



**Turning Waste into Watts:  
From Field to Fuel**

# **ESB-R BIO-CHAR PLANT**

## **ESB-R ECO-GREEN BIOCHAR50**

The ESB-R Eco-Green BioChar50 is an innovative biochar plant designed to convert agricultural waste, specifically parali (rice straw), into biochar. It provides farmers with a sustainable solution for managing crop residues.

By transforming agro-waste into valuable biochar, the ESB-R EcoGreen BioChar50 not only helps farmers reduce waste but also generates additional income. Moreover, the produced biochar enhances soil fertility, improving crop yields and promoting healthier farm ecosystems. This eco-friendly technology supports sustainable agriculture and offers economic and environmental benefits to the farming community.



**ESB-R BIO-CHAR PLANT**



**Empowering Farmers, Enriching Soil**



**ENERSOL BIOPOWER  
PVT. LTD.**

Established in 2013 by Mr. Rai Singh Dahiya, a grassroots innovator in biomass gasifier technology, our company is renowned for its small-size biomass gasifiers, smokeless biomass stoves, and other renewable energy products.

**TRANSFORM YOUR  
ENERGY,  
TRANSFORM YOUR  
WORLD...**



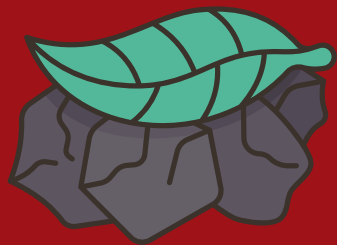
# AGRICULTURE IN INDIA

Agriculture has been a significant contributor to India's economy.

Employing more than 50% of the Indian workforce.

Contributing 20.2% to the country's GDP.

This GDP contribution could be more if we utilize the crop residues too.



**Empowering Farmers,  
Enriching Soil**



India generates on an average 500 Million Tonnes (MT) of crop residue per year



**अब पराली से  
धुआँ नही,  
आमदनी बढ़ाये।**



# CROP RESIDUE IN INDIA

In India, crop residue refers to the leftover plant material after harvesting crops like rice and wheat. Annually, millions of tons of these residues are generated, often managed through burning, leading to severe air pollution and soil degradation. Innovative solutions like converting residues into biochar or bioenergy can mitigate these issues, enhancing soil health and providing additional income for farmers. Effective crop residue management is crucial for sustainable agriculture and environmental protection.



**A surplus of 140 MT out of which 92 MT is burned each year.**



# STUBBLE BURNING IN INDIA

In India, crop residue refers to the leftover plant material after harvesting crops like rice and wheat. Annually, millions of tons of these residues are generated, often managed through burning, leading to severe air pollution and soil degradation. Innovative solutions like converting residues into biochar or bioenergy can mitigate these issues, enhancing soil health and providing additional income for farmers. Effective crop residue management is crucial for sustainable agriculture and environmental protection.



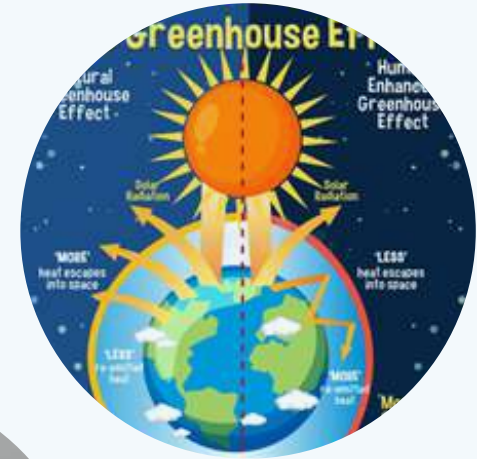
अब पराली से  
धुआँ नहीं,  
आमदनी  
बढ़ाये।



# EFFECTS OF STUBBLE BURNING



**LOW  
AGRICULTURAL  
PRODUCTIVITY**



**GREENHOUSE  
EFFECT**



**SEVERE  
DETERIORATION OF  
THE AIR QUALITY**



**SOIL  
EROSION**



**HEALTH  
HAZARDS**

# BIOCHAR PRODUCTION: A SUSTAINABLE SOLUTION FOR CROP RESIDUE BURNING

Biochar has been shown to be potentially effective in boosting soil carbon sequestration, crop production, and remediating contaminated soil and water.

