Metaplasma S.L.

INT-Energia kft.

# PGMCC COMPLEX

Green energy, fuels and useful products from renewable energy sources

INNOVATION
TECHNOLOGIES
SOLUTIONS

PGMCC® Technology

GREEN ENERGY

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# Existing technical solutions for processing municipal solid (MSW) and industrial solid waste (ISW) and their disadvantages

## MSW & ISW

### Mechanical and biological methods

#### Sorting

DISADVANTAGES

Sorting helps to get rid of a significant proportion of waste with the production of secondary raw materials, but does not solve the problem of complete vaste disposal

#### Composting of waste

DISADVANTAGES

Sorting is required and only applies to organic products. Long technological process, with possible problems with the smell. A fixed tonnage of waste is required.

### Thermal methods

#### Incineration

DISADVANTAGES

Toxic emissions into the air and hazardous residue that requires further detoxification or landfilling. Even with the best technologies, incinerators remain major sources of carbon dioxide emissions

#### Pyrolysis

DISADVANTAGES

High-molecular elements do not fission. Large financial costs for gas cleaning equipment in order to reduce the concentration of harmful substances of emissions into the atmosphere

#### Gasification

DISADVANTAGES

Large financial costs for gas cleaning equipment in order to reduce the concentration of harmful substances of emissions into the atmosphere

#### Combined method

**PGMCC Technology**

Fast Plasma gasification and Gas Conversion Method

PGMCC

# Our goals and objectives for the processing of solid municipal and industrial waste

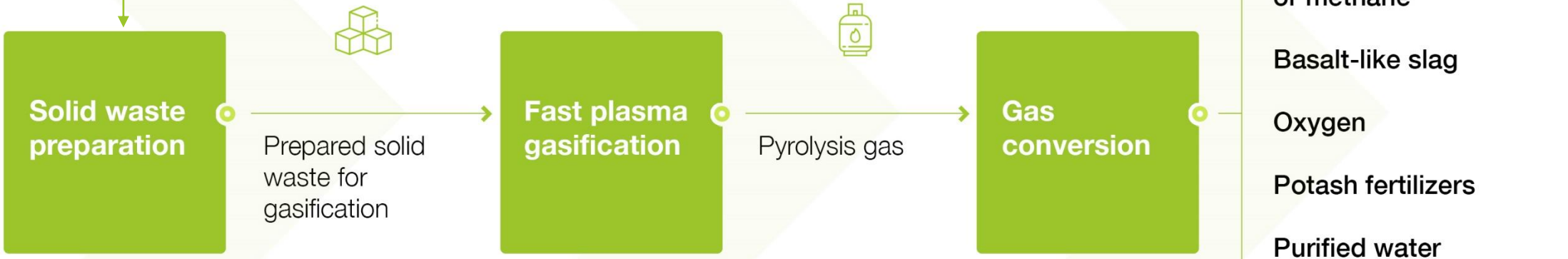
Provide to consumers of high-tech PGMCC Complexes for processing solid municipal and industrial waste and biomass, ensuring efficient management of production and consumption waste, including the elimination of landfills.

# PGMCC Technology

A method of Fast plasma gasification and gas conversion for processing solid municipal and industrial waste and biomass

**P**lasma
**G**asification
**M**elting
**C**losed
**C**ycle

Input:
- Municipal solid waste processing
- Biomass processing
- Medical waste processing
- Agricultural wastes processing
- Hazardous industrial waste processing
- Sewage sludge processing
- Gasification of low-rank coals, culm and oil sludge
- Pharmaceutical waste processing

