SOLARUPDATE

VOL. 81 | JANUARY 2026

Newsletter of the International Energy Agency Solar Heating and Cooling Programme

SHC INTERNATIONAL ENERGY AGENCY Solar Heating & Cooling Programme

#SolarHeat
#SolarThermal
#SolarProcessHeat
#SolarCooling
#SolarDistrictHeating

In This Issue

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Solar Heat Worldwide

A Strategic Resource for Policymakers Advancing Renewable Heating

In the global effort to decarbonize energy systems, heating remains one of the most challenging sectors to address. It accounts for nearly half of final energy consumption worldwide yet receives a fraction of the attention and investment compared to electricity. The annual Solar Heat Worldwide report, published by the **IEA Solar Heating and Cooling Technology Collaboration Programme (SHC TCP)**, offers policymakers a critical tool for understanding and shaping the future of sustainable heating.

21 years of Solar Heat Worldwide

Since its first edition in 2005, Solar Heat Worldwide has evolved into the most comprehensive and trusted source of global data on solar thermal energy. Produced by **AEE INTEC** in Austria, with long-standing contributions from experts such as **Werner Weiss** and **Monika Spörk-Dür**, the report now covers over 70 countries and provides detailed insights into market trends, installed capacities, and technology developments across residential, commercial, and industrial sectors.

For policymakers, the value of this publication lies in its ability to translate complex market dynamics into actionable intelligence. It tracks the deployment of solar thermal systems, quantifies their contribution to national energy balances, and estimates the environmental benefits in terms of CO_2 emissions avoided. These metrics are essential for evaluating progress toward climate targets, designing effective incentive schemes, and identifying sectors where solar heat can deliver the greatest impact.

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Solar Heat Worldwide

One of the report's key strengths is its focus on **large-scale solar thermal applications**, including district heating and industrial process heat. These systems are particularly relevant for national energy strategies, as they offer scalable solutions for decarbonizing high-demand sectors. By the end of 2023, nearly 600 large solar thermal systems were in operation globally, with a combined capacity of 2.3 GWth. This trend signals a shift from small-scale residential systems to infrastructure-level deployments that can support urban energy transitions and industrial decarbonization.

The publication also highlights the growing role of **emerging economies** in solar thermal adoption. While traditional markets in Europe have matured, new growth is occurring in Latin America, Asia, and Africa. This geographic diversification presents opportunities for international cooperation, technology transfer, and capacity building—areas where policymakers can play a catalytic role.

Importantly, Solar Heat Worldwide is not just a technical document; it is a strategic resource cited by organizations such as **IRENA**, **REN21**, and the **European Commission**. Its data informs global renewable energy status reports and supports the development of integrated energy policies that include heating and cooling—often overlooked components of national energy planning.

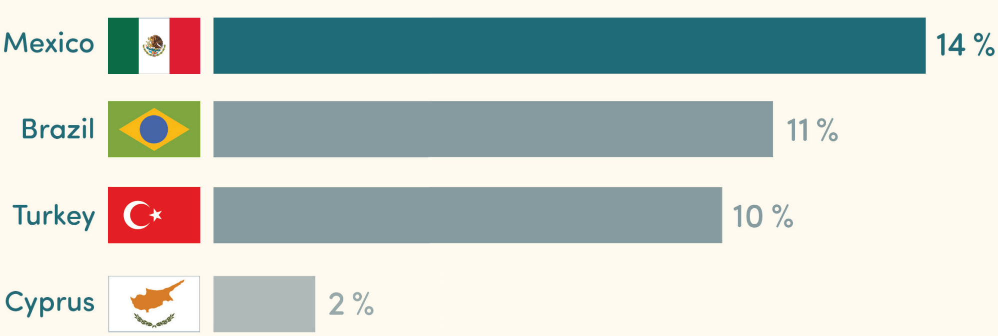
As countries work to meet their commitments under the Paris Agreement and accelerate the transition to net-zero, the insights provided by Solar Heat Worldwide are more relevant than ever. The report enables governments to benchmark their performance, identify best practices, and align their policies with proven pathways for solar thermal deployment.

