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Financing Concept for Cooperative-Led Mini-Grid Development in Ethiopia

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Acronyms

ADELE	Access to Distributed Electricity and Lighting in Ethiopia
DBE	Development Bank of Ethiopia
ECC	Ethiopia Cooperative Commission
EEU	Ethiopian Electric Utility
EPC	Engineering Procurement Construction
MOWE	Ministry of Water and Energy
MST	Minimum Subsidy Tender
O&M	Operation and Maintenance
PBG	Performance Based Grant
PPA	Power Purchase Agreement

1. Executive Summary

This concept note has been prepared to complement the Guidelines for Cooperative Led Mini-Grids and provides more in-depth guidance on financing of cooperative led mini-grids.

Section 2 recapitulates the three models elaborated in the Guidelines, i.e., the solely cooperative model, the operation and management (O&M) model, and the power purchase agreement (PPA) model, along with their pros and cons and decision tree to guide decision making in terms of choice of model.

Section 3 gives an overview of the minimum subsidy tender and performance based grant approach to subsidising mini-grids, and how cooperatives may apply for either subsidy for the aforementioned three models and the considerations for the same. This section also recommends how the financing may be structured under the different models and how the grant funds, debt and equity may be allocated for different project costs and components.

As subsidies alone cannot finance mini-grids, Section 4 proposes the introduction of concessional loans and loan guarantees to fill in the remaining finance gap and further support development of mini-grids by cooperatives, along with examples from Myanmar and Nigeria.

Finally, Section 5 provides recommendations on additional support mechanisms including pre-investment support (site assessment, pre-feasibility studies, productive use options), technical assistance upon selection of proposal under the subsidy scheme, and O&M support by cooperative unions. Finally, this section strongly recommends that the three models be piloted with the support of the Ministry of Water and Energy and Ethiopian Cooperative Commission.

2. Introduction

Recent Guidelines developed for cooperative led mini-grids presented three viable models - **Solely Cooperative Model** under which a cooperative fully owns and operates the mini-grid system, **Operation & Management (O&M) Model** under which a cooperative owns and private sector operates the mini-grid system in accordance with an O&M contract, and the **Power Purchase Agreement (PPA) Model** under which the private sector owns generation assets and supplies power in accordance with a PPA to the cooperative which owns the distribution assets and retails electricity to its members.

For mini-grids to be viable they require a mix of grants/subsidies, debt and equity financing. Currently, there is no dedicated financing or subsidy window which supports cooperative led mini-grids. However, under Access to Distributed Electricity and Lighting in Ethiopia (ADELE) Project, which is a component of Ethiopia's National Electrification Program, World Bank has committed USD 500 million for deployment of innovative solutions such as decentralized renewable energy technologies, particularly solar photovoltaic (PV) mini-grids and individual solar systems for both household and productive use through public and private delivery modalities. Part of this USD 500 million would be used to provide capital grants for mini-grids deployment in Ethiopia.

Indeed, the Ethiopian Electric Utility (EEU) is currently developing tender processes for financing mini-grids under a Minimum Subsidy Tender scheme (MST) and Performance Based Grants (PBG) scheme, which is expected to be launched in approximately one year. These upcoming schemes provide an excellent opportunity for inclusion of cooperative led mini-grids within the scope of the upcoming tender process. This Financing Concept for Cooperative led Mini-Grids therefore provides **guidance on how the three cooperative led models can be financed through subsidies** under the MST or PBG.

This financing concept is specifically targeted at cooperatives with existing operations and managerial capacities for example a cooperative for coffee, dairy, mining, etc, which may form a multi-purpose cooperative to set up and operate a mini-grid to meet its own and the community's power needs. By doing so, the cooperative would not only act as a reliable off-taker of local goods harvested by the community members, but the cooperatives processing unit where it processes these goods would act as a reliable off-taker for the electricity produced by the mini-grid, which would go a long way in addressing the demand risk which is one of the major risks associated with the mini-grid sector.

The choice of models (solely cooperative, O&M, PPA) would depend on the community and cooperative's capacities, capabilities and available resources and may be guided by the decision tree elaborated under the Guidelines, and which is replicated here.

