
EMPOWERING
TANZANIA
Energy for Growth and
Sustainable Development

Introduction

Sustainable energy is central to addressing the challenge of poverty reduction and to ensure inclusive, equitable and climate-friendly economic growth. Universal energy access has been high on the international agenda and has been recognised as an UN Sustainable Development Goal for the period until 2030. Ensuring access to affordable, reliable, clean and modern energy is a key area of European Union engagement with the global South.

Access to energy is a critical element to empower people. The absence of electricity supply in schools or offices (for light, use of computers), clinics (refrigeration of medicine, disinfection of tools), for water supply facilities, for engines in workshops, for telephone chargers, televisions, radios and household appliances, can render daily life challenging.

Sustainable Development Goal 7

Energy - Ensure access to affordable, reliable, sustainable and modern energy for all:

- By 2030, ensure universal access to affordable, reliable and modern energy services
- By 2030, substantially increase the share of renewable energy in the global energy mix
- By 2030, double the global rate of improvement in energy efficiency

Providing Universal Energy Access

The energy sector in Tanzania is currently still characterised by low electricity access rates and reliance on biomass use for household consumption (fuel wood and charcoal account for some 90% of the total energy use). Despite a significant increase in the number of connections over the last decade (7.5 % on a yearly basis), the number of customers served by the power utility TANESCO remains under 1.5 million (for a population of over 45 million people) and electricity consumption is at approximately 100 kWh per capita per year. The available power generation capacity currently stands at approximately 1 500 MW, consisting of roughly 1/3 hydro, 1/3 natural gas, 1/3 other thermal generation. Renewable energy resources such as solar, wind, geothermal, co-generation from biomass and small hydropower currently only contribute to a small amount of the national power supply. The potential of renewable energy resources is very high, particularly for geo-thermal energy.

Tanzania has adopted a long-term strategy, the **National Development Vision 2025** implemented through **Five-Year Development Plans**, with the objective of meeting the needs of the fast growing population and lift the country out of poverty. It is estimated that power supply generation capacity will have to increase to some 10 000 MW to sustain the economic growth required to transform Tanzania into a middle income country by 2025. These plans also include the objective of increasing access connectivity rates to 75 % until 2025.

Energy Potential in Tanzania

- **Discovered Natural Gas (55.6Tcf)**
- **Hydropower (4700 MW)**
- **Coal (1.9 bn tons)**
- **Uranium oxide (24,550 tons)**
- **Wind (5-9 m/s)**
- **Biomass (500 MW)**
- **Solar (insolation 4-7/kWh/m^2 per day)**
- **Geothermal (5000 MW)**

To achieve these goals, investments will be required in generation, transmission and distribution infrastructure. Tanzania plans to increase power generation primarily with more natural gas but also with hydro, coal and renewable energies. In order to attract the required capital, the country has embarked on an ambitious programme of reforms aimed at increasing efficiency and service delivery and create conditions for greater financial sustainability and private sector investments.

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

The ESI Reform strategy foresees the restructuring of the power utility and progressive separation (unbundling) of the generation, transmission and distribution business segments into separate companies. This will go hand in hand with the establishment of new independent bodies to manage power systems and market operations. The restructuring of the electricity supply industry aims at improving governance and performance to allow for sustainable socio-economic transformation anchored in active participation of the private sector.

The intended major outcomes of the ESI Reform Strategy are:

- increased efficiency, quality services and goods;
- availability of affordable power;
- satisfaction of clients, of business partners and their shareholders;
- increased transparency and opening of the sector for competition;
- reduced subsidies in the electricity sub-sector.

How the EU supports the Energy Sector

For almost a decade now, the EU has joined forces with Tanzania to fight against energy poverty. It has promoted the introduction of innovative approaches for decentralised solutions to energy supply based on renewable sources, as well as grid development and new connections in rural areas. Support has also entailed activities to strengthen capacities of key stakeholders in the sector, in rural electrification planning and policy, as well as regulatory reforms. The EU continues to work closely with the Ministry of Energy and Minerals (MEM), the Rural Energy Agency (REA), the regulatory authority EWURA and the power utility TANESCO.

Several EU member states have a long standing involvement in the sector, in particular **Sweden, Germany, France, Finland, the United Kingdom and the Netherlands**, who have also been active through technical and financial assistance programmes. The EU Delegation, EU member states and other key development partners meet regularly in the framework of the **Energy Development Partner Group** (EDPG) to coordinate their actions.

