UDC 620.98

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CHOICE OF HEAT SUPPLY SOURCES TO SUPPORT HEATING AND HOT WATER SUPPLY

Increasing energy prices pushes heat consumers to seek ways to reduce the payment for central heating services for hot water supply. To solve this issue one must understand what variants the energy market offers, and thus the cost of the unit of energy received. The analysis of prices for fuel and energy resources and heat generating equipment allows determining the most favorable heat supply option in accordance with the requirements of a particular consumer.

In order to compare the cost of a unit of heat energy, the most common fuel and energy resources in Ukraine were selected, namely: heat energy from urban heat networks, electric energy, natural gas, granulated sunflower husk, wood pellets, brackets from hydrolyzed lignin, straw braces, charcoal (anthracite).

To compare the cost of a unit of heat energy, we will quote the cost of the above-mentioned fuel and energy resources to one common unit - UAH per kilowatt-hour with VAT at the following conditions:

a) The cost of heat energy from urban heat networks (for Zaporizhzhia city) [1]: for the population - 1209.61 UAH/Gcal from VAT, for budget institutions and others - 1720.19 UAH/Gcal with VAT.

b) Cost of 1 m^3 of water for GWP: for the population - 71.66 UAH /m^3 with VAT, for budget institutions and other consumers - 90.89 UAH/m^3 with VAT.

c) The temperature of cold water for DHW is 5 ° C, the temperature of hot water for HWS is 55 ° C.

d) Cost of 1 m^3 of cold water for all consumers - 8.28 UAH/m^3 [2].

e) Electricity cost [3]: for the population - 1.68 UAH/kWh with VAT, for budgetary institutions and others - 2.49 UAH/kWh with VAT. Differential tariffs for the population at night - 50% of the daily rate for the budget institutions and other customers with three-zone of electric energy at night - 0,62 UAH/kWh VAT.

f) Cost of natural gas [4]: for the population - 6957,9 UAH for 1000 m3 with VAT, for budget institutions and other consumers - 11063,4 UAH for 1000 m^3 with VAT. The net calorific value of natural gas is 8100 kcal / m3. The average efficiency of domestic gas boilers is 92%.

g) The average cost of granulated sunflower husk is 2500 UAH/t with VAT. The net calorific value of granulated sunflower husk is 4250 kcal / kg. Average efficiency of solid fuel boilers, which can work on this type of fuel - 80%.

h) The average cost of wood pellets - 3300 UAH/t with VAT. The net calorific value of granulated sunflower husk is 4250 kcal/kg. Average efficiency of solid fuel boilers, which can work on this type of fuel - 82%.

i) Average cost of brackets of hydrolyzed lignin - 2500 UAH/t. Net calorific value of brackets from hydrolyzed lignin is 4360 kcal/kg. Average efficiency of solid fuel boilers, which can work on this type of fuel - 82%.

j) Average cost of straw braces - 2200 UAH/t. Net calorific value of straw braces is 3800 kcal/kg. Average efficiency of solid fuel boilers, which can work on this type of fuel - 82%.

k) Average cost of coal (anthracite) - 6800 UAH/t. The net calorific value of granulated sunflower husk is 7425 kcal/kg. Average efficiency of solid fuel boilers, which can work on this type of fuel - 78%.

The results of calculations of the value of the unit of thermal energy are presented in Fig. 1

