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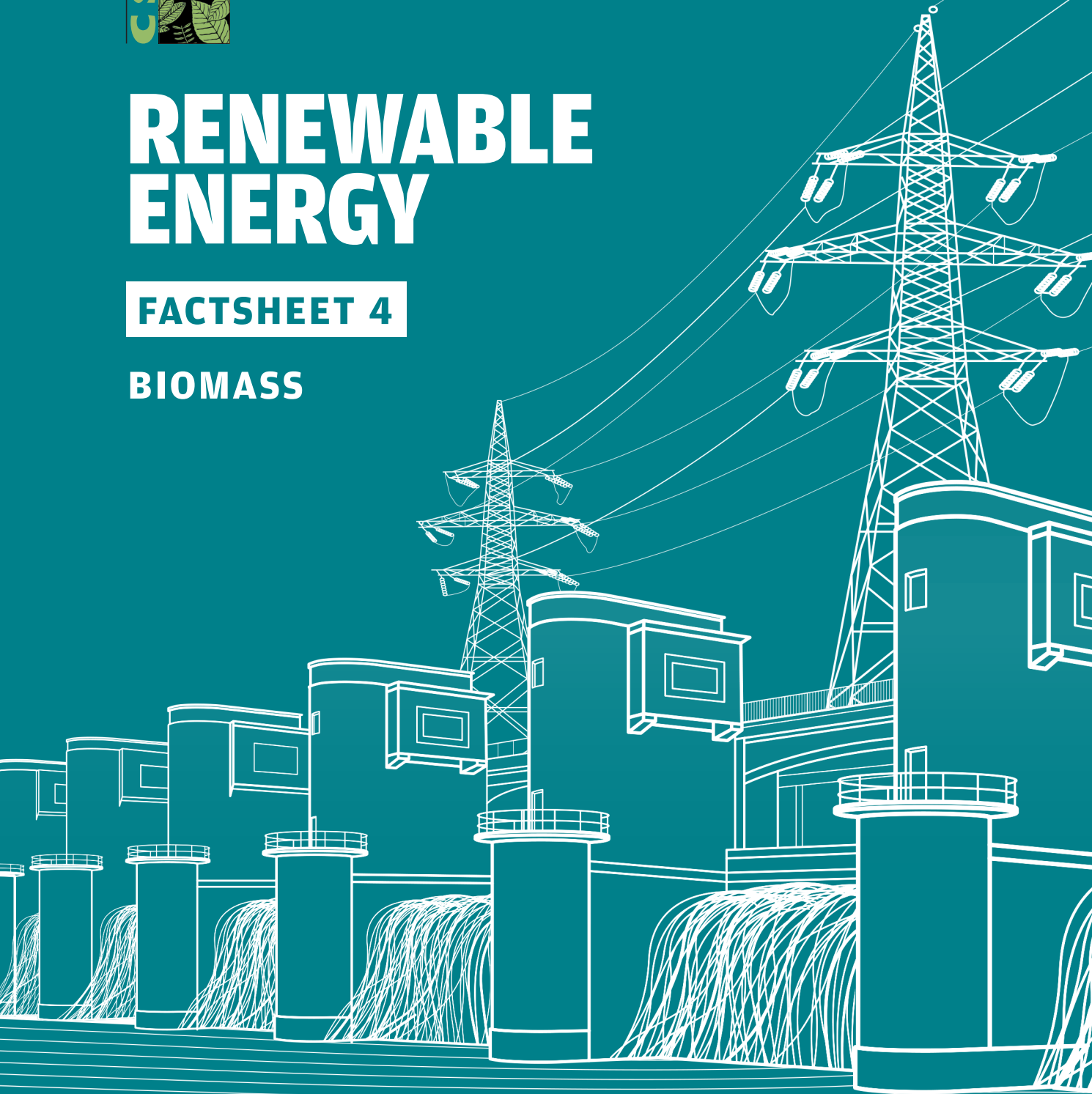




# RENEWABLE ENERGY

## FACTSHEET 4

### BIOMASS





# BIOMASS

India has already met its biomass power target. Instead of moving on to newer goals, the industry has been hamstrung by low availability of raw material and rising costs

