. Investments in natural gas, the author calculate, would serve more people in Africa at lower costs than renewable energies.[1257] Hence, the authors conclude that "efforts to end energy poverty are successful when they are pursued not piecemeal but through strategic government industrial and agricultural policy, strong institutions, public utilities, and regulated monopolies."[1258] Having unpacked the terms and concepts behind high-modernism in this dissertation, it is not difficult to unveil the authors' theses as a reverberation of this ideology and of the abstract economic thinking that have produced the ill-fated development projects in the Tanzanian power sector of the 1970s and 1980s.

These examples mark two poles of a complex current debate on access to energy in Africa. More than ever, decision-makers in the African power sector are confronted with a multitude of – sometimes competing, sometimes overlapping – policy narratives about energy provision.

[1254] Mikul Bhatia and Nicolina Angelou, *Beyond Connections: Energy Access Redefined* (Washington DC: The International Bank for Reconstruction And Development, 2015); Gunther Bensch, "Inside the metrics: An empirical comparison of energy poverty indices for Sub-Saharan countries," Ruhr Economic Papers No. 464, RWI Leibniz Institute for Economic Research, 2013; For a critique of the ESMAP tier-framework, see Sebastian Groh et. al., "What are we measuring? An empirical analysis of household electricity access metrics in rural Bangladesh," *Energy for Sustainable Development* 30 (2016).

[1255] Ted Nordhaus et.al., "Debunking Microenergy - The Future Lies With Urbanization," *Foreign Affairs*, August 30, 2016, last accessed April 25, 2017, https://www.foreignaffairs.com/articles/2016-08-30/debunking-microenergy.

[1256] Nordhaus et.al., "Debunking Microenergy."

[1257] Nordhaus et.al., "Debunking Microenergy."

[1258] Nordhaus et.al., "Debunking Microenergy."

In a recent study, Hermwille and van der Straeten have aimed at mapping out these narratives for the Tanzanian energy sector and identifying shared meta-narratives.[1259] The most widely shared of this meta-narratives revolves around the state's capability of overseeing and regulating the sector in a way that electricity can serve – what they consider to be – its original purpose: Fostering economic growth on the macro level, creating jobs and putting the country on an industrialisation path.[1260] If there is a lesson to be learned from history, I argue, it is to emphasise the first part of this narrative and question the second. Strong and effective state institutions are more important than ever to balance and manage the multifold interests from inside and outside the country, as I have shown in this dissertation. If state regulation and management are closely geared to industrialisation and a small set of macro-economic indicators, however, they run danger to repeat the same mistakes that past administrations have made. In the same manner, Gore has highlighted the "weight of history working against efforts to construct an alternative narrative or path to reform" for the Ugandan power sector.[1261] "Today," he writes, "the rationale for large-scale infrastructure development is largely based on the principles espoused historically: an assumption that more electricity for economic growth will eventually trickle down to citizens."[1262] Recent studies by Dye on Ruanda or by Cuesta-Fernandez on Ethiopia suggest the same for their respective country under investigation.[1263]

More recently, Tanzania has made considerable steps to improve the state's capacity regarding electricity by creating institutions for access and regulation. In 2001, more than four decades after the British colonial administration had made a first feeble attempt to create a rudimentary regulatory body, the government set up the Energy and Water Utilities Regulatory Authority (EWURA) that has been much lauded by the international aid community in recent years.[1264] In 2005, the Rural Energy Agency and Fund (REA/REF) was created to overview the non-commercial rural electrification and, thus, separate it from TANESCO.[1265]

[1259] Lukas Hermwille and Jonas van der Straeten, "*Of Old Stories and New Lock-ins – Mapping Energy Narratives in Tanzania,*" unpublished paper for the International Sustainability Transitions Conference, 25-28 August 2015 at the University of Sussex, Falmer, Brighton (UK).
[1260] Hermwille and van der Straeten, "*Of Old Stories and New Lock-ins,*" 19.
[1261] Gore, "Electricity and privatisation," 364.
[1262] Gore, "Electricity and privatisation," 371.
[1263] Ivan Cuesta-Fernandez, "Mammoth dams, lean neighbors: assessing the bid to turn Ethiopia into East Africa´s powerhouse," in *A New Scramble for Africa? The Rush for Energy Resources*, ed. Soren Schölvin (Farnham and Burlington, VT: Ashgate, 2015); Dye, "The Return of 'high Modernism'?"
[1264] Tenenbaum et. al., 22. At the time of this writing, Tanzania has probably made "more progress than any other African country in developing a comprehensive SPP regulatory system."
[1265] Ghanadan, "Connected Geographies," 405, 421.

Yet, although rural electrification has become a political priority in Tanzania, the legacy of organisational and planning structures geared towards centralised supply still represent a major barrier. Despite current reform attempts, the power sector is centralised and dominated by the ministries and government utilities. Rather than a lack of funds, it is in fact, as Ahlborg and Hammar have argued, this inefficient top-down structure that represents the main challenge. They highlight the fact that in 2008/2009 only a minor part (14%) of available funds for energy projects were actually disbursed. [1266] Furthermore, the utilities and energy agencies still struggle with understanding the needs and demands of rural customers. Traditional building techniques, for example, still present a major obstacle for rural electrification, as they did 60 years ago. Ever since, technical standards have made it impossible to connect the typical houses in rural Tanzania built of mud and grass. Although experiences from other countries like Mozambique exist, these houses are not considered for connection today. As a result, only 10% of the rural population that could potentially afford connection conforms to the building standards required for grid connection.[1267]

The Tanzanian experience stands for most Sub-Saharan countries. One of the few success stories of state-led rural electrification programmes in the region is Ghana, although the country is still struggling to keep electricity generation ahead of the increasing demand.[1268] Except for South Africa, Swaziland and a few island states, no Sub-Saharan Country has achieved a rural electrification rate above 50% and in about half of the remaining countries, rural electrification rates are below 10%.[1269] The question for the right policies and technological pathways to universal access cannot be answered without investigating the historical root causes for the many issues associated with access to electricity today; the urban-rural disparities of electrification as one of the main causes for rural energy poverty, and the current crises of many centralised power systems in the Global South. In order to do so, the energy access scientific community needs to take up the insights from the relatively young but growing scholarship on the history of electrification and other infrastructures in the non-Western world.

[1266] Helene Ahlborg and Linus Hammar, "Drivers and barriers to rural electrification in Tanzania and Mozambique: Grid-extension, off-grid, and renewable energy technologies," *Renewable Energy* 61 (2014), 121.
[1267] Ahlborg and Hammar, "Drivers and barriers," 120.
[1268] Francis Kemausuor and Emmanuel Ackom, "Toward universal electrification in Ghana," *WIREs Energy Environ* 6 (2017).
[1269] International Energy Agency, *World Energy Outlook, Energy Access database.* Available online. Accessed March 20, 2017, http://www.worldenergyoutlook.org/resources/energydevelopment/energyaccessdatabase/;

Bibliography

Articles, books, and unpublished theses and papers

Adas Michael. *Machines as the Measure of Men: Science, Technology, and Ideologies of Western Dominance*. Delhi: Cornell University Press, 1990.

Ahlborg, Helene, and Linus Hammar. "Drivers and barriers to rural electrification in Tanzania and Mozambique: Grid-extension, off-grid, and renewable energy technologies." *Renewable Energy* 61 (2014): 117-24.

Akaki, Tony. *Mabira Forest Giveaway: A Path to Degenerative Development*. Bloomington, IN: iUniverse, 2011.

