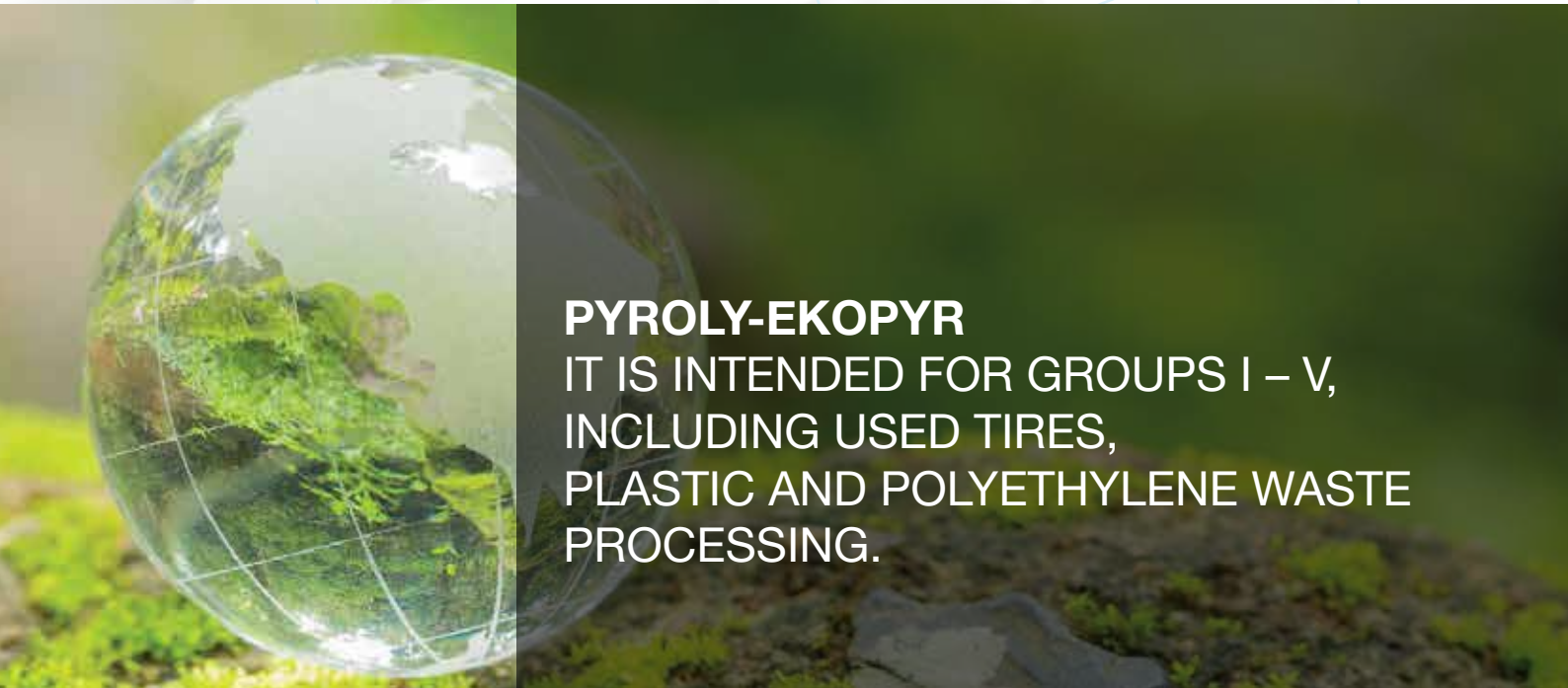


A COMPLEX SOLUTION TO SUPPLY
THE REGIONS WITH ELECTRICITY,
HEATING AND FUEL OBTAINED BY
RECYCLING VARIOUS HOUSEHOLD
AND INDUSTRIAL WASTE.



PYROLY-EKOPYR

IT IS INTENDED FOR GROUPS I – V,
INCLUDING USED TIRES,
PLASTIC AND POLYETHYLENE WASTE
PROCESSING.