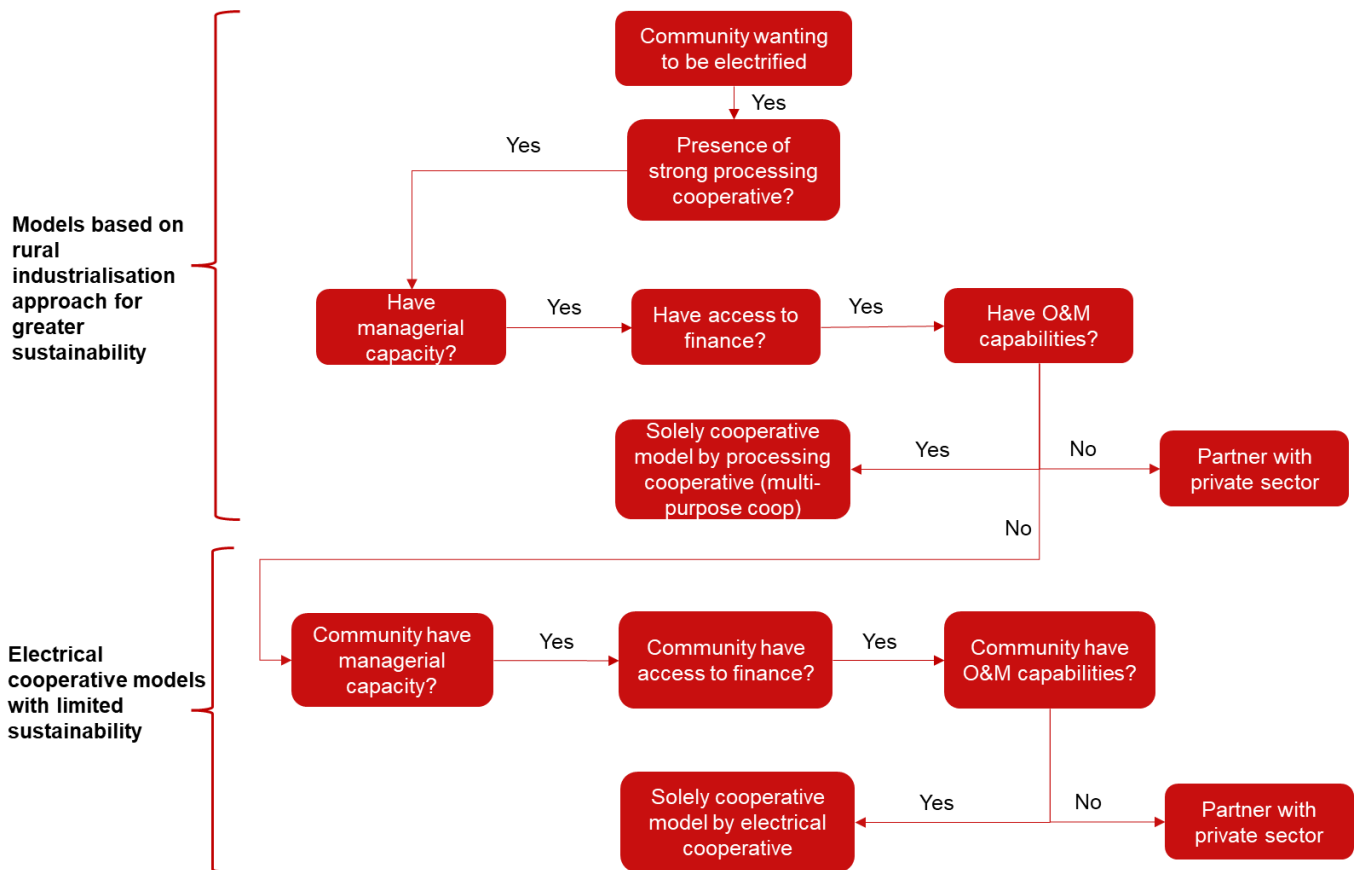


Figure 1. Decision Tree

If a community wanting to be electrified has access to sufficient financing, and to adequate managerial, operations and maintenance (O&M) capabilities, it may opt to form its own electrical cooperative. As remote rural communities typically do not have access to such resources, electrical cooperative set up by such communities would not be very sustainable in the long run, and result in serving fewer members at higher tariffs. This model is therefore not feasible and not explored in depth here.

Instead, the focus of the financing concept are strong cooperatives with exiting processing operations, for example a cooperative for coffee, dairy, mining, etc, that may form a multi-purpose cooperative to additionally set up and operate a mini-grid to meet its own and the community's power needs. Such multi-purpose cooperatives can explore the rural industrialisation approach to mini-grids, thereby increasing their chances of long-term sustainability. Where an existing strong cooperative with its own cooperative operations that can serve as a load/demand (in addition to community's energy needs) for the electricity generated by the mini-grid has strong managerial, technical and O&M capacity, it may opt for the solely cooperative model. If, however, the cooperative lacks the technical and O&M capacities for running the mini-grid but has the managerial and technical capacity to procure mini-grid assets and manage the mini-grid generation and distribution business on its own, it may opt for the O&M model. And where the cooperative lacks technical capacity as well as capacity to carry on the business management and the O&M, it may opt for the PPA model.

