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FinalFinal report dated 14.07.2025

IEA-SHC Task 68

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Date: 06.12.2024

Location: Rapperswil

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SFOE contract number: SI/502469-01

Zusammenfassung

Der IEA SHC Task 68 hat das Ziel, neue Entwicklungen bei der Integration von Solarenergie in Fernwärmenetze weiter voranzutreiben und international zu verbreiten. Dabei wird der Fokus auf Mittel- und Hochtemperaturanwendungen mit neuen Kollektortechnologien sowie die Kombination von Solarwärme mit Wärmepumpen, neue Datenanalysemethoden und wirtschaftliche Umsetzungen gesetzt. Eine Beteiligung der schweizerischen Forschung an dieser internationalen Zusammenarbeit ermöglicht das Übertragen weltweiter Fortschritte in die Schweiz, so dass der momentan stark forcierte Ausbau der Fernwärme von diesen Erkenntnissen profitieren kann. Dieser Bericht fasst die wichtigsten Erkenntnisse, Resultate und Dokumente Zusammen und setzt diese in den schweizerischen Kontext

Résumé

La task 68 de l'AIE SHC a pour objectif de faire progresser les nouveaux développements en matière d'intégration de l'énergie solaire dans les réseaux de chauffage urbain et de les diffuser au niveau international. L'accent est mis sur les applications à moyenne et haute température avec de nouvelles technologies de capteurs et la combinaison de la chaleur solaire avec des pompes à chaleur, de nouvelles méthodes d'analyse des données et des mises en œuvre économiques. La participation de la recherche suisse à cette collaboration internationale permet de transférer les progrès mondiaux en Suisse, de sorte que le développement du chauffage à distance, actuellement en plein essor, puisse profiter de ces connaissances. Ce rapport résume les principales conclusions, résultats et documents et les replace dans le contexte suisse.

Summary

The IEA SHC Task 68 aims to further advance new developments in the integration of solar energy into district heating networks and to disseminate them internationally. The focus is on medium and high temperature applications with new collector technologies as well as the combination of solar heat with heat pumps, new data analysis methods and economic implementations. The participation of Swiss research in this international cooperation enables the transfer of global progress to Switzerland, so that the currently strongly promoted expansion of district heating can benefit from these findings. This report summarizes the most important findings, results and documents and places them in the Swiss context

Contents

1 Introduction

1.1 Task 68

Large-scale solar district heating provides a solution to supply cheap renewable energy to district heating systems, which - on a worldwide scale - still widely use fossil energy carriers. In Denmark, which played a pioneering role in solar district heating, large-scale systems with a total of more than 1,250,000 m² of collector surface reliably supply heat and achieve production costs of less than 40 EUR/MWh (without subsidies).

The predecessor Task 55 of IEA-SHC has dealt with the adaption and the spread of the positive Danish experiences to other countries. Many successful follow-ups were triggered, especially in our neighboring countries. Austria, for example, decided in 2021 to promote large-scale solar thermal systems above 5000 m^2 with a total of 45 million euros, and in Germany several new large-scale projects were initiated and built^..

Therefore IEA-SHC has decided to continue the work started in Task 55 and further develop the spread of large-scale solar district heating systems. In addition to continuing the successful work from Task 55, the **purpose** of the Task is to investigate how:

- **To provide heat most efficiently at the desired temperature** level either directly by solar (e.g., combining flat-plate collectors with other solar collectors) or indirectly by solar by combining solar collectors with other technologies (e.g., solar collectors with heat pumps) focusing on the system aspect instead of single technologies.
- **To take a next step regarding digitalization measures** in order to allow for more efficient data preparation (e.g., regarding the gathering, storing, validation, and visualizing of data) and data utilization (e.g., regarding control strategies, automatic fault detection, predictive maintenance aspects, open data).
- **To make SDH systems more competitive and business appealing** by exploring new business models and finding ways to reduce costs.
- **To raise awareness for solar technologies** and disseminate the **knowledge regarding SDH systems**, especially for medium to high temperature heat, by collecting and providing best practice examples, country reports, and data and insights from real installations.

1.2 Situation in Switzerland

District heating networks offer an opportunity to transform the Swiss heat supply, which is still strongly dominated by fossil heat carriers, towards renewable energies. There are more than 1000 heating networks [1] in Switzerland, and the heat supply from the district heating sector is expected to at least double its capacity by the year 2050. Most of them are based on biomass where there is basically no more potential for growth with local resources. Especially in densely built cities, it is very difficult to supply buildings individually with heat from renewable energies. For this reason, the large Swiss cities have decided to massively expand district heating systems. Zurich, Geneva, Basel and Lausanne have decided to invest CHF in total in the construction of district heating systems.

The integration of solar heat and heat storage can replace fossil fuels for off-peak and peak loads, and save wood, a very valuable fuel for renewable energy supplies. Internationally, such systems are built in growing numbers. This development has not yet reached Switzerland, although research results indicate a large potential here as well.

