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# Mini-grid projects: does one size fits all? A case study in Tanzania

# Tanzania in the Africa Energy Outlook-IEA 2019

**Strong** economic growth

**Major** gas discovery

**Plans** for urban transport

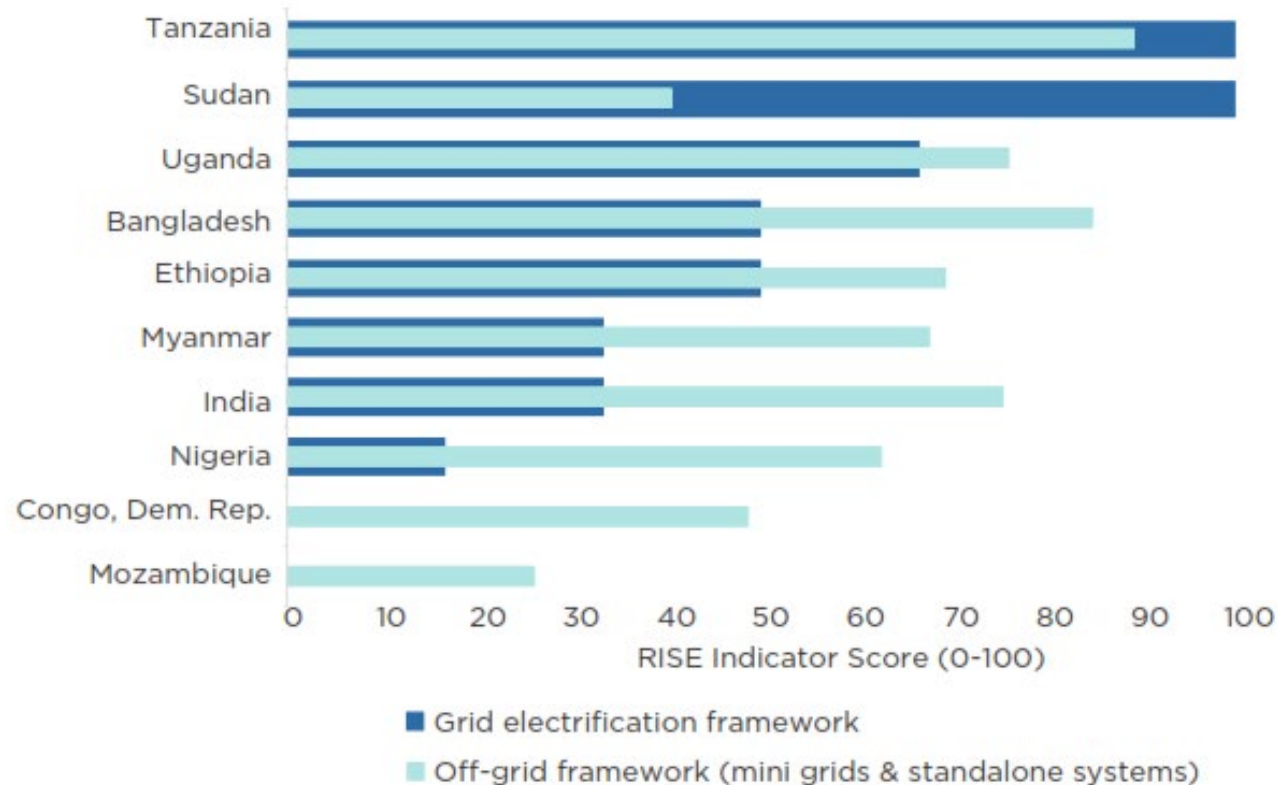
**Table 6.12A** ▶ Tanzania key indicators and policy initiatives

	2000	2018	Stated Policies		Africa Case		CAAGR 2018-40	
			2030	2040	2030	2040	STEPS	AC
GDP (\$2018 billion, PPP)	57	176	314	585	475	1 233	5.6%	9.3%
Population (million)	34	59	83	108	83	108	2.8%	2.8%
with electricity access	11%	37%	70%	80%	100%	100%	3.6%	4.7%
with access to clean cooking	2%	6%	46%	76%	100%	100%	12.2%	13.7%
CO <sub>2</sub> emissions (Mt CO <sub>2</sub> )	3	12	24	41	36	74	5.9%	8.8%

Policy	Key targets and measures
<b>Performance targets</b>	<ul style="list-style-type: none"> <li>Reduce GHG emissions by 10-20% by 2030 compared to the business-as-usual scenario (138-153 Mt CO<sub>2</sub>-equivalent gross emissions).</li> <li>Increase electricity generation capacity from 1 500 MW in 2015 to 4 910 MW and achieve 50% energy from renewable energy sources by 2020.</li> </ul>
<b>Industrial development targets</b>	<ul style="list-style-type: none"> <li>Raise annual real GDP growth to 10% by 2021.</li> <li>Build a semi-industrialised country by 2025 in which the contribution of manufacturing to the national economy reaches at least 40% of GDP.</li> </ul>

