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EVALUATION OF THE DATA CENTRE WASTE HEAT POTENTIAL IN DISTRICT HEATING IN LATVIA

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Abstract – Data centres are large global energy consumers that create low-temperature waste heat. To alleviate the impact of the temperature increase on the information technology equipment, the data centres are cooled with different technical solutions, drastically increasing the facilities' power consumption. In different regions, the use of data centre waste heat combined with heat pumps in district heating systems was identified as a lower-cost heat energy generation solution compared to alternative fossil or renewable energy-based heating solutions. The research paper aims to identify the data centre's waste heat potential as an energy source in district heating in Latvia. The technical and economic potential for using heat pumps in the data centre's waste heat systems was evaluated. To reach the goal of the study, a mixed methodological approach was used divided into four steps: the creation of the statistical calculation method, stakeholder survey to evaluate the energy consumption, mapping of the quantitative results to evaluate technical potential and distribution patterns, and system dynamics modelling to evaluate possible adoption scenarios of the technological solutions. The results of the research reveal a heterogenic distribution of data centres in Latvia, which limits the use of waste heat at the national level. Furthermore, the study identified the total waste heat potential of data centres in Latvia and provided recommendations for the adoption of data centres' waste heat based on the results of the system dynamic simulations.

Keywords – Data Centre; district heating; heat pumps; renewable energy; waste heat