

BIOMASS POWER AND COGENERATION PROGRAMME

1. INTRODUCTION

Biomass has always been an important energy source for the country considering the benefits it offers. It is renewable, widely available, carbon-neutral and has the potential to provide significant employment in the rural areas. Biomass is also capable of providing firm energy. About 32% of the total primary energy use in the country is still derived from biomass and more than 70% of the country's population depends upon it for its energy needs. Ministry of New and Renewable Energy has realised the potential and role of biomass energy in the Indian context and hence has initiated a number of programmes for promotion of efficient technologies for its use in various sectors of the economy to ensure derivation of maximum benefits. Biomass power generation in India is an industry that attracts investments of over Rs.600 crores every year, generating more than 5000 million units of electricity and yearly employment of more than 10 million man-days in the rural areas. For efficient utilization of biomass, bagasse based cogeneration in sugar mills and biomass power generation have been taken up under biomass power and cogeneration programme.

Biomass power & cogeneration programme is implemented with the main objective of promoting technologies for optimum use of country's biomass resources for grid power generation. Biomass materials used for power generation include bagasse, rice husk, straw, cotton stalk, coconut shells, soya husk, de-oiled cakes, coffee waste, jute wastes, groundnut shells, saw dust etc.

2. POTENTIAL

The current availability of biomass in India is estimated at about 500 millions metric tones per year. Studies sponsored by the Ministry has estimated surplus biomass availability at about 120 - 150 million metric tones per annum covering agricultural and forestry residues corresponding to a potential of about **18,000 MW**. This apart, about **7000 MW** additional power could be generated through bagasse based cogeneration in the country's 550 Sugar mills, if these sugar mills were to adopt technically and economically optimal levels of cogeneration for extracting power from the bagasse produced by them

3. TECHNOLOGY

3.1 Combustion

The thermo chemical processes for conversion of biomass to useful products involve combustion, gasification or pyrolysis. The most commonly used route is combustion. The advantage is that the technology used is similar to that of a thermal plant based on coal, except for the boiler. The cycle used is the conventional ranking cycle with biomass being burnt in high pressure boiler to generate steam and operating a turbine with generated steam. The net power cycle efficiencies that can be achieved are about 23-25%. The exhaust of the steam turbine can either be fully condensed to produce power, or used partly or fully for another useful heating activity. The latter mode is called cogeneration. In India, cogeneration route finds application mainly in industries.



10 MW Grid Connected Biomass Power Plant at Thimmapur Village, Dist. Haveri

3.2 Cogeneration In Sugar Mills

Sugar industry has been traditionally practicing cogeneration by using bagasse as a fuel. With the advancement in the technology for generation and utilization of steam at high temperature and pressure, sugar industry can produce electricity and steam for their own requirements. It can also produce significant surplus electricity for sale to the grid using same quantity of bagasse. For example, if steam generation temperature/pressure is raised from 400°C/33 bar to 485°C/66 bar, more than 80 KWh of additional electricity can be produced for each ton of cane crushed. The sale of surplus power generated through optimum cogeneration would help a sugar mill to improve its viability, apart from adding to the power generation capacity of the country.



30 MW Cogen Power Plant at Sahakarmaharshi Bhausaheb Thorat Sahakari Sakhar Karkhana Ltd., Sangamner, Maharashtra

4. DEPLOYMENT

The Ministry has been implementing biomass power/co-generation programme since mid nineties. A total of approximately **500** biomass power and cogeneration projects aggregating to **4760 MW** capacity have been installed in the country for feeding power to the grid. In addition, around 30 biomass power projects aggregating to about **350 MW** are under various stages of implementation. Around **70** Cogeneration projects are under implementation with surplus capacity aggregating to **800 MW**. States which have taken leadership position in implementation of bagasse cogeneration projects are Andhra Pradesh, Tamil Nadu, Karnataka, Maharashtra and Uttar Pradesh. The leading States for biomass power projects are Andhra Pradesh, Chattisgarh, Maharashtra, Madhya Pradesh, Gujarat and Tamil Nadu.

5. MANUFACTURING BASE

Manufacturing capability exists in the country for the equipment/machinery required for setting up Biomass Projects. Except for some critical control equipment, most of the equipments can be procured from indigenous sources.

5.1 Boilers

A number of large manufacturers have established capabilities for manufacturing spreader stoker fired, traveling grate/dumping grate boilers; atmospheric pressure fluidized bed boilers and circulating fluidized bed boilers.

Due to recent upsurge of interest in co-generation for surplus power, leading manufacturers are further upgrading their capabilities for high efficiency boilers.

5.2 Steam Turbines

Almost all combinations - condensing, single extraction/double extraction condensing, back pressure, etc. are now being manufactured in the country with full after sales services. The efficiencies of turbines now being offered are comparable to the best in the world.

5.3 Other Equipment

Apart from the main equipment, there is a well established capability and capacity for manufacture of related equipment for use of biomass for energy including harvesters, balers, briquetting equipment, handling and firing equipment, pollution control systems etc. Many multinational companies have set up manufacturing facilities in the country for such equipment.

