

Biomass resources and existing practices in Madhya Pradesh, Maharashtra and Tamil Nadu – experiences from field trip

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Content

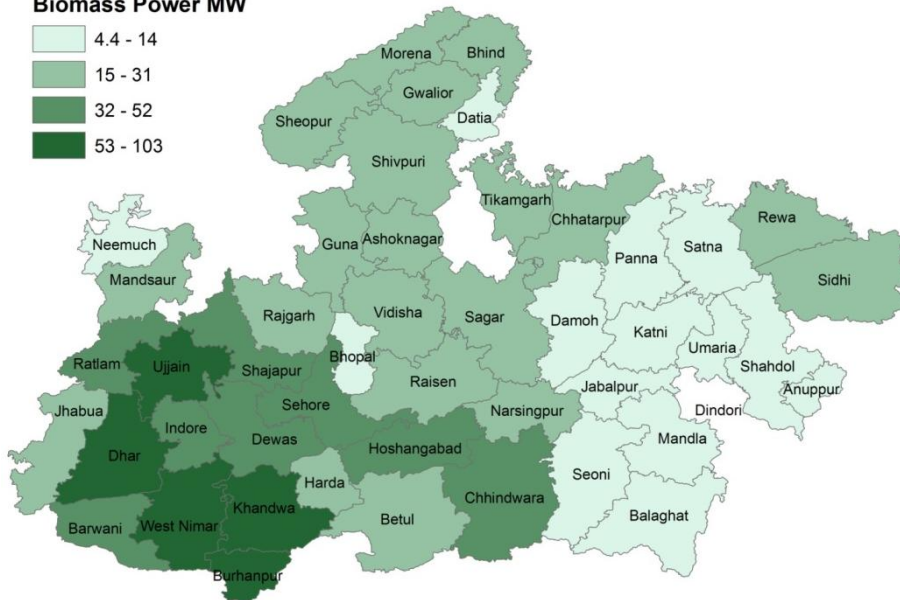
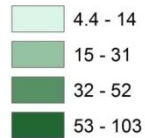
- Biomass power in MP, MH and TN
- State level potentials
- Pilot study areas
- Agricultural biomass potential
 - Pilot scale
- Industrial biomass potential
 - Pilot scale
- Power plant visits
- Key points

Biomass power in MP, MH and TN

	Madhya Pradesh	Maharashtra	Tamil Nadu
Target (MWe)	300	400	-
Installed capacity (MWe)	59	180	177
Registered capacity (MWe)	314	400	-
No of plants	14	18	19
Power tariff (Rs/KWh)	5.64	5.41	5.75
Plant restriction (km)	25 (15MW)	5taluks	-
Subsidy/incentives			
Capital subsidy	Rs20 lakh X (CMW) ^{0.646}	Rs20 lakh X (CMW) ^{0.646}	Rs20 lakh X (CMW) ^{0.646}
Wheeling charges (%)	4	-	-
Electricity duty (years)	5	10	NO
Evacuation expenses (%)	-	50	-
Third party sale	Allowed	Allowed	Allowed

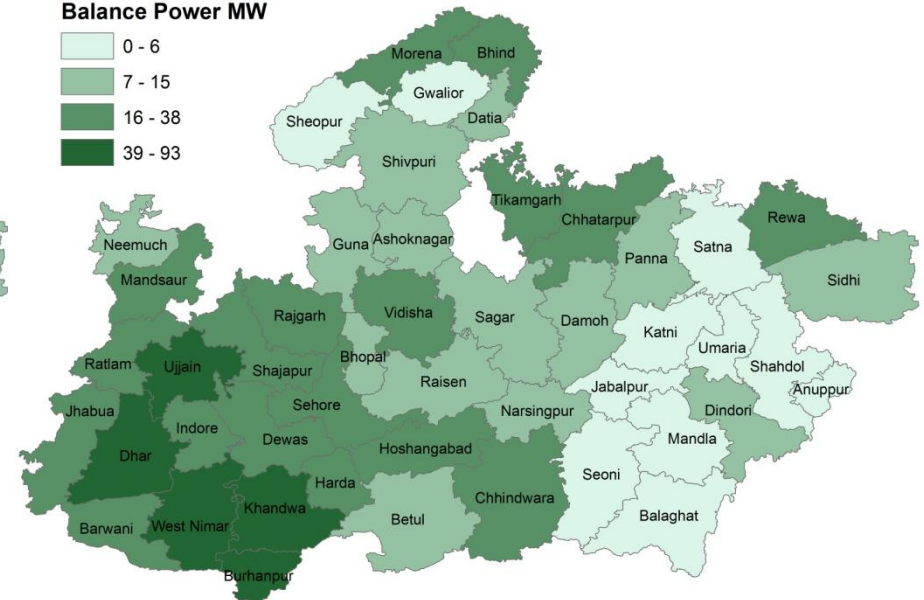
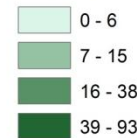
Biomass power production potential in Madhya Pradesh

