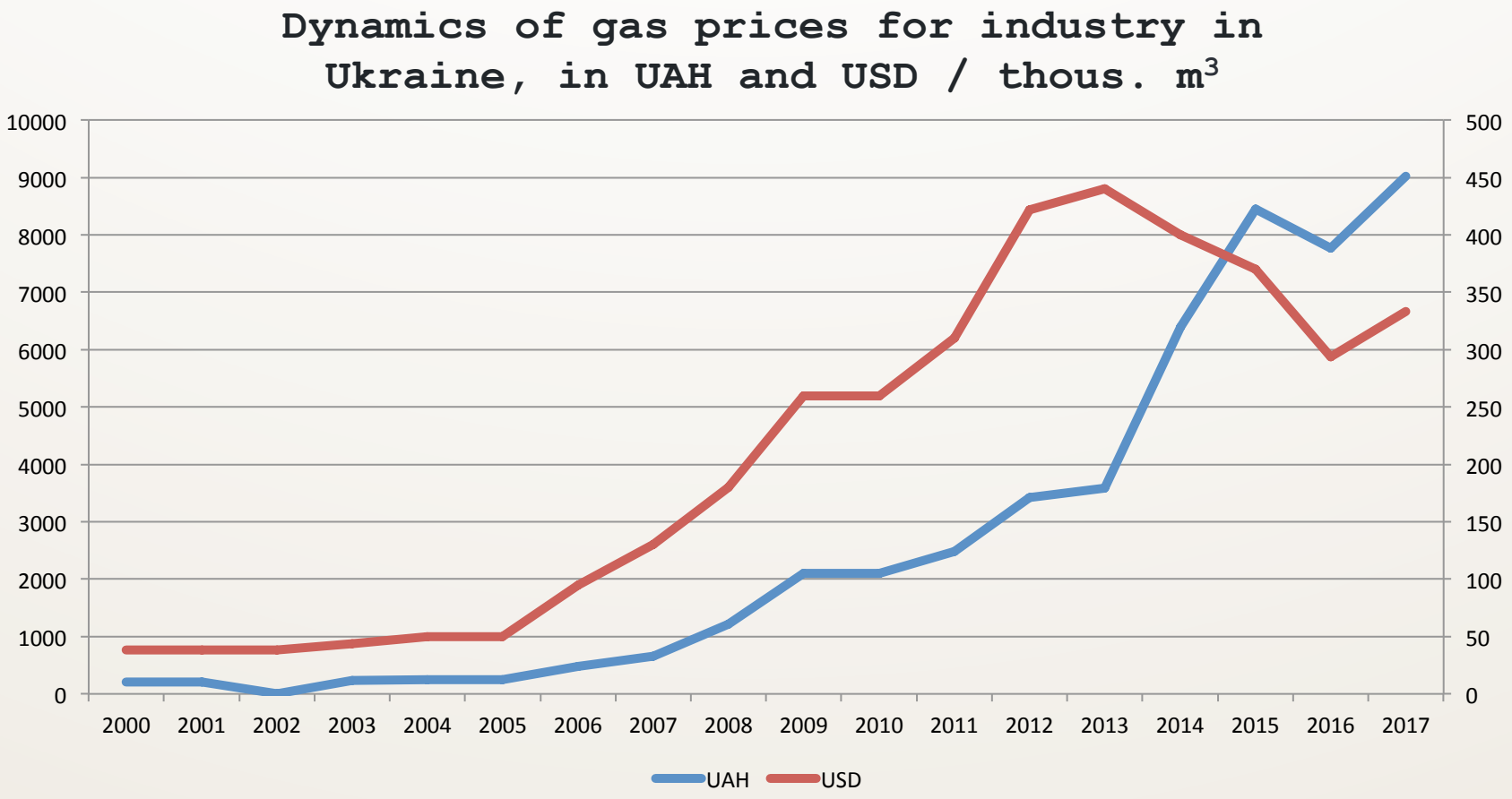
COGENERATION UNIT IS BASIS FOR THE SUCCESSFUL DEVELOPMENT OF TERRITORIAL COMMUNITY

2018

The main shortcomings of the current domestic energy system are:

1. Regular growth in the cost of energy resources, which leads to a decrease in profitability of production and a decrease in real incomes of the population.

