COMPARISON OF COGENERATION SUPPLY SCHEMES IN CONNECTION WITH THE PRESENCE INTERCONNECTED POWER

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Today cogeneration is one of the most promising technologies allows energy primary fuel with the highest efficiency. The coefficient of performance (COP) of modern cogeneration plants (CHP) reaches 90-92 %. This high efficiency CHP explained elaboration of two types of energy: first - generated electricity, and then - thermal energy through heat recovery fuel is not used in the main process. For different types of CHP with the same total efficiency ratio produced electricity and heat significantly different from 1: 1-1.2 for CHP based on reciprocating internal combustion engines to 1: 10.12 for add-boiler systems to power equipment. The maximum efficiency of CHP with the largest power generation, ie those power plants, allowing the fullest use exergic potential primary fuel. Thus, in terms of primary energy savings, the most efficient CHP are based on reciprocating internal combustion engines. Therefore, the analysis will consider CHP power is such CHP.

The necessary conditions of efficient energy from CHP facility is made maximum use of energy and the most complete coincidence CHP power generating capacity and energy needs of the consumer. However, the latter practically does not occur. Seasonal and diurnal variations of energy consumption, the differences in energy needs in different seasons and unrelated nature of fluctuations of electric and thermal loads do not allow, in most cases, coordinate both electric and thermal power and CHP energy needs of the consumer. If due to the interconnected power there are basic types of coordination:

- For the heat load, thermal power cogeneration system at any point in time is the thermal load of the consumer. Electric power if it is excessive - sold to a single electrical outlet if it is not enough - purchased from the grid;

- The electric load: electric power CHP is electric load of the consumer. Heat if its more than the customer needs - is discharged into the environment, if less -

using additional thermal power in the form of post-combustion fuel in recovery boilers and auxiliary boiler;

- Mixed coordination modes, depending on the electricity tariff on certain days and hours during certain time periods applicable reconciliation mode electric load, in other time periods - for thermal loads.

Given the fact that excess electricity generated in CHP in power in Ukraine adopted a law on cogeneration, can be directed to a single power grid and excess thermal energy generated in CHP - released into the environment and lost most promising consider adjusting capacity CHP and the consumer is by thermal energy. With this kind of coordination capacity CHPs are regulated so that it produced thermal energy corresponding to the thermal needs of the consumer. As for electricity, the relationship CHP with a single grid can solve issues like excess and lack of electricity to consumers. In such circumstances, power control again become useful CHP based on reciprocating internal combustion engines that allow you to adjust the power of CHP in significant range (30-100% of maximum capacity) without a significant reduction in the efficiency of energy production. Thus, the daily fluctuations of the energy needs of the consumer can be satisfied by adjusting power CHP. But at the same time, consumers need to heat the heating period and unheated differ significantly - according to some 4-6 times. For objects agriculture heat consumption during the heating season increased by 3-4 times compared to unheated period is almost constant power consumption throughout the year. To meet the heating needs of consumers during the heating season regulation CHP capacity is not enough. Therefore, the existing schemes of energy at the CHP, CHP power when matched by the energy needs of the consumer in unheated period, increasing heating during the heating season is due to additional thermal capacity.

In addition to the power supply circuit based cogeneration system, can supply scheme II, which consists of several CHP units. Crushing CHP generating capacity allows for year-round supply of consumer energy produced by the CHP, compared with a variant I. In addition, this scheme increases the reliability of

power supply CHP and allows routine maintenance of individual units in unheated period without stopping the entire CHP.

There are other schemes implementing cogeneration power in terms of fragmentation CHP generating capacity (Scheme III, IV.) In these schemes increase the cost of primary fuels and heat loss to the environment as unheated period, but this increases the amount of power that is given to a single mains .

The purpose of research - comparing the effectiveness of different schemes cogeneration power due to the presence of a single grid.

Materials and methods research. In this paper the comparative analysis of existing and possible schemes for combined heat and power supply.

The basic condition for comparing different power schemes is customer satisfaction in the electrical and thermal energy in full. To compare energy schemes select an object of power, which is typical for small livestock agriculture of Ukraine in Kyiv region. The fuel used is natural gas.

Results. Despite the increase in power CHP cogeneration power versions compared to the version I and, consequently, increase the value of KSU, payback for all versions and is about the same 6,5-8 months.

Annual savings from the use of cogeneration technologies in variants II, III and IV than in the form and in 2-2,3 times, which yields higher income after payback period of CHP.

The cost of equipment in variants II, III and IV are the same, but the actual cost of primary fuels are increasing: In the third embodiment, 124 %, and in the fourth - 148% of the costs for the second option. Annual savings growing at a slower pace, in the third embodiment, 108%, and in the fourth – 116 % of the economy for the second option.

The greatest savings in unit actually get spent primary fuel in the second embodiment cogeneration power: ≈ 3 USD / m^3, which is 1.5 times more than in the I form. With the cost of primary fuels 3.2 USD / m^3 actual costs using cogeneration power for the second option, subject devoted to a single mains electricity are ≈ 0,2 USD / m^3.