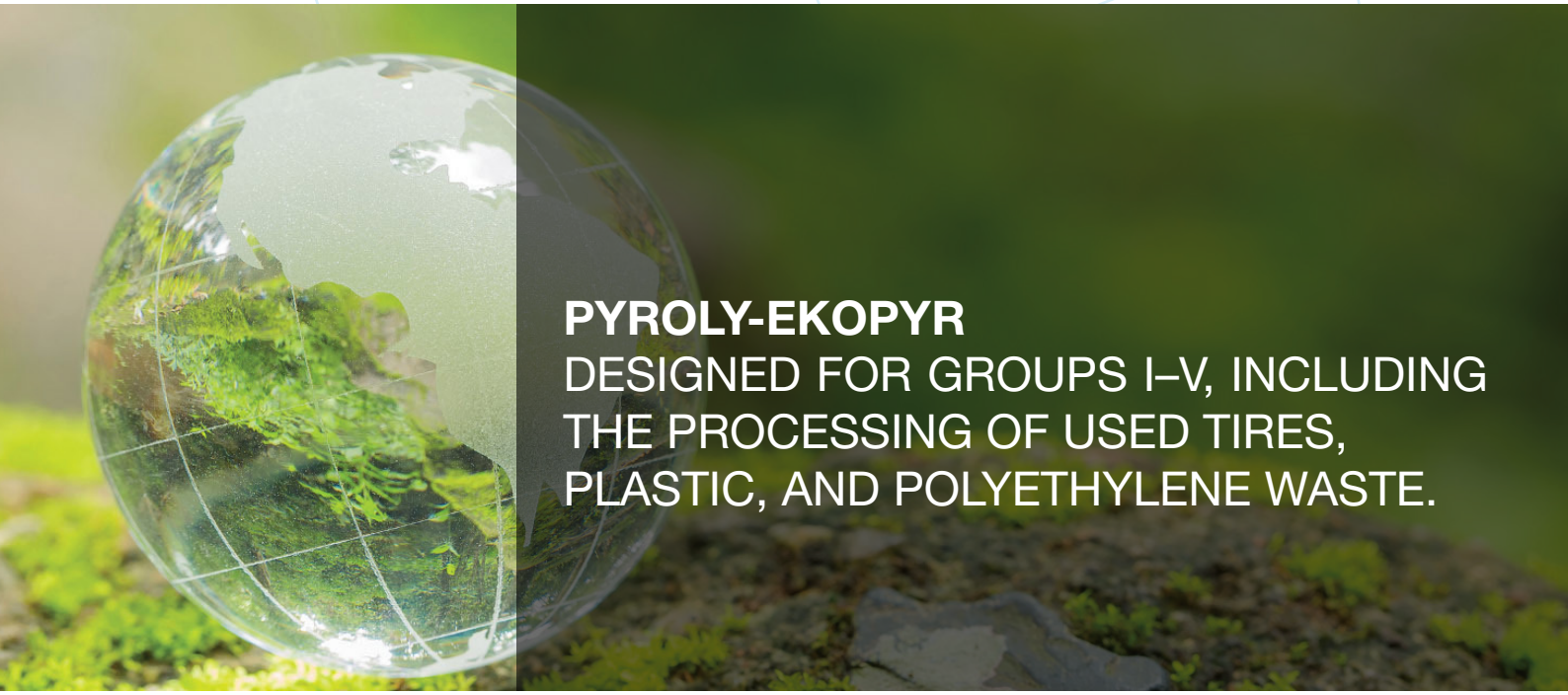
A COMPLEX SOLUTION TO SUPPLY THE REGIONS WITH ELECTRICITY, HEATING AND FUEL OBTAINED BY RECYCLING VARIOUS HOUSEHOLD AND INDUSTRIAL WASTE.



PYROLY-EKOPYR
DESIGNED FOR GROUPS I–V, INCLUDING THE PROCESSING OF USED TIRES, PLASTIC, AND POLYETHYLENE WASTE.

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.

