



Waste to Energy; an emerging Trend towards sustainable Environment

ENERGETICA INDIA

Energetica India, media partner to Mission Energy's Waste to Energy (W2E) Summit in New Delhi, brings across the discussions from the Summit.

Energy from Waste has seen significant growth potential in recent years as the demand for renewable sources of energy remains high on the agenda of government policies and legislation.

There is an obvious need to minimise generation of waste and to reuse and recycle it, technologies can play a vital role in mitigating the problems. Besides, recovery of substantial energy, technologies can lead to a substantial reduction in the overall waste quantities requiring final

disposal, which can be better managed for safe disposal in controlled manner, even while meeting the pollution control standards.

An estimated 55 million tonnes of municipal solid waste and 4400 million cubic meters of liquid waste are generated in urban areas of India annually with an POTENTIAL of 2600 MW of power production.

Waste generated by Indian industries finds way to land and water bodies in large quantities, without proper treatment,

emitting various CXO gases, air and water pollution, and increase in GHG emissions. Currently 130MW produced against total POTENTIAL of 2000 MW.

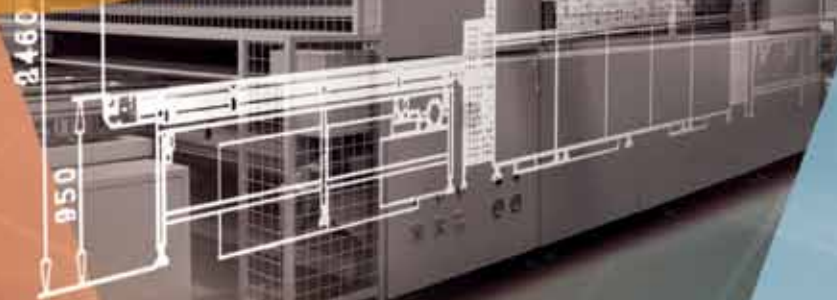
Currently 384MW of power produced against total Potential of 1000 MW from agricultural waste.

With growing government support and demand for renewable and sustainable energy supplies for the future, demand is greater than ever and the potential in this industry sector continues to encourage an evolution of new processing methods

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EVENTS

and technologies to leverage the industries opportunities and current project developments. This brought Mission Energy Foundation to organise an international summit on Waste to Energy where keynote speakers discussed the latest technologies, challenges and developments in this fast paced industry sector.

MR. BHAVESH BUDDHDEV **CEO, SOLUTION FOR ENERGY (S4E)**

Mr. Bhavesh spoke on the Challenges in Waste (Cattle Dung) to Energy Projects in India.

He said that W2E projects are perceived as need of the hour due to numerous reasons viz depleting fossil fuels sources, global warming, increasing power demand, etc

Not to forget that Treatment and Safe Disposal of Waste in Rural and Urban areas is a major concern for the government and also for the society.

Bhavesh said that policies and provisions are in place (more or less) for urban waste management, disposal and also for sale of byproducts from MSW treatment plants. But there is total lack of policy framework for Rural waste like Agriculture waste, Cattle Dung and Woody Biomass; which is needed.

On challenges in Rural W2E projects, Mr. Bhavesh cited the following:

- Lack of mass awareness about such projects
- Improper dissemination of project information, scheme and project funding
- Lack of clear policy to fast-track such projects
- Interdepartmental ambiguity on existing policies
- Selection of technology and its criterions
- Permissions and Clearances from different departments

On the way forward, Mr. Bhavesh, said:

- Rural W2E projects should be given a boost
- There should be focus on formation of roadmap for such projects with transparent policies and methods of agreement
- Dedicated cell/department to expedite the process / project
- Special interest rates for such projects



MR. KIRIT N. NAIK

CENTRE FOR FUEL STUDIES AND RESEARCH (CFSR)

Mr. Kirit Naik spoke on the potential of Waste to Energy in India and how India can work towards Zero Landfill.

He said that India has to realize the limited reserves of fossil fuels. "While we rely on fossil fuels for the present and some time to come, we need to find out ways and means to make best use and reuse of resources consumed. It is here that waste to energy adoption on a countrywide scale can make significant difference".