The EU in cooperation with its member states delivers its cooperation through grant financing to project developers or public institutions, as well as through the blending of grants with other types of funding, such as loans or equity to maximize financing for priority projects.

Electrification of North-Western Tanzania

The German Ministry for Economic Co-operation and Development through the German Development Bank (KfW), the French Agency for Development (AFD), and the EU have pooled resources totalling approximately EUR 42 million to the Government of Tanzanian for the electrification of large areas of North-Western Tanzania, including the regions of Kagera, Geita and Kigoma. The project is expected to be completed in 2019.

The project entails:

- The construction of a 220 kV transmission line from Geita to Nyakanazi
- The construction of a new substation at Nyakanazi
- The extension of the Geita substation
- The rural electrification of about 30 villages in the Geita district, Biharamulo and Chato districts in the Kagera region and the Kakonko district in the Kigoma region
- Interconnection of the future Rusumo hydropower plant to the national grid as a sustainable power generation source
- Support to cost-efficient intra-regional power trade between Tanzania and its neighbouring countries Rwanda and Burundi (and eventually Uganda)

Under the EU-funded Rural Electrification Component the expected project results are:

- Approximately 10 000 new connections to the national grid and around 6 500 households presently reliant on diesel generation benefiting from more reliable grid electricity
- Approximately 116 000 beneficiaries (of which around 38 000 are below the poverty line) with improved access to social services through electricity access
- Access to grid electricity for approximately 50 public service institutions and approximately 360 small businesses
- Decommissioning of two TANESCO bulk diesel generators in Biharamulo and Kibondo with significant TANESCO cost savings and CO_2 emission reductions

Backbone Transmission Line Iringa-Shinyanga

With a EUR 109 million loan to the Government of Tanzania supported with interest rate subsidies by the EU under the **African Infrastructure Trust Fund**, the **European Investment Bank** (EIB) has contributed to the construction of the 667 km **Iringa-Shinyanga** high voltage transmission line in the framework of TANESCO's strategy for national grid transmission line reinforcement. The new line will connect the south and southwest of Tanzania to the load centres in the north, which are experiencing a fast increase in electricity demand. The 400 kV line also represents a key segment of the regional power system interconnection among Kenya, Tanzania and Zambia. The KTZ Tanzania and Zambia interconnector will link the Eastern African and the Southern African Power Pools and greatly contribute to regional power trade.

Empowering Women and Children

Access to energy and safe electricity is closely linked to gender equality and child-protection. The lack of reliable and safe access to energy too often forces women and children to spend most of their day performing basic activities including time-consuming and physically draining tasks of collecting biomass fuels or water. Fighting energy poverty therefore also means to fight against gender discrimination and to promote women empowerment and child-rights.

Mama Shigella started her business back in 1997 when she built her first cooking stove. She was appointed to be one of the entrepreneurs under the EU funded "Developing Energy Enterprises Project" East Africa (DEEP), which started in 2007. Through training courses and workshops, Mama Shigella made improvements to the cooking stove and developed a business plan to scale up the production. Today Mama Shigella can produce up to 7 improved cooking stoves per day, and she sells on average more than 60 pieces per month. The income that she has gained through her business has enabled her to help her children to gain a proper education, improve her family's house and build two houses for other family members. The improved cooking stove is claimed to consume only 20% of the wood fuel that a conventional stove would use. The stove also allows the usage of charcoal briquettes. Mama Shigella produces the improved cooking stove in various sizes and qualities and the price ranges from 5 000 to 25 000 TZS.

Combating Climate Change

One of the main objectives of EU actions has been the promotion of climate friendly energy alternatives. This has been pursued both under dedicated programmes such as the "EU Rural Energy Programme", the "EU-ACP Energy Facility" and as part of the "EU Global Climate Change Alliance" (GCCA) initiative, which aims at strengthening resilience of vulnerable communities. The GCCA initiative in Tanzania has helped introduce pioneering and replicable approaches combining sustainable energy solutions (biogas systems, efficient cooking stoves, solar-powered water pumps etc.) with activities in agriculture, forestry, livestock, water management and business development.

Hydropower

The area of **Kisanga – Msolwa** is a wide and hilly zone in the high valley of the River Yovi, Morogoro region. Until recently, the community in the Yovi Valley was out of reach of electricity. In 2011 the Msolwa St. Gaspare Bertoni Secondary School of Stigmatine Fathers and the NGO ABCS (Associazione Bertoni Cooperazione e Sviluppo) were awarded a grant under the 10th EDF Rural Energy Programme) to construct a 1 MW hydroelectric plant, transmission lines and initial 200 connections bringing electricity within the reach of a population of 25 000 people. The project has been completed.