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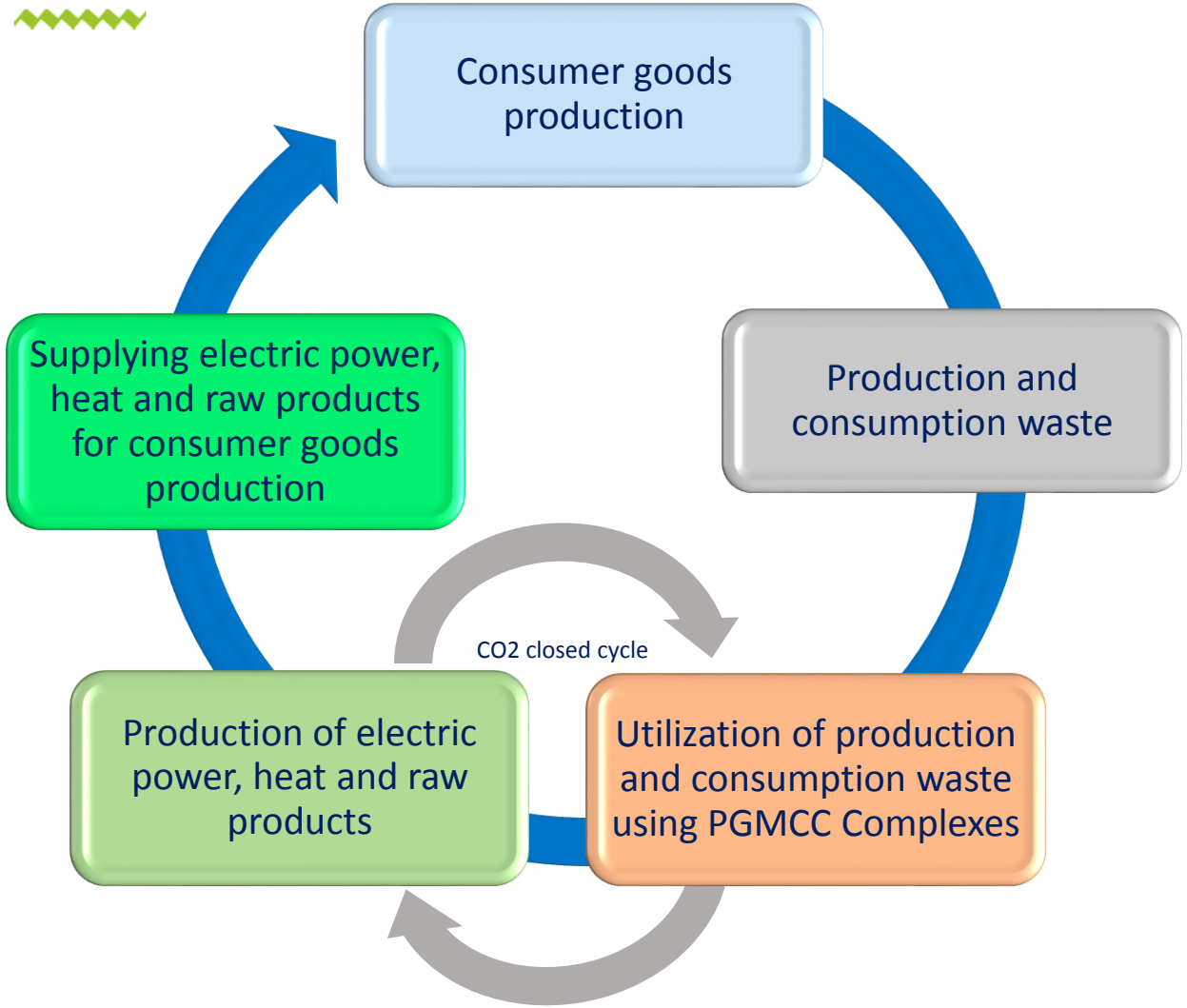
# PGMCC Technology

Eco Emission Closed-Loop
Production & Utilizing Cycle



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# Closest natural analogues for Fast Plasma Gasification Tech-nology

**Lightning is natural analogue of the processes that occur in plasma torch.**

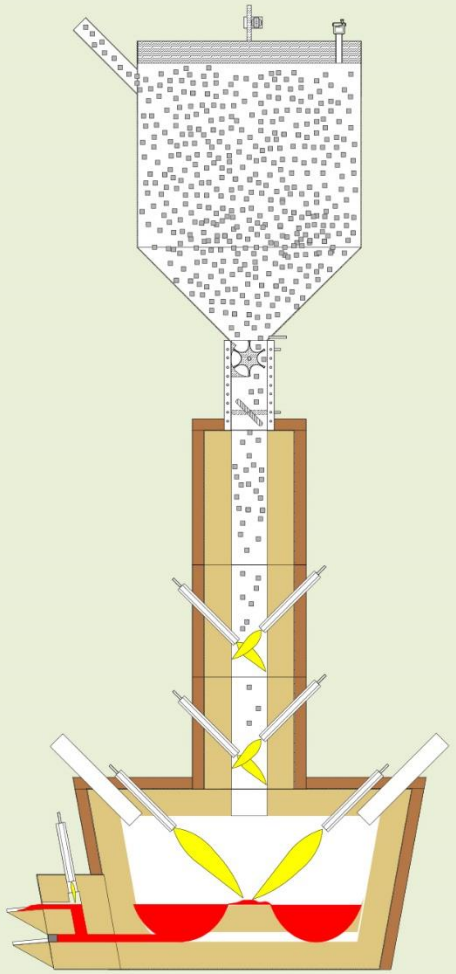
Inside of plasma torch, there are processes associated with the electric discharge with the power of 1.5 eV, which results to the heating of plasma forming gas up to 15,000 °C.

**Basalt-Like Slag - Volcanic Glass Analogue.**

The melting of inorganic sub-stances in the melting zone has a temperature of not less than 1,500 °C.

# INNOVATION

Proposed technological solutions for waste processing are protected by a number of patents in the EU and a number of other countries and meet all the requirements of environmental and technical safety of production related to waste processing and electricity and heat generation.