He pointed out that waste to energy efforts of some European cities can act as a searchlight for India. Use of Waste to Energy solution are used on municipal solid waste; Surat with a waste quantity of 1000 TPD can look at generating 403MWh/Day, Mumbai with 5320 TPD can get 2288 MWh/Day, Delhi with 5922 TPD can get 2546 MWh/Day.

Kirit believes that India needs to organize the unorganized waste management methods where all stakeholders play their role- be it government, waste collectors, and citizens.

He gave some examples of work being carried out in India in the W2E space in India:

- Howrah Municipal Corporation with the help of Selco is setting up green-energy-from-garbage project, work for which has started. The plant will generate 7.5 MW power. Power will be gen-

erated from about 500 metric tonnes of garbage every day, taken from Howrah dumping ground

- Pune civic standing committee has approved a proposal to set up 11 bio-gas plants at various sites in different zonal ward offices of the Pune city. In addition to the bio-gas plants, 3 mechanical composting plants would be set up to generate manure from waste
- M/s Shriram Energy Systems Ltd., Hyderabad have set-up a 6 MW power generation project at Vijayawada based on combustion of processed Municipal Solid Wastes (MSW)

Kirit also spoke on BioGas and how energy needs in India can be met through biogas.

- Biogas systems are probably the easiest method of reducing the anthropological green house gas emissions while also making financial sense
- EPA's Global Anthropogenic Emissions of Non—CO₂ Greenhouse Gases report, in 2005 says, India's estimated anthropogenic methane emissions ranked 2nd in the world
- There may be even more biogas energy potential from food waste than manure. Hence the possibilities of biogas production in urban areas too!
- Engineering Seva Trust has developed a residential hostel where human waste is decomposed for use as cooking fuel. The campus has sold 30,000 kilograms of fertilizer per annum

MR. D. RADHAKRISHNA**DEEAAAR GROUP**

Mr. Radhakrishna spoke on the lack of clarity on the policy front and urged the Government to seriously consider W2E on a micro-level.

He spoke on 3 aspects of W2E- Industrial Waste, Municipal Solid Waste and Urban Waste.

INDUSTRIAL WASTE:

The main objectives of the Programme on recovery of energy from Industrial Wastes are as follows:

- To accelerate the installation of energy recovery projects from industrial wastes with a view to harness the available potential by 2017
- To assess and upgrade various conversion technologies; and
- To create a conducive environment for the development of the sector in the country

However, the scope for Central Financial Assistance in the form of Capital Subsidy and Grants-in-Aid is limited to the following activities:

- Industrial waste to biogas
- Power generation from biogas
- Power generation from solid industrial waste

With No incentives to promote utilization of Waste Heat

MUNICIPAL SOLID WASTE:

The main objectives of the proposed Programme on Energy Recovery from MSW are as follows:

- To set up five Pilot projects for recovery of energy from MSW; and
- To create conducive conditions and environment, with fiscal and financial regime, to develop, demonstrate and disseminate utilization of MSW for recovery of energy;

However despite promotion by the Centre, more efforts are called for to ensure tangible relief to MSW Power Generators on ground.

URBAN WASTE:

The main objectives of the proposed Programme on Energy Recovery from Urban Wastes are as follows:

- To promote setting up of bio-methanation based projects for recovery of energy from other urban wastes such as sewage gas, cattle dung, vegetable

market, slaughterhouse wastes and agricultural wastes / residues;

- To create conducive environment, with fiscal and financial regime, to develop, demonstrate and disseminate utilization of urban wastes for recovery of energy. But we see Inefficient Implementation at Micro Level

EXPECTATIONS:

- Coherent coordination between Ministries aimed at Holistic National Energy Policies
- Preferential treatment of renewable energy initiatives based on better understanding of grassroots level problems
- Expedite the legislation of guidelines and incentives for the same
- Better implementation at micro levels with stricter mandates concerning efficiency imposed on local government bodies

MR. T S VENKATARAMAN**MANAGING DIRECTOR, ESVIN ADVANCED TECHNOLOGIES LIMITED**

Mr. T S Venkataraman spoke on "Diesel from raw DSW- A Distillery Waste"

The two big process Industries, namely Paper and Distillery, produce a large effluent volume containing high percentage of recoverable energy.