– 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.
– Additional options are available for the production of a high-purity, completely sulfur-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 GTPP (gas turbine power plants) or GPPP (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.

VISION

The planned integration of proven and practically tested technologies into a single technological chain as part of the investment project will enable the efficient and complete utilization of waste. It will extract energy, heat, and other valuable products from waste, transforming it into alternative sources of energy.

The rational and integrated use of advanced technologies addresses the challenges of neutralizing, concentrating, recovering, and disposing of toxic components and harmful emissions, including dioxins and heavy metal salts. This approach minimizes the negative impact on the environment.

With state support, this project will modernize electricity and heat networks, replacing outdated boiler plants. All work will be carried out in stages according to an agreed schedule. The company will finance, maintain, and, when necessary, repair these networks.

In the future, this technology will facilitate the planning of settlements, cities, and other public spaces based on entirely new principles.

The proposed complex, along with the appropriate balance of advanced technologies, will ensure cost-effective production of raw materials and marketable products without increasing the city budget's expenditures on sanitation and waste disposal.

The implementation of this project will enable city authorities, businesses, organizations, entrepreneurs, and the public to address waste management challenges efficiently. It will improve environmentally sensitive areas around the complex and lay a strong foundation for the city’s socio-economic development.

This project not only tackles environmental issues but also creates additional job opportunities. Residents of energy-efficient houses can participate as investors, benefiting from stable income while contributing to the project.

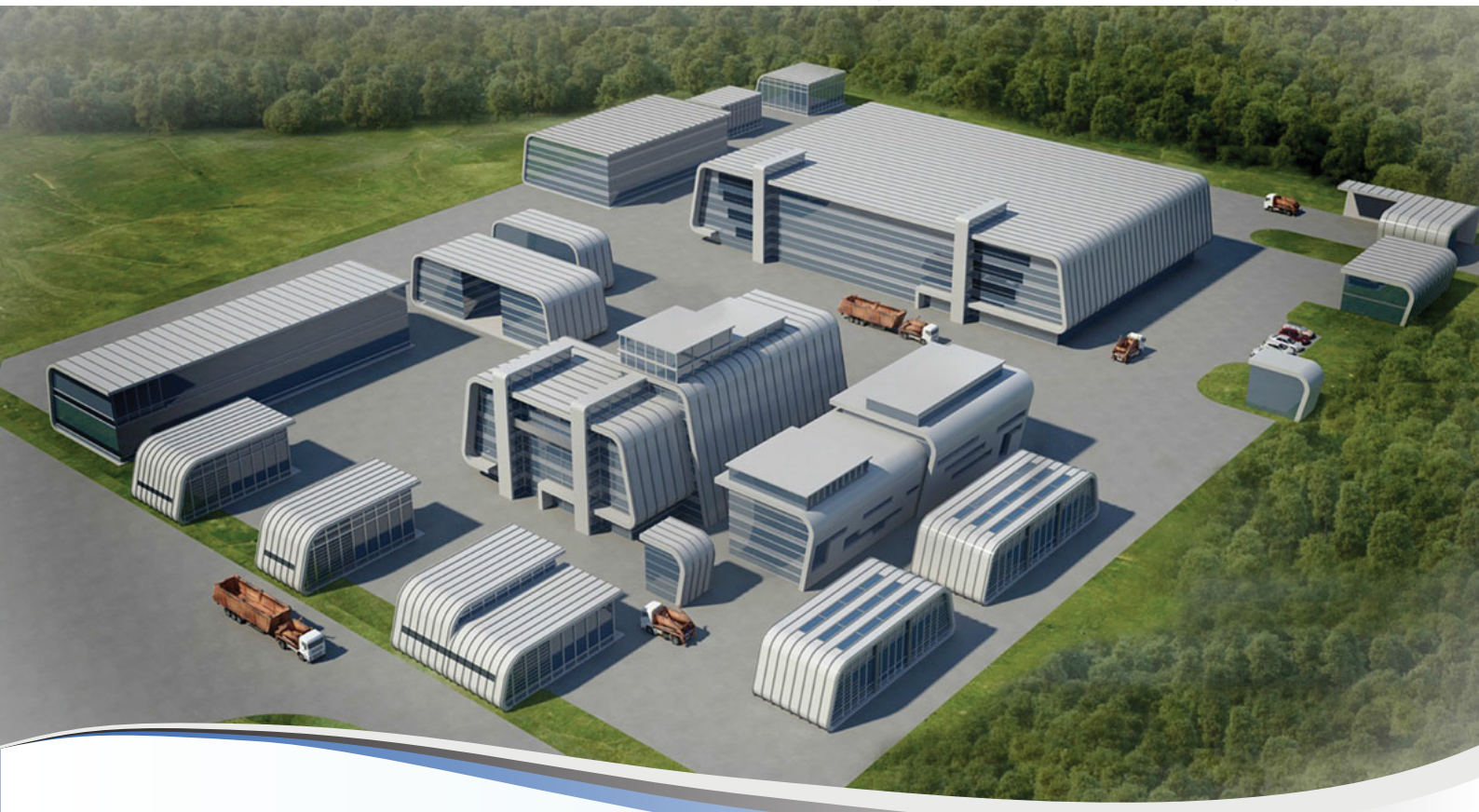
The technology proposed by our specialists enables the creation of eco-settlements for young and low-income citizens. These settlements will feature their own infrastructure for sorting and recycling waste, providing fuel, heat, and electricity for the eco-houses’ residents. This ensures better living conditions and promotes sustainable development.