In conclusion, Solar Heat Worldwide empowers policymakers with the evidence and context needed to make informed decisions about the future of heating. It bridges the gap between technical expertise and strategic planning, offering a clear view of where solar thermal stands today—and where it can go tomorrow.

Positive solar industrial heat outlook

The year 2024 was bright for solar industrial heat. At least 106 solar industrial heat (SHIP) plants with a capacity of 120 MW have been commissioned worldwide, an increase of 28 % compared to the previous year. The outlook remains strong, with an additional 125 MWth of SHIP capacity under construction by the end of 2024. Notably, this includes three multi-megawatt installations being built for copper mines in Chile. In these projects, the Chilean energy provider Gasco plays a key role as the dedicated solar heat supplier.

Rising Demand In Some Of The Largest Solar Heat Markets (Growth in new installations in 2024)



New solar heat capacity globally in2024:

17.8 GW_{th}

The number of multi-MW solar district heating systems continues to grow

Today, 346 towns and cities around the world benefit from solar energy integrated into their district heating networks. In 2024 alone, ten new systems with a total capacity of 74 MW were commissioned. The global solar district heating market is steadily expanding into new regions. Among last year's highlights was the commissioning of one of the world's largest solar district heating plants – a 34 MW system in the Netherlands.

Momentum is also building in Southeast Europe. Two major projects are advancing in the Balkans: in Pristina, Kosovo, the pre-qualification tender for a 44 MW collector field with seasonal storage closed on April 11, 2025. Meanwhile, in Novi Sad, Serbia, plans are underway for a 27 MW solar collector field, also paired with seasonal thermal energy storage.

Solar Heat On The Global Scale

544	GW$_{th}$ total capacity in operation end of 2024
-3%	growth in total capacity in operation 2023/24
443	TWh of thermal energy produced
153.5	million tons of CO_2 avoided
126	million solar heat systems in operation end of 2024
318,000	jobs in the global solar thermal sector 2023

Solar Thermal Industrial Actors Call For Clear Political Support For Their "No-Regret" Technologies Across Regions

Brussels, Brasília, Mexico City, Pune 24 June 2025:

Coinciding with the release of the IEA Solar Heating and Cooling (IEA SHC) global market report for solar heat market sales in 23/24, various industry associations across the world unite to call for clear political support and greater uptake of solar thermal technologies.

IEA SHC released today its detailed 2023 Solar Heat Worldwide reporting providing market data for 73 countries worldwide and summary trends for 2024 for 14 leading countries. Whilst the total operational capacity reached in 2024 544 GWth, with 17.8 GWth newly installed that year, the report also reports a 14% decline mainly affecting buildings (despite some increases in the hybrid PVT sector), with increasing projects though in industrial applications and district heating.

To read the full statements from each association
Click Here

To read Solar Heat Worldwide from 2005-2025
Click Here

Participating Partners

STFI – Solar Thermal Federation of India
Solar Heat Europe
ANES – Asociación Nacional de Energía Solar
abrasol – associação brasileira de energia solar térmica
FAMERAC – Fabricantes Mexicanos en las Energías Renovables A.C.

TASK 67

Compact Thermal Energy Storage

IEA SHC Task 67, titled "Compact Thermal Energy Storage Materials within Components within Systems," was a three and a half year international research initiative under the IEA Solar Heating and Cooling Technology Collaboration Programme (TCP). From October 2021 to June 2025, the Task brought together a global network of researchers—60 experts from 14 countries—united by a common goal: to advance the science and application of compact thermal energy storage (CTES) technologies.

Led by Dr. Wim van Helden of AEE INTEC in Austria, Task 67 was a joint Task with ***IEA Energy Storage Task 40****, lead by Dr. Andreas Hauer, ZAE Bayern, Germany. This collaboration ensured a multidisciplinary approach that bridged material science, system engineering, and energy policy.*

Why This Task?

The energy transition demands more than just renewable generation—it requires smart, efficient, and scalable storage solutions. Solar energy, while abundant, is inherently intermittent. To make solar heating and cooling viable year-round and across diverse climates, technologies that can store thermal energy when it's available and release it when it's needed are required.

