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The use of solid household waste as fuel in the housing and utilities sector

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The use of solid household waste as fuel in the housing and utilities sector

The problem of processing and disposal of solid household waste (SHW) is becoming more and more urgent, not only for megacities, but also for small settlements.

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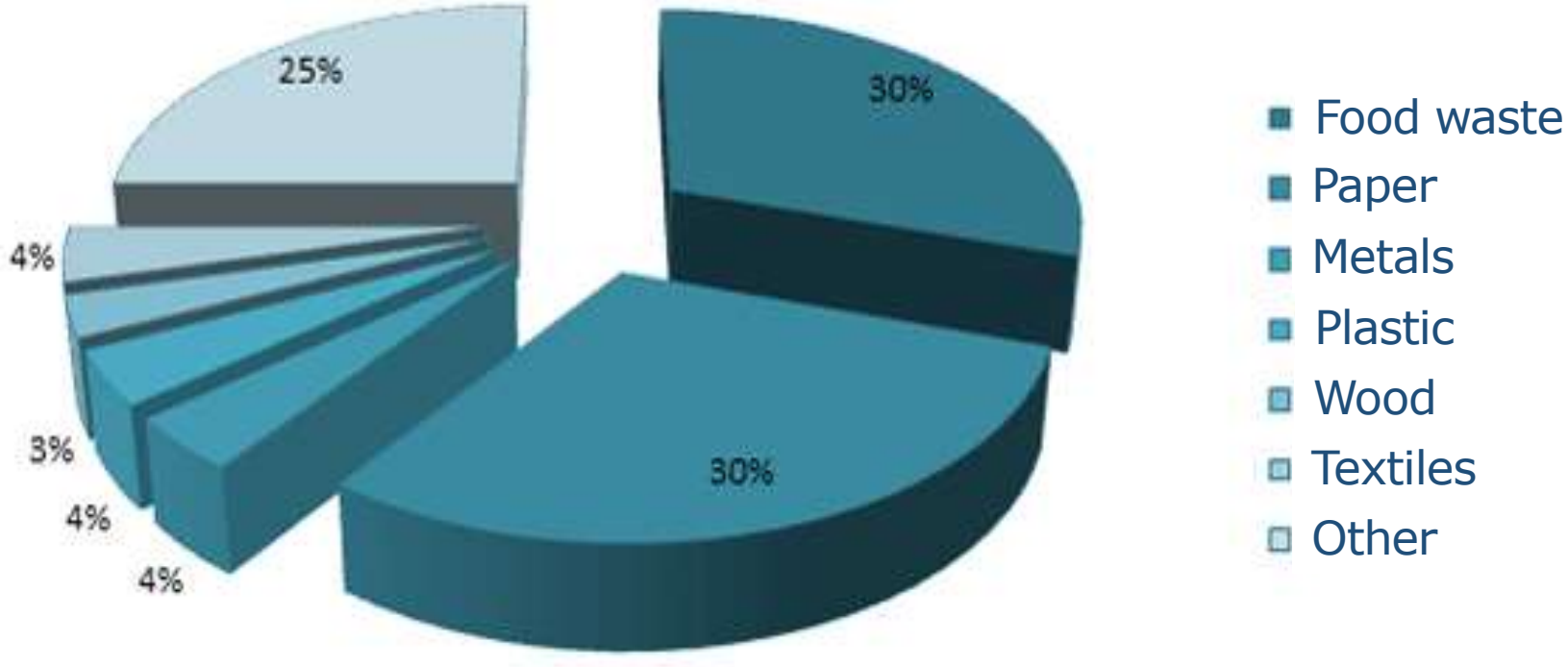
Russia annually produces about 4 billion tons of various types of waste. The amount of solid waste is 63 million tons/year, an average of 445 kg per person.



The approximate composition of solid waste in Russia.

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The capacity of the landfill in the village of Chemodanovka near Penza is 7 million 425 thousand tons. Every year, more than 300 thousand tons of solid waste are brought there.

