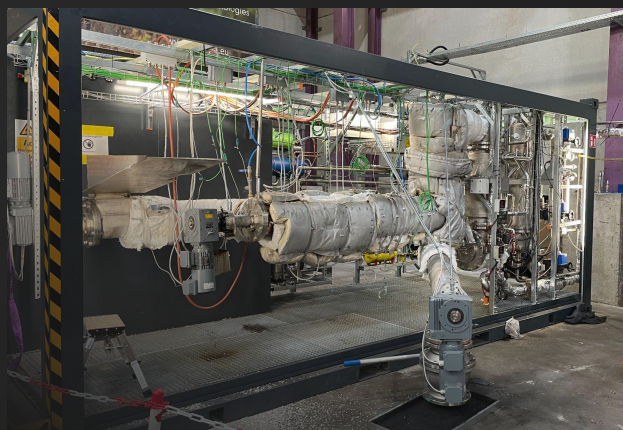


WASTX PLASTIC P2.5 Chemical recycling plant

The high-tech pyrolysis plant 'Winny' includes a reactor that precisely adjusts the residence time and temperature to the feedstock. With the Bi-Fuel pyrolysis gas generator, it uses resulting process gas for almost self-sufficient operation. The integrated BIOS operating system optimizes the uptime of the plant based on machine learning using globally analyzed plant data.



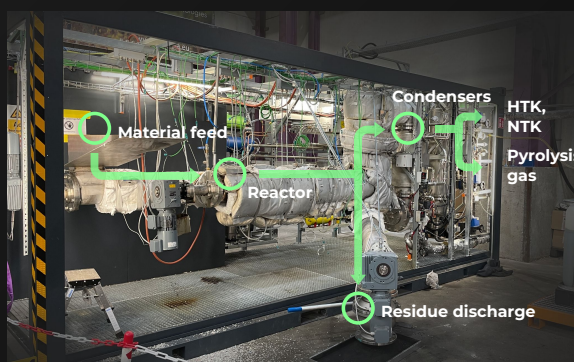
Technical details

Throughput	≈ 2.5 t/d
Dimensions	2435 x 2850 x 6055 mm
Energy consumption	60 kWh
Connection load	100 kVA
Output	≈ 85% Oil, ≈ 12% Gas, ≈ 3% Carbon black
Feedstock requirements	Polyolefins (PP, PE, HDPE, LDPE)
Weight	≈ 5 t
Operation mode	Fully automatic process operation

Components

1 Material feed	Feeding of the pre treated material under pressure via stuffing screw
2 Reactor module	Closed system for controlled continuous heating and cracking of the polyolefins
3 Residue discharge	Continuous system for the automatic discharge of the residual materials
4 Condensers	Condensation of two different oil fractions: HTK and NTK
5 Switch & control cabinet	Digital monitoring and control of the entire system + data-driven optimization
6 Gas generator	Generator running on Pyrolysis Gas and Diesel to power the plant
7 Gas Filtration	Gas filtration system
8 Exhaust gas purification	Exhausted gas purification system
9 Fire protection	Fire protection for the whole plant

Process



Integrated drip pan with tap allows mobile installation and environmental safety.



Exemplary plastic waste and the two product oil fractions

Disclaimer: The plant is in the final stages of its development and is subject to further improvements, therefore the values and information given in this handout should not yet be considered as binding and need to be confirmed.

1 Material feed

The shredded and dried material is fed from the buffer silo to the respective P2.5 plant. The compression of the plastic waste takes place in the stuffing tube of the plant, which is achieved by the plug screw. Electrically operated heating sleeves are installed on the outside of the stuffing tube. Within this area, the thermochemical conversion of the input materials takes place due to the heat input. During this early heating stages, the plastic liquifies, allowing the plug screw to airtight seal the rest of the unit. There are three heating zones in the stuffing tube, divided into the following temperature ranges:

Zone I (pipe inlet): approx. 130-150 °C

Zone II (center of tube): approx. 200 °C

Zone III (end of tube): approx. 320 °C

2 Residue discharge

The residue is discharged into a collection container (1 m³) via an automatic discharge system using a discharge screw. The discharge system is completely closed and rendered inert with nitrogen. The filling level of the collection container is monitored. If the maximum filling level is reached, the supply to the filled collection container is closed and the opening to a second collection container is opened.