- The SFOE's SolCAD [2] project has shown that more than one third of all Swiss district heating networks are suitable for the integration of solar heating systems due to their energy sources and the availability of large roof areas.
- The SFOE project BioSolFer and a feasibility study focusing on the canton of St. Gallen have shown that solar heat production prices below fossil fuel prices are possible without subsidies. In cantons with favorable subsidy conditions, heat production prices below 50 CHF/MWh are possible, which is often already below the fuel prices for wood.

1.3 Objectives

The objective of the Swiss participation in the task 68 is to transfer international research progress regarding the integration of solar heat and heat storage in efficient heating networks to Switzerland and to coordinate and communicate the results of national research projects with the international research community. Furthermore, the task 68 represents also an interesting opportunity to develop our network in order to initiate new international collaboration and participate to EU projects.

This Report summarizes the international findings and gives an overview on the task 68 publications. Furthermore, international results are set to the Swiss context by listing national boundary conditions, examples and publications.

2 Task 68 Results

2.1 Subtask A: Concepts for efficiently providing solar **heat at medium-high temperature level.**

Lead: Magdalena Berberich, Solites, Germany

Existing district heating (DH) networks in Switzerland and the whole Europe often supply heat in a temperature range of 80 °C to 120 °C. Up to now, high-performance flat-plate collectors and evacuated tube collectors are state of the art for the integration of solar heat into DH-networks and are well developed and described. However, other collector technologies, such as evacuated flat plat collectors, parabolic troughs and linear Fresnel collectors, can provide heat in a wider temperature range and elevated efficiency of high temperatures. Further advantages over the state of the art, like tracking and the possibility to control the heat yield is possible with some of these new collector technologies.

2.1.1 Solar Collector Technologies for District Heating[3]

In the main Subtask A report different solar thermal collector technologies and products are compared and analysed with the focus on how they can be implemented in DH systems. For following topics are treated in this report:

- Comparison of different supply temperatures of the various collector technologies
- Listing and geometric characteristics of all participating collector products.
- Comparison of solar Keymark data and annual yields for various locations in Europe and different temperatures.
- The next step is a comparison of investment cost by the temperature ranges of the collectors.
- outlook on the potential of the various collectors for DH systems.

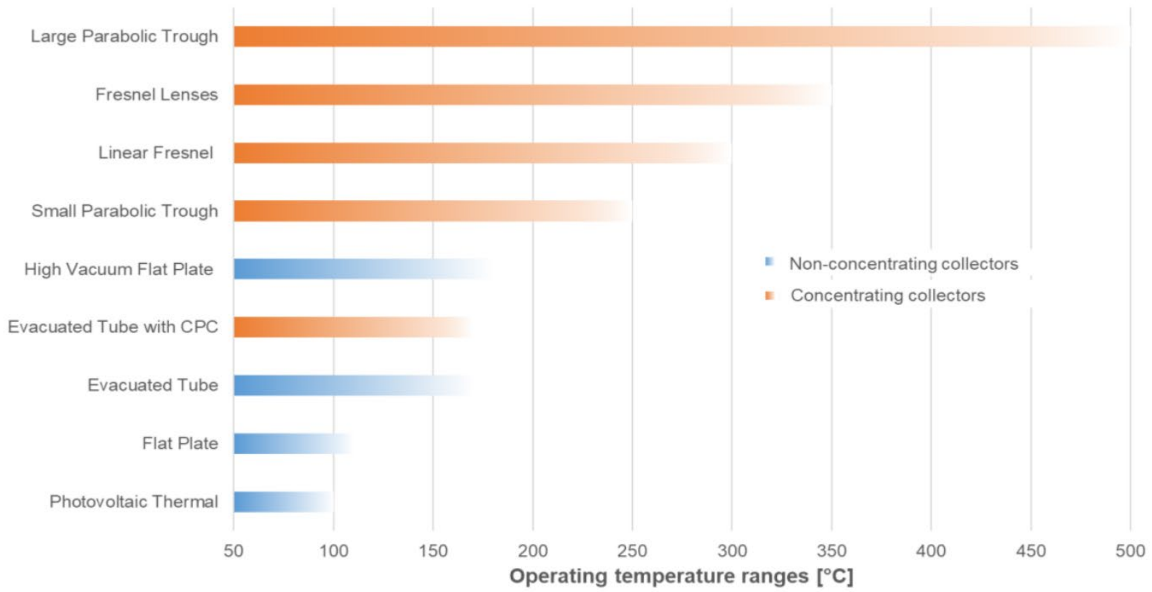

Figure 1: Summary of different collector types and their operationtemperature ranges.

2.1.2 Simulation Tools for Solar District Heating [4]

Based on a survey, various tools and simulation programs were listed and compared. The survey among various Task 68 participants shows that a wide variety of tools, including some that have been programmed in-house, are used to design large solar thermal systems. TRNSYS is most commonly used to simulate solar heating networks.

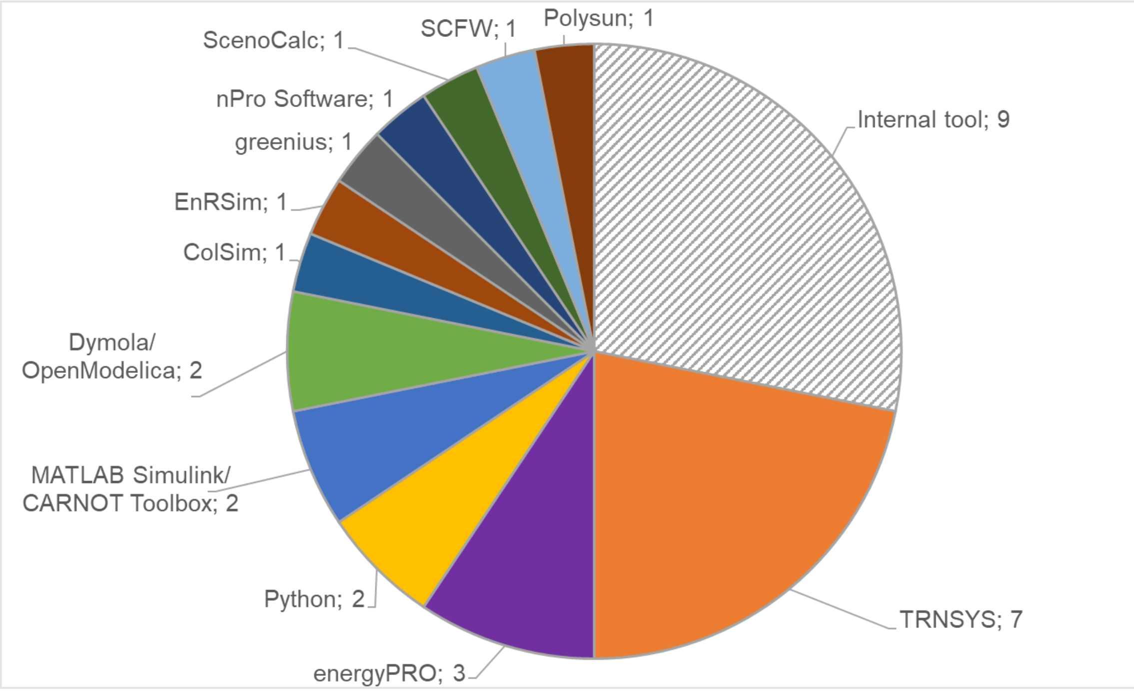

Figure 2: **Overview of tools for which the survey was completed**

Further, factsheets of some key software used by experts of the field are shared, to inform about their features, as perceived by their users. The factsheets give the opportunity to capture with more detail the main characteristics of each software, and useful information such as pricing structure, list of known users, relevant publications, etc. The factsheets are created in a collaboration with SolarPACES Task IV: Solar Heat Integration in Industrial Processes (SHIP). Factsheets are created for:

- energyPRO
- greenius
- Polysun
- TRNSYS

A comparison between TRNSYS and Polysun for the modelling of SolCAD II carried out by HEIG is then presented in the report. The main findings are shared and illustrate the arbitrage to be made between user-friendliness and modelling accuracy.

2.1.3 Performance and Efficiency Measures

The ISO 9806 is in revision and will be published in an updated version in 2025. This new version will be better adopted to district heating collectors and is better linked to the standards of the IEC TC 117 (Solar thermal electric plants) where standards for large size collectors such as parabolic trough collectors or Fresnel type collectors are developed. The new version will also include tools for LCA and GHG compensation.

It was also informed that there is already a standard for the rating of the field performance (ISO 24194:2022) which is based on the last version of the ISO 9806. The main idea of this standard is to provide tools for checking of the performance of a field which is relevant for all kind of due diligence. This standard is also under revision and input was provided to align better with the ISO 9806. In parallel the IEC/TC 117 is developing a similar standard for solar thermal electric plants: Code of solar field performance test for parabolic trough solar thermal power plants. This project caused some distortion because the mathematical model for the performance calculation is incompatible with the model for the ISO 9806. In the meantime, and after intervention of ISO/TC 180 this project was stopped and will be relaunched.

Andreas Bohren as chairperson of the Solar Keymark Network and Convenor of the working groups for collector standards CEN/TC 312/WG1 (EN 12975) and ISO/TC 180/WG4 (ISO 9806) ensured the connection of Task 68 with the international standardization and testing community.

2.1.4 Swiss context

Typical yields for Switzerland

In collaboration with the project DeCarbCH a set of fact sheets for solar district heating in the Swiss context were prepared and published on SPF website. For different collector type the typical monthly output for two SwissSites are given. To adapt to the swiss context, also lower temperature applications with PVT collectors are included. An example for Flat plate solar collectors is given in Figure 3.

