

Power from Waste

Mains: *PIB Analysis*

- **Swachh Bharat Mission Focus** - Scientific management of municipal solid waste has been a core goal since its launch in October 2014.
- **Waste as a Resource** - Organic waste is now recognized as a valuable resource to generate clean energy, electricity, fuel, and organic fertilizer.
- **Benefits of Biogas** -
 - Produced via anaerobic decomposition of organic waste.
 - Offers a viable, economical, and eco-friendly cooking fuel.
 - Leaves a nitrogen-rich slurry by-product that acts as an effective organic fertilizer, reducing chemical dependencies and maintaining soil fertility.
- **Diverse Applications (SBM-Urban 2.0)** - Waste-to-energy adapts across India based on community needs -
 - **Hyderabad** - Vegetable markets power streetlights using rotten produce.
 - **Prayagraj** - Multi-feedstock bio-CNG plant transforms organic waste into clean fuel and compost.
 - **Gandhinagar** - An educational institution cooks for 500+ people daily without LPG.
 - **Gwalior** - A gaushala turns cow dung into compressed biogas.

Key Case Studies

Gandhinagar - Educational Campus Eliminating LPG Dependence

- **Location** - Shrimati Manekba Vinay Vihar Educational Complex, near Adalaj, Gujarat (managed by Vasumati Charitable Trust).
- **Scale of Impact** - Cooks daily for 500+ people (250 hostel students getting 2 meals/day, plus 15 staff families).
- **Infrastructure and Capacity** -
 - Operates two biogas plants with a combined capacity of 90 cubic metres per day.
 - Eliminates the need for 30 LPG cylinders per month.
- **Feedstock Used** - Dung from 222 campus cows, supplemented by kitchen waste and local agricultural residue.

- **Institutional Support** - Supported by the Gujarat government's Institutional Biogas Plant Scheme and the Gujarat Energy Development Agency (GEDA).



Prayagraj - One Plant, Four Feedstocks

- **Capacity and Production** -
 - Processes 343 tonnes of organic waste daily.
 - Produces 21 tonnes of bio-CNG and 28 tonnes of high-quality compost per day for local farmers.
- **Multi-Feedstock Model** - Uses wet waste, paddy straw, cattle dung, and poultry litter—helping mitigate regional stubble burning.
- **Operational Highlights** -
 - Built on a Public-Private Partnership (PPP) model.
 - Absorbs bulk organic waste from local hotels, restaurants, and apartments.
 - Daily wet-waste processing grew from an initial 7-8 tonnes to 125 tonnes.
- **Distribution and Future Scope** -
 - Bio-CNG is sold via the CBG-CGD Synchronisation Scheme to power city

transport.

- Projected to extend piped clean gas access to ~45,000 households and offset 57,000 tonnes of carbon emissions annually.



Gwalior - A Gaushala Turned Power Plant

- **Location** - Adarsh Gaushala in Laltipara (Gwalior's largest cowshed, home to over 10,000 cattle).
- **Facility Details** -
 - In August/October 2024, inaugurated a 100 tonnes-per-day (TPD) Compressed Bio-Gas (CBG) plant.
 - Built over 5 acres with a Rs.31-crore investment in collaboration with Indian Oil Corporation.
- **Dual Processing and Output** -
 - Processes cattle dung alongside vegetable/fruit waste from markets and homes (Madhya Pradesh's first plant to do so).
 - Converts 100 tonnes of dung into 2 tonnes of compressed biogas and 10-15 tonnes of dry bio-manure daily.
- **Community Impact** - Reduces carbon emissions, promotes organic farming, and creates local green energy employment opportunities.



Bowenpally - Powering a Vegetable Market

- **Waste Processing** - Collects ~10 tons of fruit and vegetable waste daily that previously went to landfills.
- **Energy Output** - Generates 400-500 units of electricity and 30 kg of biofuel per day.
- **Application of Generated Energy** -
 - Electricity runs market streetlights, stalls, administration buildings, water pumps, and cold storage rooms.
 - Biofuel feeds the market's commercial kitchen via pipelines.
- **Economic Impact** -
 - Cut the market's monthly electricity bill by roughly half (from an average of Rs.3 lakh/month).
 - Led to funding for 5 additional plants across other market yards (Gudimalkapur, Gaddiannaram, Erragadda, Alwal, and Saroornagar).
- **Operational Process** - Vegetables are shredded and ground into a slurry, processed in anaerobic digesters, stored in gas balloons, and fed to a 100% biogas generator.
- **Social Impact and Women Empowerment** -
 - Creates steady jobs for local women in waste sorting, machine operation, and administration.
 - Provides competitive wages and essential safety gear (masks, gumboots, gloves).

What Ties These Stories Together

- **Circular Resource Recovery** - Shifts the perspective on organic waste from a disposal issue to an energy and agricultural asset.
- **Broader Expansion** - Transforms urban waste management under the Swachh Bharat Mission into a continuous model of processing and energy generation.
- **Path to Sustainability** - Combines scientific waste management, community participation, and supportive policy to establish scalable, cleaner, and self-reliant cities.

Reference

[PIB](#)

