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Tanzanian energy sector under the universal principles of the Energy Charter

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Pre-Assessment Report of the Tanzanian Energy Sector under the Principles of the International Energy Charter and the Energy Charter Treaty¹

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List of Abbreviations

AGOA - African Growth and Opportunity Act

ATIA - Africa Trade Insurance Agency

BRELA - Business Registration and Licensing Agency

CTI - Confederation of Tanzania Industries

ECT - Energy Charter Treaty

EAC - East African Community

EPA - Economic Partnership Agreement

EPP - Emergency Power Plant

EWURA - Energy and Water Utilities Regulatory Authority

FCC - Fair Competition Commission

FCT - Fair Competition Trade

GDP - Gross Domestic Product

GEF - Global Energy Fund

ICSID - International Centre for Settlement of Investment Disputes

IEA - International Energy Agency

IPPs - Independent Power Producers

MIGA - Multilateral Investment Guarantee Agency

MTOE - Metric Tonnes of Oil Equivalent

PPA - Power Purchase Agreement

PSMP - Power System Master Plan

REA - Rural Energy Agency

REF - Rural Energy Fund

SADC - Southern Africa Development Community

SPP - Small Power Producer

TANESCO - Tanzania Electric Supply Company

TEDAP - Tanzania Energy Development and Access Expansion Project

TIC - Tanzania Investment Centre

TPDC - Tanzania Petroleum Development Corporation

UNCTAD - United Nations Conference on Trade and Development

URT - United Republic of Tanzania

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Executive Summary

Tanzania signed the International Energy Charter on 20 May 2015 in The Hague, The Netherlands. The Energy Charter is an international organization that promotes the rule of law and regulatory stability for investment, trade, transit and efficiency in the energy sector across the world. As part of an objective to expand its principles and rules beyond its traditional borders, the Energy Charter updated the 1991 European Energy Charter into the 2015 International Energy Charter in order to reflect some of the most topical energy challenges of the 21st century, such as the growing weight of developing and emerging countries for global energy security, the “trilemma” between energy security, economic development and environmental protection, the need to promote access to modern energy services, diversification of energy sources and routes, and the regional integration of energy markets.

The International Energy Charter is in line with the EU and international policy agenda as reflected in the UN Sustainable Energy for All (UNSE4All) initiative, which mandates a 3-goal target of ensuring universal access, doubling the share of renewable energy and doubling the rate of improvement in energy efficiency by 2024. The European Union has allocated more than EUR €3 billion over the next 7 years (2014-2020) to promote sustainable energy in Sub-Saharan Africa. The importance of these efforts has been reinforced by the 2014 G7 and G20 meetings in Brussels, Belgium and Brisbane, Australia, respectively, which highlighted the need to provide strategic assistance for sustainable socio-economic growth and financial rebalancing in developing and emerging countries.

In this context, the Energy Charter Secretariat, in collaboration with the European Commission, DG Development and Cooperation, has developed a capacity building programme with African countries to introduce them to the universal market-based principles enshrined in the International Energy Charter and the Energy Charter Treaty, and to assess their energy sectors against these universal principles. The objective is to promote an investment friendly regulatory environment that is necessary to address the huge energy challenges facing the African continent.

This report has been funded under the EU Technical Assistance Facility for the Sustainable Energy for All Initiative – Western and Central Africa and is the result of the capacity building programme that for three months brings secondees from African governments to the Secretariat in Brussels. The secondment of a civil servant designated by the Ministry and the elaboration of this report are part of a broader strategy aiming to engage the country in further energy policy reform in line with international standards. Therefore, the secondment and report have been developed in parallel with meetings in the capital with national authorities and continuous follow-up for the development of the principles provided for in

the International Energy Charter is planned. The latter paves the way to embrace the market-based rules of the Energy Charter Treaty when the country is ready to do so.

This report provides an overview of the Tanzanian energy sector. The country is gifted with diverse energy resources most of which are unexploited, these include biomass, natural gas, hydro, uranium, coal, geo-thermal, solar and wind. As of 2014, about 70% of people did not have access to electricity in Tanzania and about 88% of the total population relied on traditional biomass in the form of charcoal and firewood for energy.

In an effort to address all challenges that Tanzanian energy sector has been facing for decades, the country has launched long-term visions and national strategies with the objective of meeting the demands of the growing population; some of these interventions include the Big Result Now initiatives, the National Development Vision 2025 and Scaling-Up Renewable Energy Programme. One of the main objectives of these initiatives and visions are to meet the average energy demands of the entire population by 2025.

The report presents national reforms against the core principles embodied in the International Energy Charter and the Energy Charter Treaty: security of supply and universal energy access, open and sustainable markets, national sovereignty, regional market integration, regulatory stability and predictability, research and technology transfer, and international cooperation. Accession to the International Energy Charter and the Energy Charter Treaty contribute to upgrading national energy policy and legal frameworks according to international standards, which improves trust and reliability in an increasingly global and interdependent energy sector. The more countries subscribe to those principles, the more they will effectively set the standard for international energy relations.

1 Introduction

The Energy Charter Treaty is an internationally legally binding text providing clear and predictable rules in the areas of investment, trade and transit and energy efficiency. It provides dispute resolution mechanisms, while explicitly recognising and protecting national sovereignty over natural resources. The Energy Charter Treaty creates an environment in which international energy markets can function effectively, and thereby helps create an international level playing field and promote the rule of law in the energy sector. The Energy Charter Treaty was signed in 1994 and entered into force in 1998. It currently has been signed by, or acceded to, 54 countries, including the European Union.

The political foundation of the Energy Charter Treaty was the European Energy Charter of 1991, a political declaration expressing the commitment of a signatory country to move towards an upgraded international legal system. The European Energy Charter is a political commitment by its members to encourage energy cooperation with the following objectives and principles: development of open and efficient energy markets, creation of conditions to stimulate the flow of investment into the energy sector and encourage the participation of private enterprise, non-discrimination among participants, respect for state sovereignty over natural resources, and recognition of the importance of environmentally sound and energy efficient policies. Up until now, the European Energy Charter has been signed by sixty-four European, Asian, Australasian, North American and African states, as well as the European Union.

The Astana Declaration of November 2014 highlights the strategic objectives of the Energy Charter to expand the principles of the Energy Charter Treaty beyond its traditional borders by maximising on the increasing interest of new countries in different regions around the world. The adoption of the International Energy Charter in 2015 reflects the implementation of this objective.

The fact that the United Republic of Tanzania (also URT or Tanzania) signed the International Energy Charter sends a political signal to the international community that the country shares a number of international energy principles on trade, investment, transit and energy efficiency. It upgrades its national energy sector according to international principles, which raises its profile and helps attract foreign investment. The objective of this report is to place the Tanzanian energy sector against the universal principles enshrined in the International Energy Charter and the Energy Charter Treaty. It concludes that Tanzanian energy objectives and structural reform match the principles of the International Energy Charter and, therefore, the country should explore embracing the Energy Charter Treaty.

2 Country Profile

The United Republic of Tanzania was created in a union between Tanganyika and Zanzibar on 26 April 1964. It has 30 administrative regions, of which 25 are on mainland (Tanganyika) and 5 on the Island (Zanzibar). Tanzania is located in East Africa and lies between the latitude 1° S and 11 45' south of the Equator and the longitude 29° 20'E and 40° 38' east of Greenwich. It borders Kenya and Uganda in the north; the Democratic Republic of Congo, Rwanda and Burundi in the west; Zambia, Malawi and Mozambique in the south and the Indian Ocean in the east.

It has a total area of 945,749 Km² with a population of 44.9 million², and a population growth rate of 2.9% per annum. The capital city is Dar-es-Salaam, and the official languages are Swahili and English. The economy of the country heavily depends on agriculture, which accounts for 42.5% of GDP, provides 70% of exports, and employs about 75% of the work force. Industry accounts for 18.9% of GDP and is mainly limited to processing agricultural products and light consumer goods. The services sector (tourism, transport, energy and mining) accounts for 38.6%. The real GDP growth rate is about 7% (2013) and has been maintained over five years consecutively while current GDP is about US \$33.23 billion and annual GDP per capita is US \$694³. The literacy rate is about 60% and 75% for female and male, respectively, while life expectancy is 59 years for males and 63 years for females⁴.

The United Republic of Tanzania, like other countries in Sub-Saharan Africa, faces an energy shortage, particularly in electricity. Insufficient power generation capacities, as well as inadequate transmission and distribution of infrastructure, have made the situation worse. The government is striving to increase access to electricity, reduce technical and non-technical losses and bring modern energy to their citizens to sustain economic growth in the country. To achieve this, the government of Tanzania is promoting private sector investment in the energy sector. It is quite evident that increasing electricity access, expansion of the national grid and efficient delivery of power will transform Tanzania's economy tremendously.

Presently, annual electricity demand has been growing at a rate of 10-15%, although to date only 24% of the population is connected to electricity. The annual per capita consumption is about 133 kWh, which is very low compared with the world average of 2,500 kWh. Tanzania's electricity connection level target is 30% in 2015, when the expected installed capacity for

² National Bureau of Statistics, "2002 Census Population Distribution as per 2012 Population Census Administrative Units", last modified 2012,

http://www.nbs.go.tz/nbs/takwimu/census2012/Pop_dist_by_enu_me_area_as_per_2002_pop_and_housing_census.pdf.

³ The World Bank, Annual Report 2014, <http://www.worldbank.org/en/about/annual-report>.

⁴ The World Bank, Country Data; Tanzania, last modified 2015, <http://data.worldbank.org/country/tanzania>.

power generation will be 3,000 MW, having increased from the present 1,583 MW of on-grid capacity. Maximum power demand is 905.05 MW as of 5 August 2014⁵.

Tanzania is one of the most peaceful and politically stable countries in Africa—since independence in 1961 the country has never experienced a civil war⁶. The Tanzanian population continues to live in peace with a sense of a common national identity. Investments in Tanzania are guaranteed against nationalisation and expropriation. Tanzania is signatory of various multilateral and bilateral agreements on protection and promotion of investment. It is a member of the World Trade Organisation (WTO), the Multilateral Investment Guarantee Agency (MIGA), the Economic Partnership Agreement (EPA), the Africa Trade Insurance Agency (ATIA), and the International Centre for Settlement of Investment Disputes (ICSID). Moreover, Tanzania is a member of the Southern Africa Development Community (SADC), the Common Market for East and Southern Africa (COMESA), the East Africa Community (EAC) and is a beneficiary country under the preferential trade enhancing scheme offered by the AGOA⁷ legislation. Similarly, Tanzania enjoys benefits set by the European Union, Everything But Arms (EBA), the ACP-EU cooperation and various bilateral cooperation agreements.

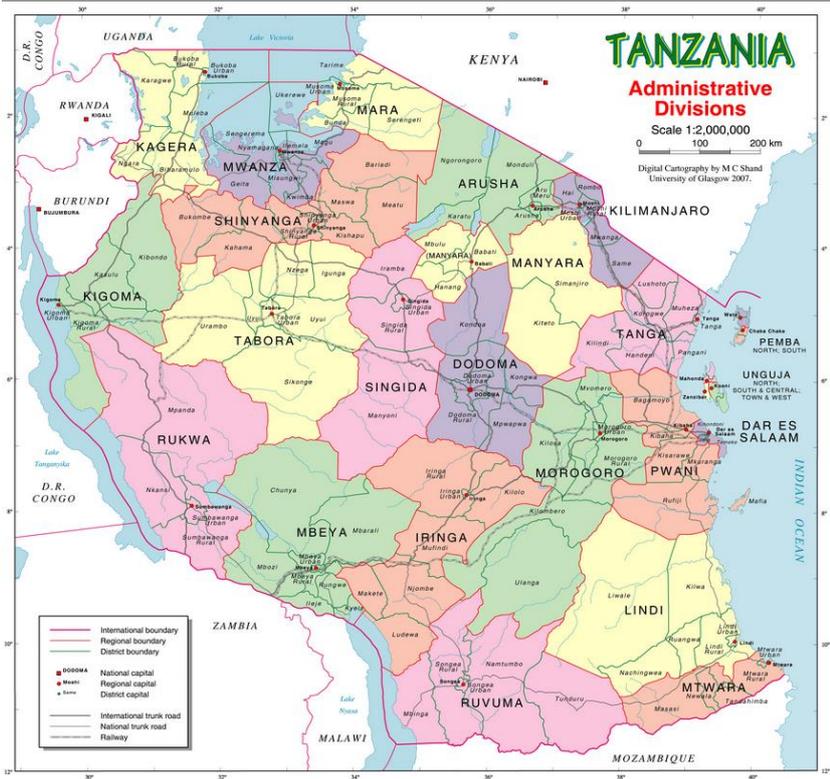


Figure 1: Map of United Republic of Tanzania
 Source: www.google.co.tz

⁵ Electricity Supply, Reform Strategy and Roadmap, 2014-2025" June 2014
⁶ Tanzanian Investment Centre, The Facilitator, "Tanzania investment guide, 2013-14", <http://www.tic.co.tz/media/Guidebook2013-14.pdf>.
⁷ AGOA: the African Growth and Opportunity Act, which allows African signatory countries to enjoy duty and quota free access to the USA market.

3 Energy Sector in Tanzania

3.1 Energy situation in Tanzania

Tanzania has abundant indigenous energy resources such as hydro (estimated at 4.7 GW), natural gas (proven reserves at 53.28 TCF⁸, composed of deep sea at 45.28 TCF and onshore at 8 TCF), solar radiation (187 W/M²), wind with an average speed 10 m/s, coal reserves (estimated to 1,200 million tonnes, out of which 304 million tonnes are proven), uranium, biomass, and geothermal which is estimated to generate about 650 MWe. Estimated total energy consumption is more than 54 million tonnes of oil equivalent (MTOE) or 1.102 TOE per capita. Energy consumption in rural areas accounts for about 85% of the total primary national energy consumption. The national energy balance is dominated by biomass-based fuels, particularly wood (charcoal and firewood), which is the main source of energy for both rural and urban areas. About 88% of total energy consumption is biomass in the form of firewood and charcoal for cooking. Commercial energy sources such as oil, gas, electricity, and coal, as well as non-biomass renewable energy, account for the remaining 12%. That means that petroleum and electricity account for about 8% and 3%, respectively, for primary energy use. Coal, wind and solar account for about 1% of the energy used, as shown in Figure 2 below.

