

May 2022

Policy Recommendation Report

Challenges of enhancing national long-term energy plans

Potential roles of renewable energy and energy efficiency strategies

in socio-economic transformation.



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Challenges of enhancing national long-term energy plans

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SUMMARY

Key Messages:

Realization of renewable energy potentials and energy efficiency technologies could play a significant role on the road towards ecological and socio-economic transformation if efficiently tapped. Several initiatives across the globe including Tanzania have been made to ensure sustainable energy for the people.

RE potential has remained inadequately tapped to enhance productivity for socio-economic transformation. Less Community Participation, lack of standalone renewable energy regulatory framework and coordination, extreme poverty to large part of communities and low level of awareness has continued to setback the progress towards increasing RE contribution in the energy sector. The increased education and awareness will initiate the anxiety to establish, develop and exploit a wide range of renewable energy and energy efficiency technologies in the country.

Recommendations:

- Mapping and quantify RE potentials

Continue enhancing cost effective mapping and quantify all RE potentials including geothermal, solar, wind, tidal and alike in the north, south and central regions of Tanzania

- Stand-alone RE policy and strategies:

The government needs to put forward the stand-alone RE policy and strategies that harmonize all highlighted efforts in analyzed documents. This could provide a better country direction.

- Awareness raising for RE

Prioritize awareness raising and dissemination knowledge on the alternative energies in the country

POLICY RECOMMENDATIONS



**Mapping &
Quantify
RE potentials**



**Develop
Stand-alone
RE policy**



**Awareness raising
for RE**

On the road towards

100 % RE Tanzania

*Needs guiding policies and strategies
to tap the potential of RE*

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1.0 Introduction

1.1. Background

Energy: life blood for a sustainable development

Energy is an important life blood of almost all socio-economic activities in the world. In developing countries and especially those found in the East Africa community and Tanzania in particular, energy is considered to play a significant role in addressing poverty and building climate resilience among communities (Torero, 2015; CANTZ, 2019). To ensure sustainable development it is imperative for national development plans to be well aligned and not only supported by energy sources whose reserves are either finite or imported at the expense of community development programmes. There is a need for a diversified energy mix that can better address the different risks such as climate change, political situations, international situation, and many more.

Time to break free:

Still dependent on fossil fuels and biomass

Tanzania is still dependent on both imported fossil fuels and local biomass to support its socio-economic development. The national Five Years Development Plan (NFYDP III) 2021/2026, National Climate Change Response Strategy (2021-2026) National Development Vision (NDV) 2025 and each year development plans will be possible if the country has secured access to reliable, affordable and sustainable energy resources for all people (CANTZ, 2019; Teske et al., 2017; URT, 2020). Within the electricity sector significant percentage of people have limited or no access to electricity. The electricity generation mix major share is from fossil-based fuels (63%), Hydropower (36%) and other RE (1%). This dependence on fossil fuel for development is risky due to its impact on climate change, vulnerability to global impacts, and volatility in its prices, stranding of assets effects and development pathway lock in effects. Secondly

statistics show that about **80% of population still depend on biomass** mainly from unsustainable harvesting of biomass (CANTZ; 2019).

Plan the future of Energy:

New guiding Energy Policy and strategies are needed for a just transition

On the other hand, studies show that, Tanzania energy demand growth is at between 10%-15%. To meet this demand and attain sustainable development, the country may require revolutionizing investments in the energy sector and embrace the use of abundant renewable energy sources. Guided by global and national changes and demands in the energy sector, Tanzania mainland has started a process of preparing new pieces of strategies and instruments that will govern the use and management of renewable energy and energy efficiency to foster the national economy. The process of preparing new strategies is still at infant stages and build on existing National Energy Policy (NEP) of 2015.

The National Energy Policy 2015 (NEP 2015)

A key towards fast-tracking RE in Tanzania?

The NEP 2015 put emphasizes and focuses on both renewable energy (RE) and energy efficiency development in the country. Hence, there should be efforts on increasing access to modern energy services and share of renewable energies in electricity generation mix to enhance availability, reliability, and security of supply (URT, 2015). On energy efficiency, the policy calls for the government to establish energy efficient technologies in several sectors such industries, residential and commercial sectors, transport, and agro-based and Small-Scale industries.

1.2. Historical pattern of energy development in Tanzania mainland

A Brief History of Energy in Tanzania

The road from a colonial to post-colonial energy system

The first public electricity supply in Tanzania was established by the German colonialists in 1908 (by then Tanganyika) and served the railway workshops and towns where the colonialists were mostly staying (Edward and Hard, 2019). During colonial eras, electricity lines were installed directed to productive areas such as industries owned by colonial powers (Chaplin et al., 2017). In rare cases electricity was installed to improve livelihoods and ensure social services of community households. The role of electricity in promoting productivity at household levels remained limited and thus impaired contribution of economic growth from household livelihood activities. It is under this circumstance many of households in Tanzania remained with no access to electricity. However, after independence in 1961 the first government of Tanganyika came up with an intention to develop the national electricity generation for domestic, industrial use and to promote irrigation of rural agricultural land. Potential foreign partners and engineers were invited

and were given an opportunity to support. However, in the process they changed the main focus to concentrate on hydropower alone and agriculture was not given priority. Consequently, the British dominance in the power sector was replaced by others such as Swedish and earlier knowledge produced by British colonial officers was disregarded. Discounting previous knowledge had its implications on future energy sector development.

1908-1961

Colonial Energy System

- First public electricity supply
- Focused only on industry hubs



1961-1992

Post-Colonial Energy System

- Intention for national electricity generation
 - Focus on hydropower
 - Founding of TANESCO (1964)

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The birth of TANESCO

Empower communities by access to energy

In 1964, the Tanzania Electric Supply Company (TANESCO) was formed as a public power utility. Electricity was seen as an essential element for improving livelihoods in rural areas and hence limit both rural-urban migration and deforestation (Chaplin et al., 2017) which were at an alarming rate. TANESCO was tasked to undertake studies and start planning new power projects to meet the increasing industrial, commercial, and rural township power supply demands. It was during this time; large-scale hydroelectric plants were built and subsidized by the government to reduce costs from imported fossil fuel (Cook et al. 2015).

A bumpy road toward energy for everyone

The challenges of transforming an industry-focused colonial energy system

However, it does not need to be emphasised that the process to increase electricity access in rural areas of Tanzania, remained focused on areas which were considered productive, towns and for decades has ignored rural areas. This shows how the colonial system in the energy sector continued to influence energy provisions in the country. Projects that intended to electrify rural areas were supported by donors or had slow advancement. Still in rural areas electricity was neither used to increase productivity nor serve the cooking and heating sectors. Even in some rural areas where households had access to electricity, it was only used for lighting (Bernard, 2012). Rural electrification did not increase a number

of households with connections due to high prices and did not reduce reliance on wood (Bernard, 2012. Chaplin et al., 2017). Deforestation rates linked to unsustainable use of biomass was thought to increase and rural-urban migration did not slow down. In the period of 1980s and early 1990s, Tanzania switched to structural adjustment policies where government and donor-funding rural electrification projects were significantly reduced. It was learnt that large-scale projects to expand grid to rural areas were expensive and increased debts to the state-owned utility company (Bernard, 2012).

The History of National Energy Policies

Promote productive use of energy

In general, all efforts failed to increase access and promote productive use of energy in rural areas and particularly at household levels, this is considered to be one of the reasons for existing poverty (CANTZ, 20219; Garcia et al., 2017). In 1992, the government formulated the first National Energy Policy (NEP) as a response to socio-economic reforms which happened in 1990s (URT; 2015). In the early 2000s, NEP was re-formulated and launched in 2003 with an intention of reforming the energy market and attracting private sector participation in the Sector (URT, 2015). It was through the implementation of NEP, 2003; Energy and Water Utilities Regulatory Authority (EWURA) was established; Rural Energy Agency (REA) and Rural Energy Fund (REF) became operational. Both Small Power Purchase Agreements (SPPA) and the Electricity Act 2008 were formulated.

