



TEKNOLOGIYA METALLOV | INDUSTRIAL COMPANY



MAGMA

PROJECT

**HIGH-TEMPERATURE RECYCLING
OF MUNICIPAL WASTE BY
WASTE-FREE TECHNOLOGY**



Project concept

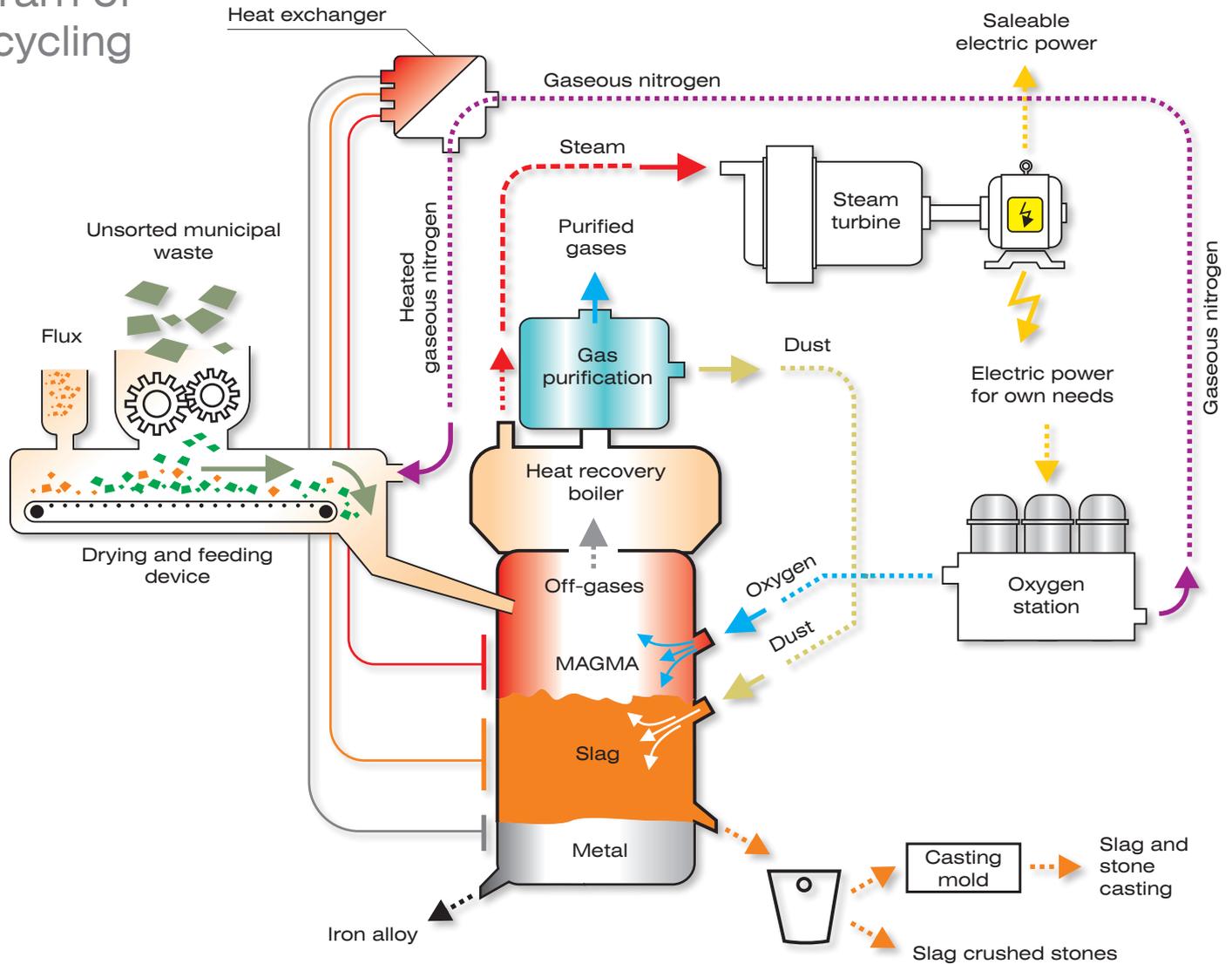
MAGMA is a high-temperature oxygen fuel continuous unit used for recycling of unsorted municipal waste that allows to implement a waste-free, profitable and environmentally clean technology of waste recycling.