Altorfer-Ong, Alicia N. "Old comrades and new brothers: a historical re-examination of the Sino-Zanzibari and Sino-Tanzanian bilateral relationships in the 1960s*."* PhD diss., London School of Economics and Political Science, 2014.

Amann, Hans. E*nergy Supply and Economic Development in East Africa.* München: Weltforum Verlag, 1969.

Andersen, Casper. *British Engineers and Africa, 1875-1914*. London and Brookfield: Pickering & Chatto, 2011.

Arndt, Heinz Wolfgang. *Economic Development: The History of an Idea.* Chicago: University of Chicago Press, 1987.

Arnold, David. "Europe, Technology, and Colonialism in the 20th Century." *History and Technology* 21 (2005): 85–106.

Ashton, S. R., and S. E. Stockwell, eds. *British Documents on the End of Empire*, series A, vol. 1: Imperial Policy and Colonial Practice 1925–1945, part 2: Economic Policy, Social Policies and Colonial Research. London: HMSO for the Institute of Commonwealth Studies in the University of London, 1996.

Baker, Martha Grace. "Citizenship on the Septic Fringe. Urban Social Policy and Peri-Urban Development in Kisumu, Kenya." PhD diss., University of Michigan, 2002.

Ballantyne, Tony, and Antoinette M Burton. *Empires and the Reach of the Global, 1870-1945*. Cambridge, Massachusetts: Harvard University Press, 2012.

Barak, On. *On Time: Technology and Temporality in Modern Egypt*. Berkeley: University of California Press, 2013.

Bataille, Chris, Henri Waisman, Michel Colombier, Laura Segafredo, and Jim Williams. "The Deep Decarbonization Pathways Project (DDPP): Insights and Emerging Issues." *Climate Policy* 16 (2016): 1–6, accessed March 20, 2017, doi:10.1080/14693062.2016.1179620.

Bates, Robert H. *Markets and States in Tropical Africa: The Political Basis of Agricultural Policies.* Berkeley: University of California Press, 1981.

Beattie, James, Edward D Melillo, and Emily O'Gorman. *Eco-Cultural Networks and the British Empire: New Views on Environmental History*. London: Bloomsbury Academic 2015.

Beckert, Sven. *Empire of Cotton: A Global History*. New York: Alfred A. Knopf, 2015.

Bensch, Gunther. "Inside the metrics: An empirical comparison of energy poverty indices for Sub-Saharan countries." Ruhr Economic Papers No. 464, RWI Leibniz Institute for Economic Research, 2013.

Bhatia, Mikul and Nicolina Angelou. *Beyond Connections: Energy Access Redefined*. Washington DC: The International Bank for Reconstruction and Development, 2015.

Bienen, Henry. *Tanzania: Party Transformation and Economic Development*. Princeton N.J.: Princeton University Press, 1967.

Binder, Beate. *Elektrifizierung als Vision. Zur Symbolgeschichte einer Technik im Alltag.* Tübingen: Tübinger Vereinigung für Volkskunde, 1999.

Bouman, Mark J. "Luxury and Control The Urbanity of Street Lighting in Nineteenth-Century Cities." *Journal of Urban History* 14 (1987): 7-37.

Brennan, James R., Andrew Burton, and Yusufu Qwaray Lawi. *Dar Es Salaam: Histories from an Emerging African Metropolis*. Dar es Salaam: Mkuki na Nyota Publishers and Nairobi: British Institute in Eastern Africa, 2007.

Brown, Frederick, ed. *Statistical Year Book, 1933&1934*. London: World Power Conference, 1936.

Buchanan, Norman S., and Howard Sylvester Ellis. *Approaches to Economic Development*. New York: Twentieth Century Fund, 1955.

Burton, Andrew. *African Underclass: Urbanisation, Crime & Colonial Order in Dar Es Salaam*. Oxford: James Currey 2006.

Büschel, Hubertus. "Eine Brücke am Mount Meru - Zur Globalgeschichte von Hilfe zur Selbsthilfe und Gewalt in Tanganjika." In *Entwicklungswelten - Zur Globalgeschichte der Entwicklungszusammenarbeit,* edited by Hubertus Büschel and Daniel Speich, 175-206. Frankfurt/M.: Campus, 2009.

Byatt, C. R. *The British Electrical Industry, 1875-1914: The Economic Returns to a New Technology*. Oxford: Clarendon Press, 1979.

Byerley, Andrew. *Becoming Jinja: The Production of Space and Making of Place in an African Industrial Town*. Stockholm: Almqvist & Wiksell International, 2005.

Cain, P.J., and Anthony G. Hopkins. *British Imperialism: Crisis and Deconstruction. 1914-1990*. London and New York: Longman, 1993.

Cairncross, A. K. „The Place of capital in economic progress." In *Economic progress: Proceedings of a Conference held by the International Economic Association at Santa Margherita Ligure, Italy,* edited by Léon H. Dupriez, 235-248. Lauvain: International Economic Association, 1955.

Callon, Michel. "What Does It Mean to Say That Economics Is Performative?" In *Do Economists Make Markets? On the Performativity of Economics*, edited by Donald A MacKenzie, Fabian Muniesa, and Lucia Siu, 311-57. Princeton: Princeton University Press, 2007.

Chikowero, Moses. “Subalternating Currents: Electrification and Power Politics in Bulawayo, Colonial Zimbabwe, 1894–1939.” *Journal of Southern African Studies* 33 (2007): 287–306.

Choi, Mihwa. “Contesting *Imaginaires* in Death Rituals during the Northern Song Dynasty.” PhD diss., University of Chicago, 2008.

Churchill, Winston. *My African Journey*. Toronto: W. Briggs, 1908.

Clark, Colin. Foreword to *The Conditions of Economic Progress,* by Colin Clark. London: Macmillan, 1957.

Clark, Colin. *The conditions of economic progress*. London: Macmillan, 1960.

Clerk, Dugald, and A. H. Gibson. *Water-Power in the British Empire; the Reports of the Water-Power Committee of the Conjoint Board of Scientific Societies.* London: Constable & Co., 1922.

Cobb, Charles W., and Paul H. Douglas. “A Theory of Production.” *The American Economic Review* 18 (1928): 139–65.

Cohen, Andrew. *British Policy in Changing Africa*. Evanston: Northwestern University Press 1959.

Collier H. *Developing Electric Power: Thirty Years of World Bank Experience*. Baltimore: Johns Hopkins University Press, 1984.

Colm, Gerhard. “Economic Projections: Tools of Economic Analysis and Decision Making.” *The American Economic Review* 48 (1958): 178–87.

Conrad, Sebastian. *What Is Global History?* Princeton: Princeton University Press, 2016.

Constantine, Stephen. *The Making of British Colonial Development Policy 1914-1940.* London: Frank Cass, 1984.

Cooksey, Brian. “The Power and the Vainglory: Anatomy of a $100 Million Malaysian IPP in Tanzania.” In *Ugly Malaysians? South-South investments abused,* edited by K.S. Jomo. Durban: Institute for Black Research, 2002.

Cooper, Frederick, and Ann-Laura Stoler. “Between Metropole and Colony: Rethinking a Research Agenda.” In *Tensions of Empire. Colonial Cultures in a Bourgeois World*, edited by Frederick Cooper and Ann-Laura Stoler, 1-56. Berkeley, Los Angeles, and London: University of California Press, 1997.

