

INDIA /The Energy and Resources Institute (TERI)

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Overview of Biogas Market in India

- **Feedstock supply side**
 - Industrial waste water streams
 - Agriculture Waste (livestock waste, agro-residues)
 - Municipal Waste (organic waste materials, fruit and vegetable waste, sewage sludge etc..)
- **End-use applications**
 - Cooking fuels in Households
 - Industrial Heating fuel
 - Grid Electricity
 - Transport fuel (use of bio-CNG)
- **Drivers**
 - Policies and incentive system
 - High untapped potential of wide range of waste streams
 - Opportunity to achieve goal of low C clean energy pathways

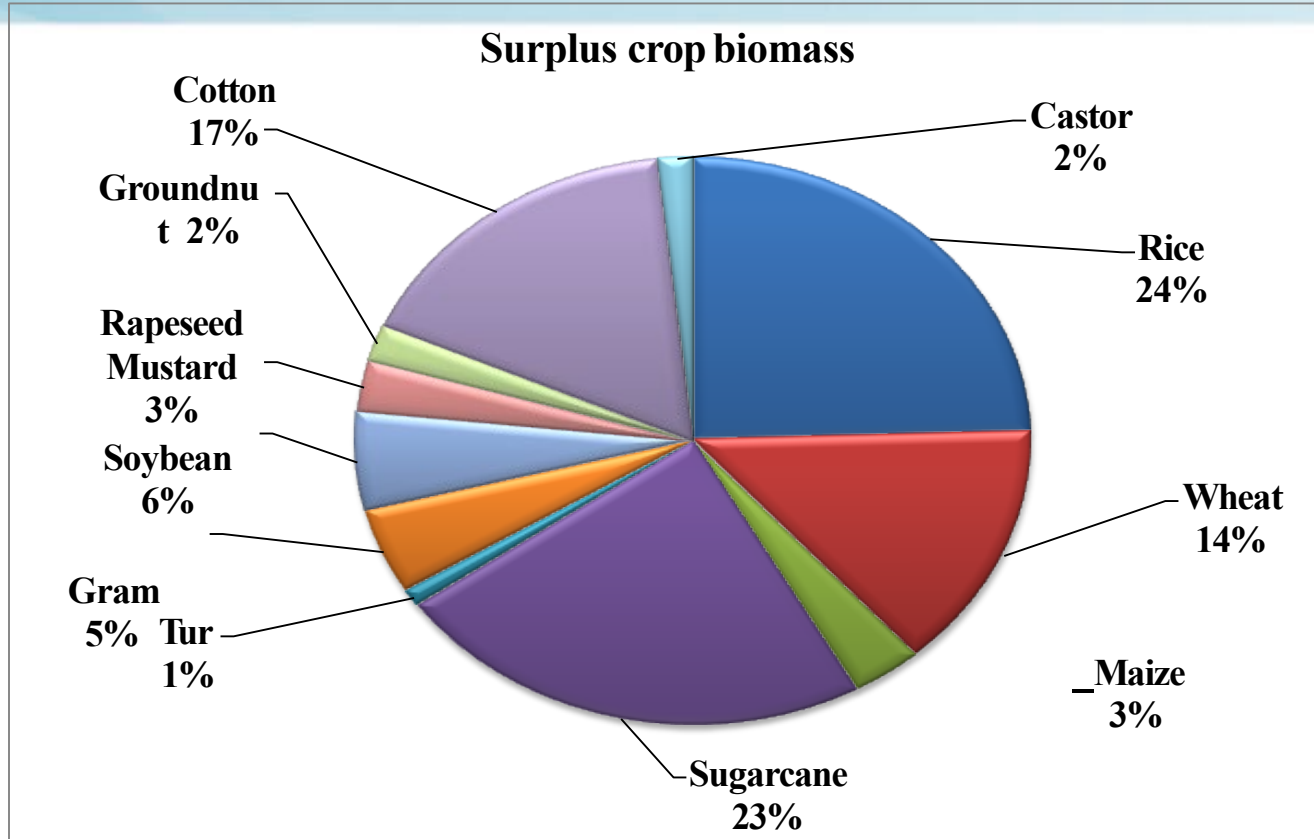


Agriculture waste material



Animal waste

Agriculture feedstock potential and surplus in India



Source : TIFAC and IARI joint report 2018

- Total dry biomass generated is 683 MT from eleven major crops and about 178 MT is surplus quantity
- Livestock population is about 192.5 million (as per 2019 census).
- About 224.8 million tons biogas generation potential (assuming 50% cattle waste is collected and used in biogas plants)