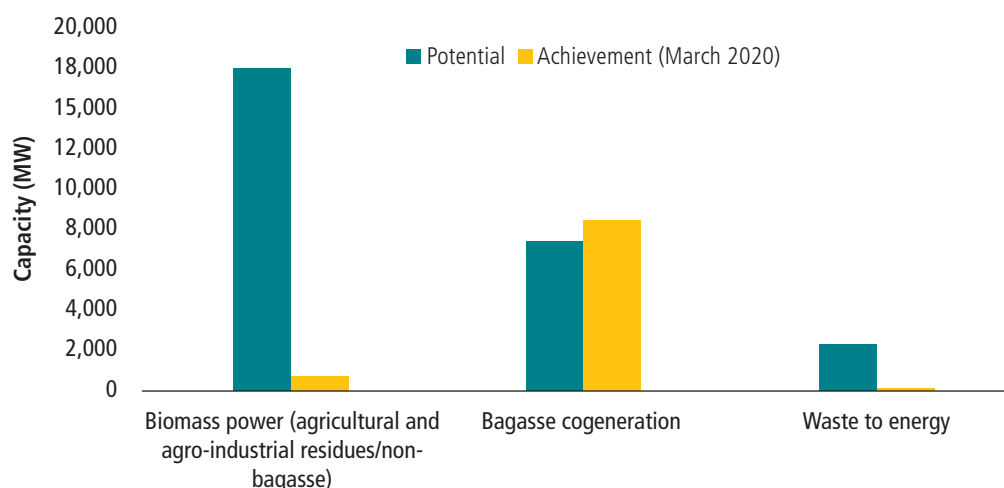
## A. WHERE DO WE STAND TODAY

**A 1** Burning biomass for energy is not a new phenomenon – large numbers of poor women continue to use biomass as cooking fuel to the detriment of their health. But what is new is the process of burning biomass/ bagasse in controlled environments to make fuel. This is a win-win option – farmers get value for their residue, the biomass is not burnt in the open to add to air pollution, and it provides energy.

**A 2** The fact is that biomass – from crop residues to kitchen waste – is a key cause of air pollution and adds to the enormous challenge of waste management in the country. Therefore, any efforts to use this so-called waste for gasification and energy generation would go a long way to combat pollution and turn waste into a resource.

**A 3** The current availability of biomass in India is estimated at about 500 million metric tonnes (MMT) per year. Studies sponsored by the MNRE have estimated surplus biomass availability at about 120-150 MMT per annum covering agricultural and forestry residues corresponding to a potential of about 18,000 MW. In addition, the potential of bagasse cogeneration is estimated at around 8,000 MW based on full utilisation by 550 sugar mills in the country. There is no estimation of the organic household waste that is generated in the country in terms of its energy potential (see *Graph 1*).

**Graph 1: Biomass energy: potential vs achievement**



Source: MNRE reports

**A 4** Given this possibility, a rather unambitious target of 10,000 MW of biomass energy has been included in India's total renewable energy target by 2022. This target had been achieved as of December 2019.

**A 5** The MNRE incentivises biomass through its biomass-based cogeneration scheme for sugar mills and other industries. Under this, it provides central financial assistance at the rate of Rs 25 lakh per MW of surplus exportable capacity fed into the grid. In addition, this energy source gets a tax holiday for 10 years and other concessions on customs and excise for equipment. Also, state electricity regulatory commissions (SERCs) provide preferential tariffs and this source of energy is also included in the ‘must run’ category – but only for plants which are 10 MW and below (see *Table 1*).

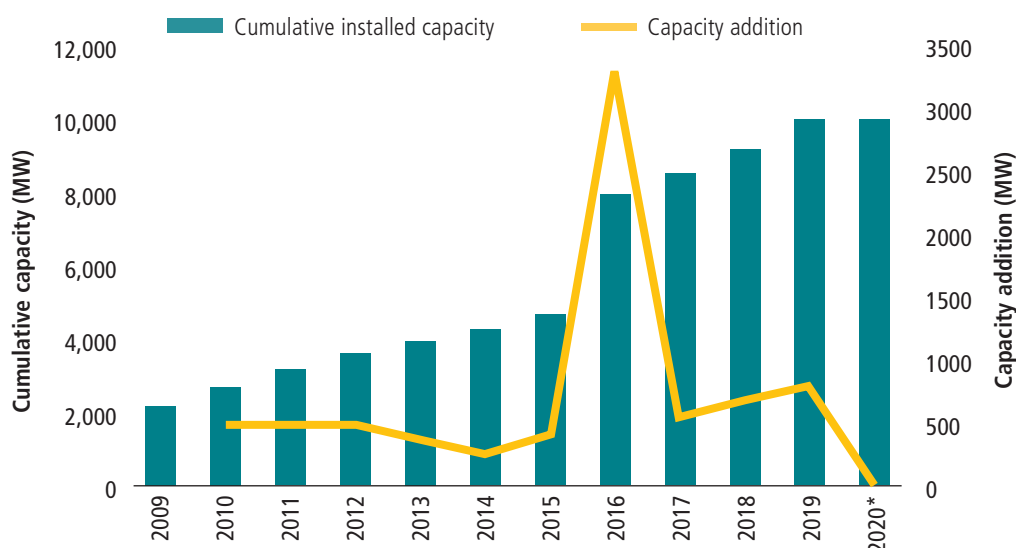
**Table 1: Net levelised tariff (upon adjusting for accelerated depreciation benefit), in Rs / kWh**

