

Development of positive energy block scenarios

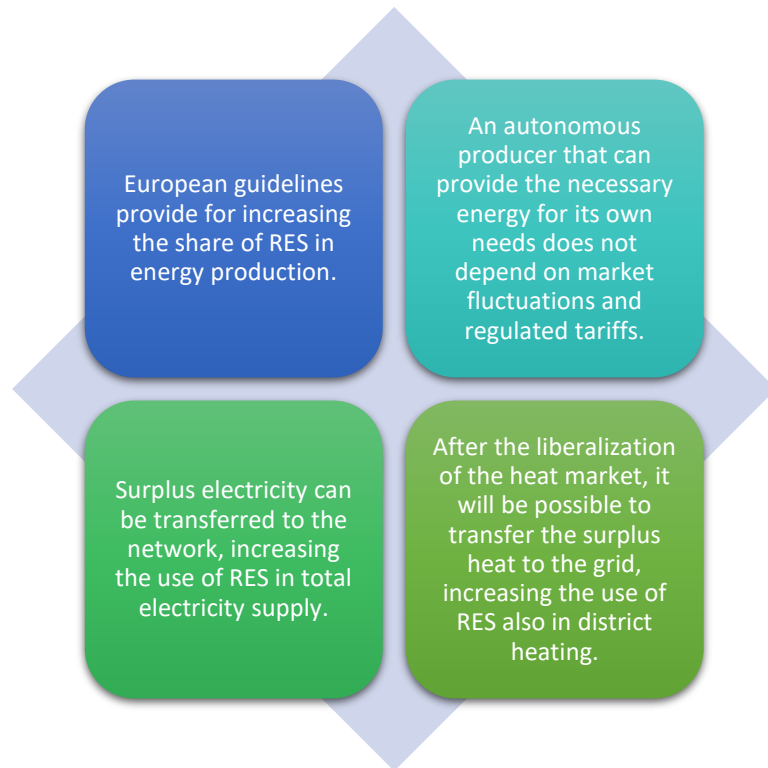
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Topicality



The goal of the research

To study the urban quarter transition to a positive energy balance quarter.



Hypothesis

A technologically and economically justified transition from a traditional quarter to a quarter of a positive energy balance is possible in the historical centre of Riga.

Several connections were made to prove the hypothesis:

1. Energy efficiency of buildings.
2. Geographical location.
3. Architecture.
4. Legislation.
5. Environmental requirements.
6. Compatibility with centralized networks.



Quarter architecture





Tasks

To perform an analysis of various development scenarios for the transition of the quarter from the traditional to the positive energy balance quarter in the historical center of Riga:

- Literature overview.
- Quarter assessment according to the actual data and the hypothesis.
- Evaluation of suitable technologies and cost analysis.
- Evaluation and comparison of different positive energy balance quarter development scenarios.



Methodology

A system dynamics model will be applied for modeling the scenarios:

- Architectural scenario.
- Energy efficiency scenario.

Energy efficiency assessment results will be taken from previous master thesis related to residential quarter.

System dynamics model

System dynamic model is created to model several development scenarios for positive energy balance quarter. Finished model will include:

All quarter buildings.

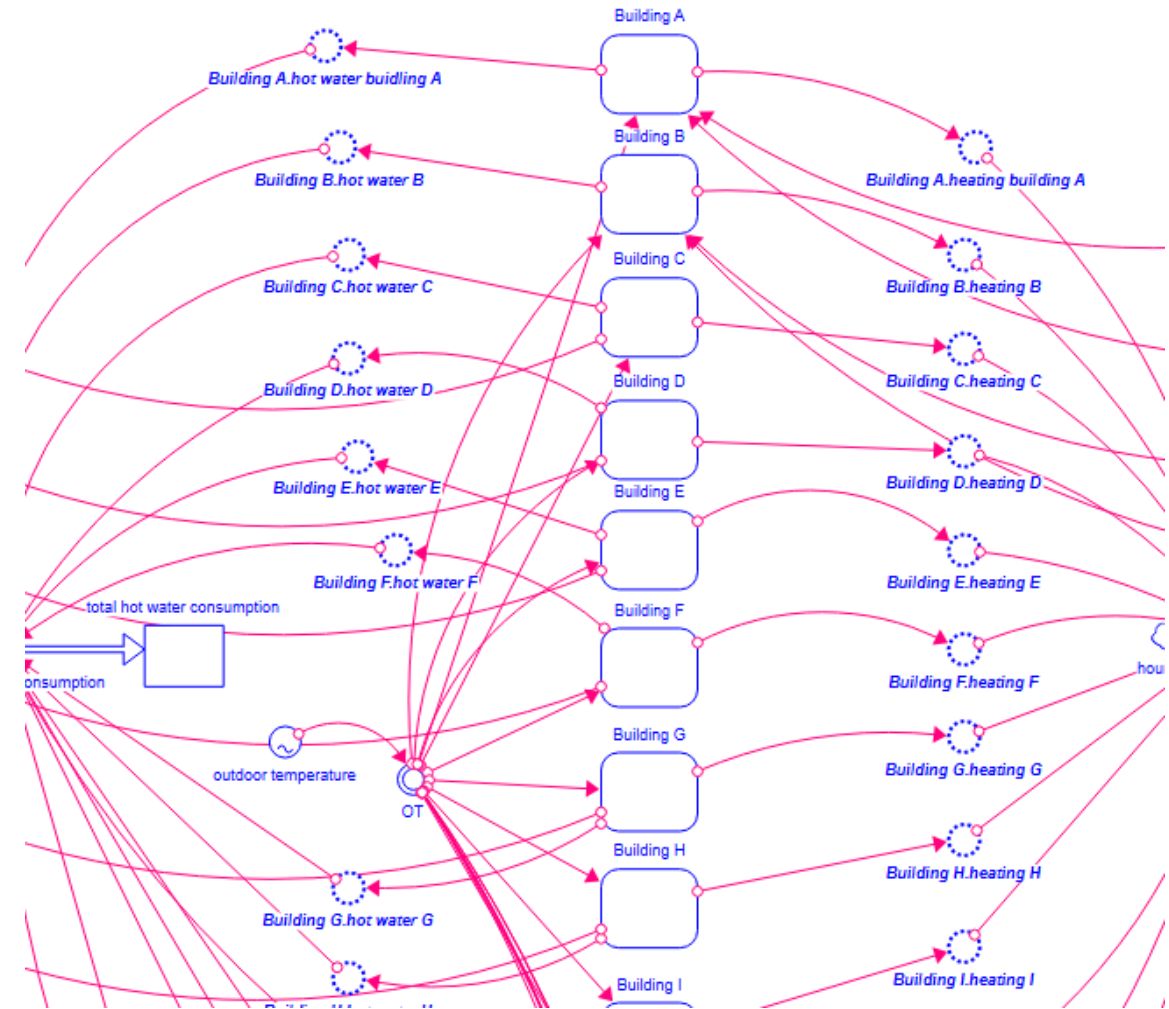
Energy consumption and production.

Waste heat production.

Energy costs.

Energy storage.

Electric vehicles charging points.



Expected results

- Hypothesis will be proved if all measures will be taken – energy efficiency, heat recovery, heat and power production from renewable resources, energy storage.
- System dynamic model will be able to be used for other residential quarters: for historic buildings, new buildings, designs.

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