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.



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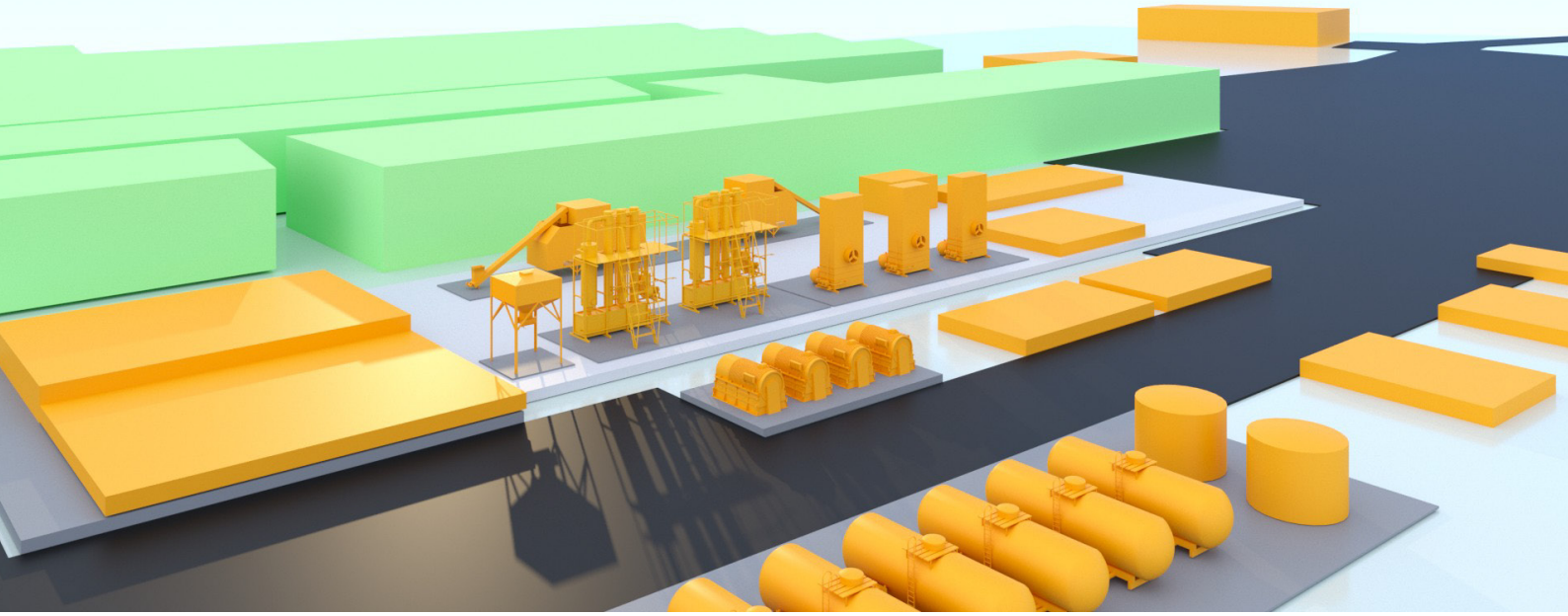