Biogas technology offer big opportunity to convert these waste material into useful form

Biogas Potential from Agro-industrial wastes (in MW)

Name	Energy Generation Potential – MW (Estimation)
Sugar mills (liquid waste)	49
Sugar press mud (solid waste)	200
Pulp and paper (liquid waste)	254
Starch (liquid)	36
Starch (solid)	15
Distillery (liquid waste)	781
Milk processing	24
slaughterhouse	311
Poultry	462
Total	2132

Assist GMI partners in India

- Provide technical, analytic, and capacity-building support to promote methane mitigation from the agriculture sector, particularly in the following tasks:
 - AD-Project Screening Tool (Abt Associates)
 - To refine these tools and applicable to projects in India to estimate of annual biogas and digestate production
 - Risk Analysis and Technical Review Guidance & Checklist for Biogas Projects (Abt Associates)
 - To ensure sufficient information to evaluate project feasibility based on technical and financial considerations
 - Preparation of AD Project Database for Punjab, Haryana and Uttar Pradesh (Tetra Tech)
 - Organizing Stakeholder meetings and workshop

Helps:

MNRE, IREDA, State Energy Development Agencies, Banks in AD projects appraisal process to estimate the technical and financial feasibility of biogas projects.

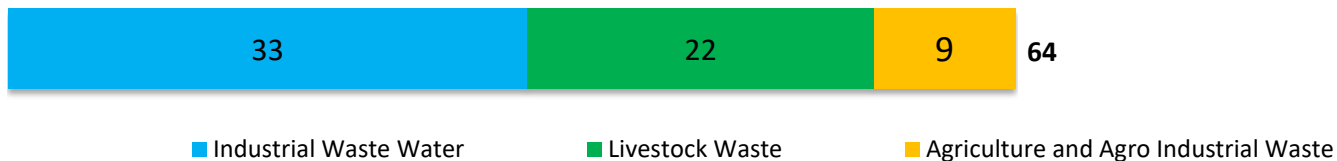
AD Project Database

1. Developed framework for collecting data (database format)

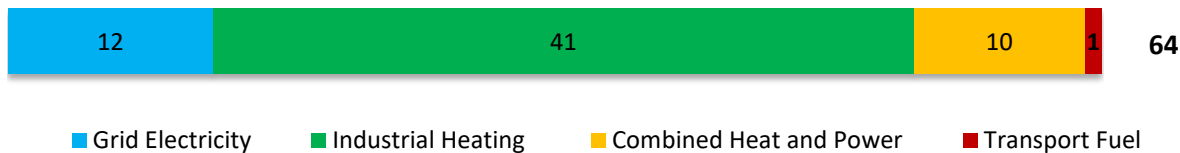
2. Complied data primary outreach to MNRE, SNAs and AD project developers

	Haryana	Punjab	Uttar Pradesh	Total
Number of Plants	12	21	31	64

AD projects by feedstock types



End Use Application



A database of 64 medium- and large-scale AD projects in the agricultural sector in State of Punjab, Haryana and UP prepared

Helps:

- ✓ To built national inventory of AD projects and to **track success of projects** and emissions reductions
- ✓ Expand market and scale up of AD projects and **increase viability of future projects**

Key challenges to scale up

Technological

- Co-digestion of mixed waste based bio-digester design
- Dry fermentation technology for agri-waste materials
- Low temperature Anaerobic Digestion for hilly areas
- Feedstock supply chain management
- Infrastructure challenges for transport of biogas/bio-CNG

Financial

- High capital cost of biogas plants
- Access to low cost financing instruments
- High working capital requirements for agri-waste based AD projects

Policy constraints

- Sale of digested manure from biogas plant is not specifically covered under FCO