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TRANSFORMING NON-RESIDENTIAL BUILDINGS: THE ROLE OF SUBSIDIES AND SUSTAINABLE ENERGY CONSUMPTION

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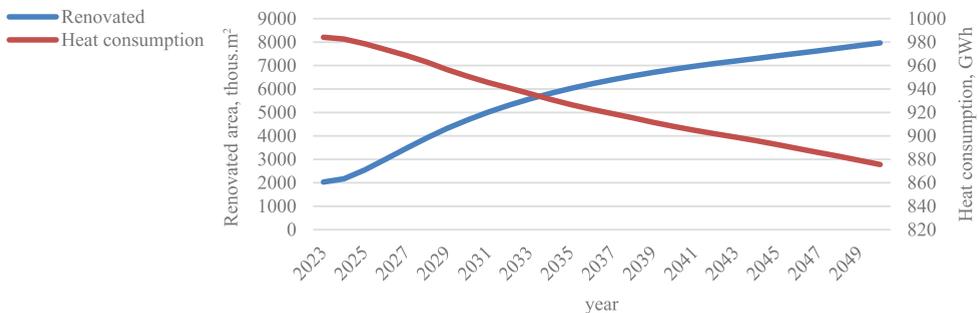
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Abstract – The European Union has set ambitious goals to achieve climate neutrality by 2050, and one of the main target areas is heat production. According to the latest statistics, heat production is one of the largest sources of greenhouse gas emissions. Although reduction of the heat consumption of residential buildings is often addressed, the non-residential buildings are no less important. In Riga, non-residential buildings make up 43 % of the total building area, and those connected to the district heat supply are responsible for 25 % of the total heat demand. Thus, it is important to include the renovation of the non-residential buildings as well as the construction of new buildings in energy efficiency measures. The study explored the key factors influencing the renovation of non-residential buildings, also considering the effect provided by the availability of subsidies on the renovation rate. A system dynamics model was developed, and the model includes four main modules: construction of the new area, renovation dynamics, energy supply module, and the impact of subsidies. The purpose of the model was to analyse the potential future trends and determine whether the climate goals set by the European Union will be achieved with the existing renovation rate. Non-residential buildings were divided into three parts: educational buildings, buildings of state and other non-living areas. Years of commissioning and the type of heat supply were considered. The results of the simulation indicate that with the existing policy, it is possible to achieve 89 % renovation level in municipal building sector, 91 % in educational building sector and 62 % renovation level in other non-residential buildings by 2050. Heat energy saving in 2050 from renovation is 14 % in buildings with district heating and 9 % in buildings with alternative heating compared to 2023. The results of this study can provide significant input to policymakers and industry professionals, helping to develop effective strategies for achieving the climate goals and ensuring sustainable development.

Keywords – Building renovation; district heating; energy efficiency; system dynamics modelling



Effect of renovation on heat energy demand in Riga