



Recycle  
Energy

We are on a different and more environmentally friendly way than known energy sources. This allows us to produce more energy

**5D RECYCLE & ENERGY**

**PLASTIC WASTE TO**  
**ENERGY**

**ENERGY AND PYROLYCTIC  
OIL PRODUCTION FROM  
PLASTIC WASTE**

(BY PYROLYSIS PROCESS)

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# Plastic Waste Problem

Plastic waste problem is very serious concern to the natural World. Waste problem is becoming more threatening to Environment, Finance and especially to Public Health.

The plastic waste problem severely impacts the environment, economy, and public health. It leads to pollution, harms wildlife, and incurs significant cleanup costs. Additionally, toxic chemicals and microplastics pose serious health risks to humans.



Environment



Plastic Waste Disposal Problem



Dangerous Gas Leakage



Fire and Explosion



Hazard of Public Health



# Environmental Pollution

Environmental pollution is a critical issue affecting air, water, and soil quality globally. It results from various human activities, including industrial emissions, vehicle exhaust, and improper waste disposal. Pollutants like chemicals, plastics, and heavy metals contaminate natural resources, leading to adverse health effects on humans and wildlife. Ecosystems are disrupted, causing biodiversity loss and long-term ecological damage. Addressing pollution requires stringent regulations, sustainable practices, and global cooperation to protect our planet's health.



**144**  **TON**

Plastic waste being disposed  
to sea everyday in Turkey

As per specialists, The harm to sea eco-system  
by plastic waste is around 13 billion usd.

**31M**  **TON**

domestic waste being produces in Turkey  
in every year.

**12%** Plastic waste is 12% of the  
domestic wastes.

# Plastic Waste Disposal Problem

Very limited part of plastic waste can be recycled, however, rest of plastic wastes being end up in landfill.



Plastic wastes are not organic and being dumped in landfill with other wastes.




This process is causing environmental pollution and serious harm to the environment.




# What is Pyrolysis?

**1**   
Organic and  
Plastic wastes

**2**   
Being heated  
upto 1000<sup>c</sup>

“pyro”  
Heat

**3**   
In an oxygen  
Free atmosphere

“lyse”  
Decomposing

**4** Decomposing in solid,  
liquid and gas form



“pyrolyse”



# NRR Technology Process



## Solid Plastic Waste

Plastic wastes, which not being recycled and to be dumped in landfill, are being used as raw material of the process.



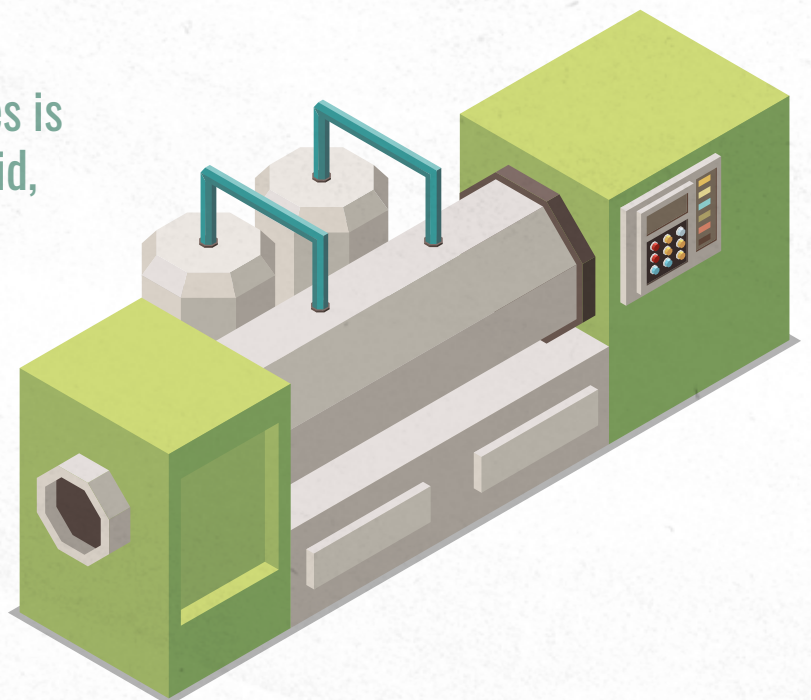
Reaction Without Oxygen



Thermic Decomposition



At ambient temperature, the gases is being condensed to Pyrolytic liquid, LPG, Carbon black and Paraffin by the auxiliary reactor.





**3**

Collected plastic wastes are being formed in small parts, which are being loaded to main reactor.



**4**

Electrical energy is being used to heat up to 500-1000 celsius in order to thermal decomposition of plastic wastes in the main reactor. The process getting speed once gas reach from main reactor to catality converter.