The figure below recapitulates the pros and cons of the three models to further guide the choice by cooperatives.

Solely cooperative model	O&M model	PPA model
<p>PROS</p> <ul style="list-style-type: none"> • Strong cooperative can leverage its business, and managerial capacity to run the mini-grid business • Cooperative's on ground presence and local knowledge can support customer management, bill collection, security of mini-grid assets and small maintenance work • Retain cooperative privileges if not regulated under the Mini-Grid Directive 	<p>PROS</p> <ul style="list-style-type: none"> • Longer sustainability of mini-grid due to professional O&M support • Free up cooperative's resources to run other aspects of business • Cooperative's on ground presence and local knowledge can support customer management, bill collection, security of mini-grid assets and small maintenance work • Retain cooperative privileges if not regulated under the Mini-Grid Directive 	<p>PROS</p> <ul style="list-style-type: none"> • Procurement and EPC by professionals with mini-grid expertise • Longer sustainability of mini-grid generation assets due to professionals running the operations • Frees up private sector from being locally present at all times • Frees up cooperative's resources to run the distribution operations • Cooperative's on ground presence and local knowledge can support customer management, bill collection, security of mini-grid assets and small maintenance work • Retain cooperative privileges if not regulated under the Mini-Grid Directive
<p>CONS</p> <ul style="list-style-type: none"> • Cooperatives may struggle with procurement of EPC due to lack of experience • Cooperatives may struggle with business management and financing the mini-grid • Mini-grid may not be sustainable due to lack of technical expertise for O&M work • Lose cooperative privileges if choose to be regulated under Mini-Grid Directive 	<p>CONS</p> <ul style="list-style-type: none"> • Cooperatives may struggle with procurement of EPC/O&M due to lack of experience • Cooperatives may struggle with business management and financing the mini-grid • Cost of O&M may be high • Private sector not as interested in small spread out O&M contracts • Lose cooperative privileges if choose to be regulated under Mini-Grid Directive 	<p>CONS</p> <ul style="list-style-type: none"> • Risk of termination and tariff dampening is high for private sector if cooperative is a single customer • Cooperatives may struggle with managing and maintaining the distribution network • Lose cooperative privileges if choose to be regulated under Mini-Grid Directive

Figure 2. Pros and Cons of Cooperative Led Mini-Grid Models

Based on the above matrix and the knowledge of the mini-grid sector and feedback from various public and private stakeholders in Ethiopia, it is recommended to opt for the PPA model for cooperative led mini-grids. However, this financing concept applies to all three models.

The following section gives further insight into the MST and PBG and how cooperatives can apply for either window, and the financing structure and fund allocation for all three models.

3. MST/PBG for Cooperative Led Mini-Grids

Minimum Subsidy Tender (MST) and Performance Based Grant (PBG), have typically been used by World Bank and other development partners to promote mini-grids in many countries. Under MST, sites will be pre-selected by EEU, which will be the tendering agency in cooperation with MOWE, using geospatial analysis with World Bank's support. These sites will then be tendered to mini-grid developers. Site surveys may also be conducted by EEU to collect data on customer segmentation, productive use opportunities, estimated consumption and made available to bidders with one or more suggestions on optimal mini-grid design for each site.

Proposals requiring the least amount of subsidy for a minimum number of connections would be selected by EEU and receive a subsidy to cover part of their capital expenditure to build, own and operate the mini-grids at the pre-selected sites. The number of customer connections to be achieved would be defined by EEU, which would disburse the grant subsidy upon verifying that the required number of connections have been established.

On the other hand, under the PBG, mini-grid developers would be free to identify and validate their own sites and/or communities for development of mini-grid(s) and would receive a fixed grant amount per connection which would be defined by EEU and MOWE together with World Bank. Once the mini-grid is constructed and customers have been connected, the grant would be disbursed after EEU has verified that customers are connected and receiving satisfactory service.

Proposal under both schemes would be evaluated based on quality (technical proposal) and price. The MST and PBG which is currently being conceived by EEU only envisages the participation of private sector mini-grid developers. This financing concept proposes the inclusion of cooperatives, solely on their own and in partnership with the private sector, under these schemes.

