

# The Political Economy Analysis of Institutional Barriers to Rural Electrification in Tanzania

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## Abstract

Institutions play a great role in the smooth implementation of development programmes in any sector. They affect how players within the policy space act and affect the policy outcomes of the designated programmes. This paper investigates the institutional barriers to rural electrification in Tanzania. We investigate if the political clergy and energy sector governing entities in Tanzania constrain the smooth implementation of rural electrification projects. Moreover, we investigate if the current rules, laws, and regulations in the electricity industry and supporting sectors attract investments in rural electrification projects. Furthermore, we review policies, strategies, and interventions within the energy sector with regards to rural electrification. We use primary data collected from key informants in the sector, augmented with secondary data from official reports and periodicals from key government and non-government entities in the electricity sector. Qualitative data analysis techniques were used to ascertain the key institutional barriers to rural electrification in Tanzania. Institutional barriers pertaining to non-independence of institutions within the energy sector, deficiencies of the existing policies, strategies and interventions pertaining to rural electrification, the supporting framework's modus operandi not accustomed to serve the electricity sector, the uncertainties created by the laws and regulations governing the sector, and the institutional specific challenges facing the governing institutions in Tanzania formed some of the key bottlenecks hampering the timely implementation of and achieving of desired outcomes by rural electrification projects in Tanzania as perceived by the stakeholders in the Tanzanian electricity industry.

## Keywords

Rural Electrification, Institutions, Political Economy, Tanzania

## 1. Introduction

Access to modern energy services is necessary for any country's economic transformation as enshrined in goal number 7 of the United Nations' Sustainable Development Goals and prioritized in the Tanzanian 2015 Energy Policy (United Republic of Tanzania, 2015a; African Development Bank, 2016). Tanzania influences household energy transitions in accordance with its energy policy that promotes the provision of reliable, affordable and access to modern energy services and ensuring full participation of Tanzanians in the sector. This contributes to the economic growth of the country and, subsequently, the welfare of the Tanzanian households (United Republic of Tanzania, 2015a). The Tanzanian 2015 Energy Policy covers issues such as electricity (generation, transmission, distribution, rural and urban electrification); renewable energy; energy conservation; energy efficiency; petroleum and gas activities; institutional set up within the energy sector; and the corresponding legal and regulatory framework (United Republic of Tanzania, 2015a).

Subsequently, the country has incorporated the energy transition agenda in both its national long term and mid-term plans including the Tanzanian Development Vision 2025 and National Strategy for Growth and Reduction of Poverty II. Moreover, the country has sector specific plans and strategies with regards to the energy sector, which include the Power Systems Master Plan of 2012, the Biomass Energy Strategy of 2014, the Electricity Supply Industry Reform Strategy and Roadmap 2014-2025 and the National Electrification Programme (United Republic of Tanzania, 2015b). These strategies and plans within the energy sector are implemented in accordance with the national energy policy under the guidance of the Ministry of Energy (MOE) and autonomous entities under its stewardship including the Tanzania Electric Supply Company (TANESCO), the Energy and Water Utilities Regulatory Authority (EWURA) and the Rural Energy Authority (REA). Whereas the government plays a pivotal role in the actualization of the energy policy objectives with regards to household energy transitions, in terms of providing ease of access, reliability of supply and affordability of modern energy services, the private sector also plays a key role in terms of provision of capital and market-oriented products to aid household energy transition.

Nevertheless, despite having elaborate policies, plans, strategies, and programmes in place, most of the Tanzanian households especially in the rural areas have not transitioned to the use of modern energy services. Whereas overall access to electricity has increased over the years from 67.5 percent in the year 2016/17 to 78.4 percent in the year 2019/20 with access to electricity in urban and rural areas reaching 99.6 and 69.8 percent respectively in 2019/20, the proportions of households connected to electricity still stood at a mere 37.7 percent for the whole country, and 24.5 percent for the rural areas for the year 2019/20. Moreover, household transition to alternative modern energy services for cooking is only happening in the urban areas at a moderate pace (National Bureau of Statistics, 2015b). The government and development partners had long seen the

need to give rural energy transitions, specifically rural electrification a special emphasis by having an agency dedicated to rural energy projects, thus the establishment of REA in 2006.

According to REA reports, since the year 2007, the agency had implemented 42 rural energy projects comprising of grid and off-grid electrification projects, solar systems, and trainings to project developers (United Republic of Tanzania, 2018). The agency, although autonomous in its mandate, works together with other government institutions (TANESCO, MOE and EWURA) and donors to solicit funds for rural electrification projects, pave a good investment environment in the sector to warrant the participation of the private entities in rural electrification and render expertise necessary for the implementation of projects (United Republic of Tanzania, 2014a).

Although the country has managed to increase the number of new connections annually in rural areas to 30,357 by 2017 for both individual households and businesses, there have been delays in implementation of such projects to spear head the transitions to use of electricity. Moreover, whereas these projects were meant to bring grid electricity to the villages and subsidize household connections, agencies report that village's connectivity does not translate to more individual household connections (United Republic of Tanzania, 2018). Furthermore, the slow-paced implementations of projects have been compounded with a limited participation of the private sector, with investment in the rural electrification sector still seemingly risky (United Republic of Tanzania, 2014a).

Moreover, these have been coupled with an increasing demand for electricity and unreliable power supply to cater for the connected villages (African Development Bank, 2015). These shortcomings of the rural electrification programme usually provoke political debate due to their foreseen economic importance, as portrayed in a not far distant past in 2018, when members of parliament aired their grievances regarding delays of implementation, number of villages covered by the electrification programme and the number of households connected to electricity (Pengying, 2018). It is thus imperative that challenges attributed to such slow household energy transitions are substantiated and addressed.

The shortcomings of the rural electrification programme in Tanzania, in a scenario of well stipulated policies, plans and strategies may be susceptible to two key issues. The first being the institutional paradigm within which the programme is implemented. As defined by Polski and Ostrom (1999), institutions entail understood rules or strategies that affect behaviour in repetitive scenarios. Whereas these institutions may be formally set up, they sometimes exist as informal sets of rules or habits that affect how players within the policy space act and thus affect the policy outcomes or smoothness of implementation of policies via the designated programmes (Polski & Ostrom, 1999). Thus, the rules and strategies of key players in different scenarios within the energy sector affect the political economic behaviour of the key players (Polski & Ostrom, 1999). It is thus important that in analysing the scenario of elaborate policies accompanied with slow household energy transitions that we take a firm interest how institu-

tional set up spear heading the transitions, the politics and the laws within the sector shape up interactions in the sector and ultimately the policy outcomes resulting from such interactions.

On the other hand, equally important these shortcomings of the rural electrification programme in Tanzania, may be a case of policies, plans and strategies not incorporating fully the key determinants of change with regards to the policy objectives. As substantiated by several studies, factors such as social capital, social networks, income and price of modern energy fuels and technologies are key determinants of household transition to use of modern energy services (Bernard & Torero, 2015; Alem et al., 2013; Bonan et al., 2016; Miller & Mushfiq Mobarak, 2014). Hence, it is imperative to analyse if such key factors have been embedded in the rural electrification programme to facilitate the transition by households.

Moreover, whereas electrification has been linked to household welfare improvements with regards to children's respiratory health, study hours, schooling outcomes, time use and household energy expenditures (Van de Walle et al., 2015; Bensch et al., 2011; Bensch et al., 2015; Arraiz & Calero, 2015; Barron & Torero, 2017), in some cases, these impacts are sometimes difficult to substantiate perhaps due to a partial transitions by households. Whereas some households may have made a transition to electricity in the initial stages due to policy and government initiatives that supported the transition at the time, new connections and perpetuating the use of electricity may have been unsustainable for some households post the intervention period. Nevertheless, this could also be because of the dwindling supply of electricity. Thus, not only should the policy, plans and strategies incorporate the demand side triggers of the transition but also the supply side factors to sustain the transition and manifest the foreseen impacts of the transition. As encapsulated in literature, a successful energy policy should encompass issues of availability, reliability, affordability, and sustainability (African Development Bank, 2016).

Hence, this paper investigates the institutional challenges facing the rural electrification programmes in Tanzania, by dissecting the interactions of key players in the sector, the norms, rules, and regulations governing the sector and the resulting energy transitions outcomes. In particular, the analysis takes stock of the extent to which the rural electrification programme's demand and supply triggers household electrification and suggests institutional reforms that engender improved electrification outcomes. The paper adopts the Institutional and Development Framework (IDF) by Ostrom (2011) to systematically substantiate the institutional challenges. Thus, the paper used qualitative research techniques, and conducted 30 in depth stakeholder interviews, which constituted of experts within the electricity supply industry, from government institutions, donors, and academia. These in-depth interviews were supplemented by literature from peer reviewed articles and official institutional reports from government and private institutions.

The IDF provides a systematic way of doing policy analysis. Although in most recent studies, the IDF has largely been used in the analysis of common-pool re-

sources (Berthélemy, 2016; Koster, 2013), it has also been used in other areas of research to analyse systematically how the key actors in a particular policy space influence key decision within the confinements of the existing rules and regulations governing the policy space. These areas include delivery of human health services, infrastructure, federal public services, and international relations (Poliski & Ostrom, 1999). The framework has also been used on a few occasions to study energy transitions and electricity supply (Berthélemy, 2016; Koster, 2013). Its broad application in other fields of expertise other than its famed use in the analysis of common pool resources shows how the framework generally facilitates institutional analyses.

Moreover, whereas Alhborg and Hammar similarly looked at the challenges facing rural electrification in Mozambique and Tanzania within the confinement of 2003 Energy Policy, our analysis brings out challenges after the enactment of 2015 Energy Policy and expansion of the rural electrification programme in 2016 and thus provides a contemporary view of challenges facing rural electrification initiatives. Furthermore, unlike Aly et al. (2019) who only looked at challenges facing large scale solar power initiatives in Tanzania, our paper looks holistically at rural electrification, thereby giving a much wider picture of institutional challenges facing electrification initiatives in Tanzania. The paper specifically answers the following research questions

- 1) Do interactions between the energy sector and political clergy delay the implementation of rural electrification projects?
- 2) Do the current rules and regulations that govern the electricity industry act as barriers to rural electrification in Tanzania?
- 3) Do the current policy, programmes and strategy designs cover all the important drivers of household connection to electricity to incentive rural electrification?

The paper has six sections. Section 1 presented the introduction and research questions of the study; Section 2 presents the literature review on challenges facing electrification initiatives in Africa. The methodology of the study is presented in Section 3 while the data collection and analysis techniques are presented in Section 4. The discussion of results is presented in Section 5 while the conclusions and recommendations of the study are presented in Section 6.