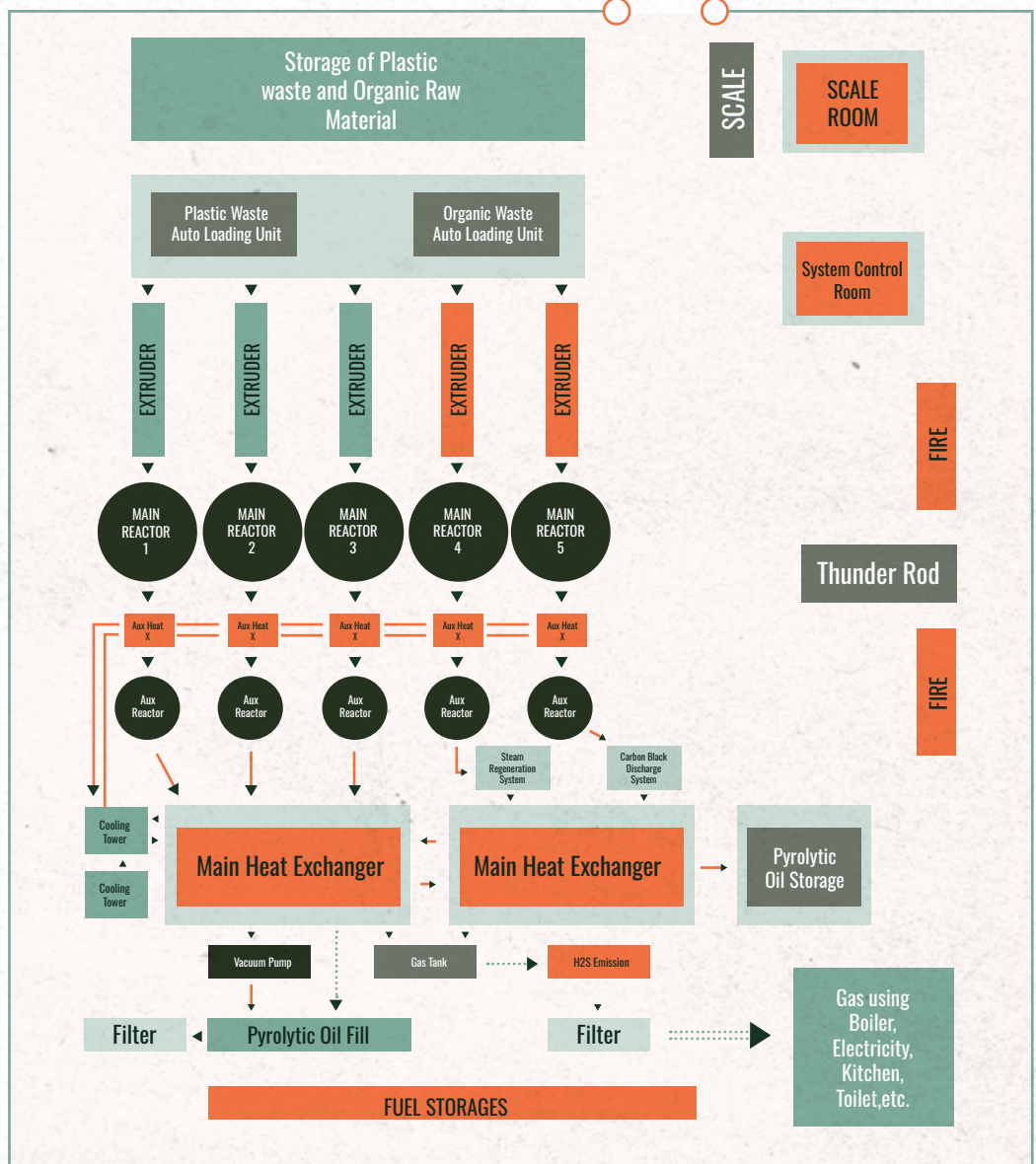


**5**

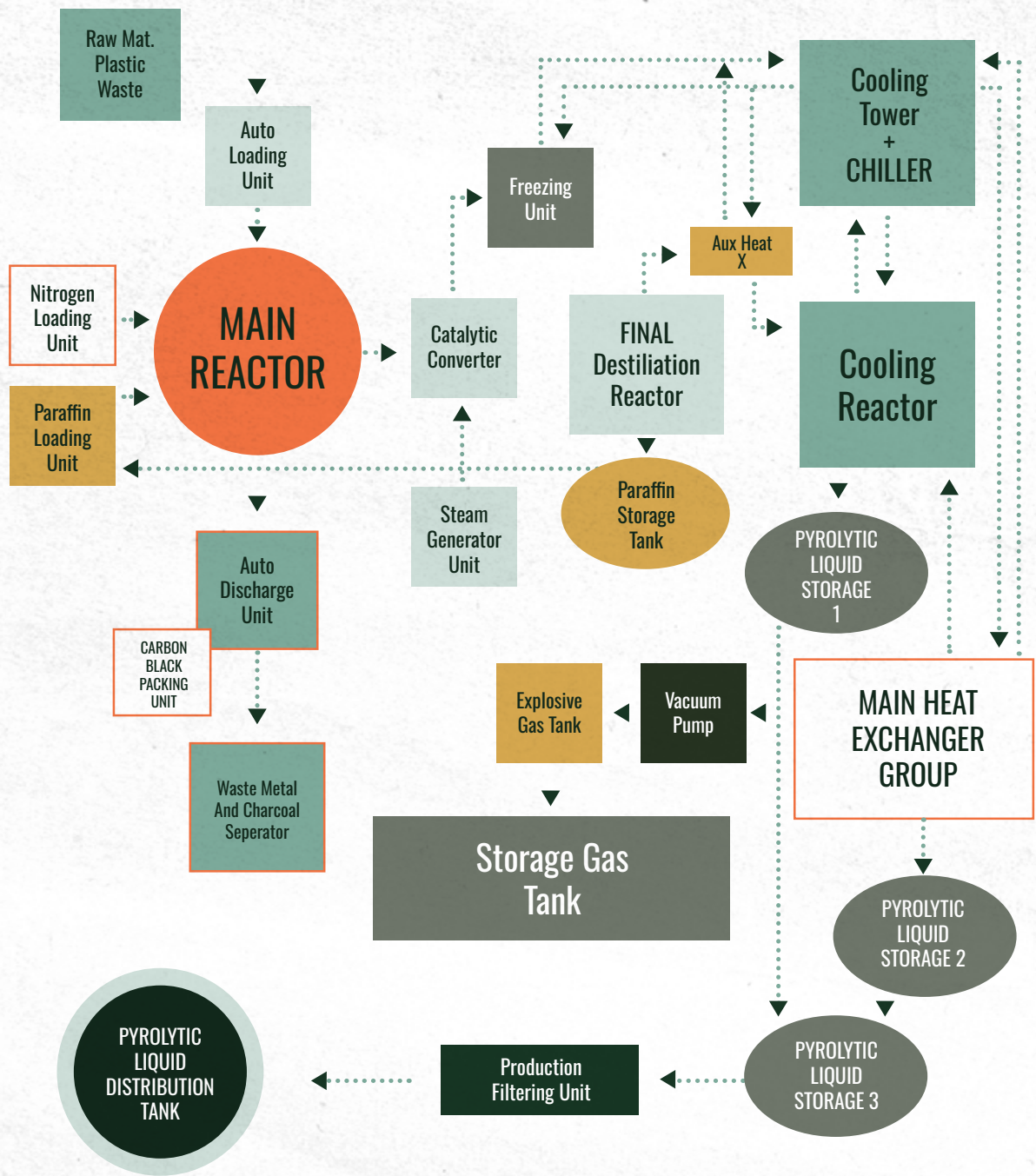
Endothermic Reaction



# Energy Production from Plastic Waste Plant Field



# Flow Chart of Production of Pyrolytic Liquid



Daily 10 Ton per unit x 5 Unit = 50 Ton / day

# WASTE TO ENERGY



Energy can be produced from plastic waste by Pyrolysis Process;

- Plastic bags
- Polypropylen plastics (PP)
- Polyethylen plastics (PE)
- Polystryens (PS)
- Bags, Packing
- Mixed Plastics
- Plastics dumped in Landfill

\* Decomposed elements are to be recycled and re-used by the industry base on types.

