

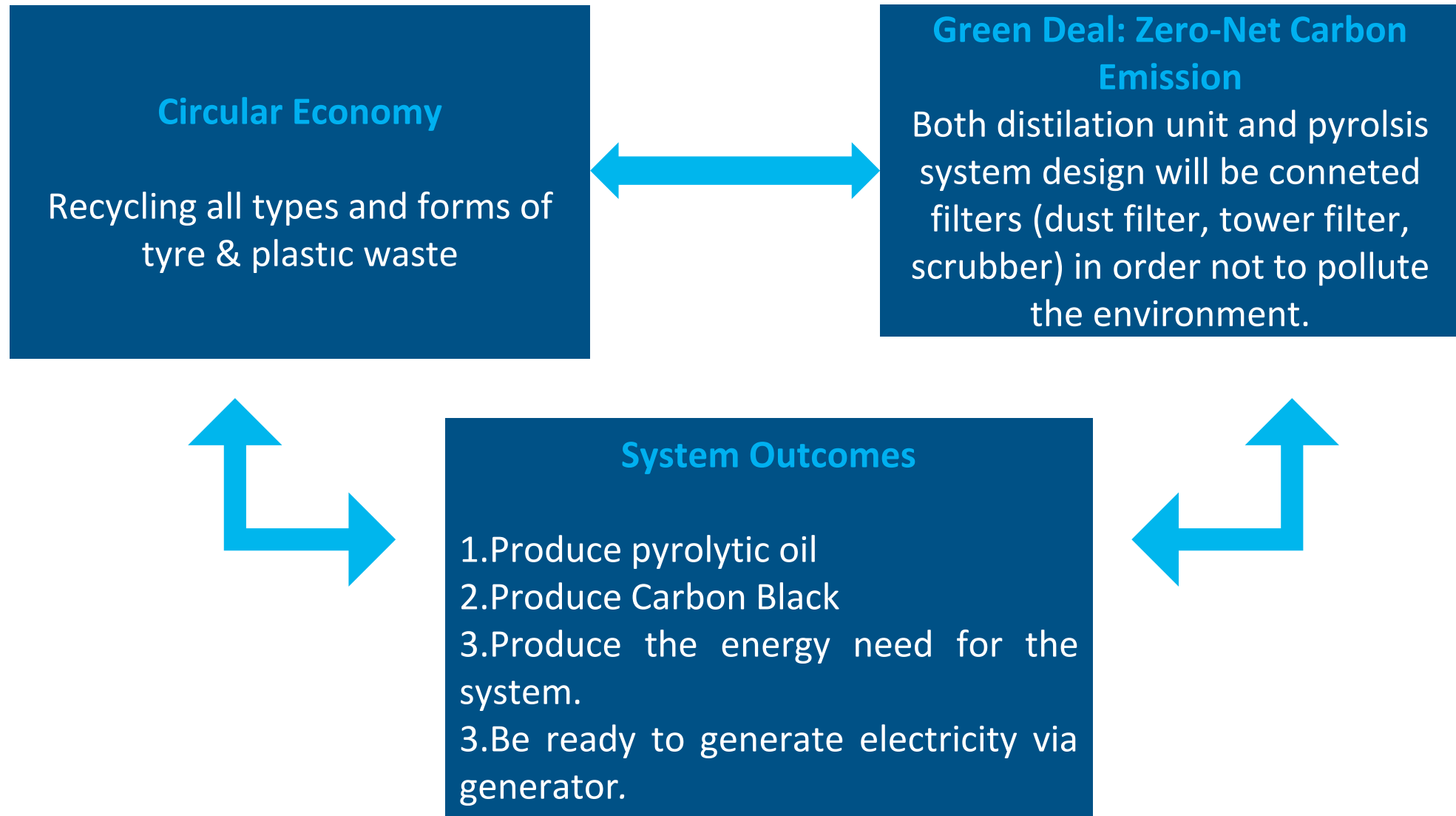


**ITACA**  
PYROLYSIS

**Zero-carbon recycling of all types of Tyre & plastic waste,  
producing pyrolytic oil, carbon black and electricity.**

**ITACA PYROLYSIS**  
**[itacapyrolysis@gmail.com](mailto:itacapyrolysis@gmail.com)**

# Core activities



# Project activities & thematic priorities

## Core areas of activity

- The reactor is heated by a hot air mechanism.
- Filtering and scrubbing systems ensure that no harmful substances are released into the environment (Green Deal).
- The proposed project will generate its own energy (sustainability).
- Pyrolysis fuel has been obtained from plastic waste (petrol, diesel and the substance that settles to the bottom of the reactor (used as burner fuel) (circular economy).
- Carbon black from the pyrolysis reactor was collected in storage tanks and converted into a new product with economic value (circular economy).
- Diesel fuel collected in the storage tank is used to generate electrical energy (Circular Economy).

## Developing trends

- Greening & sustainability
- Circular economy
- Values

## Emergency issues

- The programmable logic controller system eliminates the risk of explosion. There will be no explosion.
- When the temperature of the reactor exceeds 680 degrees, the thermocouple located at the hot air inlet of the reactor sends a signal to the PLC automation system and shuts down the burner.
- The forward and backward movement of the brass plate vanes inside the reactor mixes the liquid plastic homogeneously inside the reactor and draws the carbon black settling at the bottom to the carbon discharge unit.

**Tyre & Plastic waste**



Power



Fuel



Value-added chemicals



**Net-Zero  
C-Emission**

**All Types of the Tyre & Plastic  
Recycling**



## **The Quality of Pyrolytic Outcome**

## **AIMS:**

The aim of this project is to eliminate all types of non-recyclable tyre & plastic waste with zero carbon emission condition and obtain pyrolytic oil, carbon black and electricity.

With this project;

- (1) Obtaining high quality pyrolytic oil, synthetic gas (syn gas) and carbon black from plastics incinerated by the pyrolysis method (in an airless environment),