Below, this concept elaborates how cooperatives under the different models may apply for the MST/PBG subsidy.

3.1 Solely Cooperative Model

Application and Qualification. If the cooperative interested in developing a mini-grid is located in an area which has been pre-selected by EEU under the MST, such a cooperative may apply for a grant under the MST. Alternatively, a cooperative wanting to electrify a community and power its own operations may make an application under the PBG window.

For either option, the cooperative would be required to demonstrate key managerial, business management, technical, and O&M skills and experience as part of the eligibility and technical criteria. This may include past experience with developing mini-grids, capacity to undertake feasibility studies, design a system appropriate for meeting the current and future demand of the community it aims to serve and its own operations, procure, install and maintain mini-grid

generation and distribution assets.

The cooperative would also have to present an assessment of the lowest subsidy it would require under the MST which would have to be competitive compared to other cooperative or private sector competitors. If the cooperative is successful, it would enter into a grant agreement with MOWE or EEU and upon connecting the required number of community members be entitled to receive the grant subsidy under the MST/PBG.

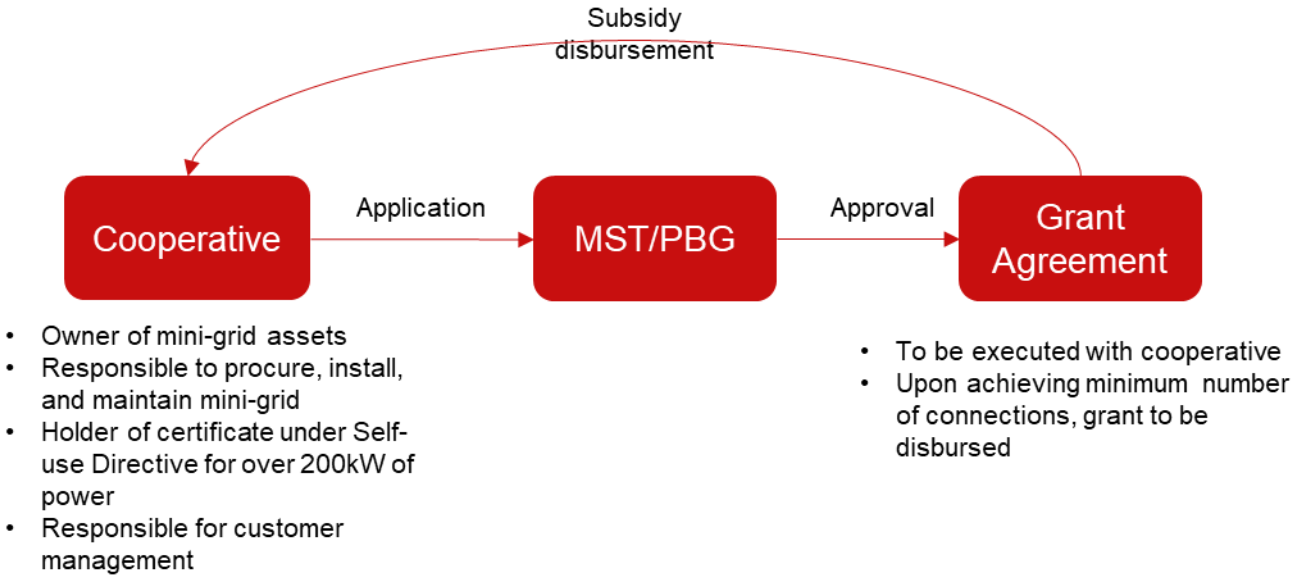


Figure 3. Solely cooperative application under MST/PBG

Financing Structure. Under this option, it is envisaged that MOWE/EEU shall contribute approximately 50% of the project costs under the MST/PBG subsidy, and the cooperative would need to provide 20 to 25% as equity and seek the remaining 25 to 30% as debt financing from a cooperative bank, microfinancing institution, rural Saving and Credit Cooperatives (SACCOs) or any other financing institution. The figure below illustrates this financing structure.