Block 1 - Absorption Station.

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 oil / 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, syngas.

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 - Syngas Cooling Unit and Condensate Removal.
It cools the wet syngas 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 - Carbon Black Hopper Coming From The Reactor.
The hopper supplies carbon black from the pyrolysis reactor. Carbon black is a recycling product that can be used for further commercial use.

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.
Generates electricity to meet the needs of the processing complex. The fuel used is compressed syngas. The power plant includes one or more Gas Piston Power Plants that provide constant electricity, as well as a set of emergency diesel generators.

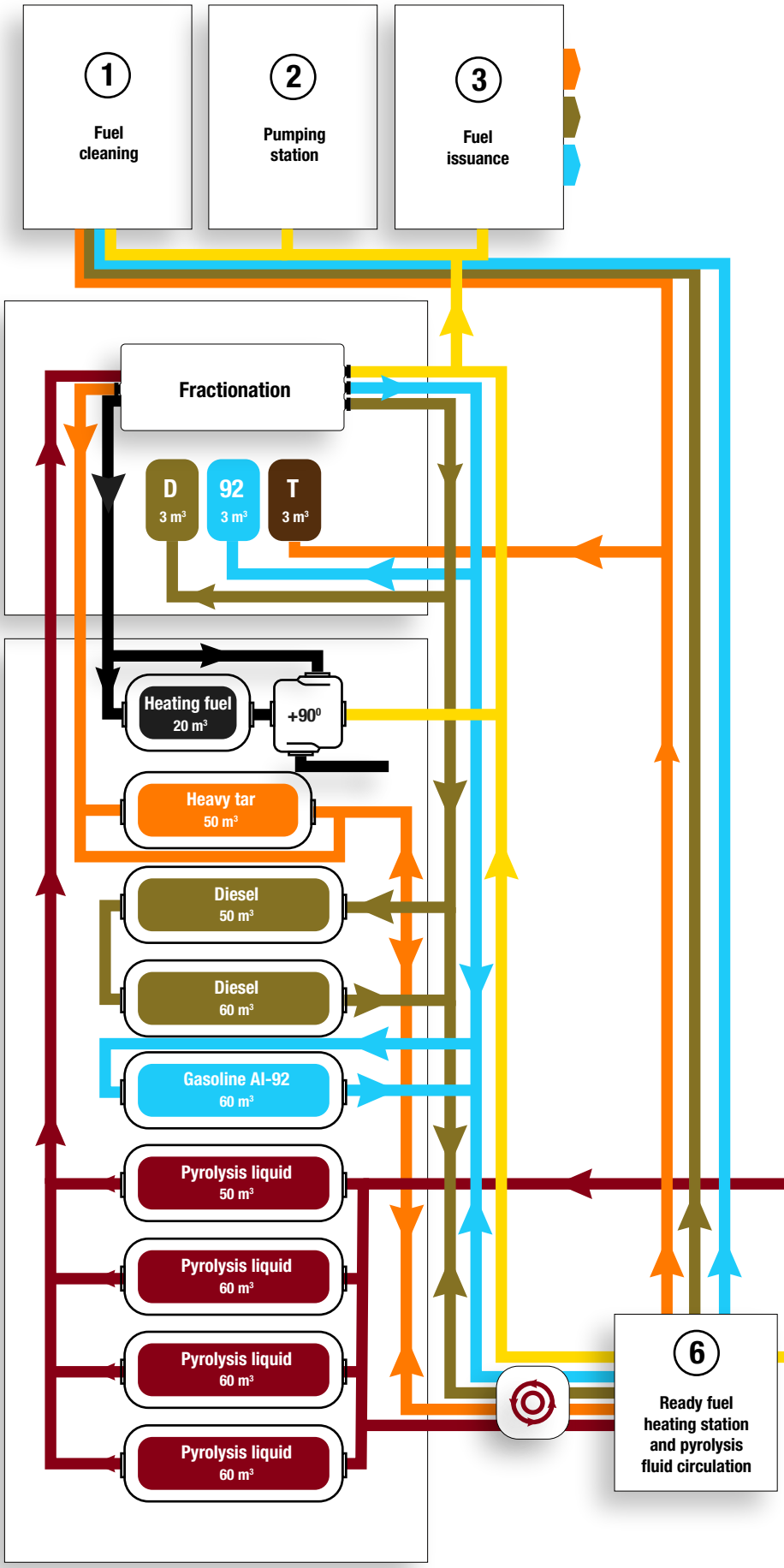
Block 17 - Syngas Compression Station.
Pushes the incoming syngas to a pressure of 220 - 250 bar, stores some of the gas in high-pressure cylinders to restart the reactor, distributes the compressed gas supply to consumers: power plant, pyrolysis reactor.

