

Biomass Gasification in India

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The Big Canvass

Bio resource base in India

- Coal Production – 407 million tons (2005-06)
- Biomass production – 420 million tons
 - (Firewood 220 million tons)
 - (Agro residues 200 million tons)
- Biomass at par with coal, but used inefficiently

- ~ 10 million electric pump sets consuming about 30% of total electricity use
- Huge technical losses (due to low voltage transmission lines in rural areas) as well as financial losses (due to theft, free power etc.) resulting in a revenue loss of \$5 billion per year.
- High promise of biomass gasification for irrigation pumping/rural electrification

The Catch

Biomass often does the vanishing trick

Source/Technologies	Units	Cumulative achievements (upto 31/Mar/06)	India's Position in the World
Power Generation			
Wind Power	MW	5340.60	IV
Small Hydro Power (Upto 25MW)	MW	1826.43	X
Biomass based Power	MW	912.53	IV
Biomass Gasifiers	MW	69.87	I
Solar Photovoltaic Power	MW	2.74	V
Energy Recovery from Urban & Industrial Wastes	MW	45.78	

The Catch

Very scant field data (post installation survey on functionality, problems, performance)



The Drivers

- Subsidy structure (Thermal & electrical)
- Incentives under:
 - VESP (Village Energy Security Program)
 - RVE (Remote Village Electrification)
 - RGGVY (Rajiv Gandhi Grameen Vidyutikaran Yojana)

BIOMASS GASIFIER PROGRAMME

Capital subsidy for Biomass Gasifiers for thermal and electrical applications

- Rs.2.0 lakhs/(\$ 4400)/300 kW_{th} for thermal applications
- Rs.2.5 lakhs (\$ 5500)/100 kW_e for electrical applications through dual fuel engines
- Rs.8.00 lakhs (\$ 17580)/100 kW_e for 100% producer gas engine with gasifier system
- Rs.6.00 lakhs (\$ 13190)/100 kW_e for 100% producer gas engine alone

* *20% higher CFA for North-Eastern States including Sikkim and Special Category States, namely Uttranchal, J&K, Himachal Pradesh.*

Biomass Gasifier based Village Electrification

Programme	Capacity of the system	Basic Package Price	Collection, processing and storage & AMC
Village Electrification	50 kW (30 villages including 10 in N.E. States)	Rs.15.00 lakhs (\$33000) per village electrification cost including biomass gasifier system, housing and local distribution	1.50 lakh (\$3300)

- For North-Eastern States and Sikkim, 90% MNES share and 10% State share or State Agency, Panchayat, etc. of Basic Package Price.
- For other States, 60% MNES share and 40% State share or State Agency, Panchayat, etc. of Basic Package Price.
- 25 kWe unit size and modular upto 100 kWe and a special rating of 10 kWe proposed.
- Average 50 kWe capacity of one village has been taken.
- For cluster of villages, 100 kWe unit size and modular upto 1 MWe proposed.
- Rs.1.50 lakh per 50 kWe plant per year in addition has been proposed as grant for biomass collection, processing and storage for a period of five years and AMC.
- Micro-credit for internal wiring @Rs.1500/- per household.
- Proposed implementation be done by / through SNAs with the involvement of ESCOs, Co-operatives, Panchayats, NGOs, Manufacturers or Entrepreneurs

Fiscal Incentives for Biomass Power Generation

Item	Description
Accelerated Depreciation	<p>80% depreciation in the first year can be claimed for the following equipment required for co-generation systems:</p> <ul style="list-style-type: none">• Back pressure, pass-out, controlled extraction, extraction-cum-condensing turbine for co-generation with boilers• Vapour absorption refrigeration systems• Organic rankine cycle power systems• Low inlet pressures small steam turbines
Income Tax Holiday	Five year tax holiday with 30% exemption in next 5 years for power projects with PPAs
Customs Duty	Duty leviable for NRSE power projects of less than 50 MW capacity (under Project Import Category) is 20% ad valorem.
General Sales Tax	Exemption is available in certain States

The back seat driver :
Electricity Act 2003

- 10% of renewables recommended but not mandated



The Actors

Government/ Public sector	Academic/NGO	Manufacturers/ Suppliers
<ul style="list-style-type: none"> • MNES • IREDA • SNAs (WBREDA etc) • MoP • NTPC 	<ul style="list-style-type: none"> • CGPL (IISc/ Blr) • ASTRA (IISc/B) • Dept of Mech Engg IIT/B • Dept of Chem Engg & CES, IIT/D • Madurai Kamraj Univ • SPRERI • Anna University • TERI 	<ul style="list-style-type: none"> • Ankur • Grain Processing • AEW • Cosmo • Aruna Electrical • CPW • 2M Industries • Paramount • Cummins India • Kirloskar • Greaves • Several un recognised entrepreneurs



The Works (Technology)

Gasifier Types:

- Throated, Imbert type
- With choke plate
- Throatless, Open top (some time), downdraft
- Throatless, Closed top, downdraft
- Updraft
- Natural draft

Air Entry:

- Both suction and pressurized

Researched and abandoned:

- Powdery biomass gasification
- Fluidized bed gasification

Recent:

- High pressure gasification

Gas cooling/cleaning:

- Cyclones
- Spray towers/packed bed towers
- Venturi scrubbers
- Centrifugal scrubbers
- Variety of filters
 - Sand bed
 - Rice husk bed
 - Saw dust bed
 - Wood/wood shavings/charcoal bed
 - Fabric/foam filters
 - Paper filters

