

**Courage
to
innovate.**

eurex
energy

Plastic waste is one of our planet's most widespread environmental problems. Millions of tons of usable material are not being recycled and are contributing to daily global pollution. The need to find solutions that support alternative ways of using and disposing of plastic materials is becoming increasingly apparent since the depletion of natural resources is accelerating. Plastic recycling has proven to be an effective way to combat this problem as it allows us to use already existing plastics instead of additional production. Recycling plastics means less waste in landfills and oceans, leading to a healthier environment and reduced carbon emissions. Recycling will not only help reduce pollution but can also lead to economic empowerment and new job opportunities in many countries around the world.

EUREX ECO 1 unit

The EUREX ECO 1 unit and the technology of processing mixed plastic materials from municipal and industrial waste represent the **thermal processing** of polymer waste without air access, which takes place continuously, while the main product is a continuously collected mixture of fission products in a gaseous state. These are subsequently condensed and obtained from them in distillation equipment liquid hydrocarbons that can be used as diesel and gasoline fractions.

It is therefore a chemical recycling of plastic waste, the output of which is obtaining a liquid mixture of hydrocarbons, which can be used as a raw material for the petrochemical industry or as a substitute for liquid fuels obtained by oil processing. It is not a process of incinerating plastic waste as a means to obtain energy.

The process of thermal treatment of plastic waste is a continuous process that requires regular addition of plastic material and removal of decomposition products (heavy fraction) without shutdown and cooling of the reactor.

The EUREX ECO 1 unit is designed to ensure the stability of the temperature and homogeneity of the overheating of the processed plastic waste in the entire volume of the reactor and thus the homogeneity of the output products, which can be used in the petrochemical industry as chemical substances or can be used as secondary fuels.

TECHNOLOGICAL PROCESS

The EUREX ECO 1 unit represents an innovative technological solution for processing hard-to-recycle waste plastics.

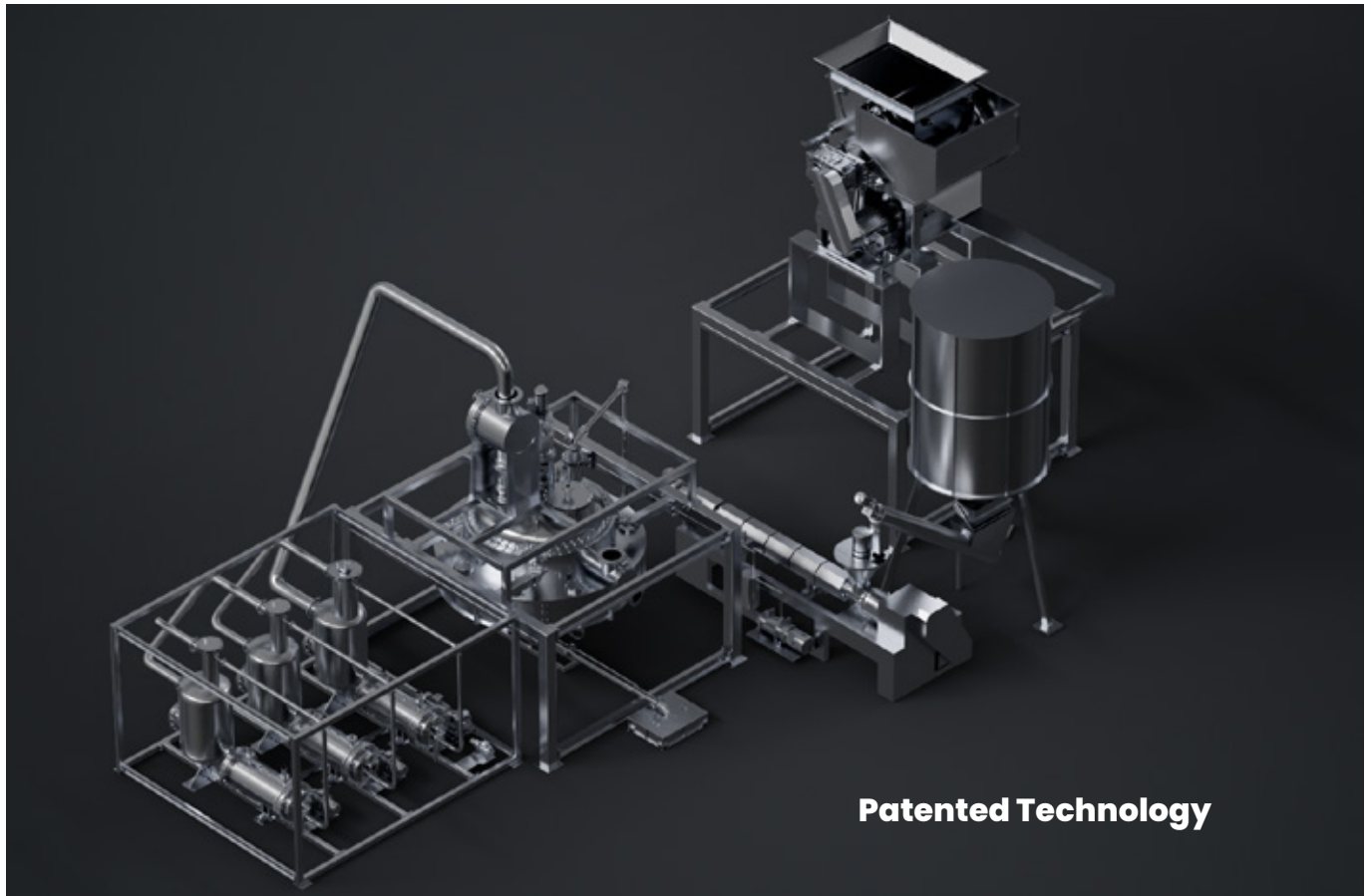
The line is built on a unique three-phase process.