BRIEF DESCRIPTION AND MAIN FEATURES

CATALANA OÜ Reg. No. 10651017 (Environmental Permit Registration Number KL-509045), is a co-founder of the international consortium group of companies "PYROLY". The international consortium "PYROLY" was created by a group of companies in 2018 to carry out projects for the construction of complexes, including the production of industrial plants for further use, equipped with "PYROLY-EKOPYR", which radically changes the principle of waste reception and treatment without creating competition with existing waste management companies.

Specialists from the companies in The PYROLY Consortium have created more than 10 prototypes for the treatment of different types of waste at various stages of cooperation, which have been successfully tested and later become prototypes for the following products that can treat different types of waste from 50 to 10,000 m³ per day:

1. Treatment of waste oils and acidic bitumens "PYROLY-EKOPYR" **OS** "
2. Processing of rubber, plastics and polyethylene "PYROLY-EKOPYR" **RP** "
3. Treatment of all types of waste mixtures "PYROLY-EKOPYR" **EG** "

The "PYROLY-EKOPYR" complexes, which we have manufactured in our production base using the latest technology, are unique and dominate in terms of productivity, production and price elsewhere in the world as a waste recycling plant.

In the first stage, the gasification of solid or liquid waste takes place in a turbulent mode in the plant's pyrolytic reactor. It produces a gas that contains carbon monoxide, hydrogen and hydrocarbons. Typically, the gas from the treatment of waste containing organic compounds contains, in addition to hydrogen, carbon monoxide and dioxide, etc., an aerosol consisting of very small droplets of hydrocarbons or resins with a chemical temperature of 450-500 ° C, then passes through a zone with a temperature of is 850 ° C, after which it no longer contains unburned carbon, organic residues and dust.

High gas flow rate in the gasifier due to the supply of inert gas heated to extremely high temperatures by turbulent blowers, resulting in no particulate matter in the produced gas. Gasification takes place at atmospheric pressure.

The gas resulting from the treatment is partially condensed in special vessels aimed at cooling the gas-liquid, the non-condensable gas fraction is burned in a honeycomb heat generator, allowing the inert gas to be heated to extremely high temperatures and increasing its entry into the PYROLY-EKOPYR reactor due to accelerated gas expansion.

- The advantage of the proposed technology is its high energy efficiency.
- At the gasification stage, the efficiency of external energy sources reaches 97%.
- Possibility to treat solid and liquid waste with high ash content and very moist waste, which is poorly treated in other equipment, producing soot and other products of incomplete combustion.
- Relative simplicity and low cost.
- High environmental friendliness of the process: complete combustion, absence of soot, carcinogens and other toxic substances, absence of dust in flue gases.
- Easy preparation of raw materials.
- No fine crushing and grinding steps.
- Technological options are possible due to the production of a high-purity, completely sulphur-free liquid (synthetic oil).

FEATURES:

1. Our complexes enable processing of all kinds of municipal solid waste (MSW), oil waste, rubber products, plastics, organics, medical waste, agricultural waste and others, both separate and unsorted, except glass and metal.
2. The temperature range of the reactor is adjustable from 350° to 1150°, which makes it possible to obtain low temperatures from 350° to 850° (furnace oil) and high temperatures from 850° to 1150° (heat and electricity).
3. Possibility of changing temperature regimes makes it possible to switch reactor operation to heat and electric power production in a short period of time (at the same time it is necessary to add GTU (gas turbine power plants) or GPU (gas piston power plants) in reverse order to produce pyrolysis oil).
4. The unit has a unique environmentally friendly process - complete combustion, absence of soot, carcinogens and other toxic substances, absence of dust in the flue gases (exhaust gases are not emitted into the atmosphere) and the versatility of the input raw materials, as well as the unique
5. Easy preparation of raw materials. No fine crushing and grinding stages. Technological options to obtain high-purity, completely sulphur-free pyrolysis liquid (synthetic oil) are possible.
6. The process of reception and recycling allows not to create new landfills after waste sorting, as the waste is a basic raw material. After separating metal, glass, concrete blocks and other secondary waste. The waste is taken directly to the production site where it is 100% recycled.
7. The equipment is also designed to recycle existing landfill sites, with the possibility of using waste-free, uncontaminated areas for any future purpose.