Cooper, Frederick, and Randall M. Packard. “Introduction.” In *International Development and the Social Sciences: Essays on the History and Politics of Knowledge*, edited by Frederick Cooper and Randall M. Packard. Berkeley: University of California Press, 1998.

Cooper, Frederick. “The Dialectics of Decolonisation: Nationalism and Labor Movements in Power French Africa.” In *Tensions of Empire. Colonial Cultures in a Bourgeois World*, edited by Frederick Cooper and Ann-Laura Stoler, 1-56. Berkeley, Los Angeles, and London: University of California Press, 1997.

Cooper, Frederick. *Africa Since 1940: The Past of the Present*. Cambridge, U.K.; New York, NY: Cambridge University Press, 2002.

Coppersmith, Jonathan. *The Electrification of Russia, 1880-1926*. Ithaca: Cornell University Press, 1992.

Coquery-Vidrovitch, Catherine. "Electricity Networks in Africa: A Comparative Study, or How to Write Social History from Economic Sources." In *Sources and Methods in African History*, edited by Toyin Falola and Christian Jennings, 346-61. Rochester, NY: University of Rochester Press, 2003.

Coulson, Andrew. *Tanzania: A Political Economy*. Oxford: Oxford University Press, 2013.

Cuesta-Fernandez, Ivan. "Mammoth dams, lean neighbors: assessing the bid to turn Ethiopia into East Africa´s powerhouse." In *A New Scramble for Africa? The Rush for Energy Resources*, edited by Soren Schölvin, 93-110. Farnham and Burlington, VT: Ashgate, 2015.

Cullather, Nick. "Development? It's History." *Diplomatic History* 24 (2000): 641–53.

Dados, Nour, and Raewyn Connell. "The Global South." *Contexts* 11 (2012): 12-13.

Deane, Phyllis. *Colonial Social Accounting.* Cambridge, UK: Cambridge University Press, 1953.

Degani, Michael. "Emergency Power: Time, Ethics, and Electricity in Postsocialist Tanzania." In *Cultures of Energy Power, Practices, Technologies*, edited by Sarah Strauss, Stephanie Rupp, and Thomas F Love, 177–92. Walnut Creek, California: Left Coast Press, 2013.

Dosser, Douglas. "The Formulation of Development Plans in the British Colonies." *The Economic Journal* 69 (1959): 255-56.

Dubash, N.K. *Power Politics: Equity and Environment in Electricity Reform* (Washington DC: World Resources Institute, 2002).

Dunlop, D. N. *British Destiny: The Principles of Progress*. London: Path Publishing Company, 1916.

Dunlop, Daniel Nicol. Foreword to *The Transactions of the First World Power Conference, London, June 30th to July 12th, 1924, Vol. I*, vii-x. London: Percy Lund Humphries, 1924.

Dye, Barnaby. "The Return of 'high Modernism'? Exploring the Changing Development Paradigm through a Rwandan Case Study of Dam Construction." *Journal of Eastern African Studies* 10 (2016): 303–24.

Eckert, Andreas. "Comparing Coffee Production in Cameroon and Tanganyika, c. 1900 to 1960s." In *The Global Coffee Economy of Africa, Asia, and Latin America, 1500-1989*, edited by William G. Clarence-Smith and Steven Topik. Cambridge: Cambridge University Press, 2003.

Eckert, Andreas. *Herrschen und Verwalten: afrikanische Bürokraten, staatliche Ordnung und Politik in Tanzania, 1920-1970.* München: Oldenbourg, 2007.

Economist Intelligence Unit. *Power in Uganda. 1957-1970. A study of economic growth prospects for Uganda with special reference to the potential demand for electricity*. London: Economist Intelligence Unit Ltd, 1957.

Egerton, F.P. *Report on Electricity Supplies in Tanganyika*. Dar es Salaam: Government Printer, 1954.

Ertsen, Maurits W. *Improvising Planned Development on the Gezira Plain, Sudan, 1900-1980*. Basingstoke: Palgrave Macmillan, 2015.

Fage, John. *A History of Africa*. London and New York: Routledge, 2002.

Fahim, Hussein M. *Dams, People and Development: The Aswan High Dam Case*. Amsterdam: Pergamon, 1981.

Fendall, N. R. E. "Housing, Health and Happiness." *East African Medical Journal* 36 (1959): 473–85.

Ferguson, James. *The Anti-Politics Machine: "Development," Depoliticization and Bureaucratic Power in Lesotho*. Cambridge: Cambridge University Press, 1990.

Fieldhouse, David Kenneth. *Black Africa, 1945-80: Economic Decolonization & Arrested Development*. London: Allen & Unwin, 1986.

Fourastié, Jean. *Le grand espoir du XXe siècle*. Paris: Presses universitaires de France, 1952.

Frey, Marc, and Sönke Kunkel. "Writing the History of Development. A Review of the Recent Literature." *Contemporary European History* 20 (2011): 215–32.

Gall, Alexander. "Mediterrane Stromvisionen. Von Atlantropa zu DESERTEC?" In *Technology fiction: technische Visionen und Utopien in der Hochmoderne*, edited by Uwe Fraunholz and Anke Woschech, 165–91. Transcript: Bielefeld, 2012.

Gandy, Matthew. "Planning, Anti-Planning and the Infrastructure Crisis Facing Metropolitan Lagos." *Urban Studies* 43 (2006), 371-96.

Gardner, Leigh. *Taxing Colonial Africa: The Political Economy of British Imperialism*. Oxford: Oxford University Press 2012.

Ghanadan, Rebecca and Anton Eberhard. "Electricity Utility Management Contracts in Africa: Lessons and Experience from the TANESCO-NETGroup Management Contract in Tanzania, 2002-2006." MIR Working Paper, Cape Town 2007.

Ghanadan, Rebecca. "Connected geographies and struggles over access: Electricity commercialisation in Tanzania." In *Electric Capitalism: Recolonising Africa on the Power Grid*, edited by David A. McDonald, 400-36. New York: Routledge, 2008.

Ghanadan, Rebecca. "Public Service or Commodity Goods? Electricity Reforms, Access, and the Politics of Development in Tanzania." PhD diss., University of California, Berkeley, 2008.

Gibson, A.H. "Water Power Problem in Great Britain and Ireland." In *The Transactions of the First World Power Conference, London, June 30th to July 12th, 1924, Vol. I*, 372-391, London: Percy Lund Humphries, 1924.

Gilson, Norbert. *Konzepte von Elektrizitätsversorgung und Elektrizitätswirtschaft: Zur Entstehung eines neuen Fachgebietes der Technikwissenschaften zwischen 1880 und 1945*. Stuttgart: Verlag für Geschichte der Naturwissenschaften und der Technik, 1994.

Gooday, Graeme. Domesticating Electricity: Technology, Uncertainty and Gender, 1880 – 1914. London: Pickering & Chatto, 2008.

Gore, Christopher. "Electricity and privatisation in Uganda: The origins of the crisis and problems with the response." In *Electric Capitalism: Recolonising Africa on the Power Grid*, edited by David Alexander McDonald, 359-399. London: Earthscan, 2009.

Granovetter, Mark, and Patrick McGuire. "The Making of an Industry: Electricity in the United States." *The Sociological Review* 46 (1998): 147–73.

Gratwick, Katharine Nawaal, and Anton Eberhard. "Demise of the standard model for power sector reform and the emergence of hybrid power markets." *Energy Policy* 36 (2008): 3948–60.

