

# Section 12

## Case study – Tanzania

Tanzania’s renewable hybrid mini-grid market took off in the early 2010s, earlier than elsewhere in Sub-Saharan Africa, thanks primarily to robust regulations and international assistance. However, weak implementation of policies, rule changes and ambiguity about the role mini-grids play within the larger goal of improving energy access are making developers uncertain about the market’s future.

### 12.1 Overview

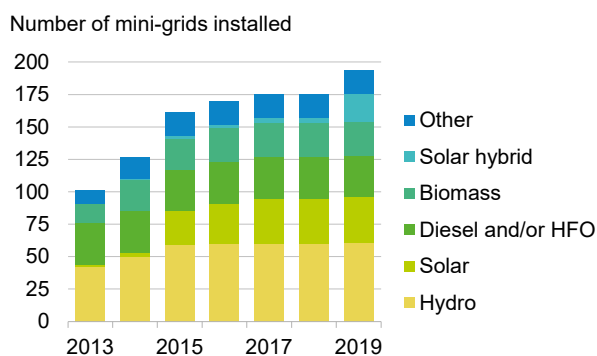
Tanzania has one of the lowest electrification rates in East Africa. At the end of 2018, one-third of the general population, and only a quarter of the rural population had access to power. The Tanzanian mini-grid market started developing earlier than others in Sub-Saharan Africa thanks to a well-designed regulatory framework, along with financial support from DFIs and donor agencies.

Today, Tanzania has 209 known mini-grids installed. With an aggregate capacity of 231,7MW, these projects account for about 15 percent of the country’s total capacity of 1,461MW.<sup>17</sup> Of these projects, almost one-third are either solar or solar hybrid mini-grids. On a per-MW basis, renewable mini-grids are dwarfed by older hydro and diesel projects (Figure 105, Figure 106).

Market growth has slowed, however. Weak enforcement of existing regulations plus rule changes have made players wary of developing new projects. Mixed signals from the government are partly to blame. The Ministry of Energy and Minerals’ latest long-range electrification strategy emphasizes grid expansion and large generation capacity building but leaves the role of mini-grids somewhat ambiguous (Ministry of Energy and Minerals, 2016). These factors might have contributed to the slowdown in project development over the past few years.

**Figure 105**

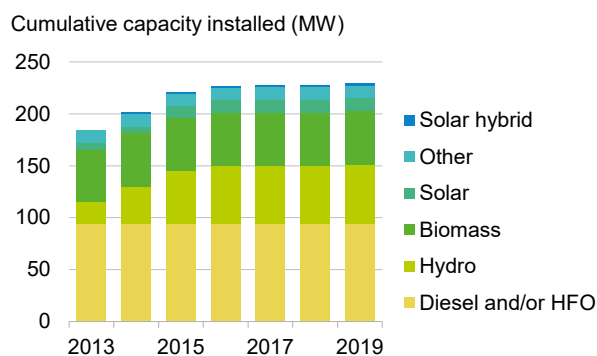
**Tanzania’s installed mini-grids, by projects**



**Source:** BloombergNEF, GIZ, Carbon Trust, CLUB-ER, World Resource Institute, surveyed developers. **Note:** Operating projects without a specified commissioning year are not included.

**Figure 106**

**Tanzania’s installed mini-grids, by capacity**



<sup>17</sup> This excludes projects where either the operation year or project status was not specified.

## 12.2 Distributed power market structure

Tanzania’s mainland power sector is dominated by the state-owned vertically integrated utility Tanzania Electric Supply Company (Tanesco). Tanesco owns most of the country’s bulk generation directly. In the distributed segment of the power-generation market, however, private companies hold sway.

Tanzania’s Small Power Producers Framework policy defines any project 10MW or smaller in size as a small power producer (SPP). The framework allows electricity from mini-grids to be sold directly to consumers, or to Tanesco if the central grid expands to where a mini-grid is operating. As of the end of 2018, there were nine registered SPPs serving off-grid communities.

