

Strategies and Policies to Overcome Barriers in Implementation of Anaerobic Digestion

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Indian Energy Scene

- 156,000 MW power generation capacity is mainly based on thermal and hydro with about 8% from RE. Peak shortage 12 %. Energy shortage 9 %.
- 153 MT consumption of oil products. 33.5 MT domestic crude production. Imports 78%, and growing.
- Coal production about 490 MT/year.



Indian Energy Scene (Contd.)

- Primary energy consumption - 440 mtoe., about 4.6% of global total.
- Per capita energy use is 1/4th of global avg.
- Commercial energy demand growing at 4%.
- Growing gap between demand and supply
- Oil imports to rise beyond existing 78%



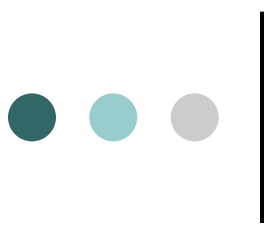
Rural Energy Scene

- About 80% of rural energy consumption comes from fuelwood, animal dung, agro wastes, etc.
- Only 45% of rural households use electricity with supply being inadequate and unreliable. About 80 million households still use kerosene for lighting
- Majority of villages that are yet to be electrified are remote and have low load densities. Extension of grid uneconomical and will increase T&D losses



Relevance of Renewable Energy in India

- Demand for power and exhaustible fossil fuels increasing
- Problems in meeting even minimum energy needs for cooking and lighting in many areas
- About 80 million homes with 400 million people still without electricity
- Power shortages even in cities
- Need more power and less GHG emissions



Anaerobic Digestion in India

- Household biogas plants mainly based on cattle manure for cooking and lighting
- Biogas plants based on livestock wastes / urban and industrial wastes
- Co-digestion of farm / agricultural residues with urban and industrial wastes



Anaerobic Digestion in India - Barriers

- Technology / Equipment
- Power evacuation infrastructure
- Market for organic manure
- Financial viability
- Entrepreneurship development



Household Biogas Plants

- National Programme for household biogas plants operational since 1982.
- Over 4 M small plants (1 Cum. onwards) for cattle manure installed so far against a potential of 12 Million
- Cost : Rs.8000 (US\$165) onwards
- Two broad categories of plants in use - floating dome type and fixed dome type



Biogas Plant Designs
Top: Floating drum
Bottom: Fixed dome



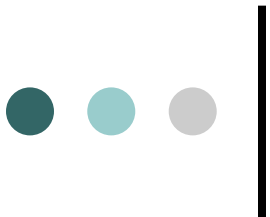
Agricultural Biogas Plants

- 1 MW Cattle manure based biogas project at a dairy colony
- About 2000 small and medium size biogas plants based on cattle manure for heat, electricity or motive power (5-25 kW)
- 1.5 and 2.5 MW biogas projects for poultry droppings
- About 10 projects based on mix of agricultural residues and livestock wastes taken up



Some Projects based on Agro-Industrial Wastes

- Two projects of 0.8 MWeq biogas for Slaughterhouse Wastes
- Over 250 distilleries generating biogas from wastes /effluents. 40 MW power generation from biogas at 20 distilleries
- 17 Projects of 16 MWeq for starch industry
- 4 projects of 3.5 MWeq at Agro-residue based Paper mills



Biogas Potential from Agro-industrial wastes (in MW)

Sugar	363
Pulp and paper	58
Starch	129
Distillery	503
Milk processing	69
Slaughterhouse	94
Poultry	65
Total	1281



1.0 MW power project based on cattle dung at Haebowal Dairy Complex Ludhiana, Punjab



1 MW Cattle manure based biogas project – Case Study

- Demonstration project for power generation from cattle manure
- About 21000 kWh and 70 TPD organic manure from 235 TPD cattle manure
- Based on technology obtained from Austria
- Project commissioned on 4th November'04
- Has operated at PLF of over 90%



Biomethanation of Tapioca Processing wastewater at Varalaxmi Starch, Salem

Ministry of New and Renewable Energy, India



Energy from Sago/Starch Effluents

- Effluent Capacity : 400 Cum./day
(100 tcd capacity)
- Biogas production : 5000 Cum/day
- Power generation : 400 kW
- Cost : Rs 2.00 crore
- Payback period : 2-4 years



2 MW biogas power at Kanoria Chem, Ankleshwar



Energy from Biogas at Distilleries

- o Capacity : 30 kL
- o Biogas production : 12000 cum./day
- o Power generation :
 - Steam turbine route : 0.5 MW
 - Reciprocating Engine: 1 MW
- o Project Cost : Rs. 4.5 crore
- o Payback period : 3-4 years



Energy from Dairy Effluents

- o Capacity : 3 Lakh LPD
- o Biogas production : 1200 cum./day
- o Power generation : 100 kW
- o Cost : Rs. 1 crore
- o Payback period : 4 years



Energy from Poultry Litter or cattle dung

- o Capacity : 1 M Birds / 20000 cattle
- o Waste production : 180 TPD / 250 TPD
- o Capacity : 1 MW
- o Cost : Rs 9 cr.
- o Payback period : 4-5 years



3000 cum biomethanation project for solid waste at Slaughterhouse in Andhra Pradesh



Financial Viability of Biogas Projects

- Revenue sources

- Sale of Power
- Sale of Manure / compost
- CERs

AND / OR

Tipping / Treatment Fee

- Subsidies

- Direct subsidy
- Tariff support



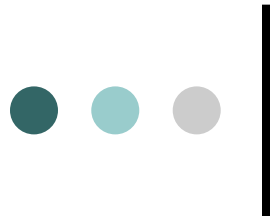
Government Support for Biogas Programme

- Subsidy for installation – 20-50% of cost
- Administrative costs
- Capacity building through:
 - * training of officials and constructors
 - * Training of plant operators/users
 - * Information dissemination
- Sponsorship for Research and Development



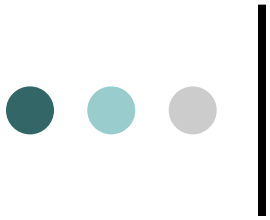
Government Support (Contd.)

- **Provisions in the Electricity Act 2003**
 - Open access to grid for RE power
 - Preferential tariffs by State regulators
 - Targets for RE power
 - Captive generation decontrolled
- **Fiscal Incentives / Concessions**
 - Customs duty for imports
 - Excise duty for manufacture of RE devices
 - Income Tax



Recent initiatives

- Preparation of best practices brochures for dissemination of information about success stories, technology and equipment for different applications
- Focus on individual sectors
- Thrust on co-digestion of mix of various waste streams
- Consultations through seminars and business meets for individual industries/sectors



THANK YOU

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