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Description:	This fact sheet provides an overview of the classification of solar district heating systems into different categories
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Overview of solar district heating system categories

In general solar district heating systems consist of large collector fields integrated into a district or block heating system for supplying heat to residential and industrial areas. In practice this integration is realised in rather different ways under quite varying boundary conditions. This fact sheet provides an overview of the classification of solar district heating systems into different categories.

Main aspects for distinguishing solar district heating systems are:

District heating (DH) system

- Size of DH system: District heating (large) ⇔ Block heating
  (small e.g. for a group of buildings or a residential area)
- Heat generation: Combined heat and power (CHP) ⇔ Heating plant

Storage system

- Seasonal heat storage (with or without multiple usage) ⇔ Short term storage

Solar thermal system

- Design: Pre-heating with solar fraction < 10 % ⇔ Average solar fraction of 10 - 30 %
  ⇔ High solar fraction > 30 % with long term thermal energy storage.

- Solar feed-in: Central (at heating plant) ⇔ Distributed
  (at any point of the district heating network)

- Type of solar feed-in: Between forward pipe and return pipe
  ⇔ Raising of forward pipe temperature
  ⇔ Raising of return pipe temperature.

- Collector field location: Central (at heating plant)
  ⇔ Distributed and distributed feed-in (e.g. on buildings)
  ⇔ Distributed (e.g. on buildings) and central feed in via collecting network.

The two main categories are related to the solar feed-in point of the solar system (centralized ⇔ distributed system) and to the size of the district heating system (solar district heating system ⇔ solar block heating system).

Central systems

In a central solar district heating system the solar thermal system feeds in at the main heating plant of the DH system. The collector field is typically ground mounted in close connection to the heating plant. Alternatively the collectors can be roof mounted on buildings and the heat is transferred to the heating plant via a collecting grid. A large long term storage connected to the heating plant enables high solar fractions. The plant is typically owned and operated by the owner of the district heating system e.g. the local utility.

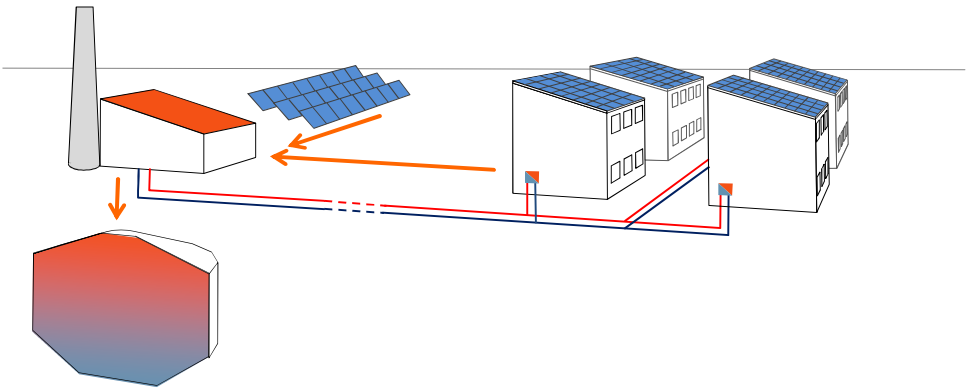

Fig. 6.1.1. Central solar district heating system. (Source: Solites)

Central solar district heating systems

Plants of this type were mainly built in Denmark, Sweden and Austria. In general these systems are connected to combined heat and power (CHP) units (often biomass, see also fact sheet 2.1 *"Solar heat combined with other fuels"*).

Central solar block heating systems

Smaller central solar district heating plants are called solar block heating plants. Several plants were realised in Germany, often applied on new residential areas in combination with heating plants (without CHP). Eleven of these systems were designed for a solar fraction of ~50 % of the total heat demand and large seasonal heat stores were applied (see fact sheet 7.2 *"Storage"*).

Distributed systems

In distributed solar district heating plants the solar collector fields are installed at suitable locations at any place of the district heating network and connected directly to the district heating primary circuit on site. Often these plants utilise the district heating network as storage (as long as they provide a minor amount of heat in comparison to the total load in the district heating system).

Systems realised so far are owned and managed either by a housing company or by an energy service company (ESCO) or by the district heat supplier (see also factsheet 2.5 *"Feasibility study"*).

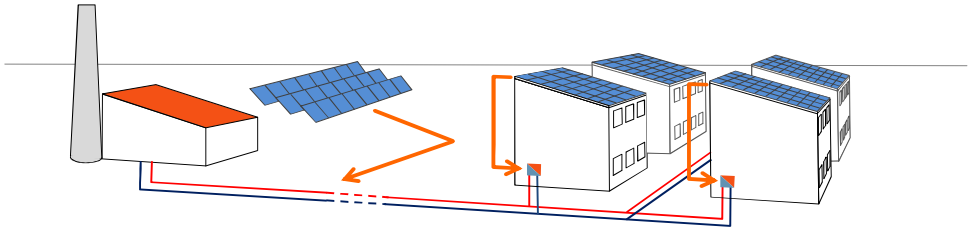

Fig. 6.1.2. Distributed solar district heating system. (Source: Solites)

Distributed solar district heating plant

Large distributed solar district heating plants are e.g. operated by an ESCO in the city of Graz, Austria. They are connected directly to the district heating network on site.

Distributed solar block heating plant

Distributed solar block heating plants are realised e.g. in Sweden. In recent plants net-metering is applied, i.e. the collector fields are owned by the building owner who trades the solar heat according to a net-metering contract with the district heating net owner as it is known from the grid-connected PV plants.

References

[1] Jan-Olof Dalenbäck: Success Factors in Solar District Heating, Dec. 2010, www.solar-district-heating.eu.

The SDH fact sheets addresses both technical and non-technical issues, and provide state-of-the-art industry guidelines to which utilities can refer when considering/realizing SDH plants. For further information on Solar District Heating and the SDHtake-off project please visit www.solar-district-heating.eu.

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