Farmers can use biochar as an alternative for stubble burning as it is a carbon-rich, stable, and long-lasting substance and it will help to improve health and quality of the soil.



From Crop  
Residue to  
Revenue:  
A Clean  
Solution



# BIOCHAR FROM CROP RESIDUE AN ALTERNATE TO STUBBLE BURNING



# ESB-R ECO-GREEN BIOCHAR50

Biomass torrefaction is a thermal process that converts raw biomass into a coal-like material. It involves heating biomass with limited oxygen to a temperature of typically 300 to 800°C.



## 100KG BIOMASS BASED ESB-R TORREFACTION PLANT

Crop Waste to  
Earnings,  
No More Burning



## KEY FEATURES OF ESB-R ECO-GREEN BIOCHAR50

Biomass torrefaction is a thermal process that converts raw biomass into a coal-like material. It involves heating biomass with limited oxygen to a temperature of typically 300 to 800°C.

- Best Method:** Provides the optimal solution for converting crop residues into biochar.
- Portable System:** Highly useful for farmers due to its mobility and ease of deployment in various locations.
- Reliable and Rugged:** Built to be durable, dependable, and easy to maintain.
- User-Friendly:** Designed for ease of use, ensuring that farmers can operate it with minimal training.
- Capacity:** 50kg of biomass is process per hour.
- Environmental Benefits:** Reduces air pollution and enhances soil health by offering an alternative to burning crop residues.
- Economic Advantage:** Generates additional income for farmers through biochar sales while improving soil fertility and crop yields.
- Sustainability:** Supports sustainable agriculture and provides renewable energy through pyrolysis byproducts.



# TECHNICAL SPECIFICATIONS

## SPECIFICATIONS OF ESB-R ECO-GREEN BIOCHAR50

- Make - Enersol Biopower®
- Fuel Mode - 100% Biomass based
- Feeding System - Semi-Automatic
- Acceptable moisture in biomass - Less than 15%
- Biomass acceptable size - 6-10mm
- Power Required - 5-8HP

## SCREW CONVEYOR WITH HOPPER

- Capacity - 50kg/hr. (Biomass Input)
- Conveyor flow rate - 50kg.hr.
- Material - Mild Steel (MS Sheet)

## PRE-HEATER

- Capacity - 50kg/hr.
- Operating Temperature - 100°C - 200°C
- Material - Mild Steel (MS Sheet)

## AIR LOCKING SCREW

- Specifications - Low pressure reaction vessels with 50kg/hr. capacity
- Material - Mild Steel (MS Sheet)

## MAIN REACTOR

- Material - Stainless Steel & Mild Steel
- Capacity - 50kg/hr.
- Temperature - 250°C - 800°C

## GAS COOLING & CLEANING SYSTEM WITH CONDENSOR

### ➤ Water Tank with Cooling Tower

- Water tank capacity - 1000ltr approx..
- Material - Mild Steel (MS Sheet)

### ➤ Condenser

- Material - Stainless Steel (SS Sheet)

### ➤ Gas Cleaning Scrubber

- Material - Stainless Steel (SS Sheet)

## SCREW CONVEYOR WITH COOLING SYSTEM

- Capacity - 50kg/hr.  
(shell & tube heat exchanger)
- Material - Mild Steel (MS Sheet)
- Temperature range - 350°C to 50°C

## SMOKELESS WOOD BURNER

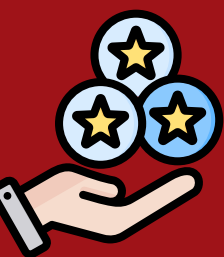
- Material - Mild Steel (MS Sheet)
- Number of gas burner - Single Burner provided

## CONTROL PANEL & THERMOCOUPLES

- Basic control panel with temperature control provision
- K type thermocouples - 4nos
- J typer thermocouples - 2nos.
- Exhaust - Provided
- Power required - 5-8 HP