## A « local champion » in electricity access

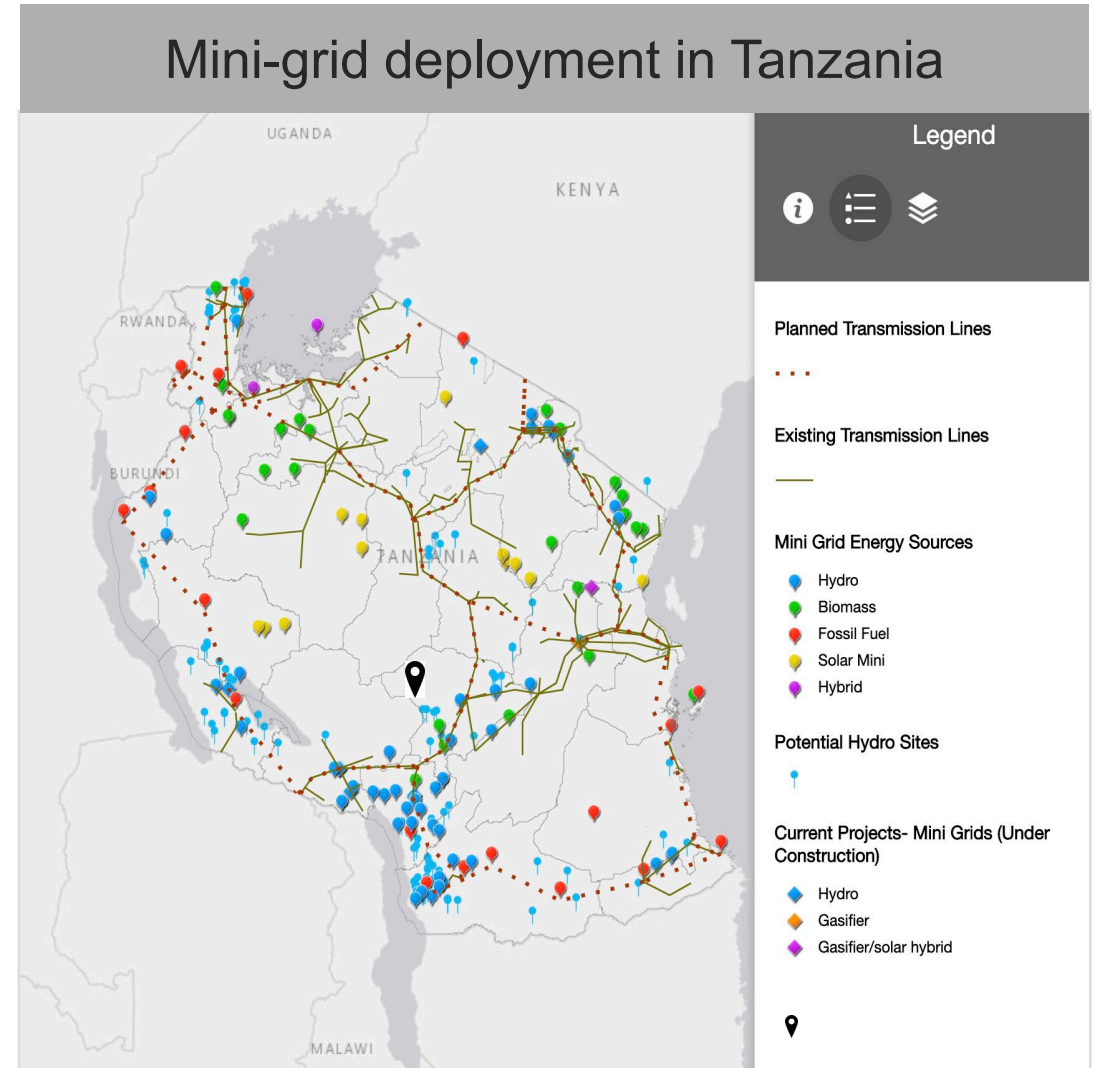
**FIGURE 3.20** RISE SCORES FOR GRID AND OFF-GRID ELECTRIFICATION FRAMEWORKS FOR 10 COUNTRIES WITH THE LARGEST POPULATIONS WITHOUT ACCESS TO ELECTRICITY, 2017



