

## Waste biorefinery in the making



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Integrated waste biorefineries will become feasible in another five to 10 years, but the process of integration will pose the biggest challenge

SUSTAINABLE CONVERSION OF BIOWASTE		
<b>Integrated plant</b>		
SOLID WASTE	BIOMASS	WASTEWATER
<b>Production</b>		
BIOFUELS	BIOELECTRICITY	BIOMATERIALS
<b>Process</b>		
CHEMICAL	BIOLOGICAL	THERMOCHEMICAL
<p><b>India generates</b></p> <ul style="list-style-type: none"> <li>150 million tonnes of municipal solid waste a year</li> <li>30 billion litres of sewage a day</li> <li>0.12 million tonnes of faecal sludge per day</li> </ul> <p>Nation has realised only <b>2%</b> of its waste-to-energy potential</p> <p><b>Rs.10.32 lakh</b> Monthly revenue from biorefinery using 500 kg of food waste</p>		

Scientists at the Indian Institute of Chemical Technology, Hyderabad, are gearing up to establish an integrated waste biorefinery that would convert wastewater and solid waste into a range of environment-friendly fuels and materials, under a pilot project aimed at cleaning up cities and enabling the transition to a bio-based economy.

Under the project to be funded by the Ministry of New and Renewable Energy (MNRE), Department of Biotechnology and the Council for Scientific and Industrial Research (CSIR) will align with the Swachh Bharat campaign for a cleaner India, according to S. Venkata Mohan, Principal Scientist, Environmental Bioengineering and Biofuels, IICT.

Dr. Mohan, who is here to participate in an international conference on New Horizons in Biotechnology hosted by the CSIR - National Institute for Interdisciplinary Science and Technology (NIIST), said the pilot plant would be a technology demonstrator for sustainable conversion of biowaste and production of bioenergy.

### Biohydrogen

The institute has successfully implemented a project for the production of biohydrogen from waste water. The proposed waste biorefinery, Dr. Mohan explained, would be an integrated plant using solid waste, biomass, and wastewater as feedstock to produce biofuels, bioelectricity, and biomaterials. The plant would utilise a range of chemical, biological, and thermochemical processes to produce biohydrogen, methane, volatile fatty acids, bioplastics, biodiesel, and ethanol as well as other value-added chemicals.

For a country generating 150 million tonnes of municipal solid waste a year and 30 billion litres of sewage and 0.12 million tonnes of faecal sludge per day, India has so far realised only about two per cent of its waste-to-energy potential, observes Dr. Mohan. He estimates that a biorefinery using 500 kg of food waste as feedstock on a daily basis could generate a monthly revenue of Rs.10.32 lakh. The waste remediation comes as an added benefit, he points out. Dr. Mohan feels that integrated waste biorefineries would become feasible in another five to 10 years. He, however, points out that process integration would pose the biggest challenge.

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