Practical Aspects of the Improvement of Heat Supply Systems

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Abstract

This paper investigates major points of the practical aspects of the improvement of heat supply systems. On this case, research of the heating systems in different places were conducted. Examples of the Republic of Uzbekistan were mentioned in the research methods. Finally, it concluded with outcomes and shortcomings as the whole.

Key words: *Practical aspects, heat supply systems, heating problems, development, infrastructure*

Introduction

Practical aspects of the improvement of heat supply systems were mentioned in the point of the development from various points of view.

The heat supply system can be classified by several key features, depending on the location of the source of heat energy relative to the consumer, i.e:

centralized;

not decentralized.

The equipment for the preparation, transmission and use of the heat carrier is a centralized heat supply system. In such systems, the heat source and the consumer's heat transfer equipment are often located at a considerable distance, so heat transferring from the source to the consumer through the heat transfer network. The main advantage of centralized heat supply is the ability to use fuel more effectively and achieve synergetic effect. This can be accomplished through production of heat and electricity (cogeneration). Conditional fuel savings are achieved by utilizing a high-performance coefficient of high-power pumps and gas or steam turbine equipment, which allows for heating water by using a rationally dispersed gas or separated vapor. Combined sources of heat energy generated by the combined method are essentially a co-product in the production of electricity. The advantage of centralized systems is the efficient and environmentally safe burning of low-grade mazut or coal and household waste. Due to the high cost and complexity of the gas-fume smoke systems for the separation, transfer and combustion of such fuels, and the removal of harmful waste, construction of only large centralized heat sources can be technically and ecologically justified. Centralized sources pollute the city's atmosphere at least as the source of heat production is substantially distant, usually outside the city's borders. Ecological aspects play a major role in the provision of access to administrative resources through centralized sources in large cities.

Main part

Centralized sources of energy efficiency are largely dependent on the growth of the coefficient of utility efficiency, mainly due to the use of modern equipments (boilers, combustion equipment, gas and steam turbines, heat exchangers, electricity generators, etc.) in the production of thermal energy. One of the key features of increasing the efficiency is the creation of automated systems, that is:

Automated information-computing systems for trading energy resources of energy enterprises. In addition to the objective assessment of energy efficiency, this system allows for an automated and short-term analysis of energy costs of enterprises for their own needs, as well as finding defective or explicit errors in energy efficiency. In addition, automated systems allow accelerating the response to emergency situations and improving the quality of work of technological dispatchers.

automated process control systems. These systems allow optimizing the complex process of processes described by the complexity of the bulk density and management algorithms.

The main drawback of the centralized heat supply system is the significant loss of heat energy in heat networks and the cost of the network. The cost of heat energy for end-consumers includes heat generation and transmission costs. Loss of heat transfer in major sources of centrifugal heat supply eliminates the cogeneration effect. Therefore, one of the main directions of increasing the efficiency of centralized sources and their advantage over non-centralized sources is to eliminate losses through the replacement of heat pipe pipelines with pre-insulated pipes with high hermetic polyethylene shell. This crust excludes groundwater corrosion and electrical corrosion.

The heat transfer device from the unbounded source can be heat-transfered without heating. The centralized heat supply system is individually and locally based. In the individual system separate heat supply is provided from a separate source for each residential and non-residential building. These systems are particularly heated and furnace heating. In the local heating system, each building is provided with a separate heat source, usually from a local boiler. Currently boilers and additional boilers are being developed. Additional built boilers are, in principle, designed for a group of buildings and are installed in an additional room in the immediate vicinity of the building group. Roof boilers are designed for one building and, as a rule, are designed and installed in newly constructed buildings. The installation of the boiler in the old buildings is rarely possible because the construction of such buildings is not considered an additional burden. Installation of boiler houses in individual heating boilers of old buildings is usually not done, because it is connected with the organization of complex riot systems.

At present, centralized heat supply systems are increasing in large cities of the republic. Their further development will continue in the near future. At the same time, in the case of new construction, especially in the construction of individual and low-rise buildings, may even increase the supply of centralized heat supply. In this situation, the competitive factor of centralized and decentralized resource prices plays a greater role. Price competitiveness by unbalanced heat supply will be cost-effective to optimize and improve the price policy in the centralized heat supply sector.

The central heating system can be divided into four groups:

- inter-city heating supply of several cities;
- the city provides heat supply to several districts;
- heat supply of several buildings (district);
- The group (quarter) is the heat supply of the building group.

Inter-city and inter-city heat supply in Uzbekistan, as a rule, is carried out by large Thermal Power Plants (IEMs), which utilizes heat and electricity generated from condensation. One of the advantages of large IEMs is the use of high heat levels in heat networks that reduces the cost of operating heat transfer devices. In the production of mixed concrete, heat supply is a major difference in heat energy supply, where electricity is generated at power stations, and thermal energy is produced in boilers.

Basically, the efficiency of the thermal power stations is considerably lower than the efficiency of the IEM due to the low heat of the steam used for condensation (cooling) in the gradients.

