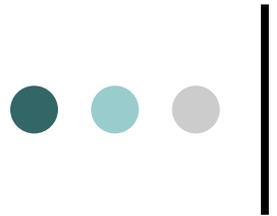




# Biogas in India

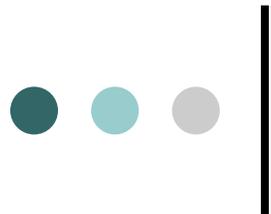
Anil Dhussa

Ministry of New and Renewable Energy  
Government of India  
New Delhi



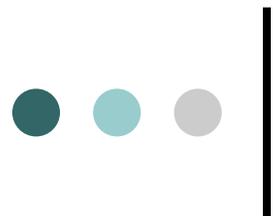
# Indian Energy Scene

- 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.



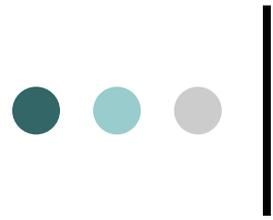
# Indian Energy Scene

- Primary energy consumption - 440 mtoe., about 4.6% of global total.
- Per capita energy use is 1/4<sup>th</sup> 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%



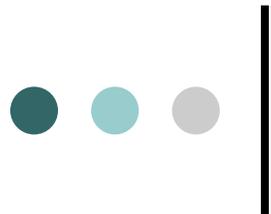
# Rural Energy Scenario

- 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



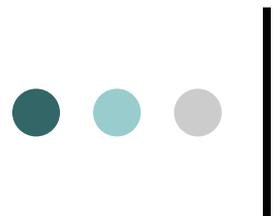
# Relevance of Renewable Energy in India

- 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

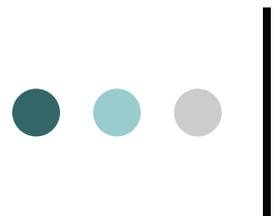


# Household Biogas Plants

- 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**



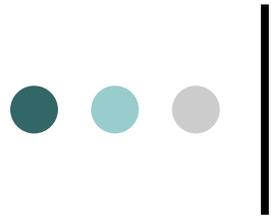
# Agricultural Biogas Plants

- 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<sup>th</sup> November'04
- Has operated at PLF of over 90%



# 1 MW Power Project (Contd.)

## **Imported Components**

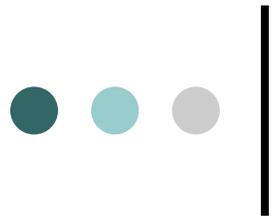
- Gas Engine
- Macerator
- Screw Presses
- Gas Holder

## **Spares of imported components indigenised**

- Macerator shaft and mechanical seals
- Sieve cylinders of screw press

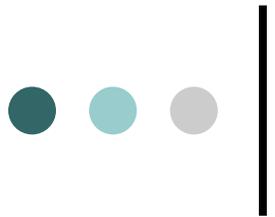


**1.0 MW power project based on cattle dung at Haebowal Dairy Complex Ludhiana, Punjab**



# 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
<b>Total</b>	<b>1281</b>



# 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



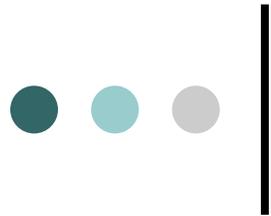
## Biomethanation of bagasse wash-water at Tamil Nadu Newsprint and Papers Limited, Karur



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

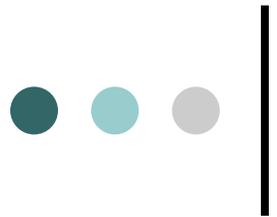


## Biomethanation of Tapioca Processing wastewater at Varalaxmi Starch, Salem



# Research Areas of Interest

- o Low temperature Anaerobic Digestion
- o Anaerobic Digestion of Mixed Wastes
- o Conversion of biogas into Natural Gas quality fuel gas
- o Development of Micro-turbines
- o 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

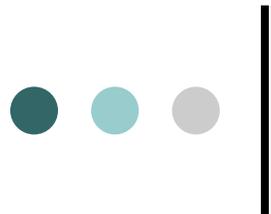
- Subsidies

- Direct subsidy
- Higher price for power or manure



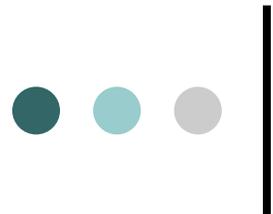
# Government Support for Biogas Programme in India

- 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



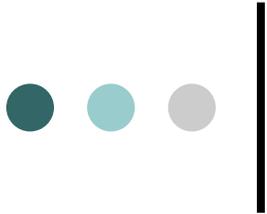
# Government Support (Contd.)

- **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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