## 2. Challenges Facing Rural Electrification Initiatives in Africa

Literature has stressed on several challenges prohibiting the success of rural electrification initiatives in Africa. As most of these initiatives differ structurally in different contexts and different countries, most of the papers have substantiated programme and country specific challenges (Abdullahi, 2017; Aly et al., 2019; Sergi et al., 2018; Mawhood & Gross, 2014). Nevertheless, as some of the challenges are inherently common regardless of the contexts at hand, a handful of papers have provided a snapshot of challenges that most of these initiatives face in Africa (Peters et al., 2019). The vast literature in this area has substan-

tiated these challenges as institutional, technical, political, economic, and social challenges. Most of these papers used stakeholder interviews supported with literature analysis and qualitative techniques to substantiate these challenges (Abdullahi, 2017; Aly et al., 2019; Sergi et al., 2018; Mawhood & Gross, 2014; Peters et al., 2019).

Political and institutional challenges have been vindicated in different forms in various contexts. In Nigeria, the legal and regulatory framework within the energy sector, non-participation of the private sector, non-integration of energy mix and lack of political will in investing in clean energy technologies were among the institutional and political barriers to the development of solar energy initiatives. This led to uncertainties with regards to solar energy, induced negative lobbying against solar energy initiatives and created a disconnect between the solar energy developers and law makers in the country, thus slow down solar energy and in turn slow down electrification initiatives (Abdullahi, 2017). In Tanzania and Mozambique, the institutional and political challenges were in form of political priorities of the regimes, corruption, politically motivated and economically unviable plans and over reliance on donor funding to implement electrification initiatives.

Furthermore, Aly et al. (2019) adds on the institutional challenges facing rural electrification initiatives in Tanzania. They put to bear the lack of political will and commitments towards electrification projects as one of the institutional challenges that faced the development of large-scale solar power initiatives. They further reiterated challenges with regards to non-independence of autonomous government institutions within the energy sector and uncondusive business environment (Aly et al., 2019). Similarly, the lack of political support and politicization of electrification initiatives were cited as institutional barriers to rural electrification initiatives in Senegal (Mawhood & Gross, 2014). Nevertheless, institutional barriers may sometimes manifest in terms of misalignment of priorities and policy direction with regards to electrification initiatives between the donors and recipient governments (Sergi et al., 2018). This has been reiterated for the case of Kenya and Tanzania, whereby although development agencies have focused on funding off-grid electrification initiatives, the Kenyan and Tanzanian governments still favour grid electrification initiatives, and thus slow down the electrification process due to lack of funding to pursue their objectives (Sergi et al., 2018).

The technical challenges to electrification initiatives in Africa substantiated in literature include lack of skilled personnel for the initiatives, lack of data and studies to support clean energy initiatives, lack of training facilities, and unreliability of power supply (Abdullahi, 2017; Aly et al., 2019; Mawhood & Gross, 2014). These challenges have amounted to poor plans, constrained markets, uninformed decisions with regards to technology risk and acceptance and thus slowed and prohibited the implementation of electrification initiatives (Abdullahi, 2017; Aly et al., 2019; Mawhood & Gross, 2014). On the other hand, financial challenges have hampered implementation of electricity initiatives in most Afri-

can countries. The lack of access to capital, consumer credit and proper lending financial instruments hampered the adoption and investments in solar systems in Nigeria (Abdullahi, 2017). Similarly, in Tanzania, poor financing conditions and financial weaknesses of the main utility company have hampered the development of large-scale solar power projects (Aly et al., 2019).

As stipulated by literature, these challenges that hinder the smooth implementation of electrification initiatives differ in different contexts, as they manifest differently due to the policies in place and the institutional framework governing the sector (Abdullahi, 2017; Aly et al., 2019; Sergi et al., 2018; Mawhood & Gross, 2014; Peters et al., 2019). It is thus important to understand the root of these challenges by understanding the policies, rules, regulations governing the energy sector in different contexts, and the powers in play, the resulting interaction and policy outcomes with regards to the electrification initiatives at hand. This paper investigates the institutional challenges facing rural electrification initiatives in Tanzania and adopts the Institutional and Development framework by Ostrom (2011) to substantiate the institutional challenges systematically and qualitatively. The framework's systematic way of policy analysis renders to a detailed analysis of the policy space at hand.

Although in most recent studies, the Institutional and development framework has largely been used in the analysis of common-pool resources (Berthélemy, 2016; Koster, 2013), it has also been used in other areas of research so to analyse systematically how the key actors in a particular policy space influence key decisions within the confinements of the existing rules and regulations governing the policy space.

Moreover, whereas the paper by Alhborg and Hammar similarly looked at the challenges facing rural electrification in Tanzania and Mozambique with the confinement of 2003 energy policy, our analysis brings out challenges after the enactment of 2015 Energy Policy and expansion of the rural electrification programme in 2016 and thus brings in a more current outlook of challenges facing the rural electrification initiatives. Furthermore, as our paper takes a wholistic look of rural electrification in Tanzania, it gives a much wider picture of institutional challenges facing electrification initiatives in Tanzania, and thus goes beyond what Aly et al. (2019) did for the case of Tanzania, who only looked at challenges facing large scale solar power initiatives in Tanzania.

### 3. The Methodology

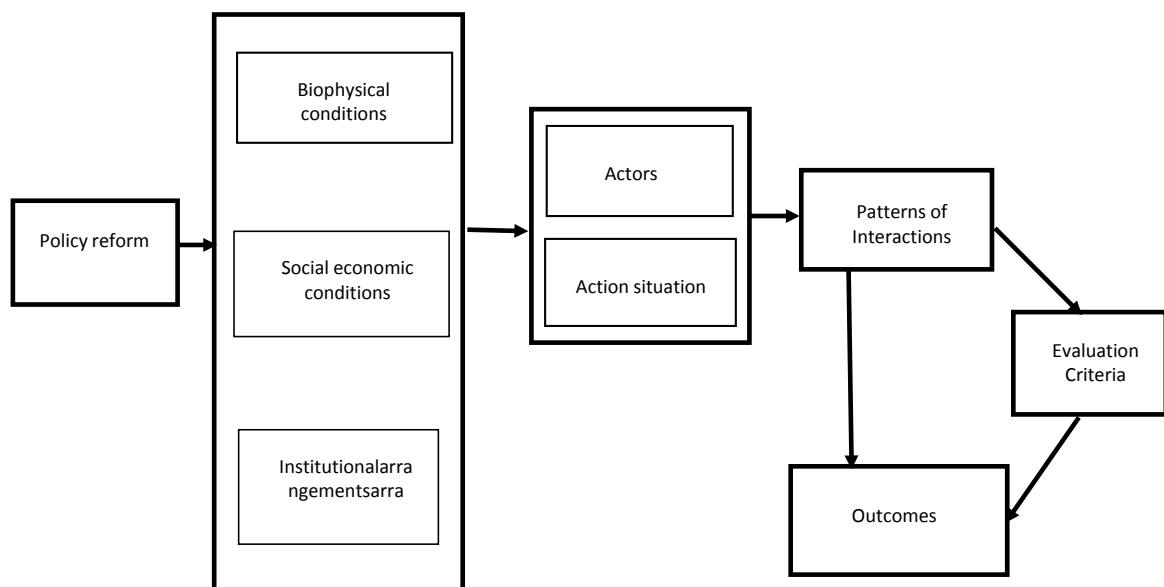
#### 3.1. The Conceptual Framework

The paper borrows conceptually from the Institutional and Development framework (IADF) by Ostrom (2011). The IADF is a useful conceptual framework to organize policy analysis and concentrates attention of the analysis to actors involved in policy manifestation (Koster, 2013). It is a systematic way of breaking down a complex policy scenario into manageable multiple sub-scenarios. Its multiple scenarios nature allows for a detailed analysis which results in policy solutions that encompass the entire policy space (Polski & Ostrom, 1999).

**Figure 1** presents the diagrammatic schematic of the IADF as portrayed in [Polski and Ostrom \(1999\)](#). The current paper adapts it for the context of rural electrification in Tanzania.

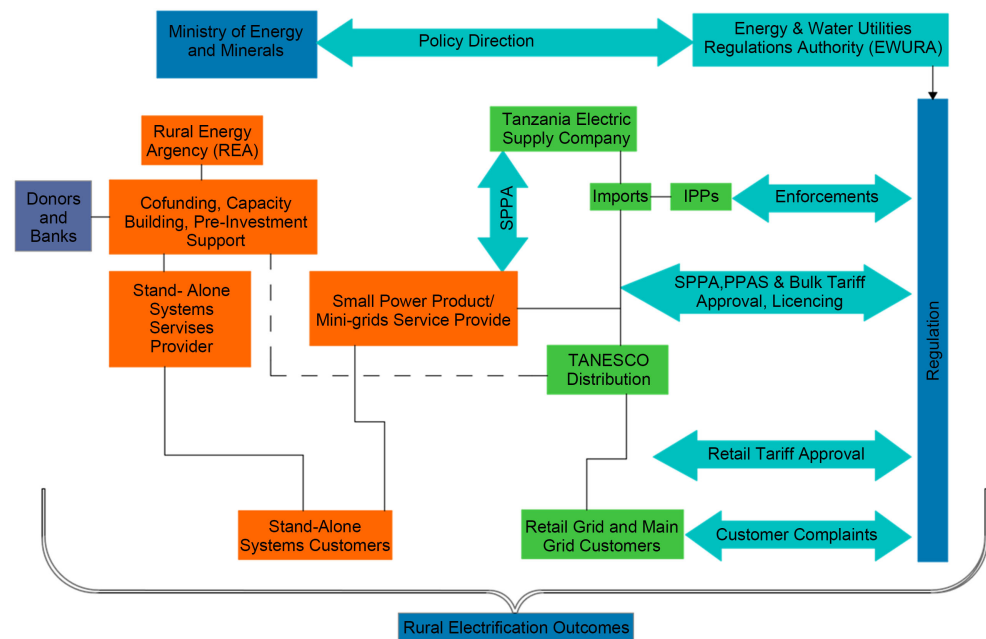
The action arena, which constitutes of the actors and the action situations, is at the heart of the IADF; actors within the energy sector interact there to shape the outcomes in the energy sector e.g., rural electrification ([Polski & Ostrom, 1999](#); [Nigussie et al., 2018](#)). The IADF also entails the analysis of the physical and material conditions, which are comprised of the physical and human resources used in the production and provision of goods and services ([Polski & Ostrom, 1999](#)). In our context, these will comprise of the domestic resources used in the generation of electricity and the skills and capabilities of the personnel and the institutional arrangements in the electricity supply industry. Moreover, the IADF also brings to the fore the analysis of the rules-in-use in the policy arena; according to [Polski and Ostrom \(1999\)](#), these refer to both formal and informal rules that affect behaviour in the action arena. In our study, we investigate the rules and regulations articulated and those that have become part of the *modus operandi* in the sector and the sources of these rules and how they affect the speed and timely implementation of rural electrification projects in Tanzania.

