PYROLY

Thermolysis / Pyrolysis Solutions

100% Recycling of Solid Municipal Waste and Industrial Waste into Valuable Commercial Products.

OTECHESTVENNYE TEKHNOLOGII LLC

Presentation on Large-Scale Use and Opportunities of Our Solutions

2024

PROJECT

SUMMARY

PROJECTS	▪ Build and launch a pilot pyrolysis plant with the possibility of 100% recycling of Solid municipal and industrial waste up to 200 thousand tons per year with the production of commercial products for their subsequent sale. ▪ Establish a network for the recycling of MSW and IW waste, starting with a pilot plant, and expand it to construct additional plants with future plans for entry into new markets. ▪ Enhance environmental sustainability by eliminating landfills and developing sites with "PYROLY-EKOPYR" waste to energy complexes, which will fundamentally transform waste management practices.
ADVANTAGES	▪ Quick payback (2.5 years) with no utilization tariff at all. ▪ Capable of processing any type of waste, including medical waste, expired fertilizers, oil sludge, sour tar, and all forms of solid municipal waste. ▪ By modifying technical modules (without increasing equipment costs), the plant can generate electricity or produce light fuel fractions. ▪ Absolutely environmentally sustainable with zero emissions. ▪ Cost of waste processing is lower than landfill disposal. ▪ High commercial profitability of plant operations.
PRODUCTS EXPECTED TO BE RELEASED	The primary product PYROLY offers is the PYROLY-EKOPYR waste to energy complex, which operates on the principle of plasma gasification and is unmatched globally. These complexes turn waste into electricity, heat, recovered carbon black, and pyrolysis oil, which can be further processed into petrol, diesel, fuel oil, heavy tar, and fertilizers.
PROJECT PAYBACK	**2.5 years**
BUDGET	**Around 50 million euros with European market prices**
Financial performance	**Preliminary data are shown in the annex in the financial and economic model (FEM) of the project.**

PROJECT

PROBLEMS & OPPORUNITIES

There is a critical situation with accumulation of solid domestic and industrial wastes, oil sludge and sour crude oil.

There is a severe shortage of land plots suitable for the storage of domestic and industrial waste.

Over 2 billion metric tons of municipal solid waste (MSW) are produced globally each year, with this amount projected to rise by about 70% by 2050.

Existing landfills for domestic and industrial waste are expected to become full within 2-3 years.

ECOLOGY

- Large areas worldwide are used for waste disposal, leading to air pollution, soil degradation, and groundwater contamination.
- Our technology for processing solid domestic and industrial waste will free up landfill sites and restore the ecology of land damaged by waste.

ECONOMIC ASPECTS

- Our technology saves 40 million euros or more compared to building an incineration plant.
- Revenue from waste collection tariff is expected to reach at least 30 million euros.
- Sales of recycled products can recover costs within 1.5 to 2 years.
- Tax benefits.
- Low competition.
- Projected revenue from product sales is expected to reach at least 38 million euros/year per plant.

OPERATING COMPANIES

- Many waste disposal sites are nearing full capacity.
- Challenges in securing new land and funding for building additional landfills.
- PYROLY has expertise in processing municipal, industrial, and other types of waste.

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Concept

THE PROJECT CONCEPT INCLUDES:

Construction of a pilot plant capable of processing up to 200,000 tonnes of MSW+IW annually, producing electricity, heat, pyrolysis oil, liquid carbon dioxide, carbon, and, after further processing, gasoline, diesel fuel, fuel oil, and heavy tar.

