4. Biomass Based Power Generation Opportunities and the Role of Independent Power Producers in India

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4.1 Background

The National Action Plan on Climate Change (NAPCC) released, on 30th June 2008, inter alia includes specific action points for promoting deployment, resolving the barriers to development, and commercial deployment of biomass amongst other renewable energy technologies, and promoting biomass combustion and biomass gasification technologies. In the context of energy security and the necessity to reduce greenhouse gas emissions, there is an urgent need for accelerated harnessing of all renewable energy sources, especially biomass based energy, feeding power to the grid, and off-grid applications. Promotion of distributed / decentralized generation, along with grid interactive biomass based power generation, would not only help in meeting the energy needs in rural areas but also help in reduction of transmission and distribution losses, and sustainable energy supply to the industries.

4.2 Policy Support

India faces formidable challenges in meeting its energy needs of providing requisite quantities of energy, of desired quality, for sustained growth at the rate of 8-9 per cent during the next 25 years. This would require a four-fold increase in energy supply, with a six-fold increase in power generating installed capacity. The Government of India has initiated several reform measures to create a favourable environment for the addition of new generating capacity in the country. A further boost to this sector has come with the implementation of the Electricity Act 2003, which lays emphasis on the use of renewable sources of energy for power generation. The Electricity Act 2003 and the National Electricity Policy 2005 have put in place a highly liberal framework for generation. So far, 14 biomass potential states have announced preferential tariffs as well as renewable energy purchase obligations. CERC has recently issued guidelines for tariff determination, including biomass, which is a positive step towards development of renewable energy in the country.

4.3 Estimated Biomass Potential

Biomass, which is a carbon neutral fuel source for production of electricity, holds considerable promise for India. The availability of biomass in India is estimated at about 540 million tonnes per year, covering residues from agriculture, agro industrial, forestry, and plantations. The principal agricultural residues include rice husk, rice straw, bagasse, sugar cane tops and leaves, trash, groundnut shells, cotton stalks, mustard stalks, etc. It has been estimated that about 70-75% of these wastes are used as fodder, as fuel for domestic cooking and other economic purposes, leaving behind 120 – 150 million tonnes of usable agro industrial and agricultural residues per year, which could be made available for power generation. By using

these surplus agricultural residues, more than 17,000 MW of grid quality power can be generated with presently available technologies. However, all the potential is not realizable as the biomass is available in a dispersed manner, its availability is seasonal, and there are competitive uses. Apart from providing much needed relief from power shortages, power projects based on biomass would generate employment in our rural areas.

4.4 Present Level of Biomass Utilization for Power Generation

Keeping in view this vast potential, a number of technologies for converting them into power have been successfully developed, demonstrated, and found to be commercially attractive and techno-economically viable. Of this, more than 1900 MW biomass combustion and cogeneration based power generation projects have been established and about 2000 MW projects are under commission.The States of Andhra Pradesh, Chhattisgarh, Karnataka, Maharashtra, Punjab, Rajasthan, and Tamil Nadu have taken lead roles in this sector. It has to be mentioned that biomass projects of about 1000 MW have been set up without MNRE support. In addition, about 100 MWeq equivalent biomass gasifier systems have been deployed for thermal applications in industries. A very small fraction of about 10 MW biomass gasifier systems are being used for meeting the electricity needs of rural areas. Considering the present status of biomass based power generation and / or thermal applications, it is expected that only about 20-25 million tonnes of surplus woody, or non-woody, biomass is being used annually for ongoing biomass projects. In addition, there are other competitive uses of such biomass feed stock for brick and tiles, industries, such as thermal uses in many small and medium industries, etc. More than 300 districts in India have biomass potential of 10-100 MW.

4.5 Need for Small MW Capacity Biomass Power Plants

Large biomass projects, of late, are facing problems in their operations due to the shortage of biomass available at reasonable distances. This is because the biomass is finding a variety of competitive uses in the wake of the increasing price of conventional fuel, mainly diesel, which is being substituted by biomass, both in small and medium scale boilers and for other such applications. Biomass thus becomes a tradable commodity and its price varies as per the market. In that event, large biomass projects become commercially unsustainable. While a sustainable and organized biomass fuel linkage can make the biomass projects a successful venture, there is also a need to utilize biomass for small capacity projects in a decentralized mode to provide electricity in the rural areas at the tail end of the grid. In this context, biomass gasification technology, which is more efficient at this scale, assumes greater importance.