Compact thermal energy storage offers a promising pathway. Unlike conventional water-based systems, CTES technologies use advanced materials—such as phase change materials (PCMs) and thermochemical materials (TCMs)—to store significantly more energy in a smaller volume. This makes them ideal for applications where space is limited, such as residential buildings, mobile systems, and retrofits.

Task 67 was initiated to address the technical and practical barriers that have historically limited the adoption of CTES. It aimed to accelerate innovation, standardize testing, and support the integration of these materials into real-world systems.

> "Task 67 was initiated to address the technical and practical barriers that have historically limited the adoption of CTES"
>
> WIM VAN HELDEN
> *SHC Task 67 Manager*

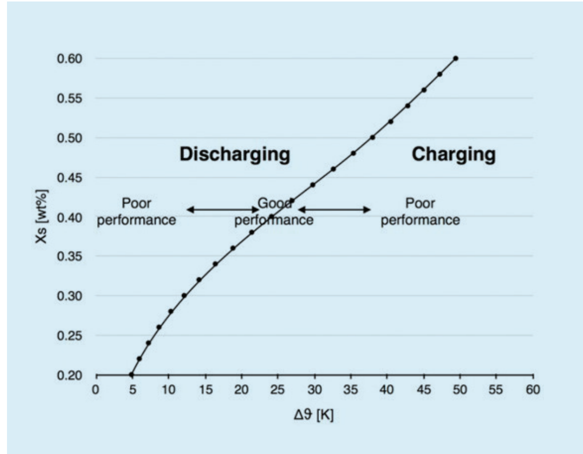
Objectives and Scope

The Task was structured around six core objectives. First, it sought to deepen the understanding of how CTES materials perform under various conditions, including their energy density, thermal conductivity, and long-term stability. Second, it focused on developing standardized methods for characterizing these materials, enabling researchers and manufacturers to compare results across different labs and applications.

A third major goal was to improve techniques for determining the state of charge (SoC) of CTES systems. Knowing how much energy is stored or available at any given time is essential for smart control and grid-responsive operation. The Task also explored the design of heat exchangers and reactors, aiming to optimize the interaction between materials and system components.

TASK 67

Beyond the technical aspects, Task 67 emphasized the importance of system integration. It examined how CTES materials behave within complete systems and identified best practices for incorporating them into heating and cooling networks. Finally, the Task prioritized knowledge dissemination, sharing its findings through webinars, publications, and collaboration with industry and policy stakeholders.



▲ **Task 67, Sub Task C. Component performance with innovative materials**

Key Achievements

One of the most impactful outcomes of Task 67 was the development of standardized testing protocols. The ‘Standardizing Thermal Energy Storage Measrurements Procedures’ article discusses coordinated round robin tests, participating laboratories were able to validate procedures that ensure consistent and reliable evaluation of CTES materials. This is a critical step toward commercial adoption, as it builds trust and comparability across the sector.

The Task also produced the first database cataloging CTES materials and their properties. This resource supports researchers, developers, and decision-makers in selecting appropriate materials for specific applications.

Innovative instrumenting and modeling approaches were introduced to assess the state of charge in CTES systems. These help operators understand how much energy is stored and how efficiently it can be retrieved, which is especially important for systems integrated with smart grids or variable renewable sources.

In addition to technical progress, Task 67 fostered a vibrant international community. Through the IEA SHC Solar Academy, the Task hosted webinars and workshops that facilitated knowledge exchange and built capacity among researchers, engineers, and policymakers.

Looking Ahead

Although Task 67 has officially concluded, its legacy continues. The insights and tools developed during the Task lay the foundation for future innovation in thermal energy storage. Key areas for continued focus include scaling up the production of advanced materials, integrating CTES into diverse energy systems, and bridging the gap between laboratory research and market deployment.

▼ **Thermophysics Lab at the Austrian Institute of Technology**

As governments and industries pursue decarbonization, CTES technologies will play an increasingly important role. They offer a flexible, efficient, and sustainable solution for storing heat—whether for residential comfort, industrial processes, or district energy systems.

Follow up Tasks have already been approved at the June 2025 Executive Committee meeting in Bratislava, Slovakia. Two Tasks with maximum collaboration with the IEA Energy Storage TCP have been created. SHC Task 74/ Energy Storage Task 47, ‘Components for Thermal Energy Storage’ and /Energy Storage Task 48/SHC Task 75 ‘Thermal Energy Storage Materials’ have already begun.

