Expanding Rural Energy Access and Improving Agro Industrial Energy Efficiency through Targeted Interventions

Sonya Fernandes,
Programme Manager
Renewable Energy and Energy Efficiency Partnership (REEEP)
REEEP South Asia Secretariat, India

Abstract

While access to low-cost, clean, safe, modern and sustainable energy technologies is a priority to farmers and agro-communities residing in villages, improving energy efficiency as a cost cutting measure is extremely important to rural agro industries, especially micro, small and medium enterprises (MSMEs). Hence specific and targeted projects focusing on building awareness at the grass-root level, technology transfer, capacity building and fast-tracking clean energy financing to these sector are crucial growth and development drivers.
This paper presents case studies of a few such REEEP (Renewable energy and energy efficiency partnership) supported, monitored and assessed projects undertaken in India and replicated in other developing countries.

Scalable Biomass Gasification Models in India

In most South Asian Countries, biomass fuels dominate rural energy consumption patterns, accounting for over 80 per cent of total energy consumed[1] and wood is the most commonly used source followed by crop residues, livestock dung and agricultural biomass.

In countries such as India the biomass technology for woody biomass for thermal and power generation is well developed and the low bulk density biomass rice husk is widely used in the country.

Table 1: Internal usage pattern of biomass in India[2]

Block	Consumption
Wheat Straw	Fodder
Rice Husk	Industrial Fuel
Paddy Straw	Raw Material for paper mills/agro industries and very minimum used as fodder
Cane Tops and Trash	Tops- used as Fodder/thatching Trash-Used as domestic Fuel
Mustard Residue	Domestic Fuel

While project developers in the biomass gasification industry have tried various models and techniques to help accelerate the pace of technology adoption, they have also come to realize that any kind of a fragmented approach is quite detrimental and could run to the project a ground.

Technology-wise one most common method used in making biomass gasification projects sustainable is by increasing the diversity of the fuels to include leafy biomass, agricultural residues and by capitalising on the cheap fuel available locally. Yet another

1 Swaminathan M.S., .2011, Working Paper on Bioenergy Resources Status in India
2 Dalkia Industries Field Survey

essential element is the practice of linking technology, supply chain and users through appropriate business and financing mechanisms.

To efficiently achieve this, smart investment and expansion tools need to be designed in consultation with regional rural banks (RRBs), Grameen (rural) banks and financial institutes.

A REEEP supported biomass project implemented in the sugar belt at the heart of rural Uttar Pradesh, India uses a business cum financing plan for rural biomass based decentralized generation. This model integrates farmers, rural agriculture markets, local financing institute, sugar industries and the community.

A 20 kW straw based gasifier plant is set up close to a sugar manufacturing industry but owned, managed and operated by the local farmer's market club, traditionally known as Hariyali Kisan Bazaars. The onus of, ensuring that the fuel supply comes from the surplus biomass, that there is finance available to run the technology and revenue generated from the unit is collected and distributed, is on the farmers. The role of the sugar manufacturing industry here is to provide maintenance, servicing & technology support, capacity building and training if needed. This entire model is based on revenue and service for fee model which seems to be working quite well and the gasification unit now powers the farmer supermarkets, shops and even the village milk preservation and cooling unit.

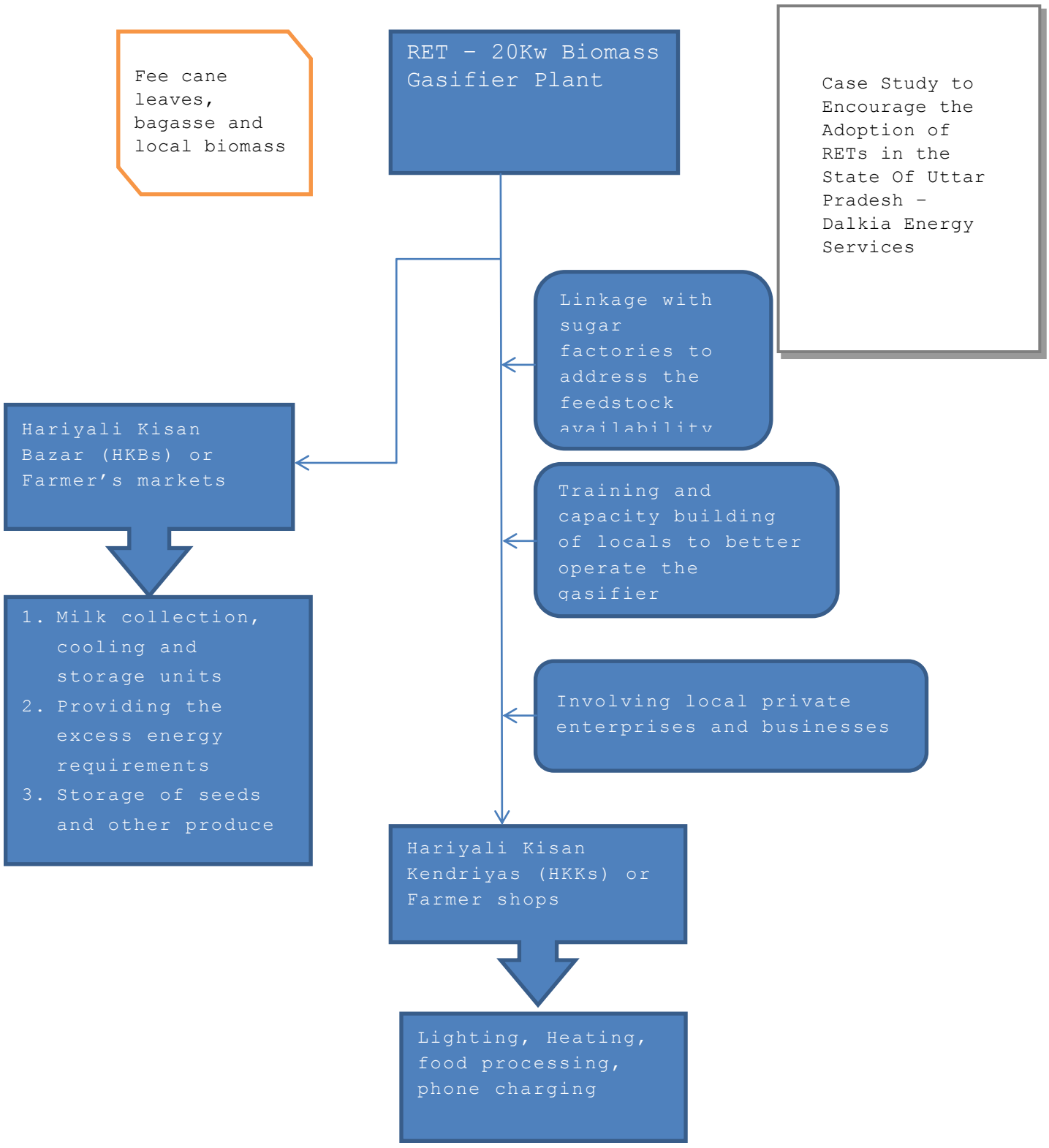
This project is an ideal example of expansion of rural energy access and clean energy network. There is a possibility of scaling up the projects to include 400 more farmer markets with a potential of serving over 15,000 farmers in state of Uttar Pradesh.

