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)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Potential (MW)</th>
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<tbody>
<tr>
<td>Sugar</td>
<td>363</td>
</tr>
<tr>
<td>Pulp and paper</td>
<td>58</td>
</tr>
<tr>
<td>Starch</td>
<td>129</td>
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<tr>
<td>Distillery</td>
<td>503</td>
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<tr>
<td>Milk processing</td>
<td>69</td>
</tr>
<tr>
<td>Slaughterhouse</td>
<td>94</td>
</tr>
<tr>
<td>Poultry</td>
<td>65</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1281</strong></td>
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1.0 MW power project based on cattle dung at Haebowal Dairy Complex Ludhiana, Punjab

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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

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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

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Energy from Biogas at Distilleries

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

- Capacity: 3 Lakh LPD
- Biogas production: 1200 cum./day
- Power generation: 100 kW
- Cost: Rs. 1 crore
- Payback period: 4 years
Energy from Poultry Litter or cattle dung

- Capacity: 1 M Birds / 20000 cattle
- Waste production: 180 TPD / 250 TPD
- Capacity: 1 MW
- Cost: Rs 9 cr.
- 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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