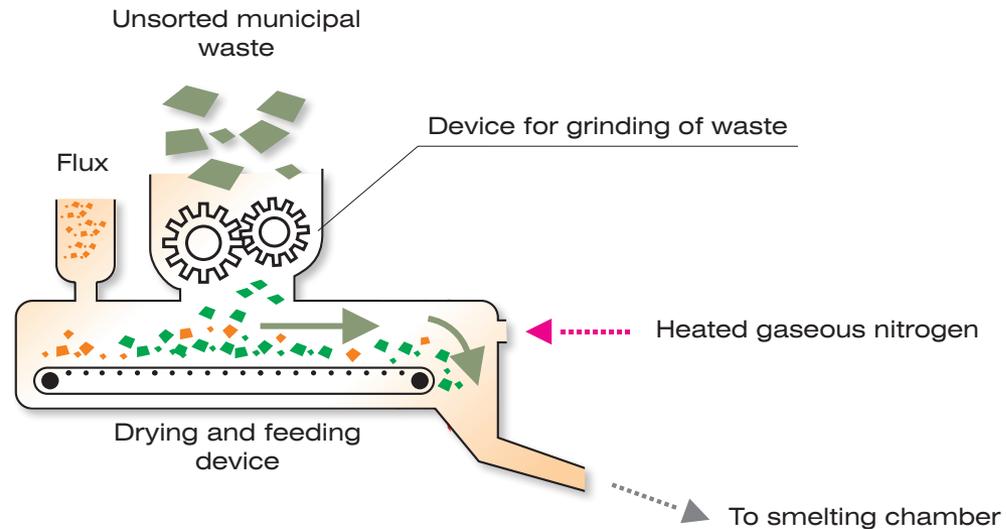
Specifications of MAGMA unit

Maximum production capacity of one module for wet unsorted municipal waste, metric tons per year	300,000
Maximum thermal power, MW	100
Fuel type	organic constituent of waste
Raw material for processing of saleable products (construction materials and iron alloy)	mineral constituent of waste
Oxidant for waste recycling	technical oxygen (O ₂ 95%)
Temperature of gas phase in free space of the unit, °C	1800-1900
Temperature of molten slag, °C	1400-1650
Cooling system of smelting chamber body	liquid metal coolant

Flow diagram of waste recycling



Preparation of waste for recycling



Preliminary drying of waste in the feeding device by heated gaseous nitrogen

Advantages:

- 1) drying of waste decreases formation of off-gases when recycling of waste;
- 2) use of gaseous nitrogen definitely eliminates spontaneous ignition of waste during drying and improves energy performance of recycling process;
- 3) use of heat from the body of the unit for heating of gaseous nitrogen improves energy performance of recycling process.