2. High degree of dependence of the end user on the monopoly position of the energy supplier, incl. in the context of a high degree of deterioration of the main transport channels and generating enterprises.


Dynamics of gas prices for industry in Ukraine, in UAH and USD / thous. m3
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
500
450
400
350
300
250
200
150
100
50
0
2000
2001
2002
2003
2004
2005
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2011
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2014
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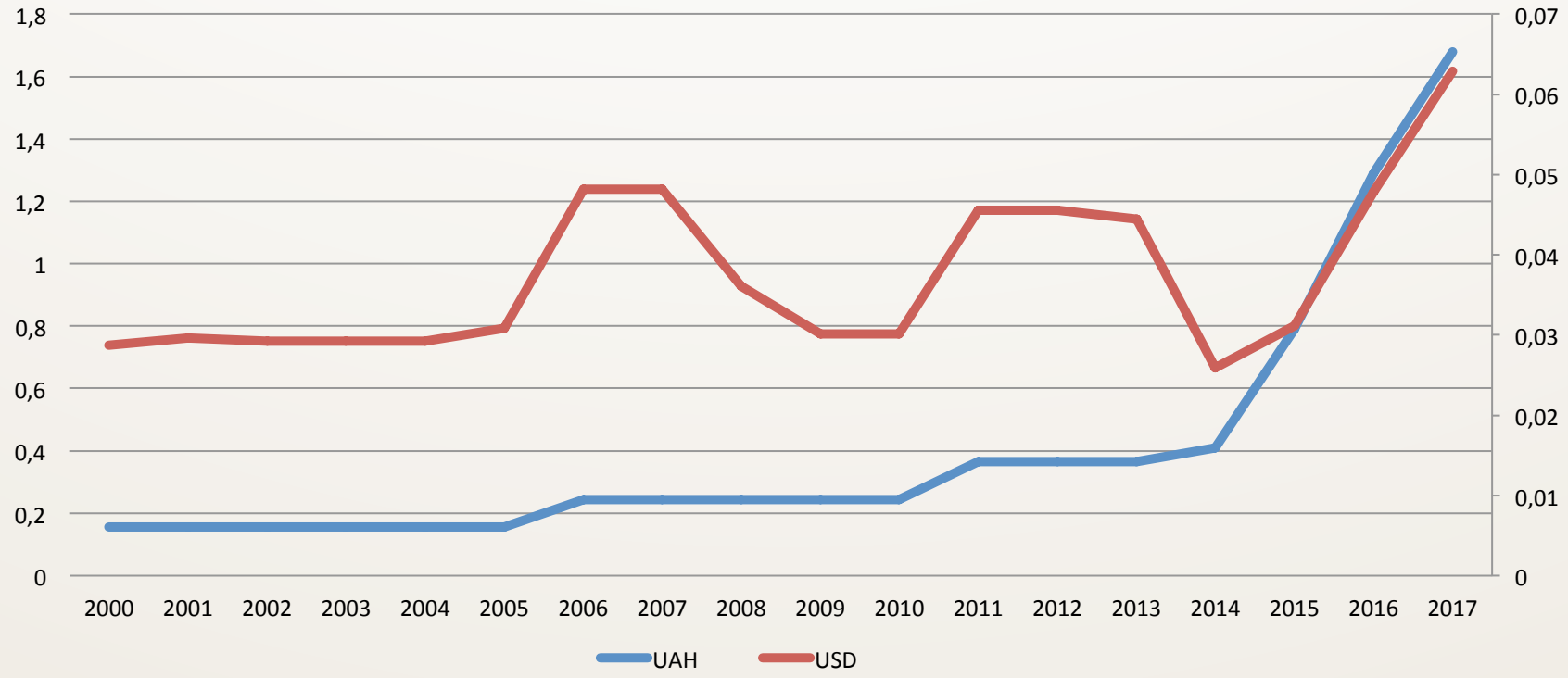
2016
2017
UAH
USD

