

# Waste to Energy- A Regulatory Perspective



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- **Is it useful to go for Waste to Energy plants**
- **Can the waste be an effective Fuel**
- **Is waste incineration is a source of Renewable Energy**
- **Does the burning waste produce the toxic emissions**
- **Does the burning waste contribute to climate change**
- **Can recycling waste is better option than burning the waste**
- **CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2017**

# Is it useful to go for Waste to Energy plants



- Options to deal with Waste or Municipal and Industrial
  - **Landfilling**
  - **Recycling**
  - **Convert Waste to Energy**

# Is it useful to go for Waste to Energy plants



- Waste-to-Energy (WtE), the process of converting waste into energy, is growing in popularity as a preferable option to landfilling.
  - Waste to energy (WtE) is a vital part of a strong and sustainable waste management chain.
  - Fully complementary to recycling,
  - It is an economically and ecologically sound way to provide a renewable source for energy while diverting waste from landfills.
  - WtE technology has been developed and proven around the globe, including:
    - ✦ 100 plants in North America,
    - ✦ 500 in Europe
    - ✦ and 1,600 in Asia.

# Can the waste be an effective Fuel



- The amount of Waste we produce is growing more rapidly with [our population and our economy](#).
- Recycling has been the main approach for recovering resources and reducing landfill but a lot more needs to be done.
- One part of the solution is “waste-to-energy”: using a range of thermal or biological processes, the energy embedded in waste is captured, making it available for the direct generation of heat and electricity, or for solid fuel production (also known as “processed engineered fuel”).

# Can the waste be an effective Fuel



- Waste-to-fuel plants produce fuels pellets from the combustible (energy-rich) materials found in waste from households and industry.
- Suitable materials include non-recyclable papers, plastics, wood waste and textiles. All of these typically end up in landfill.
- These materials are preferably sourced from existing recycling facilities, which currently have to throw out contaminated matter that can't be recycled.
- Solid waste fuels are produced to specified qualities by different treatment methods.
- These include drying, shredding, and compressing into briquettes or fuel pellets. Fuels can be specifically tailored for ease of transportation and for different uses where industrial heat is required. This make them suitable alternatives to fossil fuels.

# Is waste incineration is a source of Renewable Energy



- This is debateable issue
- Waste contains fossil derived materials such as plastics.
- It also contains biogenic materials such as paper, card and food waste.
- While it may be environmentally (and often economically) preferable to recycle them, they are arguably just as renewable as any other form of biomass.
- Many of the biogenic materials find in the residual waste stream, such as food, paper, card and natural textiles, are derived from intensive agriculture – monoculture forests, cotton fields and other “green deserts”.
- **In India Waste to Energy is treated as renewable source of Energy as per MNRE.**

# Is waste incineration is a source of Renewable Energy



- MNRE Web site reads as follows on Waste to Energy
  - Generation of increasing quantities of wastes is leading to increased threats to the environment.
  - The Ministry is promoting all the Technology Options available for setting up projects for recovery of energy from urban wastes.
  - Environmental concerns rather than energy recovery is the prime motivator for waste-to-energy facilities, which help in treating and disposing of wastes.
  - The major Advantages for adopting technologies for recovery of energy from urban wastes is to reduce the quantity of waste and net reduction in environmental pollution, besides generation of substantial quantity of energy.

# Does the burning waste produce the toxic emissions



- All new WtE plants incinerating waste (residual [MSW](#), commercial, industrial or [RDF](#)) must meet strict emission standards, including those on [nitrogen oxides](#) (NO<sub>x</sub>), [sulphur dioxide](#) (SO<sub>2</sub>), [heavy metals](#) and [dioxins](#).
- Modern incinerators reduce the volume of the original waste by 95-96 percent, depending upon composition and degree of recovery of materials such as metals from the ash for recycling. <sup>[4]</sup>
- Incinerators may emit fine [particulate](#), heavy metals, trace dioxin and [acid gas](#), even though these emissions are relatively low from modern incinerators.
- Other concerns include proper management of residues: toxic [fly ash](#), which must be handled in hazardous waste disposal installation as well as [incinerator bottom ash](#) (IBA), which must be reused properly.

# Does the burning waste contribute to climate change



- Incinerators have electric efficiencies of 14-28%.<sup>[10]</sup> In order to avoid losing the rest of the energy, it can be used for e.g. [district heating \(cogeneration\)](#). The total efficiencies of cogeneration incinerators are typically higher than 80% (based on the [lower heating value](#) of the waste).
- Today, it is possible to reuse 90% of the metals contained in the bottom ash. And the remaining clinker can be reused as road material.
- Avoids methane emissions from landfills
- Offsets greenhouse gas (GHG) emissions from fossil fuel electrical production
- Produces clean, reliable base-loaded energy and steam
- Uses less land per megawatt than other renewable energy sources
- Sustainable and steady renewable fuel source (compared to wind and solar)
- Catalytically destroys NO<sub>x</sub>, dioxins and furans using an SCR
- robust and effective alternative energy options to reduce CO<sub>2</sub> emissions and replace fossil fuels.
  - Approximately 2/3 of household waste is categorized as biomass. Therefore, we can recover 2/3 as CO<sub>2</sub>-neutral energy and reduce our dependence on fossil fuels.
- 4 tons of waste equals 1 ton of oil
- 2 tons of waste equals 1 ton of coal

# Can recycling waste is better option than burning the waste



- Critics argue that incinerators destroy valuable resources and they may reduce incentives for recycling.
- The question, however, is an open one, as European countries which recycle the most (up to 70%) also incinerate to avoid [landfilling](#).

# CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2017



## Defines

**‘Municipal solid waste’** means and includes commercial and residential wastes generated in a municipal or notified areas in either solid or semi-solid form excluding industrial hazardous wastes but including treated bio-medical wastes”

**‘Refuse Derived Fuel’** means segregated combustible fraction of solid waste other than chlorinated plastics in the form of pellets or fluff produced by drying, de-stoning, shredding, dehydrating, and compacting combustible components of solid waste that can be used as fuel;

**‘Renewable Energy Sources’** means renewable sources such as small hydro, wind, solar including its integration with combined cycle, biomass, bio fuel cogeneration, urban or municipal waste and other such sources as approved by the MNRE;

# CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2017



The Regulations specify:

- **Municipal solid waste based power projects** – The project shall qualify to be termed as a Municipal solid waste based power project, if it is using new plant and machinery based on Rankine cycle technology and using Municipal solid waste as fuel sources,
- **Refuse derived fuel based power projects** – The project shall qualify to be termed as a Refuse derived fuel based power project, if it is using new plant and machinery based on Rankine cycle technology and using Refuse derived fuel as fuel sources
- In case of municipal solid waste and refuse derived fuel based power projects, the **Tariff Period** shall be twenty (20) years;
- **Project specific tariff**, on case to case basis, shall be determined by the Commission for the Municipal Solid Waste and Refuse Derived Fuel based power projects.
- The Municipal Solid Waste and Refuse Derived Fuel based power projects shall be treated as 'MUST RUN' power plants and shall not be subjected to 'merit order despatch' principles

# CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2017-**Technology specific parameters**



- **Technology**

- The norms for tariff determination specified hereunder are for power projects which use municipal solid waste (MSW) and refuse derived fuel (RDF) and are based on Rankine cycle technology application, combustion or incineration, Bio-methanation, Pyrolysis and High end gasifier technologies.

- **Capital Cost**

- The Commission shall determine only project specific capital cost and tariff based on prevailing market trends for MSW/RDF projects.

- **Plant Load Factor**

- Threshold PLF for determining fixed charge component of tariff for the power projects which use MSW and RDF shall be:
  - ✦ a) During Stabilisation 65%
  - ✦ b) During the remaining period of the first year (after stabilization) 65%
  - ✦ c) From 2nd year onwards 75% /80%
- The stabilisation period shall not be more than 6 months from the date of commissioning of the project.

# CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2017-**Technology specific parameters**



- **Auxiliary Consumption**

- The auxiliary power consumption for MSW/RDF based power projects shall be 15%.

- **Station Heat Rate**

- The Station Heat Rate for MSW/RDF based power projects shall be 4200 kcal/kWh.

- **Operation and Maintenance Expenses**

- The Commission shall determine only project specific O&M expenses based on prevailing market trends for MSW/RDF projects.

- **Calorific Value**

- The Calorific Value of the RDF fuel used for the purpose of determination of tariff shall be at 2500 kcal/kg.

- **Fuel Cost**

- RDF price during FY 2017-18 shall be Rs 1,800 per MT and shall be escalated at 5% to arrive at the base price for subsequent years of the Control Period, unless specifically reviewed by Commission. For the purpose of determining levelized tariff, a normative escalation factor of 5% per annum shall be applicable.
- No fuel cost shall be considered for determination of tariff for the power projects using MSW.

# CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2017



## Debt:Equity Ratio

- For Project specific tariff, the following provisions shall apply:-
  - If the equity actually deployed is more than 30% of the capital cost, equity in excess of 30% shall be treated as normative loan.
  - Provided that where equity actually deployed is less than 30% of the capital cost, the actual equity shall be considered for determination of tariff:
  - The equity invested in foreign currency shall be designated in Indian rupees on the date of each investment.

# CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2017



## Return on Equity

- The normative Return on Equity shall be 14%, to be grossed up by prevailing Minimum Alternate Tax (MAT) as on 1st April of previous year for the entire useful life of the project.

# CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2017



- The Working Capital requirement in respect of Municipal solid waste /Refuse derived fuel based power projects shall be computed in accordance with the following clause :
  - Fuel costs for four months equivalent to normative PLF;
  - Operation & Maintenance expense for one month;
  - Receivables equivalent to 2 (Two) months of fixed and
  - variable charges for sale of electricity calculated on the target PLF;
  - Maintenance spare @ 15% of operation and maintenance expenses
  - Interest on Working Capital shall be at interest rate equivalent to the average State Bank of India MCLR prevalent during the first six months of the previous year plus 300 basis points.



**Thank You**

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