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Abstract: One of the methods used for heat supply to buildings involves centralized systems, which are best suited to heavily urbanized areas with high energy demand. A major advantage of the centralized systems over other solutions of the heat supply problem is that they enhance the transformation of the primary energy contained in fuels into heat and electricity. The transformations of the energy market that have occurred in the past two decades necessitate extensive research aimed at improving the performance of the centralized systems. In this paper an analysis is presented of the potential application of bifunctional substations involving a one-stage domestic hot water (d.h.w.) exchanger with serial-parallel district heating water supply. The so-called first-stage substations could be a viable alternative especially to the parallel substations commonly used. The research reported on in this paper was conducted in a real object. The results obtained were compared with those of the theoretical analysis. As for the first-stage substations, these comparisons have revealed that if the temperature of the heating water is reduced before the heat exchanger, this will lower the risk of boiler scale formation on the walls of the heat exchanger (on the side of the d.h.w. installation). The results have also shown that owing to the indirect mode of heat supply to the d.h.w. exchanger, the variations in d.h.w. temperature can be reduced (by comparison with parallel substations). The benefits are manifold: improved quality of the d.h.w. supplied, extended life of the d.h.w. flow regulating valve, and reduced flow of the network water abstracted from the heating network.

Keywords: District heating, substation, heat exchanger.