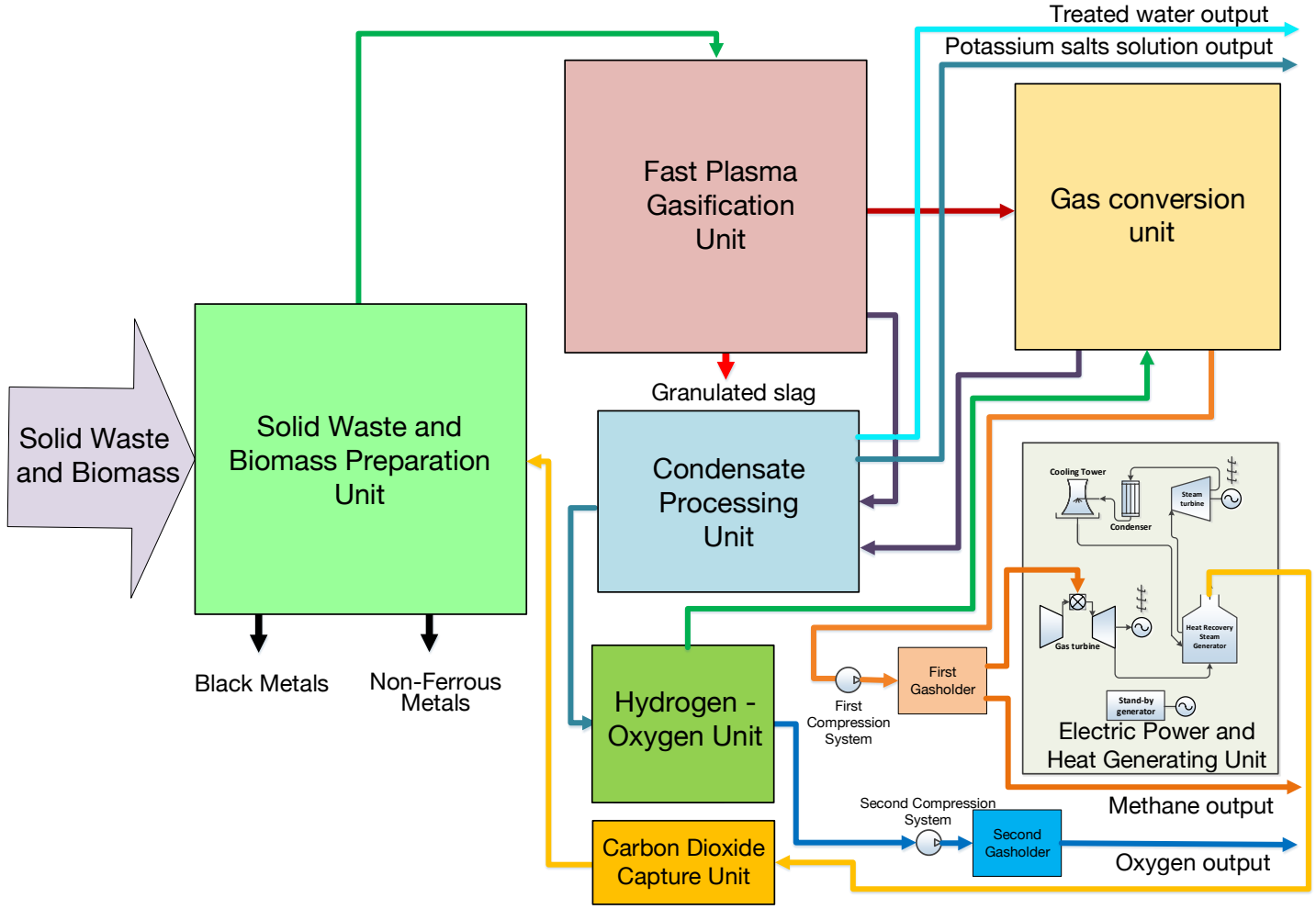
# TECHNOLOGIES

The PGMCC Complexes for processing of household and industrial waste are implemented on the basis of the technology of fast plasma gasification and gas conversion.