Gratwick, Katharine Nawaal, Rebecca Ghanadan, and Anton Eberhard. "Generating Power and Controversy, Understanding Tanzania's Independent Power Projects." *Journal of Energy in Southern Africa* 17 (2006): 39-56.;

Groh, Sebastian, Sonali Pachauri, and Rao Narasimha. "What are we measuring? An empirical analysis of household electricity access metrics in rural Bangladesh." *Energy for Sustainable Development* 30 (2016): 21-32.

Groh, Sebastian, Jonas van der Straeten, Brian Edlefsen Lasch, Dimitry Gershenson, Walter Leal Filho, and Daniel M. Kammen, eds. *Decentralized Solutions for Developing Economies.* Cham: Springer, 2015.

Hannah, Leslie. *Electricity Before Nationalisation*. Baltimore, John Hopkins University Press, 1979.

Hard, Mikael, and Andrew Jamison. *Hubris and Hybrids*. New York: Routledge, 2005.

Harding, Leonhard. Geschichte *Afrikas im 19. und 20. Jahrhundert*. München: Oldenbourg 2006.

Harris, Richard, and Alison Hay. "New Plans for Housing in Urban Kenya, 1939-63." *Planning Perspectives* 22 (2007): 195–223.

Harrison, Conor. "The Historical–geographical Construction of Power: Electricity in Eastern North Carolina." *Local Environment* 18 (2013): 469-86.

Hart, David. *The Volta River Project: a case study in politics and technology*. Edinburgh: Edinburgh University Press, 1980.

Hausman, William J., Peter Hertner, and Mira Wilkins, editors. *Global Electrification: Multinational Enterprise and International Finance in the History of Light and Power, 1878–2007*. New York: Cambridge University Press, 2008.

Havnevik, Kjell J. *Framing African Development. Challenging Concepts.* Leiden: Koninklijke Brill NV, 2015.

Havnevik, Kjell J. *Tanzania: The Limits to Development from Above*. Uppsala, Nordic Africa Institute, 1993.

Hayes, Charles. *Stima: An Informal History of EAP&L*. Nairobi: East African Power and Lighting Co., 1983.

Headrick, Daniel R. *The Tentacles of Progress: Technology Transfer in the Age of Imperialism, 1850-1940*. New York: Oxford University Press, 1988.

Headrick, Daniel R. *The Tools of Empire: Technology and European Imperialism in the 19. Century*. New York: Oxford University Press, 1981.

Hege, Patrick. "The German variation. A sketch of colonial Städtebau in Africa, 1884-1919." In *Urban Planning in Sub-Saharan Africa. Colonial and Postcolonial Planning Cultures*, edited by Carlos Nunes Silva, 165-179. New York: Routledge, 2015.

Hermwille, Lukas, and Jonas van der Straeten: „*Of Old Stories and New Lock-ins – Mapping Energy Narratives in Tanzania*." Unpublished paper for the International Sustainability Transitions Conference, 25-28 August 2015 at the University of Sussex, Falmer, Brighton (UK).

Hirschman, Albert O. *The Strategy of Economic Development*. New Haven: Yale University Press, 1958.

Hirschman, Albert O., *Development projects observed.* Washington DC: Brookings Institution, 1967.

Hoag, Heather J. "Designing the Delta: A History of Water and Development in the Lower Rufiji River Basin, Tanzania, 1945-1985." PhD diss., Boston University, 2003.

Hoag, Heather J. "Transplanting the TVA? International Contributions to Postwar River Development in Tanzania." *Comparative Technology Transfer and Society*, 4 (2006): 247–67.

Hoag, Heather J. *Developing the Rivers of East and West Africa: An Environmental History*. London: Bloomsbury, 2013.

Hoag, Heather J., and May-Britt Öhman. "Turning Water into Power: Debates over the Development of Tanzania's Rufiji River Basin, 1945–1985." *Technology and Culture* 49 (2008): 624–51.

Hodge, Joseph M. and Gerald Hödl, "General Editors Introduction." In *Developing Africa. Concepts and Practices in Twentieth-Century Colonialism*, edited by Joseph M. Hodge, Gerald Hödl, and Martina Kopf, x. Manchester: Manchester University Press 2013.

Hodge, Joseph M., and Gerald Hödl. "Introduction." In *Developing Africa. Concepts and Practices in Twentieth-Century Colonialism*, edited by Joseph M. Hodge, Gerald Hödl, and Martina Kopf, 1-28. Manchester: Manchester University Press 2013.

Hodge, Joseph Morgan. *Triumph of the Expert. Agrarian Doctrines of Development and the Legacies of British Colonialism*. Athens: Ohio University Press, 2007.

Hodgson, Geoffrey Martin. *How Economics Forgot History: The Problem of Historical Specificity in Social Science.* London and New York: Routledge, 2002.

Home, Robert. "From barrack compounds to the single family house. Planning worker housing in colonial Natal and Northern Rhodesia." *Planning Perspectives* 15 (2000): 327–47.

Home, Robert. "Town Planning, Segregation and Indirect Rule in Colonial Nigeria." *Third World Planning Review* 5 (1983), 165-75.

Home, Robert. *Of Planting and Planning. The Making of British Colonial Cities*. London: Routledge, 1997.

Honey, Martha. “Asian Industrial Activities in Tanganyika.” *Tanzania Notes and Records* 75 (1974).

Hughes, Thomas P. "The Electrification of America: The System Builders." *Technology and Culture* 20 (1971): 124-26.

Hughes, Thomas P. *Networks of Power. Electrification in Western Society 1880–1930*. Baltimore: Johns Hopkins University Press, 1983.

Hyden, Goran. *No shortcuts to progress: African development management in perspective*. London: Heinemann, 1983.

Iliffe, John. “A History of the Dockworkers of Dar es Salaam.” *Tanzania Notes and Records* 71 (1970): 119-48.

Iliffe, John. *A Modern History of Tanganyika.* Cambridge: Cambridge University Press, 1979.

International Bank for Reconstruction and Development, *Seventh Annual Report 1951/52.* Washington: International Bank for Reconstruction and Development, 1952.

International Bank for Reconstruction and Development. *The Economic Development of Tanganyika.* Baltimore, John Hopkins University Press, 1961.

International Bank of Reconstruction and Development, International Development Association. “Appraisal of the Development Program of the Tanganyika Electric Supply Company Limited, 1967.” Report, November 13, 1967.

International Bank of Reconstruction and Development. “Prospects for Economic Development in East Africa, Vol. 11.” Report, August 31, 1967.

International Bank Reconstruction Development. *The Economic Development of Tanganyika: Report of a Mission Organized by the International Bank for Reconstruction and Development at the Request of the Governments of Tanganyika and the United Kingdom*. Baltimore: Johns Hopkins Press, 1961.

International Energy Agency. “Energy for all: Financing access for the poor.” Special early excerpt of the World Energy Outlook, Paris, 2011.

Joseph, George. “A econometric approach to forecasting demand for electricity in Tanzania to the year 2000 A.D.” Research report no. 38, Bureau of Resources Assessmetn and Land Use Planning, University of Dar es Salaam, undated (ca. 1978).

Kale, Sunila S. “Structures of Power: Electrification in Colonial India.” *Comparative Studies of South Asia, Africa and the Middle East* 34 (2015): 454-75.

Kale, Sunila S. *Electrifying India: Regional Political Economies of Development*. Stanford, California: Stanford University Press, 2014.

