

FINAL REPORT - GIS BASED INVENTORY TOOL OF ORGANIC WASTE STREAMS

Extended Mapping of the available urban and industrial organic waste in various locations in India

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1.0 GENERAL INFORMATION

1.1 Introduction

United Nations Industrial Development Organization (UNIDO) in partnership with the Ministry of New and Renewable Energy (MNRE), Government of India (GOI) is implementing the project named 'Organic Waste Streams for Industrial Renewable Energy Applications in India'. The project is funded by the Global Environment Facility (GEF). The project aims to contribute to the GEF Climate Change Strategic Objective 3 of promoting investment in renewable energy technologies. It is also aligned to the Government's priority of promoting sustainable development as resolved in the National Action Plan on Climate Change (NAPCC).

The project focuses to support energy generation from industrial organic wastes using bio-methanation technology. Bio-methanation is widely known as biogas technology in India. The project is designed to promote promising and sustainable innovations in the domain by extending support for their demonstrations. The industrial priority sectors identified for the project are poultry, sugar, cattle, fruit, vegetable and food processing. Despite having large potential for waste-to-energy generation in these sectors, major part remains untapped owing to the constraint of seasonal waste availability, limited demonstration and knowledge of co-digestion of multiple feedstock and lack of innovation in the biogas technology, as well as applications of the biogas and by products together with lack related business models.

With the objective of using other organic wastes as complementary feedstock for the waste streams from priority industrial sectors aiming a sustainable biogas generation, a study of mapping the urban and industrial organic waste availability across India was carried out. The study conducted under the project included mapping of waste availability and its potential of energy generation in different urban and industrial sectors such as poultry, sugar Industry, Fruit & Vegetable Processing, Cattle Farms, Pulp & Paper Industry, Distillery Industry, Slaughterhouse, Urban Liquid Waste and Urban Organic Solid Wastes. A GIS based tool is one of its outcomes.

The Bio Resource Map developed for the project will facilitate the potential investor in exploring different regions and waste sectors; and installation of potential organic waste to energy projects.

1.2 Objective

- To facilitate geographical mapping of the different types of waste availability and its energy generation potential across India.
- It also focuses to enable SME's, project developers, government, financial institutions to contribute to the rapid growth of the waste-to-energy sector.

1.3 Features of Website

- The data on sector wise waste availability and estimated energy generation potential in terms of power and bio-CNG is available at country, state & district level.
- The data is presented in both pie chart & tabular format and can be downloaded in standard formats of Microsoft Excel & Adobe Acrobat PDF
- Tables & Pie Charts can be printed directly.
- User interactive to select customized combinations of location and sector.
- User friendly and well-designed online system

1.4 Requirements

Minimum PC Requirements

The minimum requirements for running the website are listed below

- Mobile Compatibility – Android & Apple Mac
- Operating System - Microsoft Windows 7 / Vista / XP SP2 • MAC OS X 10.4 or later
- Internet Connectivity

Supported web browsers include

- Microsoft Edge
- Mozilla Firefox
- Google Chrome

(In case the site is irresponsive when opened in any of the browser user may either try clearing the history and cache of the browser or visit the site in private window of Mozilla Firefox or incognito window in Chrome browser or InPrivate window of Microsoft Edge).

1.5 Data Available

Available data of 9 sectors on the map is as below:

- Solid waste generation in Ton per annum
- Liquid waste generation in MLD
- Energy potential in MW
- Bio CNG potential in Ton per day

1.6 Disclaimer

- Every effort has been made to ensure the accuracy of data included on this website. No organisation can be held liable for positioning inaccuracies, subsequent updates, errors or omissions of data.
- Developers and/or other organizations intending to set up organic-waste-to-energy projects are responsible to undertake their own due diligence, including verification and potential update of data provided in this website, from waste generators, concerned authorities and/or other sources as appropriate.
- In no event the United Nations Industrial Development Organization (UNIDO), the Ministry of New and Renewable Energy (MNRE) nor the Global Environment Facility (GEF) can be held liable for any expense, loss or damage including, without limitation, indirect or consequential loss or damage, or any expense, loss or damage whatsoever arising from use, or loss of use, of data, arising out of or in connection with the use of this Portal.
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2.0 WEB PORTAL

2.1 Getting Started

- Navigate to the page of the website <http://www.isid4india.org/bio-energy>
- Ensure that the system requirements of the computer or laptop in use, meet those listed under section 1.3 of previous chapter.
- Individual color has been assigned to each sector for easy identification
- Tab - Combined and Individual sector information can be viewed.



