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ANALYSIS OF MAIN ENERGY SAVING MEASURES IN THE DESIGN OF HEATING SYSTEMS FOR INDUSTRIAL BUILDINGS IN KAZAKHSTAN

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Of course, the first priority for energy-saving activities in heating systems is to implement a space-specific heating system that is more cost-effective than other possible systems. The main component of energy consumption of the heating system determines the conditions of stabilization of temperature parameters in the room of the mode «heating-cooling». At the same time, the main share of energy consumption depends on the external environmental parameters, which vary during the year. The second component of the energy consumption of the heating system is determined by the conditions of treatment of the internal air in the ventilation and air-conditioning systems, which also have a sufficient influence on the formation of the climate in a given room [1].

Experience with the introduction of measures to regulate heat consumption in heating systems shows that it is possible to reduce energy consumption to 60%. Measures for the application of different methods of secondary energy use in heating systems show the possibility of reducing the energy consumption of the system to 40% [2].

Construction in Kazakhstan today is on the path of development of energy-efficient and economical construction with increasing energy efficiency of both civil and industrial buildings, When using lightweight structures with sufficient heat capacity and low thermal conductivity, which undoubtedly also has a sufficient impact on reducing the energy consumption of heating, ventilation and air conditioning systems while creating a comfortable climate.

Energy consumption management measures require the availability of the necessary quantity of metering devices that detect actual thermal energy consumption, which may differ significantly from the design value. The excess of energy consumption from the design indicator in the absence of the necessary number of meters can reach 35-40%, which will undoubtedly affect the energy capacity of the system. This excess of energy consumption can be due to various parameters, and

above all, to a poor quality real-volume construction solution for the use of building materials and structures other than design [3-5].

Based on the analysis and systematization of the main energy saving measures, the most rational and cost-effective measures are proposed with an assessment of their potential for energy saving in the heating system, presented in the table 1.

Table 1 - Potential of energy saving measures introduced in the design of heating systems of industrial buildings and structures.

№	Energy saving approaches	Energy saving potential
1	Use of the required number of meters	60 %
2	The use of an automatic system of qualitative control of the heat carrier	20 %
3	Use of the standby schedule of the heating system on weekends and holidays	10 – 15 %
4	Triple glazing in production facilities	3 – 4 %
5	Presence of glazing with increased thermal performance	20 – 25 %
6	Presence of vestibules and thermal curtains	4 – 9 %
7	Application of thermostats for radiators	7 – 9 %
8	Application of temperature controls in heating systems	11 – 16 %
9	Application of individual automatic heat point	25 – 30 %
10	Sealing silos and regulators according to the project regulation	3 – 5 %
11	Introduction of infrared radiation into heating systems	15 – 25 %
12	Application of heat exchanger convectors	20 – 30 %
13	Cold bridge removal	2 – 4 %
14	Application of energy-efficient plate heat exchangers	3 – 7 %
15	Heat-reflecting plant	4 – 6 %
16	Use of water as a heat carrier	15 – 30 %
17	Application of exhaust gas regeneration	15 – 25 %
18	Renewable Hybrid Heating Systems	25 – 40 %

Industrial enterprises are high consumers of both thermal and electrical energy. Moreover, taking into account the main specifics of the industry of the Republic of Kazakhstan, the ratio of thermal energy consumption to electrical in the main share of industrial enterprises of the Republic of Kazakhstan can be presented as 10:1.

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