In the first, **mechanical-thermal phase**, the incoming waste is suitably treated and freed from most of the water and other pollutants.

The input can be all plastic waste based on PE and PP in any proportion, even with slight pollution up to 15% of the

total weight. Plastics can come from both municipal and industrial waste, but also from landfills or other sources. A melt is created from the input plastics, which in the second phase is decomposed in the **reactor** into process gas at a temperature of up to 430° C. This proceeds to the **condensation system**, where two liquid and one gas fractions are separated.

The resulting product can be certified secondary fuels suitable as a substitute for fuels from fossil sources, for example in electricity generators. After supplementing with absorbents, additional purification, and filtration, the output products can be used repeatedly for the production of plastics. And part of the non-condensable gases will be used as gaseous secondary fuel for the own process heating of the reactor of the recycling line.



INPUTS

Origin of input raw materials:

- Mixed municipal waste (black containers)
- Mixed plastic waste (yellow containers)
- Waste packaging material from industry and commerce (PE, PP, PS)
- Sorted plastic waste
- Plastic waste
- Plastics after the technical and qualitative limits of repetition of mechanical recycling processes have been exhausted

Basic maximum limits of pollutants /PVC, PET, PS, PA, PMMA/:

- Total moisture content of incoming plastic waste - up to 10% by weight
- Content of pollutants in total - up to 10% by weight
- Maximum oxygen content of 5% in its molecule

OUTPUT PRODUCTS

- Liquid: medium fraction (diesel), light fraction (gasoline)
- Gaseous: technological gas
- Solid residue

The output products are mainly liquid substances usable in the petrochemical industry, which fulfills the European strategy for plastics in the circular economy, which was adopted on January 16, 2018.

From a chemical point of view, mixed waste plastics, mechanically difficult to recycle, will be used as a secondary raw material for the recovery of chemical liquid and gaseous substances in an environmentally friendly method. This will not only achieve a favorable environmental impact - reducing the storage of hard-to-decompose and problematically recyclable plastic waste in landfills with the uncontrolled release of harmful substances into the air and groundwater, but also obtain very valuable raw material resources normally obtained from fossil sources according to the principles and goals of the circular economy.

The output products from the recovery of waste plastics can be used in the petrochemical industry as chemicals, or they can be used as secondary fuels if they meet the fuel quality requirements.



TECHNICAL PARAMETERS

Operation				
Number of operation hours	7 200	year	7 200	year
Input				
Amount of mixed plastic waste	400	kg/hr	880	pound/hr
	2 880 000	kg/year	6 350 000	pound/hr
Outputs				
Middle fraction	250	l/hr	66	gallon/hr
	1 800 000	l/year	475 510	gallon/year
Light fraction	50	l/hr	15	gallon/hr
	360 000	l/year	95 100	gallon/year
Recyclable (middle + light fraction)	300	l/hr	81	gallon/hr
	2 160 000	l/year	571 000	gallon/year
Technological gas	28	m ³ /hr	28 000	liter/hr
	201 600	m ³ /year	201 600 000	liter/year
Solid residues (approx. 5 % from input volume)	20	kg/hr	44	pound/hr
	144 000	kg/year	317 470	pound/year

MAIN ADVANTAGES OF EUREX ECO 1 UNIT:

- Use of the process of thermal degradation of polymers, during which decomposition occurs without access to oxygen which means that it is not a combustion technology
- Very low consumption of external energy - the produced technological gas is also used to heat the main reactor itself
- Compactness – the unit can be installed in a small space and at the same time it can be dismantled and moved to any place
- Continuous production process – high capacity and energy output, high efficiency of the equipment
- Quality output product – easy placement on the market
- High level of automation – low requirements for manual operation

ENERGY CONSUMPTION

The technological equipment is low in energy consumption.

It also uses its own gaseous product for the waste processing process itself (part of the gaseous components that cannot be liquefied under normal conditions) and needs additional external energy only to drive electric motors and to cool the components of the final product.

In terms of energy consumption, the EUREX ECO 1 unit has a projected maximum energy consumption of 150 kW/h from all processes.

IMPACT ON THE ENVIRONMENT

The technological equipment does not have a significant impact on the environment from the point of view of emissions.

The EUREX ECO 1 unit within all combustion processes in 1 hour of operation at maximum energy consumption produces fewer pollutants than a family house at maximum energy consumption per hour when heated with wood, 6 times fewer pollutants compared to a family house heated with black coal, or almost 10 times fewer pollutants than a family house heated with brown coal. Compared to a single-family house heated by ground gas, the EUREX ECO 1 unit produces less than 5 times the pollutants of a family house. However, it is necessary to take into account that apart from heating, family houses also produce emissions from other activities.

In terms of CO₂ greenhouse gas production comparison, the EUREX ECO 1 unit produces approximately as many emissions per hour of maximum operation as 2.5 solid fuel-burning family homes and 5 natural gas-burning family homes.

The EUREX ECO 1 unit does not burden the environment with a large amount of exhalates and greenhouse gases and can significantly contribute to the processing of hard-to-recycle plastic waste.



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