2.2 Bio Energy Website on GIS Platform

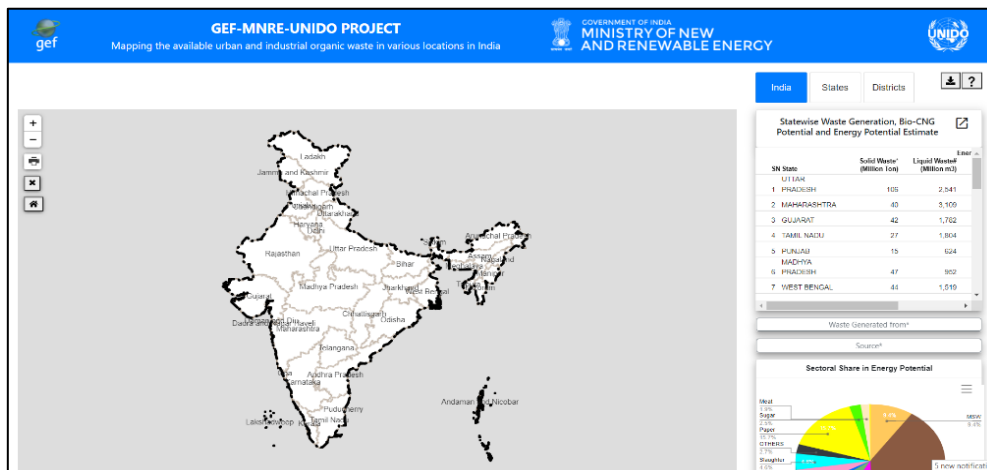


Figure 2-1: Website on GIS Platform

2.3 State Level Information

- Page provides state level waste generation, power potential and Bio CNG potential for 9 sectors for all States in India.
- Combined and Individual sector information can be viewed.

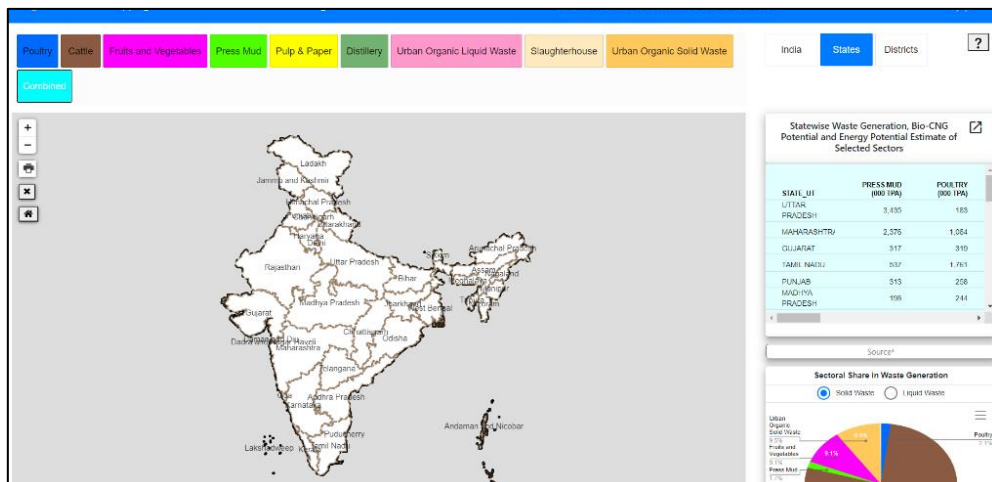


Figure 2-2: State Level Information

2.4 State Level Data for Individual Sector

- Any state can be selected and data for the respective sector for the state can be viewed both as pop up and in table format