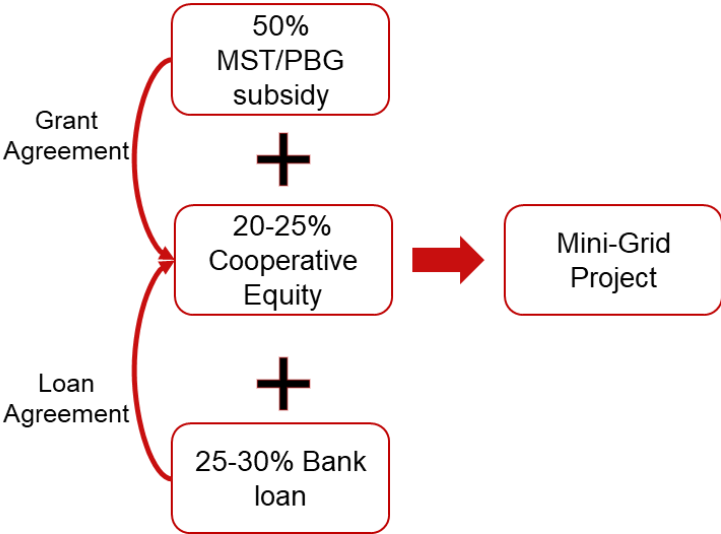


Figure 4. Financing structure for solely cooperative model under MST/PBG

3.2 O&M Model

Application and Qualification. As with the solely cooperative model, under this model too a cooperative may apply under the MST if it is located at a pre-selected site or make an application for a site of its own choosing under the PBG window.

The considerations under for the eligibility and selection criteria would also be the same as under the solely cooperative model, i.e., the cooperative would be required to demonstrate key managerial, business management, technical, and O&M skills and experience and additionally for MST submit an assessment of the subsidy required. However, for O&M experience the cooperative would be able to refer to the expertise and experience of the O&M provider that it would procure for this purpose.

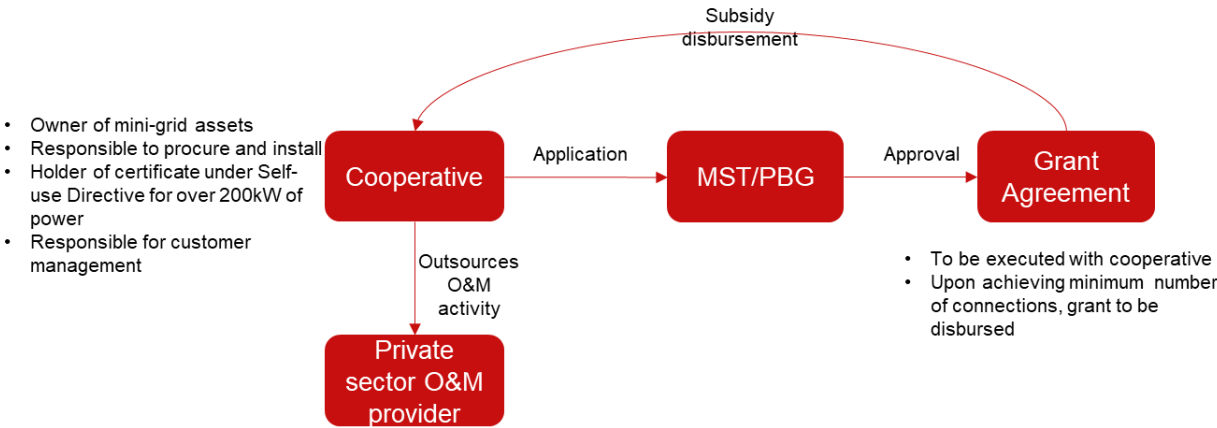


Figure 5. O&M model application under MST/PBG

Financing Structure. The financing structure for deployment of the O&M model would also be the same as the solely cooperative model as illustrated in Figure 4 above.

3.3 PPA Model

Application and Qualification. Under this approach, the mini-grid developer and cooperative may form a consortium to allow for a joint application, with the cooperative being the lead member. The mini-grid developer would be responsible for procuring and installing the mini-grid generation and distribution assets. The mini-grid developer would further own and operate the generation assets and supply electricity to the cooperative under the PPA, which the cooperative would use for its own operations and further supply to its members using the distribution network which would be owned and operated by the cooperative. The consortium may apply for the MST if the cooperative has its operations at one or more of the pre-selected sites, or select a site of their own and apply under the PBG.

As owner and operator of the generation system, the mini-grid developer would be required to demonstrate key managerial, business management, technical, and O&M skills and experience as part of the eligibility and technical criteria. The cooperative would only need to demonstrate its experience and skill with customer management and non-technical maintenance of the distribution network. The cooperative, as the main beneficiary of the subsidy, would be in lead of the consortium.

If the joint application of the consortium is successful, it would enter into a grant agreement with MOWE or EEU and upon connecting the required number of community members be entitled to receive the grant subsidy under the MST/PBG. One of the conditions under the grant agreement would be that the private developer would build and transfer the distribution network to the cooperative, which would own and operate it.

