

European SDH Projects – The Next BIG Solar Step

Task 55

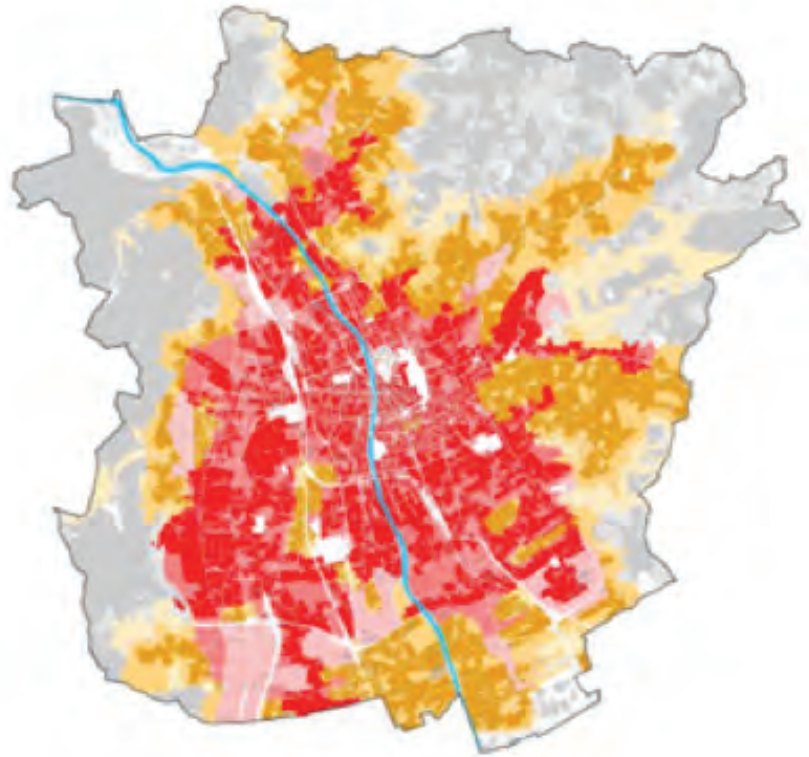
Identifying the biggest winners of the late Paris Agreement (COP21) is a challenge, but solar thermal energy, efficient system integration, and network transmission are among the top players, compared to the biggest losers of fossil fuels, oil, and gas. The EU has started to take steps for the first-ever universal, legally binding global climate deal to reduce EU emissions by at least 40% by 2030. However, the successful implementation of large-scale solar thermal plants into district heating networks is often hindered by multiple items arising during the project development process.

A team of experts from the city of Graz, Austria, has decided to take a lead in the analysis and evaluation of a major proposed local Solar District Heating (SDH) project to determine if it is technically feasible, is feasible within realistic costs, and if it will even be a profitable business opportunity.

The feasibility study “BIG Solar” was conducted in 2015 aiming to evaluate the integration of a large-scale solar thermal system into the district heating network of the city of Graz. Based on extensive modeling, dynamic simulations of the large solar thermal system and its seasonal storages were developed. The study was promoted by the Austrian Research Promotion Agency, the Climate and Energy Fund, the Province of Styria, and the City of Graz. A variety of key topics were identified and elaborated on with a number of collaborative partners. The simulations resulted in a techno-economic optimum of a 450,000 m² collector field area, a seasonal heat storage capacity of 1,800,000 m³ and absorption heat pumps (AHPs) with a total heat capacity of 100 MW. Technical limitations identified were the maximum capacity of the district heating transport line or the current and future heat and temperature loads.

In conclusion, the simulations show that the BIG Solar concept is technically and economically feasible. The economic analysis shows that a heat price is comparable to that of other heating sources of the district heating network in Graz. Although the plant construction has high upfront investment costs, the payback-time is moderate and economically reasonable, even if additional environmental benefits are neglected. Moreover, project parameters on technical and economic simulations are flexible. Given local boundary conditions in Graz, such as the land area available, the collector area of the solar system can vary between 150,000 m² and 650,000 m².

Still, further studies and assessments are needed and will be conducted to guarantee a detailed economic and technical understanding of the system and its network integration prior to the construction phase.



▲ District Heating connections in Graz (red).

continued on page 4



SHC Task 55: Towards the Integration of Large SHC Systems into DHC Networks will be one platform to elaborate on the economic and technical challenges and opportunities of projects such as BIG Solar in Graz. This new SHC Task aims to facilitate the planning, integration, and operation process of SDH projects into district heating and cooling (DHC) networks to provide standard solutions that can be multiplied globally.

For more information on SHC Task 55 and this project contact the Task 55 Operating Agent, Sabine Putz, s.putz@solid.at.

◀ Fernheizwerk in Graz is the biggest Solar Thermal installation for district heating in Austria.

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Results of the Feasibility Study:

- Available land for up to 650,000 m² solar collectors and possible locations for storages
- Techno-economic optimum at 450,000 m² collector field, 1.8 million m³ seasonal storage, absorption heat pumps with 96 MW (heat output)
- Flexible size of system with moderate price ranges