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W4RES – Technical Service from HFT to Friends of the Earth-CEPA

#W4RES – Women4RES is a 3-year-EU-funded project, which aims at scaling-up the involvement of women in the market deployment and uptake of Renewable Heating and Cooling (RHC) solutions via replicable support measures tested and validated across eight European countries. As a consortium member, HFT Stuttgart is providing technical support to selected women-led projects in the RHC field. In this context, the Slovakian Friends of the Earth-CEPA project was supported in finalising a feasibility study for a low temperature network using renewable heat sources.

Friends of the Earth-CEPA is pioneering work with Slovakian municipalities to demonstrate the benefits of replacing fossil heating systems with renewable and sustainable solutions. With their application to W4RES, Friends of the Earth-CEPA strived for technical feedback on their pre-feasibility study of a low-temperature heating system in Partizánske, and to network with experts in renewable heating concepts from Germany.
The pre-feasibility study was prepared by Friends of the Earth-CEPA based on publicly available information and several key assumptions to compensate for missing or unavailable data. It considers two phases. In phase 1, the proposed solar thermal, pit reservoir, and geothermal energy are considered for the *Luhy settlement* grid. The natural gas boilers in this area and the separate district and house boiler houses remain in place for the time being. By interconnecting houses equipped with gas boilers to use renewable energy sources, it seems possible to reduce fossil fuel energy consumption by up to 32%, and reduce natural gas consumption and CO_2 emissions by 53% and 58%, respectively, compared to the status quo.
The components from phase 1 will be expanded in phase 2 to include the use of biomass and the district heating supply will be extended to the Luhy and Šípok settlement networks. The system's inlet temperature will be reduced to 70 °C during the heating period, which increases the efficiency of the solar collectors and reduces the operating costs of the geothermal heat pump. By refurbishing the settlements' buildings and energy systems, using renewable energy sources, and reducing the heating grid's operating temperature, it is possible to reduce fuel energy consumption by 64% and natural gas consumption by 98% compared to the status quo. Implementing phase 2 would thus result in an annual reduction of CO2 emissions of approximately 87 %.

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There will be no increase in biomass consumption compared to the status quo. However, there will be an increase in electricity consumption compared to the status quo. Ensuring at least partial self-sufficiency of electricity supply could further improve the economic balance.

Assessment by HFT Stuttgart.

In the context of the W4RES project, we translated the prefeasibility study into English and assessed it from a technical perspective. Generally, the study contains a good level of detail for a pre-feasibility study and can be considered state of the art in the context of municipal heat planning, as for example some detailed simulations in high temporal resolution have been performed. The most critical issues are the following:

Considering the pre-feasibility study:

1. Since both solar thermal and geothermal are planned in parallel, the question arises whether the solar thermal plant will have “adverse” effects on the geothermal plant’s annual full load hours and thus its economic feasibility. In our understanding, geothermal plants typically provide base load heat, also during the summer months when solar thermal plants typically provide all the heat required for hot water. If this was already considered, we would suggest including it in the study.
2. It would be valuable to present the CO_2-emissions savings from all the proposed scenarios in the study
3. Investment in energy efficiency in buildings is rightly identified as the key enabler of the DH transition. The savings from such measures should be assessed in more detail and be linked to recommendations on financing options for building refurbishments on a national or local level
4. Furthermore, suggestions on how to make the considered heating grid truly carbon-neutral would be great in the context of the EU’s net zero plans for 2050. Technical measures might include rooftop photovoltaic coupled with heat pumps, and/or substituting the remaining natural gas with biogas or hydrogen
5. Assumptions used in the pre-feasibility study need a more in-depth verification during a subsequent feasibility study. These areas of additional analysis are for instance
    - Mapping the availability of locally and regionally available primary and secondary renewable energy sources;
    - Assessing land availability for the proposed solar thermal collectors and heat storage;
    - Assessing and codifying the state of the settlements‘ buildings stock and its heating systems;
    - Assessing heat demand and load curves in more detail, also with a view on reduced heat demands in the future due to a changing climate
    - Assessing district heating network investment needs
    - Re-verification of impacts on heat price and economic viability, ideally by calculating levelised costs of heat (LCOH) generation and supply

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More general recommendations, next steps:

6. The proposed pre-feasibility study should become part of a municipal heating master plan. The implementation will not be a one-off investment but will likely require a multi-year investment program.
7. As a next step, it is essential to engage with all relevant stakeholders, namely the heating grid operator, the municipality, building owners, and citizens to discuss the implementation of the proposed plan. In particular, financing questions need to be considered in much more detail in a second study that should build on relevant expertise, e.g. from local banks and the municipality

HFT Stuttgart wishes Friends of the Earth-CEPA continued success with their projects.

Sincerely,

Prof. Dr. Bastian Schröter

Find out more about HFT Stuttgart and our research group.

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