

## Should India look towards Biomass Electricity?

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To make India a "renewable superpower", the new government has encouraged and incentivized the wind and solar energy sector with ambitious targets. However, biomass has not received similar attention. Past failures could have caused this lack of enthusiasm towards bioenergy; over 60 percent of existing grid-connected biomass plants are not functional.

A major problem is large plant size (5-20 MW) which makes it difficult to get the required amount of feedstock. Without assured feedstock supply, bioenergy producers find it difficult to convince banks to finance them.

Experts at the Indian Institute of Science (IISc) say that smaller plants (< 2 MW) with lower feedstock needs can solve this challenge. However, even small-scale projects haven't seen success. In 2001, a UNDP funded project in Karnataka aimed to install twenty four gasifiers. Eleven systems were installed, and today only one is functional.

The systems weren't sustainable because, electricity production costs were Rs 4-6 per unit, but buy-back tariffs were only Rs 3-4 per unit. The situation hasn't improved much. Though the center recommends tariffs of Rs 6-7 per unit for biomass gasifiers, states offer only Rs 4-5 per unit.

Ms Tamara Law Billimoria, a biomass-based consultant and researcher, reveals that many petitions have been filed to State Electricity Regulatory Commissions (SERC). However, state regulators haven't given enough thought to how exactly power production costs play out versus selling prices for that power in the Indian RE market. She concludes by saying that, despite biomass-based power being an important sustainable source of energy at the grass-root level of our agrarian economy, it isn't given enough leverage by policy makers.

#### **The case for bioenergy**

Bioenergy's biggest advantage is that unlike wind and solar energy, it isn't variable. In energy-starved states, it can complement variable resources to meet electricity needs. Bioenergy can be conveniently scheduled in advance by utilities.

India's large local experience in biomass technologies, implies low import dependence and could make the country a

bioenergy equipment export hub, thus catering to the "Make in India" aspiration. Benefits of bioenergy include employment and income creation within the agricultural sector. Research at CSTEP shows that 1 GW of installed gasification capacity could create over 70,000 direct and indirect jobs.

Indian Institute of Tropical Meteorology's recent report shows that open burning of biomass residues causes significant pollution in India. Using these agricultural residues for electricity generation could lower 25-50 percent of the total CO and NO<sub>2</sub> emissions in the country.

As bioenergy provides broader social and economic benefits in addition to reliable electricity, it is an option certainly worth exploring. However, while seeking a solution, caution must be taken not to encroach on useful land and crop use. The World Resource Institute (WRI) strongly encourages using surplus residue and fallow land for producing biomass feedstock. Keeping this in mind, the following suggestions have been made.

### **Learning from the past and the way forward**

Currently, most biomass plants are dependent on forestry or agricultural residues. Woody residues are difficult to procure from Forest Departments and agro-wastes are often used by other businesses. Ms Aklavya Shravan of DESI Systems, says that his organisation tries to meet partial feedstock needs (30-40 percent) through inter-cropped energy plantations. Hardy species such as *Melia Dubia* and *Subabul* are grown, and crops like chillies and garlic are grown below.

Mr Jai Rathod from the Natural Group said that higher-yielding species such as Beema bamboo, could also be grown but they have high water requirements. Fortunately, these demands can be met with water from Effluent Treatment plants and sewage. With increased research in this sector, he predicts that these land requirements will go down.

IISc estimates that around 40 million hectares of wasteland in India is available for these plantations. An important first step would be to conduct a more detailed national assessment before utilising these lands for biomass. The survey will ideally capture residue availability and identify suitable wastelands for plantations of different species. The possibility of briquetting agro-residues should also be explored. The only assessment made on a nation-wide scale by IISc, is a decade old and doesn't have plantation potential.

A 1 MW solar, wind and bioenergy gasifier power plant with captive plantations would require a minimum area of five, thirty (assuming inter-turbine space is unutilized) and two hundred acres respectively. Mr Jai Rathod explained how even though land requirements for plantations are relatively high, the positive impacts compensate. Other than adding significantly to the upliftment of local communities, plantations could offer advantages similar to afforestation on degraded land.

A stance similar to the Karnataka Solar Policy 2014 can be adopted, where farmers lease out waste/barren lands to solar companies. Farmers can lease their unutilized barren lands to private companies, who can set up captive feedstock plantations for small-scale biomass plants on a long-term basis. Ms Billamoria recommended that these lands be harvested in a mixed use scheme.

Most government funded projects have poor after-sales maintenance but several NGOs report success stories due to community participation. Hence, biomass training programs should be implemented.

The long disbursement times of capital subsidies make investors not keen to solely rely on them. Hence, incentives which reward generation should be introduced. Models involving rural entrepreneurs, Electricity Supply Companies (ESCOs), community ownership, and collaboration amongst these stakeholders should be promoted. Depending on the model, appropriate soft loans can be granted.

Biomass plants are eligible for 80 percent Appreciated Depreciation (AD) in the first year. However, AD benefits for biomass plants are not effective because biomass electricity producers tend to be small ventures, which do not have large profits. To ensure a level playing field, schemes where AD benefits can be traded should be introduced.

Supportive policies, national assessments and robust after-sales mechanisms will ensure that bioenergy contributes in making India a "renewable superpower".