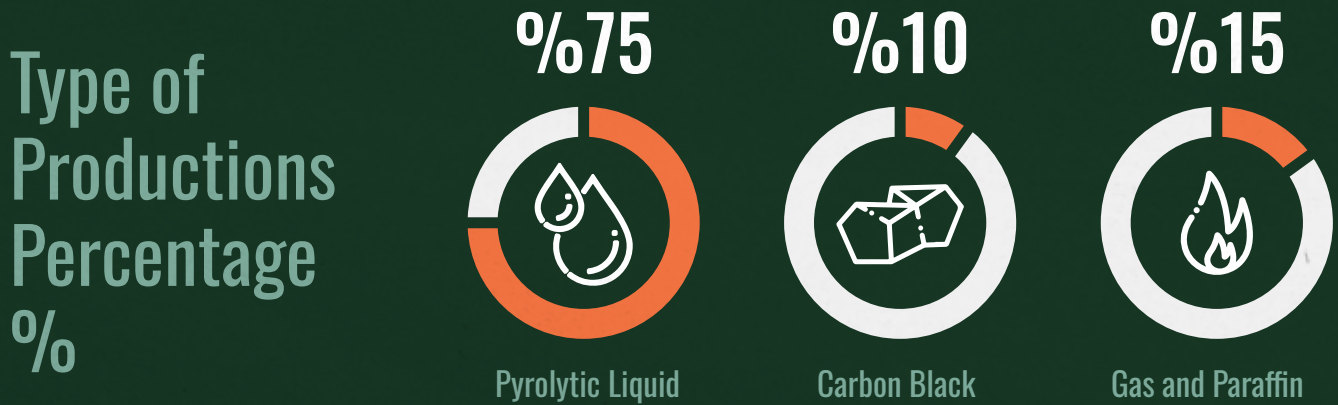
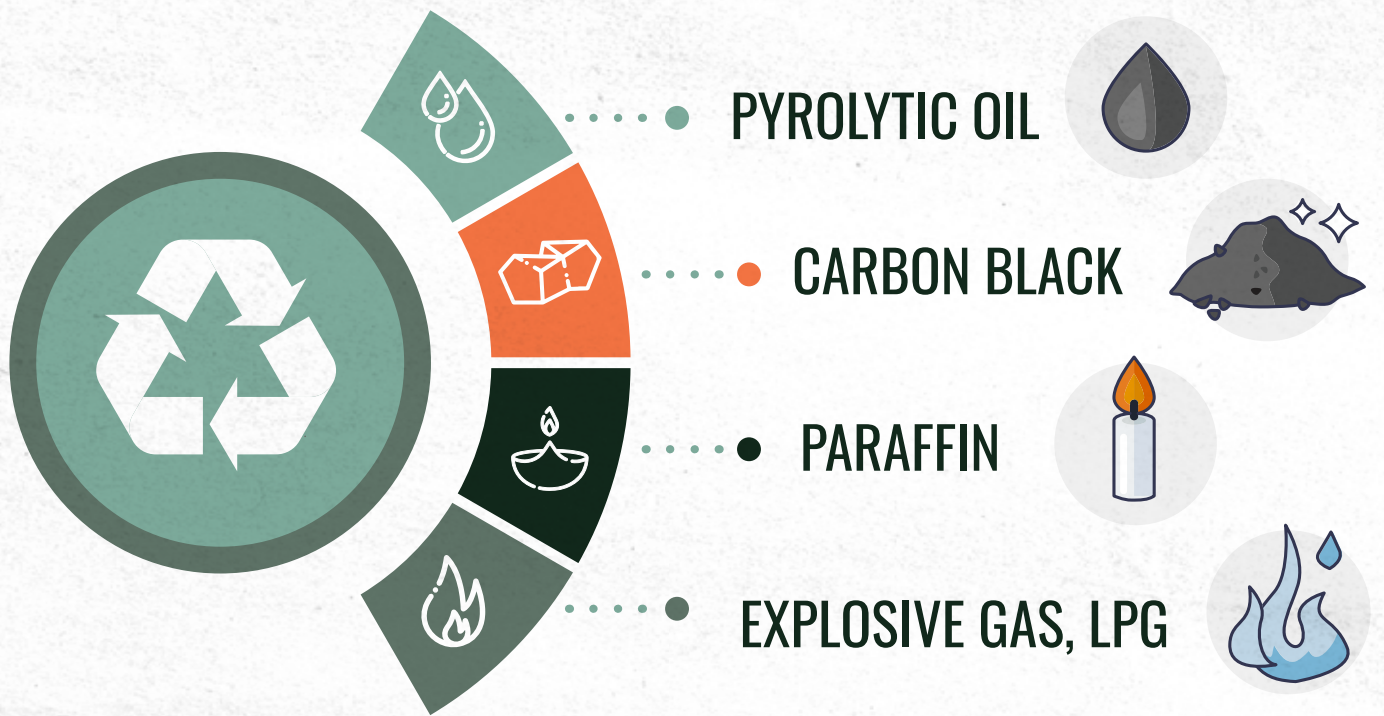
Organic Pyrolysis Process;

Additionally;

It is possible to install a process to pyrolysis organic, inorganic and used lube oils which can not be recycled.



# Type of Production by NRR Process



# Pyrolytic Oil

Pyrolytic oil samples as below, produced from Plastic and tyres 10500 - 10700 kcal/kg



Produced Pyrolytic Oil has high calorific value (min 10.500 kcal) and the least emission values.

