Indian Energy Scene

- 141,000 MW generation capacity. Mainly based on coal thermal and hydro with about 8% from renewables. Peak shortage 15%. Energy shortage 9%.

- 150 MT consumption of oil products. 34 MT domestic crude production. Imports 77%, and growing.

- Coal consumption 400 MT.
Indian Energy Scene

- Primary energy consumption - 440 mtoe., about 4.6% of global total.
- Per capita energy use is 1/4th of global average.
- Commercial energy demand likely to grow at 4%.
- Growing gap between demand and supply
- Oil imports expected to rise further from present 77%
Rural Energy Scenario

- About 80% of rural energy consumption comes from non-commercial sources: about 320 MT of fuelwood, animal dung, agro wastes, etc.

- Only 45% of rural households use electricity. Even in electrified villages, supply is 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 would lead to heavy 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 felt even in cities
- Need to reduce in GHG emissions
Biogas in India

- Household biogas plants mainly based on cattle manure for cooking and lighting
- Biogas plants based on cattle manure, slaughterhouse and vegetable market wastes for heat, electricity or motive power
- Biogas from urban and industrial wastes and effluents
- Co-digestion of farm / agricultural residues with urban and industrial wastes
Household Biogas Plants

- National Programme on 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 from Rs.6000 (US$150) onwards
- Two broad categories of plants in use - floating dome type and fixed dome type
Biogas Plant Designs
Top: Floating drum
Bottom: Fixed dome

Ministry of New and Renewable Energy, India
Agricultural Biogas Plants

- 1 MW Cattle manure based biogas project at a dairy colony in Ludhiana, Punjab
- 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 based on poultry droppings in Tamil Nadu
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
- Cost – INR 136 Million
- Based on technology obtained from Austria
- Project commissioned on 4\textsuperscript{th} November’04
- Has operated at PLF of over 90%
1 MW Power Project (Contd.)

Imported Components

- Gas Engine
- Macerator
- Screw Presses
- Gas Holder

Spares of imported components indigenised

- Macerator shaft and mechanical seals
- Sieve cylinders of screw press
1.0 MW power project based on cattle dung at Haebowal Dairy Complex Ludhiana, Punjab
<table>
<thead>
<tr>
<th>Category</th>
<th>Biogas Potential (in MW)</th>
</tr>
</thead>
<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>
</tr>
<tr>
<td>Distillery</td>
<td>503</td>
</tr>
<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>
</tr>
</tbody>
</table>
Some Projects for Energy from Industrial Wastes

- 0.5 MW power from starch industry waste
- 4000 cum. biogas from Slaughterhouse Wastes
- 15000 cum. biogas from bagasse wash-water
- Over 250 distilleries generating biogas for heat and/or power from their wastes/effluents
2 MW biogas power at Kanoria Chem, Ankleshwar
Biomethanation of bagasse wash-water at Tamil Nadu Newsprint and Papers Limited, Karur
3000 cum biomethanation project for solid waste at Slaughterhouse in Andhra Pradesh
Biomethanation of Tapioca Processing wastewater at Varalaxmi Starch, Salem

Ministry of New and Renewable Energy, India
Research Areas of Interest

- Low temperature Anaerobic Digestion
- Anaerobic Digestion of Mixed Wastes
- Conversion of biogas into Natural Gas quality fuel gas
- Development of Micro-turbines
- Development of equipment for moisture removal from digested slurry
Financial Viability of Biogas Projects

- Revenue sources
  - Sale of Power
  - Sale of Manure / compost
  - CER trading under CDM
  - AND / OR
  - Tipping / Treatment Fee

- Subsidies
  - Direct subsidy
  - Higher price for power or manure
Government Support for Biogas Programme in India

- Subsidy for installation – 20-40% of cost
- Preferential tariff for sale of power
- Fee for supervision and warrantee for small plants
- Capacity building through:
  * Training of officials and constructors
  * Information dissemination
  * Training of plant users
- Sponsorship for Research and Development
- Monitoring and evaluation
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
Required Support Measures

- Best Practices Manuals for dissemination of information about success stories
- Manuals / brochures giving tech. / equipment details for different applications
- Project Development Documents for sample projects for CER trading
- Financial assistance for AD initiatives
- Training of experts / planners
- Expert / Advisory Group for outreach activities
THANK YOU

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