Source: World Bank RISE 2018

## A bottom-up case study

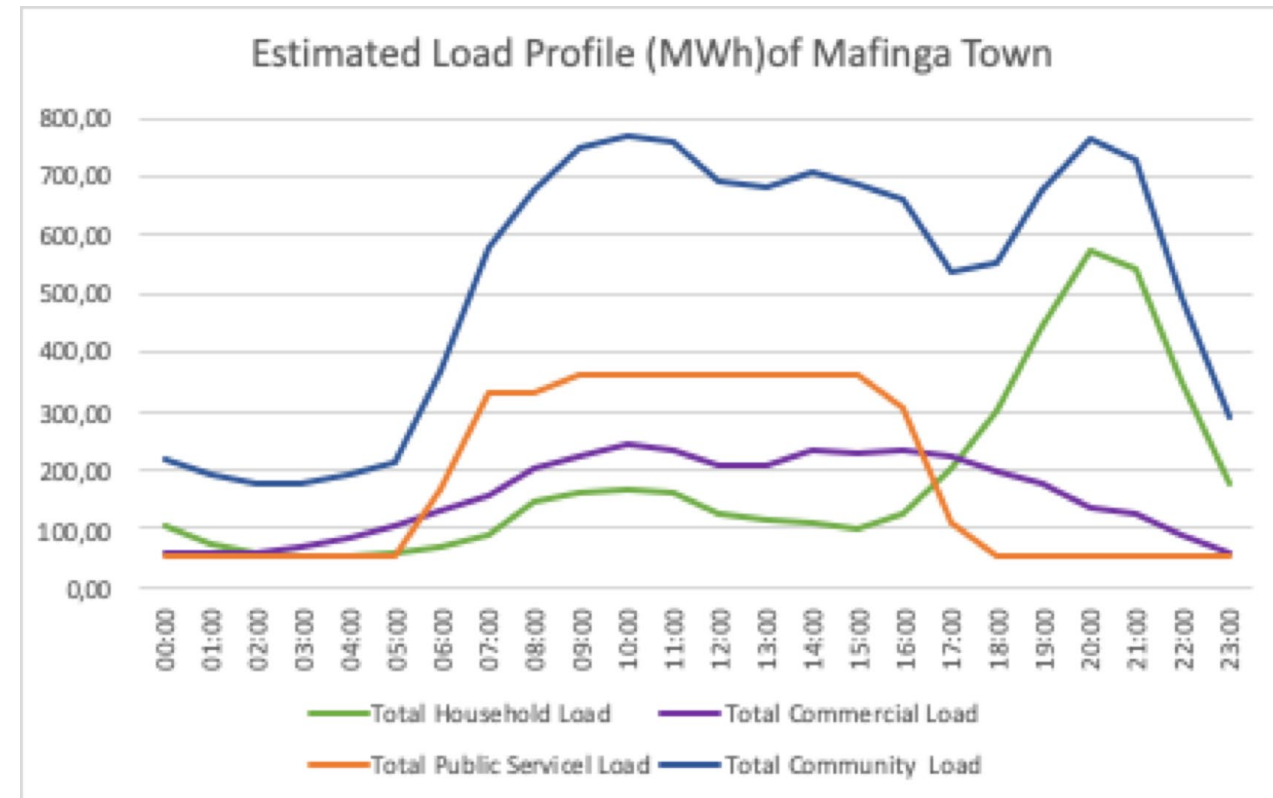
- Tanzania has a quite developed mini-grid deployment plan, with complex regulations
- Does it suffice to grant private investors profitability?
- Yes, we need subsidies, but how much?



Proposed Project Location

# Methodology

- We use
  - HOMER (NREL) to simulate and optimize the potential supply of electricity
  - The Rural African load profile tool to estimate the potential electricity demand from Mafinga Town.
  - Economic Buoyancy Vector (WRI) to assess consumer ability and willingness to invest in clean energy.



# Results

- The approved mini-grid tariffs and subsidy scheme in Tanzania still do not allow mini-grid for rural electrification projects to be profitable.
- Even with a sensitivity analysis using the estimated future system component costs, discount rates, system reliability and different business models, off-grid projects are still not profitable from a private investment perspective

	Diesel Genset	PV + Battery	Hybrid System
<b>LCOE</b>	<b>\$0.58</b>	<b>\$0.46</b>	<b>\$0.32</b>
SSP Tariff \$/kwh	\$0.10	\$0.10	\$0.10
<b>Difference</b> \$/kwh	<b>-\$0.48</b>	<b>-\$0.37</b>	<b>-\$0.22</b>
<b>Annual Loss</b>	<b>-\$2'213'876</b>	<b>-\$1'675'193</b>	<b>-\$995'855</b>

## Impact/governance/policies

- Our evaluation questions the viability of the subsidies as a one fits all solution to encourage bottom-up approaches to electrification investment

<https://www.esi-africa.com/industry-sectors/renewable-energy/new-partnership-to-finance-60-mini-grids-in-tanzania/>

- Would it be more coherent for the Government to consider
  - investing subsidies in income generation activities (*“The key is persuading customers to pay”?*)
  - enabling rural consumers earn sufficient income to pay for the cost of power
  - reviewing the tariffs/expanding the grid (the “developed approach” to electrification is cross subsidization from urban to rural customers)

## A final quote to debate

“There are two reasons why this form of service leapfrogging might provide the main benefits of rural electrification. **First, technology is evolving.** For example, when the US embarked on rural electrification in the 1930s, the idea of mobile money and mobile loans wasn't anywhere on the horizon ... **Second, people in rural Uganda face their own economic reality**, with unique challenges and opportunities. Going back to the rural US in the 1930s again, the vast majority of households had bank accounts. In Uganda today, fewer than 20% of people nationwide have an account at a financial institution...

It's natural to be empathetic and extrapolate our own experiences, needs and wants to others. But, it's also important to meet people where they are and **provide the services that they most value**”

*Wolfram, Catherine. “Are We Looking for the Benefits of Rural Electrification in the Wrong Places?”, Energy Institute Blog, UC Berkeley, July 29, 2019*



# Thank you

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