This paper takes a keen focus on the electricity industry and its policy space and portray the key actors in the Tanzanian electricity sector, the functions of the various actors in the sector, the rules and regulations governing the sector and thus analyse the structure of interactions within the IADF and how the behaviour of the actors is affected by the prevalent structure and accompanying rules and regulations. To accomplish this, we use a modified and customized IADF befitting our context as depicted in **Figure 2**.



**Figure 1.** The schematic presentation of the IAD framework. Source: [Polski and Ostrom \(1999\)](#).





**Figure 2.** Customized IADF for the Tanzanian electricity sector. Source: IRENA (2017).

The customized framework portrays the main actors in the policy arena, which include the Ministry of Energy, politicians, EWURA, TANESCO, REA, the development partners (donors), the Independent Power Producers, Small Power Producers (SPPs), standalone systems service providers, the banking sector, and customers. In Section 3.3, we describe in detail the actors in the action arena depicted in **Figure 2** in terms of their functions and authority in the sector.

### 3.2. The Resource Endowments of the Sector

Tanzania has been endowed with diverse electricity generation resources, including hydro, coal, natural gas, wind, solar, (National Bureau of Statistics, 2017; National Bureau of Statistics, 2015a; United Republic of Tanzania, 2014b). Whereas the country has exploited extensively its hydro resources, some of abundant renewable energy resources such as wind and solar power have not been extensively explored. The country has just recently started using its natural gas reserves discovered offshore in the deep sea off the coast of Tanzania, along Lindi and Mtwara regions, and onshore in Mnazi bay, Songosongo, Mkuranga, Kiliwani and Mtorya intensively for electricity generation activities. On the other hand, the country's massive coal reserves offer another avenue for electricity generation expansion. It is estimated that the country has about 1.9 billion tonnes of coal reserves, of which 25 percent are proven (National Bureau of Statistics, 2017; National Bureau of Statistics, 2015a; United Republic of Tanzania, 2014b). Furthermore, the country has uranium reserves that have not been used (National Bureau of Statistics, 2017). As of 2016, of the installed 1474 MW generation capacity, 38 percent was hydro power, 49 percent natural gas fired power plants and 12 percent fuel power plants (Eberhard et al., 2018).

### 3.3. The Key Actors of the Electricity Sector

#### 3.3.1. The Ministry of Energy (MOE)

The ministry of energy is the pivot of the electricity supply industry in Tanzania. Not only does it give the policy direction but also sets up and shapes the agenda of the electricity industry by enacting and overseeing laws and strategies for the fruition of policy objectives (IRENA, 2017). The ministry is envisioned to bring about social economic development and improvement in the quality of life of the Tanzanian citizens through the provision of reliable and affordable modern energy services, most prominently electricity (IRENA, 2017; United Republic of Tanzania, 2015a). All institutions that oversee the electricity supply industry in various capacities are under the stewardship of the ministry. It is within the ministry's mandate and guidance, that TANESCO, REA and EWURA work in tandem to pave and implement rural electrification projects, create an enabling environment for the sustainability of such projects and attract private investments in the electricity supply industry (World Bank, 2016a; United Republic of Tanzania, 2014a; African Development Bank, 2015).

#### 3.3.2. The Energy and Water Utilities Regulatory Authority (EWURA)

EWURA was enacted in 2006 and accorded an autonomous mandate to regulate the energy and water utilities in Tanzania; this was five years after its creation under the Energy and Water Utilities Regulatory Authority Act in 2001 (IRENA, 2017; World Bank, 2016a; United Republic of Tanzania, 2014a; African Development Bank, 2015). Its mandate within the electricity supply industry spans from licensing, enforcement and monitoring of technical standards within the industry, regulation of consumer tariffs and facilitate access to modern energy services for all, particularly the low-income group, thus spur on rural electrification (IRENA, 2017; World Bank, 2016a; African Development Bank, 2015; United Republic of Tanzania, 2014b). In its regulatory capacity, EWURA has been key in setting up regulations compatible and friendly to prospective investors in rural electrification. Regulations that allowed for setting of own tariffs for standalone systems that sell power to customers directly, exemption of licensing to entities producing less than one megawatt and feed-in tariffs for Small Power Producers (SPPs—producing power under 10 megawatts), are the few incentives that EWURA has used to attract the private sector into rural electrification initiatives in Tanzania (United Republic of Tanzania, 2014a; African Development Bank, 2015).

#### 3.3.3. The Tanzania Electric Supply Company Ltd. (TANESCO)

TANESCO is as state-owned company with the sole mandate of electricity generation, transmission, distribution and sale in Tanzania. Etymologically, the company was formed in 1975 upon the merger of the Tanganyika Electric Supply Company (previous TANESCO) and the Dares Salaam Electric Supply Company (DARESCO) with the government becoming the sole shareholder. It is the only electricity utility company with such a holistic mandate in the electricity sector in Tanzania; guided by its mission to generate, transmit and supply electricity in

the most effective, competitive and sustainable manner possible (IRENA, 2017; World Bank, 2016a; African Development Bank, 2015; United Republic of Tanzania, 2014b). Nevertheless, after the liberalization of the Tanzanian electricity supply industry, the company is going through the first stages of reforms of unbundling the company to make it more efficient and attract greater participation by the private sector. Currently, the electricity sector allows for private power generation through Independent Power Production Agreements and Small Power Producer Agreements (African Development Bank, 2015; United Republic of Tanzania, 2014b). Whereas TANESCO is at the frontier when it comes to urban electrification, it plays a supervisory, quality assurance, performance monitoring role, together with overseeing the commissioning of infrastructure whose construction had been procured by the REA when it comes to rural electrification (World Bank, 2016a).

#### **3.3.4. The Rural Energy Agency (REA)**

REA is an autonomous body that was enacted together with the Rural Energy Fund (REF) under the provisions of the 2005 Rural Energy Act and operationalized in 2006, with the mandate to accelerate access to modern energy services in rural mainland Tanzania (IRENA, 2017; World Bank, 2016a; United Republic of Tanzania, 2014a). REA plays a key role in realising the goal of modern energy access to all with regards to rural electrification, as it supports extension of electrification services to areas that may not be priority niches for TANESCO. REA supports rural electrification processes in various ways, first by offering subsidies for rural electrification projects, which it does under the supervision of the Rural Energy Board (REB) which administers the REF. The REF gets its resources from various sources including but not limited to the government, development partners, levies and fees as stipulated in section 19(3) of the Rural Energy Act no. 8 of 2005 (World Bank, 2016a; United Republic of Tanzania, 2016; United Republic of Tanzania, 2012; African Development Bank, 2015). Nevertheless, not all resources that finance REA's initiatives go through the REF, sometimes special purpose vehicles are set up to support specific projects whose fund disbursements must adhere to special rules and regulations agreed with the financier. REA provides technical know-how through capacity building initiatives for private power developers e.g., technical assistance and training on rural electrification project management (World Bank, 2016a; United Republic of Tanzania, 2016; United Republic of Tanzania, 2012; African Development Bank, 2015).

#### **3.3.5. The Emergency Power Producers (EPPs) and Independent Power Producers (IPPs)**

EPPs and IPPs are privately owned generation companies that each produce more than 10 MW. They currently contribute to about 40 percent of the country's generation capacity. Most of these privately-owned generation stations are diesel, gas or heavy fuel operated; nevertheless, new IPPs that make use of renewables such as hydro, wind and solar power are in the pipeline (IRENA, 2017; African Development Bank, 2015). According to the Africa Development Bank

(2015), by the year 2015, about six IPPs and EPPs were operational in the country; these included Symbion (Arusha, Ubungo and Dododoma), Songas, Independent Power Tanzania Limited and Aggreko (Tegeta and Ubungo). The IPPs sell the power they produce to TANESCO under IPPA's (IRENA, 2017; African Development Bank, 2015). Nevertheless, according to Eberhard et al. (2018), some of the EPPs have since been retired, these include Aggreko Tegeta, Aggreko Ubungo, Symbion Arusha and Symbion Dodoma.

### 3.3.6. The Small Power Producers (SPPs)

SPPs constitute of privately-owned power generation systems that produce up to 10 MW. Most of these systems are characterized by the fact that they are not solely power producing systems but rather part of a structure such as tea, sisal, tannin and sugar business entities (IRENA, 2017; World Bank, 2016a; African Development Bank, 2015). These production systems were first piloted and supported by World Bank through REA. Whereas they sell the power produced to TANESCO via SPPAs, they have also been licensed to sell power directly to individual customers and communities at large (World Bank, 2016a; African Development Bank, 2015). Some of the SPPs in Tanzania include Mwenega Hydro Power, Mufindi Paper Mills, TANWATT, Texpol company, Ngombezi (IRENA, 2017; World Bank, 2016a; African Development Bank, 2015).

### 3.3.7. Development Partners and Banks

Development partners and the banking sector are also important players in the electricity sector in Tanzania. Whereas development partners have supported the electricity sector and rural electrification initiatives through donations made to the REF or special purpose vehicles, grants and concessionary loans, the banking sector has liaised with the development partners as channels for access of much needed liquidity for investment in the electricity sector by the private sector (African Development Bank, 2015; United Republic of Tanzania, 2014a). Most development partners in Tanzania have preferred using special purpose vehicles, grants and credit lines rather than donating into the REF to support rural electrification initiatives. Donor's support towards rural electrification initiatives have not only covered the generation, transmission and distribution costs but also studies and capacity building pertaining to the implementation of rural electrification projects in Tanzania (African Development Bank, 2015; United Republic of Tanzania, 2014a). Nevertheless, most of the funding from donors has been directed to support grid expansion initiatives, having committed a chunk of their donations to the sector towards grid-based projects, with only a reportedly 8 percent of foreign aid committed to off-grid projects (Aly et al., 2019). Furthermore, the type of grid energy projects funded by donors has depicted the paths different donors desire for the Tanzanian energy sector. Whereas the European Union has looked to support renewable energy-based projects, the African Development Bank and Japan International Cooperation Agency (JICA) have supported and/or committed to support Tanzania's coal and gas-powered energy initiatives (Aly et al., 2019). The magnitude of donor support for the Tan-

zanian electricity sector has been massive on an annual basis, exemplified by the 1.5 trillion Tanzanian shillings (646,776,420,000 USD) of commitments recorded for the year 2016/17. The World Bank has been the major player in financing electrification initiatives in Tanzania, with the development agencies of France, Japan, Norway, Sweden and USA, the African Development Bank, and the European Union being the other main donors for the sector (African Development Bank, 2015).

