IEA DHC|CHP

International Energy Agency

Implementing Agreement of District Heating and Cooling, including the integration of CHP

Annex TS1 | Low Temperature District Heating for Future Energy Systems

SUCCESSFUL IMPLEMENTATION OF INNOVATIVE ENERGY SYSTEMS IN COMMUNITIES

- WITH LOW TEMPERATURE DISTRICT HEATING AND RENEWABLE ENERGY SOURCES

COLD DISTRICT HEATING GRID– PROJECT ENVISAGE IN WÜSTENROT

Thermal activation of agricultural area as geothermal heat source / sink © doppelacker GmbH

COLD DISTRICT HEATING GRID WITH DECENTRALIZED HEAT PUMPS SUPPLIES HEAT AND COLD FOR RESIDENTIAL NEIGHBORHOOD

Wüstenrot is a rural community with 6,500 inhabitants situated in South-West of Germany. In 2007, the municipal council decided to make Wüstenrot a plus-energy community. Under the lead of Stuttgart University of Applied Sciences (HfT-Stuttgart), the EnVisaGe project is developing transferable strategies for energy efficiency measures and the utilization of local renewable energy sources. A new residential neighborhood is being built in Wüstenrot. This energy-plus-quarter consists of 25 new high energy standard buildings (single family and detached houses). With the sale contract for the ground, the future building owners agree to fulfill the high energy standard requirements, install PV systems of sufficient size (6-10 kWp) and connect to an innovative cold water heating grid.

This grid supplies low temperature heat from a near surface geothermal system to decentralized heat pumps providing heating energy and hot water for the single buildings. The geothermal source is based on a sub-surface underground geothermal (agrothermal) collector. This collector was designed by assuming a heat gain of 28-32 kWh/m²a in a dimension of 1,5 ha. Thus, the heat demand of the settlement of 288 MWh/a is covered while providing additional reserves of about 380 MWh/a for the possible connection of nearby existing buildings. A common intelligent load and storage management system optimizes the PV self-consumption, reduces the peak power supplied in the electricity grid and offers the possibility to use the heat pumps with hot water and electricity storages as controllable electricity sinks for future smart grid applications.

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