Heat Demand in Non-residential Buildings

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Heat Demand & Renovation.

Heat consumption in district heating (DH) is decreasing by 27%, while in the buildings with alternative heating (AH) is increasing by 5% in 2050 relative to 2023.

Using the currently available subsidy funds, it is possible to renovate up to 89% of municipal buildings and 91% of educational buildings. In the sector of other buildings, the extent of renovation could reach only 62% by 2050.

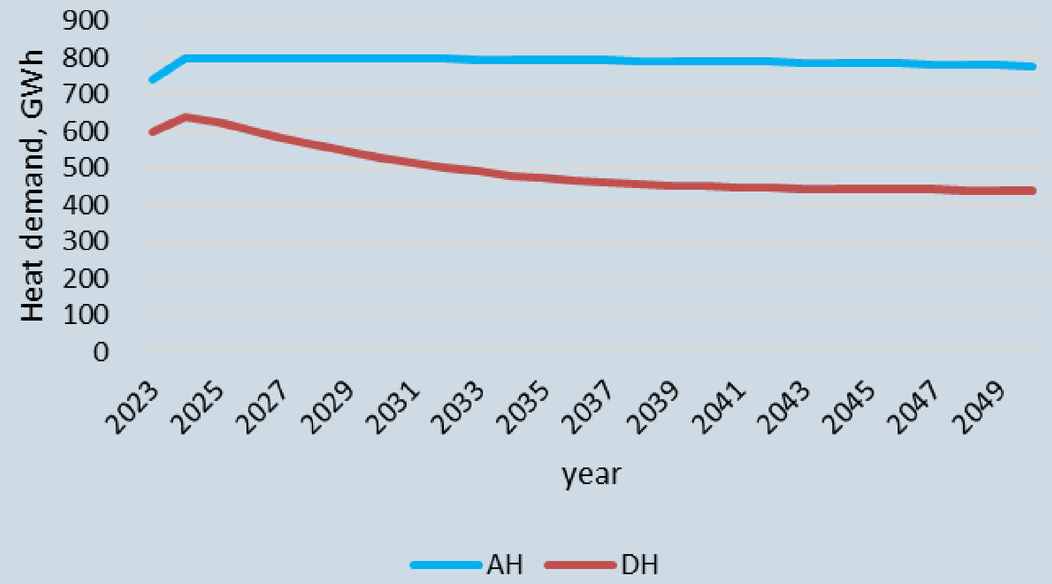

Fig. 1. Heat Consumption trends: district vs. alternative heating

Introduction

Building renovation is recognized as a crucial step towards achieving climate neutrality. While most renovation discussions focus on residential buildings, the non-residential sector is frequently overlooked. In Riga, non-residential properties account for 25% of the heat demand in buildings connected to the district heating system. This brings forth the concern that the contribution of non-residential buildings to reduce heat demand and the necessity for renovation is not adequately evaluated.

Methods

System dynamics modeling was carried out to determine the possible development of heat demand until 2050. The model contains sub-modules related to the allocation of subsidies for renovation, and analysis of dynamics of renovation and construction of new non-residential buildings.

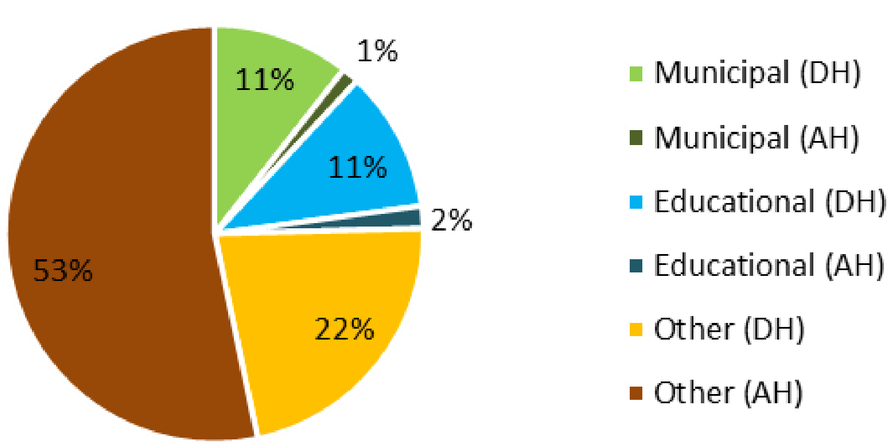

Fig. 2. Heating system distribution across non-residential building types

The buildings were divided into three blocks - municipal (libraries, court buildings, social institutions, etc.), educational(kindergartens, schools, universities) and others (shops, logistics centers, offices, etc.) Each block was divided into areas by year of commissioning and type of heating (DH or AH).