The 4 MW "**Mwenga Hydro Generation and Rural Electrification Project**" is an energy infrastructure initiative located in the Tanzanian highlands. Rift Valley Energy in partnership with the EU has supplied TANESCO, the local tea industry, and a rural electrification network with approximately 25 000 000 kW/h of green power per annum. At present 17 villages are connected. Upon completion of the new EU funded project, which extends the rural distribution network by an additional 200 km, a total of 32 rural villages will have access to reliable, grid quality power. This includes over 5 500 rural households, 32 schools, 19 health centres, 450 small and medium enterprises and the offices of all local authorities.

In **Matembwe** a 120 kW hydropower plant has been in operation since the early 1980s, one 250 kW in Bomala'ngombe since 2001 and one 80 kW in the remote village of Ikondo, which is in operation since the early 2000s. With funding from the 10th EDF Rural Energy Programme another hydropower plant in Ikondo has been equipped with a new 350 kW turbine. Through these projects, more than 1 500 direct beneficiaries have access to reliable and affordable electricity services. In order to profit from the new availability of electricity for productive uses, the implementing partner CEFA, undertook several interventions in the areas of the projects, such as a chicken factory, a feed factory, a jam & sausage factory, several carpentry and tailoring workshops and an oil mill.

In 2006 the NGO ACRA, in partnership with the Tanzanian NGO NDO (Njombe Development Organisation) communities and local institutions started an integrated development programme centred on the provision of renewable energy in **the Kisongo river basin**, Municipality of Mawengi, District of Ludewa (Njombe region). Together with other donors including the Italian Ministry of Foreign Affairs, the Rural Energy Agency and private funds, EU financial support under the 10th Rural Energy Programme allowed for the construction of a hydro-electric plant for the production of 300 kW power and its distribution to 9 villages (1 400 connections including schools, health centres and public offices). The intervention also included complementary activities to promote productive uses of electricity, in particular in agriculture, agro-forestry, education and small businesses, as well as activities in forest, land and water management. The project helped establish LUMAMA a community association which owns the infrastructure and operates the mini-grid. The project was completed in 2014.

Ludewa District is generally affected by low economic growth and high poverty levels. The consequences of this are rural migration, especially of young people towards Dar es Salaam and other bigger towns. The NGO ACRA and its partners Njombe Development Office and the engineering firm Studio Frosio, is implementing activities that will lead to a new power plant of approximately 1.7 MW. This new generation facility will be connected to TANESCO to feed power into the national grid. At the same time, 20 villages in the surrounding areas of Lugarawa shall be connected and supplied with electricity. This includes almost 4 400 users and more than 50 000 beneficiaries (covering more than the 30 % of the Ludewa district population), 43 primary and secondary schools, 1 hospital and 19 dispensaries/ health services, 340 small and medium enterprises and the local authorities offices in 6 wards and 1 district.

Wind & Solar Power

The "**Zanzibar Renewable Energies and Energy Efficiency Programme**" is carrying out a full scale feasibility study for the development of wind and solar power. The project will also support increased private sector involvement and will help create a business environment conducive to the roll out of renewable energy projects and the promotion of energy efficiency. Currently, 100 % of the electricity in Zanzibar is imported from the mainland. Solar power represents an untapped and abundant renewable energy resource for Zanzibar, with each square metre receiving approximately 1 800 kWh of energy from the sun annually.

The project "**Micro Power Economy, Tanzania Roll-out**", developed by the micro-utility JUMEME and its international partners, aims at implementing and operating Solar-Hybrid Mini-Grids in remote settlements in Tanzania. JUMEME plans to install more than 25 Mini-Grids providing electricity to more than 80 000 people reaching 11 000 households, 2 600 agricultural enterprises and businesses, and more than 80 public infrastructures (schools, clinics, religious buildings) by 2018. The project applies a gender mainstreamed approach that promotes more economic growth, productivity and business opportunities for women. The approach will take into account the requirements and needs of women and will include measures to mitigate specific barriers that usually hinder women from participating and benefiting from economic growth and business opportunities arising from electrification schemes. It will thus enable them to become drivers of growth themselves.