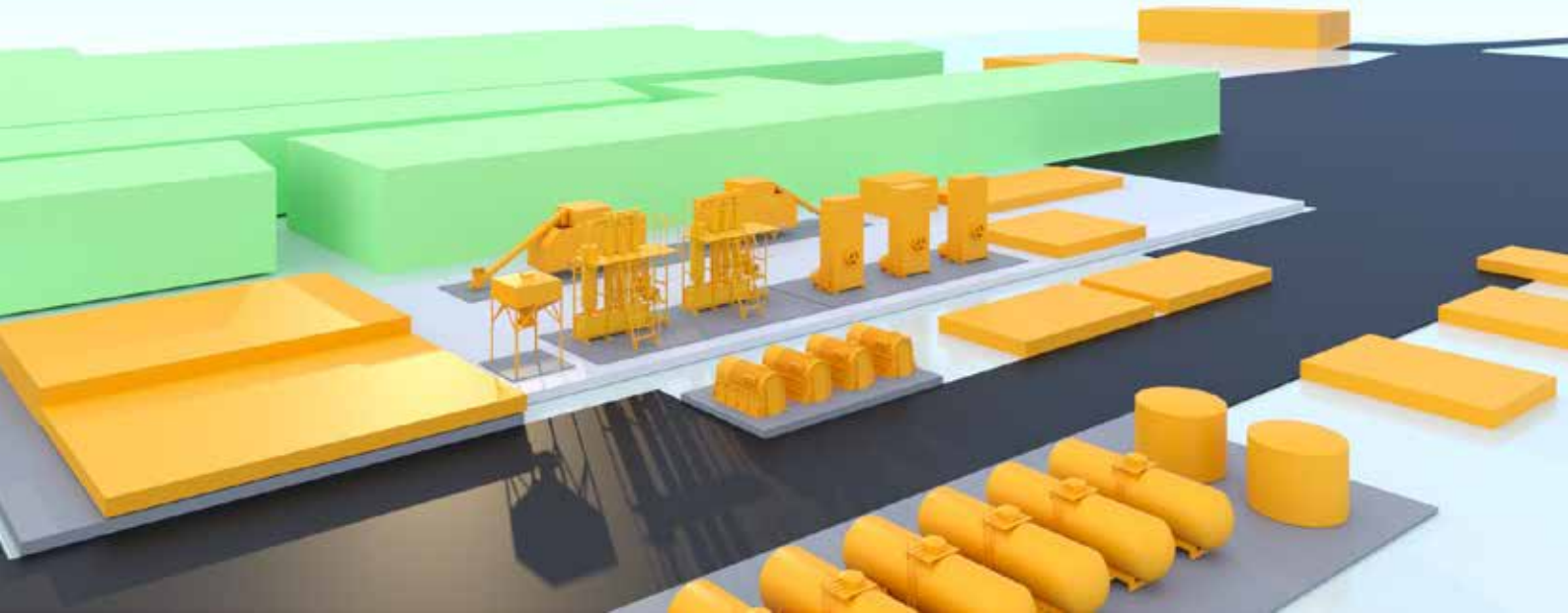
Garbage and Waste are raw materials for the production of heat, electricity and fuel at an affordable price, without harming the environment.

Garbage and Waste are raw materials that can significantly reduce labour costs in agriculture and accordingly, significantly reduce the prices of products and goods produced (heat, electricity and petroleum products).

Garbage and Waste and their proper management - reducing dependence on traditional energy sources (gas, oil), a green planet today and in the future.

Garbage and Waste - products for life made of environmentally friendly materials at an affordable price.





Block 1 - Absorption station.

The station operates in semi-automatic mode.

Work process:

1. coarse filtration of fuel from storage,
2. pumping fuel through absorbers,
3. Fuel Supply Unit No. 2 through medium thickness filters.

Block 2 - Final cleaning of fuels and lubricants.

Work process:

1. ultraviolet fuel cleaning.
2. Pumping fuel to Unit No. 3 through fine filters.

Block 3 - Delivery of fuels and lubricants to tanks.

The dosing unit regulates the amount and speed of fuel from the pump.

