News from IEI's Asian Regional Initiative in Bangalore (India) – June 2015

Value-addition to food crop processing: converting banana plant-waste to cooking fuel – up-scaling strategy

This project is continuing as planned. It is one of the cases where we have been demonstrating the sustainable provision of clean energy services in villages, through the integration of economically- and environmentally-feasible farm activities with the conversion of their waste to fuel. In this "efficient banana cultivation -> waste as energy source -> clean fuel" model, banana plantations have been developed with efficient resource use and the plantation waste is being used for the generation of biogas. This gas is intended for regular stove-fuelling that can completely replace biomass collection and burning in homes, with the associated impacts, and also the need for seeking an LPG connection. *The photographs show some of the users of the new fuel.*

While the first phase of the project was successfully demonstrated at community-scale with each large digester linked through extensive pipelines to houses around the community, we are now working on an up-scaling strategy for extending the model to small groups in different locations. In this manner, even if entire villages/hamlets cannot be served, or all homes are unable to participate, groups of families willing to commit to a joint endeavour can avail of the integrated benefits. However, access to water is critical: for sustainability, it is imperative that water is available either from surface sources or that groundwater has not been over-exploited so that wells can be used.

At the project sites -- four small farms, in one village each of Ramanagara district, Karnataka state -- banana cultivation is in progress, with efficient irrigation systems. The revenue from fruit sales will help not only the families involved but can contribute to the recovery of the capital costs of the efficient cultivation (drip-systems) and the biogas generation (digester plants). The biogas-digester effluents, a pathogen-reduced organic source of nitrogen, are usable as manure at the plantations, but could also be sold for additional revenue.

Currently, the growth of the banana plants is in progress; the fruit are not yet ready for harvesting. However, banana-plantation-waste -- chiefly the additional ("pseudo") stems that develop around each fruit-bearing stalk – are being used as digester feedstock. As the construction of each biogas plant is completed, its "fuelling" with these stems begins. The stems are chopped, mixed with measured amounts of water in the appropriate solid-to-water ratio, and inserted in the input tank.

The construction of two $10m^3$ biogas-plants and one 8 m^3 plant has been completed, while another 8 m^3 plant is under construction. The biogas-digester capacities were planned to suit the number and size of families involved and their expected cooking fuel requirements. All the plants have floating-drum digesters that have been successfully constructed by the project team for other projects and in other locations. The construction of each plant included a

masonry-lined cylindrical pit, metal guide-frame and gas-holder and two tanks (one each for the input of dung-water slurry mixture and outflow of effluents).

Linkage to the consumers is being carried out. This involves a pipeline from the gas-holder, reduced to smaller-bore pipelines, and then further reduced to drip-lateral-type individual pipelines (capable of handling the required pressure) to each home.

Both phases of this project -- the initial village-based demonstration and this extension – have been financially supported by the Wuppertal Institute for Climate, Environment, and Energy, Germany, through their Wisions-SEPS programme.

Integrated Resource Planning (IRP) for Electricity Distributing Utilities in India with special reference to the Bangalore Electricity Supply Company (BESCOM)

Integrated resource planning (IRP) is a method that considers both supply and demand-side measures to meet the need for resources, while minimising the costs accruing to the firm and to society. IRP enables planners to assess a range of options through which the demand-supply gap could be bridged in a sustainable manner.

However, despite the advantages of such an approach, IRP has not been used by Indian electricity utilities. Further, as most state utilities have been "unbundled", it can be expected that individual distribution companies (Discoms) would face barriers to conducting integrated planning.

A study was therefore carried out to assess how IRP could be implemented for the benefit of Indian Discoms. Subsequently, the results were shared with the public through an article in the *Economic and Political Weekly (EPW)*.

Identifying the barriers that discourage the adoption of integrated resource planning by Indian power distribution companies, it pointed to feasible conditions in which these hurdles could be overcome. Using the case of the Bangalore Electricity Supply Company and the available documentation, these barriers have been classified as financial, technical and operational; for each, a possible solution is suggested. The study also identifies conditions that would be sufficient for integrated resource planning to be practised, including providing at least a specified level of electricity services, and minimising costs, environmental impacts and additional investments.

The EPW article is currently available at http://www.epw.in/special-articles/integrated-resource-planning-electricity-distributing-utilities-india.html.