District Heating System (DHS) In Georgia

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Histrocial overview

Until 1961 Tbilisi consumers were supplied with heat generated by autonomous boilers, the total number of which equalized 1000 units. At that time the only sources of centralized heating supply was Tbilisi Thermal Power Station built in 1938, which is still operating. In the middle of 1950 an order was given regarding propriety development if centralized heating systems for the city, which gradually replaced the autonomous boilers.

Construction of the first district heating stations (DHS) started in 1958. In 1961, with the start up of the first DHS a new era of monopoly development of centralized heating systems started, lasting until 1989, when the last DHS # 48 commissioning took place.

By 1989 the structure of Tbilisi heat supply system was as follows:
✓ 80% centralized heat supply from DHS;
✓ 6% centralized heat supply from the Tbilisi Thermal Power Station;
✓ 5% centralized heat supply from industrial thermal station;
✓ 9% autonomous boiler facilities;

Consumers of the centralized heating system were residents of about 6000 block of flats and about 100 public and administrative buildings. The centralized heating system supplied heat to 83% and hot water to 75% of the city population.
Centralized Heating System of Tbilisi

Heat Generation

Until 1993 heat generating for the centralized district heating system was carried out by 47 district thermal stations the total thermal capacity of which was 4295 MW. Thermal capacity of separate DHS-s varied from 3.48MWt. Total number of boiler facilities located at DHS-s equaled 326 units. Due to various boiler damages and lack of stand-by equipment, actual capacity of DHS was about 2930 MW.

Average efficiency of small boilers was 65-75%, while that of larger boilers varied within 80-85%.

The Boilers were equipped with gas burners or combined burners which operated using natural gas or mazut (black oil) fuel. Low capacity steam boilers were used for mazut heating. Steam also was used water deaeration. If there were no steam boilers, then deaeration was done by means of vacuum pumps. At present the majority of boiler facilities are in such poor condition that there is no use in rehabilitation. During all of the operating period only minimum maintenance was carried out.
Thermal Energy Supply

Thermal Energy hot water supply in the Tbilisi centralized district heating system was performed by means of pipelines of 1166 lm length. Most of pipes are laid in concrete ducts located on 0.7-1.0 m depth under the city streets. At the same time controlling and locking fittings are located in accessible concrete chambers.

Newer pipelines were laid underground without arrangement of concrete ducts. In such cases bitumen-pearlite thermal insulation was used. Part of the pipes laid on the surface is accessible for inspection. Their thermal insulation is in very poor condition. Lengths of pipelines from different District Thermal Stations to consumers vary from 4.3km to 58 km. thermal networks of District Thermal Station often have connection with each other. Each thermal energy supply network has many loops and cross connections.

The Heating design network was designed to provide a 150°C water in supply piping. But the low quality of locking fittings could not resist the increased pressure at such temperature and the actual temperature of supplied water was about 90°C. According to the assessment of Georgia specialists, about 30 km of thermal networks needed complete replacement by 1993. Such assessment must be considered as underestimated.
Distribution and Utilization of Thermal Energy

About 870,000 citizens of Tbilisi (83% of the whole population) were consumers of central district heating system by 1993. 70% of total thermal energy, produced by all district thermal stations, was used for population needs. Specific heat consumption rate for heating of resident buildings was about 90kWh/m²/year.

About 1000 administrative and public buildings were also served by district thermal stations. Specific heat consumption rate for them was about 75kWh/m²/year.

Before 1990 prices on heat power were stable – 3.87 Rubles/MWh for population and public institutions and 13.97 Rubles/MWh for industrial enterprises.

Heating costs for a middle-level family, occupying about 50m² of heating area, were about 25 Rubles per year. This amount was equal to about 0.3\%0.5% of the average annual income of one family. In such conditions all consumers actually paid bills for their heating supply.
Reason of cessation of DHS in Tbilisi, Georgia

Due to the stopping of the natural gas supply to Georgia, operation of the central heat supply system was ceased and its consumers were left without heating since 1993-1994. After this the main fuels being used the population for winter heating was kerosene, propone and wood.

Possibility for rehabilitation and/or reconstruction of DHS in Tbilisi, Georgia

At present rehabilitation and/or restoration of District Heating System in Tbilisi, Georgia is connected with following obstacles:
First, the existing system is amortized and needed complete replacement with new system
Second, the construction of new system is connected with high cost of it.

A summary of costs for DHS rehabilitation and construction is about 1638 million $.