Dynamics of electric power prices for industry in Ukraine, in UAH and USD / kWh

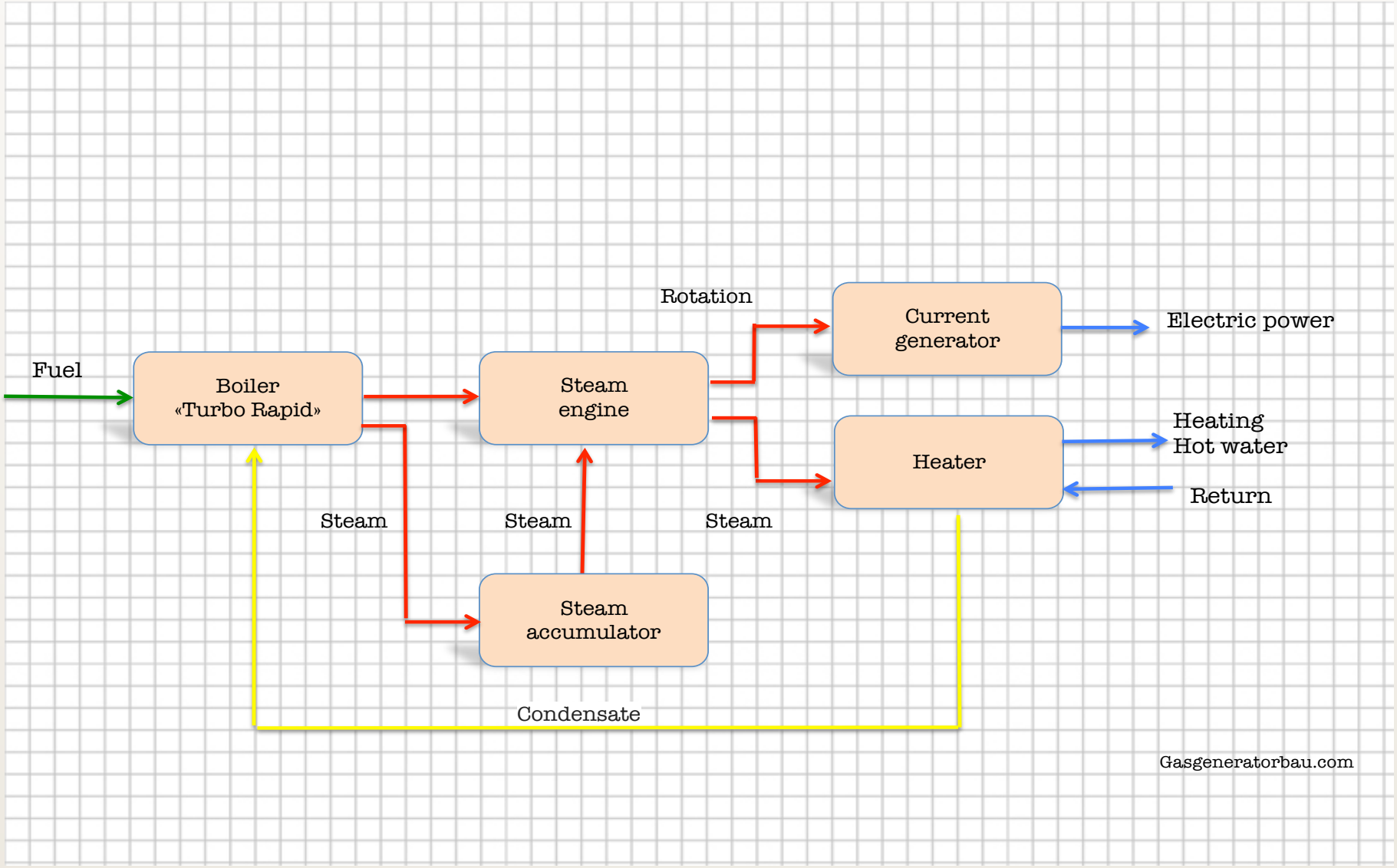


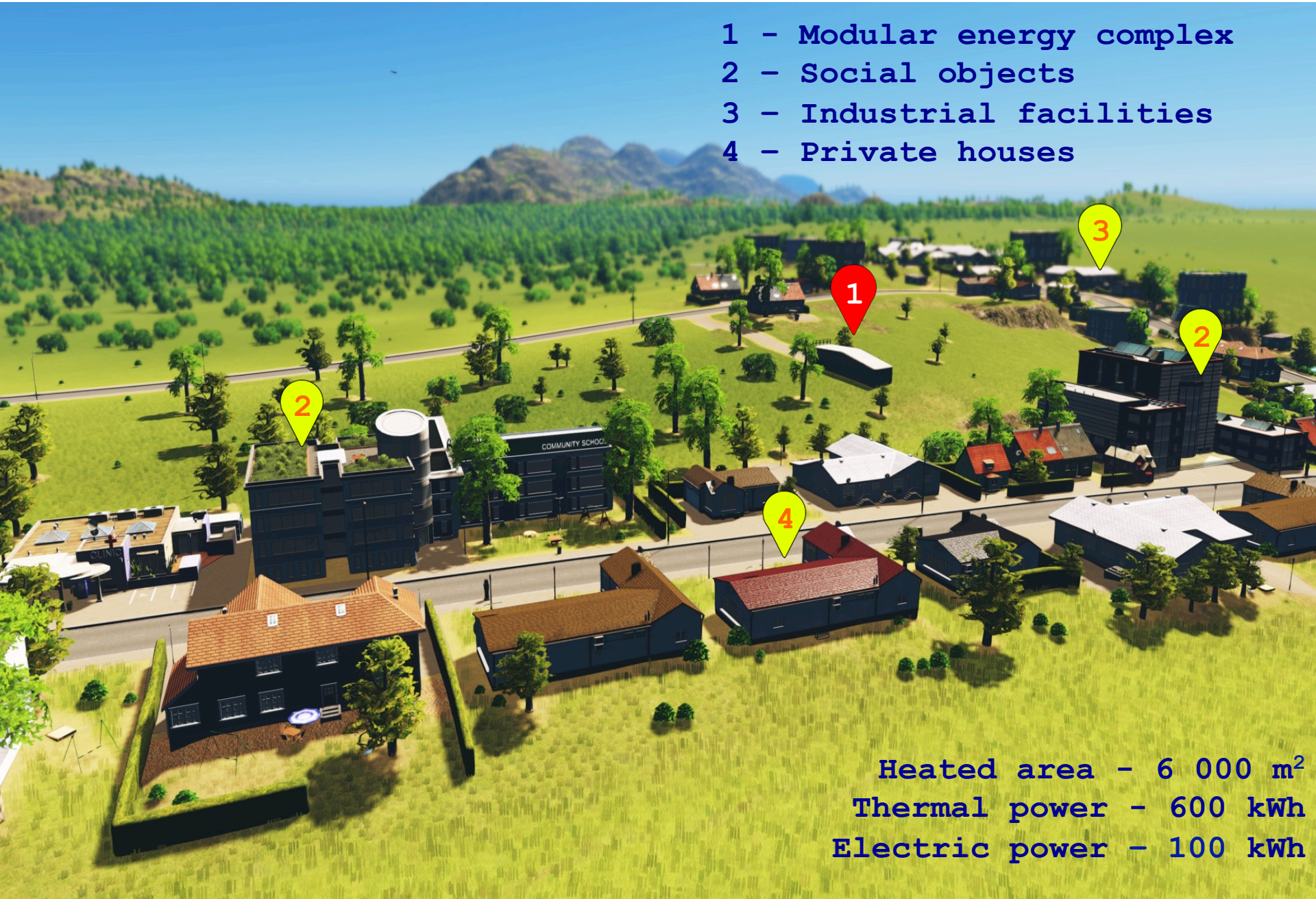
The main objective of the company activity «Gazgeneratorbau» is a significant reduction in the cost of energy for energy consumers.