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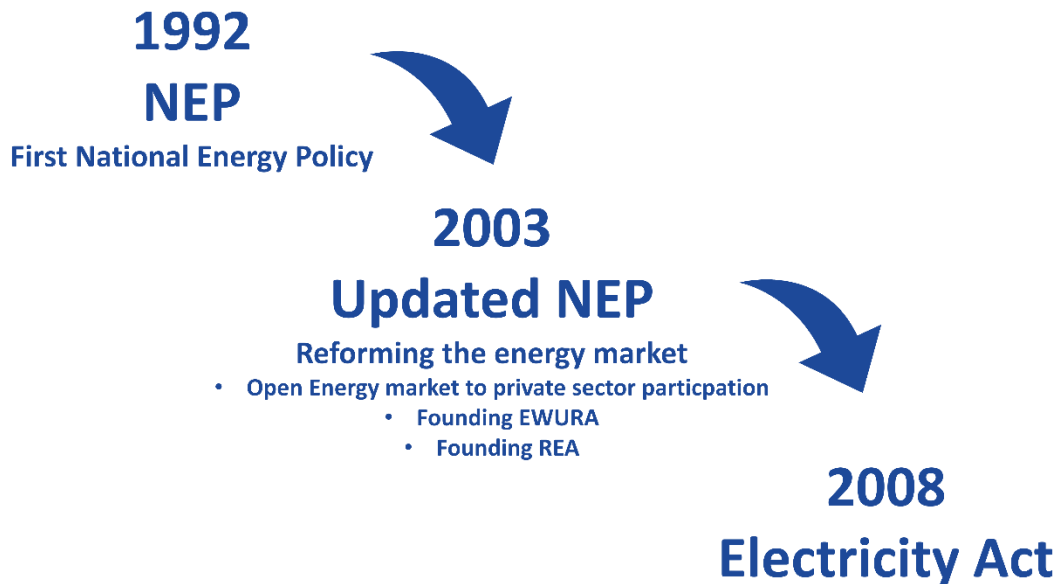
Energy for Development

A key to fight poverty

Since the 1990s, energy has been explained as one of the important socio-economic transformation enablers. It has since been considered both in the Millennium Development Goals and Sustainable Development Goals as an important instrument to fight poverty and hunger, enhancing education, health, transport, empowering women, ensuring access to water and decent jobs. The utilisation and promotion of renewable energy and energy efficiency are among the SDGs and well linked to the Paris climate agreement. Renewable energy and energy efficiency are also considered to be important

in addressing energy poverty and building resilience to rural and off grid communities. Decentralised energy and especially utilising local renewable energy sources are now widely accepted to ensure sustainable development. Despite their emphasis documentation in many national plans and agenda, their implementation has been lagging significantly. The current legislations in the energy sector have less emphasis on amplifying the role of renewable energy and decentralising energy compared to grid extension. If the abundant renewable energy sources are not utilized the current plans may not meet present and emerging energy demands and sector challenges.

History of National Energy Policies



1.3. Current energy mix and access status

Who has the power?

Access to energy and connectivity in Tanzania

The Tanzania Mainland Energy Access and Use Situation Survey II (2020), reveal that for the year 2019/20; 78.4 percent of the Tanzania mainland total population had ¹access to electricity compared to 67.5 per cent in the year 2016/17. The report indicates 11 per cent increase in electricity access from the previous survey conducted in the year 2016/17 however electricity connectivity remained low (37.7%) in Tanzania mainland. Moreover, the survey analysis explored on the urban - rural differentials in electricity access. Limited household electricity connectivity and broader limited use of power for social and productive purposes are linked to expensive prices for providing energy access and connectivity services in Tanzania. Furthermore, existing energy demands to cutter for the current energy requirements accelerate elevated electricity market prices.

Among other initiatives to increase electricity access and connectivity in Tanzania is to increase electricity generation to lower the demand and so the price.

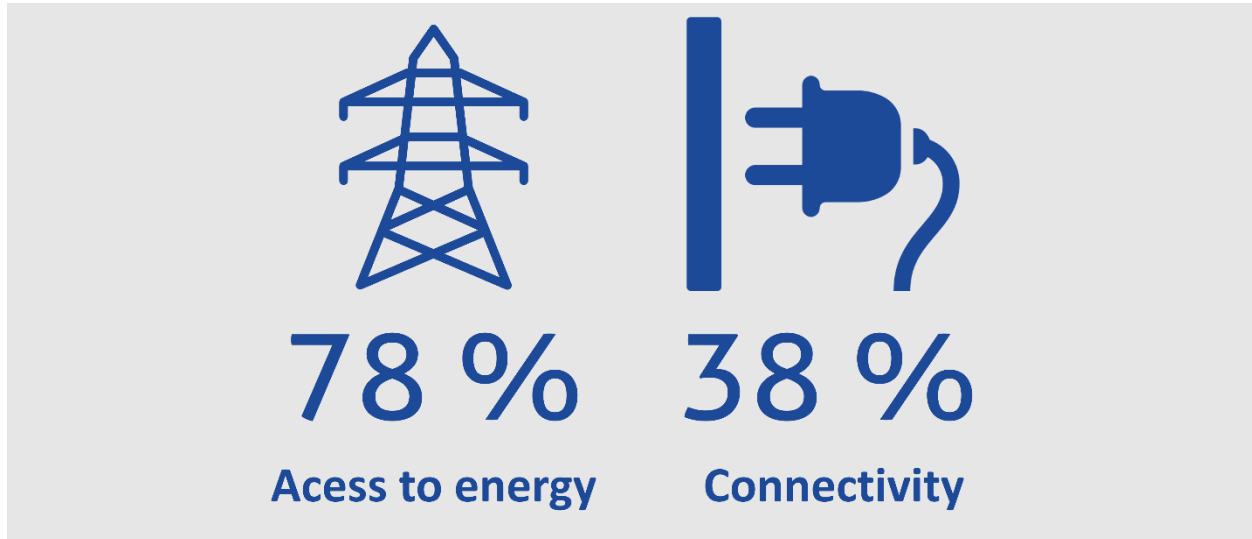


Figure 1: Access to electricity and electricity connectivity in Tanzania (Data from Tanzania Mainland Energy Access and Use Situation Survey II (2020))

¹ Electricity Access: Refers to percentage of people in a given area that have relatively simple, stable access to electricity.

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A dangerous mix for a sustainable future?

A mix of fossil fuels and hydropower

Based on the Tanzania Power System Master Plan 2020, electricity generated and utilised largely (94%) comes from natural gas and hydro sources. Anecdotal findings show that less than 3% of electricity generated and contributing to energy mix comes from renewable energy sources (non-hydropower source). Linked to that, Tanzania has abundant and potential renewable energy resources that once are fully tapped could contribute massively to sustainable ecological and socio-economic development. Under such scenarios it is important for the government and other key stakeholders in the energy sector to deliberately enhance plans and investment in extra reliable and affordable (renewable) energy sources

Biased power

Inequality energy access and supply

Urban access to electricity increased from 97.3 percent to 99.6 percent, while in rural areas electricity access remained significantly lower increasing from 49.3 percent in a year 2016/17 to 68.9 percent in a year 2019/20 (URT, 2020). Such spatial differentials continued to create a limited room for inclusive initiatives to foster ecological and socio-economic stewardship in rural communities. Limited access and connectivity to electricity in most of the villages in Tanzania tend to impair human electricity-based productivity initiatives. The sustainable

development goal seven (SDG 7) emphasize on the focus to ensure an effective inclusiveness of various marginalized groups in the communities for an increased energy access, connectivity, and decent job creation. The thinking should be to reflect energy as an economic enabler to these special groups such as women, youth, small holders (farmers, fisher folks and livestock keepers) and poor people. more focus needs to be directed in clean, reliable, and affordable energy investments so there is a swift adoption and take off in productive use of renewable energy especially in rural areas of the country.

Decentralized and innovative

A chance for fast-tracking access to energy

Furthermore, it remains to be an open opportunity to scale up decentralized renewable energy in these villages whereby a pay as you go (PAYGO) system has proven success in some pilot projects. These trials with the indication of progress will finally improve electricity access and connectivity driven by energy demands for productive purposes. Seven regions of Dar es salaam, Kilimanjaro, Mwanza, Mbeya, Mara, Pwani and Geita were recorded with highest electricity access of 100, 93.6, 89.9, 89.0, 87.7, 85.8 and 84.4 percentages respectively, leaving Kigoma (56.3%), Manyara (58.1%), Shinyanga (61.7%), Songwe (61.9%) and Rukwa (64.8%) with least electricity access in the country.

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Fair enough?

