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# MOBILE THERMAL ENERGY STORAGES AS COMPLEMENTARY TECHNOLOGY TO DISTRICT HEATING NETWORKS

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***Abstract*** – District heating networks (DHNs) are an important backbone of today's heat supply with high potential to contribute to a reduction of greenhouse gas emissions, if their heat sources are increasingly transformed into renewable ones. However, an economically viable application of such networks requires adequate occupancy rates and power density along the lines because the infrastructure causes significant effort in terms of investment, operation and maintenance. This is one of the reasons why DHNs are mostly implemented in urban regions. On the other hand, industrial plants are not always located within the meaningful range of DHNs, although they require huge amounts of heat as well as release significant amounts of waste heat, depending on the specific industrial sector. The utilisation of mobile thermal energy storages (M-TES) can be a possibility to close the gap of energy transfer between a DHN and the industry or even directly between two or more industrial plants. The intention of this approach is to transfer heat by charging a mobile heat storage at the producer and transfer it to the consumer by means of common transport and available infrastructure, e.g. by a truck on the road. In this way, the M-TES concept could serve as a complementary heat supply technology for regions without DHN or it could even be a competitor to DHN for the case that it might by economically advantageous. M-TES was already investigated in the past, even by experimental implementation, but with the energy prices of 2015 it was financially not feasible. As energy markets had to face unknown fluctuations in 2022, the research work presented in this paper had the aim to analyse the M-TES concept for the current situation. Therefore, a comprehensive economic evaluation was performed, based on VDI2067, for calculating the levelised costs of heat (LCOH) for M-TES. This investigation was done for the three main types of heat storing mechanisms, namely, sensible, latent and thermochemical storages. In each category, several material types were considered to meet possible requirements of the specific application, e.g. in terms of temperature demand. This updated analysis of M-TES yielded positive results for thermochemical and latent heat storages, as the LCOH are significantly lower compared to the heat costs of DHN in Austria in 2022. However, the transportation distance is the most sensitive parameter in this study, which restricts the viability of M-TES to near surroundings.

***Keywords – Economic evaluation; heat transfer network; industrial excess heat; waste heat recovery***

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