Karekezi, Stephen, and John Kimani. “Status of Power Sector Reform in Africa: Impact on the Poor.” *Energy Policy* 30 (2002): 923-45.

Kasambala, J.S. Introduction to *A Guide to Careers in the Ministry of Industries, Mineral Resources and Power and the Tanganyika Electric Supply Company* by United Republic of Tanzania, 5-6. Dar es Salaam: Government Printer, 1965.

Kemausuor, Francis, and Emmanuel Ackom. "Toward universal electrification in Ghana." *WIREs Energy Environ* 6 (2017): 1-14.

Kindersley, Robert M. „British Foreign investments in 1929. *The Economic Journal* 41 (1931): 377-81.

King, Timothy. "Development Strategy and Investment Criteria: Complementary or Competitive?" *Quarterly Journal of Economics* 80 (1966): 108-20.

Kjellström, Björn, Maneno Katyega, Henry Kadete, Dolf Noppen and Abu Mvungi. *Rural Electrification in Tanzania: Past Experiences – New Approaches.* Stockholm: Stockholm Environmental Institute, 1992.

Kline, Ronald R. *Consumers in the Country: Technology and Social Change in Rural America*. Baltimore, MD: Johns Hopkins University Press, 2002.

Lambert, David, and Alan Lester. *Colonial Lives across the British Empire: Imperial Careering in the Long Nineteenth Century*. Cambridge, UK, and New York: Cambridge University Press, 2006.

Lanthier, Pierre. "L'électrification de Bombay avant 1920. Le projet de Jamsetji N. Tata." *Outre-mers* 89 (2002): 211-33.

Larimore, E. "The Alien Town. Patterns of Settlement in Busoga, Uganda. An Essay in Cultural Geography." Research Paper No. 55, Department of Geography, The University of Chicago Press, 1958.

Latour, Bruno. *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press, 2005.

Law, John. "Actor-Network Theory and Material Semiotics." In *The New Blackwell Companion to Social Theory*, edited by Bryan Turner, 373-393. Oxford: Wiley-Blackwell, 2008.

Lester, Alan. "Imperial Circuits and Networks: Geographies of the British Empire." *History Compass* 4 (2006): 124-41.

Lewis, W. Arthur. *The Theory of Economic Growth*. London: Allen & Unwin, 1955.

Lohmeier, Jochen. *Tanzania: eine politische Ökonomie der Regionalentwicklung*. Hamburg: Institut für Afrika-Kunde, 1982.

Lohrmann, Ullrich. *Voices from Tanganyika: Great Britain, the United Nations and the Decolonization of a Trust Territory, 1946-1961.* Berlin: Lit, 2007.

Lugard, Frederick J. D. *The Dual Mandate in British Tropical Africa.* Edinburgh: William Blackwell and Sons, 1922.

MacKenzie, Donald A. *An Engine, Not a Camera How Financial Models Shape Markets.* Cambridge, MA: MIT Press, 2006.

Magee, Gary Bryan, and Andrew S. Thompson. *Empire and Globalisation: Networks of People, Goods and Capital in the British World, c.1850-1914*. Cambridge and New York: Cambridge University Press, 2010.

Manafa, Marcel N. Azodo. *Electricity Development in Nigeria (1896-1972)*. Yaba: Raheem Publishers, 1979.

Mann, Michael. "Delhi's Belly On the Management of Water, Sewage and Excreta in a Changing Urban Environment during the Nineteenth Century." *Studies in History* 23 (2007): 1-31.

McDonald, David A., "Electric Capitalism: Conceptualising electricity and capital accumulation in (South) Africa." In *Electric Capitalism: Recolonising Africa on the Power Grid*, edited by David A. McDonald, 1-49. New York: Routledge, 2008.

McFarlane, Colin, and Jonathan Rutherford. "Political Infrastructures: Governing and Experiencing the Fabric of the City." *International Journal of Urban and Regional Research* 32 (2008), 363-74.

McFarlane, Colin. "Governing the Contaminated City. Infrastructure and Sanitation in Colonial and Post-Colonial Bombay." *International Journal of Urban and Regional Research* 32 (2008): 415-35.

Meares, J. Willoughby. "National Review of the Water Power Resources of the Indian Empire." In *The Transactions of the First World Power Conference, London, June 30th to July 12th, 1924, Vol. I*, 449-459. London: Percy Lund Humphries, 1924.

Merril, Dennis, ed. *The Point Four Program: reaching out to help the less developed countries.* Bethesda, MD: University Publications of America, 1999.

Mitchell, Timothy. "Introduction: Life of Infrastructure." *Comparative Studies of South Asia, Africa and the Middle East* 34 (2014): 437-39.

Mitchell, Timothy. *Colonising Egypt*. Cambridge: Cambridge University Press, 1988.

Moffett, John Perry, ed. *Tanganyika: A Review of Its Resources and Their Development*. Dar es Salaam: Government of Tanganyika, 1955.

Molony, Thomas. *Nyerere: The Early Years.* London: James Currey, 2014.

Monson, Jamie. *Africa's Freedom Railway: How a Chinese Development Project Changed Lives and Livelihoods in Tanzania*. Bloomington: Indiana University Press, 2009.

Monstadt, Jochen. "Großtechnische Systeme der Infrastrukturversorgung: Übergreifende Merkmale und räumlicher Wandel." In *Wandel der Stromversorgung und räumliche Politik,* edited by Dieter Gust, 7-34. Hannover: Verlag der Akademie für Raumforschung und Landesplanung, 2007.

Morgan, David John. *The Official History of Colonial Development: The Origins of British Aid Policy, 1924-1945*. London and Basingstoke: Macmillan, 1980.

Morrison, David R. *Aid and Ebb Tide a History of CIDA and Canadian Development Assistance*. Waterloo, Canada: Wilfrid Laurier University Press, 1998.

Morton Jr, David L. “Reviewing the History of Electric Power and Electrification.” *Endeavour* 26 (2002): 60-63.

Mustafa, Kemal. “The Development of Ujamaa in Musoma: A case study of Butiama Ujamaa Village.” MA thesis, University of Dar es salaam, 1975.

Mwakapugi, Arthur, Watheda Samij, and Sean Smith. “The Tanzanian Energy Sector: The Potential for Job Creation and Productivity Gains Through Expanded Electrification.” Special paper, Research on Poverty Alleviation 10/3, Dar es salaam, 2010, 8.

Myrdal, Gunnar. *Economic Theory and under-Developed Regions*. London: G. Duckworth, 1957.

Njoh, Ambe. *Planning Power: Town Planning and Social Control in Colonial Africa.* Aldershot and Burlington, VT: CRC Press, 2007.

Norconsult A.S. “Stiegler’s Gorge Hydropower Utilisation.” Report prepared for the United Republic of Tanzania, October 1972.

Nordhaus, Ted, Shaiyra Devi, and Alex Trembath. “Debunking Microenergy - The Future Lies With Urbanization.” *Foreign Affairs*, August 30, 2016, last accessed April 25, 2017, https://www.foreignaffairs.com/articles/2016-08-30/debunking-microenergy.

Nurkse, Ragnar. “International Investment today in the light of nineteenth century experience.” *Economic Journal* 64 (1954).

Nurkse, Ragnar. *Problems of capital formation in underdeveloped countries.* Oxford: Blackwell, 1964.

Nye, David E. *Consuming Power a Social History of American Energies*. Cambridge, Mass.: MIT Press, 1998.

