



## RUDRA ENVIRONMENTAL SOLUTION (INDIA) LTD

(CIN.NO. U37200PN2009PLC134390), ISO 9001-2008 Co.

B-1, Minar Apartment, 124/1 Erandawana, Law College Road, Near Film Institute, Pune -411004

Tel: +91-20- 25448900, Email:rudraenvsolution@gmail.com

web: rudraenvsolution.com

### Rudra's Transformation through Innovation

We at **Rudra Environmental Solutions** very strongly believe in Social transformation through Innovation. We believe invention can solve many of the biggest social, environmental and economic challenges of our time.

**RUDRA ENVIRONMENTAL SOLUTION (INDIA) LTD.** established on 29th July 2009. Since inception the company has been involved in research of converting waste plastic into fuel technology through TCD i.e. **Thermo Catalytic Depolymerisation Process**. The first pilot plant was established in March 2010, second-generation plant in 2013 and now its patented third generation plant is running successfully in company's own factory situated in Jejuri M.I.D.C. area. **Company is ISO 9001-2008 certified.**

The company spearheaded under the dynamic leadership of **Mr Shirish Phadtare** who with vast experience in administration and financial sector looks after technical and commercial sides of company. While another Director **Dr. Medha Tadpatrikar** works as Brand Ambassador and spoke person of the company, looks after marketing, and is involved in creating awareness amongst the society about how to collect, segregate and recycle of plastic.



Factory Building at Jejuri, Pune



2009, First Trial Plant of 50 Kg



2013, Second Trial Plant of 100 Kg



2016, III Generation Plant 500 KG

#### The Trigger :

The promoters when on a visit to a wildlife sanctuary witnessed the death of a deer due to consumption of plastic. From 2009 onwards as a mission, Rudra has been researching and developing its Thermo Catalytic Depolymerization (TCD) technology.

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### CONVERSION TECHNOLOGY:

The machine effectively reverses the plastic production process; where the **Thermo Catalytic Depolymerization (TCD)** process cracks the long chains of polymer to produce useable fuel. The waste plastic; is cleaned and shredded into small pieces before **Thermo Catalytic Depolymerization (TCD)** process, to remove contaminants like paper, oil, grease, food particles etc. This is important as it increases the efficiency of the machine and subsequently quality of the fuel.

During the startup, depending on the availability the natural gas/ LPG or the diesel is used. During the process, the heat output monitored to maximize the consistency of the fuel. The process is a batch type process, which takes between 3 to 7 hours to complete depending on the capacity of the machine.

The **Thermo Catalytic Depolymerization (TCD) process** performed within a heated sealed reactor. The reactor is loaded with the shredded plastic and is heated and the catalyst helps in cracking the long chains of polymers in the absence of oxygen to produce hydrocarbon vapors. The plastic depolymerized at 380 – 430°C, and the gases are condensed. The condensed vapor produces the fuel and synthetic gases, out of which the syngas used as an energy source for the further heating of the reactor. This synthetic gas, which is a byproduct is passed through scrubber and cleaned prior to being used a heating source; helping improve the efficiency of the process. The fuel passes through the filtration system before it's collected.

The Non-plastic material and non-depolymerized plastic settles at the bottom of reactor, collected after the shift or during weekly maintenance.

### Depolymerization

Depolymerisation is the **process of molecular decomposition** when large molecules split into the smaller molecules. The waste plastic is converted into usable end product: **synthetic oil, gas and carbon**. Depolymerisation is thermo-catalytic decomposition or cracking of polymers in absence of oxygen. Depolymerisation process is **pollution free**. There are **no harmful gases or effluents generated** in the process.

### BENEFITS OF TCD PROCESS

- The plant is able to **process** plastic waste that are **not easily recyclable** including wrappers, other **thin plastic and residual plastic waste** material from businesses and households. We have been successful in processing various types of plastic waste.
- This will result in **diversion of waste plastic from the landfill** and produce fuel with lower carbon footprint.
- The fuel produced **used directly as a source for burning** without any need for further processing.

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- **Energy efficient and Zero emission process:** no harm to the environment
- The waste plastic to fuel process produces **very low emission**, due to the capture of almost all of the output, both liquids and gases inside the system. In the process, Plastic heated as opposed to burned. The **Sulphur content** in the synthetic oil is usually **less than 18 ppm**, and **used directly for burring** without need of any further process.
- Another important benefit of the Rudra process is the range and type of plastics it accepts for conversion, especially those plastics that are not suitable or are of high enough quality for recycling.
- Rudra and Keshav Sita trust have work constructively over the period of almost Three years to develop good working relationship with all its stakeholders.
- In addition to being strong industrial partner, Rudra benefits from Keshav Sita Trust's expertise in material collection, handling and in securing feedstock contacts.

### ❖ RUDRA FUEL OUT PUT



The machine converts waste plastic into fuel and cleaned synthetic gas. The exact recovery ratio and characteristics of the fuel varies depending on the types of plastic received.

#### ***Each ton of plastics produces approximately***

- **600 to 650 liters of poly fuel**
- 20 to 25% synthetic gas – used in the process
- 5 to 10% moisture
- 5 to 10% Residual char – can be used ad road filler with bitumen.

The produced fuel used directly for the **burning in kerosene stoves, boilers, furnaces, certain types of gensets** etc. The char produced, as the contamination of waste plastic is a non-hazardous waste.

**Land Requirement:** Our Platform mounted Model for capacities ranging from 70 Kg to 3000 Kg per batch. Approximately land is required from 1000 Sq.ft to 10,000 Sq.ft. depending upon plant capacity.

