

ENHANCING THE EVALUATION OF DISTRICT HEATING SYSTEM RESILIENCE: A LITERATURE REVIEW

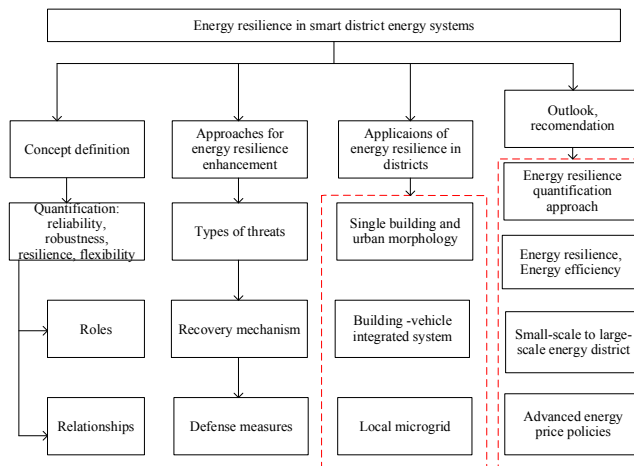
Guntars KRĪGERS^{1*}, Ieva PAKERE², Dagnija BLUMBERGA³

¹⁻³ Institute of Energy Systems and Environment, Riga Technical University, Āzenes iela 12/1, Riga, LV-1048, Latvia

* **Corresponding author.** Email address: guntars.krigers@edu.rtu.lv

Abstract – Ensuring an uninterrupted supply of energy, electricity, and heat is becoming an increasingly pressing necessity. Energy provides both social and economic growth, therefore, the energy systems should be resilient to different external conditions. Resilience is the ability of a system to recover from adversity and in connection with the critical infrastructure - the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions. Resilience includes the ability to withstand and recover from deliberate attacks, accidents, or naturally occurring threats or incidents. Several factors influence the resilience of the energy supply system: energy security, reliability, robustness, flexibility, and resilience. If energy resilience has not been well considered or even ignored in the planning, design, and operation stages in district energy communities can lead to system fragility and vulnerability. Therefore, the research assesses the different methods for resilience assessment in energy systems by focusing on district heating. During climate change mitigation and adaptation energy supply system resilience is unclear. Based on current studies, the energy resilience factor for most is considered in the context of the electricity transmission system, and the heat transmission resilience study is limited. During the research of the literature, it has been concluded that there is no consistent quantitative and quality approach to resilience because there is no consistent treatment of the concept of resilience. The available literature sources about energy resilience are limited in their scope and usability and hence are not amenable for use outside the scope where they have been developed. The metric and formula used for calculating resilience, if any, and the input data required for such calculations are also dependent on the research scope. There is a need for a fundamental generic quantitative and quality approach for resilience that would be usable and useful across various scopes or sectors in a consistent manner, which can be used for the development of resilient systems and effective resilience strategies for district heating systems.

Keywords – District heating systems; resilience assessment; smart energy systems



An overview of energy resilience in smart district energy systems.