

USTDA-REA Solar Mini-grids Workshop: Regulatory Framework and Quality Assurance

Grid Integration: Preparing for Future Grid Connection

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OVERVIEW OF MINIGRID INTERCONNECTION OPTIONS

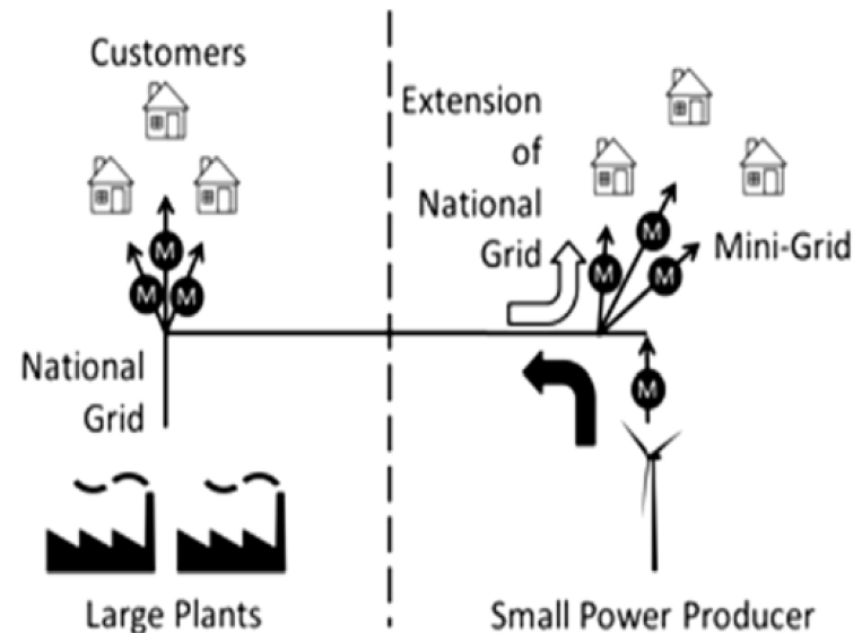
- 1. Minigrid Operator (MGO) stops operating the minigrid but keeps operating the generating plant*
- 2. MGO is a wholesaler of electricity*
- 3. MGO keeps operating both generating plant and minigrid*
- 4. The main grid is only serving as backup energy*

OVERVIEW OF MINIGRID INTERCONNECTION OPTIONS

5. *Sale of minigrid assets to the main grid operator*
6. *MGO abandons the site and removes the generation assets*
7. *Distribution franchisee*
8. *No interconnection*

Option 1: MGO stops operating the minigrid but keeps operating the generating plant

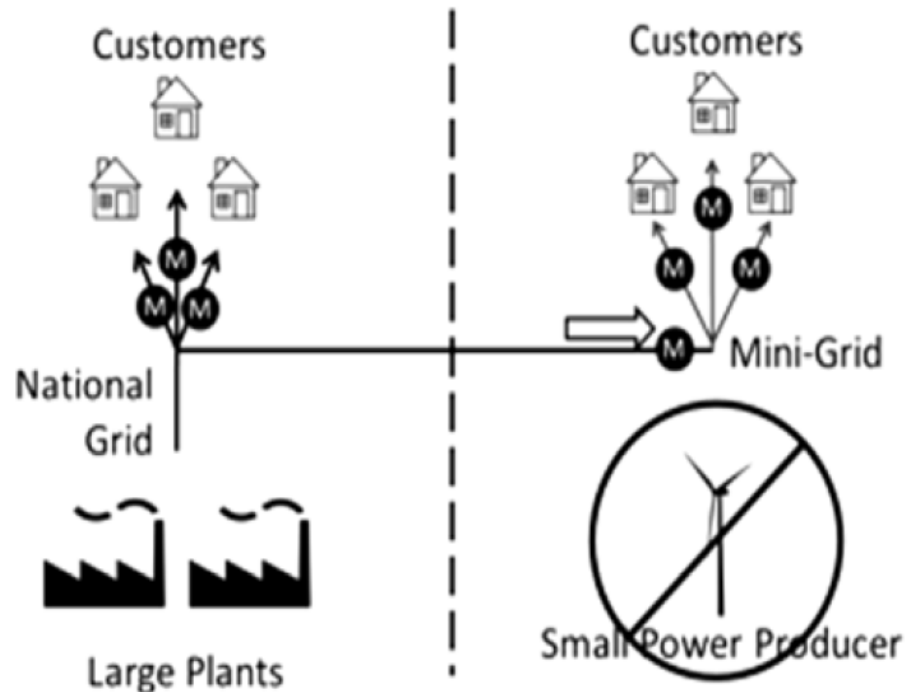
- The MGO becomes an independent small power producer (ISPP) and signs a PPA with the main grid operator or distributor. The FIT required to maintain financial viability of the generation plant will depend on each individual project