TECHNO

# Solid waste and biomass processing Complex using Fast Plasma Gasification and Pyrolysis Gas Conversion

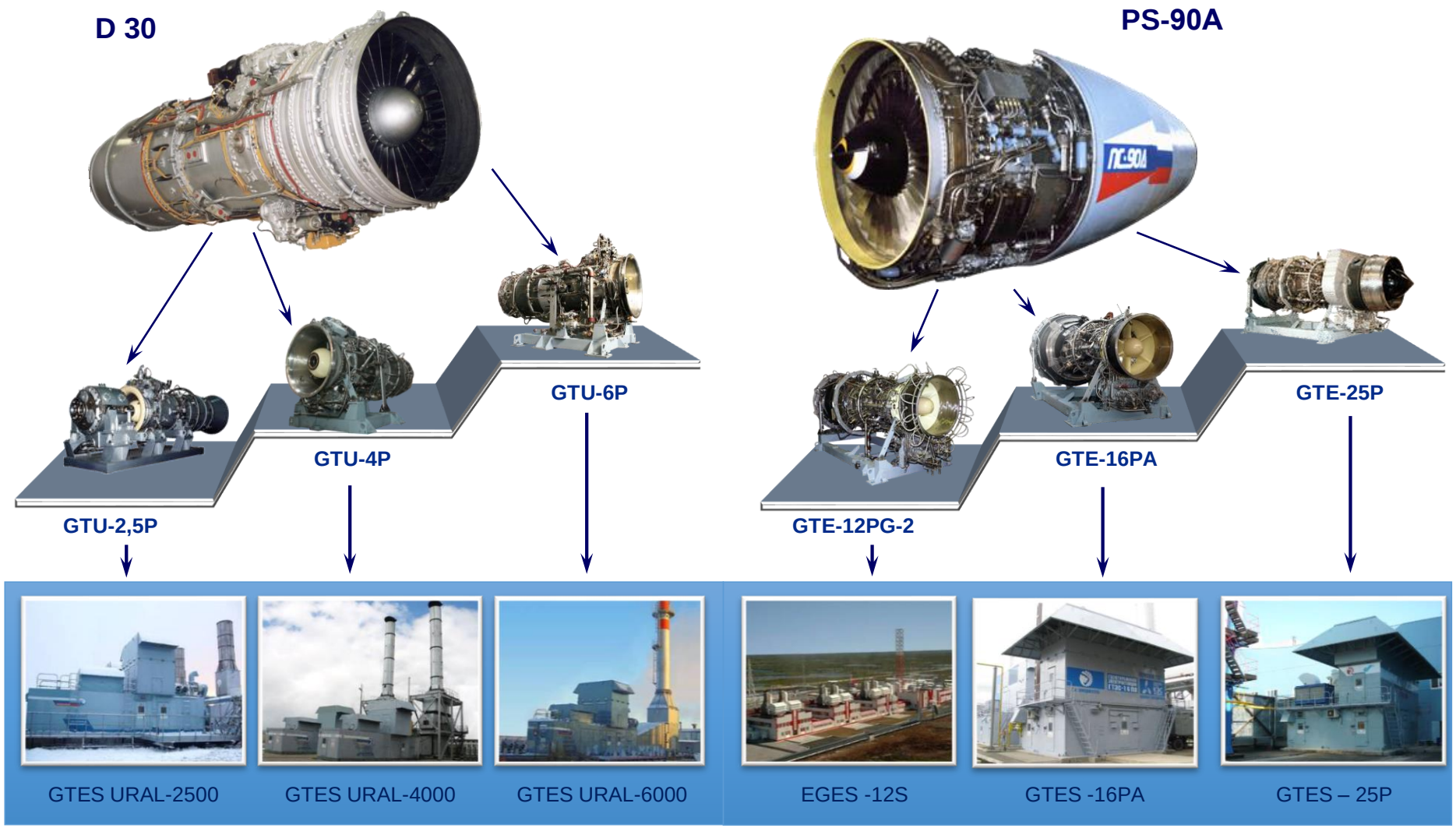
The shredded solid waste and biomass are accumulated, then supplied to the fast plasma gasification reactor, where subjected to fast plasma gasification. The obtained pyrolysis gas is fed to the Gas Conversion Unit. The produced methane, as a result of gas conversion, is compressed and accumulated. The accumulated methane is used for supplying to external consumers and for the production of electric power and heat. Oxygen obtained as a result of electrolysis is supplied to external consumers.