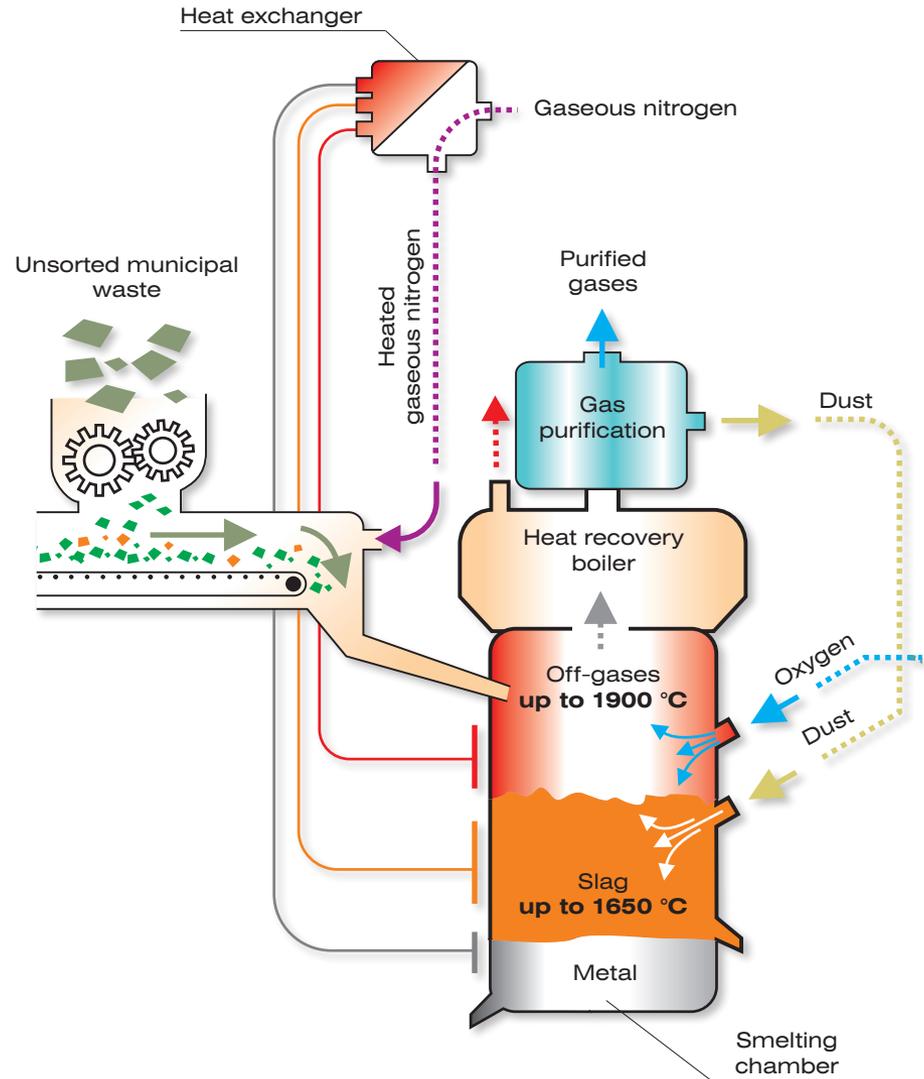


Waste recycling

Waste is recycled at a temperature above 1650°C in oxygen on the surface of molten slag

Advantages:

- 1) the process of waste recycling does not require additional fuel;
- 2) at a temperature above 1350°C formation of dioxins and furans is definitely prevented;
- 3) at a high temperature the mineral part of waste is smelted to slag without forming toxic ash; chemical composition of slag is adjusted by adding flux;
- 4) toxic dust captured by the gas purification is returned to the molten slag and is absorbed by the slag;
- 5) waste recycling in oxygen allows the unit to decrease the volume of off-gases and achieve concentrations of $\text{NO}_x < 80 \text{ mg/m}^3$, $\text{CO} < 7 \text{ mg/m}^3$;
- 6) the original cooling system of the body of the unit allows making a continuous process of waste recycling.



