Ausbauziele und Förderung im Bereich Bioenergie in Indien

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Structure

- India and Indian Biogas Association!
- Biogas - an introduction
- Biogas potential and present scenario
- Biogas: A need for Indian urban, rural and Industrial sector
- Socio-economic model of Biogas
- Financial analysis of Biogas based business model
- Challenges for Biogas
India

India - a $100b opportunity?

24/7 power across India

100GW by 2022

Improving investment climate

More than 1 billion people and a growing middle class

13 of 20 world's most polluted cities

Inflation

Make in India

www.biogas-india.com

Photo source: http://www.ey.com/
Renewable energy country attractiveness indices

Key index movements

India 5 (6)
France 7 (8)
UK 8 (7)
Chile 11 (12)
South Korea 12 (11)
Sweden 20 (21)
Mexico 23 (24)
Morocco 27 (28)
Philippines 32 (34)
Egypt

( ) = Previous ranking
Installed power in India

Data as of 31.12.2014

- Coal: 1,54,170 MW
- Gas: 22,971 MW
- Diesel: 1,199 MW
- Nuclear: 4,780 MW
- Renewable: 33,791 MW
- Hydro: 40,867 MW

- Wind Power: 22,465 MW
- Small Hydro Power: 3,990 MW
- Bio Power: 4,165 MW
- Solar Power: 3,062 MW

Source: www.mnre.gov.in
Indian Biogas Association

The association was founded in 2011 and is now mushrooming. The sole motto of the association is “propagating Biogas in a sustainable way”.
Biogas refers to a gas produced by breakdown of organic matter in the absence of oxygen.
Substrate from Agricultural, Urban and Industrial origin

- Cow Dung, poultry litter
- Agricultural residues as rice straw, banana stem, maize stalks
- Sugar mill press mud, Distilleries spent wash, Sago plant effluent
- Municipal Solid Waste, slaughter house waste, vegetable market waste, kitchen waste
- Silage from agricultural crops as Napier grass, Sugar beet, Sugar cane, Maize
Utilization of Biogas

BIOGAS

Drying, Desulfurization

Boiler

Heat

Gas conditioning with or without CO2 separation

Compression

Bottling or gas grid

Substitute for LPG or nature gas

Reformation (possibly)

Filling station

Fuel cell

Fuel

Electricity and heat
Financial Analysis

1 NCum of Biogas → 0.4 Kg of Compressed Biogas
   ↓ € 0.32 @ € 0.8/Kg*

1.8-2.1 Units of Electricity
   ↓ € 0.21 @ € 0.1/KWh*

Not to forget – Biofertilizer is an intrinsic part of revenue for Biogas business!

* CAPEX & OPEX almost similar for both type of plants
Biogas in India – An Analysis

Cumulative profit/loss

- Technology transfer
- Research
- Development
- Product launch
- Commercialization
- Valley of death
- Success as a new product
- Success as a business

Time
Scenario

- Scattered market
- No established player at national level
- Market needs someone offering end to end solution
- Experienced and skilled workforce is lacking
- Government active intervention is needed
- Promotion of organic crops is lacking
- Different approach is needed for small, medium and large scale biogas plant promotion
- Supply chain management is to be streamlined
Biogas: A need for Indian rural and Industrial sector

• India has the natural resources.
• It provides a buffer against energy security concerns.
• It offers a hedge against fossil fuel price hikes and volatility.
• Off-grid energy supply can meet demand in un-served rural areas.
• It can be supplied to both urban and rural poor.
• It can support attainment of India’s climate change goals.
• India aims to be a global leader in renewable energy!
Challenges

- Finance
- Technical
- Energy management
- Social engineering
- O&M
- Policy
- Cost
Socio-economic model of Biogas: An example
Gobar Bank Concept

1. Cow Dung
2. Dung collection
3. Weighing and passbook entry
4. Gas production
5. Pressure regulating system
6. Gas utilization
7. Slurry output
8. Vermi compost usage
9. Vermi compost shed