### 3.4. Policies, Laws, Rules, and Regulations Governing the Sector

Table A1 (in the Appendix) presents a list of key policies, laws, rules and regulations governing the Tanzanian energy sector. Tanzania's energy policy has always given a general direction of the whole energy sector. The most current policy is the 2015 Energy Policy, which was brought in to address challenges in the sector and shortcomings of the 2003 Energy Policy which ushered the era of liberalization for the electricity supply industry in Tanzania. The 2015 Energy Policy is anchored in access to affordable and reliable modern energy services by all Tanzanians and provides a comprehensive institutional, legal and regulatory framework for electrification initiatives (World Bank, 2016a; United Republic of Tanzania, 2015a). The policy not only gears towards the creation of a business environment conducive for private investment, but also anchors its goals in sustainability of resource use in the electricity supply industry by increasing the share of renewables in the total electricity generation mix of the country (World Bank, 2016a; United Republic of Tanzania, 2015a; African Development Bank, 2015). Nevertheless, the electricity supply industry is also dependent on policies of supporting sectors for the manifestation and fruition of its plans, strategies and policy outcomes. Some of the key policies supporting the sector include the 1997 National Environment Policy and the 1997 National Land Policy (United Republic of Tanzania, 2015b; African Development Bank, 2015).

Whereas the energy policy gives the general direction the country yearns the energy sector and electricity sector to pursue, Tanzania has put in place specific plans, strategies and a prospectus for the electricity sector, which give a snapshot of actions and programmes within the electricity supply industry. The Tanzanian 2016 Power Master Plan is one of such plans that streamlines the general objectives of the energy policy and other development plans in the country in the context of the electricity sector. The plan is anchored in attainment of sustainable power supply. It provides a detailed assessment of generation, transmission and distribution requirements to optimally use the available resources in an efficient and least cost manner, so as to bring about reliable power supply and thus spur economic development, bring about energy security and ensure environmental protection. Furthermore, the connection of off-grid regions is also at the heart of the plan, with the aim of deriving social-economic development through electricity access to all Tanzanians.

Furthermore, the electricity supply industry reform strategy and road map (2014-2025) provide a framework and road map for reforms of the electricity

supply industry in line with the energy policy and more broadly with the Tanzania's Development Vision 2025 (United Republic of Tanzania, 2014b). The strategy entails the step by step restructuring the sector must go through. Key issues stressed by the strategy is restructuring the market and electricity sub sector, risk mitigation within the sector and the timelines associated with the respective restructuring processes, with the road map providing the implementation plan (United Republic of Tanzania, 2014b). The creation of a financially sound sector, improved access and increased electricity connections, optimal use of energy resources and improved reliability of power supply are at the centre of the reforms (United Republic of Tanzania, 2014b).

On the other hand, the national electrification program prospectus depicts a strategy to support the national electrification programme for the period between 2013-2022. At the heart of the strategy is the advancement of electrification using the least cost path, and suggests a framework in terms of institutions, regulations and capacity of human resources needed for the smooth implementation of the strategy. The strategy covers both urban and rural electrification, with the viability of grid and off grid solutions assessed for different population densities in different parts of the country. Nevertheless, the prospectus proposes grid-based electrification for settlements close to the grid, densely populated and large. Off-grid solutions have been proposed for remote low-density areas (United Republic of Tanzania, 2014a; United Republic of Tanzania, 2012). If the prospectus is realized, country's electrification rates are supposed to be 31%, 57% and 20% for the overall country, urban areas, and rural areas respectively (United Republic of Tanzania, 2014a; United Republic of Tanzania, 2012).

To support the implementation and realization of the energy policy and other supporting sector policies within the provided institutional setups, the country has passed several legislations providing for the establishments of various institutions in the sector and their respective functions. The most encompassing legislation of the Tanzanian electricity supply industry is the Electricity Act of 2008. It stipulates the mandate of the Ministry of Energy and the respective minister. It also stipulates the role of EWURA with regards to tariffs setting, its regulatory mandate with regards to licensing, monitoring, enforcement of standards pertaining to rural electrification and sets out procedures for the reorganization of the electricity supply industry (United Republic of Tanzania, 2012; African Development Bank, 2015). Other more specific legislations in the sector include the Energy and Water Utilities Acts of 2001, 2006 and its regulations which provided for the establishment of EWURA as the regulator of the energy and water utilities sectors. To give priority and facilitate rural electrification, the Rural Energy Act no. 8 was passed in 2005 to provide for the establishment of REA. It stipulates funding channels and procedures for disbursement of such funds for rural energy projects (United Republic of Tanzania, 2012; African Development Bank, 2015).

On the other hand, there are other overlapping or general legislations, that not only provide for the smooth functioning of the electricity supply industry, but

also of other sectors. One important legislation of such nature is the Public Private Partnership Act of 2010, which provides for the regulation of public-private-partnership projects in Tanzania. Not only does it stipulate the responsibilities of all parties involved in private-public-partnership projects with regards to penalties, remedies and financial controls, it also provides for dispute resolutions procedures in case of disputes between parties. It provided for the establishment of the public-private-partnerships coordination units under the Tanzania Investment Centre in conjunction with the Tanzania Investment Act of 1997, which provides provisions for investments and leeway to make them prosper in various sector, the electricity supply industry being one of them, with regards to rural energy projects (United Republic of Tanzania, 2012; African Development Bank, 2015). Moreover, the most recent Contract Review Act of 2017, provides provisions for renegotiations of contracts if the country deems the contracts to have unconscionable terms (Aly et al., 2019).

Other general legislations of the same importance to the electricity supply industry, include the Land Act of 1999 which stipulates the provisions for land ownership by investors in various sectors, be it individuals or corporates, which works hand in hand with the Village Land Act of 1999, which stipulates the procedural priors for acquisition of village land for investment on Tanzania (United Republic of Tanzania, 2012). Moreover, most importantly for rural energy projects developers that access grants, and make use of public funds, the Public Finance Act of 2001 provides provisions for access of such funds and required audits to be adhered to and institutions responsible for such audits. On the other hand, the Public Procurement Act of 2011, and its regulations, provides for the disbursements of grants for development projects (United Republic of Tanzania, 2012). As most projects in the electricity supply industry involve the use of natural resources in one way or the other, legislations pertaining to the use, acquiring of such resources and sustainable use of the resource also provide a framework in which these projects operate. These legislations include the Water Resources Management Act of 2009, which provides for the management of water resources with regards to protection of catchment areas and pollution. Furthermore, the Environment Management Act of 2004, stipulates the responsibilities and regulations that rural energy projects developers will have to bear and adhere to with regards to environmental sustention. On the other hand, the Petroleum Act of 2008, provides for the licensing requirements and regulations with regards to acquiring, processing and use of petroleum products which national and rural energy projects developers that make use of petroleum products must adhere to.

#### 4. Empirical Methodology and Data

Following from the IADF, the study engaged stakeholders to get their perceptions of the electricity sector with regards to rural electrification in Tanzania, based on their mandate, influence, authority, expertise, and their overall role within the sector. The paper collected data from different stakeholders within the electricity supply industry in Tanzania through key informants interviews

from the 25<sup>th</sup> March 2019 to 25<sup>th</sup> April 2019 in Dar es Salaam, which was complimented with data from literature and official institutional reports (government and non-government institutions).

The data from stakeholders was collected through semi structured interviews. Questions were posed in the form of open-ended questions, and the stakeholders were given an opportunity to give their answers and explain them in detail, to get an ample story surrounding the issues of interest. The questioning was tailored in the context of the work of the stakeholder institution's work and areas of expertise in the electricity subsector. The stakeholders that were interviewed were experts and people working in the electricity subsector, that acted as key informants on the issues of interest in an expertise capacity. The snowballing technique was used to identify the key stakeholders in the sector.

The semi structured questions addressed five areas based on a literature review guided by the IADF; these areas were 1) the characterization of scope of electricity access in Tanzanian rural areas; 2) the pros and cons of the institutional set up in the electricity supply industry and their respective reforms; 3) the clarity and effectiveness of rules and regulations governing the electricity supply industry; 4) the role of donors in financing of the electricity supply industry, the pull and push factors for such support; 5) the opportunities for improving electricity access in rural Tanzania.

We interviewed stakeholders from government institutions within the electricity sub sector, including TANESCO, EWURA, REA, Ministry of Energy, from the international and academic community including the African Development Bank (AfDB), the World Bank office in Tanzania, the Swedish International Development Agency in Tanzania, and researchers in academic institutions. Thus, in total we conducted 30 key informant interviews. Whereas the government and international institutions provided one key informant each, we interviewed three key informants from academic institutions. The key informants were chosen by institutions based on their expertise in the area of study pertaining to their institutional mandate and role in the sector (**Table 1**).

**Table 1.** Stakeholders interviewed for the study.

The stakeholder	The number of interviewees
Tanzania National Electricity Supply Company (TANESCO)	3
Energy and Water Utilities Regulatory Authority (EWURA)	3
Rural Energy Agency (REA)	3
Ministry of Energy	3
The World Bank group, Tanzania	3
The Swedish International Development Agency (Sida)	3
The African Development Bank (AfDB)	3
Research institutions: University of Dar-es-salaam (UDSM), Environment for Development (EfD)-Tanzania, Mzumbe university (MU), Sokoine University of Agriculture (SUA)	9
<b>Total</b>	<b>30</b>



Nevertheless, due to time, bureaucracies, and financial constraints, we could not get stakeholders in the private sector. This was one of the main reasons to speak to more representatives in the academic community who had worked closely with the private sector in consultancy and research capacity in the electricity supply industry. Prior to the research, ethics clearance was obtained from the University of Cape Town along with permission and consent from the relevant authorities, institutions, and individuals.