There is a large gap in the demand and supply of electricity in the country, especially in rural areas. The problem of providing power to rural areas would be critical when the infrastructure, under RGGVY, becomes ready but remains without the supply of power. In the rural grid electricity is often either not available for extended hours during the day time or the grid voltage is very low, especially at the tail-end of the grid. This results in shifting of several productive activities, including operation of agriculture pumps during the evenings, which thus contributes to the evening time load peaking.

Biomass based power plants using locally available biomass resources for off grid / distributed and grid connected power generation of 250 kW to 1 MW capacity are being promoted. Biomass power generating systems, both biomass gasifier and boiler-turbine-generator (BTG) based, are now available commercially in the country up to the MW scale. Setting up of such projects, preferably at the tail end of the grid, and having a decentralized distribution component, would not only stabilize the grid but also reduce the T&D losses and ensure sustainable supply of electricity near the biomass production and electricity consumption points.

In the area of biomass gasification technology, significant development has been achieved in India and India is the leader in this technology. Biomass gasifiers of a few kilo watts, up to megawatts, have been successfully developed, indigenously. A large number of installations aggregating to 75 MW, for providing power to small scale industries and for electrification of a village or group of villages, have been undertaken for standalone applications. Promotion of gasifiers for providing decentralized energy and power for such applications, including productive purposes, such as water pumping in rural areas, is being contemplated by the Ministry in large numbers, especially in those states where availability of electricity is a major constraint.

4.6 Support for Biomass Based Small MW Capacity Power Projects

The Ministry is promoting the following biomass based systems:

a. Biomass, gasifier based, MW level, grid connected power plants with 100% gas producing engines.
b. Besides biomass based, grid connected, boiler-turbine-generator (BTG) projects, preferably at the tail end of the grid, and having a decentralized distribution component, would also be supported.
c. The maximum installed capacity of each such project would be 2 MW.

The programme envisages implementation of such projects with involvement of independent power producers (IPPs); energy service companies (ESCOs), co-operatives, Panchayat, SHGs, NGOs, manufactures or entrepreneurs, and promoters and developers, etc.

Grid connected project proposals should contain detailed project reports (DPRs) covering salient features, as per the format. The project developer should enter into agreement with the utilities for sale of power or 3rd party sales and furnish copies of the PPA, copies of all clearances from the statutory angle, along with loan agreements or supporting documents for meeting balance funds, etc. Only those grid interactive projects would be supported, which have envisaged fuel linkage mechanisms to ensure regular supply of the required quantity of biomass feed stock and provision of collection, processing and storage of biomass. The projects based on the BTG route should have a reasonable provision, in relation to the project locations for the decentralized distribution component and details should be provided in the project proposal.

The Ministry provides Central Financial Assistance (CFA) @ Rs.15, 000/- per kW for grid connected power projects with 100% producer gas engines or biomass based combustion projects. In addition, financial assistance up to Rs.1.00 lakh would also be available for preparation of detailed project reports (DPRs) of grid connected / captive power generation projects. CFA, as applicable under the scheme, will be disbursed, post-commissioning, through one instalment directly to the promoters or lending institutions / FIs, after receipt of commissioning and verification reports and the requisite documents.

Biomass based power generation has been taken up as an important programme by my Ministry. Besides fiscal and financial incentives, such as accelerated depreciation, tax holidays for ten years, capital subsidies for biomass power projects are also being provided. Biomass power projects can also avail of the benefit of concessional custom duty and excise duty exemption for equipment and machinery. Loans are available through the Indian Renewable Energy Development Agency (IREDA).

4.7 Technology Demonstration on Waste Heat Utilization for Cooling / Chilling & Steam Generation

Biomass gasifiers and engines produce waste heat, which is presently dissipated into the atmosphere. Waste heat based cooling / chilling and steam generating systems are available in the country. In order to use the waste heat and to increase the commercial / economic benefits, it is proposed to demonstrate the technology suitable for biomass gasification. As this potentially integrated concept has not been demonstrated till now, it is now planned to take up demonstration projects. For this purpose, the existing level of subsidy will be provided for the gasifier with 100% producing gas engine components. In addition, financial assistance, up to 50% of the cost of plant and machinery, i.e. a Vapour Absorption Machine (VAM) for cooling / chilling the system, and a steam generating system from waste heat, would be provided. Financial assistance would not be provided for land and building. It is planned to take up about 25 demonstration projects in rice mills replacing steam engines / boilers with biomass gasifiers coupled with 100% producing gas engines for power generation, along with a provision for meeting the entire thermal requirement through waste heat recovery. Under some of these projects, demonstration of cold storage or ice making units would also be taken up using waste heat for chilling / cold storage, through VAM and steam generating systems. Technology demonstration projects would be taken up as per the RD&D policy of the Ministry for Technology Demonstration on a 50:50 cost sharing basis.