Block 4 - Pyrolysis liquid fractionation plant.

The pyrolysis liquid is separated into light (petrol / diesel) and dark (heavy fuel / bitumen) fractions by heating to a certain temperature.

Selected fuel fractions are pumped from the fuel depot to the storage facility.

Block 5 - Propane / Butane Liquefaction Plant.

The gas mixture is a by-product of the pyrolysis liquid fractionation. The gas mixture is liquefied, where one part of the liquefied gas enters the emergency tanks, the other part of the gas is led to the burners of the No. 4 device. The combustion products of the fuel gas are removed to the unit for cleaning and further liquefaction. No. 11.

Block 6 - Fuel depot.

Block 7 - crushing of raw materials.

The raw materials delivered for crushing are loaded into a receiving hopper, where the 1st conveyor takes them and directs them to the crusher. The 2nd conveyor under the crusher transports the crushed raw material to the intermediate hopper, from where the 3rd conveyor delivers the raw material to the receiving hopper of the pyrolysis reactor.

Block 8 - Technical Hydrogen Recycling.

Technical hydrogen is the dry residue from the processing of raw materials in a pyrolysis reactor. The carbon is fed by a screw conveyor from the hopper No. 14 to a vibrating screen to separate the ash, after which it is crushed to the required fraction. The crushed carbon passes through a magnetic separator and is packaged.

Block 9 - Pyrolysis Reactor.

It processes raw materials to obtain useful products: technical hydrogen, pyrolysis liquid, synthesis / gas.

Block 10 - gas cleaning station.

Cleans gases from blocks 9, 4 to CO₂.

The gases go to gas-liquid purification plants, which pass through carbon dioxide, which is dried and sent to block 11.

Block 11 - CO₂ liquefaction plant.

Liquefies carbon dioxide, produces dry ice (optional), distributes liquid carbon dioxide in cylinders or containers.

Block 12 - Synthesis / Gas Cooling Unit and Condensate Removal.

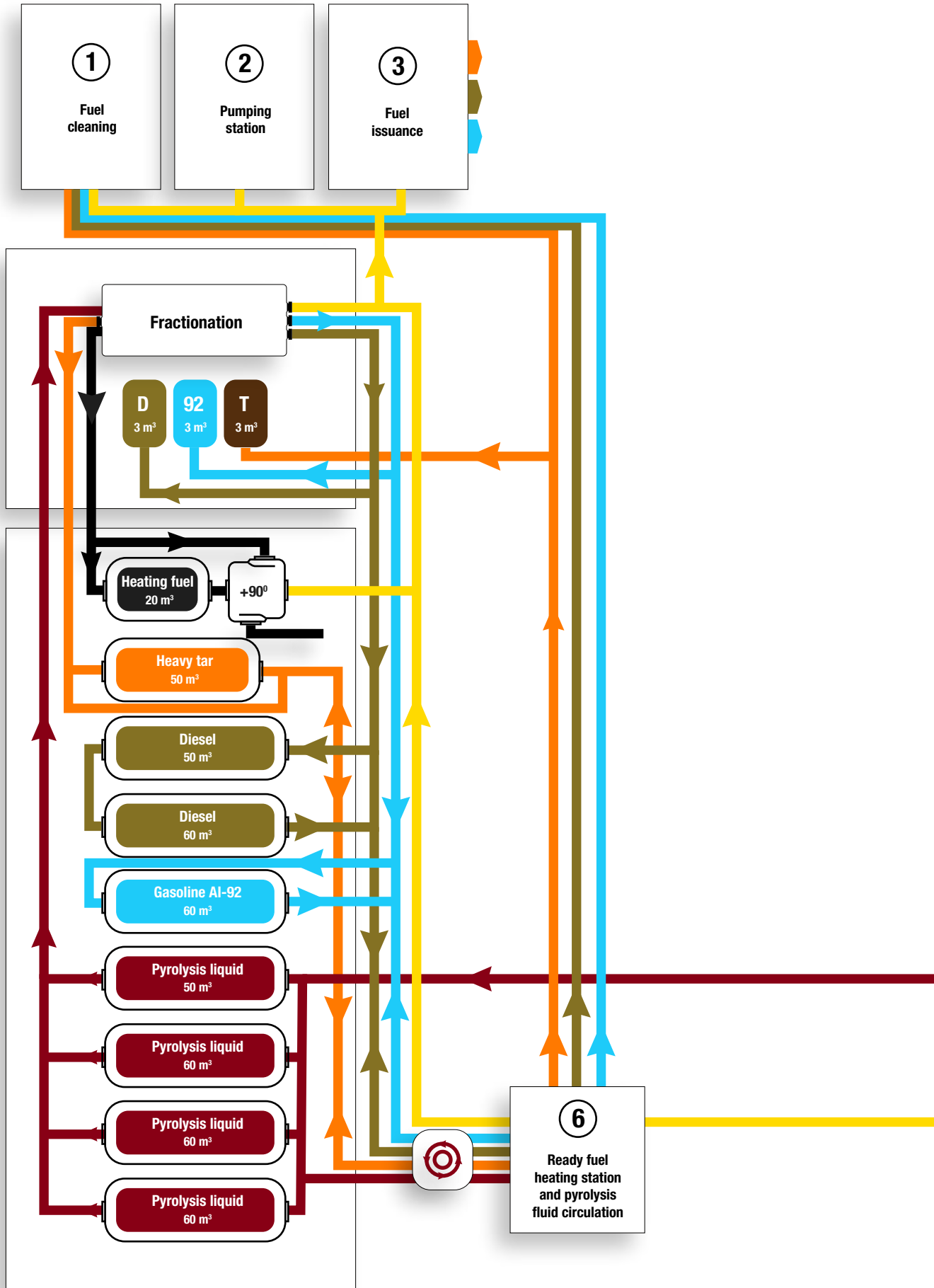
It cools the wet synthesis / gas condensate from the pyrolysis reactor to precipitate, collects the condensate (pyrolysis liquid), pumps the condensate to plant No. 13 for degassing. Delivers the dried synthesis gas to plant No. 20 for purification.