## 5. Discussion

This section presents a discussion of the stakeholder's perceptions pertaining to the electricity supply industry, with regards to institutional barriers of rural electrification in Tanzania. More specifically the stakeholders pointed to the barriers to successful and timely implementation of rural electrification projects and increased participation of the private sector in the electricity sector in Tanzania to facilitate rural electrification. The study elicited these perceptions based on the mandates/authority of individual stakeholders within the sector, expertise of the individual respondents, rules and regulations within the sector, resource use and investments within the sector and the interactions of various stakeholders within the policy space in accordance with the conceptual framework adopted for the study. The results from the stakeholder's interviews can be grouped into five main themes, which include constraints pertaining to 1) non-independence of institutions within the energy sector; 2) the current energy policy direction, strategies, and rules of operations; 3) the supporting sectors framework's *modus operandi*; 4) social and community inherent barriers and; 5) problems inherent within the energy sector governing institutions.

### 5.1. Non Independence of Institutions within the Tanzanian Energy Sector as a Hindrance to Rural Electrification

The non-independency of most of the governing institutions in the sector was one of the issues that was brought to the fore. Over 80 percent of the stakeholders interviewed stressed that the institutions that govern the sector, particularly TANESCO and REA were not independent enough in their operations and decision making, as interference from politicians and board of directors of these institutions lead to the delay of implementation of electrification projects, as portrayed in **Figure 3**.

One area where such interferences were of prominence according to the stakeholders was in deciding areas and the number of villages to be electrified under rolled out rural electrification projects, with over 50 percent of the stakeholders that cited non-independence of institutions, pointing it as an area of concern as portrayed in **Figure 3**. Stakeholders elaborated that as electrification is a key campaign issue, most politicians try to lobby and put pressure on the project implementing institutions to either include big portions or whole of their constituencies within the planned projects, which is usually beyond the project's

budget and the contractual obligations of the contactors on site. This is something that the Ministry of Energy has taken note of in the National Electrification Programme Prospectus 2013-2022, which has highlighted the need to have a transparent process in determining households that would be covered by the electrification projects (United Republic of Tanzania, 2014a). This has been a challenge that rural electrification projects in Tanzania under various donors have faced as reiterated by Miller et al. (2015), where by the consensus among beneficiaries of the Millennium Corporation Challenge electrification projects in Tanzania was that there was no known criteria for determining the beneficiary communities, which translated into feeling of unfairness by adjacent communities as projects are deemed a political game by the communities, thus putting pressure on their political representatives whose lobbying lead to delays of project implementation and over commissioning household connections beyond the projects budget scope.

On other hand, 40 percent of stakeholders that had cited non independence of governing institutions as a problem, pointed non independence with regards to regulation of the sector as shown in Figure 3. The non-independence with regards to the regulation of the sector provide loopholes for political meddling in the running of the sector, and thus threaten the sustainability of private investments and attracting of such investments in the electricity sector, particularly in off-grid generation systems which have provided a platform for electrification of remote areas. For instance, stakeholders stressed that although the Energy and Water Utilities Regulatory Authority (EWURA) had put in policies that allowed for flexible consumption tariffs that allowed cost recovery by off-grid investors (Sergi et al., 2018), the political pressure from some members of parliament and community leaders to lower tariffs charged by off-grid power producers so as to be at par as those charged by TANESCO for grid electricity which are financially unviable (Ahlborg & Hammar, 2011) may deter such investments and plunge

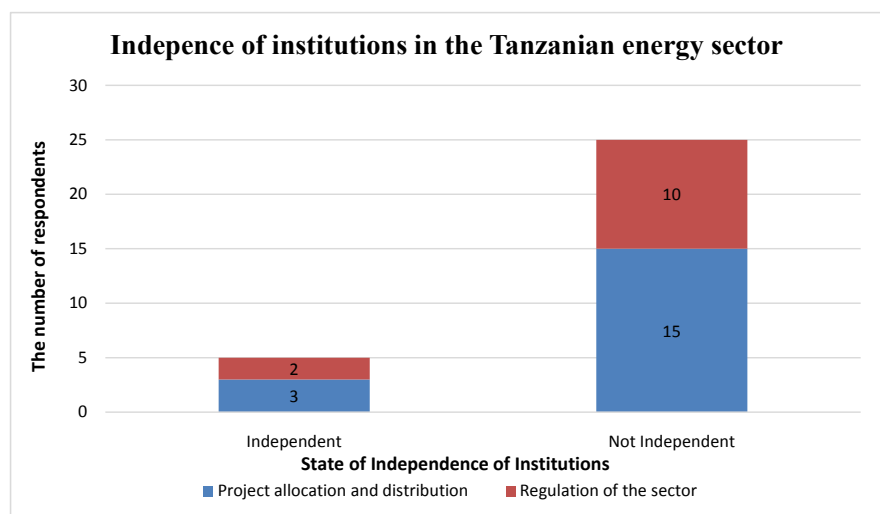


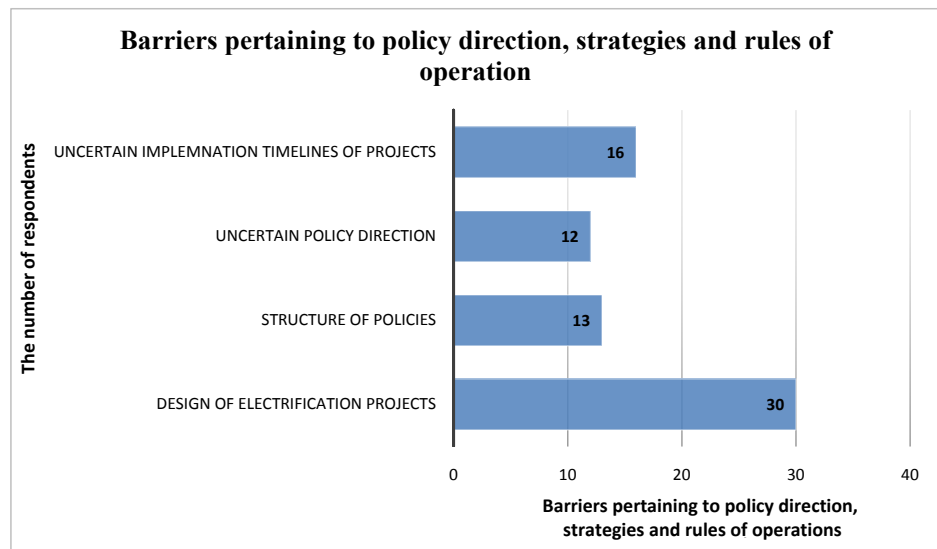
Figure 3. Independence of institutions in the Tanzanian energy sector.

the existing ones in uncertainties. While grid-based electricity projects may survive on non-cost reflective tariffs due to mostly being, on the one hand, subsidized by governments and, on the other hand, supported by a tariff system that sees urban dwellers cross-subsidize rural dwellers, such scenarios do not apply to off-grid private investments (Peters et al., 2019). Such political and community pressures culminate when off-grid served communities and grid-served communities are adjacent to each other or through communication by community members in the respective communities (Peters et al., 2019).

## 5.2. Policy Directions, Strategies and Rules of Operation as a Hindrance to Rural Electrification in Tanzania

Nevertheless, apart from political interferences in the running of the energy sector, stakeholders pointed to the shortcomings of the existing policies, strategies and plans for the energy sector which either result in partial achievement of policy outcomes, creating uncertainties in the sector or missing out on funding opportunities for rural electrification in Tanzania. Several shortcomings were brought to the fore by stakeholders, the prominent one being the design of rural electrification projects through the REA and the least cited being the uncertainty of policy direction in the sector as shown in **Figure 4**. By design these projects subsidize the household's connection fees which have been a stumbling block to household's connecting to electricity. Households under REA projects are required to only pay 27,000 Tshs (11.64 USD) flat fees for them to be connected. Nevertheless, the experience has shown that there are more costs facing households beyond the connection fees when it comes to connecting the household to electricity. These costs include wiring costs which have been deemed expensive for low-income households in the rural areas and thus act as a barrier for households connecting to electricity. This has been substantiated in recent literature, whereby not only have wiring and other electricity fixture costs been deemed a barrier to household's connection to electricity, but it has also been pointed out that even the subsidized fee of 27,000 Tshs that households are supposed to pay is still not affordable to some households (United Republic of Tanzania, 2018; World Bank, 2016a). Furthermore, it was reiterated that not only were the wiring and other electric fixture costs expensive for rural households but also these costs were much greater or equivalent to the standard connection fees that are being subsidized by rural electrification projects.

Moreover, stakeholders pointed to the policy structure pertaining to feed-in tariffs as another barrier to timely fruition of policy outcomes with regards to rural electrification in Tanzania. Whereas stakeholders commended the policy for enabling for easier registration and cost recovery by investors in off-grids, the fact that the feed-in tariffs had to be subjected to reviews annually did not give room for long term planning with regards to increased access to rural households. This problem had already been identified by policy makers in Tanzania as articulated in one of their strategy reports that reiterated the problem



**Figure 4.** Barriers pertaining to policy direction, strategies, and rules of operation.

with feed-in tariffs not only with the aspect of annual reviews by EWURA but also pertaining to the uniformity of tariffs regardless of the renewable technologies used in electricity production and the fact that there was no regulation that accounts for scenarios when the grid reaches areas where such investments were made, which may act as a deterrent for new off-grid investments and thus slow down rural electrification initiatives (United Republic of Tanzania, 2014a). Nevertheless, it has been reiterated policy incentives promoting private investments in the electricity sector would make the sector more attractive if and only if TANESCO were to improve its financial standing and the government to guarantee payment for power produced when TANESCO cannot do so (IRENA, 2017), as failure to do so makes TANESCO accumulate and struggle to pay arrears which leaves investors short of cash and drives them into debts as they solicit loans to finance their operations (World Bank, 2016a). Moreover, the policy design as it is, only supports greater involvement of the private sector in off-grid investments for SPPs, such measures that allow for flexible tariffs and ease market entrance should be extended to larger electricity grid-based projects, which have not seen enough private investments yet (Sergi et al., 2018). This may give lee way for increased electricity generation and thus have enough electricity to go around the whole country reliably.