Steps towards power access to everyone

Over the recent years, the Tanzania government have put more effort in increasing electricity access to many communities in the country, however household connected to electricity remains low. Tanzania Mainland Energy Access and Use Situation Survey II (2020) reports that only 37.7% of household in Tanzania mainland were connected to electricity by the year 2020. There were a 5.1% rise in electricity ²connectivity to household as compared to the year 2016/2017. According to 12th parliament opening speech by the late President Magufuli in November 2020; the government will ensure an increased electricity access to 2,384 villages by the end of the year 2025, which under that circumstances all 12,280 registered villages in Tanzania will be fully accessing electricity from the national grid.

Electricity connectivity and access in rural and semi urban areas of Tanzania is a prevailing challenge impending socio-economic development in the country. Power driven from national grid electricity remains to be the major source of energy for lighting and inadequately utilized for income generating activities and resolving home based domestic activities. According to ESMAP (World Bank), Tanzania energy access and connectivity remains to be applied under tier one of energy usability to contribute to economic growth. It is thus of most paramount importance to start reporting on the energy access and connectivity by describing tier levels. Further observation reveal existing challenge relies on the current definitions used for energy access and connectivity against the modern electricity access and connectivity definitions which largely inculcate the use of energy for production purposes. Highly used and popularized terms are electricity access and connectivity, which inadequately provide a room for a wide consideration of other sources of energy that could contribute to socio economic development.

² Electricity Connectivity according to the survey report refers to a pole in the village and an electric bulb in the house. Household connected to electricity are referred to household whose source of electricity was either TANESCO/REA or private entity.

1.4. Current energy use and impacts

Cut it off

Stop massive impact of heavily use of biomass

Among several energy sources used in Tanzania, biomass is the largest energy resource constituting 85.7% of all the energy source used in the country. This energy is used in the form of firewood and charcoal for cooking and heating purposes. Several studies as reported by Omari *et al.*, (2020) reveals on massive forest and land degradation impacts resulted from excessive use of biomass for heating and cooking purposes. Other attributing factors include rapid population growth, land use changes and agriculture practices, and that all these preceding conducts continue to degrade ecosystems and furthermore leading to climate change impacts. The remaining energy sources contributes to the electricity supplied into households, industries, and manufacturing factories by TANESCO and IPPs. According to Energy access and use situation survey II in Tanzania Mainland of 2020, seventy-seven (77%) of electricity is used for lighting in households followed by refrigerating (4.7%), cooling (2.9%), security (2.8%) and 5.8% for other uses (URT, 2020). Previous studies have equally indicated that households in rural areas of Tanzania use electricity for lighting and with at least two to three light bulbs (Chaplin et al., 2017) but with limited use on productive uses (Barron and Torero 2016; CANTZ, 2019). In recent years there has been an increase of electricity use including solar energy in education and health sectors. Other institutions using solar energy include church institutions and communities running shops/kiosks and youth entertainment centers.

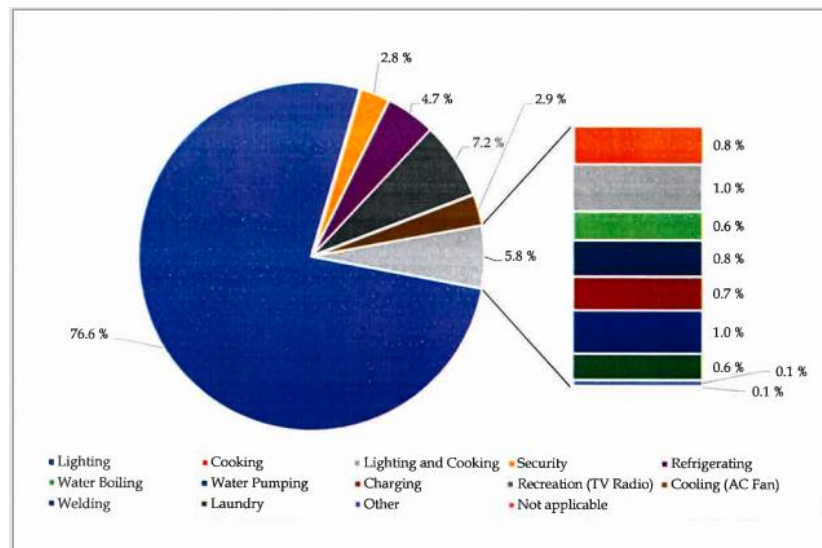


Figure 2: Percentage distribution of Households Reported the main uses of electricity in the Households, Tanzania Mainland 2019/2020 (URT, 2020).

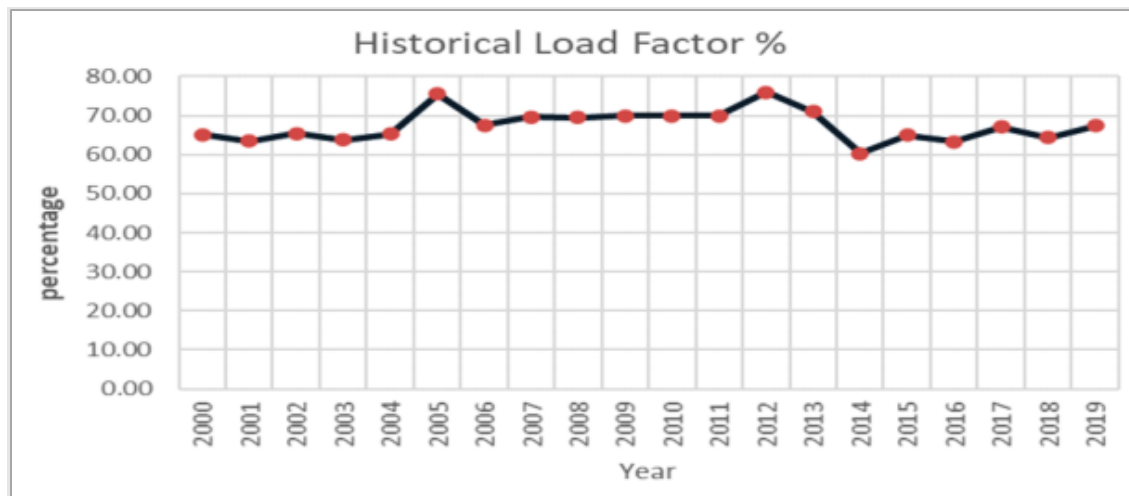
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Increasing power system load factor

The way towards stable prices

Tanzania has experienced a steady but slightly increasing power system ³load factor (LF) from 2009 to 2019. Figure 1 shows the highest load factor to peak in a year 2012 to 76%, however an average load factor of 64.6 from the year 2000 to 2019 have been recorded. The Tanzania power system master plan have been relying on 70% as a benchmark for planning and distribution of electricity in the entire country. Steady and increasing load factor ensures a stable unit costs of electricity charged to customers and that projects electricity affordability stability while creating an enabling environment for wide use of electricity consumption in the country. Tanzania National five years development plan 2021/20 – 2025/26 (NFYDP III) under development emphasizes on promoting renewable green energy technologies including wind, solar and geothermal energy sources in Tanzania. This planning further reflects on green energy systems as the key to natural resources and environmental protection tool and thus contributing to climate change adaptation and mitigation measures in the country.

Table 1: *Tanzania power system load factor (%)* (URT, 2020)



³ Load factor is an expression of how much energy was used in a time period, versus how much energy would have been used, if the power had been left on during a period of peak demand.

Cheap and reliable

The need for affordable and accessible energy for economic growth

Tanzania has achieved the goal for becoming a middle economy country five years earlier than planned under the development vision 2025. Much of the country's efforts lies along massive industrialization that push the national economic growth and sustainable development by 2025. However, a number of challenges keep impairing full industrialization scenario in the country including unreliable and costly power for running industries.

Tap the potential

Leverage on the rich RE sources of Tanzania

Tanzania has a lot of renewable energy sources such as biomass, solar, hydropower, geothermal, biogas, wind, tidal, and waves (Bishoge et al., 2018). Despite their abundance, renewable energy sources are given low priority by both government and private sector. (Bishoge et al., 2018).