The construction of a pilot plant for MSW+IW recycling is most suitable for a site with the following key reasons:

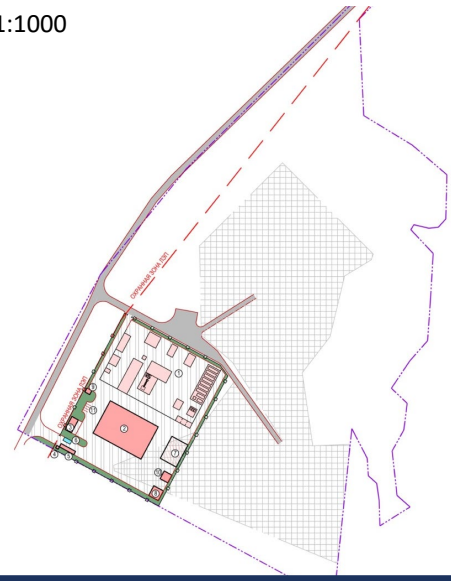
- Landfills are full.
- Large volume of MSW+IW generation;
- Proximity to potential customers for recycled end-products.

The project is planned to be scaled globally in the future.

The pilot plant ill be managed by an operating company.

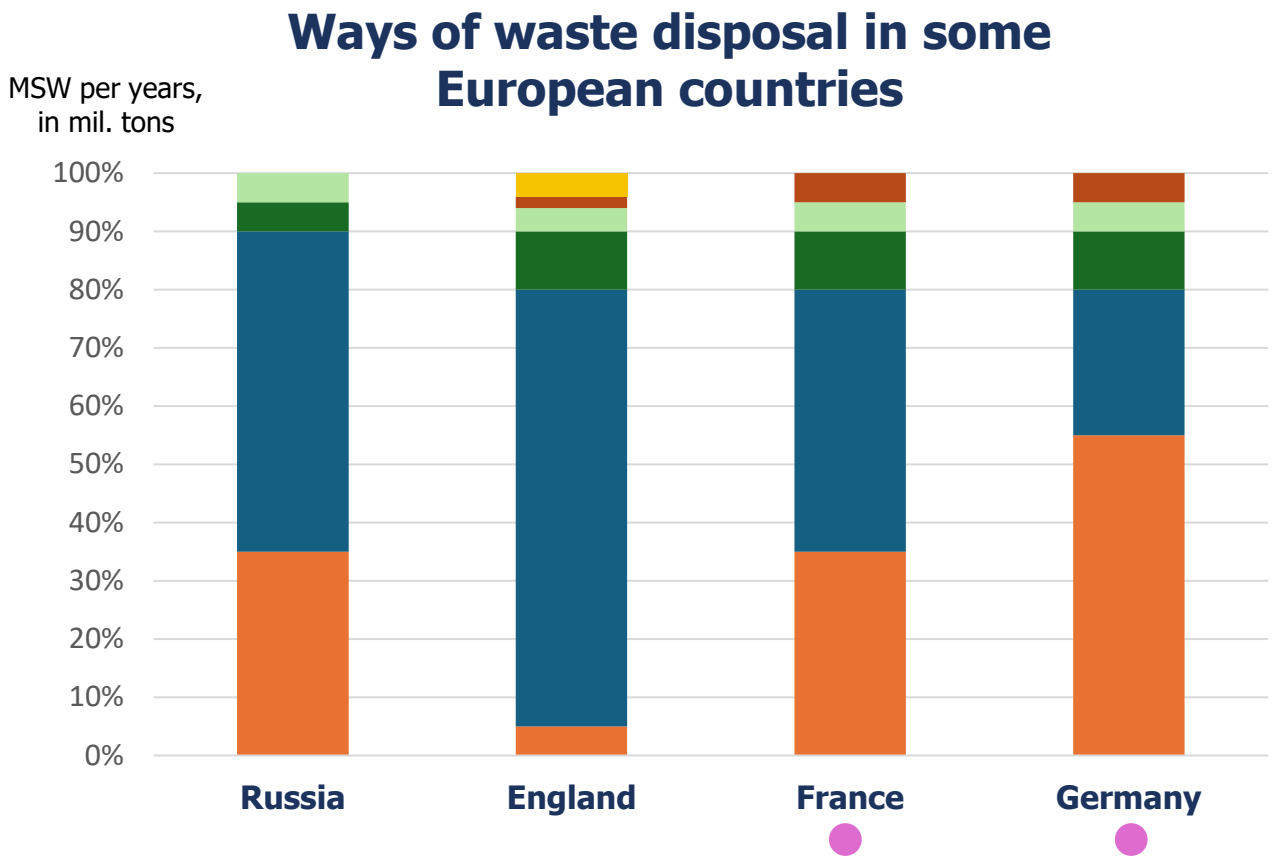
The pilot project aims to showcase and promote the developed waste to energy technology and its industrial design to potential customers, including key players in the waste recycling market.