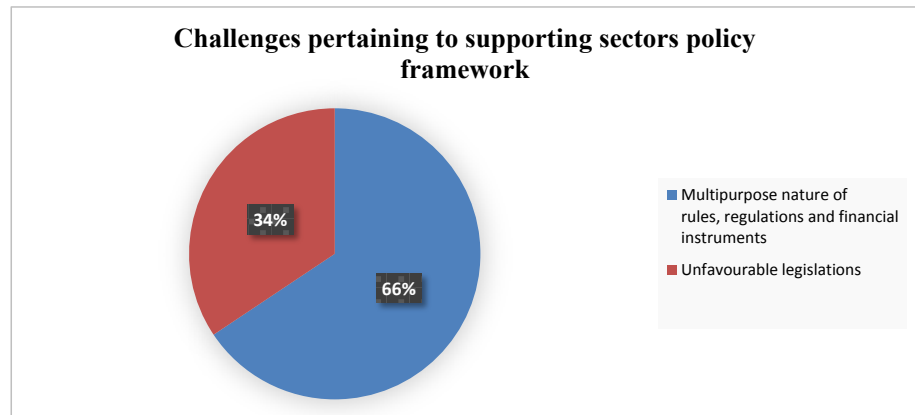
Some policy directions taken by the country and uncertainty in timelines of policy implementation with regards to some of the plans in the energy sector may lead the country to miss on timely private investments and funding opportunities. One of the policy stances of the country in the electricity sector that was pointed out as a potential bottleneck with regards to securing funding for investments in the sector, is the country's pursue of a fossil fuels heavily dependent electricity generation mix by 2040, particularly coal as stipulated in the Tanzanian 2016 Power Master Plan. One of the stakeholders reiterated that due to cli-

mate change concerns, more donors are more interested in support of renewable energy projects. Moreover, due to technological advancements and new innovations renewables such as wind and solar energy generations systems have gradually gotten cheaper and are expected to be much cheaper in the future and thus provide least cost generation options for the future. Priyavrat and Shweta (2018) had reiterated this concretely in their analysis of the Tanzanian Power Sector Master plan, where they raised caution with regards to financial and environmental costs, reduced interest by international investors and development partners pertaining to coal mining and use of coal for electricity generation. They further stressed that the country not pursuing renewable technologies due to lack of technological reliability and costs associated with operations of renewable technologies are no longer feasible reasons for not pursuing renewables, due to technological advancements made in the area. Moreover, the increased global interest in renewables investments provides an opportunity for funding not to be missed.

Similarly, uncertainty in timelines with regards to implementation of projects also derails rural electrification efforts as investments in uncertain conditions are unattractive. Stakeholders pointed to the case of grid extensions over the country, whereby although the national energy policy along with the electrification prospectus clearly stipulate increasing electricity access through enhancement of the grid, timelines on when the grid would reach various parts of the country and priority areas have not been clearly demarcated. This makes investments in off-grid electricity infrastructures unattractive due to the uncertainty of when grid electricity would move-in in certain areas which have been identified by investors as ideal for off grid investments. According to the African Development Bank (2015), such information asymmetries on the power-generation and distribution investment plans, create worries among investors already on the ground and prospective investors about the risks and costs borne by private companies operating in off-grid generation systems once the grid electricity reaches their niche markets.

### **5.3. Supporting Sectors Policy Frameworks as a Hindrance to Rural Electrification**

Furthermore, stakeholders stressed on the uncertainties and hurdles created by the supporting policy framework. This includes policies, rules and regulations and institutional setups in sectors other than the energy sector that support investments and operations in the energy sector or operations in multiple sectors. Most stakeholders, over 60 percent pointed to the multipurpose nature of the rules, regulations and financial instruments as a key barrier as shown in Figure 5. It was stressed that as most of such policies, rules and regulations and institutional set ups are multipurpose in nature, some instruments have general and contextual shortcomings with regards to supporting the energy sector. The financial sector lending framework is one of such cases, whereby although the



**Figure 5.** Challenges pertaining to supporting sectors policy framework.

Tanzanian financial sector is well vested in offering loans through various instruments, the consensus has always been that the costs of borrowing are high. Nevertheless, when it comes specifically to energy project investments, the sectors lending instruments do not conform to the context in the energy sector in relations to its operation timelines, costs involved, and services produced. Furthermore, as stipulated in the literature the Tanzanian financial sector lacks expertise in evaluating energy projects and know-how of operations of such projects to come up with informative appraisals. Moreover, coupled with the high collateral requirements and the high risk attached to energy projects in Tanzania due to financial constraints of the main power buyer (TANESCO) make lending to investors in this sector unattractive (IRENA, 2017).

Moreover, 34 percent of stakeholders cited unfavourable legislations within the general policy realm of economy as shown in **Figure 5**. Some of the supporting regulation frameworks that were pointed to derail access to electricity projects include the local content aspect with regards to procurement in rural electrification projects and the new natural resource law, Natural Resource Act of 2017. Whereas the local content aspect in procurement of inputs and services for electrification projects, is aimed at supporting the industrialization agenda of the country and make sure that local producers become suppliers in the supply chain of various electrification projects, some of the local suppliers that have been given tenders do not have enough capacity to supply the required quantity of inputs on time and thus delay the implementation of various electrification projects, which has an impact on the timelines of the projects and the length at which the contractors have to be on site.

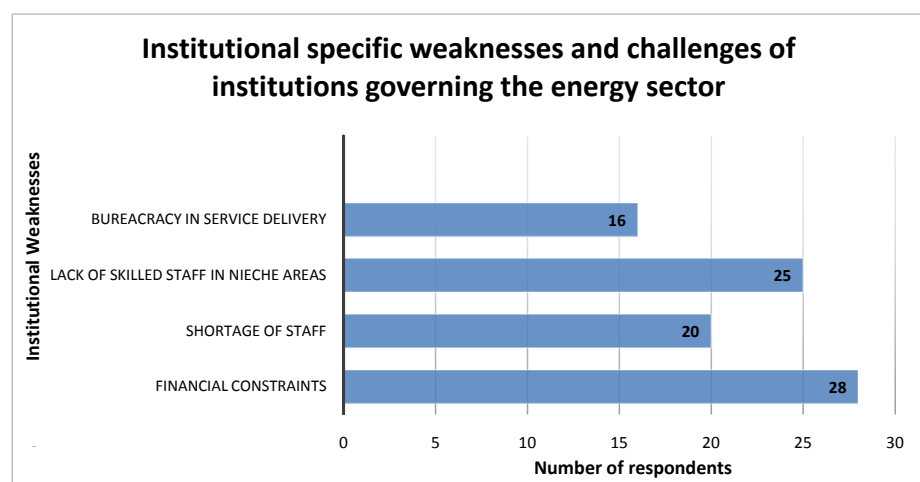
Moreover, some stakeholders stressed that because producers of most inputs for electrification projects are still few in number, sometimes having monopolies in the production of some of the inputs and thus produce these at a high price compared to products of the same quality elsewhere, awarding tenders to such suppliers on the basis of local content policies goes contrary to the national and international procurement guidelines that stipulate awarding tenders on the basis of international competitiveness while offering a percentage margin of prefe-

rence to local firms, which may lead to missing out on funding opportunities for similar projects in the future due to conflicting guidelines and regulations of supporting frameworks.

Similarly, stakeholders pointed to uncertainties that have been created due to the recently passed Natural Resource Act 2017. The Act was passed as part of the patriotic drive of the country led by the Presidency to help citizens gain appropriately from natural resources (Woodroffe et al., 2017). The Act provides for renegotiation of any contract if it is deemed to have “unconscionable” terms as per criteria laid out in the Act. Unfortunately, these terms have been deemed broad by investors and thus create fear among investors with regards to the safety of their investments. This was one of the issues pinpointed as a barrier to new investments in the rural electrification sector (Woodroffe et al., 2017; Aly et al., 2019).

#### 5.4. Weaknesses of Governing Institutions within the Tanzanian Energy Sector as a Hindrance to Rural Electrification

Nevertheless, institutional specific weaknesses and challenges of institutions governing the energy sector were pointed as barriers to timely implementation of rural electrification projects in Tanzania. Stakeholders pinpointed understaffing, shortage of equipment, financial constraints and bureaucracies associated service delivery as shown in **Figure 6**, as some of the specific institutional weaknesses that derail timely implementation of electrification projects. These institutional challenges have been widely stipulated in literature, financial constraints being the prominent of them all. This is evident in the financial uncertainties that sometime plague REA and TANESCO. Whereas REA derive their funding from government grants through the normal government budget channels, grants from development partners and revenues specific levies on electricity and petroleum, REA does not have complete control of the inflow of such funds, and thus sometimes falls short of its planned budgets due to delayed or non-disbursement



**Figure 6.** Institutional specific weaknesses and challenges of institutions governing the energy sector.

of amounts depicted in the national budgets or suspension of some of the grants by development partners due to various technical and regulatory related aspects of the projects. The shortage of funds for REA to implement its projects smoothly leads to delays in completion of rural electrification projects and the sizing down of targeted households in the commissioned projects (World Bank, 2016a). On the other hand, TANESCO's financial constraints are said to emanate from charging non-cost reflective tariffs and electricity lost due to transmission losses which stood at 17 percent in 2015 (Priyavrat & Shweta, 2018). TANESCO's financial constraints as the sole entity responsible for power distribution and transmission creates uncertainties for investors and would-be investors in generation, and thus deprive the country of immediate investments to increase the amount of power generated.

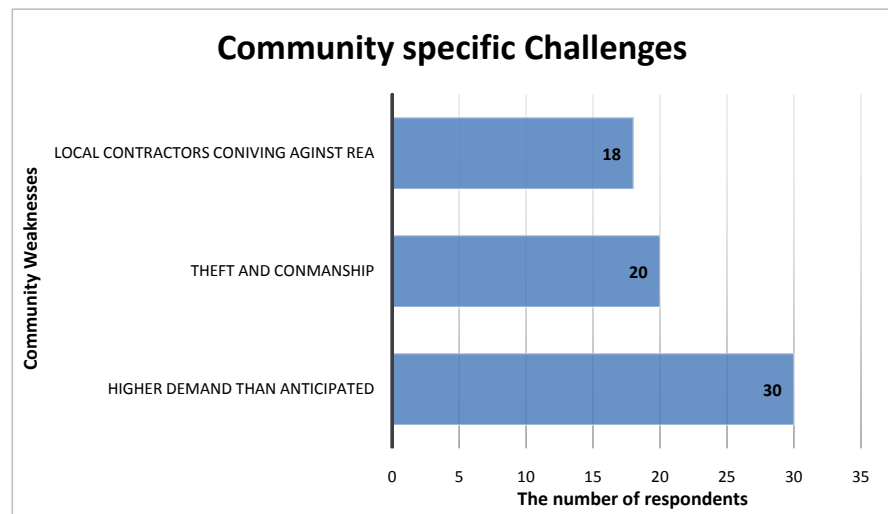
Moreover, shortage of staff has also been widely documented, whereby REA has been the most affected in this regard, especially when it comes to the monitoring and evaluation department of its rural electrification projects. As stipulated by most policy documents in the country, electrification projects aim to alleviate poverty and improve standards of living of households, thus play crucial role in social development (United Republic of Tanzania, 2014b). The only way to know the impact of such projects is to have a well-staffed monitoring and evaluation departments that comes up with detailed evaluations of various interventions with regards to electrification and impacts of such interventions, and thus come up with thorough recommendations for improvement and sustenance of the interventions in question. On the other hand, lack of knowledge and capacity in niche areas such as renewable energies, makes carrying out of feasibility studies, planning and other technical related studies pertaining to renewables and other energy investments projects, and hence the country not being able to take advantage of new and cheaper technologies and investments in the renewables electricity sector (Africa Development Bank, 2015).