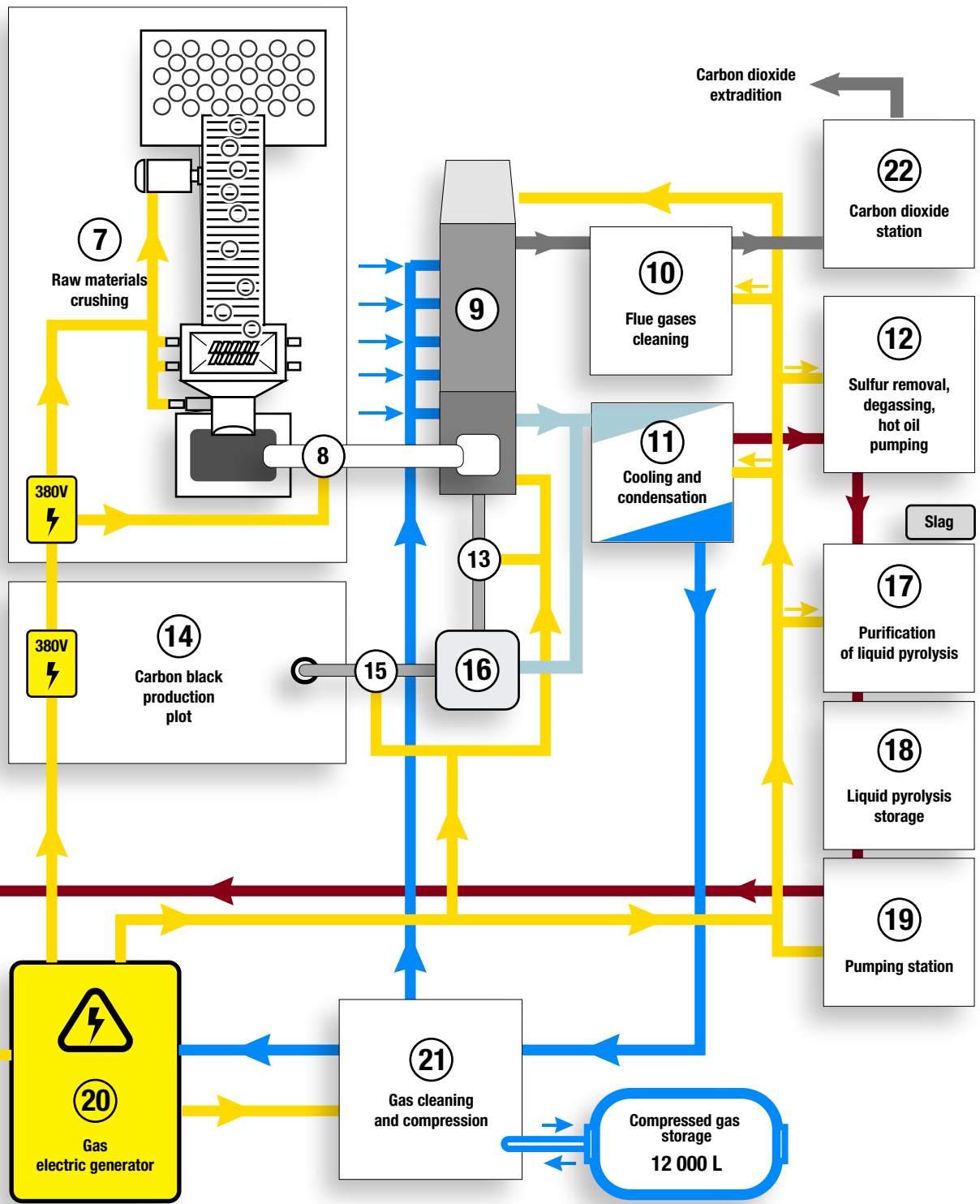
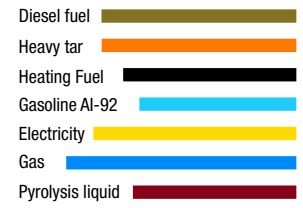
Block 13 - Distribution Station.