6. PROMOTIONAL POLICIES

Besides the Central Financial Assistance mentioned in para 8, fiscal incentives, concessional import duty, excise duty, tax holiday for 10 years, bank loans of up to Rs 15 crore for biomass-based power generators will be considered part of PSL etc., are available for Biomass power projects. The benefit of concessional custom duty and excise duty exemption are available on equipments required for initial setting up of biomass projects based on certification by Ministry. In addition, State Electricity Regulatory Commissions have determined preferential tariffs and Renewable Purchase Standards (RPS). Indian Renewable Energy Development Agency (IREDA) provides loan for setting up biomass power and bagasse cogeneration projects.

7. CENTRAL FINANCIAL ASSISTANCE AND FISCAL INCENTIVES

8.1 CFA for Biomass Power Project and Bagasse Cogeneration Projects by Private/Joint/Coop./Public Sector Sugar Mills

	Special Category States(NE Region, Sikkim, J&K, HP & Uttaranchal)	Other States
Project Type	Capital Subsidy	Capital Subsidy
Biomass Power projects	Rs.25 lakh X(C MW) (Maximum support of Rs. 1.5 Crores per project)	Rs.20 lakh X (C MW) (Maximum support of Rs. 1.5 Crores per project)
Bagasse Co-generation by Private sugar mills	Rs.18 lakh X(C MW) (Maximum support of Rs. 1.5 Crores per project)	Rs.15 lakh X (C MW) (Maximum support of Rs. 1.5 Crores per project)
Bagasse Co-generation projects by cooperative/ public sector sugar mills	R s.40 lakh * Rs.50 lakh * Rs.60 lakh * Per MW of surplus power [®] (maximum support Rs. 6.0 crore per project)	R s.40 lakh * Rs.50 lakh * Rs.60 lakh * Per MW of surplus power [®] (maximum support Rs. 6.0 crore per project)
40 bar & above		

60 bar & above		
80 bar & above		

**For new sugar mills, which are yet to start production and existing sugar mills employing backpressure route/seasonal/incidental cogeneration, which exports surplus power to the grid, subsidies shall be one-half of the level mentioned above.*

@ Power generated in a sugar mill (-) power used for captive purpose i.e. net power fed to the grid during season by a sugar mill.

Note: CFA and Fiscal Incentives are subject to change.

8.2 CFA for Bagasse Cogeneration Project in cooperative/ public sector sugar mills implemented by IPPs/State Government Undertakings or State Government Joint Venture Company / Special Purpose Vehicle (Urja Ankur Trust) through BOOT/BOLT model

PROJECT TYPE	MINIMUM CONFIGURATION	CAPITAL SUBSIDY
Single coop. mill through BOOT/BOLT Model	60 bar & above	Rs.40 L/MW of surplus power *
	80 bar & above	Rs.50 L/MW of surplus power*
		(maximum support Rs.6.0 crore/ sugar mill)

** Power generated in a sugar mill (-) power used for captive purpose i.e. Net power fed to the grid during season by a sugar mill.*

8.3 CFA for Bagasse Cogeneration Project in existing cooperative sector sugar mills employing boiler modifications

PROJECT TYPE	MINIMUM CONFIGURATION	CAPITAL SUBSIDY
Existing Cooperative Sugar Mill	40 bar & above	Rs.20 L/MW of surplus power *
	60 bar & above	Rs.25 L/MW of surplus power*
	80 bar & above	Rs.30 L/MW of surplus power*
<i>* Power generated in a sugar mill (-) power used for captive purpose i.e. Net power fed to the grid during season by a sugar mill. CFA will be provided to the sugar mills who have not received CFA earlier from MNRE under any of its scheme.</i>		

Note: CFA and Fiscal Incentives are subject to change.

8.4 Fiscal Incentives for Biomass Power Generation

Item	Description
Income Tax Holiday	Ten years tax holidays.
Customs / Excise Duty	Concessional customs and excise duty exemption for machinery and components for initial setting up of Biomass power projects.
General Sales Tax	Exemption is available in certain States

9.0 STATE-WISE/YEAR-WISE LIST OF COMMISSINED BIOMASS POWER/COGENERATION PROJECTS (AS ON 01.04.2016)

S.No.	State	Upto 31.03.2012	2012-13	2013-14	2014-15	2015-16	(IN MW)
							Total
1	Andhra Pradesh	363.25	17.5				380.75
2	Bihar	15.5	27.92				43.42
3	Chattisgarh	249.9		15	15		279.9
4	Gujarat	20.5	10	13.4	12.4		56.3
5	Haryana	35.8	9.5				45.3
6	Karnataka	441.18	50	112	111	158	872.18
7	Madhya Pradesh	8.5	7.5	10	9		35
8	Maharashtra	603.7	151.2	185.5	184	96.38	1220.78
9	Odisha	20					20
10	Punjab	90.5	34	16	15		155.5
11	Rajasthan	83.3	10	8	7		108.3
12	Tamil Nadu	532.7	6	32.6	31.6	39	626.9
13	Uttarakhand	10		20	20	13	50
14	Uttar Pradesh	644.5	132			93.5	842
15	West Bengal	16	10				26
	Total	3135.33	465.6	412.5	405	400	4831.33



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