The group, district, and sometimes city centralized heat supply are often provided with only boilers for heat energy production. The main drawbacks of the boiler to the IEM are the low efficiency. This is due to the fact that the heat level is not capable of generating high-temperature heaters, increasing heat transfer and additional costs. Moreover, due to the lack of combined production of electricity, the efficiency of the boilers associated with high fuel costs will decrease.

Theoretical background The main way to increase the efficiency of small boilers is to organize heat and electricity generation by mixing, first of all, with the use of microprocessor equipment with a capacity of 30-350 KW. Gasoline turbine equipment with high power capacity (250 kW to 15 MW or more) in large boilers, cogeneration at the expense of internal combustion engines with gas piston and steam turbine units is desirable. It should take into account the installed electricity and consumer load schedule (winter / summer, day / night, and hourly adjustments). Thus, the main advantage of the microprocessors is that they can be used in centralized heat sources due to their ability to operate at objects with high load capacity.

The heat transfer system can be divided into water and steam by type of heaters.

Steam is a potentially high thermal loader. Regardless of the low cost of the steamer and its low cost-effectiveness, the technological requirements of steam or industrial plants are used for the needs of IEMs. Vapor condensation obtained from the remaining heat from the IEM is used to fill the network water for subsequent repetition in the boilers for further vapor recovery. As a result, as a result, the effectiveness of combined power generation and complete energy equipment from mix production increases. Steam with very high potential is more expensive than heat.

Utility energy uses water for heating purposes. In addition to the abovementioned reasons, it is advantageous for water systems to have high battery capacity due to its high thermal capacity. Deficiencies are high sensitivities and high pressure reliability of the heat carrier, which requires strong link between all points of the centralized heat supply system. Heat supply is divided into open and closed systems, depending on the use of heat-carrier hot water supply (IST) requirements. In closed systems, water can only be used as a heat-transferer and can not be drained through the heat-circulating system. This is used for hot water supply, which is heated by means of a heat exchanger and dispatched to a water dispenser. In open systems, circulating water is partially consumed by consumers for hot water supply. The heat supply systems in foreign countries are closed, while in the CIS countries both systems are equally represented. This means that in many cities and towns of our country, hot water is unusable since it is treated as a heat transfer system for special chemical corrosion.

Transition to closed heat supply systems is an important factor in increasing the cost efficiency of centralized heating systems. The purely economical benefit is due to a sharp reduction in the costs of chemical preparation, since heat carriers can not be removed from the heat supply system.

In the heating system of the consumers, depending on the type of pipe conduit, the water heating systems can be one pipe or two pipe. In one pipe conduit, all heating equipment is mounted on top of each frame of the multistage building and connected to the single pipe conduit. As the heat transfer device passes through each heating device, the temperature of the container decreases. This, in turn, requires the expansion of the heatsink area of the heating equipment with the movement of the carrier. Therefore, one pipe carrier is characterized by a strong hydraulic connection of the serial heating

equipment and requires compliance with the values of the calculated project. A single pipe carrier is relatively inexpensive compared to the two pipelines in terms of capital expenditure. That is why he has gained popularity.

The main difficulty is the complexity of using a single tubular carrier for automatic individual control of room temperature using common thermostatic valves in European countries. There is also a possibility to install and operate two-stage thermostatic valves in one pipe carrier of a technical heating system. However, for the installation of two-phase valves, the mounting costs are considerable, as the connecting rods have to comply with the geometry of the connection. Therefore, due to the change in the hydraulic resistance in the installation of the valves, the installation of the main tracks is necessary, taking into account the distribution of the heat transfer fluids. This significantly reduces the interest of consumers to install thermostatic valves due to the length of time (5 to 10 years).

In the two pipe plugs, the heating equipment is connected in parallel to the pipe conduit. One of the pipes is a sender, and the other one is acceptable. The lack of a rigid hydraulic connection of heating equipment in such carriers enables easy installation and operation of thermostatic valves. According to the final conclusion, the individual room temperature control allows the consumers to effectively utilize thermal energy and reduce their overall demand and force suppliers to increase the efficiency of the production, transmission and distribution of heat energy under conditions of limited growth. That is why individual control of one of the key roles in raising energy efficiency in the entire heat supply system.

As you can see, the optimization of the heating system of consumers is not the concern of consumers, but consumers themselves.

However, it is possible to imagine that in the case of multi-apartment housing construction and overhaul and modernization of existing homes consumers will switch to two-pipe heating system. The process of heat consumption optimization in the housing sector is of particular interest to this process by considering that homeowners are one of the most important opportunities to develop their business. This means that heat supply companies need to be timely aware of consumers' needs for changing their heat consumption to a greater extent than ever.