Biomass Power MW



1242 MW

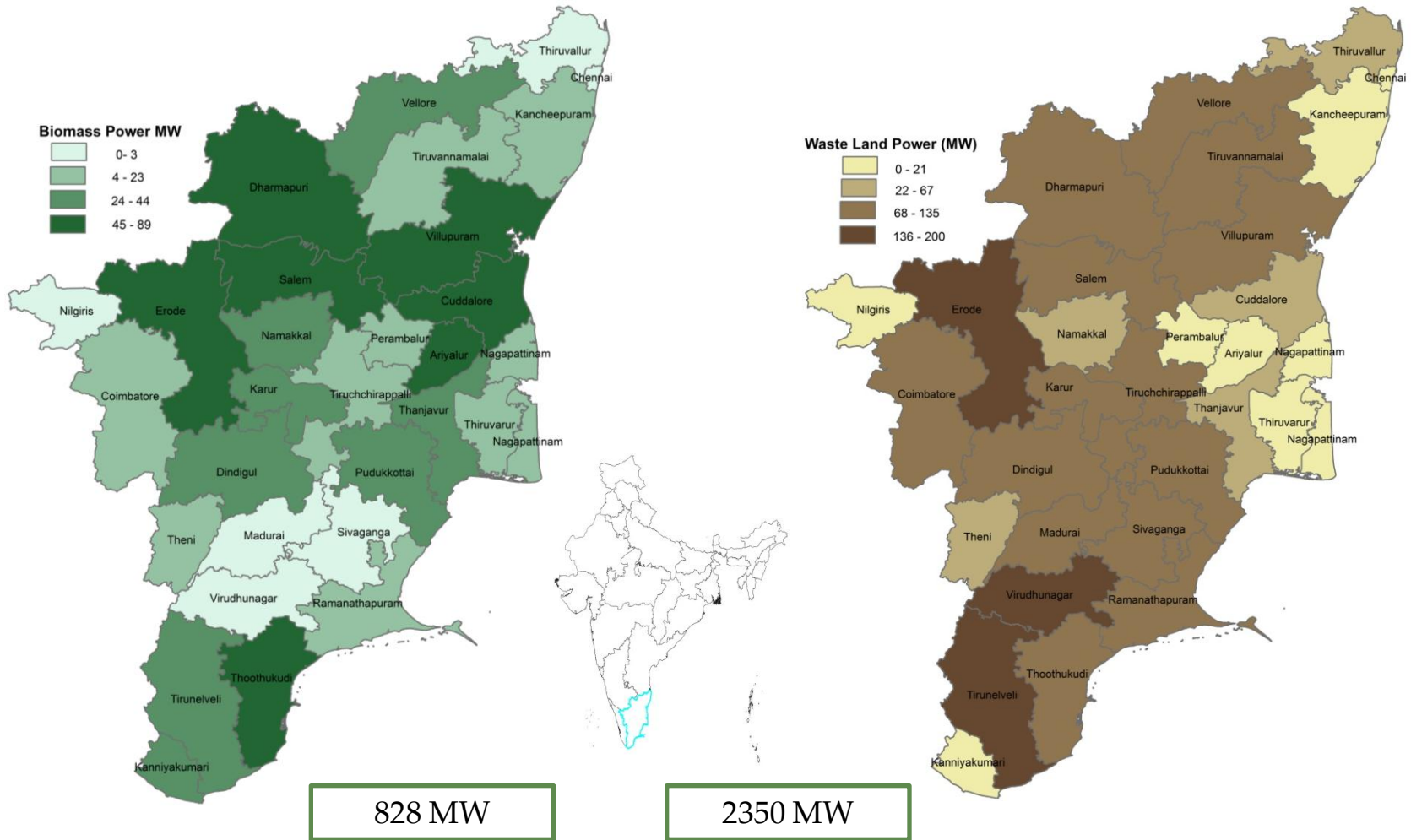
Balance Power MW



869 MW

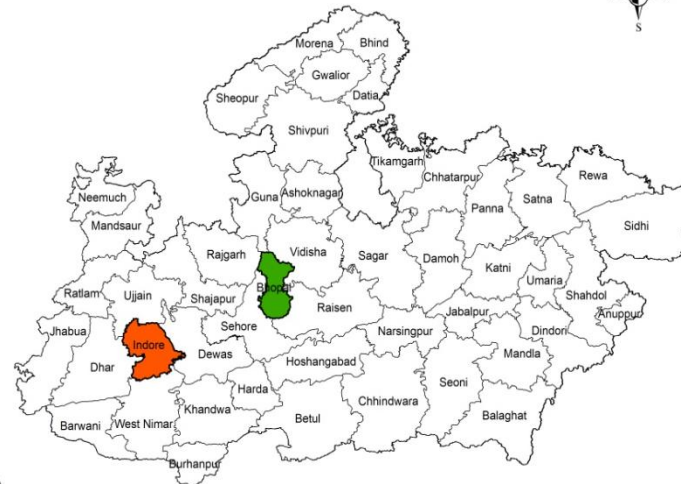
Data source: MPEDA, 1998

Biomass power production potential in Tamil Nadu

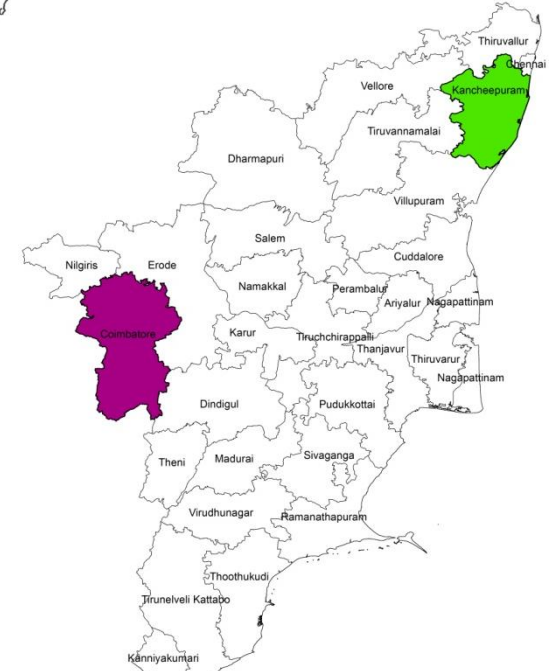


Source: TEDA, 2009

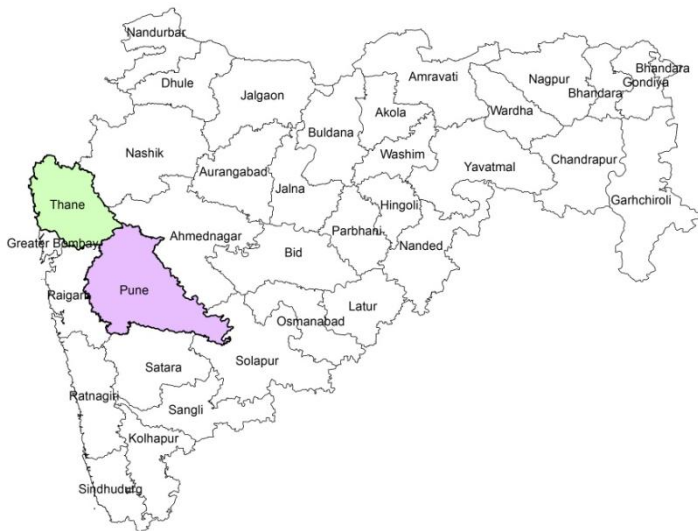
Pilot study – field data collection



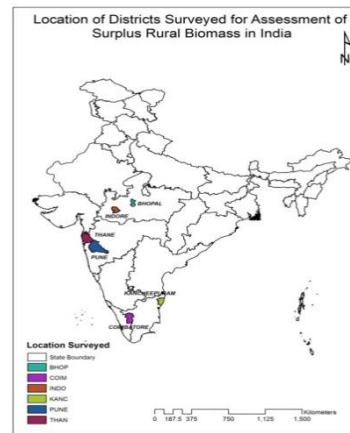
Madhya Pradesh



Tamil Nadu



Maharashtra



Field survey



Major agro-biomass in Bhopal and Indore

Major Crop Residues

Current practices

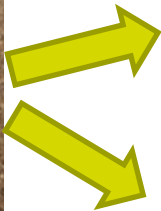
Key figures



Wheat stalk



Soybean stalk



- 1.5 CRR
- 3250 Rs/ton @field
- 4500 Rs/ton @dairy farm
- Harvesting – March – April

- 1.7 CRR
- 2400 Rs/ton
- 1000bricks – 50 kg soybean
- Less rainfall – chickpea
- Harvesting – Sept/October
- Burning practice

Industrial residue potential in Bhopal and Indore

Sawmill residuals



Current practices



Key figures

- Rich in Teak and Babul
- Bhopal (180) and Indore (225)
- Avg 1.5- 3 m³ wood per day
- Sawdust – 10% coefficient
- Firewood – 10-15% coefficient
- Sawdust – 4000 Rs/ton