The paper Industry has succeeded in recovering the energy for export in a combustion process even though recycling the chemical is their prime objective; whereas the Distilleries for long time have not attempted even to fully recover the energy potential from the Distillery Spent Wash (DSW) since the combustion route was unsuitable due to limitations in water evaporation and also problems of corrosion due to low melting potassium salts. Power generation requires auxiliary fuel to be co-fired.

Two innovative technologies have changed the scenario- one is the highly efficient Biostil2000 process for alcohol manufacture that can cut down water to give 33% solids concentration and the second one is the Pyrolysis/ Gasification Technology developed in India by Esvin Tech in early nineties to produce synthesis gas (Syngas). The technology, has been commercialized by the parent Company, namely, Thermochem Recovery International (TRI) Inc. Baltimore, USA, albeit, for

Black liquor (60% solids)) having similar characteristics, in a Canadian Paper Mill.

A typical 200 klpd Distillery (Bios-til2000) produces 700 c.m per day of DSW @ 33% solids, generating total solids of about 240 tpd. The FT diesel that can be generated would be around 4-5 million liters a year that can drive the trucks used by the sugar Mill and Distillery complex, in addition to some export of power.

It is believed that the FT Diesel from such a feedstock of negative cost is expected to be cheaper than the fossil Diesel whose subsidized price may not be available for the Industrial use in the near future. As in the case of captive power generation it is good for Sugar Mills, owning fleet of trucks, to be secured by captive fuel for their own use.

MR. SHIVANAND NIMBARGI**CEO & MD, GREEN INFRA LIMITED**

Mr. Nimbargi spoke on "Acceleration of Biomass based Power Generation".

Biomass based Energy Generation has many Social Benefits

- Additional income to various players in the biomass supply chain
- Diversify the rural economy, which generally rely entirely on food crops
- Traditional "wasteland" which have no/minimal access to irrigation are used for cultivation of energy plantation. This improves land productivity over long run
- Surplus biomass does not need to be burnt in fuel causing harmful smog

Despite its various advantages, biomass based power generation is plagued by many issues. The key issues are:

- With rising energy prices, demand for biomass as a fuel has risen rapidly leading to increase in price of easily usable biomass
- Technology to utilize difficult biomass that is available is still untested in India
- Biomass based power tariffs are often tightly controlled by regulators, sometimes in the misplaced belief that increasing the tariff would lead to increase in fuel costs
- State policies often provide limited protection for securing sufficient biomass for the projects while trying to maximize the capacity awarded for development
- Institutional equity investors are often uncomfortable with large amounts of cash transactions required for fuel

EVENTS

procurement and are uncomfortable in partnering with small entrepreneurs with no well defined corporate governance practices

- Recent issues related to tariff, fuel prices and subsequent underperformance of plants have led lenders to have a very negative view of this sector and securing debt for such projects has become very difficult

Suggestions for Accelerating Development:

FOR REGULATOR AND GOVERNMENT

- Policy support for providing better fuel security
- Support for testing and proving new and innovative business models for the industry (including PPP models) which may improve the viability of biomass based power generation capacity
- Appropriate and rationalized tariffs which take into account reduction in system losses, reduced need for system strengthening and benefits of increased

economic activity in the state and vitalization of local rural economy

- Financial support for development and testing of technologies to handle difficult fuels in India
- Provision for direct power supply to local population to promote local involvement and development

FOR PROMOTERS / DEVELOPERS

- Greater transparency and accountability in cash transactions
- Better corporate governance practices to regain investor and lender confidence

DR. G.V. RAMA KRISHNA

CMD, SELCO INTERNATIONAL LTD.

Dr. G.V. Rama Krishna spoke on "Advanced Waste to Energy – Present and Future".

Waste-to-energy (WTE) has large potential in India with growth driven by shrinking landfill space and favourable regulations. However, certain challenges

to WTE exist, including air quality concerns and NIMBY sentiments.

It is more than a decade since MSW RULES 2000 have come into force in India. Some major attempts have been made under public private partnership in various states, but only a few plants have started operations.

