Sustainability, Inclusiveness and Governance of Mini-Grids in Africa (SIGMA) Project

Understanding Business Models and Access to Finance for Mini-Grid Development in Sub-Saharan Africa

This paper is based on a comprehensive literature review of publications from academia, industry, governmental and international institutions relating to business models, finance, and operational risks and challenges of mini grids in SSA. Despite notable growth in connections to solar or solar-hybrid mini grids in SSA and elsewhere, progress in bridging the rural electrification gap has been slow, with more than 560 million people still lacking energy access in SSA, particularly in remote areas considered too poor to afford cost-reflective tariffs.

While the literature points to hybrid ownership, partially subsidised models, a focus on anchor customers, and the bundling of projects into financial portfolios as the most promising business strategies, we argue that there is no one-size-fits-all solution for mini grid business models in SSA.

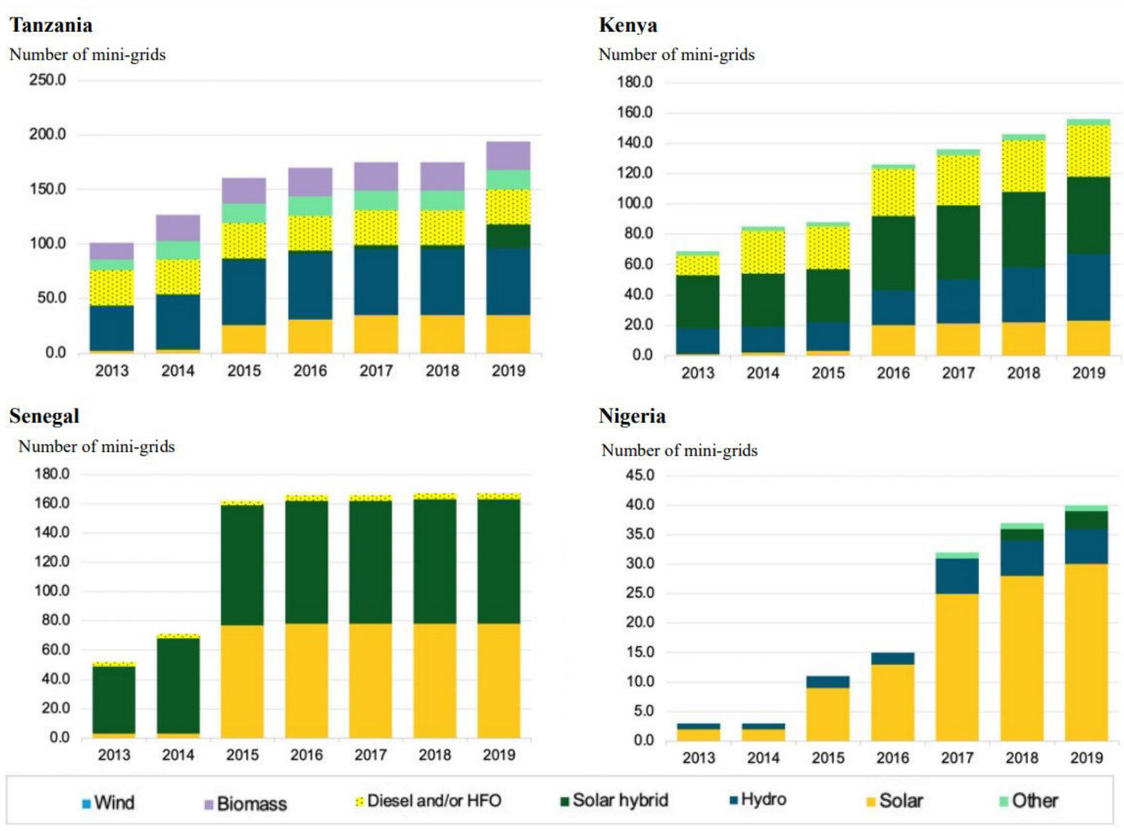


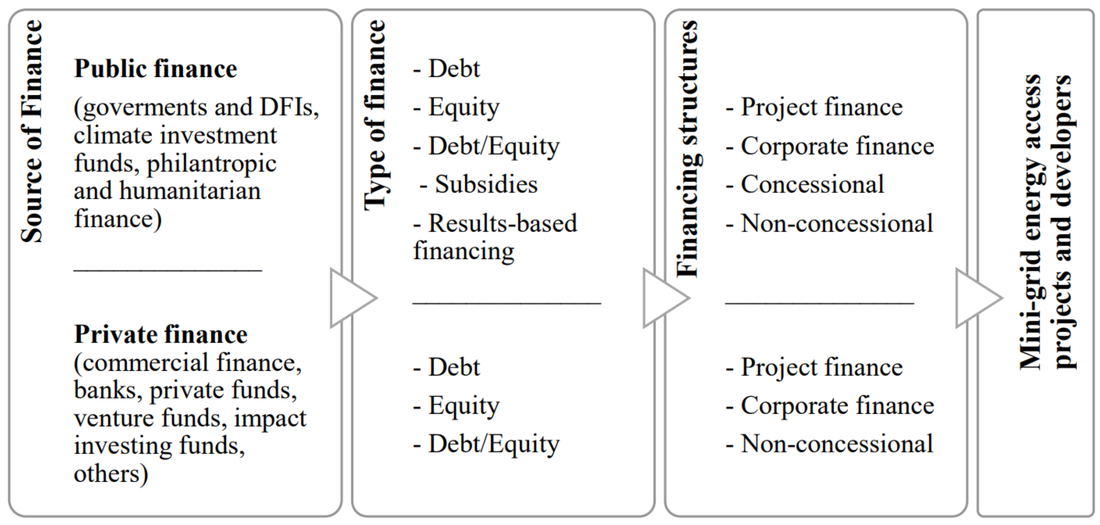
Table 1 summarises the variety of ownership models used in the SIGMA partner countries: of reported types, public mini-grids dominate, but unknown ownership models are over half of the reported total, indicating data availability remains a challenge.

Country	Total database	Public	Private	Public Private Partnership (PPP)	Community	Unknown
Nigeria	67	1	45	10	1	10
Senegal	431	107	1	6	7	310
Tanzania	278	36	112	5	42	83
Kenya	208	70	6	4	17	111
Total	**984**	**214**	**164**	**25**	**67**	**514**

Source: Authors' own using information from Bloomberg NEF Database 2022

Public Private Partnership (PPP)	Contractual agreement between a public and a private party that combines financing, ownership, and management capacities.
Renewable Energy Service Company (RESCO)	RESCO companies work similarly to utilities at smaller scale, whereby the assets are purchased and owned by the government while RESCOs operate and maintain the mini grid.