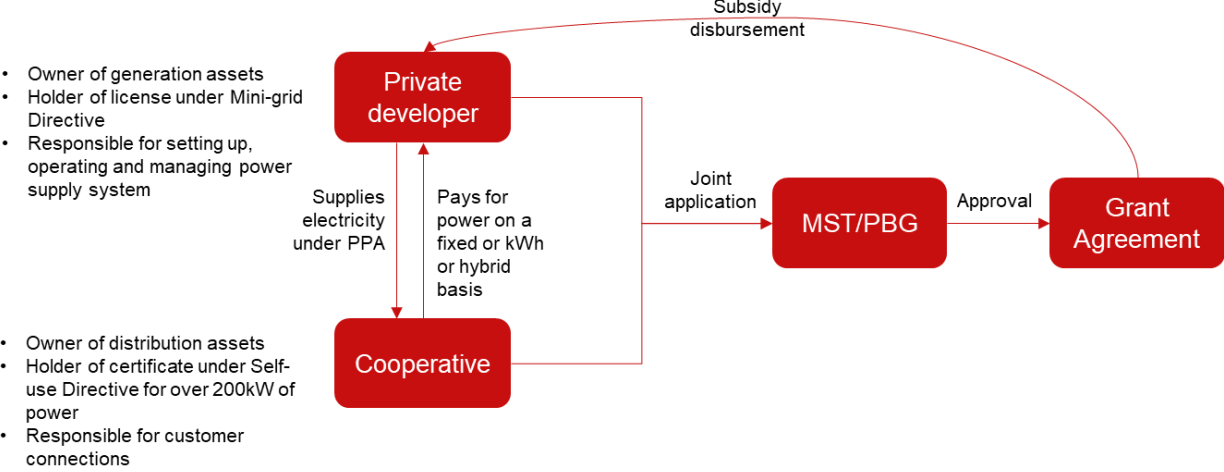


Figure 6. PPA model application under MST/PBG

Financing Structure. Under this option, it is envisaged that MOWE/EEU shall contribute approximately 50% of the project costs under the MST/PBG subsidy. The private sector would need to provide approximately 10% as equity while the cooperative would be required to contribute 5% in equity which may be in kind equity. The remaining 35% would need to be sought as debt financing by both the private developer and the cooperative, with the majority of the debt to be channelled through the private developer. The figure below illustrates this financing structure.

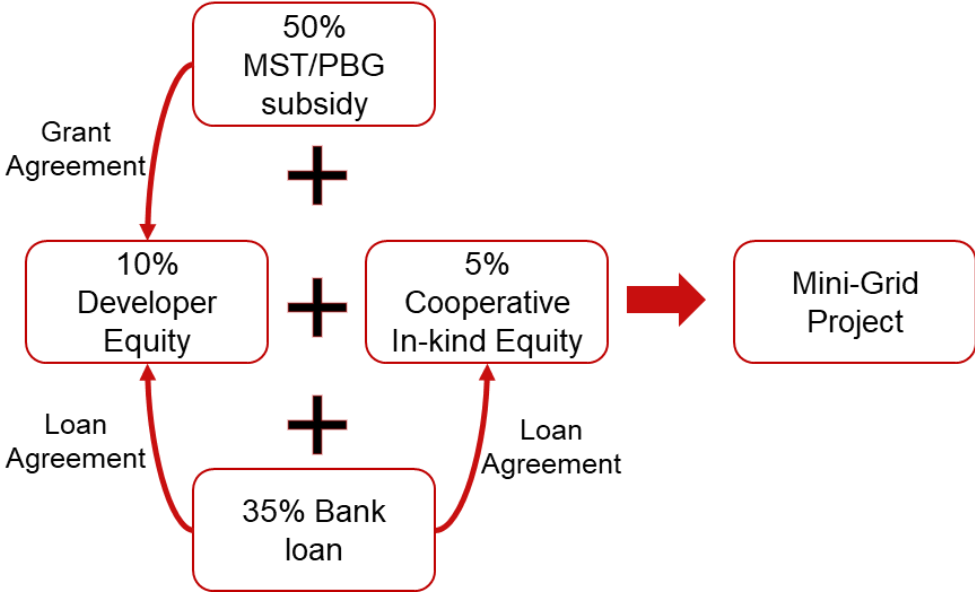


Figure 7. Financing structure under PPA model

3.4 Allocation of funds under the three models

Under the **Solely Cooperative and O&M Model**, it is envisaged that the grant funding received from the MST/PBG window shall be applied towards procurement and installation of the distribution network, prepaid metering and vending system, customer connections, indoor installations, power house and fencing around the power plant. The 20-25% equity contribution of the cooperative and 25-30% debt is envisaged to be applied towards procurement and installation of generation assets including photovoltaic (PV) panels, batteries, inverters as well as productive use assets to be used and/or distributed to community members by the cooperative. The equity contribution from the cooperative may also include in-kind contribution in the form of land for installation and housing of the generation assets and labour from community members for erecting of poles and other construction work.