# Plasma torches

# Basalt-like slag

# Gas turbine technology



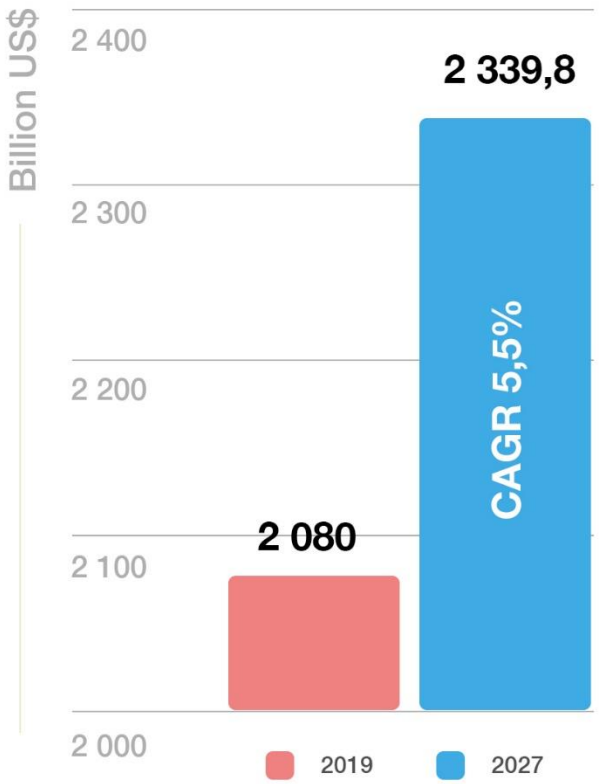
# SOLUTIONS

The Complexes implementing PGMCC Technology differ from the existing ones by the following technical solutions:

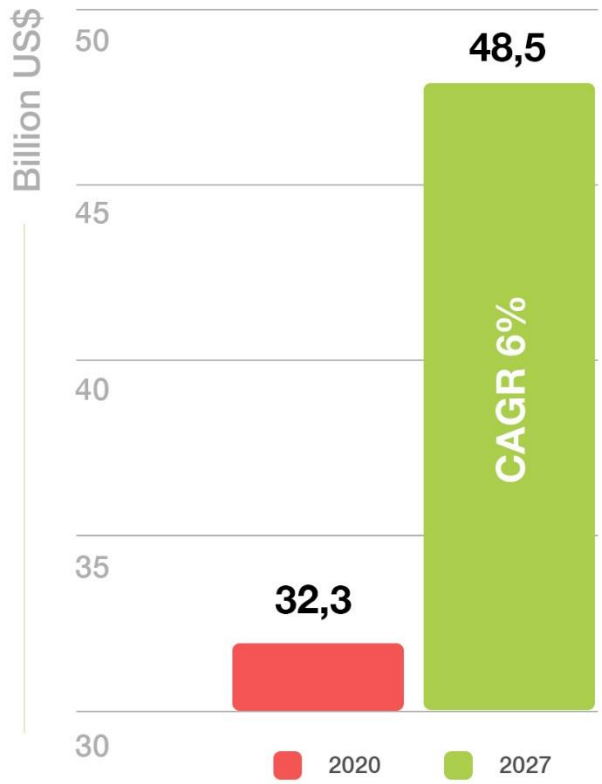
- Processing of solid municipal and industrial waste without sorting with the generation of significant amounts of electricity and heat;
- Methane production;
- Production of environmentally friendly basalt-like slag;
- Separation of non-ferrous and ferrous metals from waste during the processing of household and industrial waste;
- Production of oxygen to supply hospitals and medical facilities;
- Production of potash fertilizers;
- The technological processes of PGMCC Complexes provide an environmentally friendly exhaust gas emission into the atmosphere and do not affect the environment;
- Processing of 1 t/h of solid household and industrial waste, 1600 kW h of electric power is generated (for comparison: incineration of 1 t/h of solid household and industrial waste, only 500 kW h of electricity is generated).

# Global Waste-to-Energy Market

Global Waste Management Market Revenue




Global Waste-to-Energy Market Revenue




# Economic efficiency and investment appeal assessment of the Pilot Project implementation

## Key financial and economic indicators of the Pilot Project

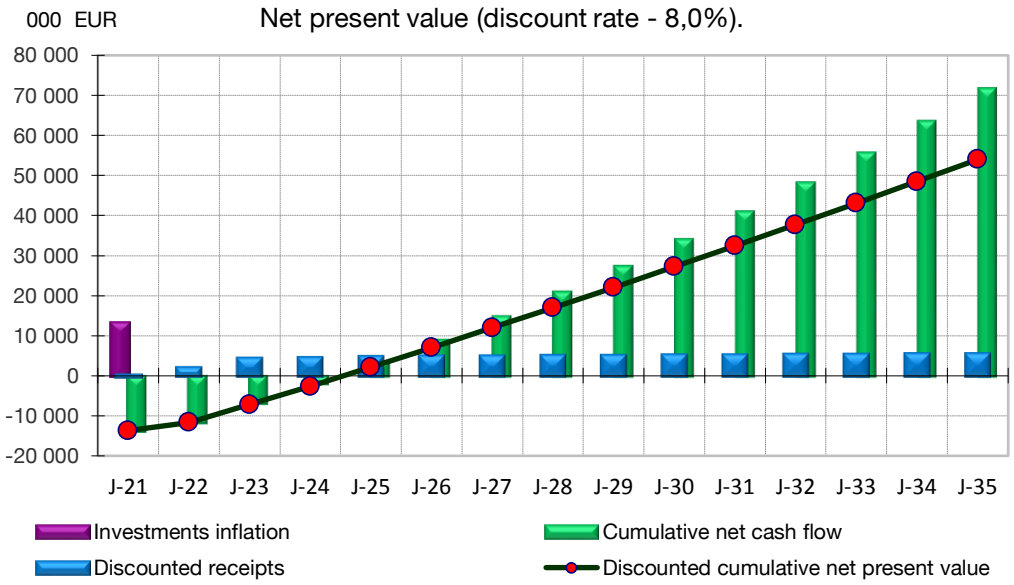
Price Quotation Model
for the Pilot Project Target Products