## PLANT DIMENSION AND WEIGHT

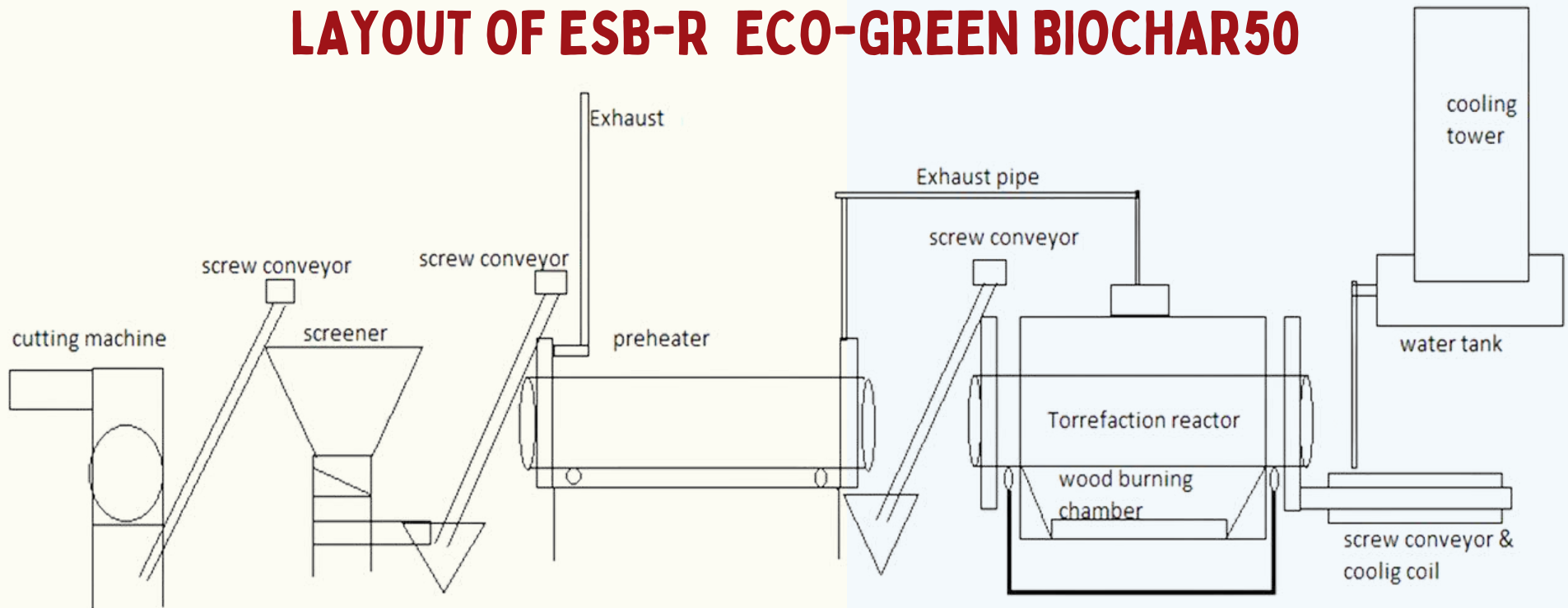
- Dimension
  - Length - 40 feet approx.
  - Width - 15 feet approx.
  - Height - 6 feet approx.
- Weight - 3.5 Ton approx.