To solve this problem the company «**Gazgeneratorbau**» has developed a scheme of the «**Cogeneration Unit**»**(CU)**, which includes equipment of its own production:

- Boiler equipment of the type «TurboRapid™»;
- Steam machine unit, coupled with an alternator;
- Steam accumulator;

COGENERATION UNIT. THE PRINCIPAL SCHEME

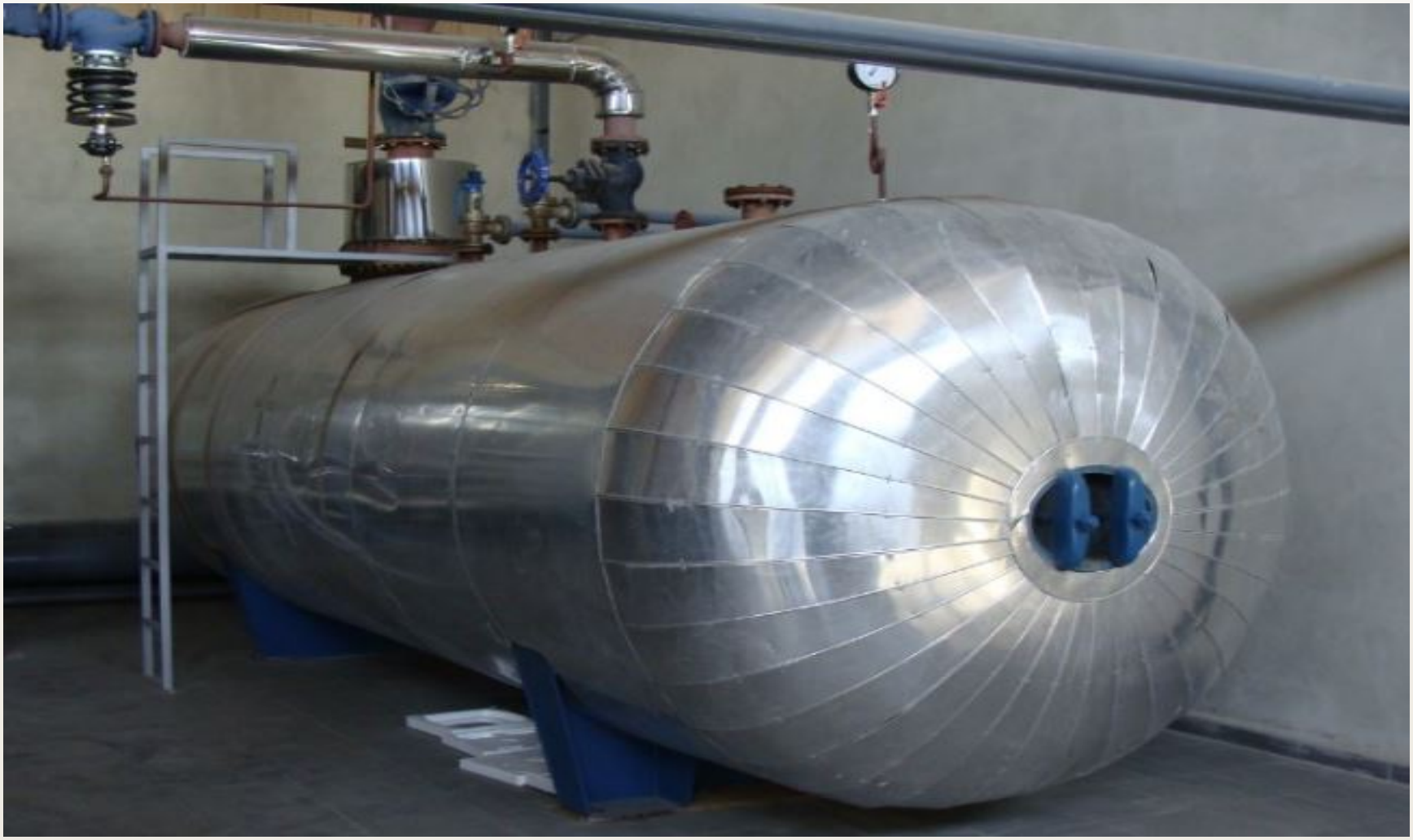



1 - Modular energy complex
2 - Social objects
3 - Industrial facilities
4 - Private houses
1
2
2
3
4
Heated area - 6 000 m²
Thermal power - 600 kWh
Electric power - 100 kWh