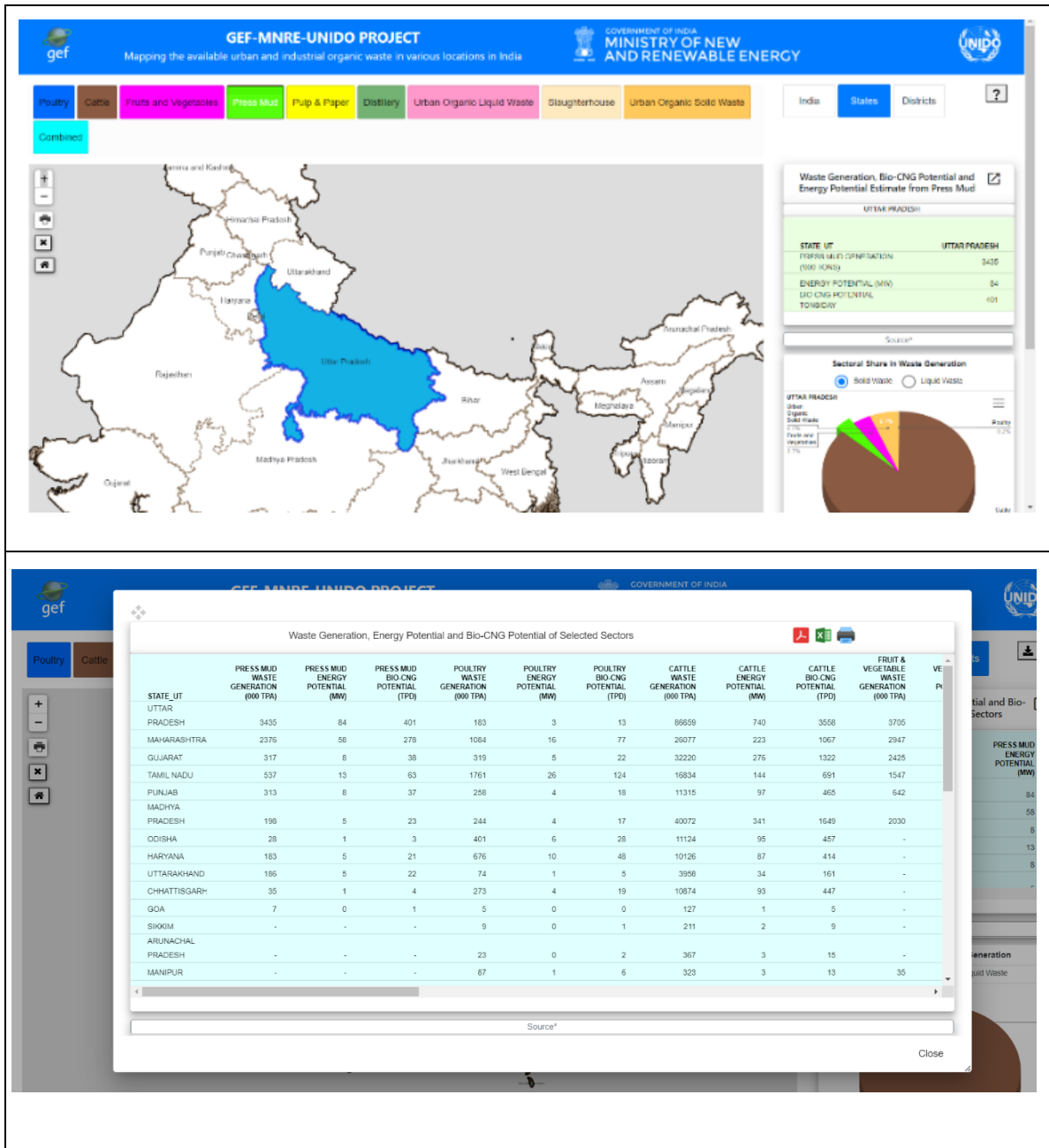


Figure 2-3: State Level Data

2.5 District wise data – the popup shows combined data

- On the district tab any district in the country can be selected and data for the district for selected sector/sectors can be viewed.