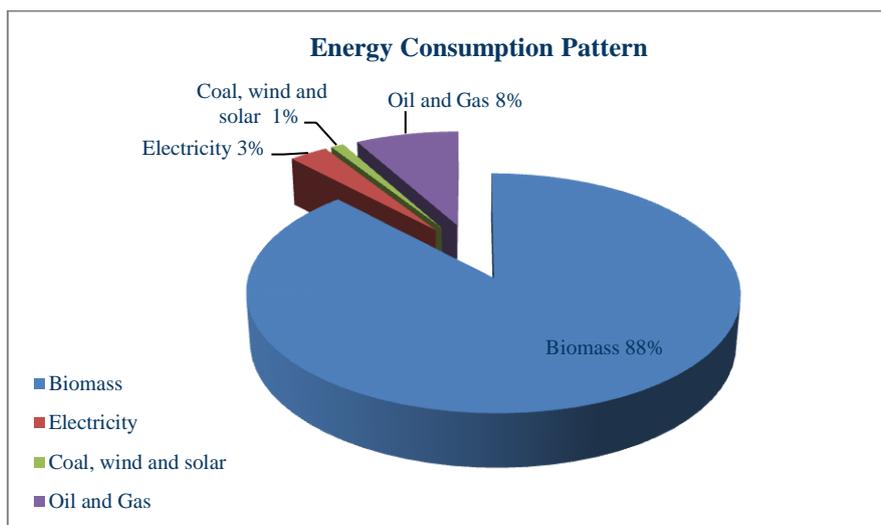


Figure 2: Primary Energy Consumption Pattern in Tanzania in 2012

Source: Ministry of Energy and Minerals, 2013

Provided the huge deposits of natural gas in Tanzania, the country has not proven oil reserves yet, therefore, Tanzania continues to rely on the importation of petroleum products which accounts for about 3% of the total energy imports per annum. In 2014, Tanzania's total installed capacity was 1,583 MW composed of hydro 561 MW (35%), natural gas power plants of 527 MW (34%) and liquid fuel power plants of 495 MW (32%). Tanzania also imports

⁸ According to recent Tanzania Petroleum Development Corporation Report released in January 2015.

about 16MW⁹ of power from Kenya, Uganda and Zambia, as shown in Table 1 below. In 2002, the situation was that 98% of total installed capacity was from hydro power, which caused reliability issues due to unpredictability of hydroelectric power and weather patterns. Access to electricity is 36%, 20% in urban areas and 16% in rural areas, which is considerably low, leading to constraints on growth and a low level of earning potential. There are also low levels of electricity consumption per capita: 133 kWh per year which is very small compared to the world average consumption of 2,500 kWh per annum¹⁰, and an average consumption in developing countries in Sub-Saharan Africa of 550 kWh per annum. The Power System Master Plan 2012-2035 indicated that Tanzania would reach an electrification rate of 75% for Tanzanian households by the year 2033. As of August 2014, the electricity demand growth rate was about 10-15% per year and the peak demand was about 905.05 MW.

Due to high demand for electricity, some people obtain power through stand-alone diesel generation, solar photovoltaics (PV), and several mini-hydro mini grids operated by local NGOs and faith based groups. The government initiative is to increase utilization of natural gas for power generation, and diversify to other sources like wind, geothermal, coal and solar.

The government plan under the Big Result Now (BRN)¹¹ initiative, to be implemented in 2014-2020, is to generate 1,500 MW from gas, 160 MW from oil, 100 MW from wind, 60 MW from solar, 11 MW from small hydropower and 200 MW from coal, as well as 650 MWe from estimated geothermal potential.

Existing Plant	Plant type	Owner	Installed Capacity
Kidatu	Hydro	TANESCO	204.00
Kihansi	Hydro	TANESCO	180.00
Mtera	Hydro	TANESCO	80.00
New Pangani Falls	Hydro	TANESCO	68.00
Hale	Hydro	TANESCO	21.00
Nyumba ya Mungu	Hydro	TANESCO	8.00
Uwemba	Hydro	TANESCO	0.84
Songas	Natural Gas	IPP	189.00
UGP 1	Natural Gas	TANESCO	102.00
UGP 2	Natural Gas	TANESCO	105.00
Tegeta	Natural Gas	TANESCO	45.00
Symbion Ubungo GP	Natural Gas	IPP	60.00
Symbion Ubungo JET A1	Jet-A1	IPP	60.00

⁹ Ministry of Energy and Minerals, "The Electricity Supply Industry Reform Strategy and Roadmap 2014-2015", June 2014

¹⁰ Ibid

¹¹ Big Result Now (BRN) is the government development model which developed strategies to be implemented in six key priority sectors (Energy, Agriculture, Water, Education, Transport and Finance) to transform Tanzania from a low to a middle-income country by the end of 2025. BRN aims at adopting new methods of working in innovative ways under a specified timeframe for delivery of the changes required. It was adopted from Malaysian Model of development.

IPTL	HFO	IPP	103.00
Symbion (Arusha)	Jet-A1	IPP	50.00
Symbion (Dodoma)	Jet-A1	IPP	55.00
AGGRECO (UB & TG)	Diesel	EPP	100.00
Zuzu (Dodoma)	Diesel	TANESCO	7.40
Nyakato (Mwanza)	HFO	TANESCO	63.00
Total (MW)			1,501.24

Table 1: Existing Power Plant available/grid installed capacity in Tanzania

Source: TANESCO, November, 2014

3.2 Institutional system and stakeholders

The energy sector operates under the Ministry of Energy and Minerals (MEM), which is mandated to develop energy and mineral resources. MEM is responsible for the formulation and articulation of policies to create an enabling environment for investors and energy stakeholders. Under MEM there are several institutions which deal with energy, namely TANESCO, REA, TPDC, TGDCL, and the regulator EWURA.

TPDC is the state corporation through which the Ministry of Energy and Minerals implements petroleum exploration and development policies. It is responsible for all activities that involve exploration and production of oil and gas in the country.

The Rural Energy Agency (REA) is an autonomous body under MEM, responsible for the support and facilitation of improved access to modern energy in rural areas by promoting electrification and development of rural energy projects. REA became operational in October 2007, and it owns the Rural Energy Fund (REF) which is used to promote, facilitate and finance renewable energy projects undertaken by small IPPs in rural areas.

Tanzania Geothermal Development Company Limited (TGDCL) is responsible for geothermal exploration, development and all activities regarding investments in geothermal.

EWURA is an autonomous multi-sectoral regulatory authority established by the EWURA Act of 2001. It is responsible for the technical and economic regulations of electricity, petroleum, natural gas and the water sector. The EWURA Act granted authority for most regulatory tasks, such as licensing, standards, tariff regulations, performance monitoring and enforcement of compliance with the law and its standards. The role and the relations of the different actors—the Ministry, regulator and operators of the sector—are determined by legislation. Through the regulatory functions of the sector, operators are expected to be licensed; markets and performances have to be monitored.

TANESCO is a sole bulk supplier of electricity to the Tanzanian islands, and starting in 1980 it supplied bulk power to the Zanzibar State Fuel and Power Corporation using a 132 kV

submarine cable (38 km) with the capacity of 45 MW. Distribution of electricity in Ugunja and Pemba (Zanzibar) is the sole responsibility of the Zanzibar Electricity Corporation (ZECO).

The monopoly on the electricity industry ended in June 1992 when the private sector was allowed to participate in power trading due to market liberalization. To date, a number of independent companies are in place. These are IPTL (100 MW), Songas (189 MW), Symbion (225 MW), AGGRECO (100 MW, as an emergency power plant) and Artumas (8 MW).

In Tanzania, the main transmission system network operates at a level of 220 kV¹², 132 kV and 66 kV, and the distribution system network operates at a level of 33 kV, 11 kV and 0.4 kV. In 2014, the transmission network system covers 4,904.5 km, comprised of 2,732 km of 220 kV lines, 1,591.79 km of 132 kV lines (including the submarine cable to Zanzibar) and 578.7 km of 66 kV lines. The distribution system network is comprised of 17,021 km of 33 kV lines, 5,375 km of 11 kV lines, 34,513 km of low voltage (0.4 kV) lines and a total of 11,124 distribution transformers to supply electricity to consumers¹³.

Projected electricity demand growth in Tanzania is shown in Figure 3 below. The increase in demand is caused by national economic growth, population growth and growth in the mining, water and agriculture sectors. TANESCO anticipates major demand increases from several mining operations, LNG plants, factories and water supply schemes. Peak demand is projected to increase rapidly from about 1,600 MW in 2014 to about 4,700 MW by 2025, and 7,400 MW by 2035. Simultaneously, the service sectors like tourism, households, and hostels are growing very fast due to the increasing population and level of education. Due to mining activities in the country, there is currently a need for more than 500 MW of generation between 2014 and the end of 2017. The government's vision is to develop a strong, vibrant and a well organised mining industry over the next 10 to 20 years led by the private sector, and this vision depends on the availability of electricity. The target for the mining industry is to make sure to contribute more than 10% of the country's GDP. The achievement of growth in the industrial sector (particularly the mining subsector), agriculture and the service sectors will also contribute to the demand growth of electricity.

Concurrently, the government of Tanzania recognizes that modern energy is essential to generate jobs, support industries, enable efficient transport, and make commerce and agriculture more productive. Energy is needed to process, store and cook most foods. Education is facilitated by electricity access, including via attracting and retaining teachers in rural areas.

¹² kV-is kilovolt and km is kilometer.

¹³ Ministry of Energy and Minerals, "The Electricity Supply Industry Reform Strategy and Roadmap 2014-2015", June 2014.

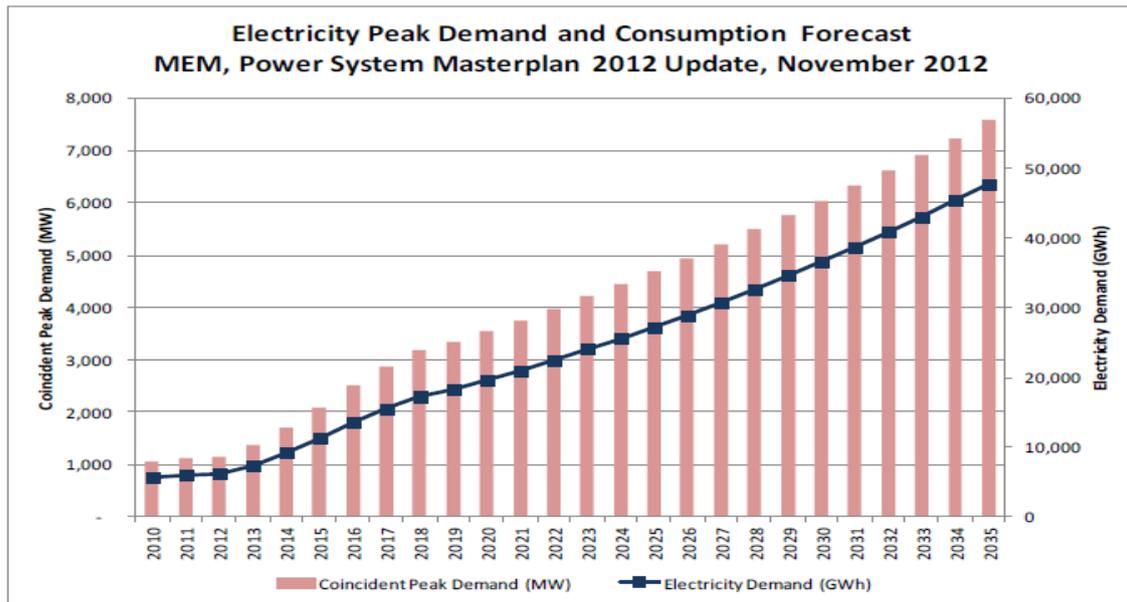


Figure 3: Electricity demand Outlook 2010-2015

Source: Ministry of Energy and Minerals, Final Report Energy Joint Sector Review 2010/2011, Sept 2011

3.3 Energy Resource Potential

Tanzania has abundant indigenous energy resources including hydro, natural gas, coal, solar, geothermal, wind power, uranium and biomass, much of which is untapped. Social and economic development of the country will be accelerated through effective exploitation and utilization of these resources. Based on that, the government is encouraging the private sector to participate in the development of these energy resources for power generation, which will be used at the local as well as regional level. Other sources of energy which are under assessment include tidal and wave power.

3.3.1 Hydropower

Tanzania is a country of great lakes such as Lake Victoria, Tanganyika, Nyasa, Rukwa, Manyara, Eyasi, and Natroni. It has rivers and basins such as river Rufiji (Rufiji basin); Kagera (Lake Victoria basin); Malagarasi (lake Tanganyika basin); Ruvuma (Ruvuma and Southern Cost basin); Mara (lake Victoria basin); Pangani (Pangani basin); Ruaha (Rufiji basin) and Wami (Wami Ruvu basin). Due to these lakes, rivers and basin across the country, Tanzania has natural topographic features which provide the country with many opportunities for hydropower resources, to the magnitude of 4.7 GW in total, only 12% of which is currently being tapped.

3.3.2 Hydrocarbons and Natural Gas

Tanzania has a long history of exploration for oil and gas, with the first gas discovery made at the Songo-Songo Island in 1974, but the field was not developed due to financial constraints. Further discoveries were made in the 1980s by the TPDC in Mnazi Bay, located in south-east Tanzania. In 2010, Tanzania's energy sector became quite significant in the Sub-Saharan region following important natural gas discoveries in the Mtwara region, located in the southern part of Tanzania. The natural gas discoveries are currently confirmed at 47.83 trillion cubic feet. Despite efforts to undertake petroleum exploration, Tanzania has not yet discovered oil and is currently dependent on imported petroleum products.

In supporting the development of natural gas industry, the Tanzania Petroleum Development Corporation (TPDC) has concluded more than 26 onshore and offshore production-sharing agreements (PSAs) with more than 20 international companies seeking to conduct exploration activities within the country. To date, more than 72 wells have been drilled to completion and five more are in various drilling stages. TPDC represents the government's interest in the oil and gas subsector. Among other things, its role is to promote the development of the petroleum industry.

Having mentioned significant natural gas discoveries in Tanzania, the country is expecting to produce about 1 trillion cubic feet of natural gas from the Songo-Songo Island and 2 trillion cubic feet from the Mnazi bay area. Currently, all of the country's natural gas production is consumed domestically for power generation plants, where about 300 MW of electricity is generated every day, in CNG plants and in households for cooking. To this end, 36 industries, 60 vehicles, 70 households, 1 hotel and 2 government institutions (Keko Prison and Mgulani JKT) are using the natural gas, as seen in Figure 4. There is only one 225 km pipeline connecting the Songo-Songo Island and Tanzania's commercial capital, Dar-es-Salaam. It has been noted that the current supply of natural gas does not meet the increasing demand of natural gas users within the country; for instance, in 2001, the Songo-Songo field was recorded to transfer about 70 million standard cubic feet per day (mmscfd) and increased to 110 mmscfd in 2008 when gas demand grew. In order to meet the increasing demand of natural gas consumption in the near future, Tanzania has completed the construction of a natural gas pipeline that links Mtwara and Dar-es-salaam.