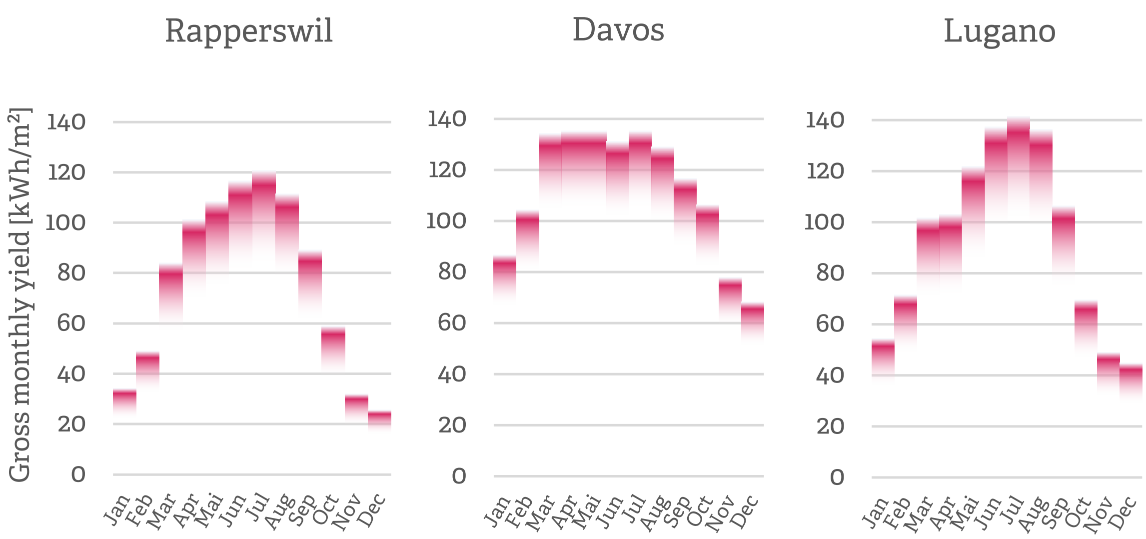

Figure 3: Gross monthly yield of evacuate flat plate collectors in different locations in Switzerland as given in the factsheets for different collector technologies.

Simulations and tools

There are few country-specific requirements for simulation tools, and the findings from the task 68 can be transferred to the Swiss context. It is important to use specific weather data which can be generated by Meteonorm or defined for selected locations in SIA 2020. Because Polysun was developed in Switzerland at SPF and is distributed by spin-off company Velasolaris, this tool has a particularly high user density in Switzerland.

For smaller systems, there are online calculators available from Swissolar, for example, but these are not designed for use in a district heating network. Klick is planning an online calculator for large solar thermal systems, but this is not yet available.

Collector testing

SPF is the European leading test house when it comes to district heating collectors. The main European manufacturers (e.g. Arcon, Absolicon, Soliterm, Meriaura, Ritter) are testing at SPF according to international norms and to obtain the European Solar Keymark certificate (https://solarkeymark.eu/). These certificates are available in the European Solar Keymark database (https://solarkeymark.eu/database/). Factsheets of tested collectors are also published on the SPF website (https://spftesting.info/data/1.kollektoren/) and on the site www.kollektorliste.ch which is operated by SPF but includes also collectors tested in other labs. A listing in kollektorliste.ch is required to apply for subsidies in Swiss subsidy schemes.

2.2 Subtask B: Data preparation & utilization

Lead: Sabine Putz, SOLID, Austria

Subtask B of IEA SHC Task 68 focuses on advancing the digitalization of solar district heating (SDH) systems through better data management, validation, and control strategies. Led by SOLID Austria, this initiative aims to automate data workflows, validate system data, develop monitoring techniques, optimize control strategies, and promote open-data frameworks.

The Subtask B key achievements are the following:

- Automating the collection, storage, and distribution of data
- Ensuring data validation
- Developing techniques for analysis, monitoring, and fault detection
- Optimizing control strategies for plants and systems
- Establishing open data frameworks

Subtask B has been divided in several activities. A short description of those activities is given below. For more information, the reader should refer to the Task 68 reports and deliverables [5] available on the Task website.

B1: Data Collection, Storage, and Distribution

Effective solutions were identified and implemented for gathering, storing, and distributing data from various devices at both single- and multi-plant levels. An assessment of state-of-the-art methods led to the development of an efficient Information, Communication, and Technology (ICT) platform for handling large data volumes. A comparison of data-handling solutions (e.g., open-source vs. commercial products) provided valuable insights, enabling operators and users to select the most suitable options.

