



## **A Study on Biomass As a Significant Renewable Energy Source in Rural Maharashtra**

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### **1. Introduction**

Biomass is material from plants and animals which can be used directly as a fuel or converted to a liquid or gaseous combustible product. India has anticipated potential of producing about 450 to 500 million Tons of biomass fuel per annum which is 32% of energy demand in the country. (eia.gov. 2024) Some of plants studied and identified as potential feed stocks for biodiesel production in India include *Jatropha Curcas*, *Neem* and *Mahua*. Worldwide plants produce 10 times the electricity that is produced by human beings every year but the energy from plants is not fully captured because of the limitation in technology and capital investment. For India and especially the rural part of this country, biomass energy has enormous importance because it is a clean and local energy. Modern bioenergy has proven useful as it is economic and social as well as being more friendly to the natural environment. It contributes to the decrease of air, water and land pollution, to creation of job places and business offers, to cutting down the energy price.

Cooking stoves used in rural homes in India are traditional that emit smoke that affects the quality of life of women. Same found with the use of kerosene and wick lamps for energy, the levels of illumination and the energy produced is very low. Also, generation of electricity through centralized grid electricity in the rural areas is received frequently with fluctuations in voltage and irregular, inadequate supply of power. Coal based power plants also come with environmental vices like leading to land and water pollution, air contamination and climatic change. Lighting up rural homes can be a life-altering by making chores easier, making education better, supporting health, providing employment, and affirmative environmental impact.

### **2. Research methodology**

First, this study shows how biomass energy plays a crucial role in making sustainable development and a major contribution in economic development. This study also demonstrates how the environment is benefited due to biomass energy plants.



**Data Source:** The present study is based on only Secondary data. Secondary data collected from various journal, books and also published record use of online records and websites.

**Theoretical Source:** Information has been sourced from books, newspapers, trade journals, e-journal and government agencies, trade associations, etc.

### Objective

- This study aims to analyse social economic development due to biomass energy
- To analyse the biomass plant in reducing wastage and how they protect environment

### 3. Social economic development

Organic material when burned for energy entails heavy utilize of human labour and land a feature that clearly departs from the known energy sources. This also provides employment for personnel through increasing the requirement for agricultural residue and biomass in rural areas that are abundant in organic farming. New jobs are created in the collection and processing of biomass as well as operation of energy services facilities bestowing most impact on rural folk. (M & M,2024)

Mr. Dinesh Jagdale stressed on the perceived value of biomass stating that farmers' income may rise through biomass. Delivering a keynote address on the same at a workshop facilitated by the Ministry of New and Renewable Energy, GiZ, Biofuel Circle, and BAIF Agro and Bio-Technology Pvt. Ltd., at its Pune base on January 13, 2023, he expounded more on standardizing biomass. He said that initiatives being taken by Indian Institute of Bioenergy, Kapurthala could make India the world's largest biomass energy hub.

Currently, India is among the largest producers of renewable energy and there will be a particular emphasis on increased use of renewable and bioenergy. Mr. Jagdale also focused on the idea of the digital marketplace created by Biofuel Circle that might help to sell biomass coming from rural communities effectively. (Pune,2023) Biomass can be in the form of plant or trees and can be burning directly to produce energy or convert it to other forms of fuel. In the countryside it is used in the preparation of food, and in warming of homes therefore can be classified as a key player in the part of socioeconomic transformation through provision of better standards of living and support of sustainable development.

### 4. Waste reduction with environment protection

Bioenergy can actually be carbon free if the greenhouse gas emissions are avoided from other sources. For example, using reconditioned waste vegetable oil from restaurants, to generate electricity using diesel generators eliminates the burning of coal. Biomass is just another kind of a renewable source of energy derived from plant and animal materials and they do not have



the same disastrous effects for the environment as oil, gas or coal; the extraction or burning of which release considerable amounts of carbon.

Biomass is generally considered to be carbon balanced or carbon negative in certain embodiments. For instance, generation of ethanol from canola is carbon neutral since the quantity of carbon discharges when cultivating the canola, transporting it, processing it and burning it, is equivalent to the amount that the canola uses to absorb during its growth. This makes biomass as an acceptable solution to energy challenge in as much as it is sustainable and friendly to the environment. (Biomass Energy | USDA Climate Hubs, n.d.)

## **5. Case study on AA Energy Ltd**

### **5.1 Reduction of Waste and Protection of Environment**

This plant has low gestation period, low capital investment and low recurring costs as compared to the cost of generation from fossil fuel-based power plants. Also, the plant reduces the transmission and distribution losses by directly linking the generation plant with distribution substations in areas with high rural uptake. Densification of technological resources with locally available biomass such as rice husk helps to minimize the use of conventional fuels, hence lowering operational costs at the same time maintaining sustainability.

On the matter of the surroundings the company has developed the following measures which can be termed as the innovative measures. To make proper use of fly ash produced in CHP it commissioned fly ash brick manufacturing unit as well as 120 TPD cement grinding unit in Desaiganj Wadsa. Clean technologies, environmental standard, and environmental regulatory frameworks are acknowledged and blended into the company's core values and objectives. Effluent treatment plants, waste water reuse and the tree plantations as additional commitments to environmentalism.