- (2) Separate the mixed pyrolytic oil into two phases as gasoline and diesel according to their evaporation degrees with the distillation unit, and use the resulting diesel in diesel internal combustion engines and the gasoline solvent in gasoline internal combustion engines,
- (3) to produce carbon black for use in the paint industry (ink, etc.),
- (4) using the synthesis gas released during the pyrolysis process to meet the system's own heat energy needs (providing the system's heat energy by burning the burner),
- (5) using the diesel fuel produced (decomposed) as a result of the distillation process to produce electricity in diesel generators.

## **METHOD:**

The Tyre & plastics recycling project will be carried out using the pyrolysis method. In this context;

- (1) Tyre & Waste plastic is granulated using a crusher and the granulated tyre & waste plastic is transported to the reactor feed unit using a screw conveyor.
- (2) The reactor heats the granulated tyre & waste plastic in an airless environment to 300-350 degrees. The mixture boils with the help of the mechanical scraper and stirrer system inside the reactor. Meanwhile, the mixture separates into hydrocarbon vapour and carbon black at the bottom.
- (3) The hydrocarbon vapour released in the reactor is separated from its dust by passing through the first dedusting filter. At this stage, the hydrocarbon vapour passes to the tower filter while the dust remains in the dust filter.

(4) Clean hydrocarbon vapour is condensed in the exchanger and converted to pyrolytic liquid and collected in pyrolytic oil collection tanks. During this process, the syn gas that does not condense and separates from the fuel is sucked in by the vacuum pump and washed in the syn gas wash tank. This scrubber is also used to prevent gas flashback.

(5) The pyrolytic fuel accumulated in the pyrolytic oil collection tanks (i.e. petrol, diesel, burner fuel and the substance settling at the bottom, etc.) is fed into the distillation unit by means of a hose with the aid of the oil pump.



(6) When the mixed and raw pyrolytic fuel entering the distillation unit is heated to 130 degrees, the gasoline-like products contained therein are collected in the first gasoline tank. Gasoline and diesel are taken for use by means of pumps connected to the gasoline and diesel tanks.

(7) The residual fuel oil at the bottom of the reactor is burned in the burner connected to the reactor to meet the energy needs of the system.

(8) By means of the soot discharge unit connected to the reactor, the soot remaining at the bottom of the reactor is pushed out of the reactor by means of the mechanism inside the reactor.

(9) The carbon black product is used in the production of asphalt roads, parquet flooring, car tyres or as a fuel in thermal power plants in a way that does not harm the environment.

## **Assessment in terms of carbon emissions:**

- The system proposed with this project does not emit any gas, solid or liquid waste harmful to the environment.
- The method used is pyrolysis. Pyrolysis takes place in a closed cycle.
- After entering the scrubber system and being purified, the exhaust gases are released into the atmosphere as a harmless gas to the environment. The only outlet from the system to the atmosphere is controlled by a scrubber.

## **Original aspects of the project:**

- (1) The reactor is heated by a hot air mechanism.
- (2) With the help of filter and scrubber systems, no harmful substances are released from the system into the environment; the scrubber filter system for gas washing has made the harmful gases from the pyrolysis and distillation unit harmless to nature (Green Deal).
- (3) The PLC controls the burner, pump, internal mechanism of the reactor, fans, pressure and temperature according to pre-set values. For example, the thermocouple on the tower filter is set at 220 degrees. It automatically shuts down the burner in the combustion chamber when the steam temperature in the filter reaches 220 degrees.
- (4) Pyrolytic fuel was obtained from tyre & plastic waste. With the distillation unit, the economic value was again converted by separating it into three phases: petrol, diesel and the substance that settled at the bottom of the reactor (used as burner fuel). The bottom product from the distillation outputs was used as the heat energy required by the system. The system is 100% Green Deal compliant.

(5) Carbon black from the pyrolysis reactor was collected in storage tanks and converted into a new product with economic value (circular economy).

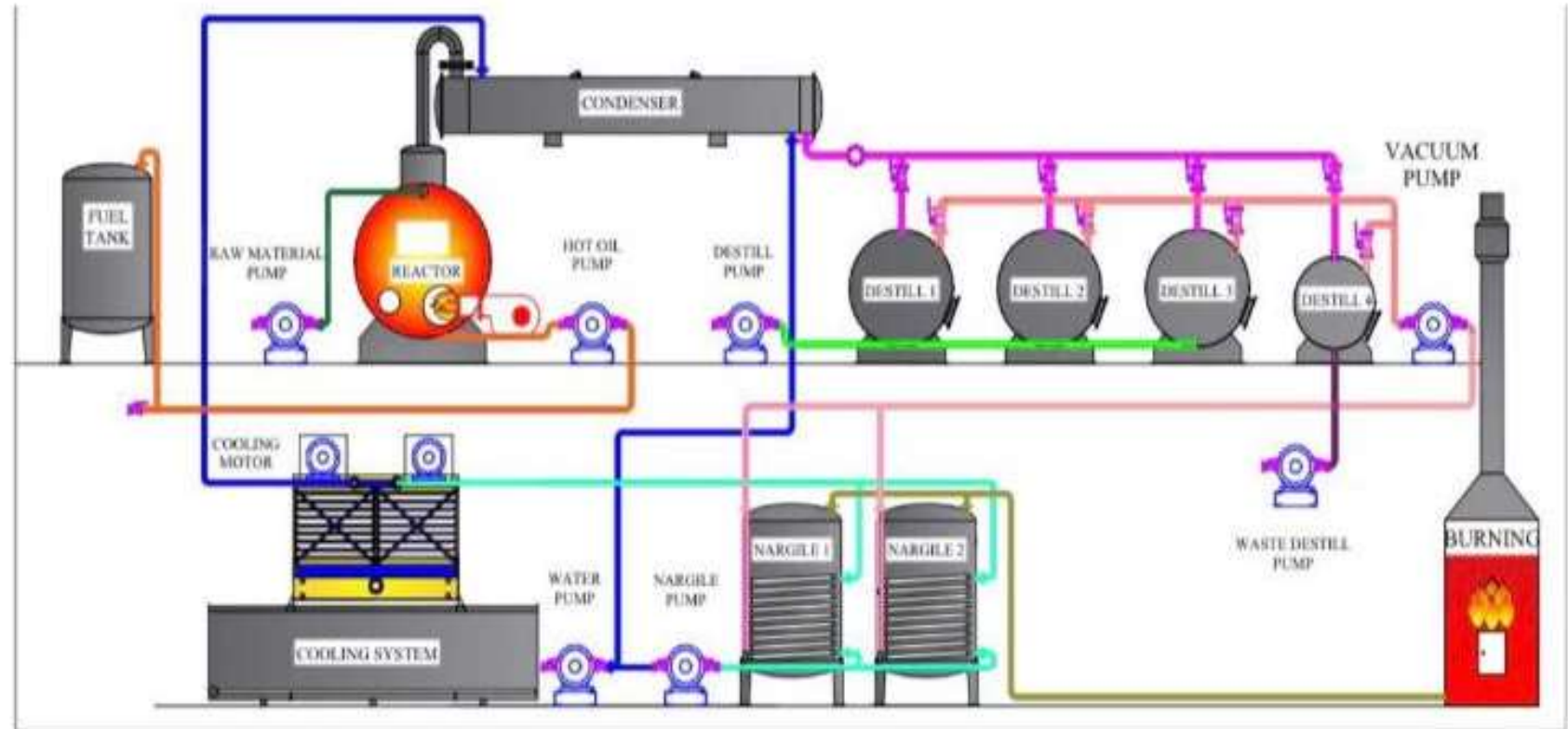
(6) Diesel fuel collected in the storage tank is used to produce electrical energy (e.g. 1 megawatt/hour of electrical energy from 256 litres of diesel fuel) with the help of a generator (circular economy).