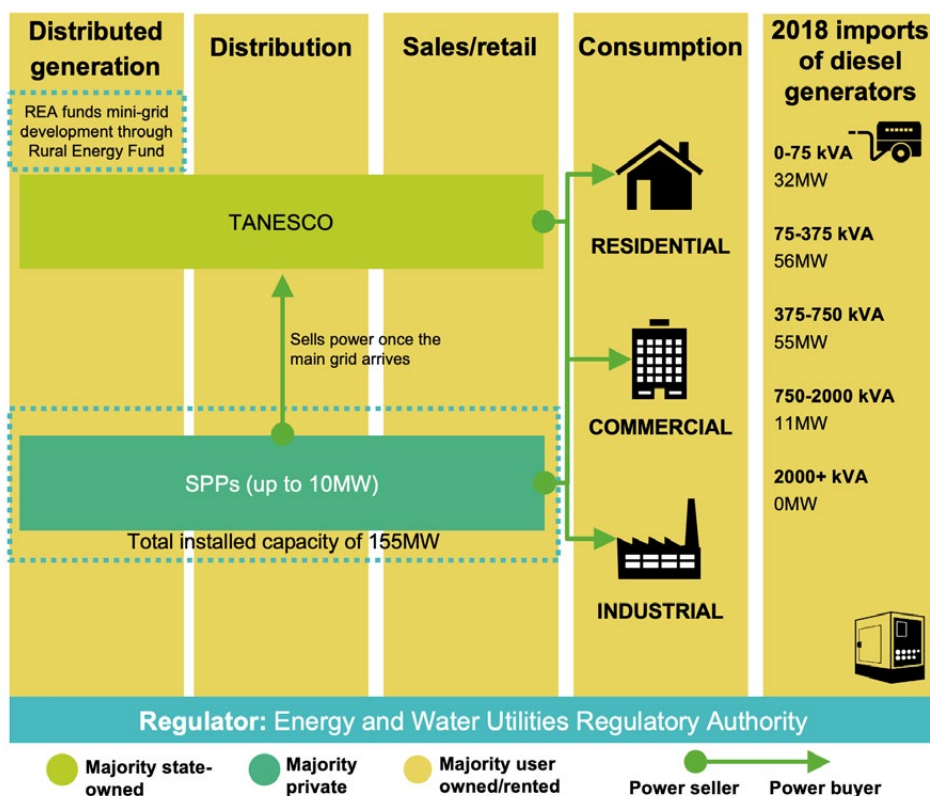
The Energy and Water Utilities Regulatory Authority (EWURA) oversees technical and economic

regulations in the power sector. It sets grid electricity tariffs and fixed tariffs paid to SPPs, develops guidelines and oversees licensing. Tanzania’s Rural Energy Agency (REA) is the government’s dedicated organization for electricity access and manages the Rural Energy Fund (REF). The REF is funded by international donor agencies, DFIs and the government via the annual budget and from commercial generation levies. It also provides financing to fund rural energy projects in the form of:

- Grants for feasibility studies up to USD 100,000 or 80 percent of the study cost
- Grants of USD 500 per household connection to distribution grids or mini-grids, or a maximum of 80 percent of the project’s transmission and distribution costs
- Construction loans up to 85 percent for <3MW generation projects (70 percent for projects greater than 3MW).

Figure 107

Tanzania’s distributed power market structure



Source: BloombergNEF.

## 12.3 Current market status

The mini-grid market in Tanzania took off earlier than in neighbouring countries. Favourable regulations and rural electrification programmes have attracted a diverse range of developers (Figure 108). The authors identified nine developers active in the market with Jumeme and PowerGen as the two largest in terms of the number of mini-grids installed.

After successfully developing projects in Kenya and Zambia, PowerGen began installing mini-grids in Tanzania in 2015. The organization will expand its portfolio further with a project financing deal it secured with CrossBoundary Energy Access (CBEA) and other financiers in July 2019. CBEA has an agreement with the Renewable Energy Performance Platform (REPP), managed by Camco Clean Energy, to finance an initial debt investment of USD 5.5 million to build 60 mini-grids in Tanzania (Rockefeller Foundation, 2019). In August 2019, PowerGen also acquired EON subsidiary Rafiki Power, which has built eight mini-grids ranging from 5kW to 50kW for customers in Tanzania.