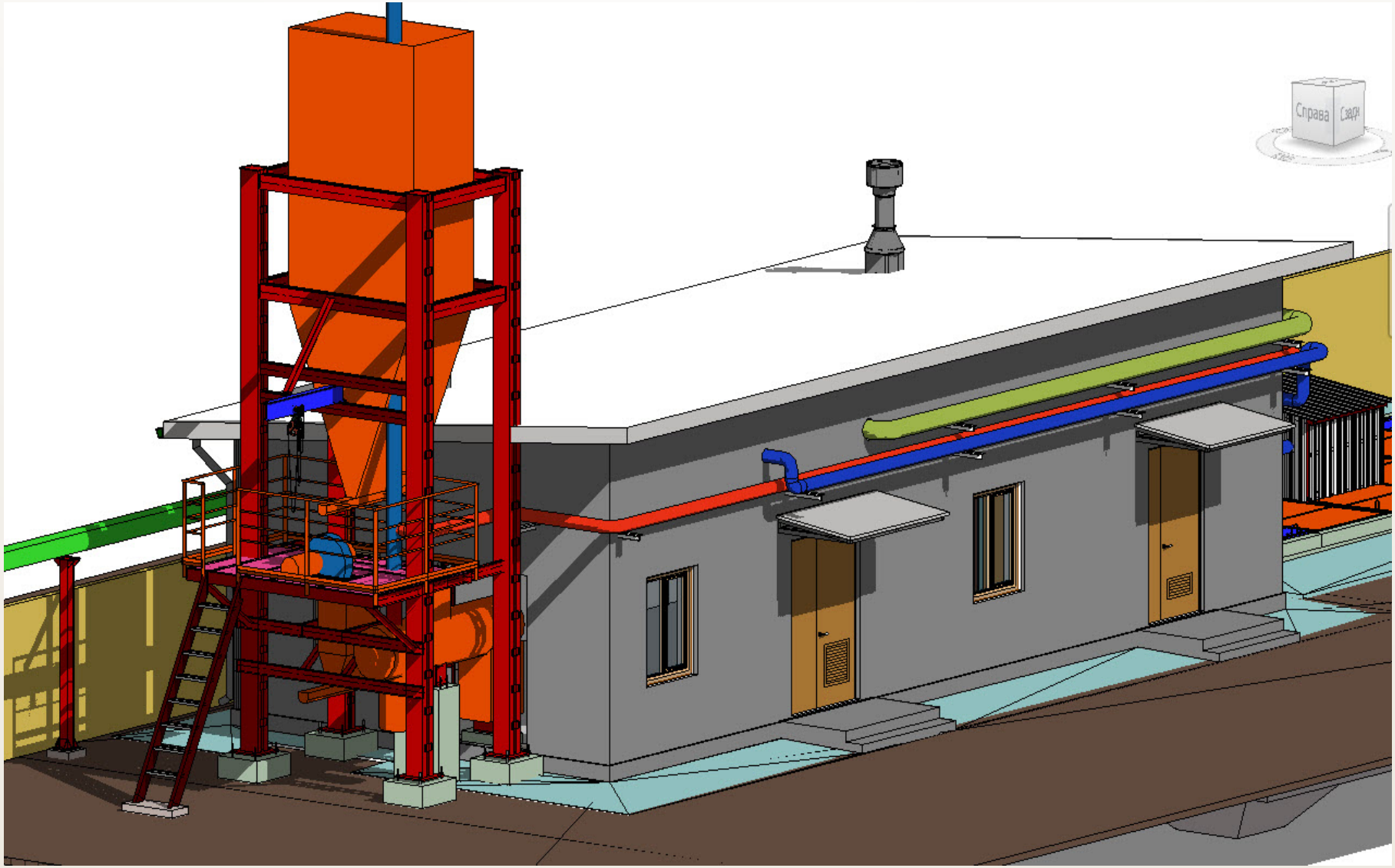
ELEMENTS OF THE COGENERATION UNIT. BOILER