(7) In the event of an undesirable event inside the reactor, the pressure in the reactor, filter and heat exchanger will be constantly controlled by a pressure transmitter to eliminate the risk of explosion. In the event of an unwanted increase in pressure, the pressure transmitter will immediately send a signal to the PLC automation system, opening the pneumatic valve and securing the system. No explosion will occur.

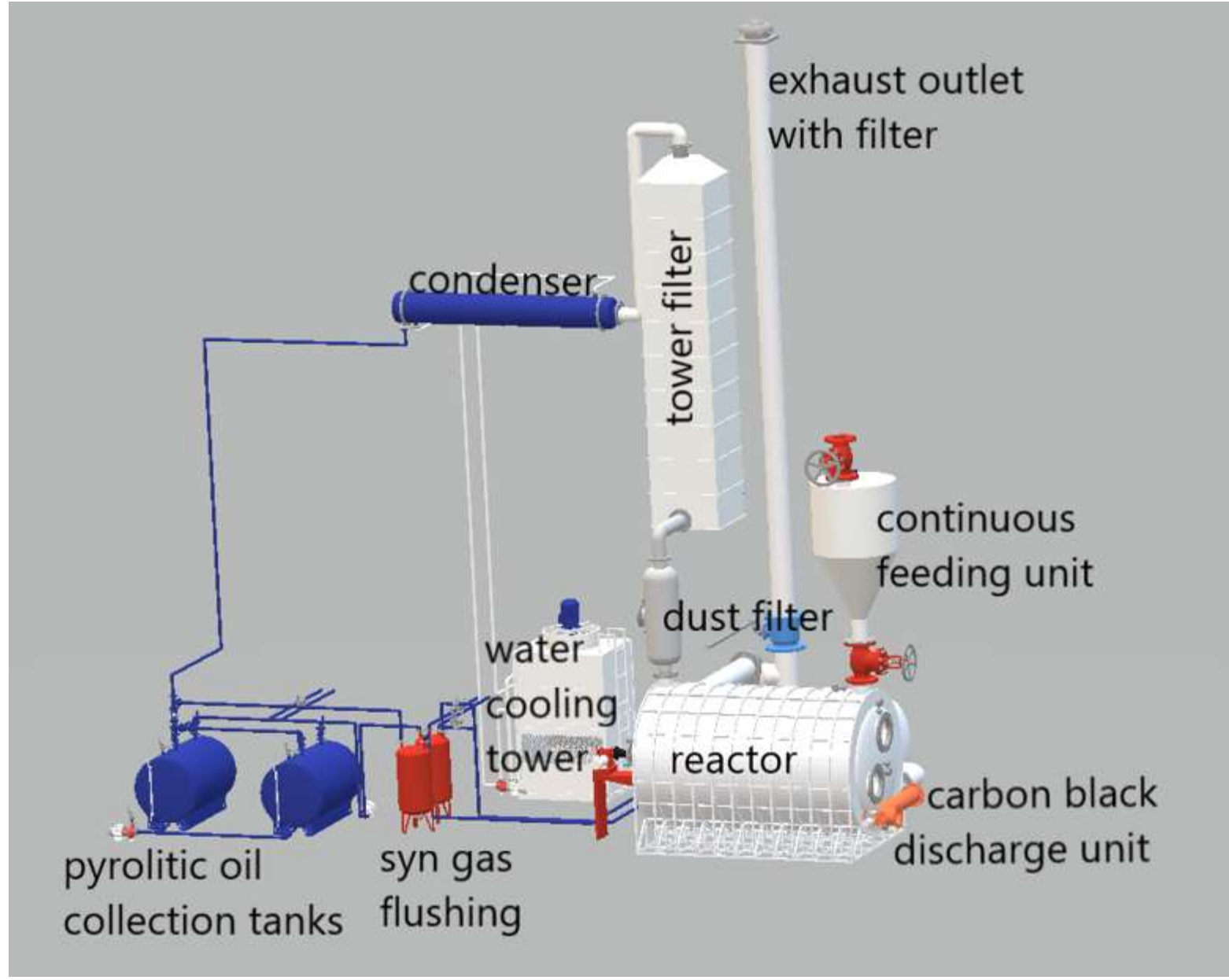
(8) The target temperature of the hot air circulating in the space between the inner and outer walls of the reactor is approximately 680 degrees. The hot air heated in the combustion chamber is continuously circulated around the reactor wall by the circulation fan. When the temperature exceeds 680 degrees, the thermocouple located at the hot air inlet of the reactor sends a signal to the PLC automation system and shuts down the burner.

(9) The reactor of the pyrolysis machine is specially designed. Brass plates are placed at the ends of the mixing and entrainer blades inside the reactor. With the help of this mechanism, the deposits formed on the inner wall of the reactor are scraped off. Thanks to the forward and backward movement of the wings with brass plates at the tip, the liquid plastic is homogeneously mixed inside the reactor and the carbon black that settles to the bottom is drawn to the carbon discharge unit by these mixing and entraining wings and the carbon black is removed from the reactor.