Photo of the Chemodanovsky landfill in the Bessonovsky district of the Penza region.

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To reduce the volume of solid waste, it is necessary to improve the production and put the project of a mini-plant for processing solid household waste into operation.

Project objectives:

- *1. Thorough recycling of waste and solid waste;*
- *2. Development of a scheme for producing and using combustible gas;*
- *3. Cost reduction of garbage collection and its disposal;*
- *4. Energy consumption reduction for the processing of solid waste;*
- *5. Reduction of solid waste disposal volume;*
- *6. Reduction of the concentration of harmful substances in burial grounds.*

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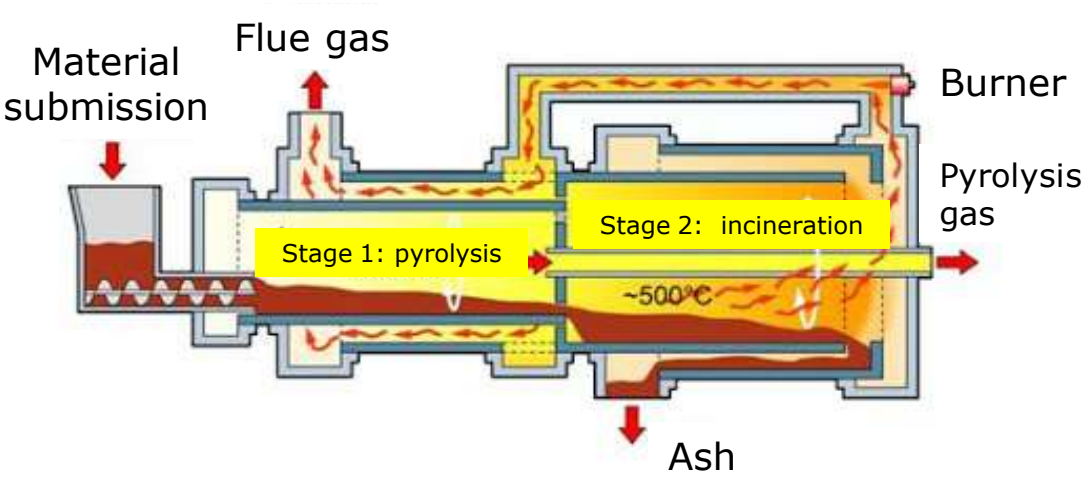
Pyrolysis is the thermal destruction of the initial substance, in which the normal structure of the substance is broken down into the simplest molecules during the reactions.

The distinctive features of the rapid pyrolysis method are:

1. *The closed nature of the continuous technological production process;*
2. *Relative "purity" of the final pyrolysis products;*
3. *Maximum energy consumption of the process, in comparison with other technologies;*
4. *The release of a significant amount of thermal energy.*



Boiler for high-turbulence waste incineration.