Tenenbaum et al, 2014

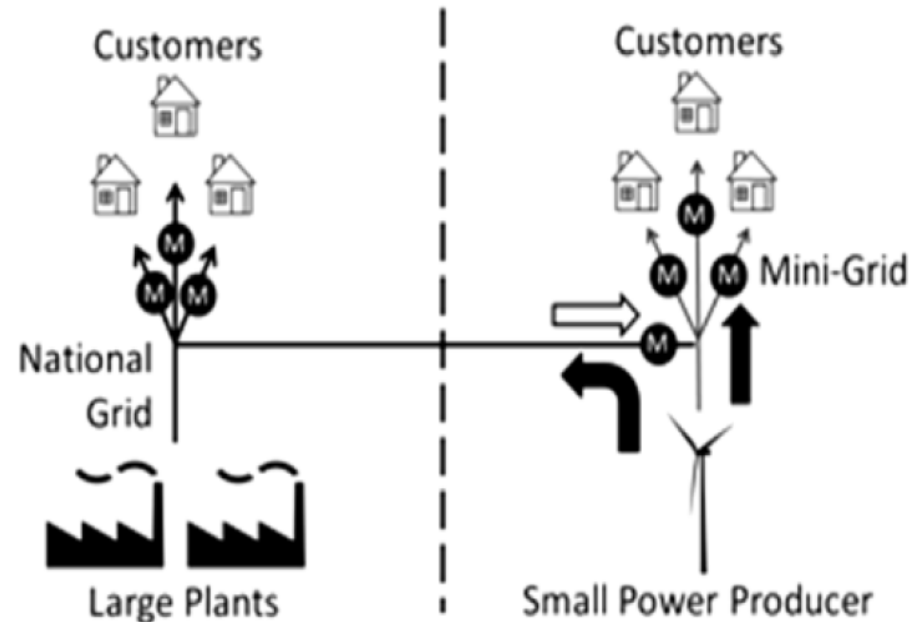
Option 2: MGO is a wholesaler of electricity

- The MG operator becomes an independent small power distributor, signs a PPA with the main grid operator or distributor and purchases bulk electricity to sell to its consumers.



Option 3: MGO keeps operating both generating plant and minigrid

- The MGO interconnects with the main grid but remains both a small power distributor and producer. The MGO can also sell surplus to the main grid.



Tenenbaum et al, 2014

Option 4: The main grid is only serving as backup energy



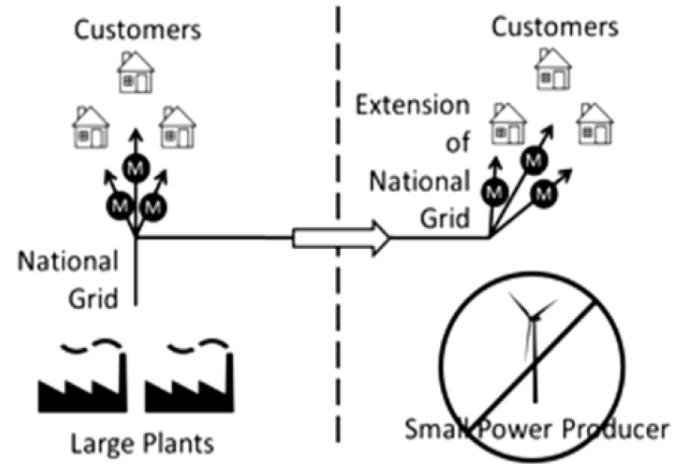
- The MGO is seen as a large consumer and shall enter into a contract/agreement with KPLC for backup power provision:
- KPLC shall not unreasonably withhold the MGO's request.
- The MGO and KPLC shall agree on a tariff with two components:
 - A fixed demand charge, mostly depending on the power capacity subscribed (KES/kVA)
 - An energy charge (KES/kWh)
- The tariffs methods CI1, CI2, and CI3 shall apply depending on the voltage level at the interconnection point.
- The consumer tariff shall be a mutually agreed tariff or the tariff for minigrid projects taking into account Government/public subsidies or grants.