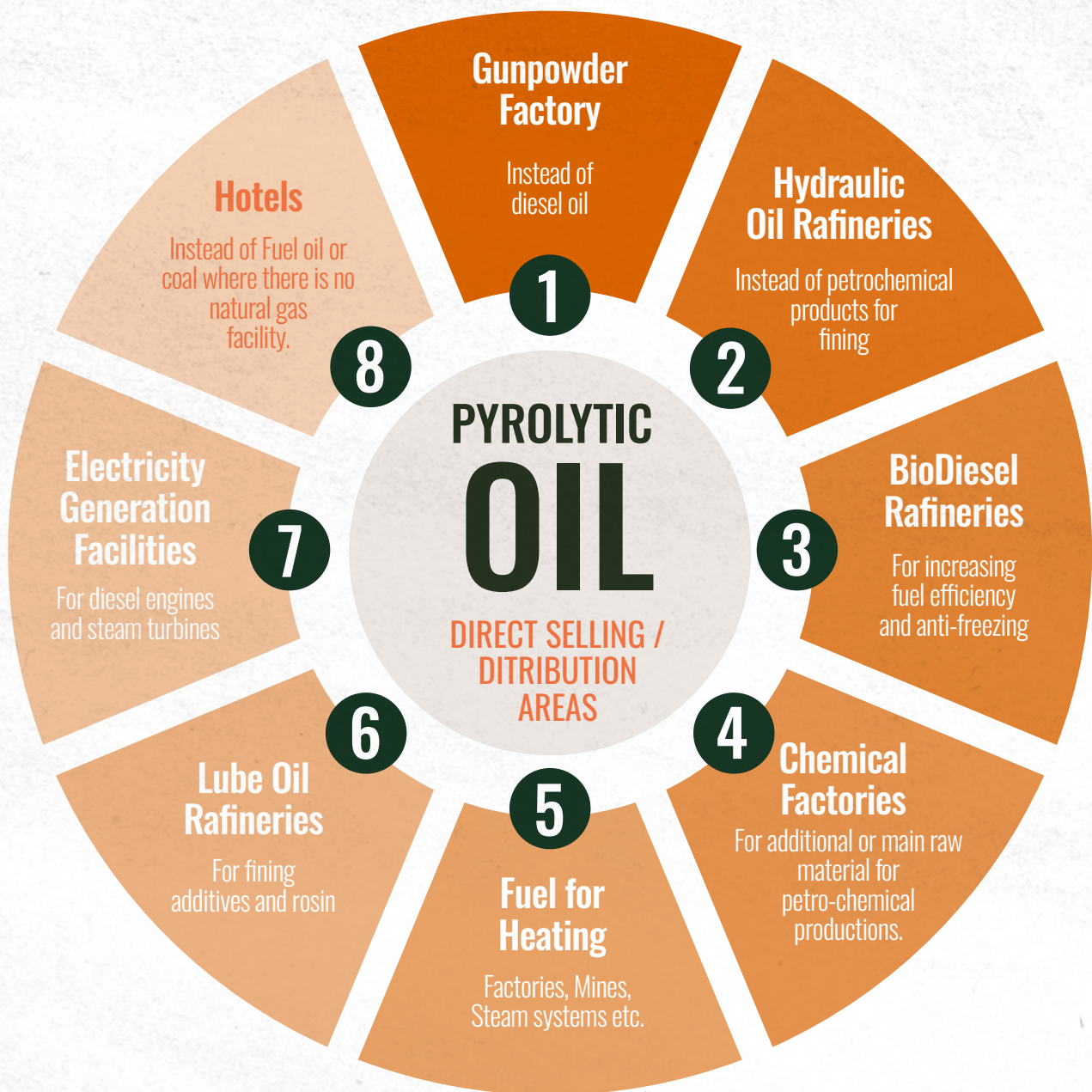
Fuel Type	Calorific Value
Liquified Petroleum Products	8.300 - 9.000 kcal/kg
Clean Petroleum Products	10.000 - 10.200 kcal/kg
<b>PYROLYTIC OIL</b>	<b>10.500 - 11.000 kcal/kg</b>



Final distillation rate is %95 and K1 Pyrolysis Oil

# Pyrolytic Oil Where to Use

Pyrolytic oil, derived from biomass pyrolysis, is a versatile renewable fuel used for energy generation, chemical production, and soil improvement.