The plant produces low fly ash with low sulphur and nitrogen oxides emissions, the wastewater treatment plant recycles all the treated wastewater for ash disposal, dust suppression, and green belt establishment. Biomass is still the main fuel, although during monsoons, when wet biomass is unavailable, coal is burned. Currently, the plant is open almost 24/7 a year supplying 59.13 MU of electrical energy a year while dispatching 15,150 tonnes of ash per day and emitting 68 tonnes of flue gas per hour. Every wastewater; boiler and cooling tower blow down water; is treated and recycled wherever possible.

As a UAE based company, AA Energy Ltd is a registered participant with the UNFCCC through which it obtains Credits for Emission Reduction or CERs in the fight against climatic



change globally. Today, the company's commitment to sustainability gives people of India affordable, safe, and clean power accompanied by social and environmental responsibility. (Welcome to AA Energy Ltd., n.d.)

## 5.2 Challenges

Biogas is a typical circular technology, but its advantages must go down to people who still use firewood and those with no access to toilets. A biogas plant needs water every day, a daily supply of fresh dung matter, proper agitation and rinses, no toilet bowl cleaners containing acids, and sunlight or hot water if the bacteria slowdown in winter. However, the plant is viewed as uninteresting to attend to, and where repairs become necessary and the required skilled masons become scarce, if the plant is no longer operational.

The costs associated with adopting a construction are also high, hence discouraging the widespread uptake of construction. As concrete price increases the capital cost for a two cubic meter biogas plant is above minimum ₹50000 beyond the affordable of many. Further, for ₹12,000 subsidy the government for toilets, the overall setting cost generally requires 2-3 months common man income as opined by Uttam Nigade, a turn-key biogas plant installer in Kolhapur since 1997. (Pandey,2023) Lastly, to ensure that biogas facilities are adopted the subsidy should be at least 50% of the total cost.

That being the case, the broader biomass industry has some challenges as well. The uncertainty in supply chain is persisted because inefficient management of resources, absence of government policies and regulatory measures for biomass suppliers and the seasonal and regional availability of biomass fuel for a consistent price for a year is not available. Efforts to obtain land on which to harvest and store biomass are especially challenging when the energy density is low, especially in cases where access to land is scarce or costly. Biomass is bulk and has high moisture content and therefore its transportation is expensive and ineffective especially when transported over long distances.

Losses convert operational challenges at conversion facilities into another problem. The absence of comparability of equipment's and systems combined with the many types of biomasses make the technical barriers. The required pre-treatment processes ensures that biomass quality and heating value is not compromised as it also hikes up the costs of production and requires capital investment, more so in the case of converters.

The supply chain is especially underdeveloped and a primary constraint is that it is almost impossible to sign a long-term contract for a steady and cheap supply of biomass feedstock. This lack of stability makes it difficult for biomass plants to find reliable feedstock which in



turn results in unpredictability and slow growth of the sector. (Challenge related to Biomass-European Biomass Industry Association, n.d.)

### 5.3 Upcoming project

In order to provide adequate power and energy to Maharashtra, AA Energy Ltd proposed to increase the installed capacity of the existing 10 MW biomass power plant and also set up a new 7.5 MW biomass-based power plant at Desaiganj (Wadsa), Tehsil Armori, Gadchiroli district. The expansion project is expected to cost ₹39.51 crores.

AA Energy Ltd was incorporated in 2005 and has been generating power using biomass fuel for the last five years. The company has a 10-mw plant at Desaiganj (Wadsa). The proposed 7.5 MW plant will be an environmentally friendly project that mainly depends on agricultural waste as its raw material. The new plant is proposed to be constructed on the same piece of land as the existing facility, but alongside it, to avoid wastage of resources as well as destruction of the natural environment. The Ministry of New and Renewable Energy (MNRE) has always encouraged the effective use of renewable energy resources and aimed at achieving generation of 10,000 MW power from renewable sources by the year 2010. Likewise, the Government of Maharashtra has endorsed biomass as a sustainable source of energy as compared to the fossil fuel and has once again assured its support for the development of renewable energy.

### Conclusion

The feasibility of 10 MW biomass power plant in Gadchiroli, Maharashtra was established in a study carried out in Kolhapur district. The utilization of biomass is a major sector in the daily use of products, and its benefits are felt in environmental and economic aspects. Biomass based power generation is eco-friendly as it has low fly ash and negligible sulphur emission. Moreover, the net contribution to the greenhouse effect is close to zero since the CO<sub>2</sub> from agro crops exceeds the CO<sub>2</sub> emitted by biomass power plants. Through the project, the community is able to produce clean energy as well as create employment and development. The installed capacity has increased because a new biomass power plant has been added to the current 10 MW facility with a new 7.5 MW plant. That said, the biomass energy sector has several challenges among them costs, feedstock availability, maintenance, and ash disposal. However, the advantages of biomass energy, including the decrease in the negative effects on the environment and the generation of employment opportunities, make biomass energy important for the development of sustainable economic growth.



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