Nyerere, Julius. Address to *Tanganyika five-year plan for economic and social development, 1st July 1964 - 30th June, 1969*, by United Republic of Tanganyika and Zanzibar. Dar es Salaam: Government Printer, 1964.

O’Connor, Anthony Michael. *An Economic Geography of East Africa*. London: Bell, 1966.

Oestigaard, Terje. *Dammed Divinities: The Water Powers at Bujagali Falls, Uganda*. Uppsala: The Nordic Africa Institute, 2015.

Öhman, May-Britt. “Taming Exotic Beauties: Swedish Hydropower Constructions in Tanzania in the Era of Development Assistance, 1960s – 1990s.” PhD diss., Royal Institute of Technology, 2007.

Peacock, Alan T. and Douglas Dosser. *The National Income of Tanganyika, 1952-54.* London: Her Majesty's Stationery Office, 1958.

Pearce, Robert D. *The Turning Point in Africa. British Colonial Policy 1938-48.* London: Frank Cass, 1982.

Prakash, Gyan. *Another Reason: Science and the Imagination of Modern India*. Princeton, N.J.: Princeton University Press, 1999.

Prebisch, Raúl. “The Economic Development of Latin America and Its Principal Problems.” UN document no. E/CN.12/89/Rev.1. Lake Success, N.Y.: United Nations, 1950.

Pritchard, Sara B. “From Hydroimperialism to Hydrocapitalism: ‘French’ Hydraulics in France, North Africa, and beyond.” *Social Studies of Science* 42 (2012): 591–615.

Rao, Srinivasa, and John Lourdusamy. “Colonialism and the Development of Electricity. The Case of Madras Presidency, 1900–472.” *Science Technology & Society* 15 (2010): 27-54.

Richards, E. V. *Report on the Hydro-Electric Resources of East Africa*. London: Cook, Hammond & Kell Printers, 1947.

Rizzo, Matteo. “What Was Left of the Groundnut Scheme? Development Disaster and Labour Market in Southern Tanganyika 1946-1952.” *Journal of Agrarian Change* 6 (2006): 205–38.

Rostow, Walt W. “The Take-Off Into Self-Sustained Growth,” *The Economic Journal* 66 (1956): 25–48.

Rweyemamu, Justinian. *Underdevelopment and industrialization in Tanzania: a study of perverse capitalist industrial development.* Nairobi: Oxford University Press, 1978.

Sadove, Robert. “Cost of Capital in the Choice between Hydro and Thermal Power.” Report for the International Bank for Reconstruction and Development, January 17, 1957.

Schott, Dieter. *Die Vernetzung der Stadt: kommunale Energiepolitik, öffentlicher Nahverkehr und die “Produktion” der modernen Stadt; Darmstadt - Mannheim - Mainz 1880-1918*. Darmstadt: Wissenschaftliche Buchgesellschaft, 1995.

Schumacher, Ernst Friedrich. *Small is beautiful: economics as if people mattered.* New York: Harper and Row, 1973.

Self, Henry. *Electricity Supply in Great Britain, Its Development and Organization*. London: Allen and Unwin, 1952.

Shamir, Ronen, “Electricity and Empire in 1920s Palestine under British Rule.” *NTM Zeitschrift für Geschichte der Wissenschaften, Technik und Medizin* 24, (2016): 451–80.

Shamir, Ronen. *Current Flow: The Electrification of Palestine*. Stanford, California: Stanford University Press, 2013.

Shove, Elizabeth. “Putting Practice into Policy: Reconfiguring Questions of Consumption and Climate Change.” *Contemporary Social Science* 9 (2014): 415–29.

Showers, Kate B. “Electrifying Africa: An Environmental History with Policy Implications.” *Geografiska Annaler: Series B, Human Geography* 93 (2011): 193–221.

Sieberg, Herward. *Colonial Development: die Grundlegung moderner Entwicklungspolitik durch Grossbritannien, 1919-1949*. Stuttgart: Steiner, 1985.

Simpson, E.S. “Electricity production in Nigeria.” *Economic Geography* 45 (1969): 239–57.

Singer, Hans W. *International Development: Growth and Change*. New York: McGraw-Hill, 1964.

Singer, Hans. “The Distribution of Gains between Investing and Borrowing Countries.” In *Economic development and social change: the modernization of village communities,* edited by George Dalton, 336-52. Garden City, N.Y.: The Natural History Press, 1971.

Solow, Robert M. “A Contribution to the Theory of Economic Growth.” *The Quarterly Journal of Economics* 70 (1956): 65–94.

Solow, Robert M. “Technical Change and the Aggregate Production Function.” *The Review of Economics and Statistics* 39 (1957): 312–20.

Speich, Daniel. „Der Entwicklungsautomatismus. Ökonomisches Wissen Als Heilsversprechen in Der Ostafrikanischen Dekolonisation.” *Archiv Für Sozialgeschichte* 48 (2008): 183–212.

Speyer, H. R. “The Development of Electric Power for Industrial Purposes in India.” *Journal of the Institution of Electrical Engineers* 53 (1915): 597–604.

Steen, Jürgen, Monika Scholdei-Klie and Almut Junker. *‘Eine neue Zeit ...!’ die Internationale elektrotechnische Ausstellung 1891*. Frankfurt am Main: Historisches Museum Frankfurt am Main, 1991.

Steinmetz, George. *The Devil’s Handwriting: Precoloniality and the German Colonial State in Qingdao, Samoa, and Southwest Africa*. Chicago: University of Chicago Press, 2008.

Stier, Bernhard. “Die neue Elektrizitätsgeschichte zwischen kulturhistorischer Erweiterung und kommunikationspolitischer Instrumentalisierung. Anmerkungen zum Forschungsstand am Ende des ‘langen 20. Jahrhunderts der Elektrizität’.” *Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte* 87 (2000): 477-87.

Stier, Bernhard. *Staat und Strom: die politische Steuerung des Elektrizitätssystems in Deutschland 1890 - 1950.* Ubstadt-Weiher: Verlag Regionalkultur, 1999.

Sunderland, David. *Managing British Colonial and Post-Colonial Development. The Crown Agents, 1914–1974*. Suffolk: Boydell & Brewer, 2007.

Sunderland, David. *Managing the British Empire: The Crown Agents,* 1833–1914. Woodbridge, UK: Boydell & Brewer, 2004.

Suny, Ronald Grigor, and Terry Martin. *A State of Nations: Empire and Nation-Making in the Age of Lenin and Stalin*. Oxford: Oxford University Press, 2001.

Tanganyika Territory. *Report of the Central Development Committee*. Dar es Salaam: Government Printer, 1940.

Tate, Muzaffar. *Power Builds the Nation: The National Electricity Board of the States of Malaya and Its Predecessors. The Formative Years*. Kuala Lumpur: National Electricity Board of the States of Malaya, 1989.

Taylor, James Clagett. *The Political Development of Tanganyika*. Stanford, CA: Stanford University Press, 1970.

Technology 21 (2005): 85-106.

Telford, A. M. *Report on the Development of the Rufiji and Kilombero Valley*. London: Crown Agents, 1929.

Tendler, Judith D. “Technology and Economic Development: The Case of Hydro vs. Thermal Power.” *Political Science Quarterly* 80 (1965): 236–53.

Tenenbaum, Bernard, Chris Greacen, Tilak Siyambalapitiya, and James Knuckles. *From the Bottom Up: How Small Power Producers and Mini-Grids Can Deliver Electrification and Renewable Energy in Africa*. Washington, DC: World Bank, 2014.