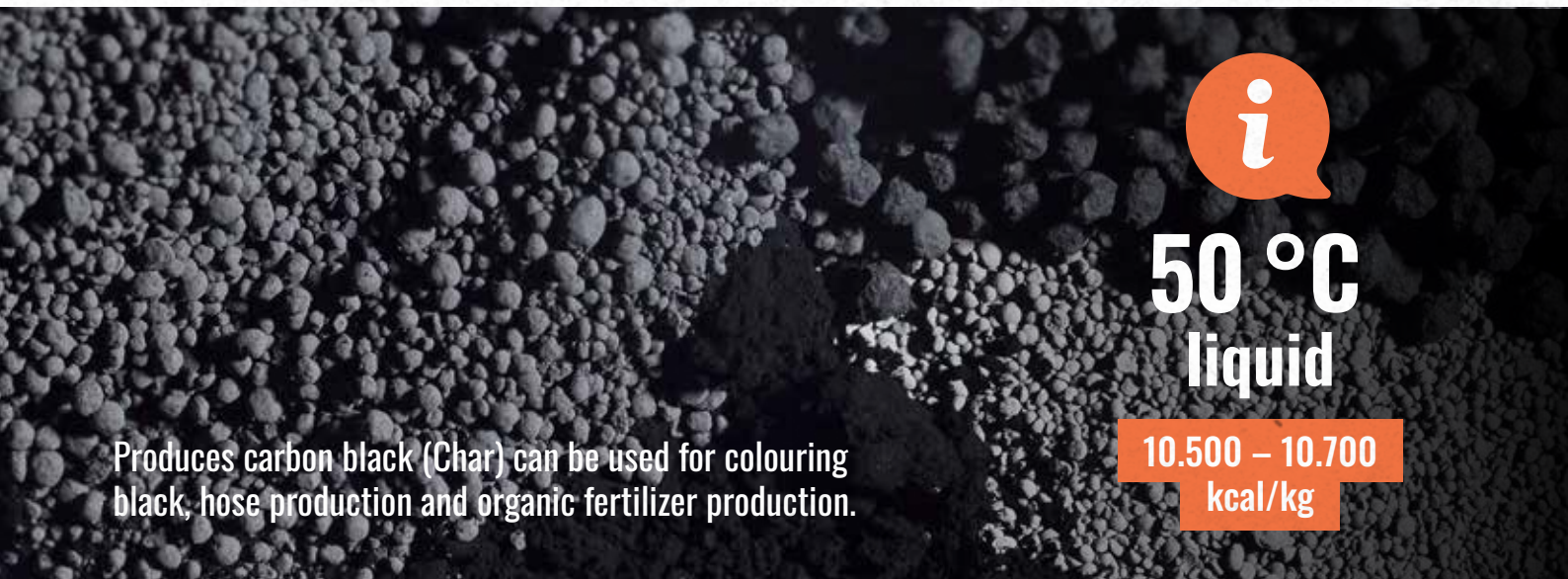


Pyrolytic oil is produced through the thermal decomposition of biomass in the absence of oxygen, creating a renewable fuel. It is used for generating heat and power, as a chemical feedstock, and in bioplastics production, while also serving as a soil amendment through biochar.

# Carbon Black

Pyrolytic Liquid samples as below, produced from Plastic and tyres 10500-10700 kcal/kg

Solid Product (char) is being used as fuel and also used for chemical industry and metallurgic purposes. During pyrolytic process, certain amount of char is being produced by the main reactor unit.



**50 °C**  
liquid

**10.500 – 10.700**  
kcal/kg

Produces carbon black (Char) can be used for colouring black, hose production and organic fertilizer production.



# Paraffin

Paraffin is being used in very common areas.

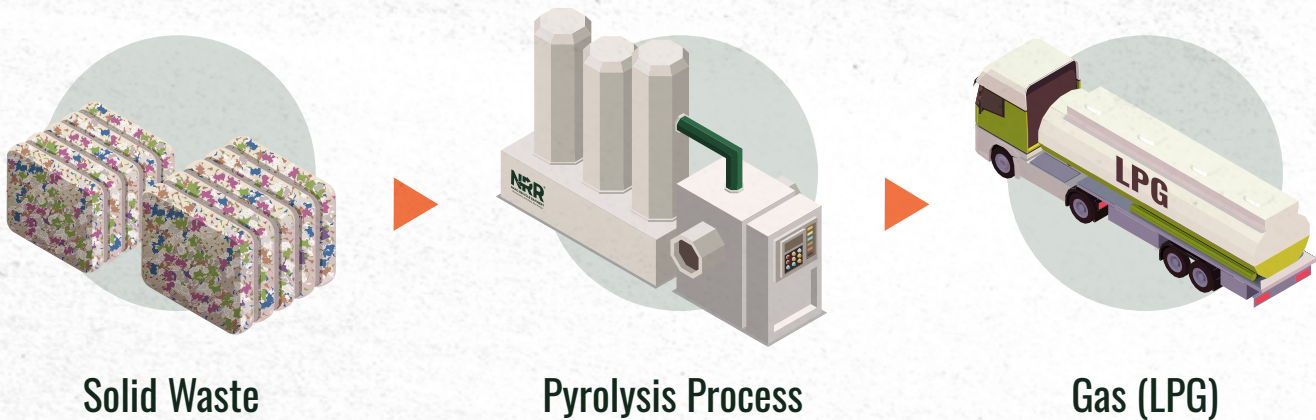
## Where to use Paraffin?

There is common areas such that pharmacy, textile, cosmetic factories, packing and storing of foods, farming, production of electrical equipments etc. Paraffin has benefit for isolation by its passivity and not reacting with other materials.

# GAS - LPG

There is apx %10-15 gas can be produced by the pyrolytic process.

The pyrolytic gas, which is not condensed during the process, is have better calorific value than natural gas.



Pyrolytic process have capacity to accumulate pyrolytic gas by %10-15 (1.000 - 1.500 m3/ day), which is considerable energy potential.