- Firewood – 4500 Rs/ton

Approximately, one sawmill can supply 2-4 tons of sawdust and 3-6 tons of firewood every month.

Other potential biomass resources for power generation



Sugarcane trash burning



Jatropha plantations on Govt wastelands



Medicinal plant wastes – Pharmaceutical industry

Major agro-biomass in Thane and Pune

Major Crop Residues

Current practices

Key figures



Paddy straw



- 1.5 CRR
- 3- 3.6 tons/ha yield
- 150 dairy farms (50-80 buffaloes)
- 2000Rs/ton @field



Sugarcane



- 0.05 CRR tops
- 0.33 CRR bagasse
- 100 tons/ha yield
- 16 sugar mills (8 co-gen)
- 2000 Rs/ton sugarcane
- 4crores/MW cogeneration

Industrial residues in Thane and Pune



Rice mill



Rice husk



Brick kiln



Jaggery mill



Bagasse as fuel



Jaggery for export

Other potential biomass resources in MH



Burning of beir grass



Vegetable wastes – bitter guard



Kasai grass



Cotton

Case example: Anant Urja Ltd (1.25 MWe), Bhopal, MP



Specification	Unit	Value
Gasifier type		Downdraft
Fuel size	DL	10 -75
Fuel MC	W-%	<20
Biomass consumption	Kg/hr	630
Gasification temp	°C	1050-1100
Power output	KWe	5 x 250