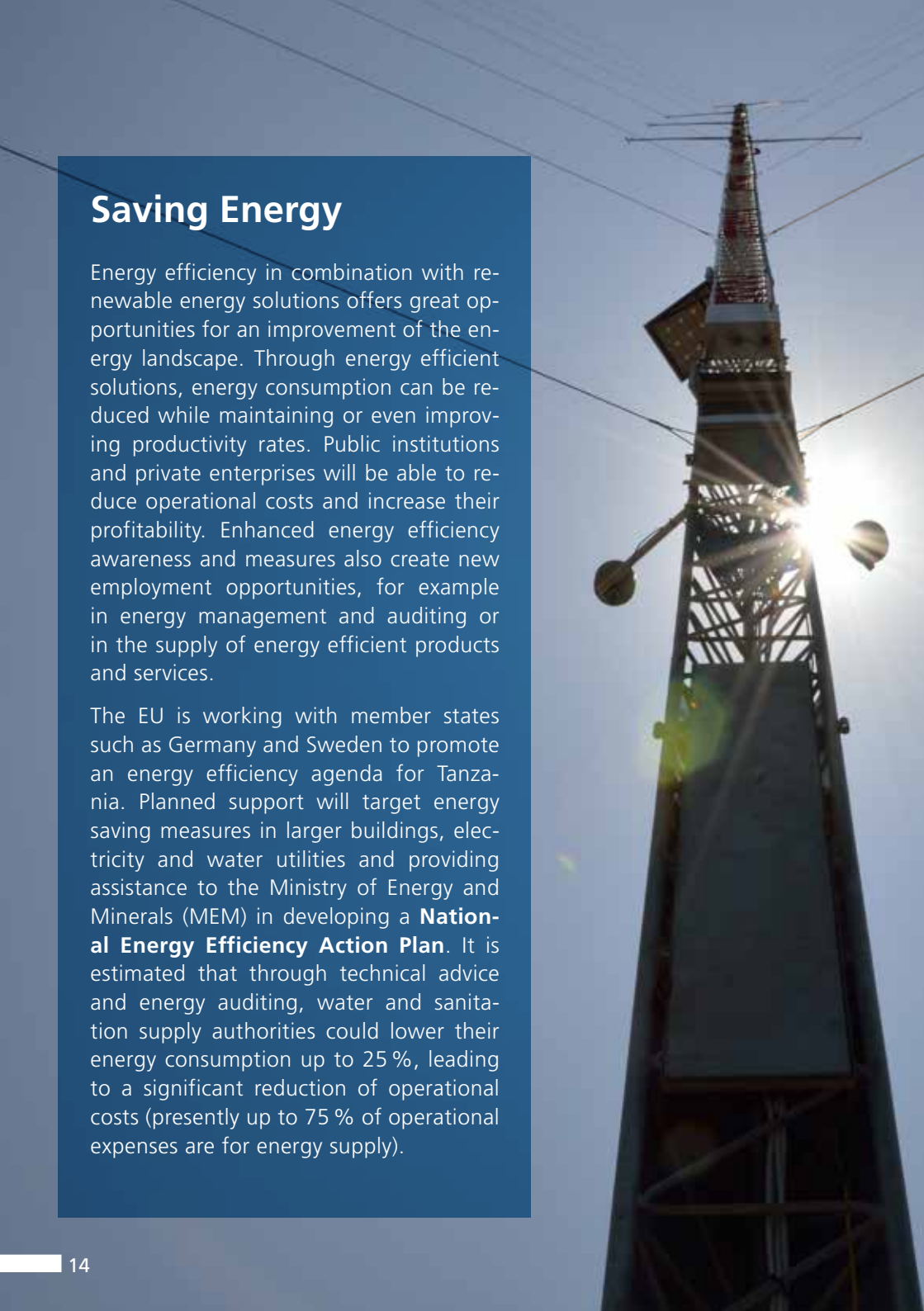
The communities of Maasai pastoralists and Meru farmers living in the **Oldonyo Sambu** ward (Arusha district) and the **Ngarenanyuki** ward (Meru district) have been provided access to alternative modern energy services through the "Best Ray" project, implemented by Istituto Oikos Onlus. One part of the project is the creation of "Community Energy Resource Centres" (CERC). The CERC supplies the equipment to sell, assemble or build energy and energy-related products and infrastructure. Farmers can purchase Solar Photovoltaic (PV) systems, including PV panels, controllers, batteries, inverters and other electrical equipment.