Tanzania has also discovered other six gas fields: Mkuranga, Kiliwani-1, Ntorya, Pweza-1, Chewa-1 and Chaza-1. This makes total gas reserves in both onshore and offshore 53.28¹⁴ trillion cubic feet (TCF). In 2007, Ophir/BG discovered three gas fields in the deep sea (offshore) with a potential of 7 TCF. Figure 5 below shows the total natural gas discovery in different onshore and offshore sites in Tanzania. For more information visit www.tpdc-tz.com.

¹⁴ According to TPDC News as of 3rd January, 2015. The report indicates that: Mkuranga 2007 (0.2TCF), Kiliwani 2008 (0.07 TCF), Songo Songo 1974 (2.5 TCF), Mnazi Bay 1982 (5TCF), Ntorya 2012 (0.178TCF) and Deep Sea, from 2010-2014 (45.28 TCF). Total discovery as per November, 2014 is **53.28 TCF**.

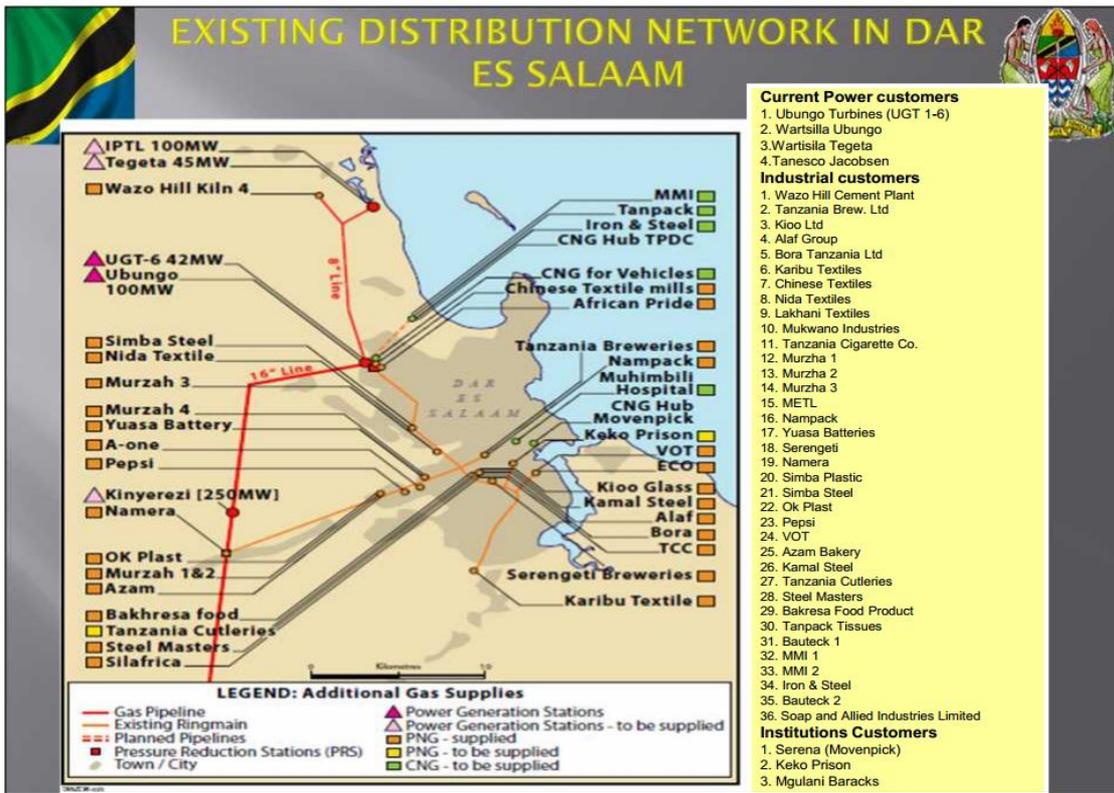


Figure 4: Natural Gas Distribution Network in Dar-es-Salaam

Source: Figure available at the website of Tanzania Petroleum Development Corporation, on <http://www.tpdcc-tz.com/OIL%20and%20GAS%20EXPLORATION.pdf>

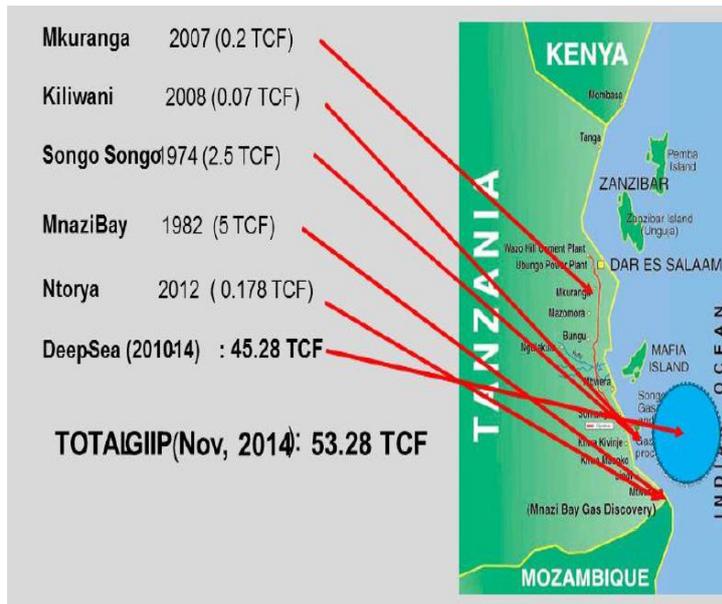


Figure 5: Total gas discovery in Tanzania

Source: TPDC, 3rd January, 2015

These gas discoveries offer business opportunities to private companies that include exploration of gas fields, the construction of LPG plants and storage, gas pipelines across the country, petrochemical industries, manufacturing of fertilizers, and development of infrastructure for the gas business. The government has plans to extend the natural gas pipeline from Mtwara, through Dar-es-Salaam to Tanga.

3.3.3 Petroleum

Tanzania imports its petroleum requirements in refined form and some crude oil. These imports account for about 30% of the total import bill. Of the imported fuel, more than 40% is used locally, with the balance being transported by cargo to landlocked neighbouring countries like Rwanda, Burundi, Malawi and the Democratic Republic of Congo (DRC). Tanzania transports crude oil via a pipeline that runs from Dar-es-Salaam Port to Ndola Zambia.

Tanzania welcomed private investors' participation in developing petroleum infrastructure in the country to meet local demand and handle transit volume to neighbouring states. There remain, however, huge investment opportunities in the exploration of natural gas and petroleum in the country.

3.3.4 Geothermal

Tanzania has geothermal potential in most parts of the East African Rift Valley System. Geological, geochemical and geophysical studies have shown geothermal potential in various areas. Some of the prominent sites are: Songwe (Mbeya), Luhoi (Rufiji), Manyara, Lake Natroni, and Kisasi (Morogoro). The estimated potential may generate about 650 MW of electricity. Tanzania's government established a geothermal company (TGDC) to specifically deal with the overall development of geothermal resources in the country.

Diversification of energy sources in power generation is very crucial for the sustainability of resources and the environment. Development of geothermal is capital intensive, so the government is encouraging the private sector to participate in exploration and development of the sector. Public-private partnerships are highly encouraged due to minimizing the perceived investor risk.

3.3.5 Coal

Tanzania has been endowed with coal reserves of about 1,200 million tonnes, of which 304 million tonnes (30%) have been verified. The coal sites include Mchuchuma/Katewaka, Kiwira and Ngaka, as well as about 220 million tonnes recoverable in the Lake Victoria region. The

government of Tanzania, through its State Mining Company (STAMICO) and TANESCO, is planning to produce up to 400 MW of electricity from the Kiwira coal mine, and develop the Mchuchuma and Katewaka coal mines to be able to generate 600 MW instead of the 300 MW which was initially planned. The power that will be generated from the Mchuchuma coal mine will be largely used to smelt iron ore.

The target generation plans for the Ngaka coal mine are to generate up to 400 MW. Similar power plants can be constructed in the area, for taking advantage of future coal unloading facilities and grid connections. The government plan is to use coal for power generation and cement factories in Tanzania, and the wider region.

3.3.6 Wind

Tanzania has plentiful wind resources along the coastline, the highland plateau, and regions passed by the Rift valley, on the plains and around the Great Lakes. Wind resource assessments indicate that areas such as Kititimo (Singida) and Makambako (Iringa) have adequate wind speed for grid-scale electricity generation. The wind speed is an average of 9.9 m/s at Kititimo and 8.9 m/s at Makambako, at a height of 30 metres. So far, three companies have shown interest in investing in wind energy, namely: Power Pool East Africa, Wind East Africa both in Singida and Sino, Tan Renewable Energy Limited in the Makambako, Njombe region. Power Pool East Africa is negotiating a PPA (Power Purchase Agreement) with TANESCO, and will start generating 100 MW of electricity from the wind farm in the Kititimo area in the Singida region in a few years.

Other areas where wind resource assessments have been made are Litembe (Mtwara), Mkumbara (Tanga), Gomvu (Dar-es-Salaam), Karatu (Manyara), Kititimo (Singida), Mgagao (Kilimanjaro), Makambako (Iringa) and Mafia (Pwani). Data analysis will give the clear wind potential in the above areas, while more areas are currently under assessment.

3.3.7 Solar

Tanzania has high levels of solar energy ranging between 2800-3500 hours of sunshine per year and global radiation of between 4 to 7 kWh/m²/day. It has also been noted that solar resources are especially good in the central part of the country, thus making Tanzania a suitable place for the development of solar energy as an important alternative to conventional energy resources if efficiently harnessed and utilized. Both solar photovoltaic and thermal technologies are under development. To date, about 5.3 megawatt peak (MWp) of PV solar have been installed. The government has been on the leading line in encouraging and supporting solar development within the country. In supporting that, Tanzania has removed VAT and import taxes on the main solar components (panels, batteries, inverters and regulators) which has allowed end-users to get PV system at a more affordable price.

3.3.8 Biomass

There are different types of biomass: wood fuel (charcoal and firewood), Agricultural residues and animal waste. In Tanzania, there is a woody biomass growing stock of about 4.39 billion m³, with a mean annual increment of 140 million m³. Regarding biomass residues, there are about 15 million tons/annum of crop residues, animal droppings from 14 million cattle and 11 million goats and sheep, 200,000 tonnes of volatile solid sisal waste and 1.1 million tonnes/annum of forest residues. There is potential to generate more than 500 MW, with a sustained yield of 24.3 million m³ per annum.

Presently, more than 35 MW is being generated from bagasse and woody residues, with about 30% of this capacity being connected to the national grid. TPC-Moshi, TANWAT, Sao Hill, and the Kilombero and Kagera sugar factories are some of the key players in power generation from biomass.

Tanzania is growing different crops which are suitable for biofuel production like sunflower, palm oil, sugarcane and jatropha. Biofuel includes ethanol and bio-diesel, of which Tanzania has crops for the production of both.

3.3.9 Uranium

In the 1970s, Tanzania discovered uranium deposits, and exploration concluded in 2005 revealed commercially exploitable deposits in Namtumbo, Ruhuhu near Lake Nyasa, (Ruvuma) and Manyoni (Singida), Handa and Bahi (Dodoma). To steer the country towards a nuclear era, the government has formed a task force to prepare a national nuclear strategy that provides a framework for guiding implementation of nuclear technologies, particularly power generation.

4 The National Energy Strategy

The 2015 International Energy Charter explicitly recognises the sovereignty of each state over its energy resources and its right to regulate energy transmission and transportation within its own territory, respecting all relevant international obligations. In the spirit of political and economic cooperation, signatories agree to promote the development of efficient, stable and transparent energy markets at regional and global levels, taking into account environmental concerns and the role of energy in each country's national development. To this end, signatories agree to coordinated action to achieve greater coherence of energy policies, which should be based on the principle of non-discrimination and on market-oriented price formation.

4.1 Efficient Utilization of Energy Resources

Tanzania's government is planning to use available resources in an efficient way for the sustainability of economic, social and environmental aspects. In this regard, diversification of sources in electricity generation is crucial to achieve green growth. Government initiatives are to increase the utilization of natural gas and coal in power generation, reduce dependency on hydropower, and diversify to other sources like wind, geothermal and solar. Under the Big Result Now Initiatives, the main plan (which should be implemented between 2014-2020) is to generate 1,500 MW from gas, 160 MW from oil, 100 MW from wind, 60 MW from solar, 11 MW from small hydropower and 200 MW from coal, with also 650 MWe of geothermal estimated potential available.

Due to financial constraints, however, these plans might not be met. Currently the government is concentrating on power generation from natural gas, due to its pipeline construction from Mtwara to Dar-es-Salaam which will bring 784 mmscfd. Coal and hydro are also given priority, due to their availability and firm commitments for their projects to begin soon. The graph below in Figure 6 shows the planning of power generation from different sources, based on the current revision of the Power System Master Plan (2012).

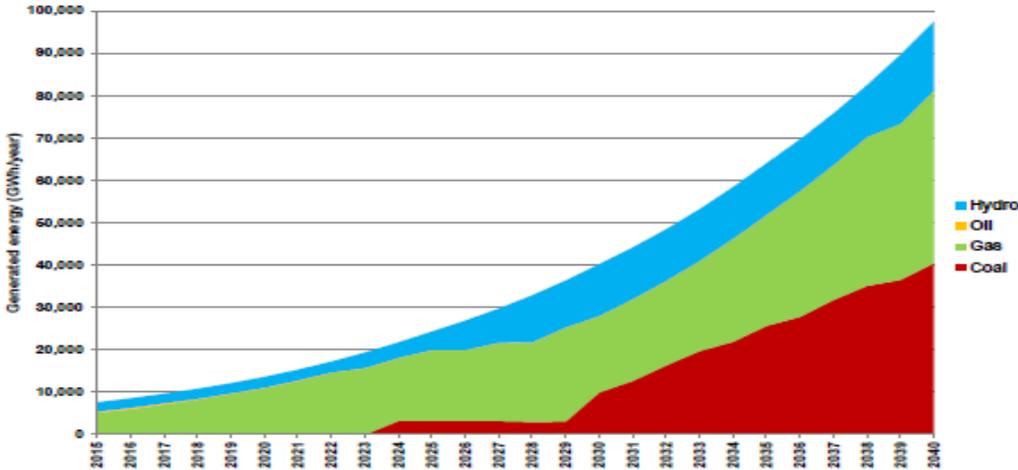


Figure 6: Energy generation planning from different sources
Source: Revision of 2012-PSMP, November, 2014

4.2 Current Energy Projects under development

The government of Tanzania, under the Big Result Now Initiatives, is implementing different projects for the purpose of increasing power generation, access to electricity and bringing reliable power to the citizens for economic growth. These projects are: Kinyerezi-I (150 MW); Kinyerezi-II (240 MW); Kinyerezi-III (600 MW); Kinyerezi-IV (330 MW); Mtwara (210 MW) and Singida Geo-Wind (150 MW). There is also the reinforcement of transmission infrastructure and the building of new transmission lines from Iringa-Shinyanga (400 kV); Singida-Arusha-Namanga (400 kV); Makambako-Songea (220 kV) and Lindi-Dar-es-Salaam (220 kV). These transmission projects require substantial capital to be realised, through Development Partners (DPs) and private sector participation.