Yet another project that has been recently commissioned and is being monitored by REEEP is on creating a fuel barter model for sustainable power generation using biomass in rural areas in India. The objective is to develop a business model for procurement of biomass from farmers in exchange of reliable

power or clean water supply. A successful model can, in addition to deriving sustainable environmental benefits help also develop a win-win situation for the 3 stakeholders involved namely Project Developer, Farmers and Utility. Since this project aims to create a biomass barter system between very complex stakeholders, the market and institutional barriers here are highly unpredictable and time –consuming.

Decentralized energy generation models appeals to the imagination of the entrepreneurs/project developers and encourages innovation. At a rural set-up these projects start small and are later can be extended to communities and neighbor-hoods with a potential of transforming into a self-sufficient micro-grids.

Business plan and financial mechanism for rural distributed generation based on Biomass



Targeted Energy Efficiency Interventions for the Small and Medium Enterprises

The Small and Medium Enterprise (SMEs) sector is the one of the largest employment sector in India after agriculture, accounting for around 35% of the national GDP. Though much of this sector is considered unorganized SMEs are also believed to be highly energy intensive and polluting due to use of outdated technologies and/or lack of end of line pollution control systems[3]. There are over 13 million Small and Medium Enterprise (SMEs) in India and it is here where energy efficiency and low carbon solution if strategically incorporated will have cascading effects and measurable impacts.

In a rice husk SMEs, in Tamil Nadu, India a case study was developed around building the capacity of SMEs clusters in India to improve their energy efficiency by using innovative mechanism for financing the purchase of energy efficiency equipment.

Project work was undertaken with Puduvayal Rice mill cluster, Tamil Nadu to do a feasibility analysis on implementing energy conservation measures (ECMs) and experimenting with carbon trading mechanism. The Investment Grade Energy Audit (IGA) studies conducted in the cluster showed savings potential up-to 20-30% by implementing EE measures and adopting best operational practices. To assess the wider applicability of common ECMs in the cluster, an equipment audit study was conducted in additional 26 small and big sizes mill in the cluster. It was observed that 70-80% of the EE measures identified during IGA study are applicable to other mills in the cluster.[4]

Discussions with the mill owners revealed that the majority of the owners were convinced that retrofits can achieve significant

[3] PRE-SME – Promoting Resource Efficiency in Small and Medium Sized Enterprises 2010 (P 11), UNEP Resource Kit, (Industrial handbook)

[4] REEEP is monitoring and assessing the impact of this project and information has been obtained during the assessment process and from reports submitted by the project developer "Alliance to Save Energy".

energy cost savings, but they lacked confidence in investing in energy efficiency equipment and measures. Hence this project focused on connecting individual mill owners and association to technology providers to help them better understand the technologies available in the market, their cost and subsequent saving from the energy saved. A technology demonstration project was set up in one of the clusters and this has strengthened the confidence and decision making capability among the mill owners across the region.

Projects such as these inevitably have positive impact on the environment through the reduction in GHG emission, improves the quality of life in underserved villages by providing them direct and indirect employment from the development of energy service companies, leads to energy savings and access to energy.

The rural community's involvement and commitment is critical to start building bonds between the poor, the technology providers and banks and cushioning it with the necessary policy and subsidies thus sustaining the supply of clean energy solutions to those who had no access to them.