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Heat load model for small-scale CHP planning

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Extended abstract

Present-day world energy policy is based on two main directions: energy efficiency and environmental protection. Efficient Combined Heat and Power production is one of the energy consumption effective methods, where CHP production from the renewable fuels is preferable.

In order to plan for the most economical, technical and environmental optimal CHP system, it is especially important to estimate the expected heat demands and heat load profiles for the district heating area.

This paper describes a method for estimation of heat load profile for a given district heating area by dividing it to three different heat load types:

- Temperature depended heat load;
- Constant heat load;
- User defined heat load.

The paper provides a complete description of above mentioned heat load types, equations as well as calculation examples for district heating networks of Estonian cities:

- Tallinn city district heating;
- Kuressaare city district heating.

Calculation results are compared to hourly measured heat loads to estimate accuracy of a proposed model.

Trial calculations show that simulated and measured district heating network load profiles are very close to each other. As an exception there are transitional periods (late spring and the beginning of autumn), when simulated heat loads are higher than measured values.

The advantage of proposed district heating load modelling method is simplicity of use in most cases (district heating consumers could be more or less classified as constant, or temperature depended heat load consumers).

This method is suitable for pre-feasibility and feasibility studies where district heating load profile modelling is necessary and uncertainty level presuppose certain inaccuracy of modelling.

For the future, proposed model could be improved by using correction factors to increase an accuracy of transitional periods modeling. Correction factor should consider a contribution of the coldwater temperature, the solar irradiation, the wind speed and other factors which affects to heat load profile formation.