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# USE OF AN ABSORPTION HEAT PUMP TO LIFT THE DISTRICT COOLING WASTE HEAT TEMPERATURE FOR THE DISTRICT HEATING SUPPLY IN TALLINN: A TECHNICAL AND ECONOMIC ANALYSIS

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**Abstract** – Absorption heat pumps can lift a lower temperature waste heat source to a higher temperature useful output. In that process, it uses less electricity as an input compared to heat pumps with electrical compressors. Therefore, in some cases, it can be used to lift a lower temperature waste heat source to a higher temperature useful output with less electricity consumption. Absorption heat pumps are not very widely spread in district heating, mostly because there are not many suitable waste heat sources or conditions needed to run them. Tallinn has a district heating system with an annual generation of more than 2 TWh and a goal to make it an entirely carbon neutral district heating system by 2030. Tallinn has also started to develop a district cooling network, and by the end of 2023, the installed capacity was about 6 MW. District cooling capacity is estimated to grow to around 100 MW in 2030. This paper investigates different types of absorption heat pumps and the possibilities of integrating an absorption heat pump to a district cooling plant with the purpose of using waste heat from the cooling plant for renewable heat generation, that can be used in district heating. Different technical aspects are examined to find a suitable production solution and are presented as results. From an economical point of view, the cost of heat to cover peaks with an absorption heat pump is calculated. The effect of reducing fossil fuel use in the Tallinn district heating network with an absorption heat pump is estimated.

**Keywords** – *Coupling district heating and cooling; energy modelling; sustainable district energy; power to heat*

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