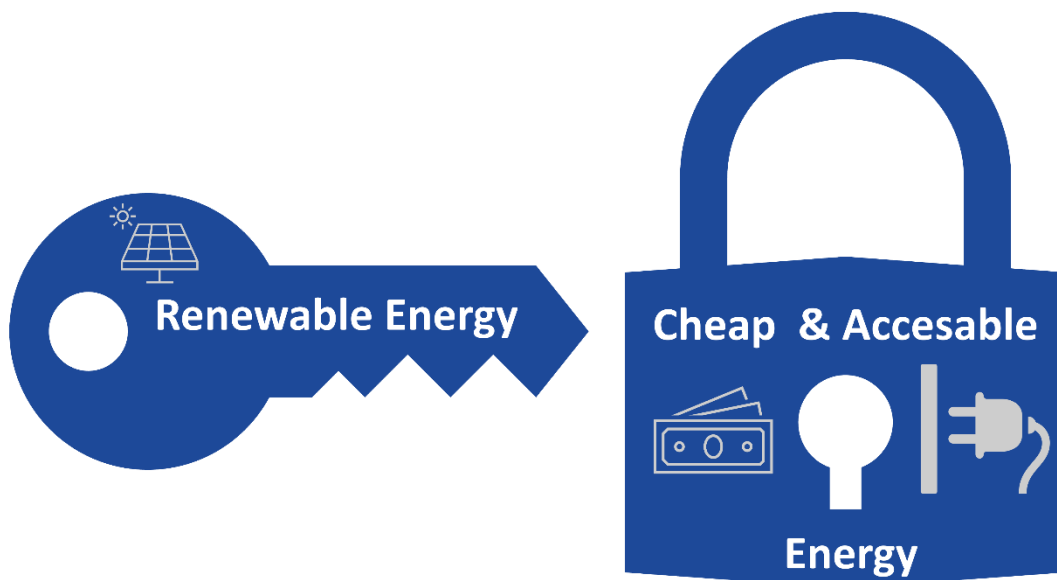


Figure 2: Renewable Energy can be key to unlock the cheap and accessible energy.

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Rise and Shine

Rising Awareness for the potential of RE

This is a challenge affiliated by the historical treatment and arrangement along energy sector whereby the colonial era government prioritized energy distribution towards railway posts, industrial and critical productions. This paradigm has impacted the energy sector coordination and arrangement to date in Tanzania. The government, in collaboration with other stakeholders such as private companies, is carrying out awareness and demonstration campaigns on the use of solar systems for domestic and industrial use. Value Added Tax and import tax for main solar components such as panels, batteries, inverters, and regulators have been detached to permit end consumers to get photovoltaic systems at more consistent and reasonable prices (Bishoge et al., 2018).

1.5. Roles of RE on productive use of energy

Create livelihood opportunities

Unlocking productive use of energy by fast-tracking RE

RE can play a key role in addressing energy poverty and wellbeing of households via enhanced productivity across social and economic perspectives. If well harnessed RE can help farmers in supporting irrigation, storage and hence reducing post-harvest loss. Further investment in RE will accelerate access to social and economic welfare that in return enhances participation in political and social decision making. Increased inclusivity and participation of a large group of people in decision making continue to widen window of opportunities for ecological and socio-economic transformation in Tanzania.

Growing from the grassroots

Decentralized renewable energy (DRE)

Teske et al., (2017) revealed that decentralized renewable energy (DRE) systems in Tanzania are key to contributing to several benefits including reduced greenhouse gas emissions, enabling of small business activities, improved health through the displacement of indoor air pollution, increased security, say street lighting at night, enhanced communications and facilitation of greater quality and availability of education through access to affordable lighting.

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Connect the dots

How to grow local networks: The case of local gas networks

In a year 2019, The Tanzania government through the Tanzania petroleum development cooperation (TPDC) has implemented a pilot project where by 500,000 Households, commercial buildings and factories were connected to natural gas in Dar es salaam. In addition, this initiative included connecting and or integrating natural gas systems to a total of 200 government vehicles under the ministry of energy and minerals (<https://www.mwananchi.co.tz>). Further, there is an increasing use of commercial cabs (taxi) with engine systems operated by natural gas fuel. The Tanzania electrical supply company (TANESCO), through its subsidiary company known as Tanzania Geothermal Development company Limited has already started to invest in power generation (200 MW) and expecting to continue generating up to 600 MW in a year 2021 to 2025 (<https://www.afrik21>)

Belief in change

The role of faith-based organizations (FBO) in scaling-up renewable energy in Tanzania

Faith Based Organization (FBO) and Civil Society Organization (CSOs) are key pioneering entities in investment of emerging hydro and solar power systems. Generated power aid to facilitate various livelihood including irrigation scheme in agriculture, processing factories such as timber, welding, food vending (juice making, rice cookers, electrical pressure cookers) and livestock keeping as highlighted in table 2. The private sector is currently taking a lead in investing in decentralized renewable energy resources including mini-grids and off-grids. Local communities further are highly involved in the entire process thus contributing to direct benefiting from the entire process of improving value chain.

Table 2: Examples of Distributed Renewable Energy Use for Productive Energy Services (Teske et al., 2017)

ENERGY SERVICE	INCOME – GENERATING VALUE	RENEWABLE ENERGY TECHNOLOGIES
Irrigation	Better crop yields, higher -value crops, greater reliability, of irrigation systems, enabling of crop growth during periods when market prices are higher	Wind, solar PV, biomass, and micro-hydro
Illumination	Reading, extension of operating hours	Wind, solar PV, biomass, micro – hydro, geothermal
Grinding, milling, husking	Creation of value -added products from raw agricultural commodities	Wind, Solar PV, biomass, micro-hydro
Drying, smoking (preserving with process heat)	Creation of value-added products, preservation of products that enables sale in higher value markets	Biomass, solar heat, geothermal
Expelling	Production of refined oil from seeds	Biomass, solar heat
Transport	Reaching new markets	Biomass (biodiesel)
TV, radio, computer, internet, telephone	Support of entertainment businesses, education, access to market news, co-ordination with suppliers and distributors	Wind, Solar PV, micro-hydro, geothermal
Battery charging	Wide range of services for end-users (e.g, phone charging business)	Wind, Solar PV, micro-hydro, geothermal
Refrigeration	Selling cooled products, increasing the durability of products.	Wind, Solar PV, and micro-hydro

1.6. Energy expansion and access challenges

The challenge: private sector involvement

Lack of productive use of energy limit economic viability of investments

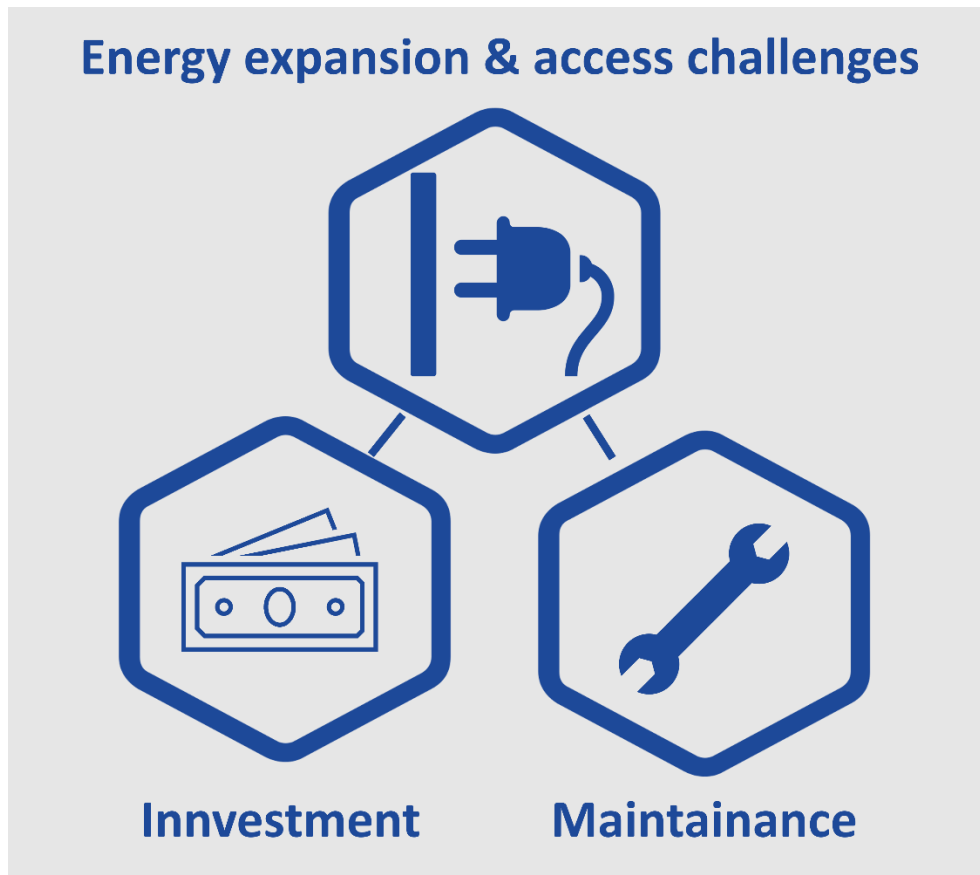
For years now Tanzania has increasingly invited the private sector to invest in the energy sector. However, the private sector has remained with limited interest in the sector due to several factors including poor business environment due to unharmonized and favorable policies, high expanses linked to expanding national grid to rural areas to connect poor and sparse population. There are cases where electricity connection rates are very low because rural households are poor to even cover connection costs. Even households which are connected do not use electricity to increase productivity and enhance their livelihoods but for lighting. It is not a surprise to find villages with electricity access but just a few people are connected to electricity. Even those households with connection fail to pay electricity monthly bills hence remain connected but with without using electricity. This remains a big challenge to the government utilities and private sector especially in covering back investment costs incurred in expanding the grid and other related infrastructure costs (Chaplin et al., 2017).