The plant removes synthesis / gas residues from the pyrolysis liquid, heats the pyrolysis liquid, pumps hot pyrolysis liquid to the device 19 for purification.

Block 14 - technical / carbon hopper coming from the reactor.

The hopper supplies technical / carbon from the pyrolysis reactor. Teh / carbon is a recycling product.





Block 15 - fuel storage pumping station, fuel processing facilities.

The plant supplies pyrolysis liquid unit No. 4 for fractionation, circulates and filters the fuel with a coarse filter, heats the fuel in the cold season, sends the fuel to the fuel purification equipment of the units 1, 2.

Block No. 16 - Power Plant.

Produces electricity for the needs of the processing complex. The fuel is compressed synthesis / gas. The power plant's fleet consists of one or more constant current GPES and one set of emergency diesel generators.

Block 17 - Synthesis / Gas Compression Station.

Pushes the incoming synthesis / gas to a pressure of 220 - 250 bar, stores some of the gas in high-pressure cylinders to restart the reactor, distributes the compressed gas supply to consumers: power plant, pyrolysis reactor.

Block 18 - Compressed Synthesis / Gas Storage.

It consists of a number of high pressure cylinders. Stores the compressed synthesis / gas reactor for restart.

Block 19 - final pyrolysis liquid treatment plant.

The plant maximally cleans the pyrolysis of liquid from soot particles and acidic compounds. The operation of the plant will significantly increase the service life of the following blocks.

Block 20 - Synthesis Gas Pretreatment Station.

Cleans synthesis / gas from possible mechanical impurities, toxic compounds.

Block 21 - Intermediate pumping station.

