

DISTRICT HEATING COGENERATION AND HEAT NETWORKS

Analysis of the State of Production and Change in the Pattern of Consumption of Heat Energy in Russia and the Sverdlovsk Oblast

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Abstract—The analysis of statistical data on heat energy consumption in Russia and the Sverdlovsk oblast for 1990–2010 and the comparative investigation of report data of the regional (Sverdlovskstat), federal (Federal State Statistics Service), and international (International Energy Agency) statistical organization are given. The causes of a decrease in heat energy production are analyzed. The problem areas in the operation of communal-general service, heat supplying organizations, and schemes of their collaboration are revealed. Legislative acts and methods for their realization are represented and weak points are determined. Variants for solving the problems of heat supply, namely, the development of the united economic-organizing mechanism of the heat supply system management, are proposed. General principles of such a mechanism are described.

Keywords: district heating supply system, heat production and consumption structure, heat supply problem, heat supply system management

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District heating supply systems have historically been the most popular heating supply systems in Russia. Their significance for the development of the economy of the Soviet power is emphasized in [1]. The large-scale centralization of heat sources resulted in their arrangement in industrial zones at a significant distance from apartment houses. According to [2], Russia with respect to the capacity of district heating supply systems also at the present time passes ahead of the remaining world. However, for 90 years in the country, a significant setback in production and consumption of heat energy was observed, new heat-electric generating stations were not built, and the operating stations lost the essential part of heat load. General causes of that, as mentioned in [2], are the following:

- reduction in the industrial production, which is connected with the shutdown of works and a decrease in steam consumption;

- construction by industrial enterprises of their own boiler houses due to a growth of tariffs for them resulting from cross subsidizing in favor of social consumers;

- building by municipalities and the consumers own small boiler houses because of limitations in connection and of a decrease in the heat carrier parameters, which was introduced as measures in non-payment control;

- and building new boiler houses by developers, municipal and heat supplying organizations, and subsidiary structures of Gazprom and other fuel companies for the development of their own product markets.

In addition, in [1] the following specific disadvantages in the district heating cogeneration are inherent in the Russian economy:

- not only the mode of the heat supply operation, but requirements to the reliability of heat energy supply changed because of an increase in the pipe range and diameter for heating systems with the enhancement of heat supply centralization. The longer the path from the heat source to consumers, the less reliable their heat supply [1];

- one of the weakest sections in the heat supply system is the heating systems; causes of this, in the author's [1] opinion, is the unreliability of applied construction of the underground heating conduit and the lack of reservation, though this is directly provided by SNiP (Construction Norms and Rules);

- the hot water circulation in the lengthy hot water supply systems is organized very unreliably and disturbances in its supply for upper floors are often observed;

- “overburning” in the autumnal and vernal periods cannot be eliminated at the qualitative (by a variation in the heat carrier temperature at its constant flow rate) method accepted in the country for the heat load control; the excessive consumption of heat energy for heating in this time, by data [1], may attain 2–4% of the annual volume; and the exposure of controlling instruments at consumers at the cost of means of manufacturers or the municipality seems unreal.

According to [3], there is a need to refer the following to disadvantages of the district heating cogeneration under modern Russia conditions: