



Mini-grids for the Bottom Billion for a Sustainable Rural Living

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Why Rural Development?

- 45% (3.4 b) of global population lives in rural areas
- Despite rapid urbanization percentage of population living in rural areas is projected to remain high (3.1 b in 2050) and with high-levels of poverty
- 85% of multi-dimensionally poor live in rural areas
- Characteristics of rural poor
 - Work in agriculture with less chances to come out of poverty
 - 39% have no formal education
 - 44% are less than 14 years of age
 - they are underfed and experience hunger, rely heavily on biomass and dirty fuels, limited access to clean water and sanitation
- Size of rural areas is 30 times bigger than urban areas

Sustainable Development: Rural-Urban Linkages

- Continuum of spaces
- Balance in rural-urban linkage is necessary to address poverty, inequality and environmental degradation
- Rural households are caught in a vicious circle of poverty, poor health, limited human capital and degraded environment

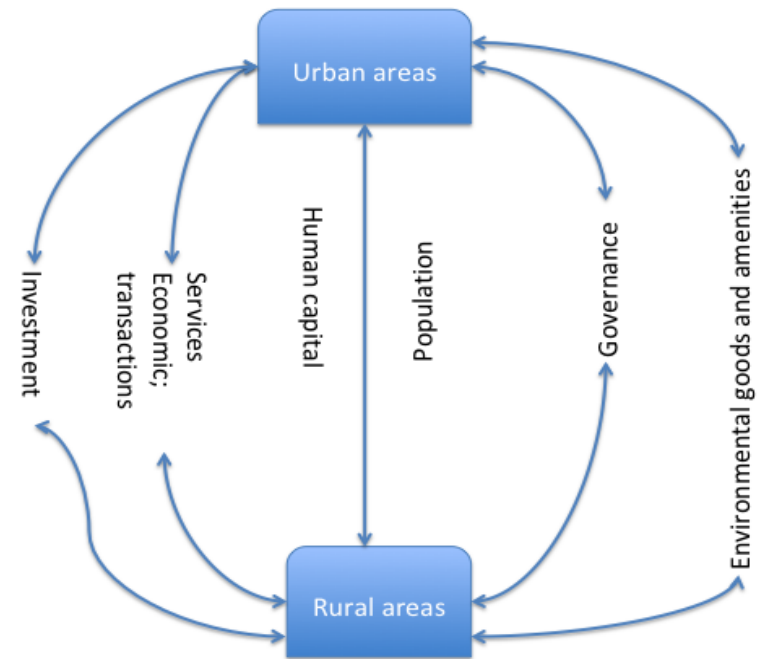


Fig. 1: Urban - rural interdependencies



BoP: Vicious Circle

- BoP population: Income below \$2/day/person
- In India, 57% of income of rural poor towards food requirements, yet diet is comparable to that in a developed country
- Lack of wealth → income ability
- Limited institutional capital → income generation abilities
- Reliance on informal sector activities, seasonal labor work, agriculture with limited value added production → limits income generation potential
- Limited income → greater reliance on natural capital, aggravated by tragedy of commons



Mini-grids and Rural Sustainability

- Broad mini-grid definition
 - Array of business and financial models when it comes to mini-grids for BoP
 - Hope that access to electricity provides socio-economic benefits for BoP
 - Opportunities for income generation directly resulting from access to electricity?
- ➔ potential to break the vicious cycle and create a virtuous cycle?



If and how mini-grids facilitate sustainable rural living?



About Gram Oorja

Gram Oorja Implementations



Gram Oorja fulfills the electricity, cooking fuel and water needs of tribal communities in the remote regions of India

WHAT?



56+

Micro-Grids



90+

Solar Water
Pumps



2

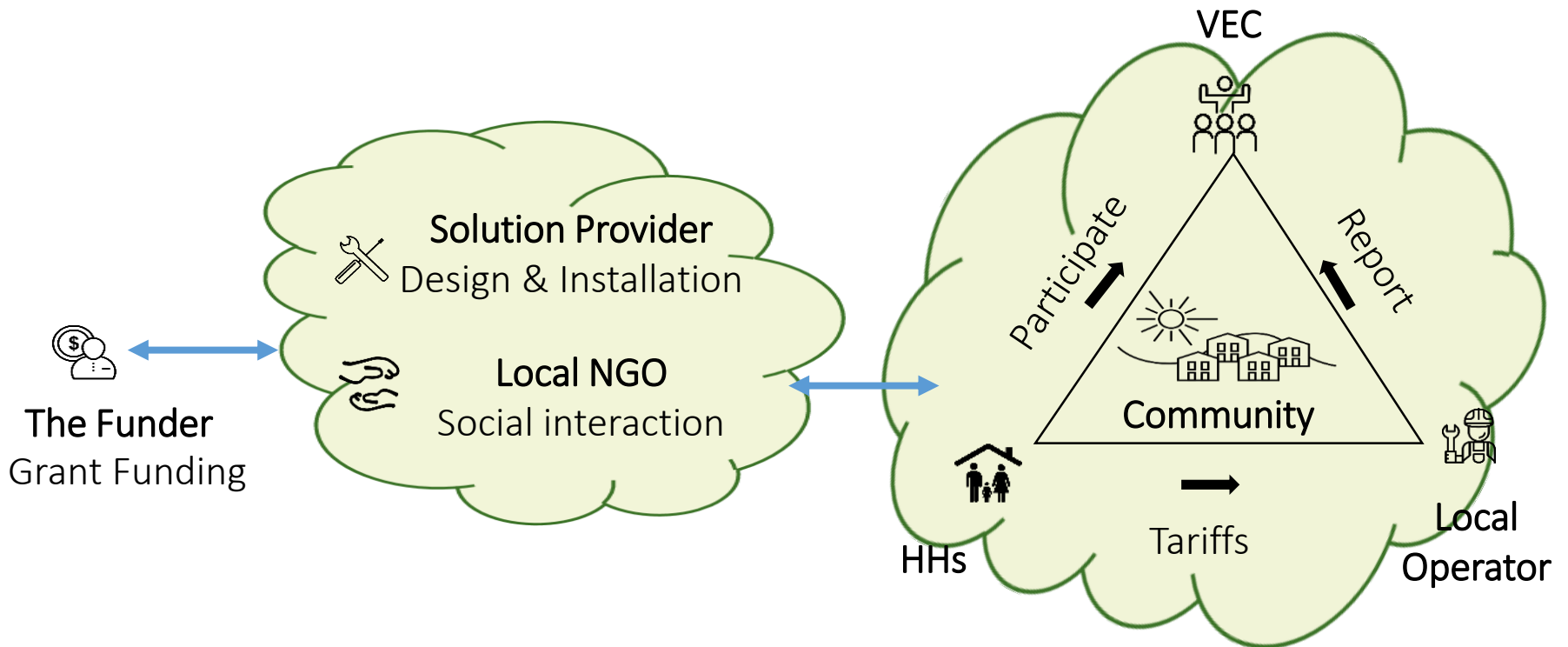
Biogas
Cooking Grids

WHERE?

Remote villages in the tribal
belt of India



Gram Oorja's Community-Ownership Model



Assessment of their 24 SMGs showed high quality, reliable and affordable supply of electricity across all implementations



Observations



Access to Basic Amenities

- Clean Water
 - Solar water pumping, particularly when the water source is at a distance
 - Water tank, supply and distribution management systems are functional
 - Health benefits observed
- Sanitation
 - Baseline sanitation prior to SMGs differed across villages
 - In some cases access to water supply from SMGs caused improvements in the form of home and public toilets
 - Running water for improved sanitation continued to be an issue in most cases
- Public lighting
 - Infrastructure created, but mixed reliability was observed
- Other civic infrastructure
 - Limited to no change was observed in most cases
- Access to improved education
 - Improved access to electricity in schools and at homes created positive effects
 - However, limited to no changes to other educational infrastructure



Economic Growth Opportunities

- Improved agricultural production
 - Occasionally additional crop with intentional intervention and partnerships; limited water supply and traditional irrigation practices were constraining;
 - Some productivity improvement practices to support existing agricultural activities (ex rice hullers)
 - Value added agricultural production – intent found in some cases but no evidence at the time of assessment
- Other local sources of income
 - Few small businesses started to serve the village – local shops, flour mills
 - Some villages had Self-Help Groups but lacked initiative to leverage it for income generation
 - Connectivity between cluster of villages presents issues to scale local businesses
 - No evidence of concerted effort to plan for income generation using electricity

Note: Gram Oorja installations are primarily designed for domestic use and public lighting with some capacity planned for commercial use. Their focus is not on ensuring electricity use for economic activities.



Growth of Human, Social and Institutional Capital

- Human capital: little to no changes were facilitated by access to electricity
- Social capital
 - Greater sense of connectedness within the villages and with the outside world
 - In some cases villages leveraged the institutional structures for new village-level projects for cultural activities
 - Too early to see downstream benefits, particularly for income generation arising from enhanced connectedness
- Institutional capital
 - Little to no immediate changes observed when it comes to access to financing, markets, or policies and regulations
 - Cases where primary health care centers were brought on the SMGs, access to healthcare had significantly improved
- Empowerment
 - Successful energy related village institutions build confidence among villagers
 - Women have greater control over their activities, more productive
 - Women involvement in energy committees created psychological empowerment



Conclusions: Creating a Virtuous Circle

- Positive social externalities
 - Little to no extra effort needed
- Positive economic externalities
 - Some can occur naturally with limited support
 - Integration with rural development agenda is necessary for significant economic impact
- Missing links for basic amenities and strengthening rural niche
 - Cannot assume that social enterprises providing access to electricity will / should have responsibilities for rural development
 - **Community development agencies** have a crucial role to play – to bring the right players to table, time the initiatives and maximize impact of access to electricity
 - However, this group depends on public sector support for institutional capital necessary for the initiatives



THANK YOU!

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