Concession Model	A holder of a concession, usually a private developer, has beneficial terms for providing electricity services. Those terms can be translated in preferential market access for specific timeframes or specially designed tariffs for the area of operation.
Power Purchase Agreement (PPA)	A PPA is a contractual arrangement between the public and private sector parties for delivery of electricity where the public entity will purchase the power generated by the private energy producer over a certain time frame and under an agreed tariff structure. PPA is also mandatory for the public utility to sell power to a private company which is also a distribution network operator.

The literature on mini grid business models indicates that success is highly context-specific depending on internal and external challenges (BNEF 2020), where the former includes project-specific aspects that the mini grid developer can control or avoid, and the latter are uncontrollable for the developer, exogenous and inherent to a specific market or country. Investment risks in mini grids relate to factors that reduce the developer's probability of having sufficient cash flow to repay the debt or meet the expected return (EEP 2015, BNEF 2020, ESMAP 2019). Thus, the risks associated with mini grid projects in SSA are often not aligned with the risk-return expectations of international investors. While improvements in technology and the involvement of DFIs in the mini grid sector have reduced perceptions of investor risk, the absence of proven business models and market challenges have increased it (BNEF 2020, ESMAP 2022). Achieving the industry call to increase private-sector investment in mini grids requires reducing the internal and external challenges that raise the investors' risk perception and addressing the developers' barriers to affordable financing



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