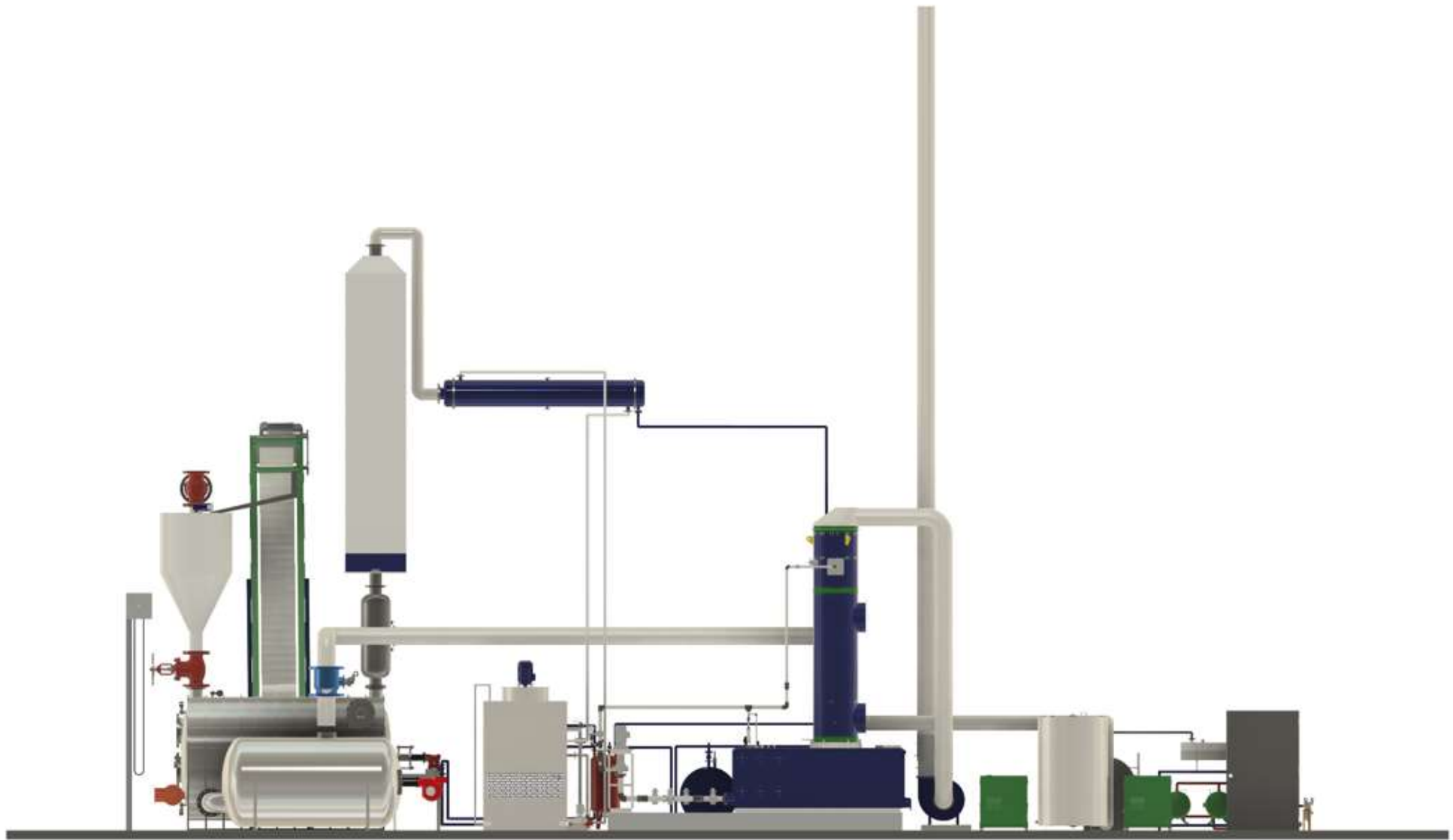
# Pyrolytic Oil Distillation Unit



The pyrolytic oil from the pyrolysis unit is fed into the reactor of the distillation unit via a hose. The pyrolytic oil in the reactor is heated by the oil burner. As the temperature rises, the pyrolytic oil evaporates. The solvent type fuel, which evaporates at temperatures between 60-140 degrees, is distilled from the heat exchanger and collected in the first collection tank. The diesel type product, which evaporates between 140-250 degrees, is distilled from the heat exchanger and collected in the diesel tank, which is the second collection tank. At 250 degrees the distillation burner is manually switched off. The bottom product (fuel oil mazut) that settles at the bottom of the reactor is manually lifted into the fuel tank of the burner to be used as burner fuel. During the distillation process, the SYN gas, which comes out of the reactor with hydrocarbon gas but does not condense, and the exhaust gas, which is formed for the purpose of heating the reactor, are collected with a single pipe, sent to the scrubber unit connected to the pyrolysis unit, washed, cleaned and returned to nature clean.

