

2020 HIGHLIGHTS

Task 55 – Towards the Integration of Large SHC Systems in DHC Networks

THE ISSUE

In recent years, megawatt-scale solar thermal district heating (SDH) systems have gained increasing attention globally. Several ambitious projects were successfully implemented in countries such as Austria, Germany, Italy, France, Spain, Sweden and Norway. Large-scale SDH systems and their large-sized seasonal storages have become attractive options for cost effective and low carbon heat supply. In the next step, large systems will become even bigger and likely grow from MEGA to almost GIGA-sized installations. These systems will be able to meet the increasing energy demand of city districts and of whole cities. Compared to conventional heat generation systems, the effective operation of a SDH network and its seasonal storage can guarantee a primary energy consumption reduction of >70% in thermal needs. However, the actual integration of large solar thermal systems into existing and new networks faces several challenges. Expertise on the integration of large solar thermal systems into district networks is limited. Therefore, SHC Task 55 collects and disseminates technical and economic solutions to leverage large-scale solar thermal district heating and cooling systems worldwide.

OUR WORK

SHC Task 55 aimed to provide a platform for practitioners and scientists to present the benefits and challenges of SDH and SDC systems. It collected research results on options and measures to realize sophisticated SDH and SDC systems by focusing on characteristics of solar thermal systems, technical and economic specifications of district heating networks that are relevant for the integration of solar thermal systems and hybrid technologies, analyses of system components and their integration, modular designs of large SDH/SDC systems, and economic requirements of large SDH/SDC systems in different market regions. Finally, SHC Task 55 collaborated with the IEA Technology Collaboration Programme on District Heating and Cooling including Combined Heat and Power (IEA DHC).

Participating Countries

Austria

Canada

China

Denmark

Finland

France

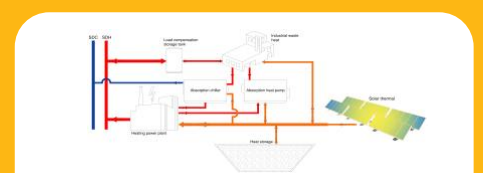
Germany

Spain

Sweden

United Kingdom

Task Period 2016 – 2020
Task Leader Sabine Putz, SOLID, Austria
Email s.putz@solid.at
Website task55.iea-shc.org



2020 HIGHLIGHTS

Towards the Integration of Large SHC Systems in DHC Networks

KEY RESULTS IN 2020

Task Results Available on Online

The results of SHC Task 55 are available as 27 Fact Sheets posted on the Task webpage (<https://task55.iea-shc.org/>). Several SDH installations have been built due to cooperation that started during the first Task meetings. For example, the installation in Tibet, [link](#). As the SDH market is still a niche market, it is important to note the strategic business cooperation established amongst the Task Experts during the Task. Not least, the lively know-how exchanges over more than 4 years of collaboration have established a shared basis for the development of solar district heating and cooling activities.

Available IEA SHC Task 55 Fact Sheets

SUBTASK A - Network Analyses and Integration (Lead AIT, Austria)

A-D1.1 - D-D3	Identification and preparation of best practice examples (combined fact sheets Subtask A and D)	Download
A-D1.2	Techno-economic comparison of collected best practice examples	Download
A-D2.1	The future of district heating and the role of solar thermal energy	Download soon
A-D2.2	SWOT analysis of solar thermal integration in district heating and cooling	Download
A-D2.3	Feasibility analysis of hybrid technologies for district heating and cooling including solar thermal	Download
A-D3.1	Integration concepts of central solar thermal systems in district heating and cooling	Download
A-D3.2	Integration concepts of decentral solar thermal systems in district heating and cooling	Download
A-D4.1	Supervisory control of large scale solar thermal systems	Download soon
A-D4.2	Control of district heating and cooling networks and reduction of the operating temperatures in district heating systems	Download soon

SUBTASK B - Components testing, system monitoring and quality assurance (Lead SUNRAIN, China)

B-D1.	ELESVIER paper: Improved in-situ performance testing of line-concentrating solar collectors	Download
B-D2	Solar energy - collector fields - check of performance	Download soon
B-D3.1	Control of large scale solar thermal plants	Download soon
B-D3.2	Automated monitoring of solar thermal	Download

SUBTASK C - Design of the Solar Thermal System and of Hybrid Technologies (Lead Plantner, Denmark)

C-D1.1	Long-term thermal performances of solar collector fields	Download
C-D1.2	Solar radiation modelling on tilted surfaces based on global radiation	Download
C-D1.3	Collector types for large collector fields thermal performance	Download
C-D1.4	CFD Models of different collector types	Download
C-D2	Seasonal pit heat storages - guidelines for material and construction	Download soon
C-D3	ELESVIER paper: Thermal and hydraulic investigation of large scale solar collector fields	Download
C-D4	Modular conception and construction	Download soon

SUBTASK D - Promotion and dissemination of SDH/SDC and hybrid technologies in new markets (Lead Solites, Germany)

D-D1.	Business Models of Solar Thermal and Hybrid Technologies	Download
D-D2	Investor Brochure - Solar heat for cities	Download
D-D3 - A-D1.1	Identification and preparation of best practice examples (combined fact sheets Subtask A and D)	Download
D-D4	Evaluation of drivers global market development and country reports	Download
D-D5.1	Training material on the design of large scale SDH/SDC installations in Chinese and English	Download soon
D-S.2	EnTSIM calculation tool for renewable district heating	Download

Task Operating Agent Elected as Chair for RHC Renewable District Heating Group

Heating, cooling, and hot water preparation account for over half of the energy demand in buildings. Paired with an increasing urbanization rate, this demand defines one of the critical challenges of the energy transition in Europe (and beyond). The question is - how to decarbonize heating and cooling in urban districts?

The members of the Horizontal Working Group (HWG) on renewable districts work in close collaboration with the other HWGs and specifically on the following topics:

- New district heating systems (low-temperature district heating)
- Refurbishment of existing district heating systems
- Urban sources for heating & cooling
- Individual heating solutions for urban use
- District cooling and individual cooling solutions for urban use
- Measures on the secondary side to support the roll-out of RES H&C solutions
- Toolboxes and stakeholder support
- Policy developments
- Economics and markets of and for RES DHC

In 2021, the HWG is tasked with developing a roadmap supporting the decarbonization of urban districts across Europe. Sabine Putz, as SOLID's Head of R&D and Operating Agent of IEA SHC TASK 55 "Towards the Integration of Large SHC Systems into District Heating and Cooling (DHC) Networks," will lead this group as chair. Sabine Putz will directly transfer information about the roadmap to the SHC Executive Committee. As Sabine Putz likely will be the Subtask leader on dissemination in the proposed follow-on Task to Task 55, this provides a perfect match in terms of know-how transfer between SHC and RHC, <https://www.rhc-platform.org/meet-the-new-hwg-districts-chair-and-co-chair/>

Proposed New Task on Large-Scale District Heating

This new Task proposed to start in 2022 mainly deals with medium and high temperature large-scale solar district heating paired with digitalization topics. The first Task Definition Meeting will be held in March 2021. The Task Organizer is Viktor Unterberger (BEST): viktor.unterberger@best-research.eu.

Technology Transfer Workshop

The planned Technology Transfer Workshop that was to be held in October in Austria in conjunction with the Task's last meeting, unfortunately, had to be moved online. Despite the change, the workshop was well attended, with 36 companies and 13 research institutes participating.