In the **Lake Zones** of Tanzania, the EU in cooperation with the NGOs Hivos and TaTEDO, has installed a total of 75 Photo Voltaic systems in schools and dispensaries. In order to secure sustainability, basic skills were offered by technicians to the staff of the dispensaries and schools. Since the implementation of the project, women are facing far less risks of losing their lives and their new born babies during deliveries. Before the installation of the PV systems, nurses had to use mobile phone torches or kerosene lamps to deliver babies which involved a lot of risks. The nurses have confirmed that the installed solar systems have improved their working environment and have improved access to quality social services in the surrounding communities.

Saving Energy

Energy efficiency in combination with renewable energy solutions offers great opportunities for an improvement of the energy landscape. Through energy efficient solutions, energy consumption can be reduced while maintaining or even improving productivity rates. Public institutions and private enterprises will be able to reduce operational costs and increase their profitability. Enhanced energy efficiency awareness and measures also create new employment opportunities, for example in energy management and auditing or in the supply of energy efficient products and services.

The EU is working with member states such as Germany and Sweden to promote an energy efficiency agenda for Tanzania. Planned support will target energy saving measures in larger buildings, electricity and water utilities and providing assistance to the Ministry of Energy and Minerals (MEM) in developing a **National Energy Efficiency Action Plan**. It is estimated that through technical advice and energy auditing, water and sanitation supply authorities could lower their energy consumption up to 25 %, leading to a significant reduction of operational costs (presently up to 75 % of operational expenses are for energy supply).



Capacity Building for the Oil and Gas Sector

Tanzania is endowed with large quantities of natural gas, but still faces a number of constraints related to the legal and regulatory framework, infrastructure and human capacities in the extractives area. The development of skills is a key to harness the potential of the gas economy to support a transformational and inclusive development agenda. The EU has committed to contribute to this effort as part of activities to promote good governance in natural resource management and energy sector reforms. These activities target higher education institutions and public sector organisations and also include core assistance for the consolidation the "Tanzania Extractive Industry Transparency Initiative" (T-EITI).

The project "**Capacity Building at the University of Dar es Salaam**" responds to the sustainable development of the Oil and Gas Sector in Tanzania. In cooperation with the University of Aberdeen the results to be achieved are:

- 2 UDSM staff members educated to PhD level and 5 staff members educated to Master level in sustainable development, and oil and gas related disciplines
- 20 staff members attend short term training in the UK and 30, training in sustainable development of oil and gas in Tanzania
- 30 staff exchanges from Tanzania to European Universities and 10 vice-versa
- 20 research projects conducted in sustainable oil and gas production

"My decision to study for an MSc (Econ) Petroleum, Energy Economics and Finance in Europe was prompted by the rising demand of talented and highly trained individuals in the energy sector, particularly the Oil and Gas Sector in Tanzania. I chose to study in Aberdeen because it's a top ranked university in the UK which provides world class education to students therefore my degree will be recognized and respected worldwide."

Doreen Kabuche

Scaling Up EU Support for Energy

Under the 11th European Development Fund (2014-2020) energy has been prioritised as a key sector of cooperation. With a focus on broader energy sector reforms and improving access to electricity and modern energy services in rural areas, the EU will contribute a total budget of up to EUR 180 million to projects and necessary reforms.

To mobilise this funding, the EU has assisted the Rural Energy Agency (REA) and TANESCO to conduct preparatory studies to improve access in rural areas through grid extensions and new connections. It is expected that through this initiative alone, between 250 and 275 villages in 23 districts in the regions of Mwanza, Geita, Simiyu, Manyara, Morogoro, Dodoma and Singida (and possibly others) would gain access to electricity. This programme, which is part of the ambitious rural electrification effort undertaken by the Government of Tanzania, will see an estimated 80000 – 90000 new grid connections during the first three years over a total population of 720000 people (119000 households).

Planned interventions under the 11th EDF National Indicative Programme for Tanzania will be complemented by new important instruments for the financing of private sector-led electrification initiatives based on renewables and larger investment in generation and transmission infrastructures.

The Electrification Financing Initiative (ElectriFI) is an EU initiative to support electrification investments that will lead to new and improved connections, with strong potential for scalability. ElectriFI will be flexible in allowing the support of different business models, utilities and mini-grids. ElectriFI can boost investments by making support available throughout the entire process, from the project idea to its successful implementation and scaling up.