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The challenge of maintenance

Lack of service and maintenance causing unreliable access to electricity

The other challenge that persists is linked to the limited finance needed for rapid electricity expansion and ensuring all households are connected and all electricity lines are serviced and maintained. Linked to that is that the electricity from the grid is sometimes unreliable and faces frequent outages. Chaplin et al., (2017) reported that unreliability and frequent outages are so costly to end users and the country at large. Another challenge comes with top down and limited local participation in planning and execution of energy sector programs. Top-down planning and exclusion of local communities and end users during designing and implementation of electrification projects. In some cases, these projects face resistance from communities who are forced to resettle and give space for contestation and hence low uptake.



1.7. Energy sector policy and legislation in Tanzania

Primary energy legislation

The Electricity Act of 2008 & Electricity rules of 2019

The primary legislation for generating, transmitting, and distributing electricity power in Tanzania is the *Electricity Act of 2008*. The act further focuses on cross-country electricity trading and rural electrification (Kihwele et al., 2012). In line with this act, the *Electricity (Development of small power projects) Rules of 2019* and the *electricity (Standardized small power projects tariff) order of 2019* stipulate all prerequisites and undertakings to develop and operate power projects in the country. These recent rules and orders have put forward clear and simplified procedures for the development of mini and off grids in the country which enhance best enabling environment for the development of decentralized renewable energy in Tanzania.

The Energy and water utilities regulatory authority (EWURA)

Regulating the energy sector

Regulation of energy sector is undertaken by the Energy and Water utilities regulatory authority (EWURA) which was formulated under the guidance of *Energy and Water Utilities Authorities Act* (Cap 414) (the EWURA Act). EWURA is specifically dealing with tariff reviews, licensing, reviewing and approving power purchase agreements, and monitoring performance and standards.

Seeding transformation

National policies to regulate the energy sector

Other key legislations which guide energy sectors are *Environmental Management Act 2004* and National *Energy Policy* (NEP 2015). NEP 2015 allows multiple energy producers to generate power from various sources such as wind and solar. This framework aligns with the *National Development Vision 2025* and *National Five Years Development plan 2016/2021* that stipulate the need for a stronger, secure, and smart power grid. In Tanzania, particularly from the study area most of the small energy producers, investors and village residents are now starting to benefit from the stipulate pinpointed out from the energy policy 2015 which promote the use and establishment of renewable energy technologies. However, there is a problem with the lack of a clear energy access roadmap which harmonizes the specific prioritization of investing in renewables to cater for fast, affordable, and reliable energy to diverse levels of economy in the country.

Energy for everyone

The Rural Energy Agency (REA)

The state-owned company known as TANESCO has remained with a monopoly over the power supply in the country since independence. However, the government in recent years has allowed involvement of private sector in the generation, transmission, and distribution in the country. In addition, *Rural Energy Agency (REA)*

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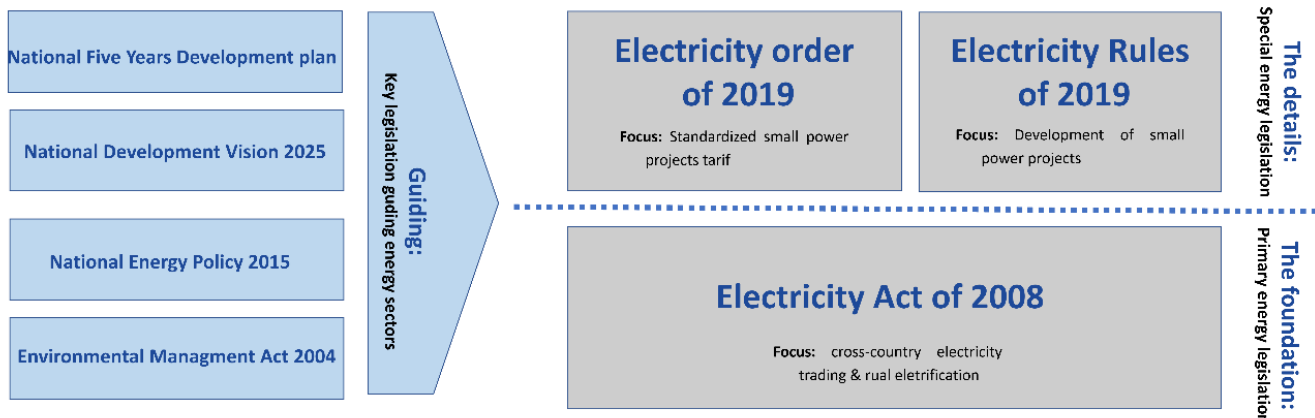
under the *Rural Act of 2005* was established to oversee and implement all rural electrification projects in the country through Rural Energy Fund. In recent years, REA has taken initiatives to extend the national main grid in rural areas coupled with small mini grids through energy fund. These initiatives are posing successful undertakings in socio economic activities especially in peri – urban and rural areas of the country.

Fill the gaps

Challenges for mini grids

The main challenge remains in the highly scattered settlement villages whereby the costs of electricity distribution become very high thus leaving these poor population non electrified. Indeed, the highly subsidized TANESCO and REA electricity tend to pose difficulties for the development of new independent mini grids including solar power plants. The tariffs being charged by the independent mini grids are still expensive and do not compete with electricity powered TANESCO and REA and thus pose a barrier to private investment in renewable energy plants.

Energy sector policy and legislation in Tanzania



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Table 2: Key energy stakeholders and institutional set-up in Tanzania Source: (IRENA, 2017)

	Name	Role
Government/Public Institutions		
1.	Ministry of Energy	Overarching role of overseeing policies, strategies, and laws within the areas of energy.
2.	Tanzania Electric Supply Company Limited (TANESCO)	It is a parastatal institution within the Ministry of Energy in charge of power generation, transmission, and distribution. It is the main power utility company in the country and provides about 60% of the effective generating capacity of the national grid.
3.	Energy and Water Utilities Regulatory Authority (EWURA)	An autonomous regulatory body that oversees the technical and economic regulation of the energy and water sectors. Its tasks consist of regulating power retail tariffs, awarding licenses and monitoring and enforcement activities.
4.	Rural Energy Agency (REA)	It was founded in 2005 as part of the Rural Energy Act to support the Government of Tanzania’s endeavors to accelerate access to rural areas. Major task: to deal with rural access by co-financing rural electrification programs
5.	Tanzania Investment Centre (TIC)	The primary agency of the government to co-ordinate, encourage, promote, and facilitate investment in Tanzania.” Although not mandatory, the Centre is a one-stop shop for new local and foreign investors because of the incentives offered to projects it approves.
6.	Tanzania Geothermal Development Company	A subsidiary company of TANESCO and became operational in July 2014 with a mandate to be at the forefront of geothermal development in Tanzania.
7.	Local government authorities (LGAs)	They have experience of off-grid production and distribution of energy in their own (mostly urban) areas using decentralized energy systems and mini-grids.
8.	Academic and research institutions	Capacity-building for people working in the energy sector is offered at various universities and research and training institutions in Tanzania.
Private sector institutions		
9.	Emergency power producers and Independent Power Producers (IPPs)	These are private investors owning power plants of more than 10 MW and currently contributing 40% of the installed electricity capacity.
10.	Small power producers (SPPs)	These are private companies operating small renewables-based power projects (up to 10 MW) under an SPPA to sell power to TANESCO or directly to customers. Many of the small power producers also operate in other business areas such as tea and sugar.
11.	Private solar energy companies	They are organized under the Tanzania Renewable Energy Association but legally permitted to work independently in solar PV installation, importing and selling solar PV products.
12.	Private biomass energy companies	These are companies engaged in the fabrication and supply of improved and clean wood fuel cook stoves.
13.	Civil society Organizations	They include NGOs, faith-based organizations and renewable energy networks. Up until now, many mini-hydropower plants have been owned, operated, and managed by faith-based organizations.