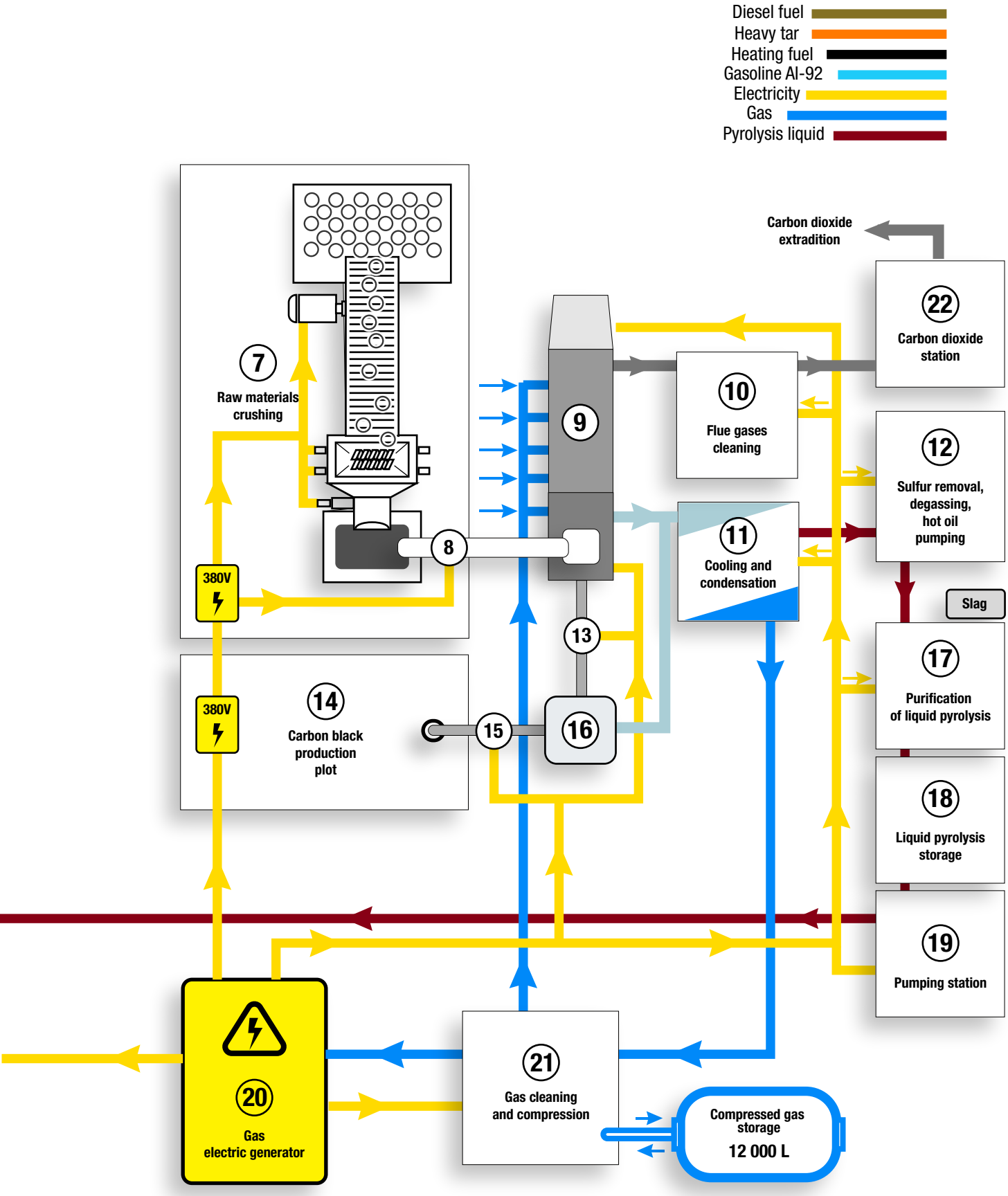
Block 18 - Compressed Syngas Storage.
It consists of a number of high pressure cylinders. Stores the compressed syngas reactor for restart.