## %10-15





Non-condensed gas is being cooled and stored in waste gas storage tank. Once reached up to required volume, gas is storing by compressors in liquid form to use for facility requirements.



# Waste to Energy



- 

**1** Plastic wastes, which are not recycled or re-used are being dumped in landfill.
- 

**2** Pyrolytic oil have advantageous calorific values, that appropriate to produce electricity.

Despite to common fossil wastes such as LPG, LNG, CNG etc; Energy production by pyrolytic process (from plastic wastes) is very simple and efficient solution for industries to produce electricity and power.



SOLUTION IS  
**PYROLYTIC  
PROCESS**

# The Advantages of Pyrolytic Process

In pyrolytic process, there is no hazardous gases such as Dioxin and Furan. Therefore, there is no requirement for expensive emission control systems.

Process is self-sufficient. Therefore, process is not required any fuel but only start up.

Pyrolytic process is developed to provide zero waste. Each output material can be used and sold on demand.

Process can use any raw material which require low or high temperatures.

Efficient and faster to produce energy.

Process require less space and can produce more production comparing to other systems.

Process is faster such that production in minutes despite to other system which can take apx 35 days.

Profit of the process is higher than any alternative method.



# Process Effectiveness in Modular Structure

Planned process structure is based on capacity of 10 tonnes per day. Capacity can be improved as long as process facility is made in modular structure.

**10**  
tonnes  
per day



Pyrolytic process is developed in order to avoid any loss of efficiency during production. In case of any unit failure / trouble; production can be maintained at same level by increasing of capacity of other two units by %12.

Pyrolytic process have the least emission values and environmental friendly.

# About the Company

Leader  
in the  
Recycling

Best  
Enginerring

## From WASTE to ENERGY



The supplied materials (Organic wastes) of BIOGAS technology is %65 of solid wastes.



The rate of plastic wastes which can not be recycled by the BIOGAS Tehcnology is %35.

**%35**

Pyrolytic process is very important for environmental protection and saving for country economy.