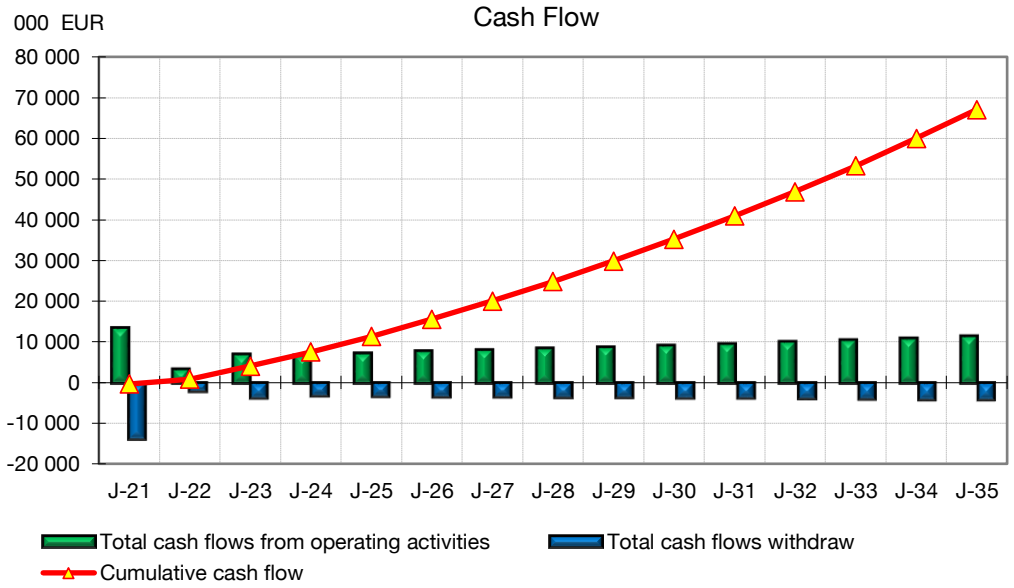
| | Target Products | Offered price, without VAT |
|---|---|---|
| 1 | Electric power | 0,06 Euro/kW h |
| 2 | Oxygen | 6,00 Euro/kg |
| 3 | Granulated slag | 15,00 Euro/ton |
| 4 | Waste and biomass utilization | 40,00 Euro/ton |

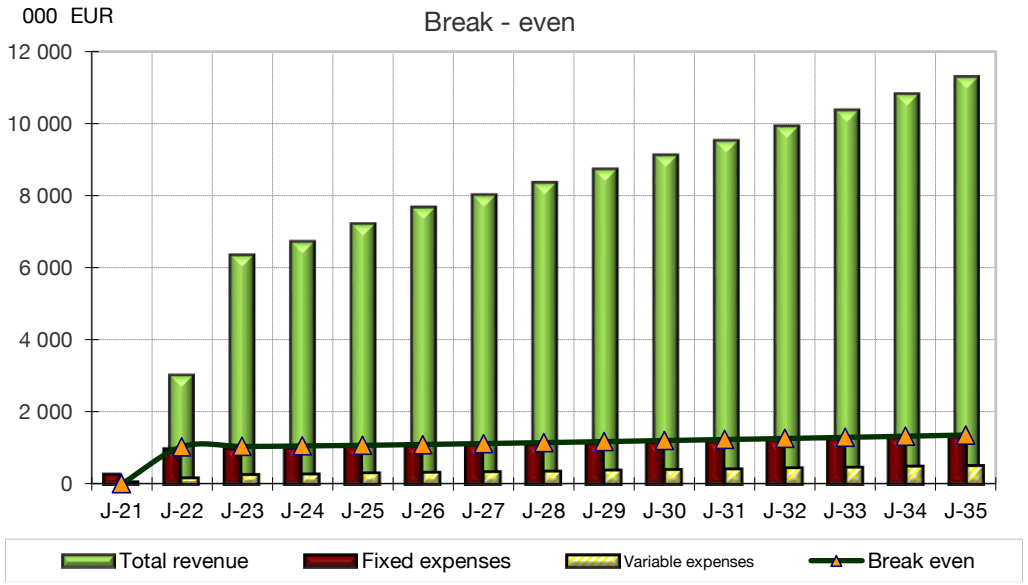
Sales of PGMCC Complex
Product over a Typical Trading Year Model