Under the **PPA model**, the application of the grant funding is envisaged to be the same as under the other two models. As the lead in the consortium, the cooperative would be the main beneficiary of the grant funding and would own and operate the distribution assets and manage customer connections. The 10% equity contribution of the developer and debt financing secured by the developer would be applied towards procurement and installation of generation assets, while the equity contribution from the cooperative would be in-kind (land for generation assets, and labour contribution) and the debt secured by the cooperatives would be applied towards procurement of productive use assets.

4. Remaining Financing Gap

Even with the provision of a 50% subsidy, a substantial financing gap shall remain. Mini-grids under this scheme will require debt financing with favourable conditions. Commercial loans provided by the Development Bank of Ethiopia (DBE) for example, have an interest rate ranging from 9 to 12% p.a. and require 100% collateral for the credit provided. Cooperative banks have more favourable lending conditions, for example, the Cooperative Bank of Oromia has interest rates in the range of 8.5 to 11.5% p.a. which is still on the higher end for mini-grid projects, and may have collateral requirements beyond just the mini-grid assets.

Mini-grids require low interest rates of less than 8% p.a. with only the mini-grids assets (generation assets) as collateral. Additionally, as many components of the generation system must be imported, cooperatives and/or mini-grid developers would also require foreign exchange to make payments for this. As such, loans must be accessible in Birr with the possibility of accessing hard currency (USD, EUR or other) for import of equipment. Presently such conditions do not exist. This is a gap that still needs to be addressed.

One option is the introduction of concessional loans for mini-grids. For instance, the Rural Electrification Fund (REF) provides loans for promoting clean energy through DBE. The scope of this window includes solar home systems and lanterns but not mini-grids and may be restructured to include mini-grids, so that any future funds channelled through this window may also be applied towards development of mini-grids. As mini-grids are new to the infrastructure sector, and there is a lack of experience and understanding of the working and peculiarities of mini-grid projects, lenders are typically hesitant to lend to these projects on favourable terms. As such, in addition to including mini-grids within the ambit of REF, it is recommended that DBE be trained to be better acquainted to the needs of mini-grid projects to facilitate it in supporting mini-grid's financing requirements.

Another recommended intervention is sensitisation of cooperative banks by the Ethiopian Cooperative Commission (ECC) towards the needs and requirements of mini-grid projects and development of favourable lending conditions by cooperative banks to cooperatives wanting to set up mini-grid projects. ECC may also support cooperative banks in the development of a due diligence checklist or methodology for vetting of mini-grid projects that apply for loans to further ease up the application and loan approval process.

Another mechanism which may be considered is the introduction of a guarantee fund by the Ministry of Water and Energy (MOWE), which may accredit various banks (cooperative, commercial, development banks) as participating financing institutions and provide guarantees up to a certain percentage of the loan amount provided to mini-grid projects. This may be a sector wide intervention and not limited to cooperative led mini-grids.

The box below provides examples of financing mechanisms which have been introduced or are being developed in other developing countries to complement grant funding to mini-grid projects.

Bridge loans in Myanmar

To complement the grant subsidy by Myanmar's Department of Rural Development to mini-grid developers and support development of mini-grids, Smart Power Myanmar provided trainings to commercial banks and developed a bridge loan facility together with them to cover the equipment costs of mini-grids being developed under the government subsidy. The bridge loan addressed a critical gap in financing as developers are required to procure high cost equipment and undertake installation work prior to grant disbursement which only happens upon establishment of minimum connections.

Mini-grid guarantee fund in Nigeria

GIZ's Nigerian Energy Support Programme is working with the Impact Credit Guarantee Limited to develop a solar mini-grid guarantee fund facility, which aims to accredit commercial banks and provide them with a 75% guarantee for loans provided by such banks to eligible mini-grid projects. The goal of the guarantee fund is to induce the commercial lending sector to lend to mini-grid projects at more favourable interest rates with only mini-grid assets as collateral, thereby filling the gap in debt financing for mini-grids.