Option 5: Sale of minigrid assets to the main grid operator

- If the MGO is given the option to transfer the MG assets to the main grid operator (provided they are in compliance with the utility's distribution system standards and codes) they should be given compensation.
- The compensation shall be calculated based on the depreciated value of assets, which in turn shall be determined by applying the Straight Line Method (SLM) on the book value of the MG assets as per data for the year of commissioning of the MG project. If both parties do not agree on the compensation price, the regulator shall intervene.

Option 6: MGO abandons the site and removes the generation assets

- This option is similar to Option 5, only that the sale of the assets is limited to the distribution network provided it conforms to Standards and codes. If the main grid operator refuses to purchase the distribution minigrid assets or if both parties do not agree on the compensation price, the Regulator shall intervene



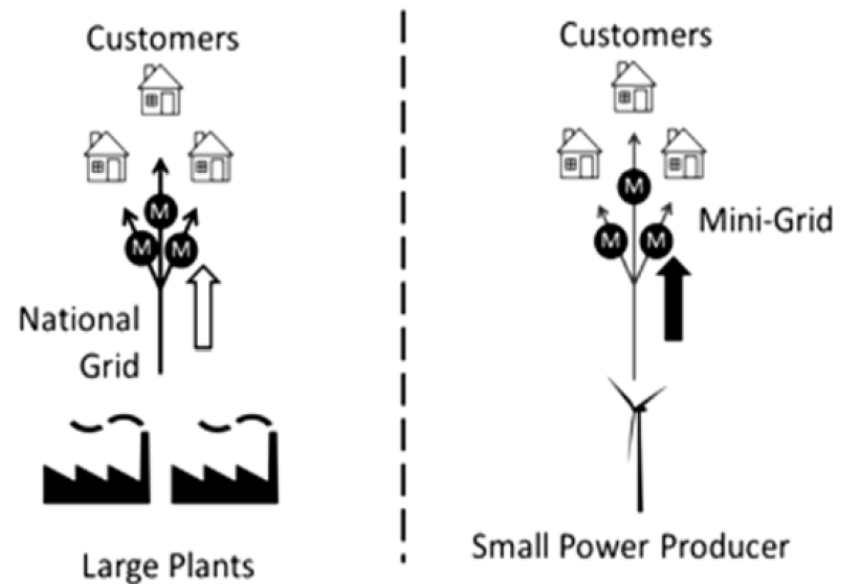
Tenenbaum et al, 2014

Option 7: Distribution franchisee

- Here the MGO becomes a distribution franchisee and signs with KPLC a Distribution Franchisee Agreement for undertaking distribution activities on KPLC's behalf. For this role, the MGO shall be compensated through a fee mechanism to be stated in the Franchisee Agreement.
- Before undertaking the role of franchisee, the MG operator shall be compensated as per Option 6, for its generation and distribution assets.

Option 8: No interconnection

- The MGO continues its operation without connecting to the main grid. Both operators share the same geographic area and customers are free to choose their electricity supplier. This option entails a major risk, that of an illegal interconnection, which might threaten the safety of operating both the minigrid and the main grid. Both operators shall ensure the safety and reliability of their respective grid.



Tenenbaum et al, 2014

Option 9. A MGO enters into a PPP agreement

- MGO provides electricity services to consumers on behalf of the contracting authority, here the GoK/REA/MoEP/county government, and receives a benefit of performing a public function by way of:
 - (i) compensation from a public fund;
 - (ii) fees collected from consumers through their electricity bills;
 - Or (iii) a combination of such compensation and such fees.
- The MGO is generally liable for risks arising from the performance of the function in accordance with the terms of the project agreement.

Option 9. A MGO enters into a PPP agreement

- PPP procedure is much longer
- Under present regulations, PPP does not protect potential MGO against interconnecting with the main grid, unless each minigrid project agreement involves the transfer of assets.
- PPP fund is multinodal and multisectoral, the offgrid sector needs a specific financing mechanism
- For projects above a critical capacity size, and subject to procurement through a competitive bidding process .
- Entering into PPP without procurement is allowed but is an exception, provided the appropriate risks are transferred to the private party.