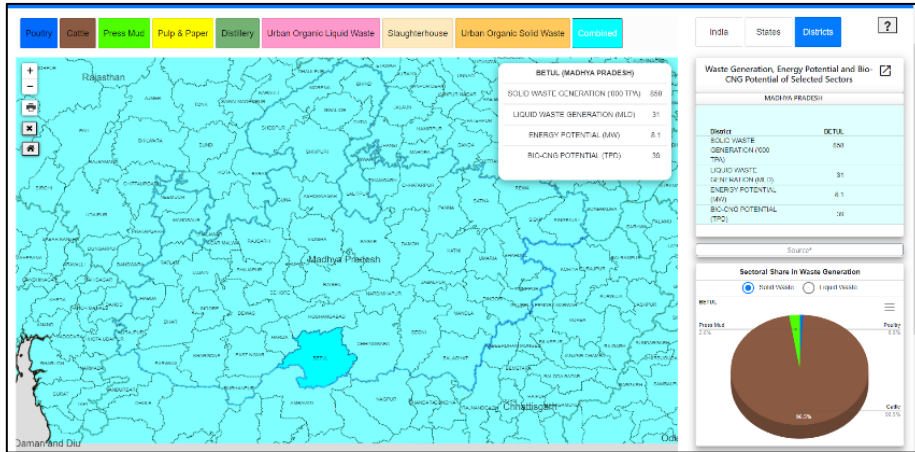


Figure 2-4: State Level Data-Combine

2.6 District wise information on Resource Availability

- In the district tab, district wise resource availability across India for selected sector can be highlighted
- For e.g. – Map shows Press Mud availability in the country - District wise

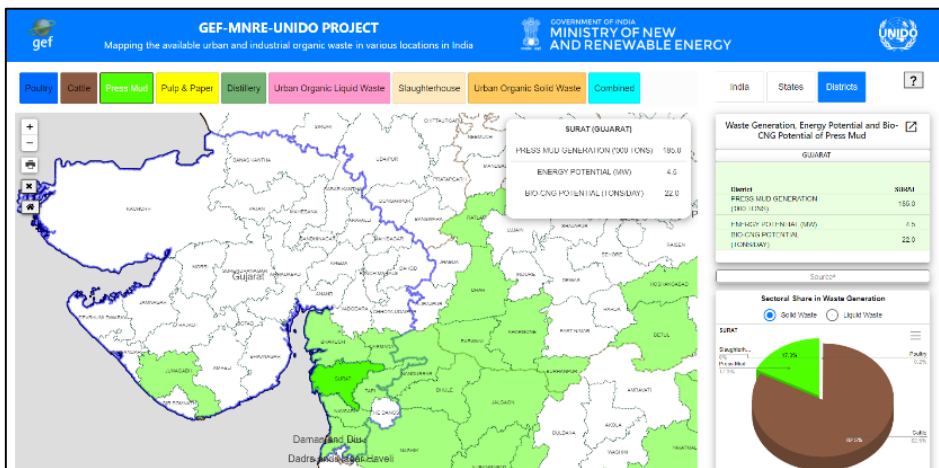


Figure 2-5: District wise Data

2.7 Data Source of each sector provided

- Data Sources tab provides source of data for all sectors.



Figure 2-6: Data Source of each sector

2.8 Pie Chart

- Data can be viewed in pie chart
- Pie chart data can we save as a JPG or PNG format

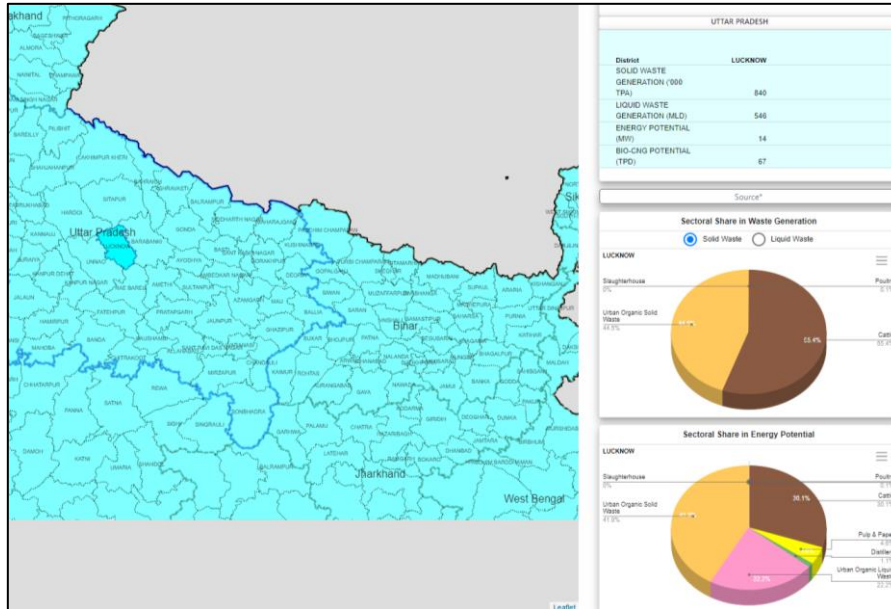


Figure 2-7: Pie Chart

2.9 Source of Waste Generation

- Source of Solid & Liquid waste generation is displayed after selection of “Waste Generated From” tab.