5. Recommendations on Additional Supporting Mechanisms

Next generation renewable energy mini-grids are new to the Ethiopian off-grid market, and more so for cooperatives. As such, subsidies and concessional loans alone will not be enough to support the deployment of cooperative led mini-grids. Support mechanisms which can further capacitate and support cooperatives in the development and operation of mini-grids would also be needed. These support mechanisms are discussed below.

5.1 Pre-investment Support and Technical Assistance

Even before the decision to develop mini-grids, a variety of evaluations have to be undertaken that feed into the decision making. This includes, site assessment and site selection using geospatial analysis and physical appraisal, pre-feasibility and feasibility studies to gauge the commercial and social potential and benefit of mini-grid deployment, market and resource assessments to check the viability of the mini-grid project.

This requires specific commercial, business, technical, and environmental know-how which cooperatives and even new private sector entrants to the mini-grid sector may often lack. MST already envisages pre-selection of appropriate sites, however it is recommended that the scope be broadened to further select sites with existence of strong cooperatives, so that such cooperatives may also have the opportunity to apply under the MST on their own or in partnership with private sector actors. This can be packaged with information on customer segmentation, productive use options, and a model mini-grid design which may be further adapted by the applying cooperative or consortium led by a cooperative. To facilitate appropriate site selection under PBG, a database of sites appropriate for mini-grid development can be created for the benefit of applying entities (both cooperatives and private developers). This database can also map existing cooperatives to facilitate partnerships between cooperatives and private developers.

Next, it is recommended that technical assistance be provided to cooperatives whose proposals have been successful under either the MST or PBG window to further refine their business models to ensure their success. This technical assistance may include review of business and financial plans, improvement of mini-grid system design, guidance on equipment procurement, customer management and monitoring activities.

5.2 Support for productive use appliances or equipment

Mini-grids typically see low demand for electricity in the first couple of years of operation. Furthermore, future demand is difficult to predict. To mitigate this demand risk, productive uses which require higher loads than households can be encouraged and promoted.

The existence of a cooperative's own operations would mitigate the demand risk to a large extent. However, this can be further bolstered by providing subsidies or concessional loans to cooperatives and to their members through the cooperatives for purchase, installation and operation of productive use appliances and equipment. The subsidy or concessional loan may be provided by ECC and channelled through the existing network of cooperative banks or rural SACCOS.

A similar subsidy is provided in Nigeria to complement the MST and PBG under the Nigerian Electrification Project. The scheme covers the incremental costs of mini-grid developers in integrating the supply of energy efficient and productive use equipment, like transport, marketing, end-user financing, installation, training, repairs, replacements etc.

Uptake of productive uses of energy may even bring down the cost of electricity for the members. According to a World Bank analysis, a 40 percent capital cost grant reduces the levelized cost of electricity from \$0.55/kWh to \$0.43/ kWh in a scenario with very low productive uses of electricity. On the other hand, in a scenario in which productive uses increase the mini grid's load factor to 40 percent, the same 40 percent capital cost grant reduces the levelized cost of electricity from \$0.42/kWh to \$0.34/kWh.¹

5.3 Cooperative Unions for O&M support

Where cooperatives opt for the Solely Cooperative Model, they may require support for continued O&M of the generation and distribution assets. Even under this PPA Model, as owner and operator of the distribution network, cooperatives may require such support. It is recommended that this requirement be fulfilled by cooperative unions who can procure O&M services for the cooperative led mini-grids.

A benefit of a cooperative union providing or coordinating O&M services would be that it could pool in various cooperative operating mini-grid assets and be able to procure O&M services at more competitive rates than primary cooperatives may be able to. This would also be attractive for private sector O&M providers, as they could secure a larger contract to service multiple cooperatives led mini-grids rather than one or two such mini-grids.

It is recommended that ECC with the support of the MOWE sensitise union level cooperatives and capacitate them in providing O&M support to cooperative led mini-grids at primary level.

5.4 Next Steps

Finally, it is strongly recommended that three models be piloted with the support of MOWE and ECC to demonstrate their working and gain practical knowledge from their development and implementation. With learnings gained from the pilot, it is recommended that the development partners and MOWE lobby with EEU and World Bank for the inclusion of the three models (or the most viable of the three models based on the results of the pilot) under the MST and PBG subsidy windows.

¹ World Bank, ESMAP, 2019, Mini-grids for Half a Billion People: Market Outlook and Handbook for Decision Makers, [World Bank Document](#)