2.0 Contribution and opportunities along development of National Renewable Energy and Energy Efficiency and energy long term plans

2.1. National Energy Policy (NEP) 2015

2.1.1. Contributions

Enable renewable energies

By involving communities

In Tanzania, the ministry of energy regulates and oversees all matters related to energy through the NEP 2015. The policy aims at creating enabling environment for provision of affordable, reliable, efficient, and clean energy services for all Tanzanians while ensuring effective community participation (CP) in the sector. The NEP 2015, realizes a huge potential of renewable energy resources that are untapped to date, and these includes waves, tidal, small-scale hydro, solar, biomass, geothermal and ocean thermal conversion (Mwanga et al., 2020).

Tap into the potential of RE

Pushing for use of innovative RE

Furthermore, the policy invites more initiatives to continue pushing for adoption and use of renewable energy technologies especially with

the focus of more involvement of private sector and increasing alternative energy sources. However, key sectors contributing to Tanzania economy including Agriculture, mining and tourism are still limited to accessing neither utilizing reliable, affordable, and clean energy to boost their massive production. Also, NEP 2015 promotes integration of renewable energy technologies in buildings and industrial design to strengthen the favorable feed in tariffs for clean, affordable, and reliable energy technologies in the country (URT, 2015). Under these circumstances, NEP 2015 align with other national and international frameworks and policies such as National Five Years Development Plan 2016/2021 (NFYDP II), UNFCCC Paris Agreement, the IPCC’s reports, Global warming of 1.5 °C, SE4ALL, and vision 2030 which all promote and leapfrog renewable energy technologies for community resilience.

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2.1.2. Identified gaps and commentaries

- Mwanga et al.,(2020) reveals on a number of barriers within NEP 2015 that continues to limit effective and efficient use of renewable energy in Tanzania, and these includes.
 - **over reliance** on few energies’ generation sources (fossil fuels and hydro energy)
 - **Limited private sector participation** in small scale power generation sector,
 - **High dependence on government subsidies,**
 - **Limited expertise/ human resources** and
 - **Inadequate financial resources.**
- Stipulated energy policy statements under the NEP 2015 on promotion and improvement of RE technologies in Tanzania faces **lack of standalone strategies and or implementation plan** to meet targeted plans.
- For renewables to play a more relevant role in meeting increasing power demand, Tanzania could look into acquiring the **necessary infrastructure**, including sophisticated **information** and **communication tools**, for more efficient system-wide decision making. Furthermore, grid operators will need to acquire the ability to **integrate forecast data** into their daily operations to manage grids with a high share of renewables.
- Tanzania is recommended to consider adopting transmission and wheeling charges conducive to variable renewables. This should be clearly mentioned in the draft Electricity Systems Operations Act 2016.
- Ministry of Energy (MoE), Bank of Tanzania (BoT), Ministry of Finance and Planning (MoF&P) and Ministry of Industries, Trade, and Investment (MoIT & I) need to establish a **framework to enhance facilitation, co-operation and co-ordination among renewable energy private actors and financial institutions** so that the two sectors become better informed about each other.
- MoE, Ministry of Education and Planning commission to make full **use of current wide vocational training facility networks** as well as higher education institutions to create a local supply of relevant labor skills along the value chain of renewable energy project development. Additionally, it is important **to resolve inconsistencies in statistical data** and the lack of a quality control mechanism by creating and providing capacity for renewable energy research centers.

2.2. National Five years Development plan 2016/ 2021(NFYDP III)

2.2.1. Contributions:

Looking Back: The old NFYDP II

Green growth strategy within NFYDP II

Through environmental and natural resources conservation intervention aspects, NFYDP II realized the need for developing green growth strategy and enhancing institutional capacity of bodies regulating RE for increasing renewable energy sources by 50% in a year 2020/2021, and further to 70% in 2025/2026. The plan emphasized promoting renewable green energy technologies such as solar, wind, geothermal and biogas energy resources (URT, 2016). But also promoting fossil fuels as liquefied petroleum gas (LPG). Additionally, the plan emphasized enacting the charcoal use and production policy which entails sustainable use of biomass for energy, particularly by decreasing charcoal use by 60% in the year 2020. A few of the planned interventions and actions were implemented under NFYDP II. Tanzania recently developed the National Five Years Development Plan 2021/22 - 2025/26 (NFYDP III)

A new plan:

The road to NFYDP III

The recently updated NFYDP III must be analyzed and reviewed to ensure that it fills and address the gaps of NFYDP II. The identified gaps in NFYDP II should be the benchline to measure progress in the updated NFYDP III. Currently, Tanzania through NFYDP III intend to utilize the existence of Rural energy fund through Global climate change fund to access and mobilize resources for rural electrification. Under this line, climate fund will extensively promote improvement of clean, reliable, and affordable energy in Tanzania. To complement the NFYDP II target, NFYDP III establish program and actions intending to increase the proportion of districts with climate change and disaster risk reduction strategies by 60%.

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2.2.2. Identified Gaps and Commentaries in NFYDP II to be tapped for NFYDP III:

- The NFYDP II targeted to increase the use of renewable energy sources as an intervention to prevent environmental degradation and inadequately considering renewables as the key contributor to energy supply for sustainable socio-economic transformation.
- NFYDP II, focused more on creating an enabling environment and promotion for industrialization economy, research, and development along SDGs 9 and 17, and other key criteria that promote innovation. In this matter **renewable energy sources were not reflected as the key contributing agent for cost efficient operations of industries** as well as an area to explore through research and development.
- Unfortunately, policies and regulatory frameworks for **renewable energy promotion have the least budget** under the NFYDP II.

2.3. Energy Supply Industry Reform Roadmap 2014 -2025

Connected

A roadmap to enhance electricity services

The Energy Supply Industry (ESI) Reform Strategy and the Roadmap provides an overview of Tanzania’s electricity market structure in the next eleven years, 2014 – 2025. The roadmap translates the Electricity Sub-Sector Reform Strategy into a plan for implementation of the proposed reforms to transform 24 percent of the Mainland Tanzanian population being connected with electricity services of which 7 percent is in rural areas.

Invest and participate

Objectives to enhance electricity services

It serves as a starting-point to guide implementation of the reform process in the immediate, short, medium- and long-term horizons. The roadmap aims to:

- (a) Increase investment from both private and public sector.*
- (b) Enhance private sector participation.*
- (c) Increase connection and access levels to electricity;*
- (d) Diversify sources of energy for electricity generation and supply.*
- (e) Enhance affordability and reliability of electricity supply.*
- (f) Reduce system losses; and*
- (g) Establish a competitive wholesale and retail electricity market.*

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2.3.1. Contributions

The main objective of the reforms is to improve the ESI governance and performance for sustainable socio-economic transformation and environment protection anchored on active participation of the private sector. Again, in the roadmap recognition of private sector in the energy sector has been given emphasis for sustainable development. It has clearly been stated that modern power generation will be undertaken by both public and private companies. Small Power Projects will also be further promoted under the Standardized Small Power Purchase Agreement. Generation companies have been given the opportunity to sell power to either bulk off-takers or distribution companies by paying wheeling charges to Transmission Company.

Moreover, distribution companies will operate as separate entities. Commercially viable zones will be converted into Zonal Distribution Companies. These companies will sell power to retailers in their territories. The ownership of distribution companies will be either public or private. This arrangement will provide a wide choice for retailers resulting in an improved quality of service, competitive prices and increased electricity connection and access levels.