Apart from these projects, the completed natural gas pipeline from Mtwara to Dar-Es-Salaam is projected to transport about 784 mmscfd, which will generate up to 3,9000 MW of electricity¹⁵. The gas pipeline will also supply gas for industrial uses like firing boilers for steam generation, feedstock, and also commercial and residential use. Due to huge discoveries of natural gas in the Ruvuma Basin, the government, in collaboration with private investors, has a plan to build (onshore) LNG and CNG plants for household and motor vehicle usage, respectively. All of this is the government's effort to bring modern energy and reliable power to its citizen for economic growth, and to make sure that the gas is used domestically to boost the economy. This natural gas can be used in smelting plants, cement and plastics industries, fertilizer production and other petrochemical industries. Table 2 below indicates on-going generation projects which will be implemented by 2030.

Type	Plant	Capacity (MW)	COD (year)
Gas	Kinyerezi-I	150	2015
	Kinyerezi-II	240	2017
	Kinyerezi-III	600	2020
	Kinyerezi-IV	330	2030
	Kilwa Energy-I	210	2017
	Kilwa Energy-II	110	2018
	Somanga Funga (TANESCO*)	8	2017
	Mtwara (IPP)	400	2018
	Zinga (IPP)	200	2018
	Mkuranga (IPP)	250	2018
	Mtwara (TANESCO*)	18	2018
Coal	Mchuchuma-I	600	2020
	Kiwira-I	200	2020
	Kiwira-II	200	2024
	Ngaka-I	200	2022
	Ngaka-II	200	2024
	Rusumo	300	2018

¹⁵ Visit, <http://www.skyscrapercity.com/showthread.php?t=1560227>

Hydro	Malagarasi stage-III	44.7	2020
	Rumakali-	222	2028
Wind	Singida Geo Wind	150	2030

*currently under operation but connected to local, isolated grids

Table 2: Ongoing Generation projects

4.3 Regional Interconnection Projects

Tanzania is a participating member in the Southern African Power Pool (SAPP) and the Eastern African Power Pool (EAPP). The goal is to establish cross-border electricity in Eastern and Southern Africa. In East Africa, the plan is to build a more than 1000 km high-voltage transmission line (400 kV) from Ethiopia, through Kenya, to Namanga in Tanzania¹⁶. Feasibility studies and environmental and social impact assessments have been concluded, and now the PPA is under negotiation. Table 3 below indicates transmission projects in Tanzania.

Name	Capacity (kV)	Distance (Km)	Year
Singida-Arusha-Namanga	400	414	2016
Kiwira-Mbeya	220	100	2016
Kasama (Zambia)-Mbeya-Iringa	400	540	2018
Shinyanga-Mwanza	400	140	2018
Geita-Nyakanazi-Rusumo	220	228	2018
Kihansi-Ruhudji-Mufindi	220	250	2025
Ngaka-Makambako	400	200	2017
Somanga-Lindi-Mtwara	220	358	2017
Mtwara-Songea	220	656	2021
Nyakanazi-Kigoma-Sumbawanga	400	808	2015
Mchuchuma-Mufindi	400	200	2018
Rumakali-Makambako	220	200	2020

Table 3: Electricity transmission line projects

Source: Ministry of Energy and Minerals, May, 2014

¹⁶ According to the Africa-EU Energy Partnership, "Status Report" Progress, Achievements and Future Perspectives. EUEI PDF 2014.

5 Overview of Tanzania's Energy Framework

The 2015 International Energy Charter encourages its members to participate in joint efforts aimed at facilitating and promoting market-oriented reforms and the modernisation of energy sectors in each member country. The signatories recognise the importance of entrepreneurs working within a transparent and equitable legal framework through the harmonisation of rules, regulations and standards in the energy sector. Signatories further acknowledge that the formulation of stable and transparent legal frameworks is necessary to create the conditions required for the development of energy resources for suitable development, and they recognise the need to formulate legislation wherever this has not yet been done.

5.1 Policy

The *National Energy Policy, 2003: The energy sector in Tanzania* is governed by the National Energy Policy (NEP, 2003). The first energy policy was formulated in April 1992. Due to changes in the energy sector and the overall national economy, this policy was revised and published in February 2003, and has been under revision again since 2014. The broad objective of the National Energy Policy is to ensure availability of reliable and affordable energy supplies and use them in a rational and sustainable manner to support national development goals. Specific objectives include: (i) enhancing the development of and utilization of indigenous and renewable energy sources and technology; (ii) adequately taking into account of environmental considerations for all energy activities; and (iii) increasing energy efficiency and conservation in all sectors. The main elements of the policy are: the development of domestic energy resources, economic energy pricing, encouraging private sector participation in the energy market, enhancement of energy efficiency and energy reliability.

Other key themes of the policy include the development of market economy for domestic energy, the institution of a clear regulatory regime for the energy sector to aid development, rectification of the unbalanced gender impact from inferior energy service, the development of a clear financial regime for the sector, and balancing revenue generation and the costs of service.

There are other policies which are available, including the Natural Gas Policy (2013), the Petroleum Policy (2014) and the local content Policy for Oil and Gas Industry (2014). These policies guide the development of the energy sector in Tanzania.

5.2 Energy legal framework

The EWURA Act (2001) became operational in 2006 with the establishment of the regulatory authority EWURA, the Energy and Water Utilities Regulatory Authority. The Authority was

empowered to: promote effective competition and economic efficiency; protect the interests of consumers; protect the financial viability of efficient suppliers; promote the availability of regulated services to all consumers including low income, rural and disadvantaged consumers; and enhance public knowledge, awareness and understanding of the regulated sectors¹⁷.

The Rural Energy Act (2005) established the Rural Energy Agency, 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. The Rural Energy Fund provides grants to TANESCO for decentralised distribution generation in rural areas. Correspondingly, it provides grants to project developers in rural areas.

The Electricity Act (2008) established a general framework for the powers of the Ministry of Energy and Minerals and the EWURA. It defined key parameters for EWURA’s tariff setting criteria and procedures, EWURA’s criteria for awarding provisional and permanent licenses, EWURA’s monitoring and enforcement activities, a requirement for ministerial plans and strategies for rural electrification, disputes resolution procedures and the process to determine the possible future re-organization of the electricity sector.

The Petroleum (Exploration and Production) Act (1980 – Cap 328 Revised Edition 2002) established the general operation of the petroleum industry in Tanzania, mainly in the downstream. It details provisions for importation, exportation, transportation, storage, and wholesale and retail distribution of petroleum and petroleum products in the Tanzanian market. The Minister is given the power to create a strategic reserve of petroleum products in order to ensure the consistency of supply in the country.

Generally, there are six main Acts in place which govern all activities of the energy sector in Tanzania. Below are some key highlights of the laws governing the energy sector in Tanzania, including the Petroleum (Exploration and Production) Act, the EWURA Act, the Rural Energy Act, the Electricity Act, the Petroleum Act and the Gas Supply Act.

Act	Highlights
Petroleum (Exploration and Production) Act, 1980 R.E 2002	<ul style="list-style-type: none"> (i) Exploration license for 11 years in three time extension periods (4, 4 and 3 consecutively) each with 50% relinquishment (ii) Establishment of Model Production Sharing Agreement (MPSA) (iii) Development of a license for 25 years plus additional 20 years for discovered area (iv) Establishment of petroleum fees for petroleum

¹⁷ EWURA, “Overview”, <http://www.ewura.go.tz/newsite/index.php/2012-03-07-08-18-03/overview>.

		development
	(v)	Prices for petroleum products shall be governed by the rules of supply and demand, subject to provisions of the EWURA Act and the Fair Competition Act
	(vi)	The Minister may create or manage strategic reserves of petroleum products in order to ensure reliability of supply
EWURA Act, 2001	(i)	Establishment of EWURA, as regulatory for electricity, petroleum, natural gas and water sectors
	(ii)	EWURA coordinates, finalizes tariff structure and provides licenses for generation, transmission and distribution
Rural Energy Act, 2005	(i)	Establishment of Rural Energy Board, REA and REF
	(ii)	Separates non-commercial electrification from TANESCO's mandate; commercial (mainly peri-urban) expansion remains under TANESCO
Electricity Act, 2008	(i)	The requirement to serve villages along transmission lines
	(ii)	The requirement for generator licenses (unless exempted by EWURA)
	(iii)	Requirement of the Minister to prepare and publish a policy for reorganization of the electricity market
	(iv)	Requirement of the Minister to prepare a rural electrification master plan and database
	(v)	Requirement to prepare SPPAs to attract investors in the power sub-sector
Gas Supply Act, 2012	(i)	Requirement for transportation, storage, distribution licenses and approval for construction of gas infrastructures
	(ii)	Requirement of the Minister to supervise the gas industry
	(iii)	Requirement of the Minister to establish the National Gas Information System (NGIS)
	(iv)	Establishment of a National Standard

5.3 Crosscutting Legislation

The *Public Private Partnership Act No. 18 of 2010* sets out the responsibilities and obligations of the parties, penalties, remedies, financial management and control requirements, assistance available from the public party, and dispute resolution. It established the Public Private Partnership (PPP) Coordination Unit within the Tanzania Investment Centre (TIC), and a PPP Unit under the Ministry of Finance.

Apart from the above, all energy investments and activities must adhere to the environmental, social and economic laws for sustainability of the environment and the project at large. In this regard, there are several guiding laws. These are the: Occupational Safety and Health Act (2003); Environmental Management Act (2004), and other Acts such as the Income Tax Act (2004), Business Registration Act (2007) and Tanzania Investment Act

(1997). Some other policies are the National Land Policy, 1997 and National Environmental Policy (1997).

To ensure coordination of foreign direct investment, the Ministry of Energy and Minerals is working closer with the Tanzania Investment Centre (TIC), which is the primary governmental agency that promotes, coordinates and facilitates investments in the country. TIC was established by the Tanzanian Investment Act (1997) and is a centre for all investors, with the authority to manage Public Private Partnerships. The PPP legislation has set a framework to build and operate transfer arrangements with private companies.

6 Energy Security of Supply and Universal Access

The 2015 International Energy Charter recognizes the importance of energy security, a concept that embraces the needs of energy producing, transit and consuming countries, as well as access to modern energy services that is based on environmentally sound, socially acceptance and economically viable policies. In order to achieve energy security, IEC signatories affirm the importance of freedom of movement of energy products and of developing an efficient international energy infrastructure in order to facilitate the development of stable and transparent trade in energy. In addition to this, signatories to the IEC highlight the importance of diverse energy sources and supply routes to enhance energy security.

Energy is a critical prerequisite for all sectors of the economy. It is an essential service, the availability and quality of which can determine the success or failure of development endeavours. The importance of energy as a sector in the national economy can therefore not be overemphasized. Due to this, Tanzania is struggling to bring modern energy to all by increasing electricity connection levels, deployment of renewable energies like bio-gas, LPG, natural gas, improved charcoal stoves, and coal briquettes for cooking and lighting.

To open up the market and bring competition in the industry and encourage foreign investment, the government plan is to increase electricity connection levels to 50% by 2025 and reach 75% in 2033, and bring reliable, affordable and efficient supplies of energy throughout the country. This will be done by implementing transmission and distribution reinforcement, as well as grid extension. Through this, the government of Tanzania identified some specific projects through the Power System Master Plan which could be implemented by the government, public private partnerships, and the private sector, as discussed in the previous chapter.

Tanzania, like other countries in sub-Saharan Africa, faces a shortage of energy, particularly in electricity and modern energy sources. Insufficient power generation capacities, as well as inadequate transmission and distribution networks, have made the situation worse. Investment in power generation, transmission and distribution in Tanzania is required to address the problems of low access to electricity, as well as technical and non-technical losses. The government is putting a lot of effort towards increasing access to electricity by implementing the different projects discussed in the previous sections.

As anticipated in section 3.1, estimated energy consumption in Tanzania is more than 54 million tonnes of oil equivalent and is dominated by biomass, which accounts to 88% of the mix. Commercial energy sources like gas, oil, electricity, LPG and non-renewable energies account for 12%. Electricity accounts for 3%, petroleum accounts for 8% and coal, solar and wind account for 1%. Tanzania relies on imported petroleum products, which account for about 3.0 million tonnes per annum for the transportation and industrial sectors, as well as

electricity generation. Electricity generation supplied to the national grid is based on a hydro-thermal mix.

As recorded on 5 August, 2014, total installed capacity was about 1,583 MW, which generated about 15.651 GWh, for a maximum power demand of 905.07 MW. Annual demand has been growing at a rate between 10 and 15%, although to date the access level is only 30%, where 19% is in urban areas and 11% is in rural areas. The number of households connected to the electricity grid is 24%. The annual per capita consumption of electricity is about 133 kWh, which is still extremely low compared to the world average of 2,500 kWh. The electricity connection (households) level target is 33% by 2015, during which the expected installed capacity for power generation will guarantee access to 3,000 MW. The government set an electricity access target of 50% by 2025, 75% in 2033 and 100% by 2040¹⁸. Generation access expansion depends on the Mtwara to Dar-es-Salaam natural gas infrastructure, which is the most critical bottleneck of the current electricity generation plan, since it will supply the fuel for most of the new power plants. The pipeline and its infrastructure construction have reached 99% of completion, and the planned date of commission is October 2015.

To increase energy supply security and affordability, the government is diversifying electricity generation to different energy sources like hydro, coal, wind, geothermal and solar. The Power System Master Plan indicates different projects which will be implemented for the period of 2012 to 2033. Reinforcement of transmission and distribution infrastructure is planned to reduce power losses from 19% in 2014 to 14% in June 2021¹⁹. Through the regulator EWURA, the government is currently undertaking a cost service study to come up with cost-reflective tariffs for electricity to provide electricity services at affordable prices to consumers while allowing the utility to maintain good services and quality of supplies for economic sustainability.

Regional integration is also considered to increase the security of energy supply. A number of regional transmission projects have been documented. Tanzania imports up to 16 MW of electricity, from Uganda (10 MW), Kenya (1 MW) and Zambia (5 MW), and transports crude oil from the Dar-es-Salaam's port to Ndola, Zambia. Nevertheless, the government has concluded and signed implementation agreements with the governments of Zambia and Kenya to build electricity transmission lines of 400 kV from Zambia, through Mbeya, Tanzania, to Namanga, Kenya²⁰.

¹⁸ Ministry of Energy and Minerals, Power System Master Plan 2012 Update, May 2013,

¹⁹ The United Republic of Tanzania Ministry of Energy and Minerals, "Electricity Supply Industry Reform Strategy and Roadmap 2014-2025", Dar es Salaam, June 2014.