**Know Your  
ESB-R  
Eco-Green  
Biochar50**



# LAYOUT OF ESB-R ECO-GREEN BIOCHAR50



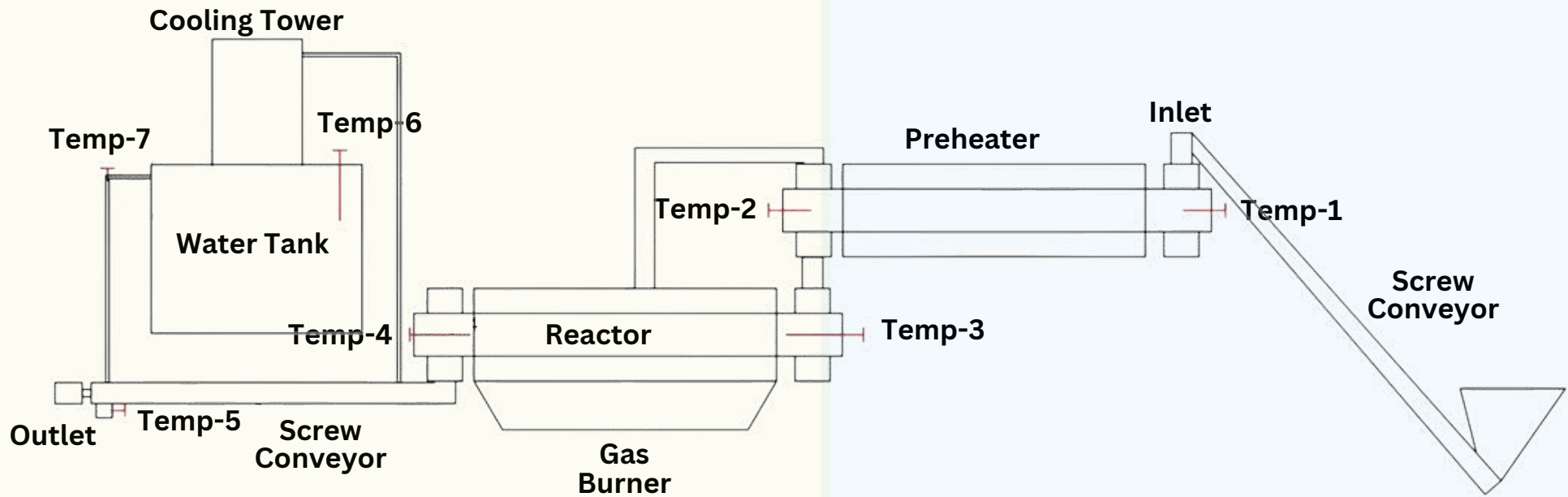
## MODEL-1

- 1 Cutting machine
- 2 Screw conveyor-1
- 3 Screener
- 4 Screw conveyor-2
- 5 Preheater & exhaust
- 6 Screw conveyor-3
- 7 Exhaust pipe
- 8 Torrefaction reactor
- 9 Wood burning chamber
- 10 Screw conveyor & cooling coil
- 11 Cooling tower
- 12 Water tank



Know Your  
ESB-R  
Eco-Green  
Biochar50

# LAYOUT OF ESB-R ECO-GREEN BIOCHAR50



## MODEL- 2

- 1 Screw conveyor-1
- 2 Inlet
- 3 Preheater
- 4 Reactor
- 5 Gas Burner
- 6 Screw conveyor-2
- 7 Water Tank
- 8 Cooling Tower
- 9 Outlet



Know Your  
ESB-R  
Eco-Green  
Biochar50



# PICTURES OF ESB-R ECO-GREEN BIOCHAR



Green  
Solutions for a  
Greener  
Tomorrow



# OUR ESTEEMED PARTNERS



IIT, Ropar



IIT, Roorkee



NIT,  
Tiruchirappalli



BITS-PILANI  
Hyderabad



The LNM Institute of  
Information Technology

LNMIIT, Jaipur



IIT, Rourkela



NIT, Mizoram



VIT, Vellore



SASTRA,  
Thanjavur



GCE, GAYA



CSIR-CMERI  
DURGAPUR



Indian Oil



CSIR- NIIST



NTPC  
Madhya Pradesh



UNDP, Yemen

Pioneering Success  
with Our Valued  
Partners.