2.3.2. Identified gaps and commentaries

The roadmap like many other national energy strategies has inadequately considered the contribution of renewable energy sources for meeting future energy demand of increasing connection levels to 30 percent by 2015, 50 percent by 2025 and more than 75 percent by 2033. Despite of creating enabling environment for private sector involvement in energy generation and supply, less priority to clean renewable energy options such as wind and solar energy sources despite of its abundance, affordability, and environmental friendliness.

The Electricity Industry Reform Roadmap takes into account less than 5% of the non-hydropower renewables that could be connected to the grid (IRENA, 2007). This low target could be attributed to a number of factors. One crucial factor is a general lack of information on the technical and economic potential of different renewable energy resources in the country.

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2.4. Nationally Determined Contributions (NDCs)

Nationally determined contributions (NDCs) refer to a particular national commitment or plans to address climate change according to Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC).

NDCs are prepared under series of consultations including government institutions, CSOs, Private sectors, parliamentarians, Academia, and research institutions.

The Paris Agreement (Article 4, paragraph 2) requires each Party (countries) to prepare, communicate and maintain successive (NDC) that it intends to achieve after every 5 years based on:

- **Equity principle**
- **Common but differentiated responsibilities** and respective capabilities principle

Thus, NDCs will focus on

- a) **Adaptation:** Building adaptive capacity and enhancing long-term resilience.
- b) **Mitigation:** Greenhouse gas emissions reduction efforts.
- c) Implemented in a **participatory and voluntary** manner.
- d) Implemented, as national deliberate efforts and or external support.

Tanzania submitted its Intended Nationally Determined Contribution (INDC) in 2015, and ratified in a year 2018: However, its preparation faced challenges such as inadequate parliamentarians and Civil Society Organizations (CSOs) participation. Thus, the government is currently reviewed the NDC whereby the CANTZ and other stakeholders were engaged in on inclusive and effective participation of diverse groups including CSOs, Member of parliaments (MPs) and private sector. Tanzania submitted the revised NDC 2021 in July 2021 upfront CoP 26.

2.4.1. Revised draft of NDC Contributions

- Exploring and investing in the energy diversification system to ensure overall energy security for economic development through enhanced availability, affordability and reliability while contributing towards energy emissions intensity reduction over time.
- Promotion of clean technologies for power generation; and diverse renewable sources such as geothermal, wind, solar and renewable biomass.

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- Expanding the use of natural gas for power production, cooking, transport, and thermal services through improvement of natural gas supply systems throughout the country.
- Promoting energy efficient technologies for supply, transmission/transportation, and demand side as well as behavioral change in energy use.
- Promoting rural electrification.

2.4.2. Tanzania NDC 2021 gaps and challenges and commentaries for action:

1. **Inadequate data** during sectoral contribution determination. There is the need to involve a wide range of data and long-term monitoring data of various sectors for proper sectoral contribution determination.
2. **Agriculture is an important sidelined contributing mitigation sector.** According to Second National Communication Report (SNC), AFOLU (Agriculture, forest, and other land uses) accounts for 93.2% of total emissions in Tanzania. Only 1.5% and 3.8% emissions contributed by waste and energy sectors, respectively.
3. **Inadequate enabling environment** (policies, regulations, and strategies) to enhance implementation along the commitment sectors.
4. **Lack of the efficient tracking mechanism of the implementation process** (sector ministries need to develop initiative programs aligning to NDC and its implementation plan).
5. **Inadequate inclusivity and participation of important groups and stakeholders** including parliamentarians and CSOs. Diversification of consultations will increase awareness and multiple opportunities towards implementation of commitments.
6. **Lack of energy diversification:** *Still relying on hydro and natural gas*, best recommend clean energy options e.g., wind and solar power at infant stages. Energy and forestry under mitigation category do not seem to provide solutions to clean cooking. Improved natural gas systems without subsidies could jeopardize the intention considering the Charcoal use in DSM regardless of LPG and electricity supply.

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2.5. Tanzania Power System Master Plans

In 2012, Tanzania developed a national power supply master plan with the fundamental objective to *provides estimate of the power demand and supply to achieve Economic Growth, Energy Security and Environmental Protection while targeting to reduce poverty through a stable and efficient power system.* To achieve this, the Plan provides guideline for re-assessing short-term (2013 – 2017), mid-term (2018 - 2023) and long term (2024 - 2035), generation, transmission plans requirements and the need for connecting presently off-grid regions, options for power exchanges. The government ‘s policy is to attain electrification rate of 78% of its people by the year 2035.

In this plan, several generation technologies have been evaluated to attain the recommended plans for development of power sector in the country. In identifying new power projects, the plan evaluates new power generation technologies, including a review of capital investment, project lead time, fuel costs and their availability, both locally and imported. The power sources considered to achieve national development targets include hydro, gas, coal, wind, geothermal, among others.

2.5.1. Contribution

The plan has been achieved to align population growth and national development scenarios with power capacity demand. It proposes a total installed capacity of 8990MW by 2035 consisting of 3304 MW hydro, 995MW gas-fired generation, 3800MW-Coal, 100MW-Solar, 120MW-Wind, 40MW-Biomass/Cogen, and some export limited to 250MW of total available generation. If implemented, this will facilitate the development speed of the country especially in all sectors requiring huge energy, especially industrialization.

On the other hand, this master plan directs that power generation should be a responsibility of both government and private sectors including business companies, NGOs, Faith-based organizations (FBOs), and Civil Society Organizations (CSOs). The government commits to working with *Independent Power Producers* through Public-Private-Partnership mechanism to identify and study additional sites for renewable power generation. The Government ‘s role in this respect will be two folds: to mobilize financial resources to implement some of the earmarked projects and to create a conducive environment of attracting investors in the power sector.

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2.5.2. Identified gaps/ Challenges

Despite good dreams to have sufficient energy and higher electrification by the end of the plan, it has failed to clearly analyze the underlying risks and setbacks that might hinder the achievement. The government has **continued to rely on hydro power and non-renewable sources** like coal, natural gas, petroleum, and uranium for generation of large percent electricity which are not sustainable and environmentally friendly, respectively. Recently Tanzania has witnessed recurrent droughts in many regions of the country creating difficult environment for hydro power generation. Sustainable and renewables such as solar and wind sources which are in abundance in the country have been assigned very small portions to contribute to the national energy industry. Solar PV technology for example is not very well considered in the master plan, rather reserved as a potential to undertake pilot project before engaging many players.

2.5.3. Areas of Interventions

With the current global challenge of climate change and environmental degradation, Tanzania needs to reconsider power generation from renewable sources for sustainable and resilient economic growth. Private investors like companies, faith-based, Non-government, and Civil Society organizations should take part in renewable energy sources. For instance, it has been reported that Tanzania has **promising levels of solar energy**, ranging between 2,800 and 3,500 hours of sunshine per year and a global horizontal radiation of 4–7 kWh per m² per day. Solar radiation is particularly high in the central region of the country (Mokveld & Eije, 2018).

Despite the existence of FiTs and SPPAs for grid connected projects, the **weak human resources and financial position of TANESCO**, the sole off-taker, means renewables-based power generation is not attracting private investors (IRENA, 2017)

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2.6. National Adaptation Programme of Actions (NAPA) 2007 (Under review)

Energy sector is among top 3 of most prioritized sectors for adaptation in Tanzania (NAPA, 2007).

2.6.1. Contributions

- (i) **Explore and invest in alternative clean energy sources** e.g., Wind, Solar, biodiesel, etc.
- (ii) Develop community based mini hydropower
- (iii) **Improve biomass to energy conversion efficiency** (improved charcoal production technology, improved charcoal and wood stoves, use of biomass waste briquettes, biomass waste gasification, promote fuel crop)
- (iv) Increase **use of geo-thermal power** generation
- (v) promotion of application of cogeneration in the industry sector (thus promoting the involvement of private sectors especially mini and off grids)

2.6.2. Identified gap/ Challenges for its Implementation

- (i) **Limited analytical capability** of local personnel to effectively analyze the threats and potential impacts of climate change
- (ii) Extreme poverty to most vulnerable groups
- (iii) Limited financial options or facilities for credits provision in rural areas.
- (iv) **Inefficient information flow, coordination, and limited resources** allocations for more cleaner green technologies in the country.

2.7. National Climate Change Response Strategy 2021

The goal of this recently updated Strategy is to enable Tanzania to effectively adapt to and participate in global efforts to mitigate and continue adapting to climate change with a view to achieving sustainable economic growth in the context of the Tanzania’s national development blueprint, Vision 2025; Five Years National Development plans; and National cross sectoral policies in line with established international policy frameworks (URT, 2012).

