

Electricity Through Cogeneration: A Promising Development¹⁹

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Think of a sugar mill, not only producing sugar but also generating power as a by-product. Bagasse, a residue of crushed sugarcane used in sugar mills is the principal fuel used to raise steam in sugar mills. With the technological innovations, the high pressure steam generated in boilers can in turn be used to rotate the turbo generator blades to produce electric current. The process employed here to generate power is called cogeneration which essentially implies the production of two forms of energy, electricity and heat. The power thus generated can be used for meeting the requirements of the sugar mill and the surplus can be fed into the grid.

Cogeneration or production of electricity in combination with another industrial process is not limited to sugar mills alone. There are several other industries such as paper and pulp, textile, fertilizer, petroleum, petrochemicals and food processing which require electrical as well as thermal energy for their operations and therefore can use cogeneration as a process. The total fuel consumption is significantly reduced when "co-generation" or "combined heat and power" (CHP) is applied. The overall efficiency of energy use in cogeneration mode can be up to 85 per cent and above in some cases.

In the present scenario, where price of fossil fuels is shooting up and there is shortage and non-availability of coal, cogeneration appears to be a promising development. The thrust on distributed generation and increasing awareness for cutting green house gases emissions increases the need of processes like cogeneration. Also it helps in controlling pollution from fossil fuels.

The Ministry of New and Renewable Energy is promoting cogeneration through various incentive based schemes. Biomass Cogeneration programme in India is currently divided into two components (i) Bagasse based (ii) Non-Bagasse based . While bagasse cogeneration is essentially sugar mills oriented non-bagasse biomass cogeneration can be used in biomass industry.

Bagasse Based Cogeneration

As already explained, the bagasse based cogeneration is mainly centred in sugar mills. India is the world's second biggest producer of sugarcane. Indian sugarcane production during 2010-11 is estimated at 340 million tonnes. India's 527 working sugar mills crush around 240 million tonnes of cane per year and generate 80 million tonnes of wet bagasse (50% moisture), of which they consume around 70 million tonnes for meeting captive requirements of power and steam. Thus, electricity production through cogeneration in sugar mills in India is an important avenue for supplying low cost, non-conventional power.

Indian efforts for promotion of bagasse cogeneration started with two pilot projects taken up in cooperative sugar mills in Tamil Nadu in 1988-89 for generation of surplus power and feeding it to the grid. Though possibilities of additional power generation through cogeneration in sugar industry has been known for long, but their usage started in a significant manner only after 1994, after announcement of programme

on bagasse based cogeneration by the Government.

A capacity of around 1854 MW of surplus power generation has so far been commissioned in 170 sugar mills in the states of Andhra Pradesh, Bihar, Haryana, Karnataka, Maharashtra, Punjab, Tamil Nadu, Uttar Pradesh and Uttarakhand. More than 200 MW of projects in about 20 private sector sugar mills are under construction. Optimum bagasse cogeneration benefits not only the sugar mills but also the sugarcane farmers as the value addition to their cane is enhanced and thus they can realise more money for it.

Power Cogeneration in Industries (Non-Bagasse) Programme

The industrial sector today consumes approximately 35% of total electricity generated in the country. At the same time, high quality stable power is required to attain the higher growth rate projected for this sector. Majority of industries in India require both electrical and thermal energy. Today, they either buy power from the State Electricity Boards, or generate their own power largely through diesel generators and meet their thermal energy requirements through captive means mostly utilizing fossil fuels such as coal, oil or natural gas. As fossil fuels are limited, and have adverse environmental impact, it would be appropriate to use non-conventional energy sources including biomass resources such as crop residues and agro-industrial wastes for generation of energy in the industries mainly through biomass gasification technology for meeting their total/partial requirements for both electrical and thermal energy.

Industrial co-generation has in the past not received adequate attention, as cheap power and fuel were abundantly available. However, with increasing tariffs, and unreliable supply of grid power, there is considerable opportunity for the industrial sector to tap the potential for producing electricity and thermal energy in the co-generation mode. In particular, there is significant potential in breweries, caustic soda plants, textile mills, distilleries, fertilizer plants, paper and pulp industry, solvent extraction units, rice mills, petrochemical plants, etc. Furthermore, co-generation projects based on conventional fuels such as coal, oil, lignite, gas and un/semi-utilized wastes/rejects like dolochar, coal rejects and refinery mud, etc. can also be installed in industry for meeting their power and energy requirements.

To meet the requirement of captive power and thermal energy, the installation of biomass cogeneration projects (excluding bagasse co-generation) is being promoted in industry, with at least 50% of power for captive use, and a provision for the surplus power to be exported to the grid. This has increased the use of non-conventional energy sources and conserves the use of fossil fuels such as coal, oil and natural gas. Use of maximum of 25% conventional fuels has been allowed in such projects. The promotional schemes also provide for Grants-in-Aid to State Nodal Agencies, NGOs and other concerned institutions for organizing seminars, workshops, training/orientation programmes, technology validation, strategic studies, industry-wise sectoral studies and performance monitoring & evaluation, etc.

New Initiatives for Promotion of Cogeneration in India

BOOT (Build, Own, Operate, Transfer) Model Cogeneration Projects in Cooperative Sugar Mills: Provision for Central Financial Assistance has been made for bagasse cogeneration projects taken up through BOOT model in cooperative sector sugar mills set up by Special Purpose Vehicle or an Independent Power Producer. In this case, the investment in cogeneration power plant with concurrent modernisation is done by BOOT developers. This model has advantage in terms of non-requirement of equity and loans by cooperative sugar mills and nil liability to repay and limited risks. The cogeneration plant and assets after BOOT period are to be handed over to cooperative sugar mills. The Ministry of New and Renewable Energy has supported the BOOT model projects in Maharashtra and Tamil Nadu. BOOT model projects in 12 Co-operative Public sector sugars mills in Tamil Nadu of aggregate capacity 180 MW and BOOT model cogeneration projects in two cooperative sugar mills of Maharashtra of total capacity 80 MW are under implementation. The Ministry plans to extend this effort in the Co-operative/Public sector sugar mills in the states of Karnataka, Andhra Pradesh, Gujarat & Uttar Pradesh, during the next two to three years.

Boiler Modification in Cooperative Sugar Mills: A number of recently installed cooperative sugar mills have already employed the configurations to enable them to undertake cogeneration power projects with

minimum investment through modification of existing boiler and matching turbine. Ministry of New and Renewable Energy has modified the scheme for providing Central Financial Assistance for boiler upgradation of cogeneration project in such sugar mills.

The incentive based schemes and the technical support to the industry by the Ministry of New and Renewable Energy for installing cogeneration based projects is expected to give a big push to the non-conventional energy programme during the twelfth Plan Period. (PIB Feature).

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