B2: Data Validation Guidelines

Guidelines were successfully established to validate SDH system data, ensuring a reliable foundation for subsequent tasks. Normalization techniques were developed, facilitating meaningful comparisons of annual performance across different plants and operating conditions (e.g., variations in irradiation and demand). These measures allowed for the detection of performance trends and potential aging effects.

B3: Techniques for Analysis, Monitoring, and Fault Detection

A comprehensive evaluation of existing analysis, monitoring, and fault detection techniques was conducted. Several methods were applied to SDH system data, demonstrating their benefits and practical insights. Statistical approaches for data evaluation were explored, enhancing system reliability and performance assessment.

Separately from Task 68 Subtask B3, the performance of the SOLARCAD II solar plant in Geneva was assessed and optimized through an independent Pilot & Demonstration project [6]. Data collected from this project was later utilized within Subtask B3 to validate simulation models, ensuring their alignment with real-world conditions. Additionally, this data supported Subtask B2, where collaboration with AEE-INTEC led to the refinement and testing of the SunPeek application—tool designed in the framework of the HarvestIT project to enhance data visualization and fault detection in solar district heating systems.

B4: Advanced Control Strategies

A thorough comparison of state-of-the-art control strategies was completed at both the component and system levels. The requirements for advanced control methods were documented, including their data and computational needs. The economic impact of these strategies was assessed, particularly for medium-to-high temperature applications, providing valuable recommendations for system optimization.

B5: Open Data Frameworks

The development of an open and transparent data-sharing environment was a central focus of this subtask. Essential requirements for open data were defined and implemented, facilitating collaboration between data providers—such as solar plant operators—and data users, including researchers and heat consumers. To enhance accessibility and usability, standardized performance metrics were established, covering aspects such as heat output, temperature levels, and overall system efficiency. Additionally, structured templates were created to accommodate different levels of data access, ensuring meaningful engagement for various stakeholders, from the general public to technical experts and researchers.

Consideration was also given to data privacy and ownership, with measures implemented to address concerns related to security and protection. Open data exchange protocols were proposed to enable seamless and secure sharing of information among stakeholders. Finally, a roadmap for the future of open data in solar district heating was developed, outlining tangible benefits to encourage broader participation from operators. By fostering this culture of openness, further innovation, improved system performance, and a more efficient and sustainable energy landscape are anticipated.

2.2.1 HarvestIT

The HarvestIT project was dedicated to advancing the monitoring and performance analysis of large-scale solar thermal plants. These plants, characterized by collector areas exceeding 500m² or power outputs above 350kW, have proven to be cost-effective solutions for supplying renewable heat to district heating networks and industrial processes.

2.2.2 Project Overview

The HarvestIIT project aimed to develop an open-source software capable of conducting comprehensive performance and yield analyses for large-scale solar thermal plants using automated test procedures. The main project achievements can be summarized as following:

- It successfully determined which of the main physical parameters are the most robust to characterize solar applications under dynamic plant conditions.
- The project enabled the detection of critical factors such as soiling, degradation, and efficiency losses through clear KPIs.
- Practical relevance was demonstrated through testing with industry partners.
- New services, such as operational optimization, were made possible.
- Stakeholders were actively engaged via a professionally managed Open Innovation process.

The project ran for 24 months, starting in November 2021, and concluded successfully at the end of 2023. With a total cost of 704,979 €, it received 422,986 € in funcdings from the National Foundation for Research, Technology and Development, administered by the Austrian Research Promotion Agency (FFG). Managed by AEE INTEC, the HarvestIT project addressed the challenges faced by large-scale solar thermal plants, including the complexity of performance evaluation and the interplay of various factors affecting solar yield. By leveraging the increasing availability of data and digitalization technologies, it laid the groundwork for modernizing plant monitoring systems.

A key outcome of the HarvestIT project was the development of the SunPeek tool. This innovative software continues to implement the advanced monitoring and analysis capabilities envisioned during the project, ensuring its impact remains relevant in current applications.

2.2.3 SunPeek: Open-Source Performance Evaluation

In the context of its relationships with the Austrian institute AEE Intec and the HarvestIT project, the HEIG-VD contributed to the test of SunPeek, a containerized web application designed to automate the performance evaluation of large-scale solar thermal plants. With a web interface and a Python backend (REST API), it serves as the reference implementation of the ISO 24194:2022 Power Check. SunPeek is free for commercial use, fully automated, and ensures transparent data handling. It also fosters an open development community, clarifies ambiguities in the standard, and provides a standardized interface for integrating performance monitoring tools. Future updates aim to enhance usability, align with standard developments, and introduce additional checks like the Daily Yield Check (sunpeek.org).

2.3 Subtask C: Business models

Lead: Luuk Beurskens, TNO, Netherlands.

2.3.1 Financing and Investment Schemes

This report distinguishes several policies and instruments to support the deployment of solar district heating. These policies are categorized into direct, integrating, enabling, and mixed policies.