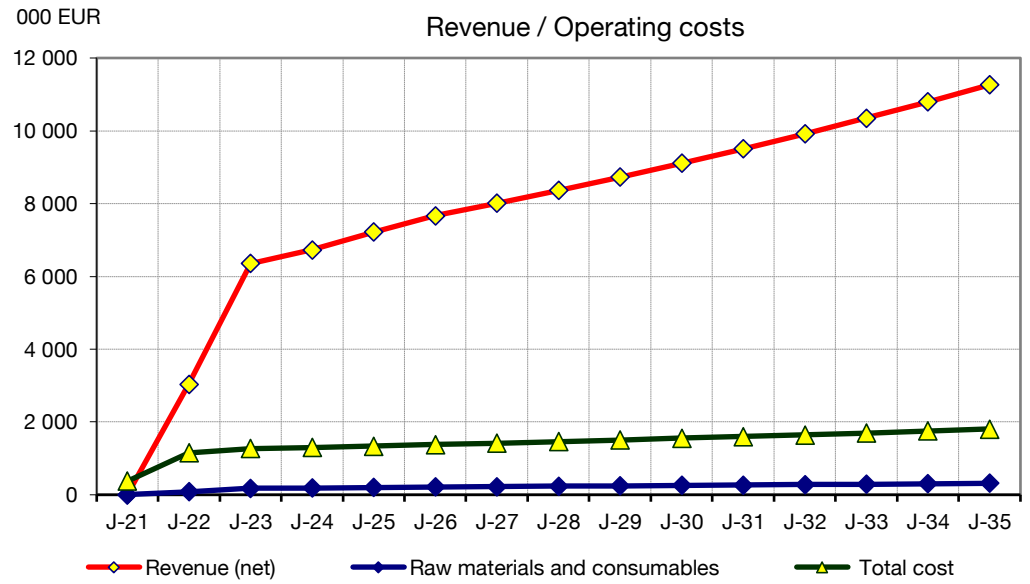
| | Index | Annual production |
|---|---|---|
| 1 | Electric power | 11 946 851 kW h |
| 2 | Oxygen | 800 000 kg |
| 3 | Granulated slag | 800 ton |
| 4 | Waste and biomass utilization | 8 000 ton |

# Dynamics of key financial and economic indicators of the Pilot Project on the basis 15 year-period from 01.01.2021 to 12.31.2035

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# Key financial and economic indicators of the Pilot Project

Main financial and economic parameters of the Pilot Project (8-th year of the Pilot Project)

| | Index | Index Value |
|---|---|---|
| 1 | Investment costs, MIO Euro (VAT excluded) | 13,350 |
| 2 | Cumulative cash flow, MIO Euro | 24,813 |
| 3 | Cumulative net profit, MIO Euro | 29,700 |

Main Pilot Project indices of effectiveness

| | Index | Index Value |
|---|---|---|
| 1 | Net present value of the Project (NPV), MIO Euro | 53,982 |
| 2 | Internal rate of return (IRR), % | 33,13 |
| 3 | Non-discounted payback period of the Project (PBP), years | 4,36 |
| 4 | Discounted payback period of the Project (DPBP), years. | 4,56 |
| 5 | Discounted profitability index (PI), times | 5,04 |

# Conclusions on “Economic Efficiency and Investment Appeal Assessment of the Pilot Project Implementation” Chapter:

1. The project analysis was carried out on the basis of 15 year-period, from 01.01.2021 to 31.12.2035. Research period was selected to assess the Pilot Project economic indices in the long term.

2. Pilot Project investment costs include costs for design, necessary production facilities and ancillary equipment purchase, and construction works and they are equal to 13 350 thousand Euro in 2021.

