

DESIGN OF CONSUMER THERMAL SUBSTATIONS FOR THE INTEGRATION OF DISTRIBUTED SOLAR TECHNOLOGIES IN DISTRICT HEATING SYSTEMS

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Solar thermal systems

- Increasing levels of building energy performance and incorporation of Renewable Energy Sources (RES) such as solar thermal (ST) technologies.
- Individual ST systems are composed by a solar collector field, thermal storage, and back-up heat sources such as natural gas
- ST technologies are sized to cope part of the heat load of buildings
- A number of experiences have proven the commercial application of large ST plants and Thermal Storage in DH networks.
- Centralized ST plants are limited by geographical constraints and scarcity of land in larger cities.
- Heat production of ST systems in NZEBs exceed local needs for large parts of the year. DHs to capture this heat which would otherwise be wasted.
- Steady reductions in operational temperatures in DH, promotes the interconnection of ST and DH infrastructure.

Connection schemes at building level

Various approaches for DH connection of ST systems:

- Isolated ST system
- DH as back-up heat source
- DH as back-up heat source, delivery of ST excess heat to DH
- Full interconnection of ST, DH and building in central manifolds/substation.

Fully integrated systems are estimated to produce a 50% surplus energy than other connections.

Basic Design of Substations

Heat delivery modes

- DH to load (space heating & DHW)
- Solar to load (space heating & DHW)
- Solar to DH

Specificities

- bidirectional/net heat meters
- Local pump for reverse pumping from return to service pipes

Expected development

Substations for the connection of ST into DH networks will be developed within h2020 project RELaTED. Several concepts will be engineered, prototyped, tested and deployed over 4 pilot DH setups across Europe:

- Green field development in VINGE, DK
- DH network with large share of biomass in TARTU, EE
- Large DH network with incorporation of large RES resources in BELGRADE, SR
- Corporate DH network in IURRETA, ES

Deployment of substations is expected in 2019.