²⁰ TANESCO Annual Report, 2014

7 Open Energy Markets

Under the 2015 International Energy Charter, open markets refers to the liberalization of the energy sector, and signatories agree to participate in joint efforts to facilitate and promote market-oriented reforms and modernization of the energy sector. The signatories also agree to promote open and competitive markets of energy products, materials, equipment and services, as well as to remove barriers to energy trade in a manner that is consistent with the provisions of the WTO Agreement and other international obligations. It is important to note that under the IEC, liberalization is not an obligation, but a principle that countries are encouraged to develop according to their national sovereignty and international strategy.

Within the context of the International Energy Charter, open markets imply having a competitive market for energy products, materials, equipment and services. It also includes transparent access to energy resources, removal of barriers, promoting the development and interconnection of energy transport, promoting access to capital, and facilitating the transit of energy. Tanzania opened its market to allow private sector participation, and private sector projects can play a big role in national development through the Public Private Partnership (PPP). Based on this, the government gives major consideration to private investment in hydropower generation to sustain isolated mini-grid systems in rural areas; integrate transmission and distribution extensions to an industrial anchor; create distribution reinforcements and grid extensions; and reduce power losses from 19% currently to at least 12% by 2017.

In Tanzania, economic and social reforms have been implemented since 1992, when the country changed its policies to allow foreign investment. Tanzania reformed its market and its regulations to allow foreign investment and to allow foreign and domestic private entities to establish and own business enterprises and engage in legal forms of remunerative activities. The Business Registration and Licensing Act established licensing regulations for business operations. It provides the right to freely establish private entities, to own property both movable and immovable, and to acquire and dispose of property, including interest in business enterprises and intellectual property. The Act stipulates that no business entity can enter into commercial activities in Tanzania before obtaining a business license through the Business Registration and Licensing Agency (BRELA). The government is now implementing the Business Activities Registration Act of 2007, which aims to reduce administrative barriers with one centralized licensing database.

7.1 Financier

Tanzania's financial system includes a banking sector with more than 20 commercial banks operating in the country. These banks are getting support from development partners to

increase financing opportunities for energy and energy efficiency projects. The World Bank is a champion of financial institutions in Tanzania, with an established US \$23 million credit line under TEDAP, accessible through commercial banks to finance renewable energy projects (refer to section 8.3). Public sector financing to TANESCO is done directly by both the government as well as multilateral and bilateral lenders and donors. TANESCO also borrows from banks for working capital. IPP, Emergency Power Plants (EPPs) and Small Power Producers (SPP) bring their own financing, both equity and debt, some of which is sourced externally.

7.2 Subsidy

The national grid in Tanzania does not cover all parts in the country, and currently the best way to overcome that is to supply electricity via off-grid, stand-alone generation or distributed generation. This is based on the fact that Tanzania has the sufficient renewable energy potential in solar, wind and mini-hydropower to generate an estimated 500 MW. This renewable energy potential will be considerably developed if the private sector is encouraged to participate in renewable sector investment, and this could be done if the government would put a national policy on electricity subsidies in place. Renewable energy sources are considered to be the best option for improving electricity supply security and environmental protection. The development of renewable energies depends on the government policies to promote them, through feed-in tariffs, capital subsidies and tax breaks.

Through the REA, the government is providing various grants to support renewable energy development. For example, the World Bank, through the TEDAP project, provides a subsidy of US \$500 per connection (described as performance grant) and a concessionary debt facility administered by the Tanzania Investment Bank²¹. Also, to supply electricity in Tanzania to off-grid communities through distribution generation (stand alone), the REA, through the Rural Energy Fund (REF), provides a 20% subsidy for home solar systems, with the remaining 80% paid by the system owner to develop the solar project. Through this project, in 2013 the government was able to provide electricity to more than 15,000 households in off-grid communities in Mwanza, Kigoma, Ruvuma and Rukwa. The government provides tax exceptions for imported photovoltaic systems since 2005, which have managed to increase from 100 kWp in 2005 to 5.3 MWp in 2015. In August 2014, the government, in collaboration with the World Bank through EWURA, hired a consultant firm to prepare the feed-in tariff mechanism for different sources of new renewable energy technologies, in order to motivate the private sector to invest further in the development of renewables in the country.

²¹ Africa-EU Renewable Energy Cooperation Programme, "The Mini-Grid Policy Toolkit", EUEI PDF, December 2014.

7.3 Renewable Energy

The government of Tanzania is making significant contributions towards the development of renewable energy in the country, by providing finance through the Rural Energy Fund, and technical assistance from qualified experts in the Rural Energy Agency for feasibility studies to make projects feasible and investable. Also, the REA, in collaboration with other international organizations, is offering technical experts to assist entities to develop renewable energy projects, from the initial to the final stage (commissioning). To facilitate development of renewable energy projects, the government also reduced the tax for imported products from abroad, and is offering performance grants to offset development risk for renewable energy projects.

Furthermore, Tanzania is the first country in Africa which has introduced the Standardized Power Purchase Agreement (SPPA) between project developers and the off-taker, TANESCO. This initiative involves more than 46.1 MW of electricity produced from renewables, which are operating on and off the grid (isolated grid) systems and are owned by private entities. Up to now, a total of eleven projects have been approved by the SPPA; four are mini-hydro projects with a combined capacity of 20.5 MW, the others are biomass powered projects. For example, 4 MW of the Mwenga hydropower is supplying the nearby rural villages, with the excess being sold to TANESCO. A good example of an off-grid enterprise is the Mawengi (300 kW) hydropower plant, which is supplying electricity to an isolated community through its own mini-grid. The other projects are supplying power to TANESCO's isolated grid, as well as directly to the communities. All of the other renewable energy projects which SPPA has signed will sell power to TANESCO and distribute electricity to local communities. Table 4 below shows the renewable energy projects which are operational and signed by SPPA with TANESCO, and the others with signed Letters of Intent to develop the projects.

Project Name	Technology	Capacity (MW)	Grid Connection
SPPA Signed			
TANWATT	Biomass	1.5	Main
TPC, Moshi	Biomass	9.0	Main
Mwenga, Mufindi	Hydro	4.0	Main
Ngombeni, Mafia, Island	Biomass	1.5	Isolated
Sao Hill, Mufindi	Biomass	6.0	Main
Symbion-KMRI, Tunduru	Biomass	0.3	Isolated
Symbion-Kigoma	Biomass	3.3	Isolated
St. Agnes Chipole, Songea	Hydro	7.5	Isolated
Next Gen. Solawazi, Kigoma	Solar	2.0	Isolated
EA-Power, Tukuyu	Hydro	10.0	Main
AHEPO, Mbinga	Hydro	1.0	Isolated
Total SPPA		46.1	

Letter of Intent (LOI) Signed			
Mapembasi, Njombe	Hydro	10.0	Main
Kikuletwa II, Kilimanjaro	Hydro	7.0	Main
Darakuta, Manyara	Hydro	0.9	Main
Mofajus, Mpanda	Hydro	1.2	Isolated
Tangulf, Nakatuta	Hydro	10.0	Main
Windpower, Mpanda	Solar	1.0	Isolated
Tosamaganga, Iringa	Hydro	0.8	Main
Total LOI		30.9	

*Table 4: Renewable energy Projects with SPPA or LOIs signed with TANESCO
Source: TANESCO and REA, March, 2014*

Tanzania and Europe have created a mutually beneficial partnership to develop renewable energy solutions, from large-scale wind and solar to innovative off-grid projects that can improve access to secure, reliable, affordable and sustainable energy. The Swedish government, through its agency, the Swedish International Development Agency (SIDA), has been assisting the government of Tanzania to facilitate rural electrification carried out by the REA. SIDA has been contributing a lot to the Rural Energy Fund for the implementation of rural energy projects. Another good example is that the government of Tanzania received a grant from the government of Austria through their renewable energy development agency to install solar container kiosks in rural areas. This project will supply fourteen (14) containers in total, that will be installed in the Rukwa, Katavi and Mwanza regions. One container will produce 15 kWh and will serve sixty (60) households, as well as public services (health centres, churches, mosques and public centres). By 20 December, 2014, a total of 840 households were already connected with this project. The latter will facilitate rural electrification of the areas which are not covered by the national grid. The government set the goal that by the year 2025, 50% of the population in rural areas which have no access to the national grid will be electrified by renewable energy power.

The World Bank, European Development Fund (EDF), KfW and other international organizations are providing grant capital to renewable energy projects in Tanzania through various funding windows. They also provide technical assistance, for example, by sending experts in geothermal development to Lake Ngozi in Mbeya. After witnessing the production of geothermal in Kenya since 2008, Tanzania and other East African countries are exploring and developing their own geothermal capacities. Notably, the development of geothermal is very expensive and challenging without a history of geothermal exploration, technical capacity and financial capability. Development Partners and the European Commission have showed interest to counter this problem by boosting technical capability, while also providing financial instruments that de-risk projects and ensure they get off the ground. The Geothermal Risk Mitigation Facility is an initiative of the African Union Commission, the German Federal Ministry for Economic Co-operation and Development, the European Commission and European-Africa Infrastructure Trust Fund, via KfW, devoted to reducing

private developers' risks in the development of geothermal and other renewable energy projects.

8 Sustainable Market

The 2015 International Energy Charter recognises sustainability of the energy market in terms of utilization of indigenous energy resources and the importance of renewable energy sources and energy efficiency. Signatories to the IEC acknowledge the importance of efficient systems in the production, convection, transport, distribution and use of energy for energy security, poverty alleviation, sustainable development and for the protection of the environment. They also agree to promote a more sustainable energy mix to minimize the negative environment consequences in a cost-effective manner by sharing best practices on clean energy development and investment.

8.1 Market sustainability

The Tanzanian market is a very stable market in terms of investment security and property rights protection. The country has not experienced any civil wars since its independence in 1961. After market liberalization in 1992, the country has made significant progress towards attracting foreign investment, and increasing funds are coming in due to investment incentives offered by the government and market stability. The government of Tanzania is aware that, by improving market sustainability, it will create investment and trade within the region and, at the same time, facilitate the financing of development projects. Meanwhile, the government is struggling to deploy infrastructure in order to open up the market for foreign investment. Also, stability of the market depends on the availability of electricity, and the government is building up electricity infrastructure and increasing power generation to sustain market demand.

The government of Tanzania is fully committed to utilizing natural gas for power generation in order to sustain demand requirements. Natural gas may be used to produce base-load/peak power, where new discoveries are increasing reserves and reducing prices.

Following discoveries in the Ruvuma Basin, estimated at around 150 TCF²², Tanzania is eager to develop industries, provide cheap electricity and create jobs. Based on the experience of the first successful gas pipeline project, from the Songo-Songo island to an electricity power plant in Ubungo, Dar-es-Salaam, as mentioned above, the government has completed the contraction of natural gas pipeline (36 inch) from Mtwara to Dar-es-Salaam (504 km). The pipeline is projected to supply 784 mmscfd, thus increase availability of gas for domestic power generation of more than 3000 MW, as well as provide for industries, motor vehicles (CNG), petrochemicals and household use. The route will be comprised of a 24 inch onshore

²² Africa-EU Energy Partnership, "Status Report" Progress, Achievements and Future Perspectives. EUEI PDF 2014.

pipeline (210 mmscfd) from the Mnazi Bay Processing Plant and another 24 inch (140 mmscfd) offshore pipeline from the Songo-Songo island that will join together to supply 784 mmscfd to Dar-es-Salaam. The natural gas pipeline infrastructure from Mtrwara to Dar-es-Salaam is shown in detail on Figure 7 below.

The existing pipeline (16 inch), is supplying 110 mmscfd under the Songas project, which is used for the generation of power in the Ubungo and Mikocheni areas, as well as industries, households and a CNG plant. Songas has a 20 years PPA with TANESCO, signed in July, 2004. Songas has been able to save \$1.8 billion since 2004, when it started operation, and they have even been willing to sell electricity at a cheaper rate of \$0.055/kWh due to the availability of domestic gas resources.

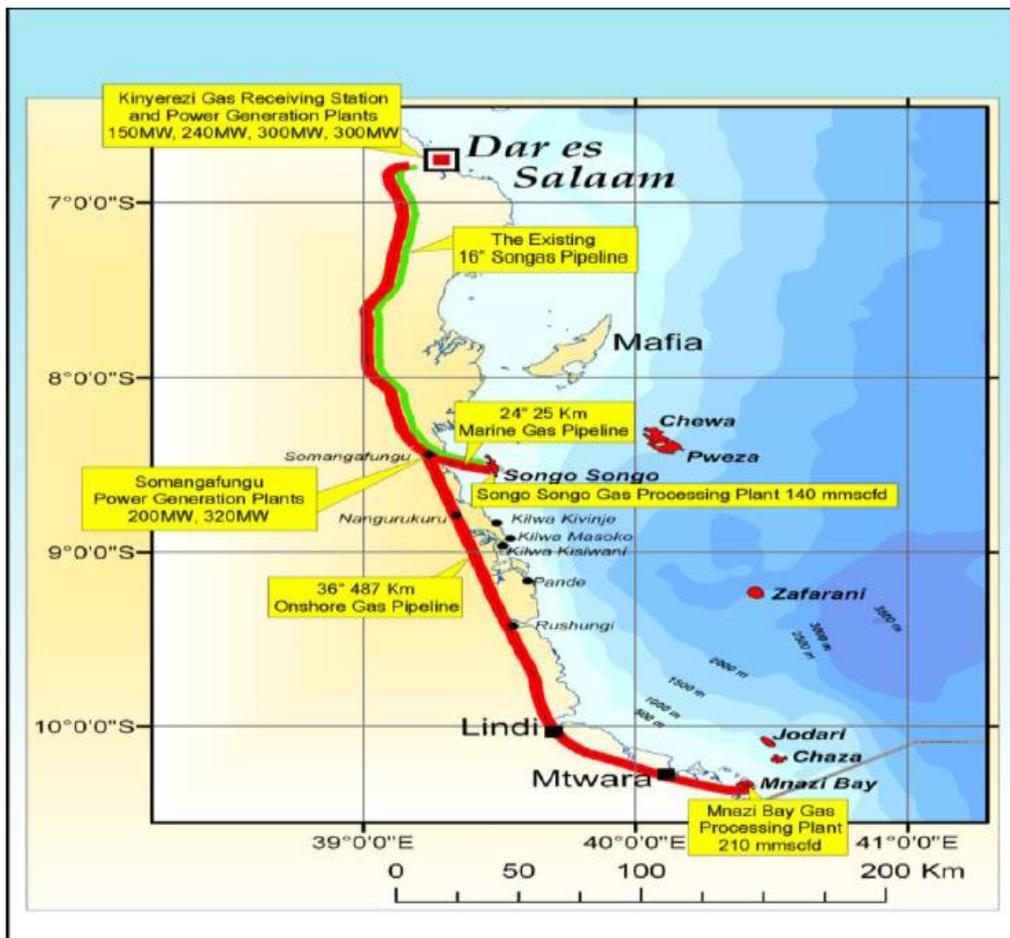


Figure 7: Natural Gas Pipeline Infrastructure
 Source: Tanzania Petroleum Development Corporation, January, 2015.