3. Beginning from 2023, the annual project net profit will exceed 4 018 thousand Euro.

4. Discount rate for the project is taken as 8.00%.

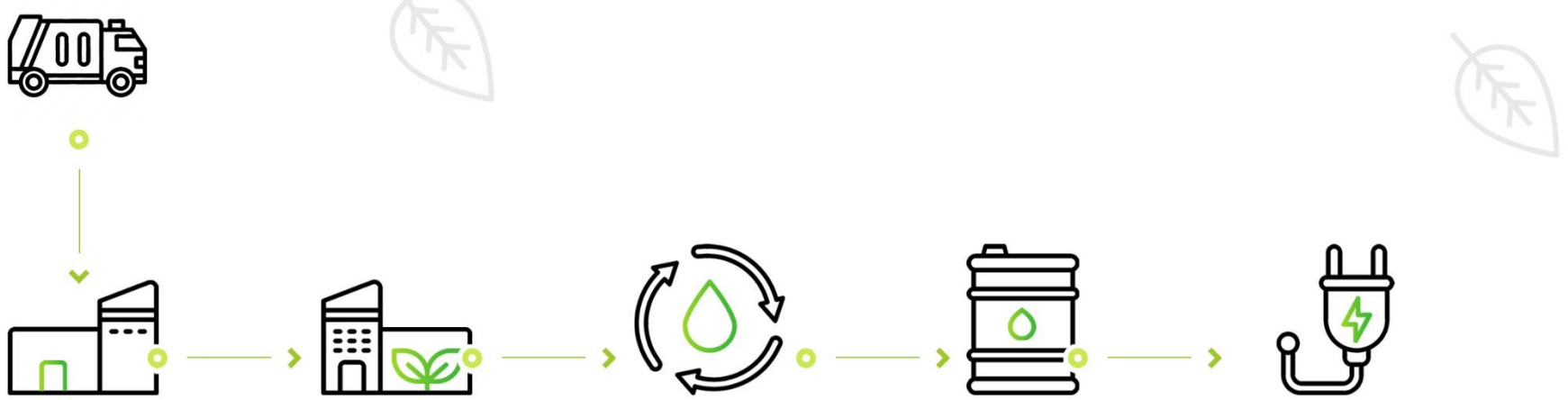
5. Analysis of the indices of effectiveness for full investment costs demonstrates that the project has a positive NPV, 53 982 thousand Euro, and normal payback period, 4.56 years, (the project is paid back within a research period), indicating that the concerned project ensures the required rate of return for the invested capital and brings additional revenues.

6. The Pilot Project is economically effective and self-supporting. Net Profit Profitability for the 8th year from the project beginning will be 65.19% and the Production Profitability - 611.4%.

PROCESS

# Our offers

We offer turnkey delivery of PGMCC Complexes for processing solid municipal and industrial waste and biomass with a capacity from **0.4 t/h to 6 t/h.**



Waste Preparation Unit

Fast Plasma Gasification Unit

Gas Conversion Unit

Methane Tank

Electric Power and Heat Generation Unit

# Team and Experience

The work of Int-Energia Kft. and Metaplasma S.L. is based on the principle of creating a team of highly professional specialists in specific areas of activity for the effective solution of tasks. The team includes leading experts from  the EU with over 15 years of experience in the mentioned areas.

INT-Energia kft. Metaplasma S.L.

# Team:

## Lazar Potashnik

**Education:** higher technical education.

From 1995 to the present - Managing Director and owner of Int-Energia Kft.
Professional experience of 40 years, co-author of 14 inventions and patents.

**Specialization:** development and creation of combined cycle gas turbine plants CCGT-CHPP, waste and biomass processing complexes based on high-temperature plasma, gas turbine and algae technologies.

## Arian Mamayenko

**Education:** higher technical education.

From 2010 to the present - Managing Director and owner of Metaplasma S. L. Professional experience of 33 years, co-author of 26 inventions and patents.

**Specialization:** development and implementation of new technologies, equipment, control systems and automation at metallurgical enterprises with the use of low-and high-temperature plasma technologies. Development and implementation of control systems for high-temperature processes.

## Oleksiy Dolynskyy

**Education:** higher economical education.

Professional experience 16 years. Joined to Int-Energia Kft in 2012.

## Oleksandr Oliynyk

**Education:** higher technical education.

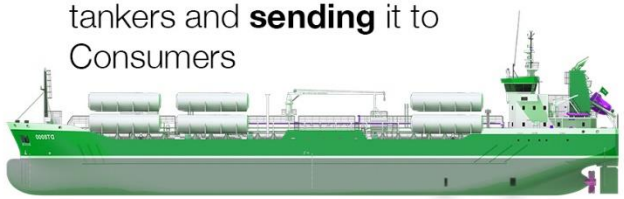
Professional experience 25 years. Joined to Metaplasma S.L. In 2013.

**Specialization:** development and implementation of process control and monitoring systems.

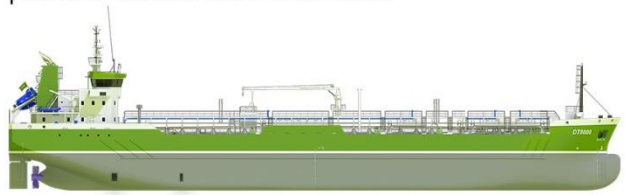
# Our strategy for the nearest future

Today, the garbage islands in the Pacific Ocean exceed the territory of three European countries by area. **PGMCC complexes in the mobile version,** installed on ships, are able to effectively destroy them to produce methane.

**Loading** methane into tankers and **sending** it to Consumers



**Recycling**
plastic waste into methane



## The specialists warn:

“The concentration of plastic is increasing exponentially. I think the situation is getting worse, “said Laurent Lebreton, lead author of the Ocean Cleanup Foundation study in Deltf, the Netherlands.

This highlights the urgency of taking measures to stop the arrival of plastics in the ocean and to clean up the existing disaster.

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# THANK YOU FOR ATTENTION!


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