Co-funded by the EU, solar hybrid mini-grid operator Jumeme aims to build 300 systems and serve 1 million people by 2022. In March 2019, it

announced it was constructing 11 more mini-grids to serve more than 80,000 Tanzanians. These were commissioned in June 2019.

Devergy, a Tanzanian social energy utility, was founded in 2010 and began operating its first mini-grid two years later. The company installed an adaptive DC mini-grid system to supply 60 to 400 households with electricity. It sets up local kiosks where customers pay for use of electricity at daily, weekly or monthly rates via mobile money. As a complementary revenue stream and a way to boost household consumption, customers can also purchase DC-compatible and energy-efficient appliances from the kiosks. Devergy communicates with its mini-grids through wireless Internet communication systems that enable remote monitoring and control down to the individual household and meter level (USAID, 2018).

With both on-grid and off-grid projects throughout West and East Africa, German company Redavia rents solar hybrid mini-grid systems to household and commercial and industrial (C&I) customers. After a certain period and depending on the structure of the rental contract, customers have the option to own the system.

The government has recently stepped back on encouraging mini-grid development, and ap-

Figure 108

### Mini-grid developer landscape in Tanzania



Source: BloombergNEF, company logos.

appears to be prioritizing grid expansion for electricity access. This has led to uncertainty among developers around how the government recognizes the role of mini-grids in its rural electrification strategy, which has hindered growth and may lead to stagnation in the coming years. Some developers the authors spoke to stated that they may focus their efforts on expanding into other countries in the region.

## 12.4 Policy and regulations

As of the end of 2018, Tanzania’s national electrification rate was 33 percent. In rural areas where two-thirds of the population resides, the rate was considerably lower at 23 percent (World Bank, n.d.). The Tanzanian government aims to have all 12,268 villages in mainland Tanzania electrified through grid expansions or off-grid renewable energy by 2021 (REA, 2017). This means that all public buildings, including schools, clinics and churches, will have access to electricity when the target is met, but not necessarily households. Overall, Tanzania has established robust regulations for mini-grids compared to other countries in Sub-Saharan Africa. However, recent actions have called the government’s commitment into question with developers complaining of weak enforcement of regulations.

### Rural electrification mechanism

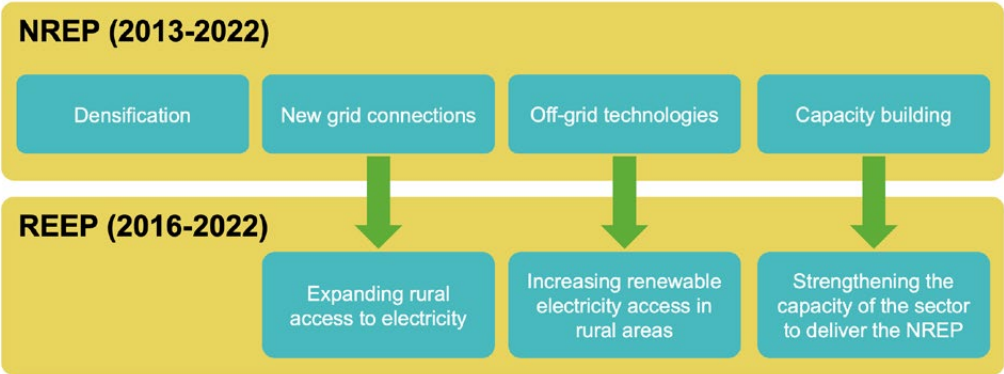
The government designed its national electrification policy with international interventions in mind. Specifically, it developed the National Rural Electrification Programme (NREP) to proceed the country’s participation in the Scaling-Up Renewable Energy Programme in Low Income Countries (SREP), administered by Climate Investment Funds (CIF).

In 2016, the International Development Association (IDA), CIF and other development partners combined to provide USD 467 million in loans, grants and direct aid to implement the Rural Electrification Expansion Programme (REEP). The programme addresses three of the four electrification goals outlined in the NREP (Figure 109). As a result, it aims to connect 2.5 million rural households. REEP applied a *programme-for-results* mechanism that links the disbursement of funds directly to the delivery of defined results.