The heat supply of the heat supply can be either dependent on the heat supply scheme depending on the hydraulic component of the heat supply network. In the direct connection scheme, the heat transfer device moves directly to the heating device of the consumer (without the intermediary). In the indirect connection diagram, the heat transfer carrier passes through the heat exchanger and heats the secondary heat transfer carrier used in the consumer heating equipment. The direct connection diagrams depend on the pressure of the heating system in the consumers heating system. The direct connection scheme has low mechanical strength, which reduces the limits of a possible operating mode of the centralized heat supply system, and is the main drawback of the thermal network's strong hydraulic connection with the heating equipment. This significantly reduces reliability and complicates the use of heat supply systems in major cities. Therefore, the heat transfer networks do not use theoretically high heat temperatures (170-1900S). The maximum temperature for heaters is up to 1200 ° C. In heating equipment, consumers use special mixing elevators to accommodate and reduce the temperature of the heat transfer medium. Temperature on the return path using the elevator is reduced to an acceptable level of consumption by heating in the heating system, ie 900S. In addition, the elevators are often referred to by the water mixing for hot water supply needs. Elevator systems are widely used for simplicity and low cost of use. In the case of indirect connection diagrams, an additional circulation pump is required for the removal

of heat transfer carriers other than the heat exchanger. Indeed, the availability of this connection system optimizes the temperature profile of the heat transfer medium using heat control systems (ITP) with a wide range of control systems in foreign countries. This significantly increases the efficiency of the use of heat energy and reduces consumers' costs. Utility heat and power supply markets:

- enterprises producing heat energy (generating enterprises);
- heat-bearing heat-conducting enterprises (transmitting enterprises);
- can be divided into heat energy consumers.

Generating plants in the country are composed of large thermal power stations and small water heaters with gas turbine and steam boosters.

Transmitting enterprises are an integral part of the centralized heat supply system. Their main task is to provide heat energy through heat networks. In contrast to the electricity grid, the heat grid is designed to deliver energy to specific local areas. This is due to the technical limitations of the transfer of heat transferring pipes through long-distance pipelines, the greatest of which is the significant reduction of pressure and the reduction of temperature, and the cost of capital expenditures for the construction of long-distance heating mains, from one settlement to another. As a rule, the heat supply zone is determined by one or more of the city's maximum boundaries of one large source. The longevity of the consumer network and the level of consumer intensity determine its degree of centralization. Utilities utility heat energy utilizes public, administrative and residential buildings. Many of them are multi-apartment houses, with tenants and owners of the room being the ultimate consumers. As a rule, the interests of end-users are protected by housing management agencies acting as multi-apartment homeowners as consolidated customers. However, due to the fact that the governing bodies do not have a realistic effect on the actual energy consumption currently used, and as a result, consumers can not afford to pay for heat energy, which is not a realistic element of the economic system. However, it can be seen in the near future that the role of housing real estate developer and the role of housing management organizations in the relationships of the heat supply organizations. Sometimes, small utilities, which are located in the centralized heat supply area in utility heat energy, are consumers of heat.

Discussions

The low level of competition in utility heat energy is primarily associated with the technological dependence of the heat transfer and transfer of heat transfer in heat networks. The existence of a single heating network for consumers in one settlement is for centralized heat supply. Establishing a centralized alternative to thermal energy does not justify duplicating new networks in addition to existing heat networks for large capital expenditures, and therefore is not implemented. That is why the transportation of heat carriers in centralized heat networks can be included in the field of natural monopoly. Therefore, the lack of a real alternative to centralized heat supply is based on the establishment of state control over pricing. As a rule, the natural monopoly nature of activities is the fact that organizations engaged in the transfer of heat energy and many district and group boilers are the basis for calculating local unitary enterprises. This situation does not help the management of behavioral businesses and organizations. The opportunity to radically change the situation through the development of decentralized supply of new construction facilities creates a competitive price factor. Indeed, the development of decentralized sources of heat energy is the main reason for consumers to seek more flexible approach to consumers and to increase their productivity.

Many thermal energy experts point to the fact that heat and electricity generation in centralized sources is more cost-effective and efficient, even in the case of large-scale losses in heat transfer networks in terms of fuel consumption than in the production of heat energy in non-centralized sources. According to some experts, only those consumers who receive heat energy from the IEMs supplied with electricity in a mixed cycle can obtain a diminished delivery. At the same time, practice has shown that in recent years, the launch of more boom boilers and additional boilers has increased the number of consumers who refuse centralized heat supply. Experts point to this in the definition of heat, which connects consumers with hidden subsidy of energy consumers at the expense of consumers. That is, the price of electricity in mixed combustion is unreasonably lower than that of heat energy. As a result, artificially decreasing opportunities for development of competitive relations in the centralized heat supply system are very limited; in some cases it is only about the local market of thermal energy, where the manufacturer of the heat energy at lower prices, if there is excessive accuracy in heat generation. This approach, in the end of the heating season, provides heat only when consumed for the supply of hot water and excessive free energy generated.

Lack of competition in the market can be competitive for the market. The main form of such cooperation will be long-term lease agreement with private investors for investment obligations on development and modernization of communal heat energy system. New utility infrastructure management new markets are emerging as new national economies. Experts estimate that state and local unitary firms are slowly moving towards a mechanism of public-private partnerships, with long-term lease contracts and concession agreements. The process of full privatization of heat supply enterprises is limited.

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