8.2 Sustainable energy Mix

The government of Tanzania recognizes that utilizing indigenous renewable energy has the potential of reducing risks of supply disruption, avoiding price shocks, improving the local and global environment, and increasing socio-economic development outcomes. Tanzania also has a unique opportunity, as it is blessed with a wide range of renewable energies to

propel its socio-economic development future by following a low-carbon path and utilizing fuel diversification in power generation by bringing reliable power supplies to its citizens. The government of Tanzania is aware that exploitation of renewable energy has the potential to contribute to the reduction of carbon dioxide and to promote access to modern energy services. Tanzania has taken some measures of mitigation and adaption for climate change, such as the National Adaption Plan for Action (2007) and the Sector Environmental Action Plan (2011-2016). The National Climate Change Strategy will integrate the climate change dimension into national policy programs, and the government in collaboration with the international community is committed to adopting a green growth pathway by increasing the share of renewable energy in the national energy mix. Nevertheless, Tanzania is an active member of the Africa Clean Energy Corridor (ACEC) Initiative²³, which aims to transform the current energy mix by promoting clean, indigenous, cost-effective renewables to support Africa's green economic growth. This initiative includes the mobilization of cost-effective renewable power options and the development of an enabling framework to attract investment for integration of a higher share of renewable energy into the transmission system network.

8.3 Energy Efficiency

Improving energy efficiency is often a more effective way of improving energy outcomes than increasing generation capacity. Energy saving measures that are applied by consumers decrease demand for electricity and improve economic outcomes by reducing costs. Efficient energy supply industries are financially sustainable and have lower tariffs for consumers. In carbon-intensive sectors, improved energy efficiency can considerably reduce emissions.

In Tanzania, the energy efficiency program is implemented by TANESCO and REA, and the Ministry of Energy and Minerals is facilitating the implementation of energy efficiency programs. The program is under REA and TANESCO through the Tanzania Energy Development and Access Project (TEDAP), which is financed by the World Bank through a US \$157.9 million IDA credit and a US \$6.5 million grant from the GEF to improve the quality and efficiency of electricity service in Tanzania and to establish a sustainable basis for energy access expansion. It includes \$113.7 million for TANESCO for urgent investment in the transmission and distribution network. REA received US \$44.2 million of the IDA credit and the GEF grant for an off-grid electrification component.

The IDA funds include a US \$23 million credit line to offer long-term financing, in Tanzanian shillings, for local commercial banks to on-lend to small renewable energy projects. The financing facility was in response to the severe difficulties the private sector faced in obtaining the long term financing needed to support off-grid electrification projects. The

²³ The ACEC initiative was endorsed by Ministers from the countries of the Eastern and Southern Africa Power Pools at the fourth IRENA Assembly in January, 2014 in Abu Dhabi.

objectives of the off-grid component were: to increase electricity access in rural and peri-urban Tanzania, establish a functioning institutional framework for commercially oriented, sustainable service delivery for rural electrification that can be scaled up, and exploit Tanzania's renewable energy potential.

To date, renewable energy-based electrification outcomes include TANESCO signing the Small Power Purchase Agreement with eleven (11) developers to supply more than 46 MW of power (currently three projects are supplying 24.5 MW to TANESCO's main grid), and TANESCO signing the Letters of Intent (Precedes SPPA) with another 6 developers for 31 MW of power. REA performance-based grant support to innovative mini-grid and stand-alone electrification ideas like the "Lighting Rural Tanzania" project will benefit more than a hundred thousand households. The REA has awarded additional grant funds to 60 mini-grid and stand-alone solar projects to electrify rural areas, and this will benefit more households.

9 Promotion and Protection of foreign investment

In recognizing the importance of energy security for energy producing, transit and consuming countries (regardless of their state of development), the 2015 International Energy Charter encourages cooperation to promote closer and mutually beneficial commercial relations and investments in the energy sector. Signatories agree to create a climate favourable to the operation of enterprises and to the flow of investments and technologies. In order to promote the flow of investment, signatories agree to make every effort to remove all barriers to investment in the energy sector and provide, at national level, for a stable transparent legal framework for foreign investment in accordance with relevant international laws and rules on investment and trade.

The 2014 World Bank's "Doing Business" report listed Tanzania as among the top 10 in the world that have made significant progress over the past few years to achieve and maintain macro-economic stability, becoming one of the best economic performers in Sub-Saharan Africa. It ranks 124 out of 189 economies. The United Republic of Tanzania is committed to attract foreign direct investment by creating a conducive environment for investors. Generally, there are no laws or regulations that hinder the participation of foreign investment in the country.

The Constitution of the United Republic of Tanzania of 1977 gives the right to own property as provided under Article 24, which states that:

"Every person is entitled to own property, and has a right to the protection of his property held in accordance with law. It shall be unlawful for any person to be deprived of the property for the purposes of nationalisation or any other purposes without the authority of which makes provision for fair and adequate compensation²⁴."

Based on Article 24 of the Constitution of the United Republic of Tanzania, everyone has the right to own a property but land ownership in the country is limited. All land belongs to the state. According to the Land Act of 1999 Revised Edition 2004, the right of occupancy can be bought, sold, mortgaged and leased by Tanzanians, and it could be made available to foreign investors on a leasehold basis for the period of up to 33,66 and 99 years.

The trend in private investment has been successful over the last ten years thanks to the government commitment to increase the role of the private sector in the energy market. A number of changes have been made to attract private investments such as the review of National Energy Policy of 1992, and the National Energy Policy (NEP 2003) that is currently under review. Other efforts include restructuring the electricity industry by enacting the Electricity Act in 2008, establishment of the Energy and Water Utilities Regulatory Agency (EWURA), Fair Competition Commission (FCC), Confederation of Tanzanian Industries (CTI), Fair Competition Tribunal (FCT) and the establishment of Tanzania Investment Centre (TIC).

²⁴ Constitution of United Republic of Tanzania enacted in 1977, as amended in 1998.

Furthermore, Tanzania has set to adopt the Malaysian development model of 'Big Result Now - BRN', a comprehensive model that will focus on six priority sectors including the energy sector. The aim is to prioritize and utilize the available resources for boosting the Tanzanian economic growth. On the other hand, the Tanzania Investment Centre (TIC) is a 'one stop shop' agency of the government to encourage, promote and facilitate investment²⁵. Other investment-related agencies are the Tanzania Revenue Authority (TRA)²⁶, Dar-es-Salaam Stock Exchange (DSE)²⁷, Business Registration and licensing Agency (BRELA), Fair Competition Commission (FCC) and et.al. The establishment of these investment agencies in Tanzania aims to mobilize the local and foreign investment, establishing a transparent and consistent legal framework that will guarantee investors protection, reliable socio-economic infrastructures as well as promoting the growth of exports.

In terms of investment incentives, Tanzania offers investment them in the form of lead and priority sectors²⁸ both in fiscal and non-fiscal form. For instance, the TIC offers the certificate of incentives when a whole investment or joint ventures project exceed a threshold of 300.000 USD for foreigners and not less than 100,000 USD for the locals. The certificate of incentive gives an investor capital deductions and allowances²⁹, tax concessions, access to land or right to transfer funds abroad³⁰, right to hire up to five expatriate employees without the review from Tanzanian government, protection from non-commercial risks³¹ as well as priority services³² on renewal for investment licenses, work and residence permits.

While Tanzania is thriving in improving its investment climate, on the other hand, the country has fuelled up its efforts in joining a number of International Organizations and several multilateral and bilateral agreements. To this end, Tanzania is a signatory of the World Trade Organisation (WTO), World Bank (WB), International Monetary Fund (IMF), Multilateral Investment Guarantee Agencies (MIGA), African Trade Insurance Agency (ATIA) and International Centre for Settlement of Investment Disputes (ICSID). All of these organisations in one way or another play a significant role in attracting and strengthening the flow of foreign direct investment in Tanzania.

Any disputes that might arise between the government and investors should be settled through negotiations or be submitted for arbitration. According to the Tanzania Investment

²⁵ TIC is also responsible for developing policies and programs that stimulates local export trade and improve investment climate.

²⁶ TRA is in charge of all tax laws and related issues and is a semi-autonomous government agency which was created in 1995.

²⁷ DSE is a company limited by guarantee without a share capital. Its mandate is to promote the conditions for the development of capital markets in Tanzania by licensing and regulating investment intermediaries and deals with evolving issues of trade and Securities.

²⁸ Lead sectors are agriculture, mining, infrastructure, power generation, telecommunications, water services and export processing zones. Priority sectors are air aviation, commercial buildings, commercial development and microfinance banks, export processing, geographical special development areas, human resources development, manufacturing, natural resources including fishing, rehabilitation and expansion, radio and television broadcasting, tourism and tour operations.

²⁹ Section 21(d) of the TIA 1997.

³⁰ Section 21(b) of the Tanzania Investment Act 1997.

³¹ Section 22 of the Tanzania Investment Act 1997.

³² Section 19(2) of the Tanzania Investment Act 1997.

Act of 1997 disputes may be submitted to arbitration through the following options: arbitration based on the laws of Tanzania; arbitration in accordance with the rules of procedure of the ICSID; arbitration within the framework of any bilateral or multilateral agreement on investment protection; arbitration in accordance with the World Bank and MIGA provisions or any other international mechanism for settlement of investment disputes agreed upon by the parties. In this regard, investments in Tanzania are guaranteed against nationalization and expropriation.

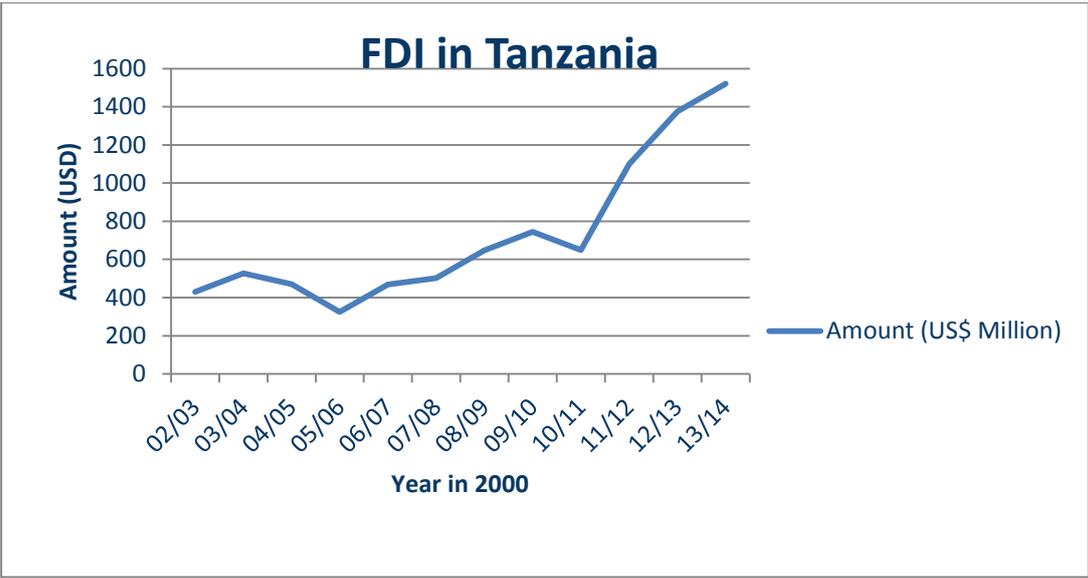


Figure 8: Foreign direct investment trend in Tanzania
Source: Bank of Tanzania (BOT) and Tanzania investment Centre (TIC)

10 Regional integration

The 2015 International Energy Charter firmly support its signatories enhancing regional cooperation in order to meet common energy challenges, acknowledging that enhanced energy trade is a powerful catalyst for strengthening regional cooperation for energy security. Members of the IEC agree to develop cooperation with regional organisations for sharing experiences and specific examples from national practice in the areas of sustainable development, access to modern energy services, energy poverty reduction, clean energy, energy efficiency, as well as the development and broader use of new clean technologies. Under the IEC, the freedom of movement of energy products, and the development of an efficient regional energy infrastructure, is essential to facilitate the development of stable and transparent trade in energy.

A regional energy integration policy was adopted by SADC³³ member states on 24 August, 1996 with the aim to use energy resources to support economic growth and development, alleviate poverty and improve the level of standard living throughout the SADC region. The SADC Protocol emphasizes the use of energy to promote collective self-reliance and create an atmosphere that fully provides participation of the private sector in the development of energy in the region.

In this regard, Tanzania is an active member of SADC and is a participating member of the Southern African Power Pool (SAPP) and Eastern African Power Pool (EAPP). The main goal is to establish cross-border regional electricity trading in Eastern and Southern Africa. Tanzania, in collaboration with neighbouring countries, is implementing regional electricity networking projects, for power trading within the region. SAPP, established in 1995, coordinates electric utility companies of its member states: Angola, Botswana, Lesotho, Democratic Republic of Congo, Mozambique, Malawi, South Africa, Swaziland, Zimbabwe, Zambia, Tanzania and Namibia. The Eastern Africa Power Pool is comprised of Tanzania, Kenya, Uganda, Burundi, Rwanda, Ethiopia and South Sudan. Tanzania aims to purchase 200 MW of electricity through the Zambia-Tanzania-Kenya (ZTK) power interconnector project, where Zambia's national grid is already interconnected in SAPP.

The ZTK project involves the construction of a 1600 km power transmission line, which will connect three countries (Zambia, Tanzania and Kenya). A 400 kV transmission line will be constructed from the Pensulo substation in Zambia to the Mwakibete substation in Mbeya, Tanzania, with a power transfer capacity of 400 MW, a reinforcement of the Mbeya-Singida transmission line of 400 kV, and a transmission line of 400 kV from Namanga in Tanzania to Nairobi in Kenya. The government is fully committed to implement the project and has already signed a tripartite intergovernmental Memorandum of Understanding (MoU) on 15 December, 2014, and a feasibility study has been conducted in 1995 and 2004 and reviewed

³³ Article 52 of 1998 ratifies the cooperation agreement in the area energy for the Southern African Development Community (SADC), member states.

in 2010³⁴. The World Bank and the African Development Bank (AfDB) are committed to provide the loan for this project and the three governments (Zambia, Tanzania and Kenya) are soliciting funds from different sources for project implementation. The government of Tanzania has already set aside 10% of total project costs. The project is expected to commence in 2018.

In the Eastern Africa Power Pool, the initial plan involves the construction of approximately 508 km of transmission of 400 kV between Tanzania and Kenya. The line will have a transfer capacity of up to 2,000 MW in both directions. On the other hand, the Kenya and Ethiopia interconnection line will allow for the interconnection of the Eastern Africa Power Pool to the Southern African Power Pool and later on to the Northern Africa through the East Africa Electricity highway. Presently, feasibility studies, environmental and social impact assessments have been concluded, and now the PPA is under negotiation between the governments of Tanzania, Kenya and Ethiopia³⁵.

