

Biomass agro-residue resource availability in Karnataka

This state wide biomass resource assessment updation was undertaken by Deloitte in the year 2009 as part of “Review of Performance of the Grid Connected Biomass Based Power Plants Installed in South India” study under the MNRE-UNDP/GEF project on “Removal of barriers to biomass power generation in India”. Biomass power potential in Karnataka was re-assessed by updating the agro-residue production in the state using the most recent agriculture crop production data, taken from Directorate of Agriculture, Karnataka for the year 2007-08 available at the time of study. Crop to agriculture residue production ratios used in the study were taken from Biomass Resource Atlas prepared by IISc, Bangalore.

Agriculture production in Karnataka

Major crop residues in the state are rice husk, maize cobs, coconut frond residue, cotton stalk, coffee pruning-waste, etc. Table 1 presents the surplus biomass available from agro residues and power potential in each district. With geographical area of around 19.2 million hectares, the average agro residue density and biomass power density of the state works out to about 0.37 ton/ha and 0.48 MW/sq.km. District wise agro-residue resource and corresponding power generation potential are presented in Table 2.

Table 1: Agro-residue availability and power potential in Karnataka

Agro-residue type	Surplus biomass ('000 tonnes)	Power Potential (MW)
Maize stalks	2,113.2	272.6
Coconut frond residue	791.8	102.1
Cotton stalks	571.5	79.4
Maize cobs	554.7	77.7
Coffee pruning & wastes	437.5	48.9
Paddy husk	351.7	47.7
Coconut husk	321.4	38.6
Gram stalks	273.4	34.1
Sugarcane tops & leaves	262.6	33.0
Paddy straw	235.4	32.8
Jowar cobs	225.9	31.6
Groundnut stalks	196.3	25.3
Jowar stalks	192.0	24.8
Coconut shell	96.4	13.5
Jowar husk	90.4	10.8
Tur stalks	65.7	8.5
Bajra stalks	65.3	8.5
Groundnut shell	58.9	7.1
Cotton husk	40.1	5.6
Cotton boll shell	43.2	5.6
Ragi straw	40.1	5.1
Tur husk	39.4	4.7
Wheat stalks	26.9	3.5
Wheat pod	20.1	2.8
Bajra cobs	16.2	2.1

Bajra husk	14.7	1.7
Millet stalks	5.1	0.7
Total	7,150.0	928.9
Agro-residue density (ton/ha)		0.37
Power density (MW/sq.km)		0.48

Table 2: Surplus biomass and power potential

	Surplus biomass ('000 tonnes)	Agro-residue density (ton/ha)	Power potential (MW)	Power density (MW/'000 ha)
Haveri	539.2	1.12	71.5	0.15
Bagalkot	304.4	0.46	40.3	0.06
Bangalore (U)	14.1	0.07	1.8	0.01
Bangalore (R) + Ramanagara	96.8	0.17	12.4	0.02
Belgaum	730.5	0.55	96.6	0.07
Bellary	363.8	0.43	46.7	0.06
Bidar	110.7	0.20	9.8	0.03
Bijapur	284.4	0.27	18.1	0.04
Chamarajanagar	139.6	0.27	37.3	0.04
Chikmagalur	321.8	0.45	27.2	0.06
Chitradurga	317.9	0.38	41.1	0.05
Dakshina Kannada	75.6	0.17	9.3	0.02
Davanagere	568.8	0.96	73.1	0.12
Dharwad	341.9	0.80	45.7	0.11
Hassan	446.4	0.66	58.1	0.09
Gadag	204.1	0.44	60.2	0.06
Gulbarga	382.2	0.24	49.4	0.03
Kodagu	125.5	0.31	26.4	0.04
Kolar+Chikkaballapura	74.5	0.09	9.6	0.01
Koppal	116.3	0.16	14.4	0.02
Mandya	127.4	0.26	15.9	0.03
Mysore	331.6	0.48	43.0	0.06
Raichur	211.6	0.31	16.9	0.04
Shimoga	292.3	0.35	37.4	0.04
Tumkur	473.8	0.45	42.9	0.06
Udupi	80.0	0.21	14.6	0.03
Uttara Kannada	74.8	0.07	9.2	0.01
Total Karnataka	7,150.0	0.37	928.9	0.48

The surplus agro-residue availability for Karnataka is about 7.15 million tonnes with power production potential of about 930 MW. The other important findings of the study were

- biomass is consumed in large quantities in small and micro industries such as silk, puffed rice, food processing, etc..
- Most of the biomass power plants are clustered in small area of Gangavati rice bowl belt (in Bellary, Koppal and Raichur districts), where almost 80% of installed capacity of

biomass power plants have been installed. This clustering resulted in shortage of biomass resources in the area.

- The biomass prices have seen significant increase due to the competitive market created due to local industries.
- Large numbers of biomass power plants were observed in and around Koppal, even though it had low agro-residue density of 0.16 ton/ha. The presence of number of rice mills in Gangavati belt (Koppal-Raichur area) ensures concentrated residue availability, which has prompted installation of such a large number of plants in a small cluster.
- The study concluded potential of several small scale biomass power plants throughout the state, if planned properly in a distributed manner, especially in high residue density untapped districts like Haveri, Davangere and Belgaum.