WASTE TREATMENT PLANT CONCEPT



APPROXIMATE SIZE OF THE LAND

Examples of MSW recycling in Europe



All types of pyrolysis processing

Other methods of disposal (exporting out of the country or into the sea)

Compositing

Recycling

Burying under landfills

Incineration

Availability of established separate waste collection

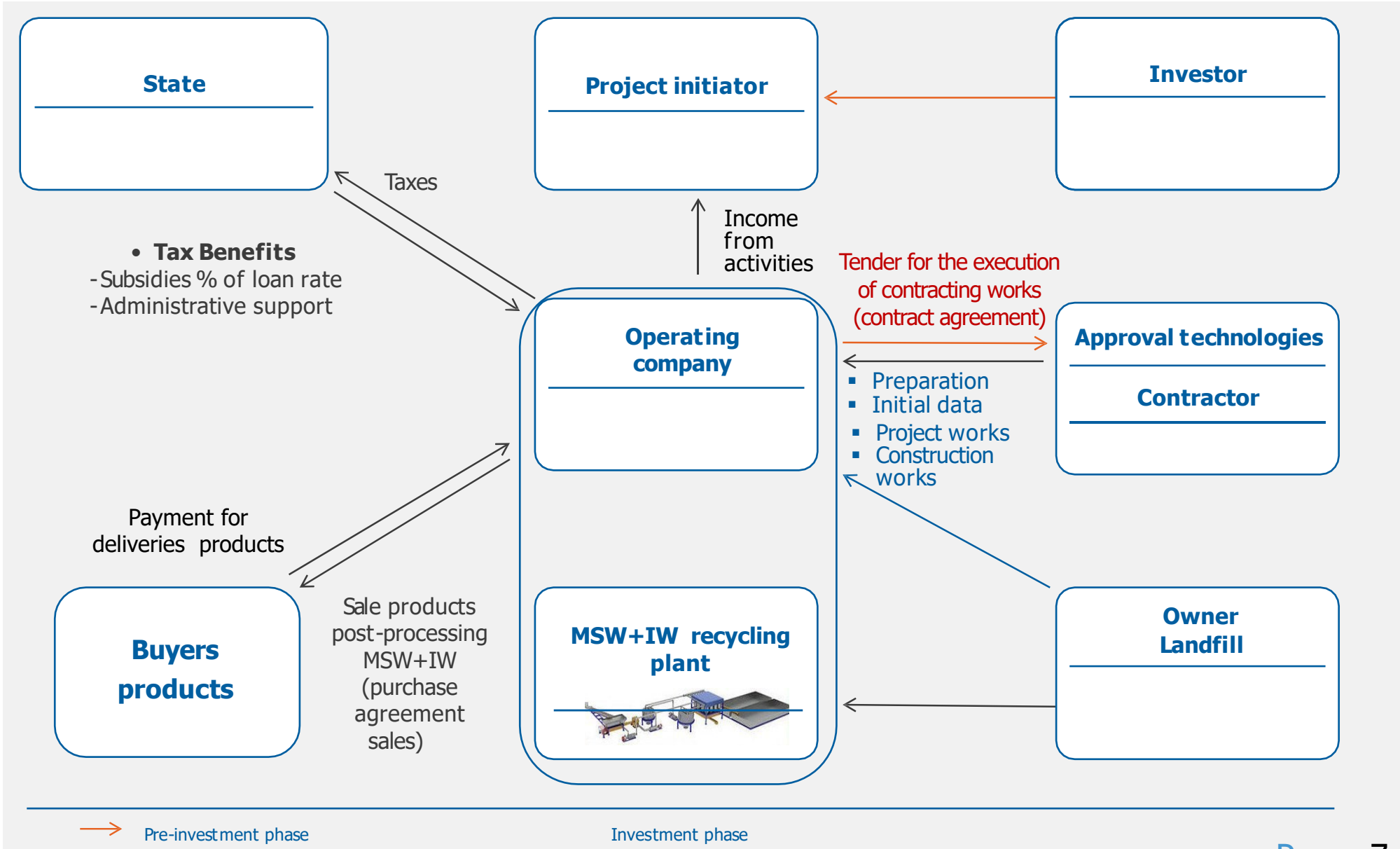
Market Potential And Estimated Revenue

The estimated pre-tax profit of the pilot plant in 2025 is around 37,8 million euros. Detailed financials are outlined in the project's ”FEM” appendix.

- **5 plants are planned for implementation between 2025 and 2027, with a total projected value of €250 million.**
  - The estimated annual revenue from the plants will be at least 190 million euros.
  - The estimated volume of waste utilization will be up to 1 million tonnes per year.
  - Estimated revenue from the waste collection tariff for the five plants is at least 150 million euros annually.

- **Main competitors:**
  - RT-Invest (Russia)
  - RSC "Kurchatovsky" (Russia)
  - NPO "Agroinnovatsiya" (Russia)
  - IEE RAS (Russia)
  - Plasco (Canada)
  - APP (England)
  - EUROPLASMA (France)
  - SOLENA Group (USA)
  - Choren Industries GmbH (Germany)
  - Pyrum Innovations AG (Germany)