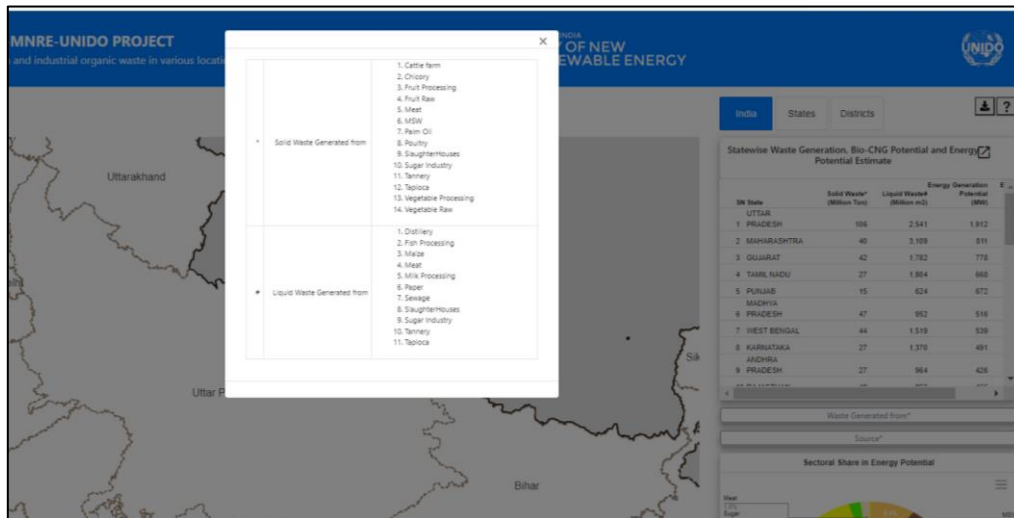


Figure 2-8: Waste Generation from data

2.10 Map Navigation

- We can zoom in or zoom out using (+) and (-) symbol.
- By selecting home tab (logo) the India map can be viewed on a screen.

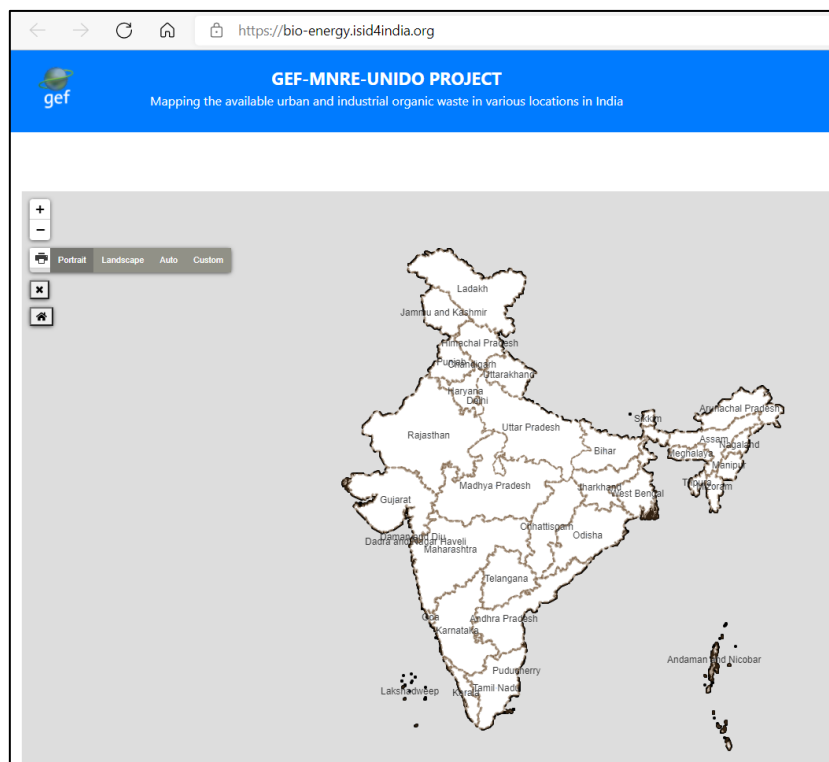


Figure 2-9: Map Print

2.11 Data Assumptions

Pulp & Paper Industry

- Water consumption considered 100 m³/ ton
- 70% of wastewater (of raw water consumption) are generated for each metric ton of paper produced
- Factor for energy potential estimation - 1 m³ of wastewater generates 5 m³ of biogas