Engines:

- Dual Fuel mode (existing diesel engines)
- 100% Producer Gas Engines
(Modified diesel/natural gas engines)

Instrumentation and Controls:

- Minimal

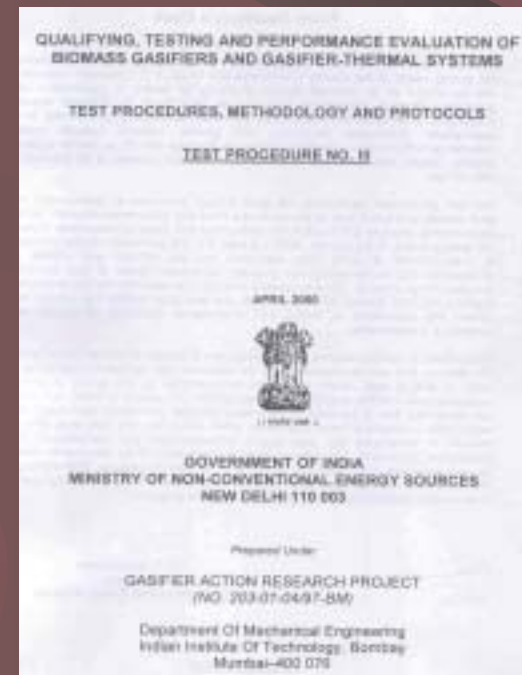
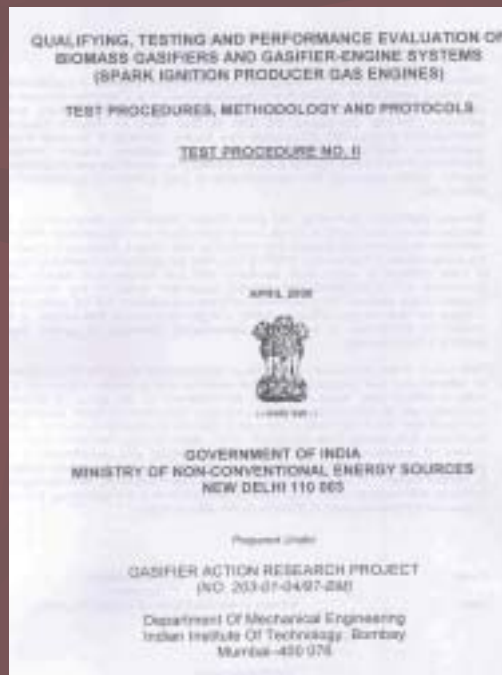
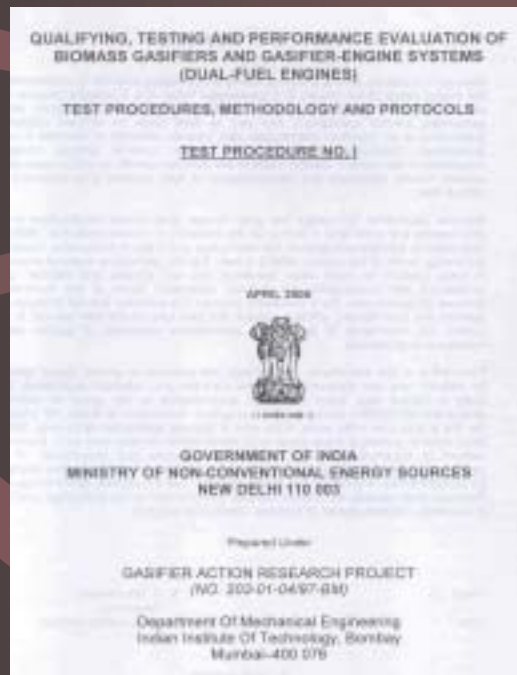
Wastewater Treatment:

- Generally not done



The Rules (Standards)

- Somewhat primitive, flexible, and individualized procedures for testing and standardization till 2000
- New test procedures since 2000



The Catch - 22

- Testing agency same as technology developer/supplier earlier (conflict of interest)
- No independent testing agency at present
- No Indian standard (BIS)
- Self certification by existing manufacturers (bars new entrants into subsidy market)
- No check on quality control of current equipments

The Play (Active till 2003)

R&D program on Gasification

- PICCOPs (Principal Investigators Committee for Coordination of Projects)
- GARCs (Gasifier Action Research Centres)
- GARPs (Gasifier Action Research Projects)
- Small Grants Program on Gasification



The Mega Play

BERI (Biomass Energy for Rural India)

UNDP/GEF, ICEF, GoK

Objectives

- To Develop and implement bioenergy technology packages
- To promote sustainable and participatory approaches
- To meet rural energy needs

Goal to be achieved through:

- Demonstrating technical and financial viability in a cluster of 24 villages in Tumkur dist of Karnataka
- Building capacity and developing appropriate mechanisms for implementation, management, monitoring
- Developing financial, institutional, market strategies to overcome identified barriers for large-scale replication for rural areas
- Disseminating bioenergy technology and information on large scale

Project Outlays:

US\$ 8.819 million	Total
US\$ 4.020 million	UNDP/GEF
US\$ 2.495 million	ICEF
Balance	GoK & Others

Time Frame: Five years

(Actual implementation started June 2002)

Expenditure till 2006: 32%

Project unlikely to achieve Objectives/Goals

THANK YOU

