

## BIGSOLAR – GRAZ



### Summary of the project

The district heating network in Graz is operated by the Energie Graz GmbH & Co KG and supplies heat to about 65 000 households as well as commercial and industrial buildings. The heat demand in the year 2017 was about 1 200 GWh and the heating capacity at peak load was about 530 MW. The flow temperature varies with the ambient temperature and is about 120 °C in the winter months and about 75 °C in the summer months. The return temperature is about 55 - 60 °C during the whole year.

Due to an announced phase out of the heat supply by the cogeneration plants Mellach the stakeholders decided to increase the share of heat produced by renewables within the district heating network Graz in the next 10 years of up to 50 %. An important step towards this challenging goal can be the realization of the project BigSolar.

Within this project a system consisting of a solar thermal system with an overall collector area of about 450 000 m<sup>2</sup> and a maximum heating capacity of about 250 MW, a seasonal thermal storage of about 1 800 000 m<sup>3</sup>, 6 absorption heat pumps each with a nominal heating capacity of 16 MW and a natural gas heating boiler with a heating capacity of 120 MW

**”THE COMBINATION OF SOLAR THERMAL SYSTEMS WITH A SEASONAL THERMAL STORAGE AND HEAT PUMPS INCREASES THE SHARE OF SOLAR THERMAL ENERGY UTILIZATION WITHIN A DISTRICT HEATING NETWORK”**

shall be built. The collector area, the seasonal thermal storage volume and the capacity of the absorption heat pumps were designed to reach minimum heat production costs and a solar fraction of about 20 % from the measured heat load profile of Graz in the year 2014.

If the heat demand matches the heat production of the solar thermal system and the temperature is sufficient high, heat can be directly supplied into the flow of the district heating network, at solar overproduction the heat of the solar thermal system is used



to charge the seasonal thermal storage. Within the seasonal thermal storage occurs temperature stratification. As long as the temperature of the seasonal thermal storage is high enough, heat is directly supplied into the flow of the district heating network otherwise the storage is used as low temperature heat source for the absorption heat pumps.

The absorption heat pumps are driven with heat from the onsite natural gas heating boiler and the absorber and condenser are used to heat the flow of the district heating network to a temperature up to 85 °C. Especially during the winter months a higher flow temperature than 85 °C is required. For this additional heat from the natural gas heating boiler can be used.

## Expected results

- The solar fraction is expected to be about 20 % of the annual heat demand of the district heating network whereby 1/3 will be supplied directly and 2/3 by the heat pumps.
- Due to a solar thermal energy supply of about 232 000 MWh/a a reduction in CO<sub>2</sub> emissions of up to 50 000 t/a can be expected (compared to the heat production of a natural gas boiler).

## References

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## FACTS ABOUT THIS PROJECT

**Project status:** planning/negotiation phase

**Building type:** Industry, Residential and commercial buildings

**Heated floor area [m<sup>2</sup>]:** 11 000 buildings (30 % with hot water preparation)

**Installed heat capacity [kW]:** [kW]: 6 x 16 000

**Heat source:** Seasonal thermal storage

**Investment cost:** 200 Mio. EUR

**Participating countries:** Austria

**Time frame:** Entire project period from 2015-2020

**Project organisation:** Energie Steiermark AG, S.O.L.I.D. Gesellschaft für Solarinstallation und Design mbH, Arcon Sunmark, Energie Graz GmbH & Co KG (operator of the district heating network)

**Link to web page or report:**

<http://solar-district-heating.eu/Portals/8/SDH-p2m/2017-05%20Delegationsreise/8%20Schubert%20Big%20Solar%20Graz.pdf>

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**IEA Technology Collaboration Programme on Heat Pumping Technologies (HPT TCP)**