Direct Policies:

- **Push Policies:** Include building codes, mandates, replacement strategies, blending mandates, regulatory and pricing policies, tradable certificates, self-consumption instruments, and fiscal measures like tax incentives, subsidies, grants, and loans.
- **Pull Policies:** Examples include feed-in policies and investment grants.

Integrating Policies:

- Focus on system flexibility, increasing the renewable share in district heating networks, and sector coupling.

Enabling Policies:

- Aim to level the playing field, ensure reliability, set targets, provide affordable financing, offer training and education, support labor policies, foster innovation, and address urban and health policies.

Mixed Policies:

- Combine elements of both integrating and enabling policies, such as streamlined permitting procedures, participative programs, awareness campaigns, and integrated resource management.

Country-specific examples are given for: Netherlands, Austria, Germany, Spain

2.3.2 Checklist - Standards and Quality Criteria

A checklist for assuring quality in solar district heating was prepared. The checklist differentiates the important steps to be considered in different stages of the project. The following stages are considered in detail:

1. Checklist for the stage of project idea
2. Checklist for the stage of planning phase

3. Checklist for the stage of project preparation
4. Checklist for the stage of construction phase
5. Checklist for the stage of operation
6. Checklist for the stage of decommissioning

Checklist and report on financing and investment schemes will be made available on the Task 68 homepage (https://task68.iea-shc.org/publications).

2.3.3 Swiss context

As there are only few solar district heating examples in Switzerland, all with collector field sizes below 1000 m^2 there is little real cost date from Swiss examples. An analysis has been done for the most recent and largest Installation, SolarCADII in Geneva with around 800 m^2 of evacuated flat plate collectors supporting the Geneva DH system [7]. The cost includes all measures for the integration in the DH system, which are responsible for nearly half of the total cost. Furthermore, data from an older installation of WLS in Schüpfen is available [8].

In the term of the DeCarbCH a fact sheets for the cost of solar district heating in the Swiss context were prepared and published. Based on mean labor cost [9] and an exchange rate $/CHF of 0.9 international solar plant cost have been transformed into the Swiss context. Figure 2 compares the two above mentioned real cost data from the two Swiss installations to these corrected internation cost.