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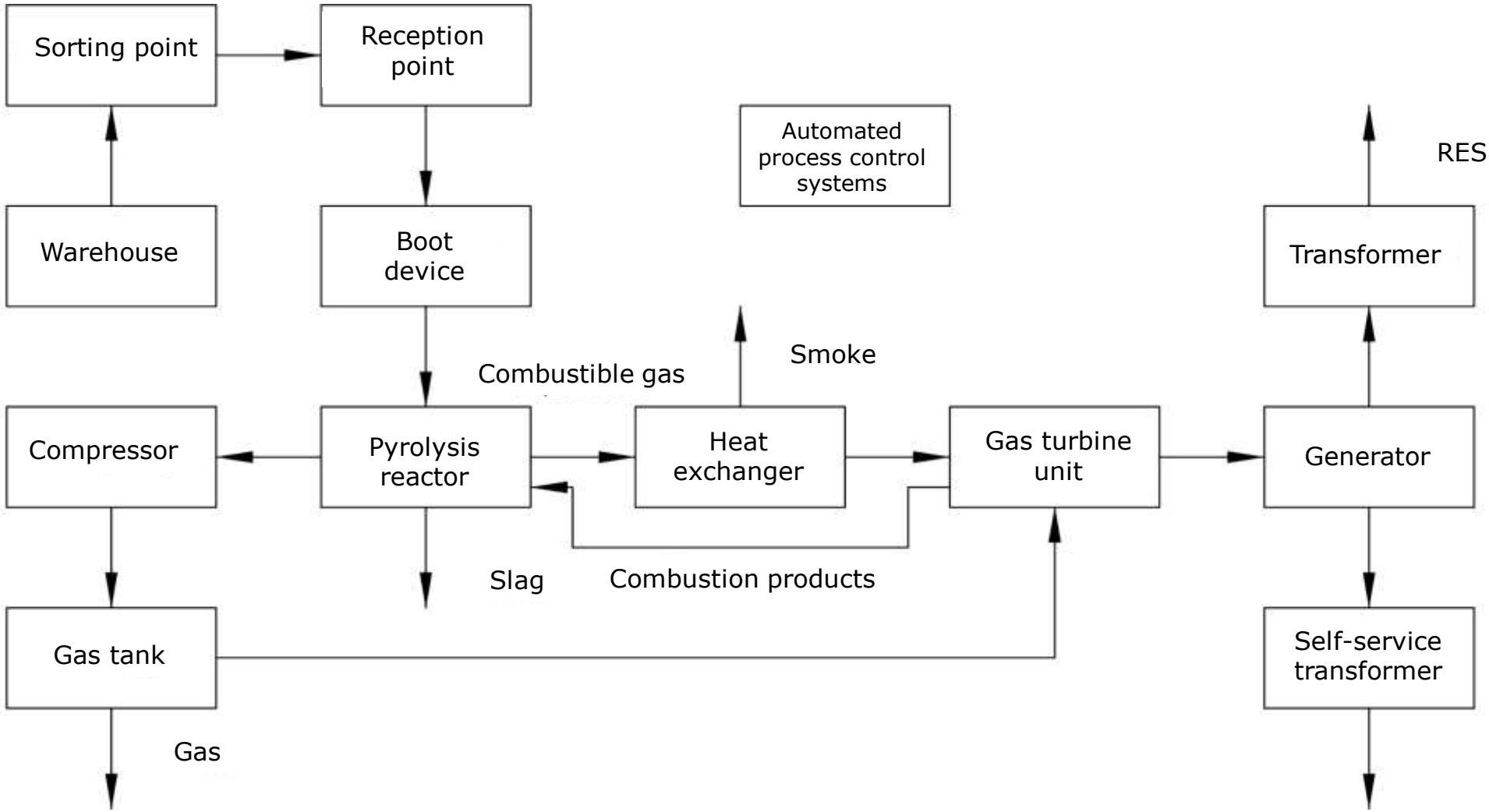

Technological scheme of the processing.

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№			
1	Plant capacity		
2	Percentage of		
3	Garbage in th		
8	Cost of fuel p		
9	Plant efficienc operation per		
10	Total amount	million rubles	15

№	Name	Unit of measurement	Value
1	Installed capacity of the plant equipment	kiloWatt	260
2	Load factor	-	0,6
3	Working hours	hour	24
4	Electricity consumption for the plant's own needs, per day	kiloWatt ·hour	3744
5	The plant consumption per month	kiloWatt ·hour	112
6	Electricity tariff	rub/kiloWatt ·hour	4,7
7	Amount of expenses	thousand rubles	530

