About heat supply schemes for settlements and city districts

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Annotation The development of heat supply schemes is particularly relevant today as according to the Federal Law of Russian Federation of July 27, 2010 No. 190-FZ “About heat supply” after December 31, 2011, the availability of a heat supply scheme is mandatory for settlements and urban districts in Russian Federation. Heat supply schemes are developed in accordance with the Order of the Government of the Russian Federation of February 22, 2012 No. 154 “On requirements for heat supply schemes, the procedure for their development and approval”.

Requirements for the heat supply schemes in Russia

In the USSR, heat supply schemes for settlements were developed within the framework of the planned economy by design organizations approved by the Gosstroy of the Union republics. Those schemes were considered and approved in the manner determined by the Councils of Ministers of the Union Republics. At the same time, such targets as streamlining of further district heating and excluding the unjustified construction of small boiler stations were set for designers of the scheme in order to save fuel and reduce the number of personnel involved in heat [1–9].

Schemes were developed and used for the design and construction of thermal sources and heat networks of most large settlements, in particular, Leningrad and Moscow. However, the validity of the developed heat supply schemes ended in the 1990s, new schemes were not developed for a long time [10,11]. The reasons for this are the reduction in the total demand for thermal energy and thermal power and, as a consequence, the lack of the need for new sources of thermal energy in the 1990s and 2000s. At the same time, due to the general growth of the economy by 2007, in some regions the demand for heat energy and thermal power returned to the level of 1990s, which necessitated the development of existing heat supply systems [12–15].

In accordance with the Federal Law “About heat supply” approval of the requirements for heat supply schemes, the procedure for their development and approval are within the competence of the Government of the Russian Federation. The specified requirements are not approved by the Government of the Russian Federation yet. However, the aforementioned Law directly contains the
following provisions[16]:

- The approval of heat supply schemes for settlements, urban districts with a population of five hundred thousand people or more, as well as cities of federal significance as Moscow and St. Petersburg is carried out by the federal executive body;
- Approval of heat supply schemes for settlements, urban districts with a population of less than five hundred thousand people is carried out by local government bodies of these settlements and districts;
- The scheme shall contain information on the Unified heat supplying organizations for the relevant territory;
- The scheme should identify the sources of heat supply, their loading, schedules of joint work and temperature charts;
- The scheme determines the effective heat supply zone beyond which the connection of consumers is not appropriate.

In addition, the heat supply scheme should contain measures for the development of the heat supply system, in particular, measures for the conversion of boiler stations for operation in the combined heat and power generation mode, and also, if necessary, measures for the conservation of excess heat capacity.

In terms of ensuring safety, heat supply schemes should provide the redundancy of the heat supply system, survivability and ensuring the uninterrupted operation of heat sources and heat networks.

Planning legislation provides for layouts of planned placement of capital construction projects of local importance, including heat supply facilities, within the boundaries of the settlement or the urban district.

However, the heat supply scheme is not a document of the Territorial Planning. The scheme for the locating heat supply facilities, as well as other layouts for the placement of capital construction facilities, is taken into consideration when developing a heat supply scheme for the respective territory.

The heat supply scheme is used for the following main purposes [16]:

- Definition of the heat supplying organization obliged to conclude a heat supply contract with the consumer (Unified heat supplying organization);
- To determine the possibility of connecting to the heat supply network of the capital construction site and to determine the organization obliged, if technically possible, to carry out such a connection;
- Measures for the development of the heat supply system provided by the scheme are included in the investment program of the heat supplying organization and, as a consequence, can be included in the corresponding tariff of the public utility services.

About actualization of the existing heat supply schemes

The heat supply scheme is a “living” document and must correspond to the actual rates of development of the settlement or urban district, which requires its annual updating. Currently, there is a large amount of work on the annual actualization of the existing heat supply schemes.

The main questions that arise when performing these tasks are as follows:

1. A large number of approved heat supply schemes (especially in small rural settlements) have been designed of poor quality without taking into account the requirements of the Order of the Government of February 22, 2012 N 154 “On requirements for heat supply schemes, the procedure for their development and approval”. Therefore, when updating these heat supply schemes, it is necessary to develop a new heat supply scheme that meets the specified requirements.

2. According to the requirements, the heat supply scheme must be developed for a period of not less than 15 years. Most approved heating schemes are designed only for a 15-year period. After approval of the updated heat supply scheme, the previous version of the scheme is no longer valid. Therefore, with the annual update, it is necessary to shift the billing period by one year. For example, if the initial version was developed for 2015-2030, then the estimated period of the updated version should be 2016-2031. In practice, in most cases, the actualization of the schemes occurs without a
change in the calculation period. For example, it is possible to meet the decision of the local government to update the heat supply scheme for the period of 2017-2026 years instead of 2016-2031 years. Since the heat supply scheme is developed on the basis of the approved documents of the territorial planning of the settlement or the urban district, it is advisable, when updating the scheme, to adopt for the estimated period not the 15-year period, but the estimated period of the master plan.

3. The electronic model is a key element of the heat supply scheme. Modeling of hydraulic modes with the help of the model is the only way to work out perspective options for the development of the heat supply system. In addition, according to the Methodological Recommendations for the development of heat supply schemes approved by the joint Order of the Ministry of Energy and the Ministry of Regional Development of the Russian Federation of December 29, 2012 No. 565/667, with the actualization it is necessary to develop an electronic model of the “second level” with the detailing of distributing (block) heating networks to the end user.

4. The development of the heat supply system should be coordinated with other programs for the development of engineering infrastructure systems. Therefore, it is desirable that the work on the actualization of the heat supply scheme be carried out in conjunction with the Program for the Integrated Development of Utility Infrastructure Systems (PID UIS). When developing the PID UIS, among other things, the target indicators for the development of the heat supply system are determined, which allow one to assess the impact of measures provided for by the heat supply scheme on the quality and reliability of the heat supply system of a settlement or urban district.

5. Annual actualization of the heat supply scheme is necessary for the development and implementation of investment programs for heat supply or heating network organizations. In accordance with article 37 of the Order of the Government of the Russian Federation of May 5, 2014 No. 410, if the investment program does not ensure the implementation of measures to develop the heat supply system provided by the heat supply scheme, the local government within 7 days from the date of receipt of the investment program makes a decision on its return for revision.

In practice, in many cases, the investment programs of heat supply or heat network organizations are included into the heat supply scheme without any justification. As a result, the heat supply scheme turns into an expanded version of the investment program, which is unacceptable. The activities of the investment program should follow from the proposals of the heat supply scheme for the construction and reconstruction of heat energy sources, heating networks and structures, as well as from the assessment (calculation) of the reliability indicators of the heat supply system. The result of such assessment includes proposals for the replacement of worn out sections of heat networks with high values of the failure parameter and do not provide the normative reliability of heat supply.

6. As a result of the actualization of the heat supply scheme, it is recommended that a roster of changes to the current version of the scheme should be made. Also it is recommended to analyze the implementation of the envisaged measures for the development of the heat supply system for the period previous the year of actualization.

**Conclusion**

Most of the issues discussed concerning the quality of heat supply schemes, the estimated time frame, the coordination of heat supply schemes with other programs for the development of engineering infrastructure systems can be avoided if the heat supply scheme is updated as a part of a integrated project for the development of the territory of the municipality. In this case, PID UIS is being developed after the development and approval of the master plan and documents for the planning of the territory. And the heat supply scheme is updated in conjunction with developed PID UIS.

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