Biogas generation plant
Project Uniqueness

• Bhitbhudrak model showed the importance of social engineering along with technology to make biogas a success
• The design was kept very simple and yet robust
• The length of pipeline in the village is 2500 meters
• The villagers are facilitated with cleaner and consistent source of energy for cooking
• Improved economics of village:
  - By way of providing more earnings from dung
  - By way of improved crop production because of use of organic fertilizer
• Improved health and hygiene
• Providing smoke free atmosphere into kitchen
• Providing cleaner environment in to village
• Women empowerment
Dung Based Biogas Potential

**BIG SHIT SPELLS BIG MONEY**

- Estimate of animal and poultry waste daily (*): 2.06 mn tonnes
- Estimate of human solid waste daily (*): 1.88 mn tonnes
- Estimated annual human and animal waste: 1,434 mn tonnes
- Estimated biogas from each tonne of waste: 40 cubic metres
- Estimated potential biogas from human waste: 57,378 mn cubic metres
- Diesel equivalent (800 cubic metre of biogas approximates 350 kg of methane): 25 mn tonnes
- Total diesel consumption in India (@): 69 mn tonnes

Total value of biogas potential from shit @ Rs.60/litre of diesel

₹150,617 cr

(@) Indian Petroleum & Natural Gas Statistics - 2013-14, Govt of India

Note: Does not include agricultural waste – wasted vegetables, fruit, dry leaves, twigs, chaff, straw etc – and food waste, mn = million

Full Market Potential ~ Euro 20483 million
Annual Biogas Generation

- **Distillery**: 500 Ncum/hr, 320 Nos
- **Tanneries**: 300 Ncum/hr, 3000 Nos, Potential sites: 159
- **Paper**: 300 Ncum/hr, 600 Nos, Potential sites: 210
- **STPs**: 300 Ncum/hr, 300 Nos
- **Others**: 320 Nos

Full Market Potential ~ **USD 3 billion**
Target Market Potential ~ USD 1.2 billion
Annual Biogas 2000 million NCum
Annual CBG potential 900 million kgs
Biogas, Enrichment and Bottling unit at Jaipur

LPSA and Bio-CNG compressor
PEDA 1 MW Biogas Plant, Ludhiana
Bio-boxX™
Yearwise biogas plant installed (cumulative)

*Data up to 31.12.2014*
Make in India

http://makeinindia.com/sector/renewable-energy/
MSW - Present situation in India

Photo sources:
STRDEL/AFP/Getty Images
Wikimedia
http://assets.knowledge.allianz.com/
Proposed Scheme

1. Waste
2. Sorting
3. Remove H2O and Nutrients
4. Add Nutrients
5. High Quality Impurities
6. Percolation
   - Remove H2O
7. Composting
8. High Quality Biogas
   - Capture and Sell
9. Organic Fertilizer
   - Sort and Sell
10. Sort and Sell
Proposed two phase system

Biowaste

Process module

Biogas Reactor

Active liquid

Biogas, >70% methane

Solid – Liquid separation

Hydrolysis – Methanogenesis separation

Anaerobic Digestion and Aerobe Composting integrated
## SWOT Analysis

### Strength
- Proven and reliable Technology;
- Cheapest sustainable energy solution;
- Energy efficient process;
- Business process expertise;
- PPP mode is possible;
- No shortage of human resources for Technology;
- The financial model can grow with the increase in gas price;

### Opportunity
- Conventional fuel prices;
- Shortage of gas supply;
- Gas grid is still not in place;
- Focus on enterprise customers opens a new dimension in value creation, further enhancing income for many stakeholders;
- Huge premium valuation for projects and great opportunities to investors;
- Partnership as energy providers with small – medium scale enterprises and other industries will hedge income drivers

### Weakness
- Usual practice of using conventional energy;
- Unsecured capital structure for the project;
- Untrained man power;
- Weak work culture and ethics across cross section of Indian society;

### Threat
- Repeated break in supply chain;
- Acceptance of organic manure;
Common sense is the realized sense of proportion!

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