Results

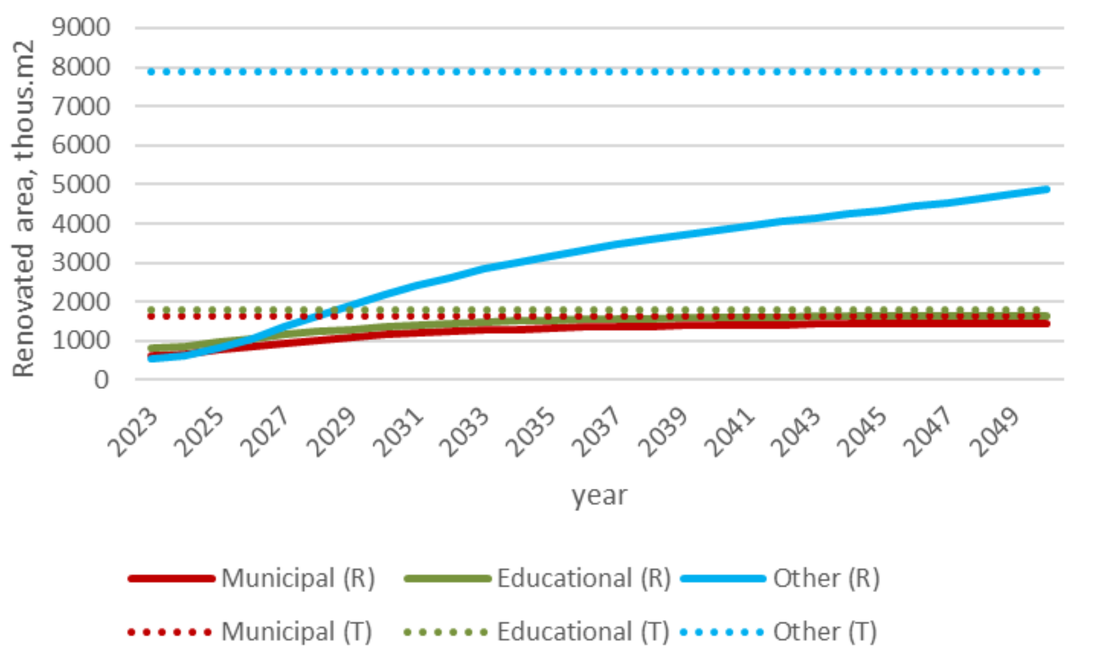

Fig. 3. Dynamics of annual renovated areas vs. goals: yearly progress in building renovation. The letter R stands for renovated and the letter T stands for target for renovation.

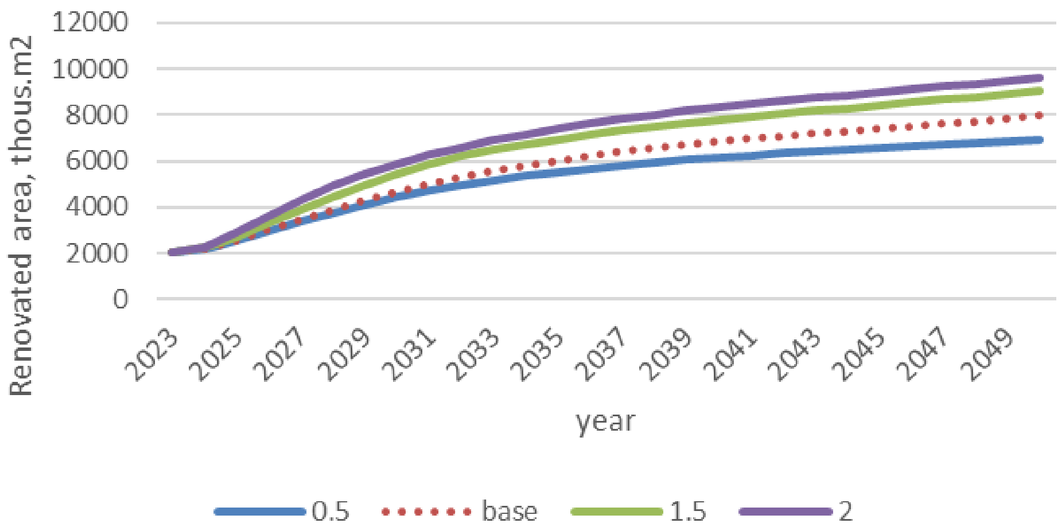

Fig. 4. Dynamics of the renovation depending on the indicated budget for renovation subsidies and probability of investing in renovation.

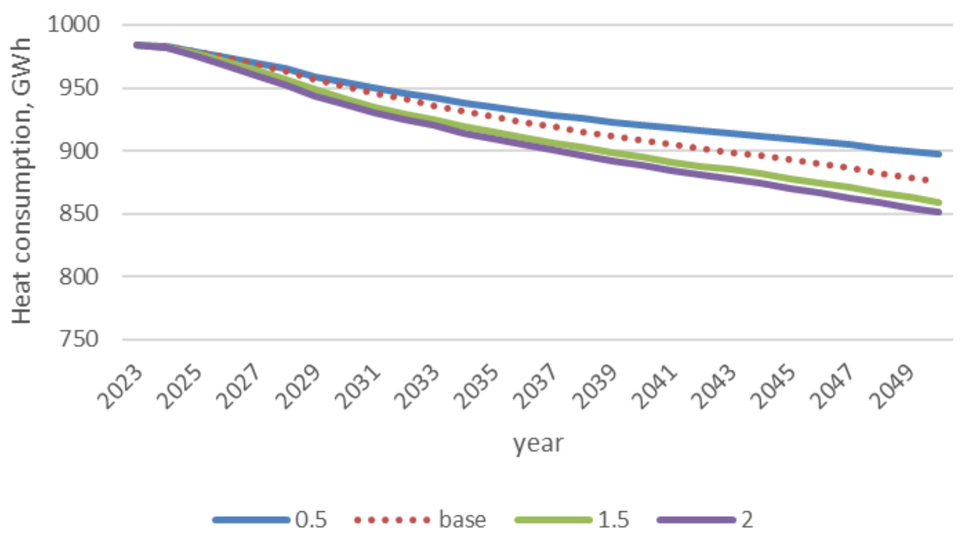

Fig. 5. Dynamics of the heat consumption in buildings built till 1991 depending on the indicated budget for renovation subsidies and probability of investing in renovation.