Domestic  
Production

Innovative

New  
Generation  
Reactor



by 1 liter fuel, producing  
5 Kw/h electricity

**25.000** liters Oil



If using Pyrolytic  
oil for electricity  
generation

**Daily**

25.000 liters x 5 Kw/h =  
**125.000 Kw/h**

**Monthly**

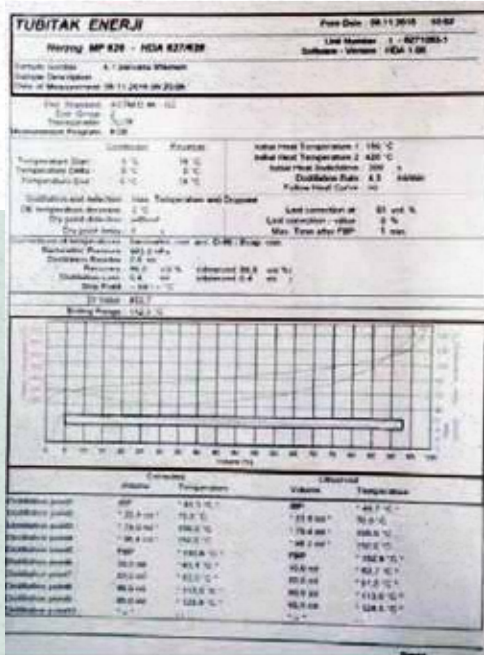
**4 Million Kw/h**

**Yearly**

**48.000 Mw/h**

**Daily 30 Tonnes  
Plastic Wastes**

# Analyses Result of Pyrolytic Oil



### TUBITAK ENERJİ

Free Date: 06.11.2016 10:02

Line Number: 1 - 6271263-1

Software Version: NEA 1.0B

Sample Number: A-1 perleke Mükem

Sample Description: CPM 1502 TMO 426776

Date of Measurement: 07.11.2016 06:20:00

Time (min)	Flow Rate (ml/min)	Temperature (°C)	Weight (g)	Flow Rate (g/min)
0	1.0	40.1 °C	40.8	40.8
1	0.8	32.1 °C	32.8	32.8
2	2.4	55.1 °C	55.8	55.8
3	3.0	59.9 °C	59.9	59.9
4	4.0	58.9 °C	58.9	58.9
5	5.0	56.9 °C	56.9	56.9
6	6.0	54.9 °C	54.9	54.9
7	7.0	52.9 °C	52.9	52.9
8	8.0	50.9 °C	50.9	50.9
9	9.0	48.9 °C	48.9	48.9
10	10.0	46.9 °C	46.9	46.9
11	11.0	44.9 °C	44.9	44.9
12	12.0	42.9 °C	42.9	42.9
13	13.0	40.9 °C	40.9	40.9
14	14.0	38.9 °C	38.9	38.9
15	15.0	36.9 °C	36.9	36.9
16	16.0	34.9 °C	34.9	34.9
17	17.0	32.9 °C	32.9	32.9
18	18.0	30.9 °C	30.9	30.9
19	19.0	28.9 °C	28.9	28.9
20	20.0	26.9 °C	26.9	26.9
21	21.0	24.9 °C	24.9	24.9
22	22.0	22.9 °C	22.9	22.9
23	23.0	20.9 °C	20.9	20.9
24	24.0	18.9 °C	18.9	18.9
25	25.0	16.9 °C	16.9	16.9
26	26.0	14.9 °C	14.9	14.9
27	27.0	12.9 °C	12.9	12.9
28	28.0	10.9 °C	10.9	10.9
29	29.0	8.9 °C	8.9	8.9
30	30.0	6.9 °C	6.9	6.9
31	31.0	4.9 °C	4.9	4.9
32	32.0	2.9 °C	2.9	2.9
33	33.0	0.9 °C	0.9	0.9
34	34.0	-1.1 °C	-1.1	-1.1
35	35.0	-3.1 °C	-3.1	-3.1
36	36.0	-5.1 °C	-5.1	-5.1
37	37.0	-7.1 °C	-7.1	-7.1
38	38.0	-9.1 °C	-9.1	-9.1
39	39.0	-11.1 °C	-11.1	-11.1
40	40.0	-13.1 °C	-13.1	-13.1
41	41.0	-15.1 °C	-15.1	-15.1
42	42.0	-17.1 °C	-17.1	-17.1
43	43.0	-19.1 °C	-19.1	-19.1
44	44.0	-21.1 °C	-21.1	-21.1
45	45.0	-23.1 °C	-23.1	-23.1
46	46.0	-25.1 °C	-25.1	-25.1
47	47.0	-27.1 °C	-27.1	-27.1
48	48.0	-29.1 °C	-29.1	-29.1
49	49.0	-31.1 °C	-31.1	-31.1
50	50.0	-33.1 °C	-33.1	-33.1
51	51.0	-35.1 °C	-35.1	-35.1
52	52.0	-37.1 °C	-37.1	-37.1
53	53.0	-39.1 °C	-39.1	-39.1
54	54.0	-41.1 °C	-41.1	-41.1
55	55.0	-43.1 °C	-43.1	-43.1
56	56.0	-45.1 °C	-45.1	-45.1
57	57.0	-47.1 °C	-47.1	-47.1
58	58.0	-49.1 °C	-49.1	-49.1
59	59.0	-51.1 °C	-51.1	-51.1
60	60.0	-53.1 °C	-53.1	-53.1

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31	31.0	4.9 °C	4.9	4.9
32	32.0	2.9 °C	2.9	2.9
33	33.0	0.9 °C	0.9	0.9
34	34.0	-1.1 °C	-1.1	-1.1
35	35.0	-3.1 °C	-3.1	-3.1
36	36.0	-5.1 °C	-5.1	-5.1
37	37.0	-7.1 °C	-7.1	-7.1
38	38.0	-9.1 °C	-9.1	-9.1
39	39.0	-11.1 °C	-11.1	-11.1
40	40.0	-13.1 °C	-13.1	-13.1
41	41.0	-15.1 °C	-15.1	-15.1
42	42.0	-17.1 °C	-17.1	-17.1
43	43.0	-19.1 °C	-19.1	-19.1
44	44.0	-21.1 °C	-21.1	-21.1
45	45.0	-23.1 °C	-23.1	-23.1
46	46.0	-25.1 °C	-25.1	-25.1
47	47.0	-27.1 °C	-27.1	-27.1
48	48.0	-29.1 °C	-29.1	-29.1
49	49.0	-31.1 °C	-31.1	-31.1
50	50.0	-33.1 °C	-33.1	-33.1
51	51.0	-35.1 °C	-35.1	-35.1
52	52.0	-37.1 °C	-37.1	-37.1
53	53.0	-39.1 °C	-39.1	-39.1
54	54.0	-41.1 °C	-41.1	-41.1
55	55.0	-43.1 °C	-43.1	-43.1
56	56.0	-45.1 °C	-45.1	-45.1
57	57.0	-47.1 °C	-47.1	-47.1
58	58.0	-49.1 °C	-49.1	-49.1
59	59.0	-51.1 °C	-51.1	-51.1
60	60.0	-53.1 °C	-53.1	-53.1

An aerial photograph of a winding river flowing through a dense, lush green forest. The river is a deep blue-green color, and the surrounding trees are a vibrant green. The text "IT IS OUR CHOISE" is overlaid in the bottom right corner in a bold, white, sans-serif font. The word "CHOISE" is misspelled.

**IT IS  
OUR  
CHOISE**

**THANKS FOR  
YOUR ATTENTION**



[www.5drecycle.com](http://www.5drecycle.com)



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