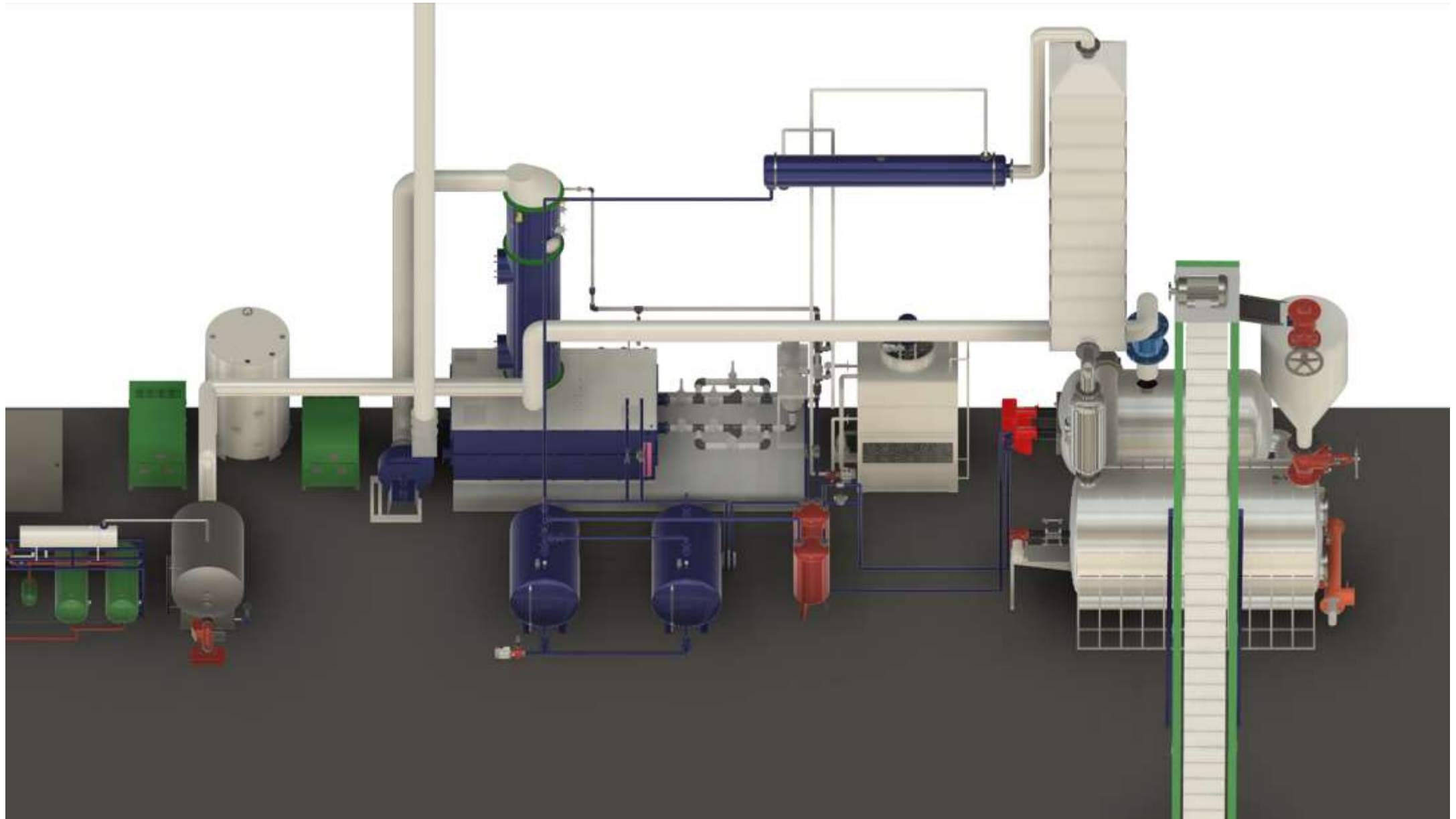


**Pyrolysis Machine General View**



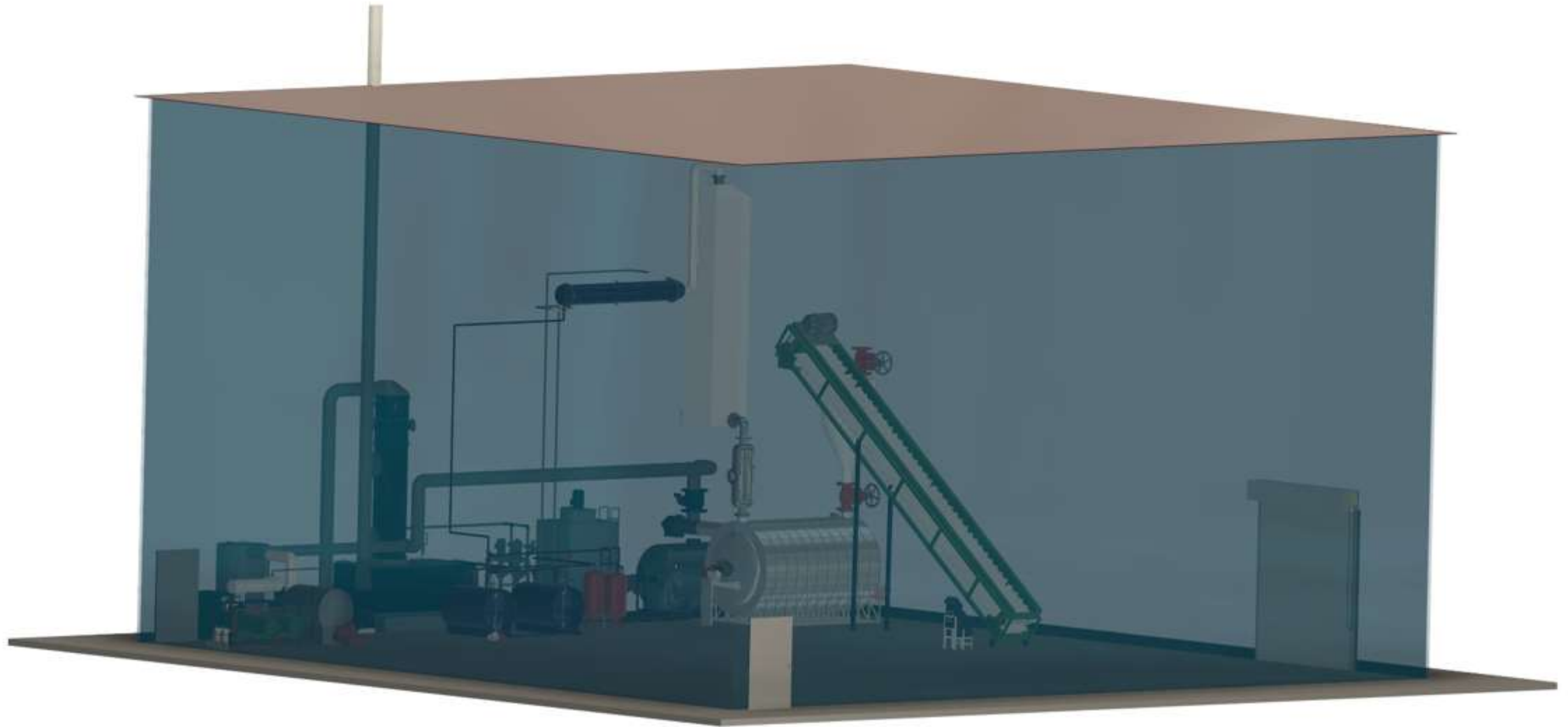
**General View of the Pyrolysis Machine&Distillation Unit**





**General View of the Pyrolysis Machine&Distillation Unit**

# Plastic Recycling System Building View



**General View of the Pyrolysis Machine&Distillation Unit**

**Thank you for your attention.**