### Results-based financing programmes

The REA has established a number of results-based financing (RBF) programmes to assist mini-grids to date. In its first programme, the REA disbursed USD 500 and USD 600 grants per new connection for a hydro mini-grid and a solar hybrid mini-grid respectively under the Tanzania Energy Development and

**Figure 109**  
**How Tanzania’s Rural Electrification Expansion Programme (REEP) builds off its National Rural Electrification Programme (NREP)**



Source: BloombergNEF, World Bank (2016).

Access Expansion Project (TEDAP) administered by the World Bank in FY2014/15.<sup>18</sup> As a result, USD 2.3 million was awarded to three hydro mini-grids connecting over 4,600 customers.

In 2016, the UK's Department for International Development (DFID) and the Swedish International Development Cooperation Agency (SIDA) financially assisted a new RBF programme. In its first call, REA dispersed grants for new connections of mini-grids based on the level of electricity service provided, with USD 600 per Tier 5 connection for grid-connected mini-grids, and USD 500 per Tier 4 connection as well as USD 300 per Tier 3 connection for isolated mini-grids (REA, 2016). In November 2019, REA announced the second call for applications to disburse grants for only Tier 4 and 5 connections (REA, 2019). In this call, SIDA was the only international donor agency to participate.

### Mini-grid regulations

Tanzanian regulator EWURA has set relatively clear regulations around mini-grids. Through its [Mini-Grids Information Portal](#), it provides regulatory information such as on licensing requirements and the process to obtain financial support. However, mini-grid developers reported to the authors of this report that regulations are not always enforced as promised, leading to confusion in recent years. In addition, recent regulatory changes have raised the hurdle for sub-100kW mini-grids, which now for the first time must receive tariff approval from EWURA. These elements could be part of the reason why market growth has levelled off in the last few years.

### Small Power Producer Framework

Tanzania defines an SPP as a generation facility below 10MW that produces power from renewable or fossil sources, or has cogeneration, or is a hybrid system. SPPs can sell power to Tanesco's main grid or its isolated mini-grids. They can also sign [Standardized Small Power Purchase Agreements](#) (SPPA) directly with wholesale or retail customers (Public-Private Partnership Legal Resource Center, n.d.). Under this framework, projects receive a fixed tariff for the lifetime of the SPPA. Payments are invoiced in US dollars and may be adjusted to another hard currency subject to the mutual agreement of the parties to the SPPA. Tariff rules and licensing requirements are established based on project size (Table 21).

#### Tariffs

Developers can propose to EWURA a specific retail tariff structure (e.g., a flat tariff, time-adjusted tariff, or a combination of the two) for mini-grid projects below 100kW (Very Small Power Producers or VSPPs). However, if 15 percent of the households served by the mini-grid petition EWURA, the regulator undertakes a tariff review. EWURA then has the power to adjust the tariff for VSPPs if it deems it to exceed relevant cost-recovery levels. While this has the potential to worry developers, EWURA has reviewed few projects to date and has never adjusted tariffs (Electric Capital Management, 2019).

100kW-1MW mini-grids (SPPs) receive fixed tariffs for electricity, regardless of whether they sell to Tanesco's isolated grid or to the main grid. The tariffs are specified by technology and cost-reflective on paper as they are examined based on operating expendi-

Table 21

Tanzania's tariff and licensing requirements under SPP Framework after the 2018 rule change

Size (kW)	Generation licence required?	Tariff approval required?	Tariff structure flexibility?
<100	Yes	Yes	Yes
100-1000	Yes	Yes	No (fixed tariffs)
1000+	Yes	Yes	No (fixed tariffs)

<sup>18</sup> Tanzania's fiscal year starts in July (e.g., FY2014/15 = July 2014–June 2015).

Source: BloombergNEF, EWURA.

tures, capital depreciation, interest expenses, and cash reserves for emergency maintenance and taxes.

### Licensing

Prior to the 2018 rule change, any project below 1MW in size was exempt from licensing and only required registration with EWURA upon commissioning. Since the change, developers have been required to obtain licences for all projects. They have also had to demonstrate proof of government support, proof of an agreement with an off-taker to buy their power and obtain a number of other project development certificates (Figure 110). Developers regard this licensing procedure as cumbersome; it generally takes over a year to complete.