Business model of the project



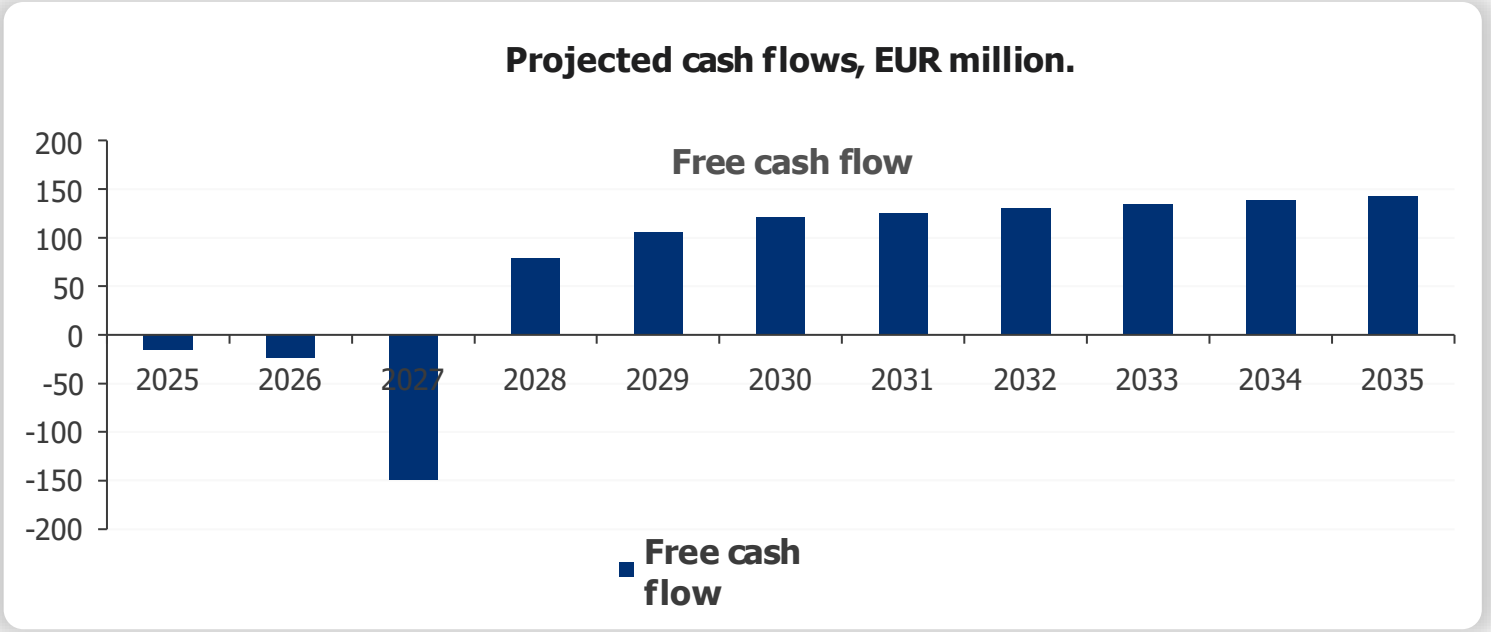
Financial performance of the project

Indicator	Significance
DPP, years	**From 2,5 years**
Funds required	50 million euros
- investments by the Investor	50 million euros
- futher financing	**Not required**
Discount rate, %	To be determined upon signing the finalized contract

Key comments:

1. The project indicates strong economic efficiency.