Parameters	Unit	Costs
Investment cost	Crore/MW	6
Biomass price	Rs/kg	1-2
Briquetting	Rs/kg	2-4

Case examples: OGPL (10 MWe), Narshingpur, MP



Parameters	Unit	Value
Bagasse req	ton/day	380
Bagasse price	(Rs/ton)	1400
Bagasse MC	W-%	50
Bagasse GCA	Kcal/kg	2400
Yard storage	Tons	5000
Truck capacity	Tons/truck	17-18
Availability	Months	Nov-April

Case examples: Skendra (13 MWe), Aurangabad, MH



Cotton stalks



Maize cobs



Soybean husk

- MIDC
- Plant operation
 - November to April
- Cotton stalks
 - 2100 Rs/ton @53%MC
- Maize cobs
 - 2400 Rs/ton @20%MC
- Soybean husks
 - 3000 Rs/ton @25%MC

Case/bad example: Sri Guruprabha ltd (10MWe), Jalgoan, MH



Key points

Biomass supply

- Continuous supply of at least one principle feedstock forms an important criteria for power plant site selection (e.g. coconut residues)
- Seasonality and short collection window of agricultural crops (e.g. soybean stalks)
- Long time storage deteriorates biomass characteristics (also hygroscopic) besides need for huge storage yards
- Optimal fuel mix ratio effects biomass to power conversion efficiency (considering MC of different fuels)



