

Why do so many Waste-to-Energy Plants Fail?

March 23, 2023 • vajiramandravi.com



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Why in News?

- The Kerala government recently announced the State's first waste-to-energy project in Kozhikode.
- The planned facility is expected to be built in two years and generate about **6 MW** of power.

What do Waste-to-Energy Projects do?

- Waste-to-energy projects use non-recyclable dry waste to generate electricity.
- The process increases the State's power generation capacity and eases the Solid Waste Management (SWM) burden.
- Generally, ***solid waste in India is 55-60% biodegradable organic waste***, which can be converted into organic compost or biogas; 25-30% non-biodegradable dry waste; and around 15% silt, stones, and drain waste.
- Of the non-biodegradable dry waste, only 2-3% – including hard plastics, metals, and e-waste – is recyclable.
 - The remainder consists of low-grade plastic, rags, and cloth that can't be recycled.
- This ***fraction of the non-recyclable dry waste is the most challenging portion of the present SWM system; the presence of these materials also reduces the efficiency of recycling other dry and wet waste.***
- Waste-to-energy plants use this portion to generate power. The waste is combusted to generate heat, which is converted into electricity.
- Waste-to-energy plants in major cities could also consume a portion of the non-recyclable dry waste generated in Urban Local Bodies (ULBs) nearby.

Why do Waste-to-Energy Plants often Fail?

- While waste-to-energy plants seem like a simple solution, they have several challenges for them to becoming feasible.
 - **Low calorific value of solid waste in India due to improper segregation -**
 - The ***calorific value of mixed Indian waste is about 1,500 kcal/kg, which is not suitable for power generation.*** (Coal's calorific value is around 8,000 kcal/kg.)
 - Biodegradable waste has high moisture content and can't be used for power generation; it should be composted instead.
 - The calorific value of segregated and dried non-recyclable dry waste is much higher, at 2,800-3,000 kcal/kg, sufficient to generate power.
 - However, ***segregation (ideally at the source, if not at the processing plant) should be streamlined to ensure the waste coming to the facility has this calorific value.***
 - **High costs of Energy Production -**
 - The ***cost of generating power from waste is around Rs 7-8/unit.***
 - In comparison, the cost at which the ***States' electricity boards buy power from coal, hydroelectric, and solar power plants is around Rs 3-4/unit.***

- While State electricity boards are considering purchasing power from newer renewable energy sources like waste-to-energy, the price of the power generated needs to be reduced.
- **Improper Management -**
 - Many waste-to-energy projects have failed because of improper assessments, high expectations, improper characterisation studies, and other on-ground conditions.

How can the Plants overcome these Challenges?

- **Proper Segregation at Source -**
 - Setting up waste-to-energy projects is complex and needs the full support of the municipality, the State and the people.
 - To overcome its various challenges, ***the municipality must ensure that only non-biodegradable dry waste is sent to the plant and separately manage the other kinds of waste.***
- **Proper Planning & Execution -**
 - The municipality or the department responsible for SWM should be practical about the high cost of power generation, and include the State electricity department, perhaps as a tripartite agreement between the municipality, the plant operator, and the power distribution agency.
 - It is also ***crucial to conduct field studies and learn from the experience of other projects.***

About Kozhikode Waste-to-Energy Project

- The total quantity of municipal solid waste generated in Kerala is approximately **8,000 tonnes per day** (TPD).
- Kozhikode has a ***population of about 6.3 lakh and generates approximately 300 TPD of waste.***
 - Of this, around 205 TPD is biodegradable and 95 TPD is non-biodegradable.
- Of the non-biodegradable waste, only about 5 TPD out of the 95 TPD is recycled; the ***remaining non-recyclable dry waste could be used to generate power at the new waste-to-energy plant.***

Q1) What do you mean by Biodegradable waste?

Biodegradable waste includes any organic matter in waste which can be broken down into carbon dioxide, water, methane, compost, humus, and simple organic molecules by micro-organisms and other living things by composting, aerobic digestion, anaerobic digestion or similar processes.

Q2) What is Biogas?

Biogas is a mixture of gases, primarily consisting of methane, carbon dioxide and hydrogen sulphide, produced from raw materials such as agricultural waste, manure, municipal waste, plant material, sewage, green waste, wastewater, and food waste. It is a renewable energy source.

Source: [Explained | Why do so many waste-to-energy plants fail?](#)

Source: <https://vajiramandravi.com/current-affairs/why-do-so-many-waste-to-energy-plants-fail/>

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