Block 19 - Final Pyrolysis Liquid Treatment Plant.
The plant thoroughly cleans the pyrolysis liquid of soot particles and acidic compounds. The plant's operation will significantly extend the service life of the subsequent units .

Block 20 - Syngas Pre-Treatment Station.
Cleans syngas from possible mechanical impurities, toxic compounds.

Block 21 - Intermediate Pumping Station.


1
Fuel cleaning
2
Pumping station
3
Fuel issuance
Fractionation
D
3 m³
92
3 m³
T
3 m³
Heating fuel
20 m³
+90⁰
Heavy tar
50 m³
Diesel
50 m³
Diesel
60 m³
Gasoline AI-92
60 m³
Pyrolysis liquid
50 m³
Pyrolysis liquid
60 m³
Pyrolysis liquid
60 m³
Pyrolysis liquid
60 m³
6
Ready fuel heating station and pyrolysis fluid circulation


Diesel fuel
Heavy tar
Heating fuel
Gasoline AI-92
Electricity
Gas
Pyrolysis liquid
Carbon dioxide extradition
22
Carbon dioxide station
7
Raw materials crushing
9
10
Flue gases cleaning
12
Sulfur removal, degassing, hot oil pumping
11
Cooling and condensation
8
380V
Slag
13
17
Purification of liquid pyrolysis
380V
14
Carbon black production plot
15
16
18
Liquid pyrolysis storage
19
Pumping station
20
Gas electric generator
21
Gas cleaning and compression
Compressed gas storage
12 000 L

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 m³/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 × 80 € / t	560 € / 14 560 €
Liquid carbon dioxide	28 / 840 tons x 230 € / t	6 440 € / 193 200 €

	1 day / 30 days
TOTAL AMOUNT PER 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»

№	Complex name	Possible electricity production	Possible heat energy production
1	PYROLY-EKOPYR EG - 50	up to 3000 kWh	2 580 000 kCal
2	PYROLY-EKOPYR EG - 100	up to 6000 kWh	5 160 000 kCal
3	PYROLY-EKOPYR EG - 200	up to 12 000 kWh	10 320 000 kCal
4	PYROLY-EKOPYR EG - 500	up to 30 000 kWh	25 800 000 kCal
5	PYROLY-EKOPYR EG - 1000	up to 60 000 kWh	51 600 000 kCal
6	PYROLY-EKOPYR EG - 10 000	up to 2 400 MWh	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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"LLC Otechestvennye Tekhnologii"

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