Key points

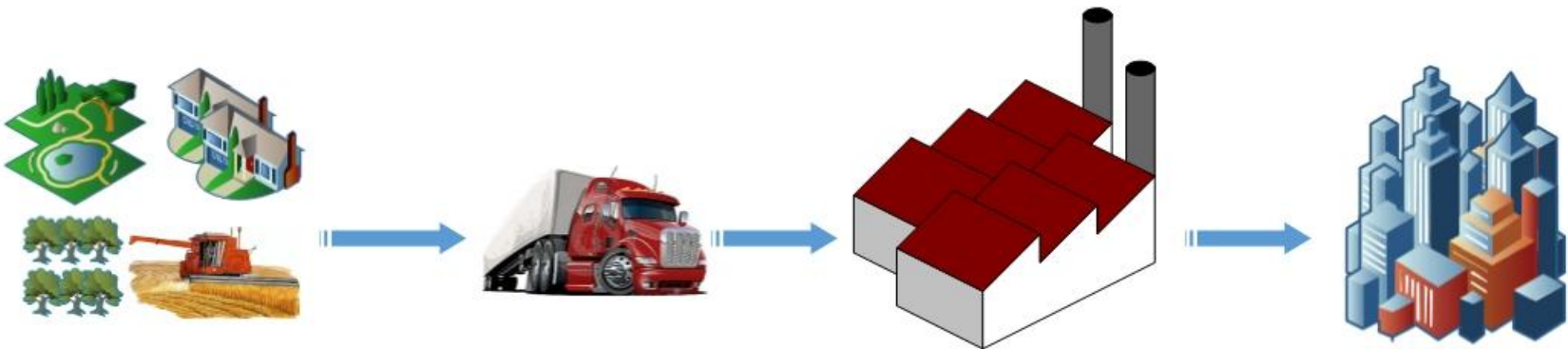
- Supply chain
 - Supply chain system is location specific.
 - Vehicle carrying capacity varies between 1.3 ton – 30 tons
 - Mechanical and manual operations
 - Long transportation distance (20 - 250 kms)



Key points

- Challenges

- Lack of clear 'energy planning strategy' regarding biomass based power production.
- Lack of new scientific innovations or interests in advanced biomass to power technology development.
- Lack of partnerships between companies- government- universities and research organizations.



Key points

- Opportunities

- Most farmers are willing to support and supply their biomass for power production (opportunity cost).
- CF, Indore and other forest officials are interested to raise energy plantations through Joint Forest Management initiatives in degraded forest lands (joint agreements between company and departments).
- Contract farming methods to bridge the gap between supply and demand (also achieve self sufficiency).
- Creating a new bio-based economy to provide employment opportunities and protect environment by reducing GHG emissions.
- Availing the CDM (UNFCCC) and CER (India) benefits



Combu Napier (CN4)

•40-45 t/acre	•30-35 t/acre (1 st y)
•3513 kcal/kg dry	•-45 t/acre(4 th y)
•6% ash	•4200 kcal/kg dry
•81% MC wet	•40-42% MC wet



K-636 Leucaena leucocephala (subabul)

Demand driven energy plantations in Kancheepuram

- Due to high demand of softwood in matchstick, plywood industry some farmers promoting energy plantation like *Casuarina* and *Eucalyptus* sp. in some parts of Kancheepuram district.
 - *Casuarina*: around 1000-2000 plants/acre with the rotation of 3-4 years
 - During final cutting stump will be uprooted and one year old seedlings will be planted newly
 - Yield: 3-5 tones/ rotation/acre wood and around 1 tone stump is generating which usually used as fire wood for household purposes
 - Wild palm trees are commonly found in cultivable waste lands and barren land. Every year the leaves and branches naturally falls on growth of tree. Local community use palm leaves for thatching roof and branches used as fire wood. However, still surplus of biomass can be seen this field



*Let's join together to create
a better opportunity for our
future generations!*



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All Pictures: Karthik's production