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2.7.1. Tanzania climate change strategies contributions on RE development

- (i) **Enhancing use of renewable energy** share in the national grid and off-grid.
- (ii) **Enhancing off – grid power supply** to rural areas.
- (iii) **Promoting diversification** of energy sources.
- (iv) **Promoting energy efficient** technologies and practices.
- (v) Developing NAMAs focusing on energy generation and conservation.

2.7.2. Gaps, Challenges, and opportunities for RE development through National Climate Change strategies

- (i) Actual cost for implementing the strategy was not established in the National Climate change strategy 2012, key determinant for estimating the cost was to rely on the costs incurred during adaptation and mitigation interventions. This also extends from UNFCCC budget which ranged from 49-171 billion per year globally (UNFCCC, 2007). Tanzania case, the recent study estimates it to range between 100-150 USD million per year. Under such uncertainties, it is hard for a fixed cost. The current National climate change strategy 2021-2026 must ensure to establish an **implementation plan** which allocates specific resources for implementing mitigation and adaptation commitments. However, substantial percentage of budgeted resources are expected to be financed by international and global climate funds. This scenario puts Tanzania NDCs under risk for its implementation and achievements.
- (ii) The revised NDCs 2021 has laid down a clear reporting line for implemented actions of set strategic interventions. The feedback mechanisms and reflections will provide a room for autonomous corrections and improvement towards contributing on greenhouse gas emission reduction globally.
- (iii) **Inadequate resource mobilization** efforts from climate funds continues to impede implementation of strategic objective and interventions. More efforts to the government and stakeholders need to be increased for enough resources to implement planned interventions.

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2.8. National Public Private Partnership (PPP) policy

Since 2009 the government of the United Republic of Tanzania realized the significance of the private sector in the national sustainable development initiatives by introducing the Public-Private-Partnership (PPP) Policy. PPPs have been identified as viable means to effectively address constraints of financing, management and maintenance of public goods and services. Additionally, PPPs can enable the Government to fulfill its responsibilities in efficient delivery of socio-economic goods and services by ensuring efficiency, effectiveness, accountability, quality, and outreach of services.

Under this policy, the government directs that, participation in PPPs may take place in both productive and socio-economic services sectors including, but not limited to the following: Agriculture, Infrastructure, Manufacturing, Education, Health, Natural resources, Tourism, Energy, Mining, Water, Land development, Environment and solid waste management, Appropriate defense infrastructure, Sports, Communication, Information and Communication Technology (ICT), Trade, Entertainment and recreation and Irrigation.

2.8.1. Policy Opportunities

In this policy, **non-government organizations** like religious institutions have been **mentioned as important partners for public service delivery** and realization of the National Development Vision 2025. For example, in the case of services, PPPs have been implemented successfully by **Faith Based Organizations** (FBOs) in education, health and water sectors for many years (URT, 2009). FBOs therefore have full government support when deciding to invest anywhere in Tanzania in any sector that contributes to the fight against poverty including modern renewable energy. Rural areas in Tanzania remains a major target for development programs as they face many challenges. Therefore, concentrating private investments in these areas would be a considerable opportunity to win full government support.

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2.9. The Rural Energy Act (2005)

The government of Tanzania formulated this important act as one the strategies to facilitate sustainable rural development in the country. Article 4 of this act recognizes access to modern energy as a prerequisite condition for rural populations to graduate from extreme poverty and economic wellbeing. It clearly states that sustainable development shall be achieved when modern energy services in rural areas are promoted, facilitated, and supported through private and community initiative and involvement.

The Act established the Rural Energy Agency (REA), the Rural Energy Fund and the Rural Energy Board. REA is the leading agency responsible for rural electrification and promotion of improved access to modern energy services in rural areas of Tanzania’s

Mainland (Kitonga, 2015). The Rural Energy Fund provides grants to TANESCO for decentralized distribution generation in rural areas. Correspondingly, it provides grants to project developers in rural areas.

2.9.1. Opportunities from this Act

The act provides **legal priority to rural development partners** including faith-based organizations, companies, individuals to work with the government on establishing energy projects aiming at improving the wellbeing of rural households. It further **supports renewable energy initiatives** including Solar PV, winds, biogas, and geothermal.

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3.0 Conclusion and Recommendations

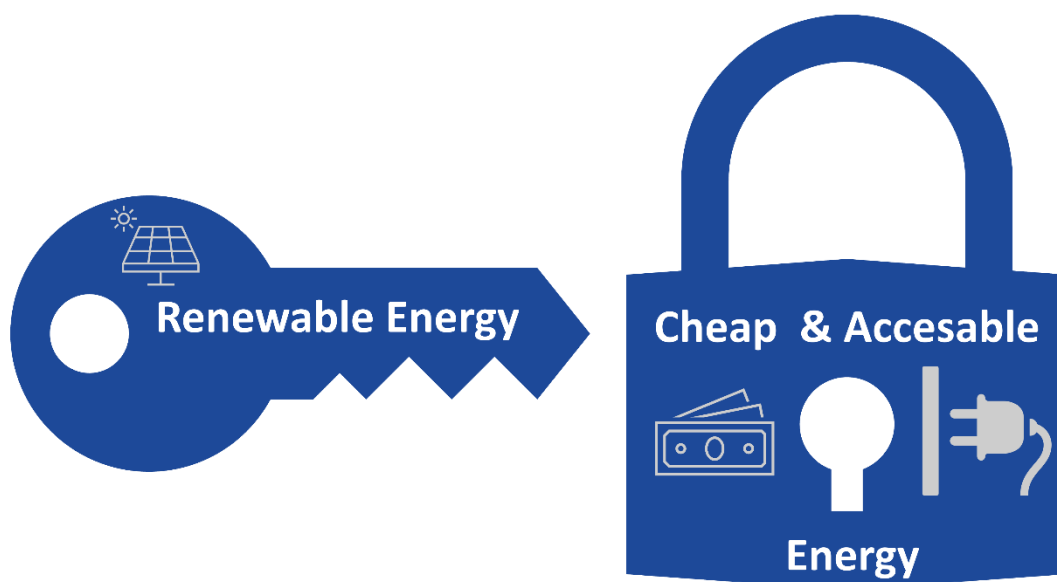
3.1. Conclusion

To foster ecological and socio-economic transformation in Tanzania, realization of renewable energy potentials and energy efficiency technologies could play a significant role if efficiently tapped. Several initiatives across the globe including Tanzania have been made to ensure sustainable energy for the people. Despite this initiative, RE has remained inadequately tapped to enhance productivity for socio economic transformation. Less Community Participation, lack of standalone renewable energy regulatory framework and coordination, extreme poverty to large part of communities and low level of awareness has continued to setback the progress towards increasing RE contribution in the energy sector. The increased education and awareness will initiate the anxiety to establish, develop and exploit a wide range of renewable energy and energy efficiency technologies in the country.

Renewable Energy

KEY TO UNLOCK

cheap and accessible energy



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3.2. Recommendations

The assessment revealed the low contribution of RE in the national energy mix agenda. A large concentration of the government initiatives towards country electrification lies under the big hydropower project up to the year 2030. This has a profoundly serious implication on the lower rate of boosting the adoption and use of solar energy systems and the alike. However, there is a window of an opportunity including political will for the solar and wind energy projects to be established to succeed and bring sustainable changes and development in the communities.

The following recommendation align with the best development and sustainability of solar energy technologies in Tanzania:

- **Map, quantify and update all RE potentials** including solar, wind and alike in different parts of Tanzania. This will motivate investment rates as well as ensure the reliability of such high demanding capital projects.
- **Stand-alone RE policy and strategies:** The current legal and institutional framework in the country do not enhance a wide platform for the RE project's establishment and development. The government needs to put forward the stand-alone RE policy and strategies that harmonize all highlighted efforts in analyzed documents. This could provide a better country direction.
- **Raising Awareness and education on RE:** Non-Governmental Organization, International Organizations, the Government, and other development partners need to keep a focus on how to support for raising awareness and education on the alternative energies in the country. Most of the communities are still reluctant to use it due to local beliefs, worries about their safety and thoughts on the unreliability.

POLICY RECOMMENDATIONS



**Mapping &
Quantify
RE potentials**



**Develop
Stand-alone
RE policy**



**Awareness raising
for RE**

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