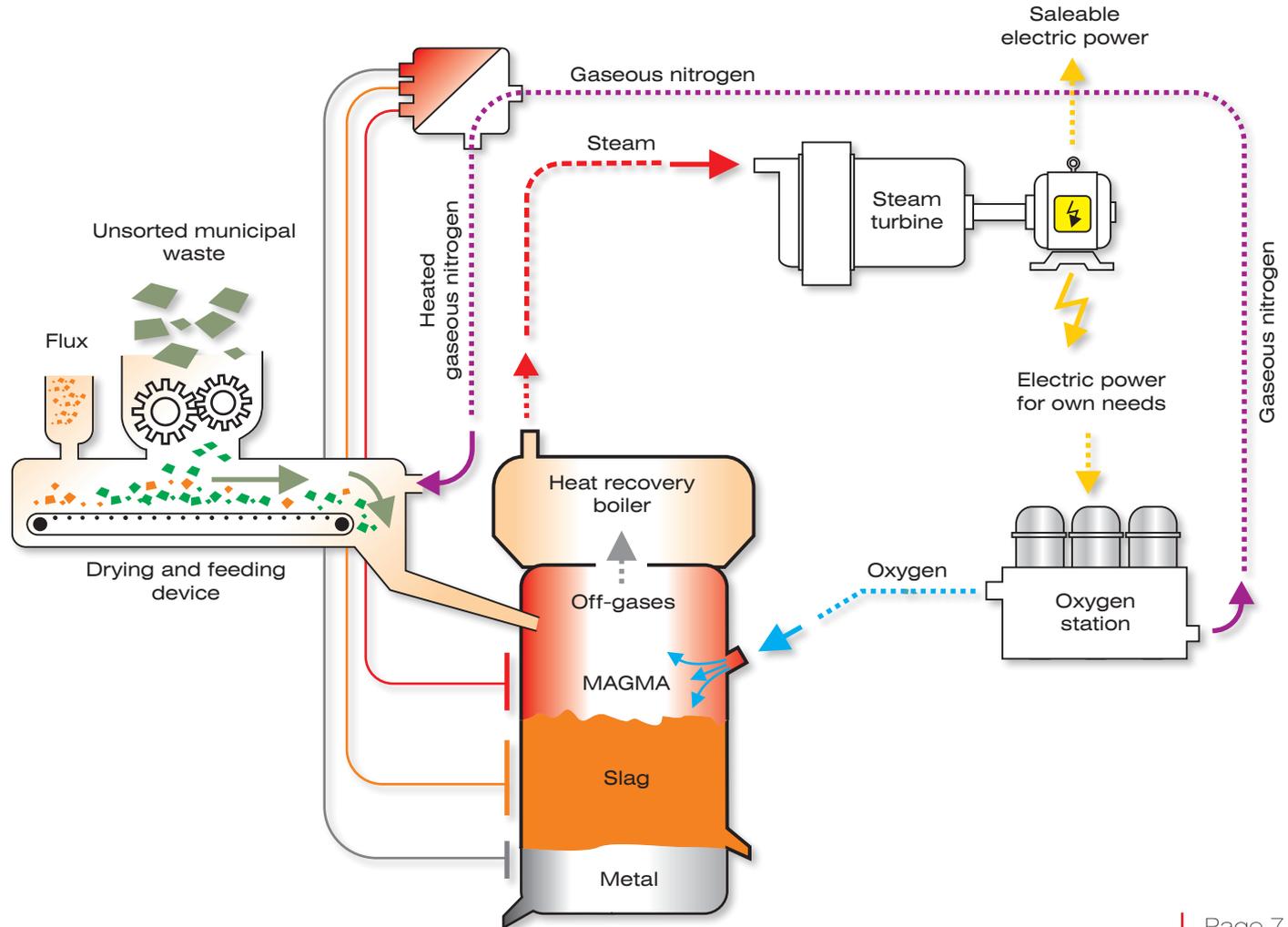


Energy of waste recycling

Production of own electric power

Advantages:

- 1) energy-independent process of waste recycling;
- 2) sale of part of electric power as a saleable product.



Production figures of products

Electric power production	0.45-0.55 MWh/t
Iron alloy production	5-30 kg/t
Construction materials production	250-300 kg/t

The figures above are indicated as per ton of municipal waste with initial humidity of 30% and can be changed according to the morphological composition of waste.



Conclusion

The MAGMA project provides:

- 1) environmentally clean recycling of unsorted municipal waste according to EU standards;
- 2) profitable process of waste recycling;
- 3) waste-free technology of waste recycling.



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