### Grid arrival rules

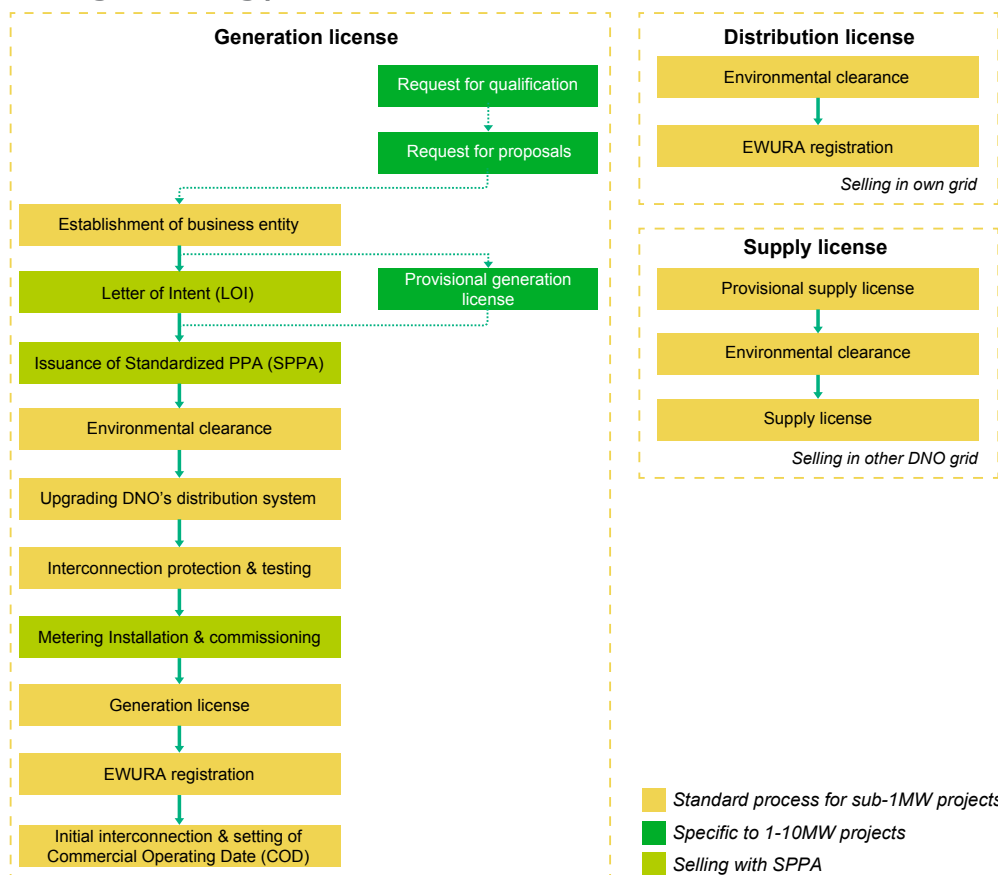
By law, when the main grid expands sufficiently to arrive at a mini-grid, a VSPP, SPP or small power

distributor (SPD) owner becomes eligible to receive compensation depending on how long the mini-grid has been operating, so long as specified conditions are met. An SPP developer is also eligible to sell electricity to the main grid. The applicable tariff for the connected mini-grid varies depending on whether the project’s SPPA was executed before or after August 2015. If the execution is after then, the technology-specific tariff is applied (The United Republic of Tanzania, 2019).

Developers explained to the authors that grid arrival rules are not always enforced as promised. Negotiations are difficult with the state utility, which seeks to lower the tariff as much as possible. This perhaps reflects the fact that Tanesco is cash-strapped, partly due to the low grid tariffs it receives. Given the potential risk of being insufficiently compensated by Tanesco, some developers say they are specifically avoiding building mini-grids within 7–10km of the main grid.

Figure 110

### Tanzania’s mini-grid licensing processes



Source: BloombergNEF, [Mini-grids Information Portal](#). Note: These licensing processes apply to solar-based mini-grids and vary slightly from those used for biomass and hydro projects.