ELEMENTS OF THE COGENERATION UNIT. STEAM MASHINE UNIT

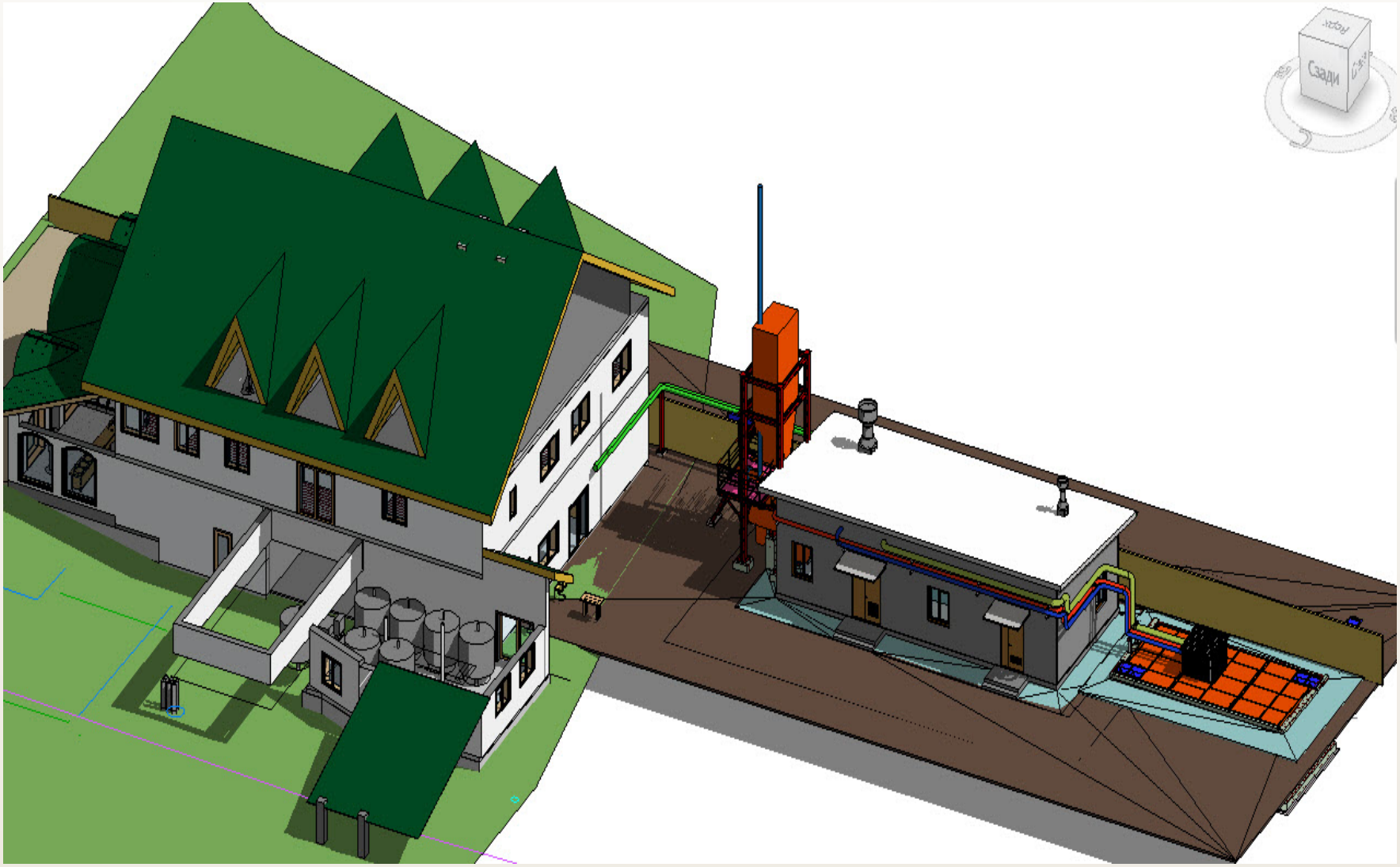
ELEMENTS OF THE COGENERATION UNIT. STEAM ACCUMULATOR



COGENERATION UNIT. PERFORMANCE VERSION



COGENERATION UNIT. PERFORMANCE VERSION



MAIN ADVANTAGES OF THE PROPOSED TECHNICAL SOLUTION:

1. The principal reduction in the cost of energy resources: heat energy - from 7 euro per Gcal, electric - from 0,01 euro per kWh.