2. The project will be self-sustaining starting from the end of 2025.
3. The cumulative net profit over 10 years is expected to be at least €3.4 billion.

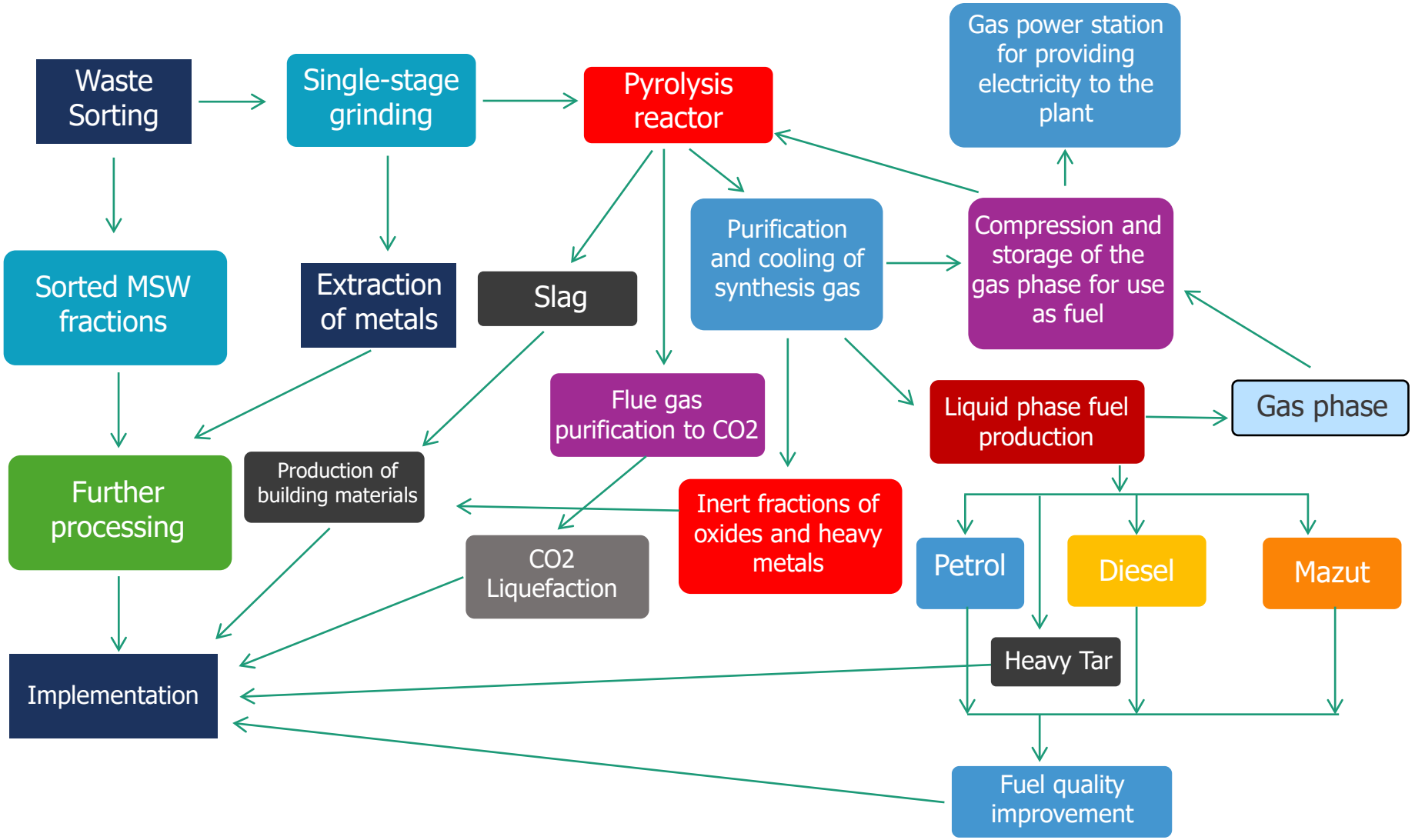
The cost of the plant does not include:
Costs for purchasing the land plot, ensuring compliance with project and environmental requirements, construction and installation works, and equipment to improve product quality and production processes.