## YOUTUBE LINKS

- <https://www.youtube.com/watch?v=FYPajsGRrrw>
- <https://www.youtube.com/watch?v=LKDlbvXdHyM&t=9s>
- <https://www.youtube.com/watch?v=Rp17MmDRiIQ>
- [https://www.youtube.com/watch?v=GTmOj\\_JRLVw](https://www.youtube.com/watch?v=GTmOj_JRLVw)
- <https://www.youtube.com/watch?v=pcQN3qzNfh0>
- <https://www.youtube.com/watch?v=IAGaO9LRVOY>
- <https://www.youtube.com/watch?v=OD9ueNYjf1Q&t=23s>
- <https://www.youtube.com/watch?v=fjULT8k4Ayg&t=9s>
- [https://www.youtube.com/watch?v=rtjSn\\_9P-Yc](https://www.youtube.com/watch?v=rtjSn_9P-Yc)
- [https://www.youtube.com/watch?v=ghm\\_odvyvzc](https://www.youtube.com/watch?v=ghm_odvyvzc)
- <https://www.youtube.com/watch?v=g1iemqc0-80&t=15s>
- <https://www.youtube.com/watch?v=g6ya3XhDBCQ>

- <https://www.youtube.com/shorts/JL5d8YCauc>
- <https://www.youtube.com/shorts/wa0S18DqY-Y>
- <https://www.youtube.com/shorts/hlZd0IjVccY>
- <https://www.youtube.com/shorts/LVqJYhPrLXU>
- <https://www.youtube.com/watch?v=0AhISC5Dw00>
- <https://www.youtube.com/shorts/tlTevfsPD0o>
- <https://www.youtube.com/watch?v=Bb8g5ooogaM>
- <https://www.youtube.com/watch?v=6cYUyY250XE>
- [https://www.youtube.com/watch?v=iyiz\\_OBGFGw](https://www.youtube.com/watch?v=iyiz_OBGFGw)
- <https://www.youtube.com/watch?v=W9HXk2M-Mgw>
- <https://www.youtube.com/watch?v=-XmU5L6lytM>
- <https://www.youtube.com/watch?v=vY73UXW6aIM>
- <https://www.youtube.com/watch?v=l8NufIvOH4k>
- <https://www.youtube.com/watch?v=7MVHph7NfkY>



# OUR PRODUCTS



**Portable Biomass Gasifier**



**Bio-Auto Mawa-Machine**



**Biomass Roti Maker Stove**



**Used Oil Recycling Plant**



**Biomass Torrefaction Plant (Charcoal Plant)**



**Biogas Genset**



**Multi-Purpose Food Processing Machine**



**Portable Biomass Gasifier**



**Commercial Wood /Biomass Stove**



**Domestic Biomass/ Wood Stove**



**Automaking Roti Making Machine**



**Wood Cutter / Biomass Shredder**



**Our Products**





# AWARDS & EXHIBITIONS

- Fifth National Grassroots Innovation Award, 2009.
- Innovation Scholars In-residence Program at President House.
- Indian Merchant Chamber (IMC) – Inclusive Innovation Award, 2012.
- Certificate of Appreciation As “Farmer Scientist” By Rajasthan University of Veterinary & Animal Sciences, Bikaner, Rajasthan.
- Certificate of “Farmer Scientist” By Pacific University, Udaipur, Rajasthan.
- Certificate from Department of Science & Technology at National Science Day, Jaipur, Rajasthan.
- Business Expo Kota 2023, Kota, Rajasthan.
- Exhibition of Innovations, President House, 2010
- Inauguration of ESB-R Biomass gasifier by former chief minister of Meghalaya, 2013
- Third international conference on creativity & innovations at grassroots at Indian institute of management (IIM), Ahmedabad, 2015
- India International Science Festival (IISF), New Delhi, 2016.
- India International Trade Fair (IITF), New Delhi, 2016.
- Mega Science & Technology and Industry Expo, New Delhi, 2017
- Bollywood movie Padman promotion, 2018.



## PRESIDENT AWARD WINNER





## CONTACT US

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(Rajasthan)



**GO  
GREEN**

## CONNECT US



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[www.enersolbiopower.com](http://www.enersolbiopower.com)  
[www.enersolbiopower.in](http://www.enersolbiopower.in)



<https://www.youtube.com/@enersolbiopower-biomassgas3987>



<https://www.indiamart.com/enersol-biopower-jaipur/profile.html>



indiamart

<https://twitter.com/EnersolBiopower>



<https://www.linkedin.com/company/enersol-biopower-pvt-ltd>



Instagram

[https://www.instagram.com/enersol\\_biopower/](https://www.instagram.com/enersol_biopower/)