There are five key WTE technologies:

- incineration, pyrolysis, gasification, anaerobic digestion,
- and refuse-derived fuel (RDF)

Incineration and RDF are the most mature technologies; Newer technologies are cost competitive with conventional incineration and RDF, but many are less proven at commercial scale

Structure of WTE market (e.g., high capital costs) slows adoption of new technologies.

TECHNOLOGIES:

- Incineration: Burn MSW /RDF to generate electricity through a steam turbine



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- Refuse-derived fuel (RDF): Compact organic waste into cubes to sell as fuel for incinerators through various processes (e.g., mechanical, steam)
- Pyrolysis: Turn specific MSW into a mixture of combustible gases, liquids (e.g., synthetic diesel), and solids (e.g., biochar)
- Gasification:
- Thermal: Turn MSW into electricity-producing gas by reacting the waste at high temperatures, with a controlled amount of oxygen
- Plasma: Turn various waste streams (e.g., MSW, industrial) into electricity-producing gas and slag, using high temperature plasma-arc torch (13,000 F)
- Anaerobic digestion: Turn various waste streams (e.g., food processing) to produce biogas, with up to 95% purity methane

So far the projects set up in the country are not upto the international level due to various reasons viz., the main concept of WTE in India is to generate energy whereas in other countries it is the disposal of waste and the operator will be paid for the same. This concept is just picking up in India.

For the disposal of Hospital waste and Industrial waste the operators are paid a fixed sum by hospitals and industries. Similarly for the disposal of MSW also scientific disposal charges or tipping fees needs to be paid (currently only done by only few municipal corporations).

Some Municipal Corporations (MC's) are expecting profit sharing from operators which is affecting project economics.

Prime goal for the MC's should be disposing municipal solid waste in a scientific manner and building robust mechanisms to ensure checks and balances on operators. When the disposal of waste becomes primary and energy generation becomes secondary as in Europe and other countries, WTE sector can give a perfect solution for the perennial garbage disposal problem and save huge requirement of land and reduce the greenhouse gases. Mr. Virendra Singh, CEO-Solar EPC, ACME Telepower.

DR POONAM AHLUWALIA

TATA CONSULTING ENGINEERS LIMITED

Dr Poonam Ahluwalia spoke on "Life Cycle Assessment LCA based approach to address Environmental Concerns associated with WTE options".

NEED FOR LCA BASED APPROACH TO EVALUATE WTE OPTIONS

- In India both energy systems and waste management systems are under change
- The changes are largely driven by environmental considerations in addition to economics.
- Waste-to-energy schemes which provide energy in the forms of heat and/or electricity as by-products are regarded sustainable and cleaner with regard to environmental emissions (compared with those generated from coal or fossil fuel-fired power plants). However, absolute environmental impacts from these waste-to-energy plants are still under deliberation

- When making new strategic decisions related to energy and waste management systems it is therefore of importance to consider the environmental implications
- Since WTE options need to be analysed in conjunction with other waste management options such as segregation, recycling, etc. LCA based approach is needed to correctly judge the options wrt to conflicting objectives of cost and environmental considerations.

LIFE CYCLE ASSESSMENT

- In a LCA the environmental impacts of a product or service are investigated throughout its whole life cycle.
- Performing an LCA is an iterative process, where information revealed during the course of the study may impose a revision of earlier steps.
- It is unfeasible to cover absolutely every aspect linked to the life of a product, therefore the system boundaries have to be determined.

LCA AND DATA UNCERTAINTIES

- Because LCA is an iterative process it is often useful to start with easily accessible data, perhaps with limited quality and then refine the data quality in relation to the importance for the results.
- Data uncertainties in LCA can be quite large. The uncertainties can be of different types – those related to the uncertainty and precision of the data or those related to uncertainties in the choice of technologies and LCA methodology
- Uncertainties in relation to choices of technology and LCA methodology are often larger than uncertainties in data. It is for example, more important to know if a fuel used is a biofuel or a fossil fuel, than to have emission factors with good quality of either

Mission Energy Foundation is also conducting 2nd International Summit on Fly Ash Utilisation 2012 from 17-18th December 2012 at NDCC Convention Centre, New Delhi. During this two intensive day, Participants would learn the advanced stage of Fly Ash Utilisation. This includes the understanding the dynamics of Fly Ash Management and converting this waste into wealth.

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