APPENDICES:

1. Technological scheme of production — Page 10
2. Potential end-product usage — Page 11
3. Tasks within the scope of project implementation up to the design documentation — Page 12
4. An overview of different waste utilization technologies — Page 13
5. financial and economic model of the project. — Comes separately

Technological Scheme of Production



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Potential End-Product Usage

	Pyrolysis Oil	Liquid CO2	Carbon Black	Gasoline Ai-92	Diesel Euro-5	Mazut M100	Heavy Oil/Tar
Product usage	• Combustion in boilers. • Marine fuel (limited).	• Food Production: carbonated beverages. • Dry ice.	• Fuel briquettes for boilers.	• Fuel for automotive transportation.	• Fuel for automotive and specialized vehicles.	• Marine fuel.	• Construction material.
Additional market opportunities	• Oil refinery • Fuel for low- speed diesels.	• Cylinder refilling for: Welding operations, fire extinguishers and gas fire suppression systems. • Slaughterhouses.	• Sorbent Production. • Construction Material. • Gas Filter Manufacturing. • Tire rubber production.	• Production of high-octane additives for automotive vehicles. • Paint and coating manufacturing.	• Boiler fuel.	• Boiler fuel. • Fuel for low-speed diesels.	• Asphalt production. • Paint and coating manufacturing.
Potential clients	• River maritime companies. • Farms. • Municipal boiler houses. • Oil refiners.	• Local catering establishments. • Local CO2 cylinder refilling services. • Food manufacturing companies. • Science and pharmaceutical companies.	• Farms. • Local small Boiler houses. • Manufacturers of construction Materials and filters. • Tire manufacturing companies.	• Gas stations. • Oil traders. • Urban vehicle fleets.	• Gas stations . • Oil traders. • Urban vehicle fleets. • Local boiler houses.	• River maritime companies. • Farms. • Local boiler houses.	• Local asphalt plants. • Local manufacturers of waterproofing coatings.