Nevertheless, shortage of equipment and bureaucracy in service delivery is another institutional challenge plaguing institution governing the energy sector in Tanzania, particularly TANESCO. As pointed out by stakeholders and widely documented, in some electrification projects and interventions, household's connections have been constrained by TANESCO's shortage in materials needed for household's connections, such as poles, conductors and earth poles. Furthermore, there is excessive bureaucracy in service delivery resulting in applications for connections taking longer to be processed than anticipated (Miller et al., 2015).

### 5.5. Community Specific Barriers to Rural Electrification

On the other hand, stakeholders also pointed to social inherent barriers to household connections to electricity, which emanate from within the targeted communities. Stakeholders pointed to higher than anticipated demand for electricity connections, theft of connection fees and local contractors conniving against REA's modern technologies as shown in Figure 7. In some projects the





**Figure 7.** Community specific challenges.

demand for electricity was higher than anticipated, preventing some of the households from being connected when the contractor was on site, and thus leaving the connected households with a burden of paying higher connection fees, which most of them could not afford. This problem synonymously occurs when household's awareness about rural electrification campaigns in their areas was low or households did not believe in the authenticity of subsidized connection programmes, maybe in fear of it being a rogue scheme, and thus only believed after seeing a few households that had benefited from the programme (United Republic of Tanzania, 2018; Miller et al., 2015).

Nevertheless, household's tendencies to have reservations about subsidized household electricity connections stems from the fact that some intervention programmes in the past have been plagued by conmanship and theft. Rural electrification projects have also been plagued with theft, as some unfaithful members of the community have impersonated REA or TANESCO officials and collected the connection fees from households, who end up not getting connected during the project due to fraud.

On the other hand, some resident electricians within the communities have also tried to connive against REA and thus downplay some of the innovative technologies REA has come up with to aid quicker household connections to electricity. For example, REA has come up with a board that enables a household to attach a bulb and socket for charging phones along with other utilities, thus save the households in the rural areas the cost of doing wiring for the entire household; these enabled connections to be done in any type of housing regardless of its building materials. Nevertheless, such technologies have been mislabelled as "dangerous, suspectable to fire" by some members of the society due to a low understanding of how the technology works and resident electricians who hope to benefit from household wiring jobs. This makes the use of such technologies hard for areas where housing materials may not be adequate for the

full-scale wiring of the house or in area where wiring costs could be hindrance to household's connection to electricity (Miller et al., 2015).

### **The political economy synthesis**

In a nutshell, the views from the stakeholders confirm the role of political clergy and institutions in the delay of implementation of rural electrification projects in Tanzania. Whereas the political elite may delay projects and interfere in the running of established institutions in the sector due to their power and authority elicited from the people, so will state designated energy entities due to their weaknesses financially and capacity-wise in terms of human and physical resources. This lack in capacities, more importantly human resources in terms of expertise, may result in plans that are not well informed in terms of technologies in use and actual costs pertaining to projects in terms of the costs of inputs and operations within the regulatory framework present in the country, which has been vindicated in plans of incorporating coal and less of renewables in the generation mix of the country in the future, thus end adopting cost inefficient ways from the start and thus make the electrification process as a whole unsustainable due to high generations costs (Priyavrat & Shweta, 2018). As reiterated by Ahlborg and Hammar (2011), whereas political priorities drive rural electrification in Tanzania, national energy entities face critical institutional and financial constraints which lead to flawed or no planning at all and subsequently ineffectual implementation of rural electrification projects.

Moreover, a subsequent deduction from our discussion is that, due to financial constraints facing the government energy entities in the sector, private investors and donors have had a major role to play in terms of financing the electrification process in terms of investments, loans and grants as discussed earlier. Nevertheless, this has given financiers power in dictating the direction the country's energy sector would pursue. This is typically evident in terms of choice of generation projects that donors choose to fund, whereas others only support renewable technologies investments with climate change concerns at the fore front, others are open to supporting investments in fossil fuels generation and associated (Aly et al., 2019). Thus, countries like Tanzania that have not incorporated a big percentage of renewables in their plans may miss out on funding for electricity projects to improve the reliability of electricity supply and that is enough to distribute across both urban and rural areas and thus see the full manifestation of electrification impacts in the rural areas. On the other hand, a question of sustainability of using such a model of donor dependency in improving access to electricity as a whole and rural electrification hover over the sector. Most of the donor support, is committed to the expansion of electrification through grid electrification projects, commitments for off-grid projects which could by far be useful to electrify remote rural areas are still very low. Moreover, this dependency brings about budget uncertainties and thus implementation outcomes (Ahlborg & Hammar, 2011).

Nevertheless, even though the country has done its fair share to attract inves-

tors in the electricity supply industry, there are still uncertainties created by the regulations, an example being the uniform tariff setting system for all off-grid renewable power generating projects, which hinders the investors' ability to recover their costs, thus limit further investments by prospective investors and slow down rural electrification initiatives. Furthermore, some of the country's laws in other supporting sectors also impact rural electrification efforts by delaying timely investments in the electricity supply industry, to improve access to electricity and rural electrification. These laws raise uncertainties due to either inducing operational procedures contrary to the norms of donor's host countries and investor's origin of capital or concerns with safety of their investments in the country.

On the other hand, our analysis also deduced some areas that have been covered concretely by the policies, strategies, and interventions on the ground, with regards to rural electrification. For example, in accordance with the stakeholder's views, subsidization of connection fees by the Tanzanian government has not solved the affordability problem, moreover, the fact that the subsidy is only effective when the contractor is on site brings about the question of sustainability of such interventions in the long run.

## 6. Conclusion and Policy Implications

The paper looked at the institutional barriers to rural electrification in Tanzania. It specifically substantiated if the political clergy and energy sector governing entities in Tanzania constrain the smooth implementation of rural electrification projects, moreover the study investigated if the current rules regulations and laws within the electricity supply industry and supporting sectors support the smooth investments in electrification projects in rural areas, and lastly the paper analysed the policies, strategies and interventions within the energy sector with regards to rural electrification. The paper borrowed conceptually from the Institutional and Development Framework by [Ostrom \(2011\)](#) as stipulated in [Polski and Ostrom \(1999\)](#) and applied qualitative methods to analyse the institutional barriers to rural electrification in Tanzania. Data was collected through key informant interviews from various stakeholders in government institutions, donors, international institutions and research community affiliated to the Tanzanian energy sector and prominently the electricity supply industry and was supplemented with literature from peer reviewed articles, institutional and government reports.

The stakeholder interviews revealed barriers pertaining to non-independence of institutions within the energy sector which delay the implementation of projects, results in over commissioning of households to be electrified in rural electrification projects and uncertainties in investment environment due to interference in setting up of cost reflective tariffs. Moreover, stakeholders stressed that some of deficiencies of the existing policies, strategies and interventions pertaining to rural electrification lead to unsatisfactory outcomes with regards to

number of connected households due to an unresolved affordability problem beyond the connection fees covered by the subsidies, unsustainability of investments due to tariff regulations that do not provide for full cost recovery and miss out on prospective funding due to the policy direction pursued by the country. On the other hand, supporting sectors framework's *modus operandi* are not accustomed to support specific investments in the electricity supply industry, others lead to delay of implementation of rural electrification projects themselves with regards to procurement procedures. Moreover, the laws governing some of the supporting sectors create uncertainties with regards to investments in electricity supply industry. Nevertheless, institutional specific challenges such as financial constraints and shortage of staff facing the various energy governing institutions like TANESCO and REA respectively have also led to the delay of project implementation and inadequate monitoring of projects. Lastly stakeholders stressed on the community and social inherent challenges such as awareness issues during project implementation, petty theft of project equipment and con-man ship deprive a large percent of households the opportunity to be connected during the project phase.

The results have substantiated how politics and institutions within the energy sector derail the pace at which rural electrification takes place due to interfering with the mandate of the respective institutions and the inherent challenges facing the energy governing institutions within the sector. Moreover, due to financial constraints and need for investment in the sector to push rural electrification and electrification agenda, the financiers have acquired much power and authority of shaping the energy sector in terms of resources to be used and kind of technologies they would support. Nevertheless, despite the country's efforts to attract private investments, some of the rules and regulations still fall short in some areas to make the investments in the area sustainable in terms of costs. Analogously, the regulations in other supporting sectors still fall short in instilling full confidence in with regards to safety of private investments in the country. On the other hand, some of the policies, strategies and interventions haven't solved the fundamental issues with regards to household's adoption of electricity in rural areas. The paper puts forward a few recommendations to smoothen the institutional barriers in the electricity supply industry in line with the barriers identified in the paper.

Household energy transitions have been mostly deterred by affordability issues in most sub-Saharan African countries. Although Tanzania has done its fair share through its rural electrification initiative which subsidizes connection fees, the initiative would benefit to take into account the extra costs that a household faces for the connection to be completed. REA has already come up with innovative technologies to do away with wiring costs, it's imperative to promote these technologies so that they are readily accepted by rural households by raising awareness on the importance and usefulness of such technologies. Moreover, programmes could include a wiring component in terms of subsidies or credit

schemes so to enable the transition to take place. Nevertheless, as reiterated in literature subsidies will only be sustainable in the long run if development partners and the country continue working together. On the other hand, other interventions have been suggested before and implemented in other contexts as a substitute for subsidies, these include the reduction of connection fees and spreading the subsidized amount over a period as part of usage fees (Miller et al., 2015). Some projects implemented in Tanzania, have provided strong evidence of the impact of lowered connection fees on connection rates (Miller et al., 2015). These initiatives would be of much help to households in the long run when combined with the current subsidy interventions applicable when the contractor is on site, so that households that have not been connected during the project phase can still be incentivised to do so. Furthermore, the push by development partners and piloted by REA for use of low-cost network designs and technical standardization should be advocated so to lower the cost of rural electrification projects and subsequently address affordability (World Bank, 2016b).