**Electricity load:** From 10 HP to 55 HP, depending upon plant capacity.

**Water :** Water Sump required from 150 liters to 5000 liters, depending upon plant capacity.

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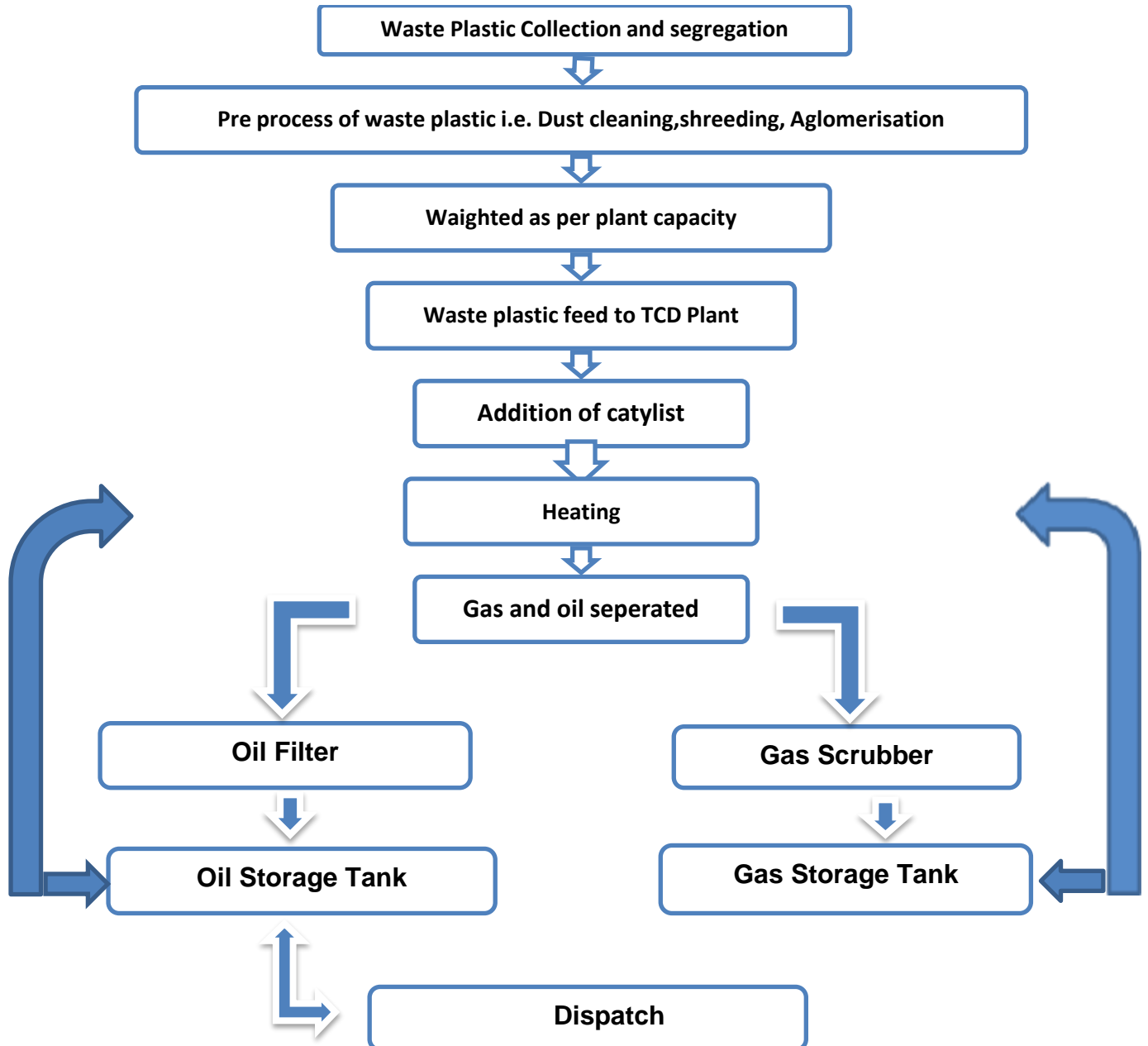
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## PROCESS BLOCK DIAGRAM



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### Rudra has tied up with Keshav Sita Memorial Foundation Trust (E3989/2003)

Rudra has tied up with Keshav Sita Memorial Foundation Trust for **creating awareness of segregation** at source as well as pick up of waste plastic from various areas of Pune for last Two and Half year

At present, the collection happens from almost **15000 households, hotels and businesses.**

We collect more than 15 to 17 MT of plastic every Month. Rudra and Keshav Sita Trust are creating **circular economy**. It is part of **Made in India mission, Swatch Bharat, Women Empowerment and Environment.**

**Until date, we have collected more than 250 MT of waste plastic, i.e. reduction of 15, 00,000 kg of carbon dioxide emission**

### AWARDS For Rudra

- Economics Times- Polymers awards 2017 Excellence in Recycling
- NK Orchid college of Engineering & Tech Solapur 2017 – Best Innovation Industry
- Mksss's Smt Hiraben Nanavati Institute of Management Pune & Rotary Club of Gandhibhavan - Most Promising Company of year 2016.



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### ***RUDRA AND KESHAV SITA MEMORIAL FOUNDATION TRUST***

***Initiative for waste plastic awareness for segregation and collection of waste plastic. Various seminars, meetings conducted by us.***



**Contact us:**

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