³⁴ Africa-EU Energy Partnership, "Status Report" Progress, Achievements and Future Perspectives. EUEI PDF 2014, 2014.

³⁵ Eastern Africa Power pool (EAPP) and East African Community (EAC), "Regional Power System Master Plan and Grid Code Study", Final Master Plan Report Volume 1, May 2011.

11 Research and Technology Transfer

Signatories to the 2015 International Energy Charter recognize the need to promote research and technological cooperation amongst members. To this end, they agree to cooperate to enhance capacity building among signatories and mutual access to technical and economic data (as consistent with proprietary rights), to facilitate the exchange of technological information and know-how in the energy and environmental sectors. They also agree to promote cooperation to further research and development activities, encourage pilot demonstration projects, as well as encourage the application of technological innovations. In addition to this, signatories recognise the industry's role in promoting vocational education and training in the energy sector and agree to cooperate in such activities, including: professional education, occupational training, and the dissemination of public information on energy efficiency and renewable energy.

Tanzania has huge potentials of untapped energy in hydro, natural gas, coal, solar, wind, geothermal, uranium, oceanic wave and other new and renewable energy sources. These energy potentials require capital intensive and technological innovation to be harnessed in order to transform the national economy. Mutual cooperation between the government, development partners, foreign investors and non-governmental organizations is needed to conduct research and development in new and renewable energy technologies in order to bring reliable and efficient energy to the citizen.

Therefore, Tanzania is interested in promoting close cooperation with developed partners, as well as pursuing bilateral and multilateral cooperation efforts like the International Energy Charter (IEC) to develop the energy sector and enhance capacity building in energy security. Strengthening cooperation in renewable and alternative energy is essential, as well as promoting energy efficiency to reduce fossil energy dependency and fostering close cooperation in research and development of renewable and alternative energy sources.

11.1 Research and technology

The government of Tanzania is encouraging research and development in the energy sector, but this is limited by budget constraints. The Tanzania Commission for Science and Technology (COSTECH) is a driver for conducting research and technology innovation in Tanzania. COSTECH is a government institution established in the early 1990s for research in agriculture, energy, water and transport. Not only that, the Ministry of Energy and Minerals has been collaborating with the Department of Engineering of the university of Dar-es-Salaam, to conduct research on efficient cooking stoves and development of renewable energy in Tanzania. There are a number of universities and training institutions that build the human capacity required for the energy sector: these include the University of Dar-es-Salaam, the University of Dodoma, the Dar-es-Salaam Institute of Technology, the Mbeya Institute of Science and Technology, Arusha Technical College, Saint Joseph College of Engineering and

the Vocational Education Training Authority (VETA). REA is working with VETA in training technicians who will be able to maintain renewable energy projects, especially regarding solar home systems.

Furthermore, the government is working closer with non-governmental organizations and different energy stakeholders to conduct research and development. The Tanzanian Traditional Energy Development and the Environmental Organization (TaTEDO), the Tanzanian Renewable Energy Association (TAREA) and the Centre for Agricultural Mechanization and Rural Technology (CAMARTEC) are NGOs that have been conducting research on sustainable energy development since 1990. Others include the Tanzanian Engineering and Manufacturing Design Organization, WODSTA (efficient stoves promotion), Solar Innovations of Tanzania, AMKA Trust, and CARE-Tanzania³⁶. There are various organizations and dealers which provide services and equipment that engage in retail sales of products such as generators, turbines, solar home systems, and offer design, installation and repair services.

The Ministry of Energy and Minerals develops the capacity of their workers and offers scholarships to Tanzanian students who perform well in science subjects to study in different universities around the world. Finally, the government, through the Ministry of Energy and Minerals in collaboration with the Development Partners, offers scholarships to public servants who are working in the energy sector and related affiliations to pursue Masters studies in foreign universities.

11.2 Property rights

Tanzania is a signatory of the World Trade Organization (WTO) and TRIPS agreements. Available international property rights and related legal instruments are governed by the following Acts: The Fair Competition Act, 2008 (FCA) and Merchandise Marks Act Regulations, 2010. Tanzania's Fair Competition Commission (FCC) is actively combating intellectual property rights violations, but its impact is limited due to inadequate legal penalties for counterfeiters. The FCC is pursuing increasing the penalties for counterfeiters and reviewing Tanzania's law to combat intellectual property rights violations, and the FCC is amending its laws on the protection of IP rights to comply with international standards prescribed in the TRIPS Agreement and other international conventions.

³⁶ Tanzania Renewable Energy Association, "General Information, 2012", TAREA, <http://tarea-tz.org/index.php/membership/general-information>.

12 International cooperation

In regard to the principles of the UN Charter and to the outcome documents of various energy-related regional and international conferences, the 2015 International Energy Charter signatories are aware of obligations under major relevant multilateral agreements, of the wide range of international energy cooperation efforts, and of the extensive activities of existing international organizations in the energy field. Its signatories agree to enhance development of trade in energy consistent with major relevant multilateral agreements, such as the WTO Agreement and its related instruments, and to also affirm the importance of full access to adequate dispute settlement mechanisms, including national mechanisms and international arbitration in accordance with national laws and regulations and all relevant bilateral and multilateral treaties and international agreements.

Tanzania is signatory to various multilateral and bilateral agreements on the protection and promotion of investment, such as the WTO and the Multilateral Investment Guarantee Agency. MIGA is a World Bank affiliated agency dealing with issues guaranteed against non-commercial risks to enterprises that invest in member countries. Tanzania is a member of the Economic Partnership Agreement (EPA), the Africa Trade Insurance Agency (ATIA), and the International Centre for Settlement of Investment Disputes (ICSID). The ICSID was established under the auspices of the World Bank by the convention on the Settlement of Investment Disputes between States and Nationals of Other States.

Furthermore, Tanzania is a member of the Southern Africa Development Community (SADC), the Common Market for East and Southern Africa (COMESA), the East African Community (EAC) and a beneficiary country under the preferential trade enhancing scheme offered by the AGOA³⁷ legislation. Similarly, Tanzania enjoys benefits set by the European Union Everything But Arms (EBA) agreement, ACP-EU cooperation, and various bilateral cooperation agreements. Tanzania is a member of the World Bank Group that promotes foreign direct investment in developing countries by offering political risk insurance (guarantees) to investors and lenders, and by providing technical assistance to help developing countries attract and retain foreign investment. Given these memberships, generally investments in Tanzania are guaranteed against nationalization and expropriation.

Tanzania is a member of the East African Community (EAC), which signed a Trade and Investment Framework Agreement with the United States in July 2008³⁸. Under the U.S-EAC Trade and Investment Partnership Initiatives, the U.S. and EAC are seeking to expand trade, investment, and dialogue with the private sector. In November 2007, EAC member states signed an interim economic partnership agreement with the European Union, but as of 2015, the EU and Eastern African Community are still negotiating a comprehensive one.

³⁷ AGOA: African Growth and Opportunity Act, which allows African signatory countries to enjoy duty and quota free access to the USA market.

³⁸ U.S Department of State, "Investment Climate Statement-Tanzania, 2013", www.state.gov/e/eb/rls/othr/ics/2013/204744.htm.

comprehensive Economic Partnership Agreement³⁹. As of 2015, this has not been finalized and entered into force.

The Multilateral and Bilateral agreement signed by Tanzania, regarding investment and resources development is attached in Annex A.

³⁹ Visit, <http://ec.europa.eu/trade/policy/countries-and-regions/regions/eac/>

13 Added value of acceding to the IEC and ECT

13.1 At the political level

13.1.1 Political signal of the country to the international community

By signing the International Energy Charter, a country sends a political signal to the international community that it shares a number of international energy principles on trade, investment, transit and efficiency in such an important sector as energy. Since investment protection is the cornerstone of the Energy Charter, it would be a good chance for governments to send a message to the investor community of their endorsement of transparency and good governance. This would most benefit countries in unstable political situations and ones which seek to enhance their ties with some key countries from the Energy Charter constituency.

13.1.2 Effects of modernization of the Energy Charter Process

The world's energy interdependence has dramatically intensified over the last decade. Improved energy security with multiple economic, technological and environmental benefits could be derived from international cooperation in the energy sector. At the same time, potential interruptions to global energy supplies due to conflicts, volatile energy prices, lack of investment and other challenges have resulted in a more fragile global energy architecture. Such challenges require both national and international responses. Where the problems cannot be adequately addressed by a country acting alone, acting cooperatively at the international level becomes essential for a country to protect its own interests.

The International Energy Charter is going to play a major role in establishing common principles to promote long-term cooperation in the energy sector based on mutual benefits. The institutional benefits of signing the IEC include, but are not limited to, the following:

- The IEC provides inspiration and motivation to pursue energy security for all, including producers, transit and consumer countries, as well as universal energy access.
- Signing the IEC means joining an established international framework of long-term cooperation in the energy sector.
- The IEC is a policy, but not a legally binding, framework, that allows a country to strengthen energy security, promote access to energy resources and new markets, facilitate access to finance, and benefit from experience exchange and multilateral cooperation on sustainable development of the energy sector.

13.2 At the strategic level

13.2.1 Promotion of energy investments and trade

By signalling its willingness to engage seriously in a dynamic political process resulting in the International Energy Charter, as well as its ability to agree on a strategic, forward-looking document, a country demonstrates that it considers the Energy Charter Process and its tools as instruments of its choice. Thus, signature of the International Energy Charter demonstrates to international investors that a country commits to the principles of secure investment. In this way, such state becomes a more attractive destination for international investment, while, at the same time, being able to use the International Energy Charter as a reference tool for its own energy investment and trade initiatives.

13.2.2 Engagement in multilateral cooperation and good governance

It is difficult for countries to find isolated solutions to complex and interlinked energy challenges, which know no borders. International cooperation is imperative to find effective, lasting and mutually beneficial solutions. The Energy Charter has a broad membership, involving developed, developing, energy exporting, importing and transiting countries. Signing the International Energy Charter will allow the signatory's representatives to assemble under the Energy Charter Ministerial Conference and Working Groups, which could serve as a platform for building relationships and sharing of information related to the challenges faced in the energy sector. Challenges concerning security of supply, competitiveness and climate action should be solved through a common approach, for which the International Energy Charter will play an important role. Signatories to the International Energy Charter will acknowledge this common approach publicly, without any legal commitments.

13.2.3 Influential and confident position within the Energy Charter Process

Engagement in the International Energy Charter is an open and inclusive process. About 70 countries and organizations have adopted the Charter but only 52 countries and organizations have ratified the treaty. The text reflects today's global energy challenges and international policy objectives. The openness of the International Energy Charter to new countries enhances the confidence and ownership of those countries in the Energy Charter process.

13.3 At the practical level

13.3.1 Observer status in the Energy Charter Conference

Signing the International Energy Charter automatically grants an observer status, which will make it possible for new countries to attend meetings of the Energy Charter Conference, without a right to vote⁴⁰. Furthermore, observer countries will have the possibility to attend official meetings of subsidiary bodies on the political and expert level, in the capacity of observers with a right to speak.

If the necessary funding is provided, observers may benefit from activities of the Energy Charter Secretariat like forums, executive training programmes, energy efficiency reviews or reports on investment climate and market structure. Observers may be invited to send seconded experts and trainees to the Secretariat in Brussels, in view of deepening their engagement in the process of applying the principles of the International Energy Charter and considering the adoption of the Energy Charter Treaty.

13.3.2 Getting familiar with the Energy Charter Treaty

The Energy Charter Treaty is unique so far as it provides a legally binding framework for energy cooperation for a large and diverse membership⁴¹. However, it is apparent that accession by new countries to the Treaty is not something that can be achieved overnight. For new members sharing the principles of the International Energy Charter, it is imperative to thoroughly analyse the provisions of the Energy Charter Treaty before committing to further steps. Signing the International Energy Charter can only be the beginning, that does not pre-empt in any way the decision of a state to accede to the Energy Charter Treaty. As observers to the Energy Charter Conference, non-members will however have the opportunity to learn more about the Treaty, its benefits and obligations, and will cooperate closely with the members to that end. This will enable them to make an informed decision about possible further steps⁴².

13.3.3 Possibility to initiate the Early Warning Mechanism

Countries signing the International Energy Charter are automatically granted a right to initiate the Early Warning Mechanism (EWM). Its aim is to provide a non-binding framework for preventing and overcoming emergency situations in the energy sector related to the

⁴⁰ Observer status is not defined in the Energy Charter Treaty. For this purpose, a Working Group on Procedural Issues was established at the 24th Meeting of the Energy Charter Conference in Astana.

⁴¹ The ECT was signed in December 1994 and entered into force in April 1998. To date the Treaty has been signed or acceded to by 54 contracting parties, including the European Union.

⁴² A state or regional Economic Integration Organisation that wishes to accede to the Energy Charter Treaty is required to be a signatory of the 1991 European Energy Charter, the original political declaration that is expected to be adopted together with the Energy Charter Treaty.

transit and supply of electricity, natural gas, oil and oil products through cross-border grids and pipelines⁴³. Parties can refer to it, voluntarily, on a case-by-case basis. It will be complementary to other mechanisms for early warning and dispute resolution agreed bilaterally between individual parties. The EWM would help to resolve energy conflicts and thereby enhance energy security for energy producing, consuming and transit countries.

⁴³ Article 2.1 of the Model Energy Charter Early Warning Mechanism, CC 501, 5 November 2014.

14 Conclusions and recommendations

14.1 Challenges

The energy sector in Tanzania faces a number of challenges, which need to be addressed in order to move Tanzania to a higher level of economic development. These include:

- i. Lack of financial capital, specifically, allocation of funds that are set for the energy sector are not enough to develop the available energy resources.
- ii. Unreliability of power supply due to demand growth and unmaintained transmission and distribution infrastructure.
- iii. The need for increased access to electricity and modern energy in urban and rural areas, for contributing to the living standard of the people, industrialization and economic welfare.
- iv. Limited energy infrastructures, which require intensive capital and technology for development.
- v. Unplanned cities and scattered settlements, which hinder development of energy infrastructure.
- vi. The level of development is low, thus making it difficult for Tanzania to become a destination for efficient energy markets.

14.2 Open issues

Many programs and actions are being considered by the government of Tanzania in order to make the energy sector more attractive and dynamic for investment, thereby contributing to more sustainable, socio-economic growth for the country.

In 1992, Tanzania, like many other developing countries, undertook various socio-economic reforms, including in the energy sector. In the same year, the National Energy policy was formulated, and opened the energy sector (especially the electricity supply industry) to the private sector. The energy industry in Tanzania has been partially liberalized since 1992, when the government changed the National Energy Policy to allow private investors to enter the sector.