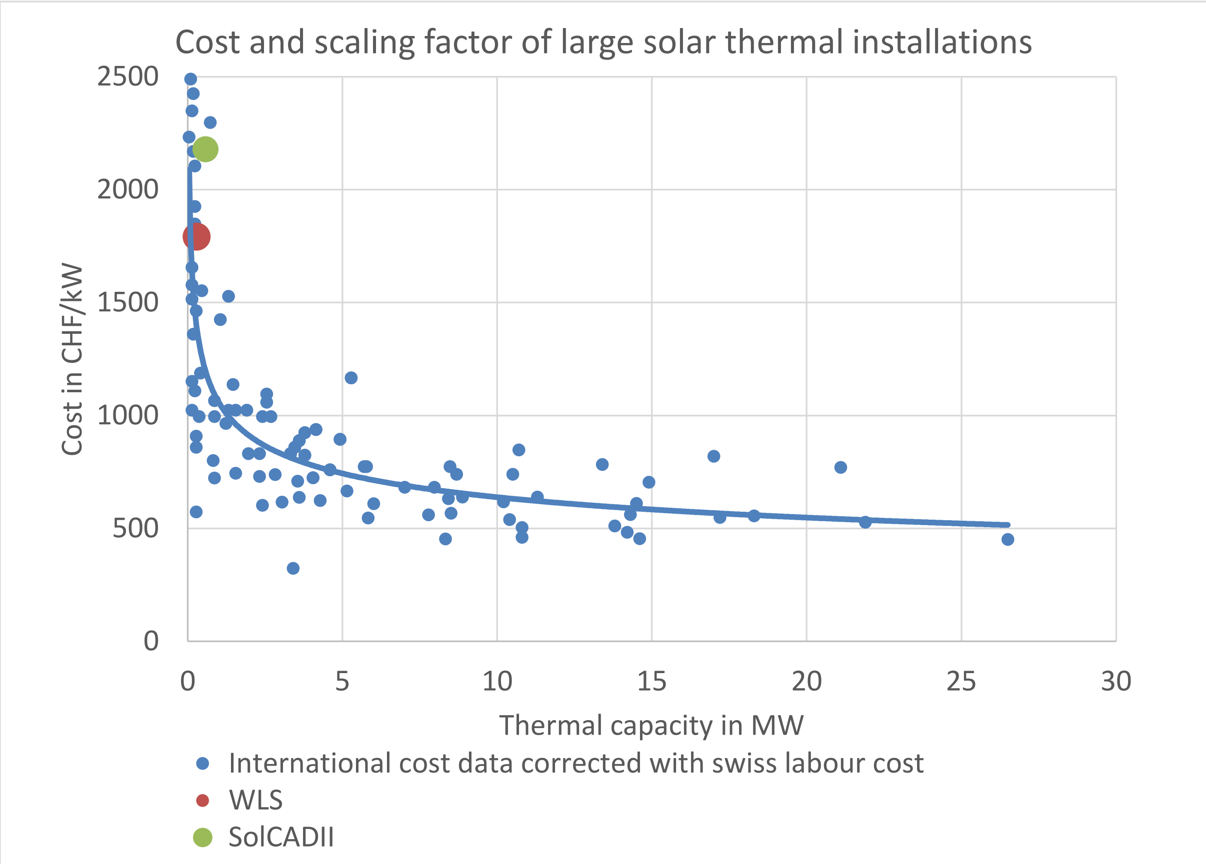

Figure 4: International solar plant cost transformed to the Swiss context in comparison to real cost of two Swiss SDH Installations.

Financial Support in Switzerland

Financial support for solar thermal energy is part of the building program and is therefore regulated at the cantonal level. Few cantons do not support solar thermal technologies in general. All other cantons base their subsidy scheme on a harmonized subsidy model (HFM) which is defining the general requirements and the minimum subsidy rates. Several cantons have much higher subsidies than what is given in the HFM. However, these support schemes are very much focused on smaller, building integrated domestic hot water installation and are not applicable to large grid-integrated systems.

The new Federal Act on Climate Protection Objectives, Innovation and the Strengthening of Energy Security (https://fedlex.data.admin.ch/eli/oc/2024/772), which is in force since **1 January 2025**, provides now national guidelines also for the promotion of large-scale solar thermal plants. The associated ordinance specifies which plants will receive subsidies and how much.

The most important conditions are:

- Fossil or direct electrical heat generation must be replaced.
- The system must have a nominal solar power of at least 70 kW.
- Quality-tested collectors must be used.

- A yield monitoring system must be installed.

The subsidy then amounts to **CHF 2400 + CHF 1000/kW**.

Despite of the national rules, subsidies are still awarded by the cantons and almost all cantons have incorporated the new federal act in their funding schemes. However, there are differences in how they are implemented in practice. The website kollektorliste.ch operated by SPF provides an overview, estimates possible subsidies and links to the relevant cantonal documents and rules. This page also contains a database of certified collectors and their performance data, so that collectors from different manufacturers or different collector types can be compared. In many cantons, subsidies are only available for certified collectors listed in the collector list.

2.4 Subtask D: Use Cases and Dissemination

Lead: Joakim Byström, Absolicon, Sweden

The objective of Subtask D was to gather insights from real-world solar district heating (SDH) installations and effectively disseminate knowledge to industry stakeholders and the public. A comprehensive overview of SDH installations was compiled, with a particular emphasis on medium- to high-temperature systems. Demonstration projects provided valuable performance data, which contributed to validating SDH concepts and supported activities within Subtask A and Subtask B.

To support long-term planning and policy development, future scenarios were analyzed, offering qualitative and quantitative targets for the solar sector. Estimates were provided on potential solar heat contributions across different temperature levels, and comparisons were made with alternative technologies, incorporating levelized costs of heat assessments. The most efficient technology combinations were identified, showcasing their economic and environmental benefits.

Industry engagement played a crucial role, with workshops organized in collaboration with SDH system planners and industry partners. These events facilitated knowledge exchange, fostered synergies, and accelerated the dissemination of Task findings while also incorporating valuable industry feedback.

To enhance awareness among both industry and the public, targeted communication materials were developed, highlighting the benefits of efficient SDH systems, data-driven optimizations, and cost-saving opportunities. Drawing on insights from all other subtasks, these materials were designed to be informative and accessible, supporting broader adoption and investment in solar district heating solutions.

Subtask D has been divided in several activities. A short description of those activities is given below. For more information, the reader should refer to the Task 68 reports and deliverables available on the Task website.

D1: Overview of Efficient SDH Installations

A collection of detailed case studies on SDH installations was compiled, with a focus on medium- to high-temperature systems. This activity aimed to demonstrate the performance and viability of SDH technologies, including their integration with complementary systems such as heat pumps. The insights gained contributed to concept development in Subtask A and provided data for evaluation in Subtask B.

D2: Future Scenarios and Policy Recommendations

Qualitative and quantitative targets were developed to guide the future expansion of solar district heating. Future heat demand projections were analyzed across different European countries, estimating how much solar heat could be supplied at varying temperature levels. Solar technologies were compared with alternative solutions, considering levelized costs of heat, and highlighting the most effective technology combinations and their benefits.

D3: Industry Workshops and Stakeholder Engagement

Workshops were organized to bring together industry partners and SDH system planners, facilitating the exchange of experiences and best practices. These events helped accelerate the dissemination of Task outcomes and provided an opportunity to collect industry feedback, ensuring that research findings align with practical needs.