ECONOMIC INDICATORS PYROLY-EKOPYR «EG-200»

Pyrolysis products per 1 day / 30 days:

• Pyrolysis liquid (density of 1 liter = 0.89 kg)	65/1950 tons
• Carbon black	26/780 tons
• Combustible gas - the entire volume is used to keep the plant running	24/720 tons
• Process water – used in the production process	1,5/45 tons
• Gas consumption of the pyrolysis reactor	600 m ³ /hr

When fractionating a pyrolysis liquid, we obtain following results:

• Gasoline AI-92	25 – 30 %.	DENSITY AT 20° C, g/cm3	0,71 – 0,76
• DT Euro-5	45 – 50 %.	DENSITY AT 20° C, g/cm3	0,80 – 0,85
• Fuel oil M-100	12 – 15 %.	DENSITY AT 20° C, g/cm3	0,92 – 0,99
• Propane-butane -ethane gas	15 – 20 %.	50% used in the production	
• Heavy tar	5 – 8 %.	DENSITY AT 20° C, g/cm3	1,2 – 1,5

The calculation of the fuel amount is made at the minimum % values and the lowest possible prices.
Light and dark fractions, for 1 day / 30 days.

	1 day / 30 days	1 day / 30 days
• Gasoline AI-92	16,25 / 487,5 tons x 450 € /t	7 312 € / 219 375 €
• DT Euro-5	29,25 / 877,5 tons x 450 €/t	13 162 € / 394 875 €
• Fuel oil M-100	7,8 / 234 tons x 250 €/t	1 950 € / 58 500 €
• Propane-butane-ethane gas	9,75 / 292 tons x 200 €/t	1 950 € / 58 400 €
• Heavy tar	3 / 90 tons x 150 €/t	450 € / 13 500 €

Additionally, when processing rubber goods and plastics:

	1 day / 30 days	1 day / 30 days
Carbon black	30 / 900 tons x 250 € / t	7 500 € / 225 000 €
Steel wire cord	7 / 182 tons x 80 € / t	560 € / 14 560 €
Liquid carbon dioxide	28 / 840 tons x 230 € / t	6 440 € / 193 200 €

TOTAL AMOUNT PER DAY/ 30 DAYS:

1 day / 30 days
39 324 € / 1 179 720 €

Payback period of the project (pessimistic scenario)	36 months after the launch
Manufacturing, installation and commissioning time	10 months
Design and georeferencing	3 months

HEAT AND ELECTRICITY GENERATION WITH THE COMPLEX «PYROLY-EKOPYR»

Nº	Complex name	Possible electricity production	Possible heat energy production
1	PYROLY-EKOPYR EG - 50	kuni 3000 kw/h	2 580 000 kCal
2	PYROLY-EKOPYR EG - 100	kuni 6000 kw/h	5 160 000 kCal
3	PYROLY-EKOPYR EG - 200	kuni 12 000 kw/h	10 320 000 kCal
4	PYROLY-EKOPYR EG - 500	kuni 30 000 kw/h	25 800 000 kCal
5	PYROLY-EKOPYR EG - 1000	kuni 60 000 kw/h	51 600 000 kCal
6	PYROLY-EKOPYR EG - 10 000	kuni 2 400 Mw/h	516 000 000 kCal

Uses of our equipment

Industrial waste (producers and importers of goods)

Mining and manufacturing.

Wastes from coal mining and beneficiation, wastes from water treatment of mines, wastes from crude oil and natural gas production, coal screenings, crude oil, natural gas and gas condensate, oil contaminated soil, waste removed from oilfield equipment.

Water companies and water treatment plants.

Sludges from biological treatment of household and mixed wastewater systems, wastes from stormwater and mechanical treatment of natural waters, wastes from sewage treatment plants (sludges), wells, wastes from mechanical treatment of oily wastewater, other wastes from industrial wastewater treatment.

Chemical and biological industries.

Wastes from the production of basic inorganic chemicals, polychlorinated biphenols, halogens, wastes from the production of mercury, wastes from the production of phosphoric acid, wastes from the production of sulfur dioxide, wastes from the production of hydrochloric acid, hydrochloric acid, acetylene.

Agriculture and wood processing industry.

Cereal waste, manure, waste from the fishing industry, obsolete mineral and organic fertilizers, slaughterhouse waste, logging waste, pesticides and agrochemical waste, low value wood waste, bark waste, natural wood chips, pulp production waste.

Landfills and recycling plants.

Municipal solid waste, construction waste for buildings, structures, asphalt and asphalt concrete pavement waste, tire waste, railway sleepers, construction and repair waste (garbage), electronic waste.



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