State	Biomass Power Projects [other than Rice Straw and Juliflora (plantation) based project]						Biomass Power Projects [Rice Straw and Juliflora (plantation) based project]		
	Water Cooled Condenser and travelling grate boiler	Air Cooled Condenser and travelling grate boiler	Water Cooled Condenser and travelling grate boiler	Air Cooled Condenser and travelling grate boiler	Water Cooled Condenser and AFBC boiler	Air Cooled Condenser and AFBC boiler	Water Cooled Condenser and AFBC boiler	Air Cooled Condenser and AFBC boiler	Bagasse Based Co-generation Project
AP	7.53	7.78	7.63	7.89	7.44	7.69	7.54	7.8	6.19
Haryana	8.25	8.52	8.35	8.63	8.15	8.41	8.25	8.52	7.19
Maharashtra	8.39	8.66	8.49	8.77	8.28	8.55	8.38	8.66	6.85
Punjab	8.53	8.8	8.63	8.91	8.41	8.69	8.51	8.8	6.61
Rajasthan	7.5	7.75	7.6	7.86	7.4	7.65	7.5	7.76	
Tamil Nadu	7.45	7.7	7.55	7.81	7.35	7.6	7.45	7.71	5.75
UP	7.62	7.88	7.72	7.99	7.53	7.78	7.63	7.89	6.58
Others	7.89	8.16	7.99	8.27	7.79	8.05	7.89	8.16	6.48

Source: Central Electricity Regulatory Commission (CERC) RE Tariff Order 2019-20

**A 6** However, given all this, the biomass energy sector seems to be running out of steam. In the past three years, capacity additions have stagnated; additions have dried up (see *Graph 2*). A similar fate has afflicted the bagasse co-generation projects, which in 2019 had been 12 per cent lower than in the previous years.

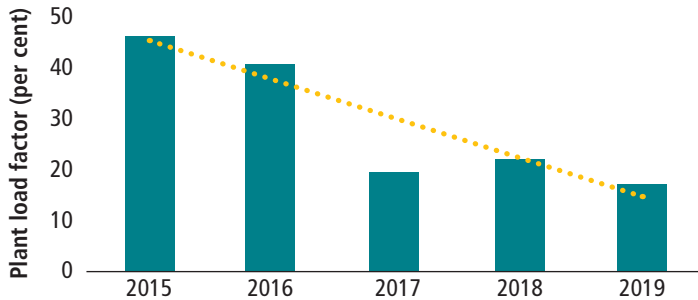
**Graph 2: Capacity addition over the years**



\* Till March 2020  
Source: MNRE, CEA

**A 7** What is inexplicable is that there is also a drastic decrease in the plant load factor (PLF) of biomass plants – from 46 per cent in 2015 to 17.1 per cent in 2019 as per the data from CEA (see *Graph 3*). This, when the CERC recommends that the PLF of biomass plants would range from 60-80 per cent. This would suggest gross under-utilisation of the existing plants.

**Graph 3: Plant load factor of biomass plants**



Source: Analysis by CSE based on CEA data

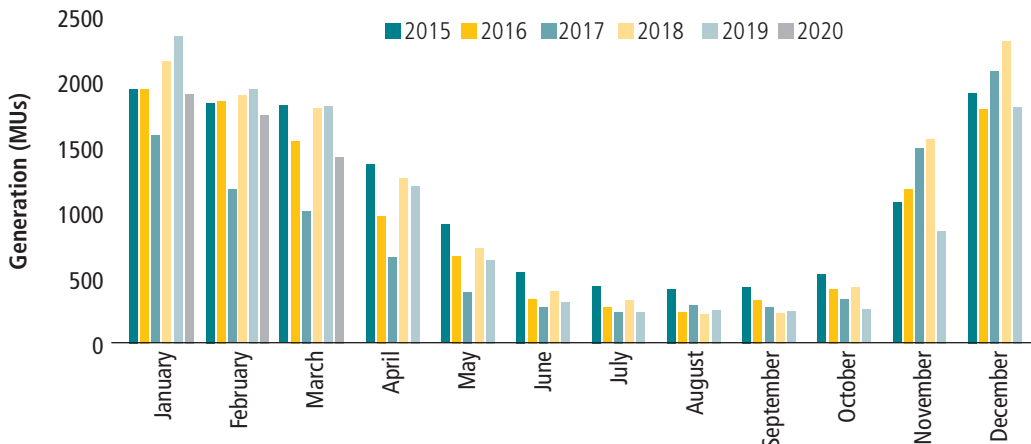
**A 8** This industry is dependent on the cyclical availability of raw material – seasonal harvesting of sugarcane and other crops. It is estimated that by and large, a 1-MW power plant requires 7,000-10,000 metric tonnes of biomass per year. The industry says there is a shortage of biomass and costs of raw material are increasing – it costs roughly Rs 6 to generate one unit of power. This is inexplicable and needs to be investigated: why is there a shortage of agricultural residues when agricultural production is high?