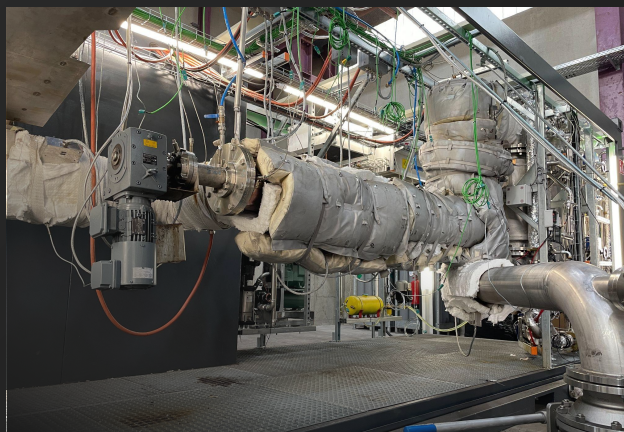
Technical details

Gas separator	Hot gas rise, solid residue falls into the discharge
Heating elements	Actively heats the residue at the beginning of the discharge to make sure there is no condensation, dries the residues
Inert system	Completely closed and rendered inert with nitrogen
Rotary valve	Ensures airtight closure, opens only when necessary



3 Reactor module

Inside the reactor, the P2.5 process takes place in a closed system, whereby the PE and PP materials are converted into gaseous short-chain hydrocarbons. The heat input required for the process is realized via electrically operated heating jackets located on the outside. The temperature is around 420 °C, max. 620 °C.



Technical information

Closed System	Airtight, ensures optimal process
Temperature level	420°C - 620°C
Heating method	electrical, heating jackets
Insulation material	Ceramic and stone wool

4 Switch and control cabinet

The high-tech pyrolysis plant 'Winny' includes a reactor that precisely adjusts the residence time and temperature to the feedstock. With the Bi-Fuel pyrolysis gas generator, it uses resulting process gas for almost self-sufficient operation. The integrated BIOS operating system optimizes the uptime of the plant based on machine learning using globally analyzed plant data.



Technical information

Touchscreen control	Allows you to choose whether to run the system in automatic mode or in manual mode
Operating system	Siemens S7 for best possible automation and compatibility
Separate compartment	Ventilated, protects the control cabinet from heat and possible emissions from the system, allows access from the outside during operation
IoT device	Internet connection required, allows analysis of data, i.e. to do predictive maintenance. Remote software updates

5 Condensers set

The gas, previously separated from the solids in the separator, is filtered and then passes into two subsequent condensation columns, one for High temperature condensates (HTK), one for low temperature condensates (NTK). This condenses the sublimated gas back and separates it into two fractions.

HTK

Comparable to gas-oil
Double-walled cooling circuit
Cooling medium: ethylene glycol
Quench process with condensate (direct flow principle)
Fed at around 500 °C
Cools down to approximately 80 °C
Heat released through an air cooler

NTK

Comparable to Naphtha
Tube bundle cooling
Cooling medium: ethylene glycol
Cools down to approximately 20 °C
Heat released through a cold water system



Uninsulated condensers photographed from inside the plant when not in operation.



Demonstrative filling of the product oil

6 Onboard generator PTH-85 T5

The PTH-85 T5 Onboard Generator is designed to use the pyrolysis gas generated in the process to power the plant during operation. Thus, a large part of the required process energy can be covered and a partial self-sufficiency is generated.



Components

1 Motor & Generator	Four stroke engine, Stage 3A ,water cooled
2 Exhaust gas filtration	Dry air filter + filter ash separator
3 Sound insulation	Sound level 69 +/- 2.4 dB (at 7m distance)
4 Control cabinet & panel	Electrical control and monitoring

Technical details

Power	91 kVA
Dimensions	max. 2888 x 1132 x 1680 mm
Weight	max. 1908 kg
Operation	Bifuel: Diesel and Syngas
Voltage	Battery Charging Alternator
Certification	CE mark, compliant EU regulations (e.g. 2006/42/CE, 2014/30/UC)
Tank	Integrated 870 l steel tank with drip pan
Compatibility	Compatible with a Winny (2.5 t per day plant)

The illustration may differ from the delivered product.