D4: Public and Industry Outreach

Informative materials were prepared to raise awareness about efficient SDH systems and the role of data in improving performance and reducing costs. Designed to be accessible to a broad audience, including policymakers, industry professionals, and the general public, these materials leveraged findings from all subtasks to promote the adoption of solar district heating solutions.

Both OST SPF and the HEIG-VD contributed to the task. In particular, SPF presented different district heating applications in Switzerland. The HEIG-VD participated to the meeting in Härnösand (Sweden) giving a presentation on the DHN research activities in Switzerlandand participated in the industry workshop organized by Absolicon. TVP Solar, a partner of the P+D SolarCADII project, contributed with the information about the SDH installation of SIG in Geneva.

3 National and international cooperation

The aim of this project is to collaborate with the international community, to integrate findings of the Swiss projects in the communications of the international task and to spread international findings in Switzerland.

SPF was ameliorating its capacity to test large scale solar collector and is working with the main manufacturers present in the task. Most European largescale solar collector manufacturers (e.g. Arcon, Absolicon, Soliterm, Meriaura, Ritter) are testing their products at SPF.

Andreas Bohren as chairmen of the Solar Keymark Network and Convenor of collector testing norms CEN/TC 312/WG1 (EN 12975) and ISO/TC 180/WG4 (ISO 9806) ensures the connection of Task 68 with the international standardization and testing community.

Together with other experts from Task 68, Florian Ruesch worked as an international expert for the evaluation of large-scale solar projects for a foreign founding agency (Details are confidential).

In the reporting period, the national flagship project SwissSTES concerning large seasonal TES for district heating networks was proposed and accepted, which is a collaboration between relevant academic and industry partners in Switzerland. A subtask leader of Task 68 (solites) acts as an international board member in this Swiss consortium.

HEIG-VD had different meetings and information exchanges with AEE-INTEC in 2024 in order to use their Harvest-It and Sunpeek applications with the SOLARCADII data. This collaboration led to a joint communication during the 3rd International Sustainable Energy Conference (ISEC 2024) In Graz/Austria.

HEIG-VD collaborated also with other IEA Task 68 experts to write a guide on the new ISO 24194:2022 intitled "Guide to ISO 24194:2022 Power Check". This task was coordinated by Daniel Tschopp from AEE-INTEC.

4 Communication

The project was presented at the “SPF Industry Day” and several events of the DeCarbCH project. A presentation concerning solar district heating was held at the “National District Heating Forum” of the VFS in Jan. 2023 [10] with nearly 500 participants from the district heating community and at the “Symposium Solarenergie und Wärmepumpen 2023, Fokus Wärmenetze” [11].

The topic of solar thermal district heating was presented and discussed in the Swissolar focus event “Chancen für die Solarwärme” on 14. November 2023 Oberburg bei Burgdorf.

A set of factsheets regarding solar thermal energy in district heating were realized in collaboration with the project DeCarbCH and published on the SPF Website [12].The topics are: 1: Flat Plate Collectors, 2: Evacuated Tube Solar, 3: Parabolic Trough Collectors, 4: Vacuum Flat Plate Solar Collector, 5: Photovoltaic Thermal Collector, 6: Cost and Economics, 7: Grid integration of solar heat.

HEIG-VD realized several communications on projects related to the Solar District Heating:

1. Presentation of SOLARCADII results during the 18th SDEWES conference in September 2023 on Croatia
2. Presentation of the Life Cycle Analysis of the SOLARCADII installation during the 2023 CISBAT conference in Lausanne in September 2023
3. Presentation on the opportunity of Solar Heat for DHN applications during the "Journée du développement du solaire" organized by the energy service of Canton Vaud on the 6th of October 2023.
4. X. Jobard, S. Pauletta, A. Duret & Q. Francois (2024). Optimizing Energy and Economic Performance of Solar-Biomass Systems for Rural District Heating: A Technical and Financial Analysis, EUROSUN 2024 proceedings

5 Publications

- Stefan Abrecht, Dominik Bestenlehner, Luuk Beurskens, Andreas Bohren, Lukas Feierl, Dirk Krüger, Klaus Lichtenegger, Alex Mellor, Yuvaraj Pandian, Dimitris Papageorgiou, Pedro Rubio, Sebastian Schramm, Luis M. Serra, Marcel Wagner, Johannes Werner, Michael Zellinger; 2024, *Solar Collector Technologies for District Heating*; IEA SHC Task 68 Report; DOI: 10.18777/ieashc-task68-2024-0002
- Silas Tamm, Magdalena Berberich, Stefano Pauletta, Nikola Botzov, Miguel Frasquet, Geoffroy Gauthier, Leif Holm, Javier Inigo Labairu, Julian Jensen, Klaus Lichtenegger, Maria Moser, Florian Ruesch, Johannes Werner (2025); *Simulation and Calculation Tools for Solar District Heating*; IEA SHC Task 68 Report; RA2 DOI: 10.18777/ieashc-task68-2025-0001
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