Thomas, Martin, Bob Moore, and L. J. Butler. *Crises of Empire: Decolonization and Europe’s Imperial States*. London: Bloomsbury Publishing, 2015.

Throup, David. *Economic & Social Origins of Mau Mau 1945-53*. London: James Currey, 1987.

Tignor, Robert L. *Capitalism and Nationalism at the End of Empire: State and Business in Decolonizing Egypt, Nigeria, and Kenya, 1945-1963.* Princeton, N.J.: Princeton University Press, 1998.

Tobias, George. *High-Level Manpower Requirements and Resources in Tanganyika, 1962-1967*. Dar es Salaam: Government Printer, 1963.

Tvedt, Terje. *The River Nile in the Age of the British: Political Ecology and the Quest for Economic Power*. London: I.B.Tauris, 2004.

United Republic of Tanzania. *Second Five-Year Development Plan for Economic and Social Development, 1 July 1969 – 30th June 1974, Vol. 1: General Analysis*. Dar es Salaam: Government Printer, 1969.

Urhammer, Emil, and Inge Røpke. “Macroeconomic Narratives in a World of Crises: An Analysis of Stories about Solving the System Crisis.” *Ecological Economics* 96 (2013): 62-70.

van der Heyden, Ulrich, and Franziska Benger. *Kalter Krieg in Ostafrika: Die Beziehungen der DDR zu Sansibar und Tansania*. Berlin: LIT, 2009.

van der Straeten, Jonas, “Eine ‘afrikanische’ Geschichte von Elektrizität und elektrischen Geräten? Das Beispiel des Distrikts Kondoa in Tansania.” MA thesis, Technische Universität Berlin, 2013.

van der Straeten, Jonas, and Patrick Hege. “Enclaves of LightThe electrification of Dar es Salaam under German and British colonial rule, 1908-1950.” In *Translating the networked city: Urban Infrastructures in Nairobi and Dar es Salaam*, edited by Jochen Monstadt, Berenice Bon, Rémi de Bercegol (forthcoming).

van der Straeten, Jonas, and Ute Hasenöhrl. “Connecting the Empire – New Research Perspectives on Technological Infrastructures and the Environment in the Colonial World.” *NTM Journal for the History of Science, Technology and Medicine* 24 (2016): 355-91.

van der Straeten, Jonas, Kathrin Friederici, and Sebastian Groh. “Taking a Micro-Perspective on the Global Challenge of Climate Change: The ‘Microenergy Systems’ Research Focus at the Technische Universität Berlin.” In *International Perspectives on Climate Change*, edited by Walter Leal Filho, Fátima Alves, Sandra Caeiro, and Ulisses M. Azeiteiro, 135–49. Cham: Springer International Publishing, 2014.

Von Massow, Heinrich. *Industrialisierungsmöglichkeiten in Tanganyika*. Hamburg: Afrika-Verein, 1964.

Wanjiru, Waithaka, and Majeni Evans. *A Profile of Kenyan Entrepreneurs.* Nairobi: East African Educational Publishers, 2014.

Westcott, Nicholas. "The East African Sisal Industry, 1929-1949: The Marketing of a Colonial Commodity during Depression and War." *The Journal of African History 25* (1984): 445–61.

White, Nicholas J. "Reconstructing Europe through Rejuvenating Empire: The British, French, and Dutch Experiences Compared." *Past Present Past and Present* 210 (2011): 211–36.

Wilhite, Harold. "Why Energy Needs Anthropology." *Anthropology Today* 21 (2005): 1–2.

Williams, James H., and Navroz K. Dubash. "Asian Electricity Reform in Historical Perspective." *Pacific Affairs* 77 (2004): 411–36.

Wilson, Gail. *Owen Falls: Electricity in a Developing Country*. Nairobi, East African Publishing House, 1967.

Wilson, J. F. *Ferranti and the British Electrical Industry, 1864-1930*. Manchester: Manchester University Press, 1988.

Winner, Langdon. "Do Artifacts Have Politics?" *Daedalus* 109 (1980): 121-36.

Winther, Tanja, and Harold Wilhite. "Tentacles of Modernity: Why Electricity Needs Anthropology." *Cultural Anthropology* 30 (2015): 569–77.

Winther, Tanja. *The Impact of Electricity: Development, Desires and Dilemmas.* Berghahn Books, Oxford, New York 2008.

Wood, Alan. *The Groundnut Affair*. London: The Bodley Head, 1950.

World Power Conference, ed. *The Transactions of the First World Power Conference, London, June 30th to July 12th, 1924, Vol. I.* London: Percy Lund Humphries, 1924.

Worthington, E. B. *A Development Plan for Uganda*. Entebbe, Uganda: Government Press, 1949.

Wright, Rebecca, Hiroki Shin, and Frank Trentmann. *From World Power Conference to World Energy Council: 90 Years of Energy Cooperation, 1923-2013*. London: World Energy Council, 2013.

Archival sources

The National Archives, London, United Kingdom (BNA)

BT 34/3219/87728: NEP&L Licence (1923)

CO 323/885/55: Water power development in the British Empire request by Douglas Spencer (1921)

CO 323/983/8: Electricity and Colonial Development (1927)

CO 533/438/5: Electric power licences protest by Tanganyika Concessions (1933)

CO 533/533/3: East African Power and Lighting (1944)

CO 533/533/4: Report on the East African Power&Lighting Co. Ltd – Appendices (1944)

CO 533/533/4: Report on the East African Power&Lighting Co. Ltd – Correspondence (1944)

CO 533/533/4: Report on the East African Power&Lighting Co. Ltd – Report (1944)

CO 536/142/2: Ripon Falls Development Electrical Power Scheme (1926)

CO 536/144/5: Ripon Falls Development (1927)

CO 536/160/10: Electric Light and Power Ordinance (1930)

CO 536/165/14: Electric Light and Power Supply - Kampala and Entebbe (1931)

CO 536/165/5: Electric Light and Power Supply - Kampala, Entebbe and Jinja (1931)

CO 536/184/16: Electricity and power supply question of supply to Kampala, Entebbe and Jinja (1935)

CO 536/185/1: Electric Light and Power Supply Company Kampala, Entebbe and Jinja (1935)

CO 536/185/2: Electric Light and Power Supply, Kampala, Entebbe (1935)

CO 536/223/10: Uganda Electricity Board Loan Programme (1950)

CO 536/224/12: Uganda Electricity Board (1951)

CO 580/23/01: Colonial Development Corporation Electricity Development in Malaya (1960)

CO 582/579/1: East Africa Industries Research Board (1944)

CO 691/101/4: Development of Electric Power Scheme A (1929)

CO 691/108/1: Tanganyika Development of Electric Power Scheme A (1930)

CO 691/108/3: Tanganyika Development of Electric Power Pangani Scheme" (1930)

CO 691/114/4: Tanganyika Development of Electric Power Scheme A (1931)

CO 691/114/5: Tanganyika Development of Electric Power Pangani Scheme (1931)

CO 691/116/3: Members of Electricity Department transferred to Power Securities (1931)

CO 691/120/4: Tanganyika Electricity Ordinance (1932-1931)

CO 691/131/5: Tanganyika Electricity Supply (1932-1931)

CO 691/140/18: Tanganyika Application of Herr Bueb to establish Electric Light and Power works at Moshi (1934)

CO 691/148/12: Tanganyika Dar-es-Salaam and District Supply Co Ltd. Proposal of Government Holding (1936)