The country should also iron out a few issues with regards to private investments in the country as raised by stakeholders. As reiterated in the country's electricity prospectus, provision of loans, lower financial risk and establishment of loan guarantee schemes are paramount for private investments in the sector (United Republic of Tanzania, 2014b). The country has put in several instruments to support private investments, but as revealed from stakeholder interviews a few regulations issues still must be ironed out. As revealed in the stakeholder's interviews, the issue of feed in tariffs to consider the technology used is something paramount for the sustainability of private investments, in line with recommendations in official government reports and development partners (United Republic of Tanzania, 2014b; African Development Bank, 2016). The world Bank through the Tanzania energy development and access expansion project have led way in rectifying these anomalies within the sector with regards to feed in tariff schemes. The bank's support to EWURA has resulted into a much-improved regulatory environment for SPPs that is transparent and revision of SPPs regulation rules which made feed in tariffs be calculated based on generation technologies used (World Bank, 2016a). Moreover, the country should also iron out policy uncertainties with regards to when national grid investments would reach, what will happen to the off-grid investments. This has started being addressed by the ministry through EWURA. Nevertheless, with regards to new laws governing the investment sector as a whole that have created uncertainties, the government through the ministry of foreign affairs should make an effort to have dialogue with development partners and investors on the good and patriotic intentions enshrined within the laws and how the country is committed in safe guarding private investments in the country, and come up with clear rules and guidelines of how the laws will effected in line with international regulations safeguarding investments.

On the other hand, the country may find it handy to consider the direction of

using more renewables to harness the readily available funds in the global renewables sector, as the world moves away from the use of fossil fuels to combat climate change. As reiterated in literature, the advancement in science and technologies has made the use of renewables much cheaper. Moreover, studies have shown that incorporating renewables could constitute a least cost energy mix rather when combined with other few fossil generation sources (IRENA, 2017). Moreover, the country's potential with regards to renewable energy resources is massive with regards to hydro power and solar (Ahlborg & Hammar, 2011). The country has continued to take advantage of the big capacity that comes with hydro power generation with the commissioning of the Stigler's gorge hydro power project. Nevertheless, because of droughts that have previously engulfed the country when its generation mix was heavily dependent on hydro, it's important to integrate projects that use other renewables too to complement the hydro generation. The inclusion of more renewables not only give a platform for access of much needed funds to push rural electrification, but also provide away to electrify remote areas much cheaply through off grid systems and thus improve energy access for the poor (Priyavrat & Shweta, 2018; IRENA, 2017; African Development Bank, 2015). On the other hand, in instances like Tanzania's, where the country has abundant reserves of coal, the country should seek cooperation with development partners who can invest in advanced technologies that can abate the harmful emissions accompanied with coal power generations (Aly et al., 2019).

Nevertheless, the country should strive to solve problems that have inherently perturbed key energy sector institutions like TANESCO and REA. Firstly, the institutions should be allowed to exercise their mandates without political interference so as to make expert informed decisions that are optimal for the sector and smooth implementation of projects. Moreover, the institutions themselves should eliminate any bureaucratic tendencies in service delivery so as to reduce lags in service delivery. Analogously, reducing uncertainties that emanate from delays of procured materials for electrification projects due to low capacity of local suppliers. The local companies responsible for supplying rural electrification projects should equip themselves to procure materials of high quality in bulk, so that projects can meet their timelines. Furthermore, enhancement in the capacity of their personnel should be at the fore front to aid the electrification agenda, so as to have ample expertise when it comes to planning and analysing ample energy paths the country should pursue, monitoring of project outcomes and deduction of ample recommendations.

Furthermore, TANESCO and REA should improve their financial viability. Whereas raising of tariffs has always been viewed as an ample way to increase revenues of TANESCO, a reduction in technical losses with regards to transmission and distribution would go a long way in increasing the power supply TANESCO can supply and increase its revenues in line with most of the stakeholder's views in the sector. Moreover, the government should effectively implement the deci-

sion to transfer the petroleum levy collections to REA so as to make the institution more certain with regards to finance. Moreover, a minimal increase in the levy could be an avenue for REA to raise funds to sustainably subsidize some of its projects effectively (World Bank, 2016b).

Generally, Improvement of household's access to modern energy services is paramount for facilitating economic growth and improving welfare, as enshrined in goal number seven of the United Nations sustainable development goals. Whereas policies, strategies and interventions try to effect factors at household level and national level, it's equally important to improve the institutional factors to improve the operations and implementation efficiency of rural energy projects. Rural electrification in Tanzania would benefit from smooth institutional processes in terms of rules and regulations, improved capacity in terms of warranted skills and human resources of the implementing institutions and subsequently well formulated interventions to trigger household energy transitions.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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## Appendix

### Appendix A1. The Political Economy of Household Energy Transitions in Tanzania

#### EXPERT INTERVIEW GUIDE 2019

##### Instructions for using this guide

Use this interview guide to conduct semi-structured interviews for the research project “The political economy of household energy transitions in Tanzania”. Before starting the interview. Make sure that you have a signed copy of the consent form from the participant. Ask the participant if he/she has any question about the consent form.

##### Interviewer Introduction

###### *Read the following to introduce yourself to the interviewee.*

My name is Kevin Rugaimukamu, a PhD student and an affiliate of the Environmental for development network (EfD), I will be interviewing you on the drivers (incentives and disincentives) of policy outcomes within the Tanzanian energy sector with regards to electricity access in Tanzania. Our Interview will take a maximum of 1 hour.

##### The Narrative

Tanzania has got prominent energy policies and supporting strategies and plans in place. The current 2015 energy policy has “*outlined improving the security of supply through effective use of energy resources and cross boarder trading; enhancing power reliability and coverage of transmission and distribution networks; accelerating rural electrification; enhancing utilisation of renewable energy and increasing private sector participation in the electricity industry*” as key objectives to improve electricity access in Tanzania. Although electricity access has increased over the years, the electrification rates of the country particularly in the rural areas, are still low compared to the global average and far off from the set targets in the development plans and strategy documents of the country. As one of the key stakeholders in the sector I want to get your views on the problem of electricity access and connection in rural Tanzania. How the institutional framework of the sector, the regulatory framework and the private sector/development partners incentivise/disincentives the materialization of policy outcomes in the electricity supply industry in Tanzania.

##### Interview questions

What is the work of your institution with regards to energy access in Tanzania?

1) How do you characterize the electricity access problem in Tanzania? Does it have to do with the supply/demand side alone/both? Why do you think the policy outcomes of the designed policies and supporting strategies with regards to rural electrification have not materialized? (Probe on: Implementation of the budgets, availability of funds, interactions of stakeholders in the electricity supply industry).

2) The institutional set up managing different operations in the electricity

supply industry in Tanzania is key in improving electricity access in Tanzania, with TANESCO (National Power utility company), EWURA (the regulator of the electricity sector), REA (rural electrification agency) and MOE (ministry of energy) being some of the key institutions governing the electricity supply industry.

- What the pros and cons of the current institution set up of the sector as a whole and the institutional set up of the individual institutions mentioned?

- Are there inefficiencies resulting from the current institutional set up that provide disincentives to the provision of affordable electricity to all in Tanzania? (Probe: On the suggestions in the strategies to unbundle the national power utility institution, what's hindering such transformation of institutions in the country).

3) Tanzania has a vast of legislations and regulations (Energy acts, of 2001, 2005 and 2006; PPP Act N.18; Petroleum Act of 2008) governing the electricity supply industry in terms of electricity generation, transmission, distribution of electricity, Investment in the various part of the electrification process.

- Do you think the rules governing these processes are clear to all the stakeholders involved such as the private sector and other key stakeholders?

- Do you think they warrant enhanced participation by stakeholders in the electricity supply industry?

- What do you think are some uncertainties with regards to the rules and regulations that derail the attainment of electrification policy outcomes? (Probe rules and regulations with regards to; Investment in the electricity supply sector, boundaries in authority between institutions, are the ones with authority in terms of rules the ones that determine the outcomes in the sector or interactions between stakeholders override the authority of some institutions?)

4) Tanzania has enjoyed political stability and peace since Independence, with five presidential regimes to date, each regime characterized with its own political agenda. The current regime's agenda is "industrialization of the economy" with the slogan "Hapa Kazi tuu" under the leadership of his Excellency President John Joseph Pombe Magufuli.

- What do you see being the approach pursued by the current regime in achieving policy outcomes in electricity supply industry?

- Have the regimes provided continuity in terms of projects and the direction of the electricity supply industry? How does policy continuity or discontinuity by political regimes affect electricity supply?

5) Development partners and the private sector have played a role in pushing the development agenda of most Sub-Saharan African Countries, Tanzania included.

- What has been the overall approach of funding of energy projects by development partners (loans/Grants/Partnership) and what determines the approach taken in funding a project? (Does a country have a say in terms of the approach it wants to receive funding? Which approach among the three readily brings funding on the table?)

- Is there always a coherence in terms of national energy project and funding objectives from development partners? If disparities in objectives exist does this deprive the country of funding for energy projects?

- What level of influence do development partners have in determining projects to be implemented that are different from the national plans and strategies? (If any, why do these scenarios occur).

- What challenges are there in terms of increased private sector participation in energy projects in Tanzania?

6) What do you see as the opportunities, areas of improvement in the policy set up, institutional set up and regulatory framework with regards to the supply of affordable electricity and increased access to electricity for households in Tanzania? (Probe improvements regarding investments in the electricity sector, rules governing the sector, and general governance).

## **Appendix A2. Important Policies, Strategies and Legislations in the Tanzanian Energy Sector**

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### **Policy framework**

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National Energy policy of 2015

Electricity Act of 2008

Energy and Water Utilities Act 2001 and 2006

Rural Energy Act of 2005

Public Private Partnership act of 2010

Investment Act of 1997

Contract review Act of 2017

Land Act of 1999

Village Land Act 1999

Public finance act of 2001

Public procurement act of 2011

Water management act of 2009

The environment management act of 2004

Petroleum act of 2008

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### **Government driven strategies and plans**

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Tanzania's Development Vision (TDV), 2025

National Strategy for Growth and Reduction of Poverty II

Power Systems Master Plan 2012 (2013-2035)

Electricity Supply Industry (ESI) Reform Strategy and Roadmap 2014-2025

National electrification programme prospectus 2013-2022

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