Products after 1st phase

Products after 2nd phase

Tasks for Project Implementation Prior to the Design Documentation

- Conducting chemical testing and technological trials at the pilot plant to determine the proportion of MSW+IW treatment products and assess their recoverability on an industrial scale.
- Based on the data obtained, preparing the initial information for developing the Terms of Reference (TOR) for design.
- Finalization of TOR for design.
- Preparing the document package for project's Design Documentation.

Based on the results of chemical testing and the development of recycling technology, data on the share ratio of MSW+IW processing products will be obtained, and optimal operating modes for the process equipment will be developed.

The obtained results will allow for the formulation of specific requirements for the technological equipment, which will serve as the basis for preparing the Terms of Reference for design.

There are more than 5 ways for MSW+IW processing worldwide. Some have been successfully implemented and are currently being adopted in Germany and Russia, while others are still in the scientific development stage.

An Overview of Different Waste Utilization Technologies

	Gas-plasma pyrolysis PYROLY	Disposal in landfills and landfill sites	Plasma thermolysis	Plasma pyrolysis (gasification)	Plasma chemical pyrolysis (gasification)	Plasma hydrolysis	High-temperature pyrolysis (gasification)	Low-temperature pyrolysis (classical)
Advantages	Conservation of natural resources, reduction of MSW+IW disposal volumes and associated cost savings, the potential to generate electricity, produce methanol, and create various fuels for internal combustion engines, along with zero environmental pollution and versatility.	Relatively low maintenance costs, the ability to process a wide range of waste materials, and the potential for site reclamation for parks and sports facilities.	Conservation of natural resources, reduction in MSW+IW disposal volumes, and corresponding cost savings in energy production.	Conservation of natural resources, reduction in MSW+IW disposal volumes with associated cost savings, and the potential for electricity generation and methanol production.	Conservation of natural resources; reduction of MSW+IW volumes to be disposed of and associated cost savings in methanol production.	Conservation of natural resources, reduction in MSW+IW disposal volumes, and associated cost savings in methanol production.	Conservation of natural resources, reduction in MSW+IW disposal volumes with associated cost savings, and the potential for electricity generation and methanol production.	Conservation of natural resources, reduction in MSW+IW disposal volumes with associated cost savings, and the potential to produce electricity and various fuels for internal combustion engines.
Disadvantages	Average material and energy costs for MSW+IW processing, and the average cost of generated electricity.	Pollution of soil, groundwater, and the atmosphere with toxic chemicals, heavy metals, landfill gases, etc.; large land area requirements; challenges in establishing new landfills due to limited available land; significant MSW+IW transportation costs.	High material and energy costs for MSW+IW processing; environmental pollution from dioxins during the combustion of generated gas in conventional power plants; and unreliable equipment.	High material and energy costs for MSW+IW processing; environmental pollution from dioxins during the combustion of generated gas in conventional power plants; high cost of generated electricity; and rapid equipment wear.	High material and energy costs for MSW+IW processing; environmental pollution from dioxins during the combustion of generated gas in conventional power plants; rapid equipment wear; and high chemical consumption in the production process.	High material and energy costs for MSW+IW processing; environmental pollution from dioxins when generated gas is burned in conventional power plants; rapid equipment wear; explosive production; and high slag output.	Average material and energy costs for MSW+IW processing; environmental pollution from dioxins when generated gas is burned in conventional power plants; high cost of generated electricity; and rapid equipment wear.	Average material and energy costs for MSW+IW processing; environmental pollution from dioxins during the combustion of generated gas in conventional power plants; and high cost of generated electricity.

Contact Information

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ИНН/КПП 5047210651/504701001

Don't hesitate to reach out to us for a free RFQ! We provide tailored solutions based on our client’s goals and needs.
PYROLY solutions can be configured for specific purposes to achieve maximum utilization efficiency.

Additionally, our company offers free consulting on business opportunities using our pyrolysis waste-to-fuel plants, especially beneficial for clients new to the industry

If you have any further questions, feel free to contact us at:

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