Tanzania will also benefit from the new EU-funded **Africa Investment Facility** (AfIF) that started operating in late 2015. The facility is an innovative financial mechanism that combines grants with other resources such as loans from development finance institutions in order to leverage additional financing for development and increase the impact of EU aid.

The potential of geothermal energy is huge, but remains fully unused to date. Through the **Geothermal Risk Mitigation Facility for Eastern Africa** (GRMF) the EU provides grants to co-finance surface studies and exploration drilling programmes for public and private developers. The support will reduce the high upfront risks related to the development of clean and reliable geothermal power to supply power grids.

On Track to a Bright Future

The demand for energy will continue to increase over the coming years, not just to fulfil basic needs for the growing population, but also to improve living standards and meet the new requirements of an expanding economy. To mention just a few examples: Farmers need energy for processing and cooling for preservation, craftsmen and craftswomen need energy to drive their tools, hospitals need energy for health care services and training centres need energy for computers.

Energy will be greatly needed in order to create employment for young people and can itself be a source of job opportunities in rural areas, through the development of small and medium enterprises for the rolling out of modern energy technologies. These will generate more highly qualified jobs and develop the capacities and technical skills required at local level.

In addition, with its vast and untapped natural resources, Tanzania is an ideal place for renewable energy solutions. Public-private partnerships can be further enhanced, based on a conducive environment for investments and can facilitate technology transfer and pilot project demonstration. By promoting access to affordable, reliable, sustainable and modern energy for all, EU partnership ultimately aims to improve lives and livelihoods of people in urban and rural areas.

Key Terms and Explanations

Hydro Electricity

Hydropower or water power is the electrical energy generated from falling or running water. A mass of water moving down a height difference contains energy which can be harvested using a waterwheel or turbine. The moving water drives the waterwheel and this rotation is coupled with a generator which produces electric power.

Mini-Grid

A mini grid, also sometimes referred to as a "micro grid" or "isolated grid" is a set of electricity generators and possibly energy storage systems, interconnected to a distribution network that supplies electricity to a localised group of customers as opposed to a single customer system such as a solar home system (SHS). Mini-grids have a unique feature as they can operate autonomously without being connected to a centralised grid. A mini-grid can be supplied by all sorts of energy resources and power plants, however most of the time a mini-grid will use low AC voltage (220-380V) with a centralised production and a storage system and will have an installed capacity of between and 5 and 300 kW, although bigger systems exist.

National Grid

An electric grid is an interconnected network of generation stations, high-voltage transmission lines and lower-voltage distribution lines for delivering electricity from suppliers to consumers.

Off-Grid

Not connected to a grid, typically a solar home system.

On-Grid

Connected to a grid, be it a national grid or a mini-grid.

Power Generation

Power generation is the production of electricity. Electricity can be produced from renewable sources like solar, wind, biomass or from fossil fuels (diesel generator). Once produced, the power should be conducted into a line or a grid for consumption, or it should be stored (into a battery for instance).

Solar Home System

Solar home systems (SHS) are stand-alone photovoltaic systems that offer a cost-effective mode of supplying amenity power for lighting and appliances to remote off-grid households. In rural areas, that are not connected to the grid, SHS can be used to meet a household's energy demand, thereby fulfilling basic electric needs. SHS usually operate at a rated voltage of 12V direct current (DC) and provide power for low power DC appliances such as lights, radios and small TVs for about three to five hours a day.

The European Union in Tanzania

The European Union (EU) comprises 28 Member States. The EU Delegation to Tanzania and to the East African Community represents the EU and promotes its values and policies in Tanzania and in the sub-region. The Delegation also manages various development cooperation programmes which contribute to reducing poverty and promoting decent living conditions in Tanzania.

Sustainable Development focusing on poor and vulnerable people - in line with Tanzania's own national strategies - is at the core of the cooperation between Tanzania and the EU. The European Union facilitates trade and investment, good governance and respect for human rights, democracy, peace and security.

More information on the work of the European Union in Tanzania can be found here:

delegation-tanzania@eeas.europa.eu

http://eeas.europa.eu/delegations/tanzania/index_en.htm

https://facebook.com/EuropeanUnionTanzania

https://twitter.com/EUinTZ

+255 22 2117473/6

Delegation of the European Union to Tanzania and the East African Community
Umoja House
Hamburg Avenue/Shabaan Robert Street
PO BOX 9514 Dar es Salaam
Tanzania

our world
our dignity
our future