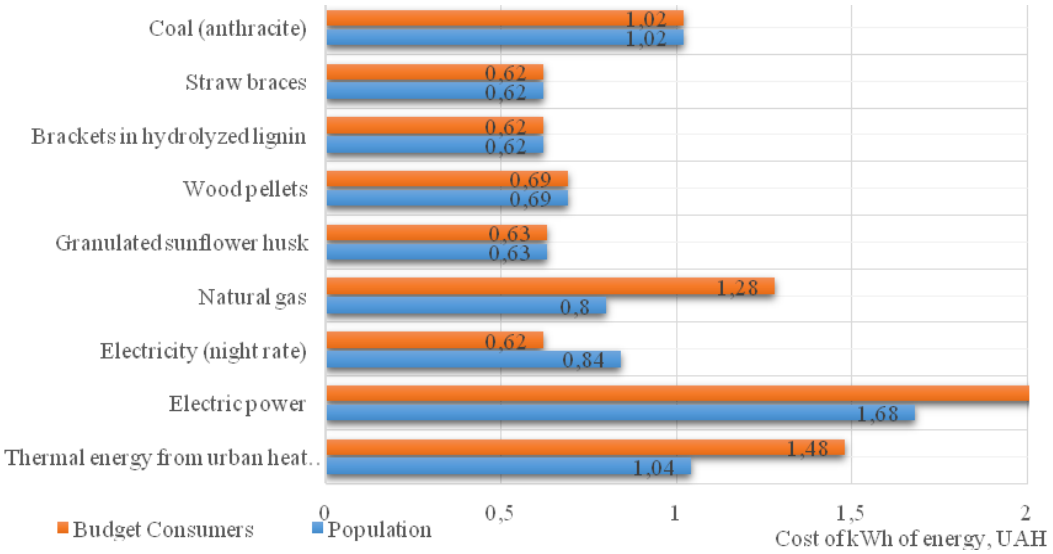

Figure 1 - Cost per kilowatt hour of each fuel and energy resource

For each type of fuel and energy resource, we will determine the cost of preparing 1m^3 of water for the PRT and present the result in Fig. 2

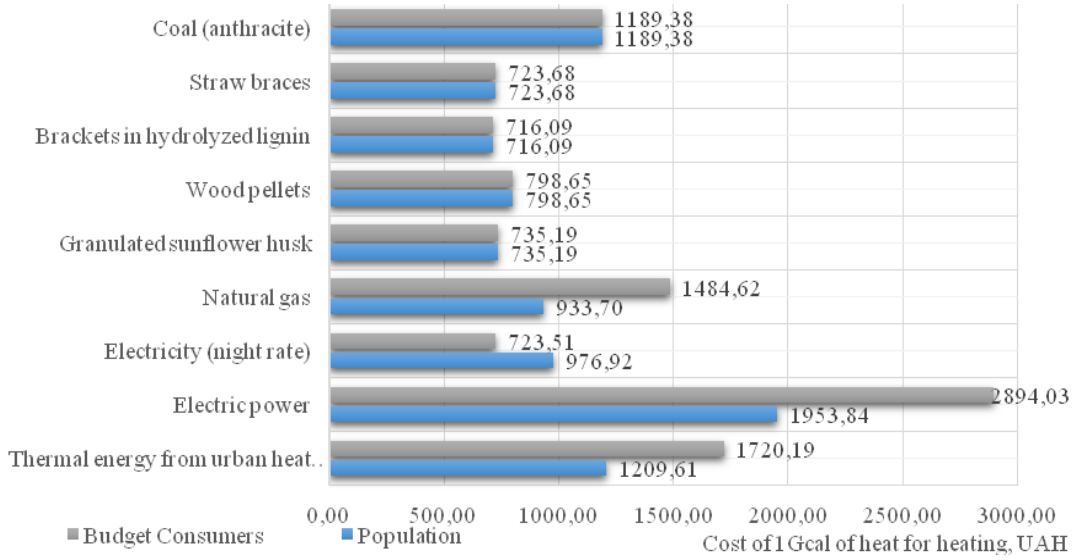

Figure 2 - Cost of 1 m^3 of water for GWP for each fuel and energy resource

Based on the calculation results, it can be concluded that the most promising is the use of energy equipment in biomass and electrical equipment. In cases where the use of biomass and electricity is impossible, the most advantageous is the use of natural gas and coal.

References:

1. Official site of City heating networks of Zaporizhzhya [Electronic resource]. - Access mode: http://teploseti.zp.ua.

2. Official site Zaporizhzhya Vodokanal [Electronic resource]. - Access mode:www.vodokanal.zp.ua.

3. Official site of Zaporizdiaoblenergo [Electronic resource]. - Access mode: http://www.zoe.com.ua.

4. Official site of Zaporizhzhas [Electronic resource]. - Access mode: https://zp.104.ua.