**A 9** The CERC puts the capital cost of these plants at Rs 5.6 crore to Rs 6.5 crore per MW for a biomass plant, and Rs 5 crore per MW for a co-generation plant. This, coupled with the cost of fuel and other operational spends, means that the cost of energy is high – Rs 7.35 to Rs 8.91 per unit (in bagasse it is between Rs 5.75 to Rs 7.19 per unit).

**A 10** This tariff makes the industry unviable, particularly at a time when there is surplus cheap energy in the grid, and discoms are in the red and cannot pay. This is perhaps the reason why the biomass sector is flagging.

**A 11** The CEA has, on January 17, 2020, drawn attention to the reduction in generation from bagasse. It says that it has found a “significant decrease in generation from bagasse-based energy in November 2019, as compared to the previous year (2018) and this, in spite of the increased capacity of 71 MW in just this period”.<sup>1</sup> It has asked for an explanation from biomass producers (see *Graph 4*). It has received responses from only two states – Maharashtra and Uttar Pradesh; both have cited the delayed harvesting and reduction in bagasse generation as the reasons.

**Graph 4: Power generation from bagasse-cogeneration**



Source: Compiled by CSE

## Husk Power's solar-biomass hybrid plant lighting the lives of people in Chanpatia, Bihar

With the solar revolution, an optimum combination of solar-biomass-storage is turning out to be an effective mini-grid based solution and an alternative to diesel-based generators in some small areas or villages in the country that often face electricity outages or load-sheddings.

Centre for Science and Environment (CSE), in its study, found that one such solution has been provided by Husk Power Energies in Chanpatia village, in West Champaran district of Bihar, through its biomass-cum-solar-storage plant located in the village. Husk Power commissioned the plant in April 2017. The current installed capacity is 40 kW solar and 25 kW biogas. Since its inception, there has been a gradual rise in customers. Husk has around 100 customers in Chanpatia, which comprises 30 per cent domestic, 10 per cent industrial and 60 per cent commercial connections. All the commercial connections are on the 5-kW load connection.

The power generated during the daytime (from 10 am to 4 pm) from solar has been rated 20 per cent less. The biomass part kicks in for supply of power during the evening and night – periods when there are outages and peak-shaving. The biomass feed is supplied by local threshers. The price ranges anywhere between Re 1 to Rs 4 depending upon the season and availability of the rice husk. Rice is harvested twice a year in the region; therefore, the husk is easily available throughout the year. Dry feed like rice husk maintains the moisture and avoids corrosion. The biomass plant can provide reliable power as it gives a stable output whenever required; it can play a balancing role and reduces the requirement for costly storage.

Such decentralised solutions play a big role in bridging the gap between government's supply of electricity and customer demand.

**A 12** But given the enormous potential of the source, it is clear that answers need to be found. In Punjab and Haryana, for instance, rice straw burning has become a major cause for concern because of its contribution to winter air pollution. Currently, in Punjab, only 3 per cent of the paddy stubble is used for generating power.<sup>2</sup>

**A 13** There is also the possibility of using biomass as fuel in coal-based power plants, with some adjustments in the boiler. This will reduce coal usage and pollution and can help utilise the existing power capacity. The NTPC estimates that 5 per cent co-firing will need roughly 200 tonnes of biomass per MW – if this is calculated for India's present coal-based power generation capacity, it would require some 40 MMT of biomass every year.

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### References

1. CEA Notice, [http://cea.nic.in/reports/others/planning/rpm/Notice\\_17012020.pdf](http://cea.nic.in/reports/others/planning/rpm/Notice_17012020.pdf)
2. Indian Express Report, <https://indianexpress.com/article/india/punjab-looks-to-biomass-power-plants-to-tackle-stubble-problem-6135111/>