CO 691/151/12: Tanganyika Electric Development Pangani Falls Scheme (1930)

CO 691/154/17: Tanganyika Dar-es-Salaam Electric Supply Company Enquiry into the responsibility of the Company for the electrocution etc. (1937)

CO 691/157/12: Tanganyika Electric Development Pangani Falls Scheme (1937)

CO 691/159/12: Tanganyika Electric Development (1937)

CO 691/174/3: Tanganyika Electricity Development Concession to Pangani Falls for the supply of electricity (1939)

CO 691/175/2: Tanganyika Electric Development (1939)

CO 691/179/15: Development of Tanganyika. Report of Central Development Committee (1940)

CO 691/184/2: Development of Tanganyika. Report of the Central Development Committee (1940)

CO 691/189/2: Tanganyika Revision of the Pangani Falls Electricity Scheme Agreement (1944)

CO 691/190/2: Development of Tanganyika. Report of the Central Development Committee (1944)

CO 691/190/3: Development of Tanganyika Post-War Planning Advisory Committee (1944)

CO 691/190/5: Development of Tanganyika Report of the Post War Planning Committee (1944)

CO 691/190/6: Development of Tanganyika Western Portion of the W. Usambaras. Memorandum by Mr Nutman (1945)

CO 691/203/2: Use of waterpower on the Kagera River (1948)

CO 691/88/10: Pangani Falls Concession (1927)

CO 691/92/9: Electricity Department: proposal for placing under control of general manager, Tanganyika Railways (1927)

CO 691/93/9: Tanganyika Development of Electric Power (1927)

CO 691/98/1: Tanganyika Development of Electric Power Part I (1928)

CO 691/98/2: Tanganyika Development of Electric Power Part II (1928)

CO 691/98/3: Tanganyika Report by Sparks&Partners (1928)

CO 822/112/6: East Africa Electrical Development (1943-46)

CO 822/1168: African Interest in Industry Tanganyika (1954-56)

CO 822/1410: Uganda Kenya Power Line (1957)

CO 822/148/2: Electricity supply (Westlake Report) (1951-1950)

CO 822/148/4:	East Africa Electricity Supply (1951)
CO 822/1757:	Development of the Coal Industry in Tanganyika (1957-1959)
CO 822/2474:	CDCW Scheme for the Construction of African Urban Houses in Tanganyika (1960-62)
CO 822/2571:	Tanganyika Development Plan 1955-60" (1960-59)
CO 822/2572:	Tanganyika Development Plan 1955-60 (Electricity) (1960-62)
CO 822/2715:	Survey of the Economy of Tanganyika by a mission of the International Bank (1960-62)
CO 852/1359/1:	Hydro Electric Schemes (1949-1950)
CO 852/1792:	Colonial Development Corporation Tanganyika Power Line (1960)
CO 852/1792:	Colonial Development Corporation. Tanganyika Power Line (1960-62)
CO 852/415/8:	Supply of electrical machinery and plant Tanganyika (1943)
CO 852/844/1:	Industrial Development, Hydro Electric Development East Africa (1947)
CO 852/844/2:	Hydro Electricity Scheme Uganda (1947)
CO 852/889/2:	Hydro Electric Schemes (1948)
CO 875/49/4:	Hydro-Electricity Scheme; Jinja; Owen Falls (1948)
CO 956/261:	Our electrical industry; Artist Clive Gardiner (1926)
DO 185/35:	Nyumba ya Mungu dam project in Tanganyika (1962)
DO 214/77:	Construction of Nyumba Ya Mungu dam (1964)
FCO 141/6912:	Kenya Nyeri Electricity Undertaking; report and valuation (1959)
FCO 31/454:	Tanzania Fuel and Power Tanzania Electric Supply Company (TANESCO) (1968)
FCO 31/49:	Reactions from Kenya to Tanzania nationalisation (1967)
FCO 312/72:	East Africa Fuel and Power Electrical Power Generation in East Africa (1968-69)
FO 881/8032:	Africa Ordinance. East Africa. Electricity Act Application (1903)
OD 26/194:	Electrical power generation in East Africa (1970-1969)
T 161/1049:	Tanganyika: Tanganyika - Dar-es-Salaam electricity supply to Nyanza Salt Mines (1920)
T 317/1020:	Tanzania implementation of policy of nationalisation following Arusha Declaration, February 1967 (1967)
T 317/1021:	Tanzania implementation of a policy of nationalisation following the Arusha Declaration of February 1967 (1967)

Tanzania National Archives, Dar es Salaam, Tanzania (TNA)

13694:	Electric Lighting-Western Province (1942-47)
16/11/269:	Mtwara, Electric Light Supply Outstations (1949-53)
16/37/42:	Mtwara Electricity (1928-48)
181/TA/210:	Mbeya Town Council, Street Lighting
25874:	The Dar es Salaam + District Electric Supply Company minutes and agenda of meetings
30/EL/22/32:	Public Works Department, Tanga Electricity
30/EL/31/33:	Public Works Department, Pangani Falls
30/EL/731:	Public Works Department, Iringa Development Electrical (1931-1934)
30/EL14/32:	Public Works Department Kurasini Oyster Bay H.I., Oyster Bay + Sea View L.T. (1932-1934)
30/LT1:	Public Works Department, Street Lighting Vol. I (1917-1943)
30107:	Dar es Salaam and District Electric Supply Co. Ltd. (1950-55)
32498:	Electricity Board Minutes
32675:	Tanganyika Electric Supply Company Ltd Distribution of Electricity Supply
469/CWC 55/38/01:	Ministry of Commerce and Industry, Electricity Advisory Board (1958-59)
469/CWC/10/55/012:	Ministry of Commerce and Industry, Electricity Appeals Board (1956-1960)
5/318:	Electric supply general (1950-60)
563/E3/01:	Tanga Region, Pangani
CL/29:	Public Works Department: Arusha Lighting I
CL/29:	Public Works Department: Arusha Lighting II
K/25874:	DARESCO minutes and agenda of meetings
K/32675:	TANESCO
K/40539:	TANESCO Agenda and Meetings (1950-1953)

Kenya National Archives, Nairobi, Kenya (KNA)

AA/26/11:	Supply to Lamu (1959)
ACW/31/90:	Electrification of non-European township Mombasa (1923)
AE/17/4:	Electric Power Advisory Board (1953-1959)
AE/17/49:	Installation and Supply National Housing Scheme (1954)

AE/17/53:	Installation and Supply of Small Townships (1954-1958)
AE/17/6:	Boards Committees electric power advisory board agenda and papers (1950-55)
AE/17/72:	Report Returns on East African Power (1944-45)
CA/8/52:	E.A. Power and Lighting Co. Ltd (1943-1950)
DC/KTI/3/20/18:	Electrification of New African Housing and Flats, Develop estimates and expenditures (1955-1963)
KZ/5/12:	Villages Electricity Supply (1954-1970)
MSS 4/227: (1938)	Correspondences and articles about E.A. Power and Lighting Co Ltd
OP/1/757:	Electricity in African locations (1955-1961)
PC/GRSSA/2/20/8:	Electrification of new African houses and flats installation of gas heaters and appliances (1952-62)
PC/GRSSA/2/21/3:	Electrification of Northern Province, and electricity schemes (1955-61)
VK/9/11:	E.A. Power and Lighting Company, Written Memorandum (1955-63)

Bodleian Library, Oxford, UK (BLL)

MSS. Afr. S. 1876/6/1 Papers of William McGregor and Isabel Ross