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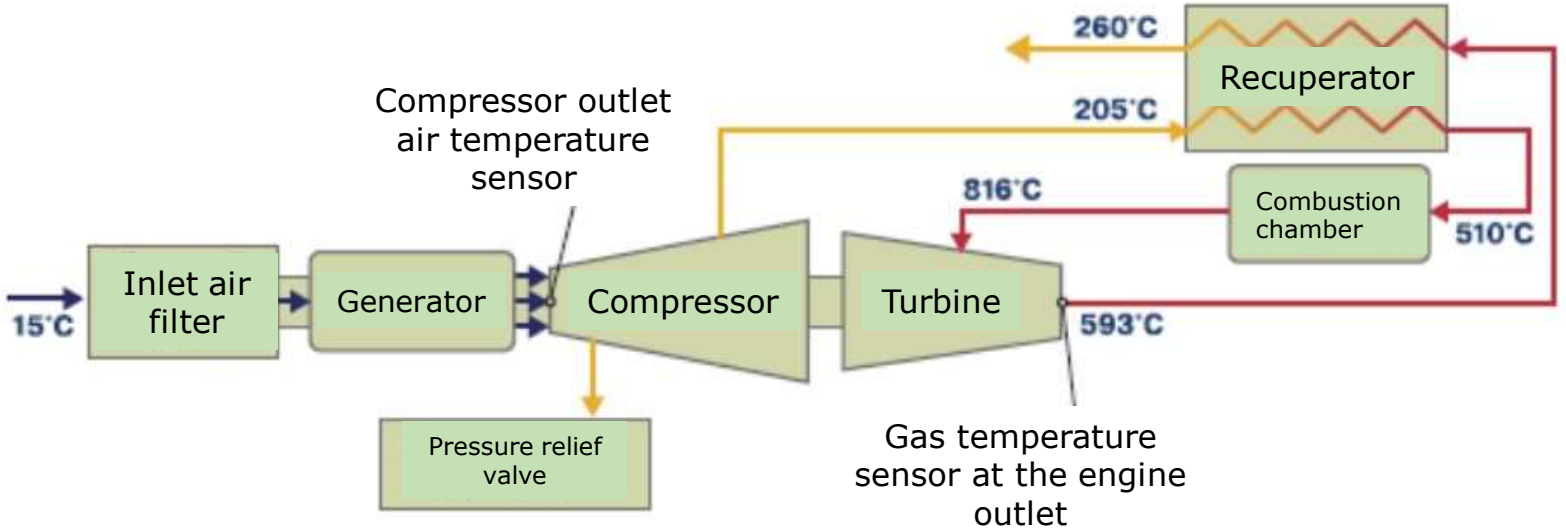

Gas turbine unit:

- easily integrated into the technological cycle of the plant;
- uses the heat of the exhaust gases;
- increases the efficiency of fuel combustion;
- reduces the cost of plant operation.

In addition, the gas turbine plant is a multi-fuel plant. It can run on motor fuel, natural gas and synthesis gas.

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№	Name
1	Volume of generated electric
2	Efficiency of a gas turbine u
3	e amo leased gas com ch
4	Sp ific he of synt sis ga combustion
6	Gas for the operation of the unit per month

№	Name	Unit of measurement	Value
1	Average heat output	kiloWatt	320
2	Plant consumption with an 8 hour cycle	cubic meters	256
3	The consumption per day	cubic meters	768
4	Gas consumption per day	cubic meters	6144
6	Gas consumption per month for pyrolysis boiler operation	thousand cubic meters	184
7	Total synthesis gas consumption for the plant's own needs	thousand cubic meters	228

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The net profit of the plant will be 14 million rubles per month or 168 million rubles per year. If transport is included in the structure of the plant, the profit will be significantly reduced, but the plant will still give profit.

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Conclusions:

The mini-plant will provide itself with electricity and fuel. This will allow:

- not to build a gas pipeline and a power line,
- to reduce capital construction costs
- to install the plant in any convenient location.

1 such plant is enough for district centers with a population of up to 100 thousand people. The needs of the regional center with a population of about 0.5-1 million people will be fully covered by 2-3 landfills with 4 - 5 such plants. Currently, the Penza region needs 35 such plants, the whole country needs several thousand plants.

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Thank you for your attention!

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