2. Energy autonomy and integrated provision of a settlement or an industrial facility with heat, electricity and hot water.

3. Use of renewable raw materials of local origin (leaves, chips, straw, pellets, coal, peat) as a fuel without changing the design of the boiler.

4. Providing of conditions for saving the city's budget and investing additional funds in the infrastructure and sociocultural development of the community.

A COGENERATION UNIT A SUCCESSFUL BUSINESS

Given the presence in the fuel-energy unit of elements capable of generating energy, it seems possible to separate them into a separate unit - the cogeneration unit (trigeneration).

Cogeneration is a process of joint generation of electrical and thermal energy.

Trigeneration is an option for the realization of cogeneration in which thermal energy is used to produce cold.

As raw materials of vegetable origin are used as fuel, the work of this block is subject to the following legislative acts:

Law of Ukraine dated 20.02.2003. No 555-IV "About Alternative Energy Dates".
The Law of Ukraine dated 14.01.2000. No 1391-XIV "About Alternative Visions of the Paliva".
The Law of Ukraine dated 05.04.2005. No 2509-IV "About the combining of the vibrobitniy heat and electricity electricity (cogeneration) and the vicarities of the skid energy service."
Law of Ukraine dated 13.04.2017 p. No 2019-VIII "About the price of electricity".

What gives the right to apply the "green" tariff

COGENERATION UNIT.
BY COMPARISON WITH A SPS

The cogeneration unit includes the following elements:
- Boiler equipment of the type «TurboRapid^{tm}»;
- Steam machine with alternator;
- A steam battery.

The cost of CAPEX for the production of an installation 1 MW of electricity will be:

№	Exspenses	Value, euro
1	Carrying out of the design works	300 000
2	Manufacture of the basic equipment	1 700 000
3	Purchase of the additional equipment	425 000
4	Installation of the equipment	170 000
5	Construction works	700 000
6	Obtaining a license and a "green tariff" (feed-in-tariff)	15 000
7	Total costs for CAPEX	3 310 000

COGENERATION UNIT. BY COMPARISON WITH A SPS

	CU	SPS
Installed power, kW	1000	1000
Lowering factor	1	0,16
Real power, kW	1000	160
Green tariff, euro	0,132	0,15
Gross income per year (electric), euro	1 156 320	210 240
Gross income per year (from heat), euros	1 765 369	0
Total gross income, euro	2 921 689	210 240
Costs of CAPEX, euros	3 310 000	990 000
Costs of OPEX (fuel only), euro	130 000	0
Net income per year, euro	2 791 689	210 240
Payback, years	1,18	4,70

COGENERATION UNIT.
BY COMPARISON WITH A SPS

Note. When comparing the parameters of OPEX, the costs for routine maintenance of equipment, wages and taxes were not taken into account, since for convenience of calculations they were accepted as being the same for both the CU and the SPS (solar power station).
Thus, the introduction of the cogeneration unit as an integral part of the fuel and energy unit ensures a short payback period.

Comparison of financial results from the introduction and operation of the cogeneration unit and solar power plant shows that despite the greater capital costs of the CU, the gross income from its operation is approximately 6 times greater than from the SPP.
This result ensures a short payback period for the CU, which is several times smaller than that of SPP solar power station .

COGENERATION UNIT. CONCLUSIONS

The use of the cogeneration plant in comparison with other technical solutions has a number of undeniable advantages, the main of which are:

- the minimum area occupied by the installation, which is estimated at tens of square meters rather than hectares;

- the derivative of this advantage is a smaller amount of land tax;

- higher efficiency of electricity production. CU produces 1 kW of electricity with a cost of 0.01 EUR, and SPS - about 0.1 EUR;

- this circumstance makes it possible to minimize the payback period of the installation;

- the possibility of simultaneous generation of thermal energy provides important social and economic benefits.