Distillery

- 12 litres of spent wash is generated for one litre of alcohol produced
- 25 Nm³/KL of spent wash is considered for estimating the energy potential.

Urban Liquid Waste

- Estimation on urban liquid waste or sewage generation has been made based on the estimates considered by CPCB for Class I Cities and Class II towns,
- Water supply @185 litres per capita per day (LPCD) and 80% of water supply as sewage generation
- Sewage generation for NCT of Delhi is estimated based on their 80 % of water supply of 925 MGD.

Urban Solid Waste

- CPHEEO Manual and CPCB report indicated that the per capita solid waste production rate lies between
 - 200-300 gm/capita/day - Population < 200,000
 - 300–350 gm/capita/day - Population between 200,000 – 500,000
 - 350–400 gm/capita/day - Population between 500,000 – 1,000,000
 - 400–600 gm/capita/day - Population > 1 million
- Urban Organic Solid Waste 51.44% is considered of total solid waste generated
- Biogas potential has been assumed considering 120 m³ of biogas / TPD of Organic Solid Waste

Slaughterhouse

- Solid waste: 4% of average weight for cattle and Buffalo (Average weight of Cattle & Buffalo is 350 kg); 7% of the average weight for goat and sheep (Average weight of sheep & Goat is 30 kg); 1% of the average weight of Pig (30 kg)
- Liquid waste: 80% of total water consumption is generated as liquid waste. Water consumption for cattle and Buffalo - 270 litres/ Cattle & Buffalo ; Water consumption- 40 litres/Sheep, goat & Pig.
- Biogas generation estimation from solid and liquid waste was done:
 - 120-160 m³ biogas is generated from per ton of slaughterhouse solid wastes
 - 3000 litres of wastewater from slaughterhouse generates an average of 147.67 m³ of biogas/day.

2.12 Data Download & Printing

- Data can be downloaded into PDF or Excel file after selecting logo for the same
- Map can be printed as a portrait, Landscape, Auto and Custom
- Reports are available in document section and can be downloaded

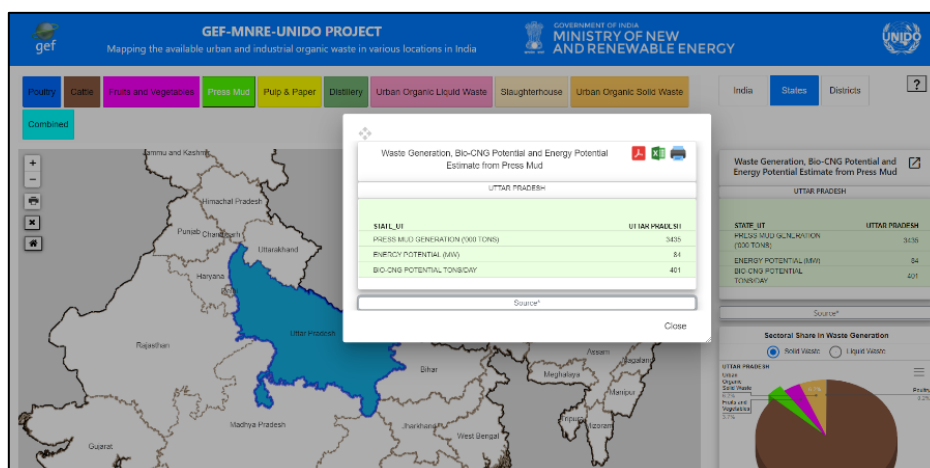


Figure 2-10: Data Download

2.13 Limitation of the current Bio Energy map on GIS platform

- Bio energy map in the current form is static. It needs updating to include changes in waste generation and its energy generation potential in the sectors.
- Many sectors having extensive potential for bio energy like agricultural waste may be included into the map to make the GIS waste mapping tool more comprehensive.



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