Over the past two decades, the electricity supply industry in Tanzania faced enormous challenges including: capacity shortage and backlogged investments; the need to attract private sector investment in the electricity subsector; increasing connection and access to electricity levels; increasing security and reliability of power supply; reducing technical and non-technical losses; diversifying power generation sources; and improving TANESCO's

financial performance. Since 1992 the government of Tanzania has been implementing various reforms to address the electricity subsector challenges and create investment opportunities in the energy sector.

To implement the electricity industry reforms, the government of Tanzania developed strategies through comprehensive consultation with key energy stakeholders and reviews of existing institutional setups, relevant policies and laws. The strategy recommends gradual unbundling of the state-owned utility into independent generation, transmission and distribution companies, with much emphasis on private sector participation in the entire supply chain (with exception of the transmission segment). To implement these strategies, a roadmap has been established which provides detailed activities that are necessary for reforms to be smoothly implemented. The following are some recommendations that should be adhered to by the government of Tanzania to attract adequate foreign investment, increase energy security and efficiency, and increase universal access to modern energy for all. The recommendations are based on the analysis of Tanzania's energy market with regard to the International Energy Charter's key principles.

On the other hand, the renewable energy market in Tanzania is underdeveloped. The government introduced a matching grant for renewable energy projects in rural area connections, and now is drafting a feed-in tariff mechanism in order to encourage further investment. This feed-in tariff will be guaranteed by the public company TANESCO, the main electricity transmitter and distributor in the country.

14.3 Recommendations

Tanzania's main policies and strategies for energy sector development are in line with the principles of the International Energy Charter. Considering that Tanzania has huge and diversified potentials of untapped energy, and that substantial FDIs are required for its development, Tanzania is in a good position to begin the process of adoption of the International Energy Charter. Further support for this is based on Tanzania's continued work towards creating favourable conditions for liberalisation of the energy market, which provides a series of incentives for investors (including tax benefits and expatriation of profits, just to name a few).

The national constitution provides for non-discrimination and, as a member of the WTO, Tanzania already follows the main principles of the International Energy Charter. As a result, Tanzania meets the basic conditions to adopt the International Energy Charter and become an observer of the Energy Charter.

Observership is a “light” form of participation in the Energy Charter process⁴⁴. It offers interested non-members the possibility to become more familiar with the Energy Charter Treaty, to establish formal contacts with member countries and other observers, and participate in the international fora for energy dialogue established by the Energy Charter. Observers do not have any legal obligations under the Energy Charter Treaty. In particular, they do not have to contribute to the budget of the Organization. Observership may be – although not necessarily – a transitional phase towards full membership.

As an observer, Tanzania would be subject only to a political commitment, pledging to move in the same direction with the principles of the International Energy Charter and its sector policies, including legal reform.

It is also recommended for a number of actions to be taken before the accession of Tanzania to this initiative:

- i. Conducting a workshop in Dar-es-Salaam organized by the Energy Charter Secretariat, involving all energy sector stakeholders, in order to further develop the principles of the International Energy Charter. This workshop would allow other entities in the energy sector to become more familiar with the International Energy Charter and the Energy Charter Treaty, and provide a platform where stakeholders will be able to share their ideas and experiences regarding the Energy Charter.
- ii. Receiving the legal opinion from the legal section of the Ministry of Energy and Minerals will be important in the process to signing the International Energy Charter. Although the International Energy Charter is just a political declaration without any legal or financial obligation, it is a necessary requirement for this type of membership.
- iii. The first contact between Tanzania and the Energy Charter Secretariat was in July 2014, through the Tanzanian Embassy, Permanent Mission to the Kingdom of Belgium, The Netherlands, and the European Union. At this time, the country’s interest in knowing more about the Energy Charter Process was expressed.

It is also recommended that the Energy Charter Secretariat expands its initiative to more countries in the southern African region, given that there is a Protocol of Cooperation at the level of countries in Southern Africa (SADC) that includes cooperation in the fields of trade and energy sector investment. There is a convergence of the main objectives and principles of SADC and the International Energy Charter.

As a signatory of the International Energy Charter, Tanzania will have the opportunity to extend its participation in the international platform for cooperation on energy and benefit from a wide range of opportunities, including:

⁴⁴ The Energy Charter Treaty, “A Reader’s Guide”, Energy Charter Secretariat, Brussels.

- i. Cooperation on technological development and innovation activities in the fields of production, conversion, transmission, distribution and the efficient and clean use of energy, taking into account their obligations and nuclear non-proliferation commitments.
- ii. Programs and activities in research and technological development, particularly dissemination and exchange of relevant information and transfer of know-how on technologies such as energy efficiency and renewables. The relevance of this to Tanzania has been higher in recent years due to survey of the country's renewable energy potential and the importance it has on rural electrification in remote areas of the country.
- iii. Institutional training programs for staff linked to the energy sector in various policy areas, which may extend to academic institutions (that is, vocational, technical and/or higher education institutions) in Tanzania.

Besides that, the International Energy Charter respects the sovereignty of each state over its energy resources, as well as the right to regulate the transmission and the transport of energy in their territories, respecting all relevant international obligations. In the spirit of political and economic cooperation, the International Energy Charter promotes the development of efficient, stable and transparent energy markets, regional and global energy cooperation based on the principle of non-discrimination and commercial-based pricing, taking into account environmental concerns and the role of energy in the national development of each country.

As a signatory of the International Energy Charter, Tanzania will be engaged in the implementation of the general principles of the International Energy Charter, which will culminate in the development of two reports prepared by officials seconded to the Energy Charter Secretariat, sent by the government of Tanzania, covering the following themes:

- i. Market Structure and Investment Climate Report; and
- ii. In-Depth Report on Energy Efficiency in Tanzania.

Expansion of the International Energy Charter to more countries in the region is an important step that needs to be implemented. Tanzania is already an integrated country within the SADC and EAC regions, and it would be advantageous that the adoption of the International Energy Charter could be taken into consideration by all the member countries in the SADC and EAC. This would facilitate further convergence of energy policies in light of the basic principles of the International Energy Charter on an international level.

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Annex

Annex 1: Multilateral and Bilateral investment treaties signed by Tanzania

Parties	Status	Date signed	Date of entry into force	Clause related to Energy	State Arbitration
MULTILATERAL INVESTMENT TREATIES					
European Union (EU) and SADC	Signed	22/01/2009		Rules of cooperation in trade in goods, supply-side competitiveness, business enhancing infrastructure, trade in service, trade related issues, trade data, institutional capacity building, fiscal adjustments. Facilitation of transit movements is regulated in Article 40. Energy is not priority sector to its appendixes	NA
EAC and USA	In force	16/07/2008	16/07/2008	NA	NA
SADC Investment Protocol (SADC)	In force	18/08/2006	16/04/2010	NA	NA
Cotonou Agreement (ACP and EU)	In force	23/06/2000	01/04/2003	According to Article 23, cooperation will develop mining and energy sector, encouraging private sector involvement and development There is no rules regarding investment protection or promotion	NA
EAC Treaty (EAC)	In force	30/11/1999	07/07/2000	Article 101, regarding policies and mechanisms to promote the efficient exploitation, development, joint research and utilization of various energy resources available within the region	
SADC Treaty (SADC)	In force	17/08/1992	30/09/1993	NA	NA
AU Treaty (AU)	In force	03/06/1991	12/05/1994	Chapter IX, regarding energy and natural resources promotion, according with the protocol on natural resources	NA
BILATERAL INVESTMENT TREATIES					

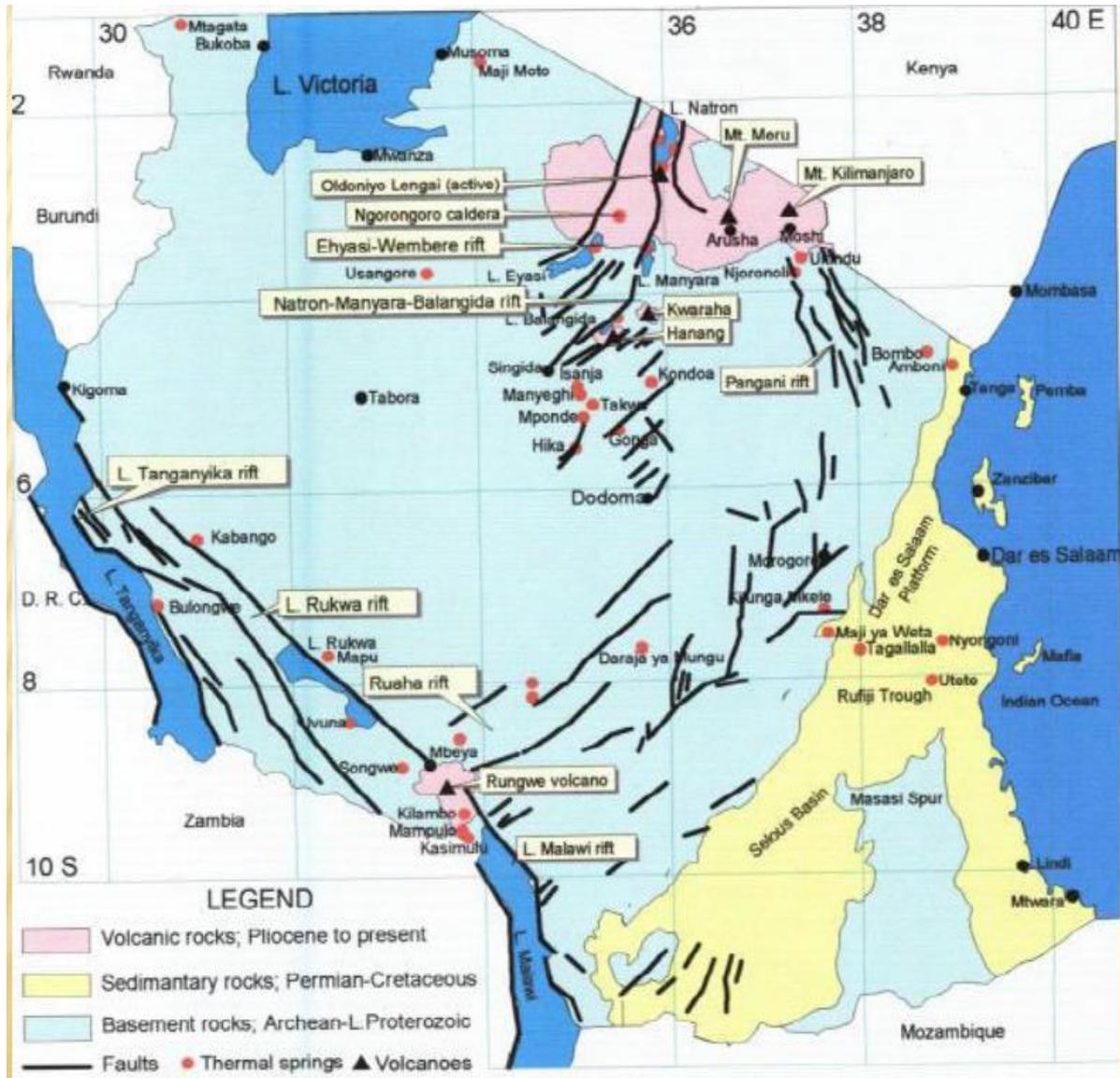
Canada and URT	In force	17/05/2013	09/12/2013	Applicable to all investment, according to Article 1 definition Survival clause: 10 years	Section C: -Consultations prior to arbitration (article 21) -Cooling off period: 6 months (Article 21) -ICSID, ICSID additional facility, ad hoc tribunals under UNCITRAL rules (Article 23)
China and URT	Signed	24/03/2013			
Denmark and URT	In force	22/04/1999	21/10/2005	Applicable to all investments, according to Article 1(1) definition. It explicitly includes exploration and exploitation of natural resources Survival clause: 10 years	Article 9: -Amicably settlement prior to arbitration -Cooling off period: 3 months -ICSID, ad hoc tribunals under the UNCITRAL Rules
Egypt and URT	Signed	30/04/1997			
Finland and URT	In force	19/06/2001	30/10/2002	Applicable to all investment, according to Article 1(1) definition. It explicitly includes exploration and exploitation of natural resources Survival clause: 15 years	Article 9 -Amicably settlement prior to arbitration -Cooling off periods: 3 months -ICSID, ICSSID additional facility, ad hoc tribunals under UNCITRAL Rules
Germany and URT	In force	30/01/1965	12/07/1968	Applicable to all investment, according to Article 8 definition. It explicitly includes exploration and exploitation of natural resources Survival clause: 20 years	NA
Italy and URT	In force	21/08/2001	25/04/2003	Applicable to all investment, according to Article 1 definition. It explicitly includes exploration and exploitation of natural resources	Article 8: -Consultations and negotiations prior to arbitration -Cooling off period: 6 months

				Survival clause: 20 years	-Fork in the road provision -ICSID, ad hoc tribunals under UNCITRAL Rules
Jordan and URT	Signed	08/10/2009			
South Korea and URT	Signed	18/12/1998			
Kuwait and URT	Signed	17/11/2013			
Mauritius and URT	Signed	04/05/2009		Applicable to all investment, according to Article 1(1) definition. It explicitly includes exploration and exploitation of natural resources Survival clause: 10 years	Article 8: -Negotiations prior to arbitration -Cooling off period: 6 months -Fork in the road provision -ICSID, ad hoc tribunal under UNCITRAL Rules
Netherland and URT	In force	31/07/2001	01/044/2004	Applicable to all investment, according to Article 1(a) definition. It explicitly includes exploration and exploitation of natural resources Survival clause: 15 years	Article 9: -Settlement by conciliation or arbitration -ICSID
Oman and URT	Signed	16/10/2012			
South Africa and URT	Signed	22/09/2005			
Sweden and URT	In force	01/09/1999	01/03/2002	Applicable to all investments, according to Article 1(a) definition Survival clause: 15 years	Article 7: -Amicably settlement prior to arbitration -Cooling off period: 6 months ICSID, ad hoc tribunals under UNCITRAL Rules -Enforcement under ICSID and New York Conventions.
Switzerland and UTR	In force	08/04/2004	06/04/2006		
Turkey and URT	Signed	11/03/2011		Applicable to all investment, according to Article 1(1) definition. It explicitly	Article 10: -Amicably settlement prior

				includes natural resources Survival clause: 10 years	to arbitration -Cooling of period: 6 months -Fork in the road provision -ICSID, ad hoc tribunals under UNCITRAL Rules.
UK and URT	In force	07/01/1994	02/08/1996	Applicable to all investment, according to Article 1(a) definition. It explicitly includes exploration and exploitation of natural resources Survival clause: 20 years	Article 8: -Local remedies prior to conciliation or arbitration -Cooling of period: 6 months -ICSID
Zimbabwe and URT	Signed	03/07/2003			

Source: UNCTAD, 2014

Annex 3: Geothermal Development and location



Source: Ministry of Energy and Minerals, 2012



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