Final Thought: Why Task 67?

The answer is simple: because thermal energy storage is essential to a climate-neutral future. Without compact, efficient, and intelligent storage solutions, the full potential of solar and other renewables cannot be realized. In the Technology Position Paper, an introduction is given to the potential application areas and market size of several compact thermal energy storage technologies, giving policy and decision makers a basis for steering policies in the direction of more applications and better thermal storage products.

Summary

IEA SHC Task 67 was a global research initiative focused on advancing compact thermal energy storage (CTES) technologies to support the transition to renewable energy. By developing standardized testing methods, improving material characterization, setting first steps towards novel state-of-charge determination methods, and fostering international collaboration, the Task laid critical groundwork for integrating CTES into residential, commercial, and industrial energy systems. Its outcomes not only addressed technical challenges but also helped bridge the gap between innovation and market readiness—making thermal energy storage a key enabler of climate-neutral energy solutions.

Conclusion: Key Messages from Task 67

Task 67 demonstrated that compact thermal energy storage is not just a technical possibility—it is a strategic necessity for the future of sustainable energy systems. Through international collaboration, rigorous testing, and knowledge sharing, the Task helped move CTES technologies closer to real-world deployment.

The Key Messages From Task 67 Are Clear:

- **State of charge monitoring and system design must evolve alongside materials to ensure performance and reliability.**
- **Knowledge dissemination empowers stakeholders—from researchers to policymakers—to make informed decisions that support climate goals.**
- **Thermal energy storage is essential for maximizing the value of solar and other renewable sources.**
- **Compact storage solutions offer flexibility and efficiency, especially where space and system integration are critical.**
- **Standardization and collaboration are vital to accelerating innovation and building trust across the industry.**

As the energy landscape continues to evolve, the work of Task 67 provides a solid foundation for future research, development, and deployment. Its collaboration between material experts and component and system engineers has shown very effective in setting steps towards better materials, characterisation methods and system integration of compact thermal energy storage.

INTEVIEW

Wim van Helden

The SHC Programme finalized its work on Compact Thermal Energy Storage Materials (SHC Task 67) in 2025. To learn firsthand about the Task's impact, we asked the Task 67 Manager, Wim van Helden of AEE Intec, to share his thoughts on this exciting project.

Why was a project like this needed?

Wim van Helden (Wim): Thermal energy storage technologies are crucial for realising a flexible, 100% renewable energy system. Compact thermal energy storage technologies provide optimal solutions for a broad field of applications, for which the present thermal energy storage technologies offer a sub-optimal solution. The research and development work for compact thermal energy storage technologies is still very scattered, with low budgets. International collaboration between experts therefore is needed and the Task67 provided a perfect platform for the experts to collaborate, to exchange knowledge and experience and to form new collaborations.

How has the Task's work supported capacity and skill building?

Wim: The Task has common goals, that are worked on by experts from different groups. And in the Task meetings, gained knowledge and experience is shared. An important part of the work was developing novel standardised methods to measure and determine properties of thermal energy storage materials, resulting in increased measurement skills of the collaborating experts.

What is the future of compact thermal energy storage materials?

Wim: We see a steady improvement in the quality of the materials and methods developed, that find their way to the market better than in the past. From our activities, already more than five start-up companies have been started while several existing thermal storage industries actively participate in the work.

What is the current status of the applications used for compact thermal energy storage materials?

Wim: Especially with phase change materials, there are several successful market applications. There are PCM technologies for building components, for HVAC applications and for domestic heating appliances. And for sorption technology, an application is on the market in a zeolite dishwasher.

What were the benefits of running this as an IEA SHC Task?

Wim: The major benefit is the international collaboration between experts in the fields of materials development and component development. From the start of the work on compact thermal energy storage technologies with Task42 in 2011, we saw that this collaboration is needed to increase the understanding of materials experts with the component/system challenges and vice versa. With this increased understanding, the development cycle from materials to system application is much more efficient.

Is there one result/outcome that surprised you?

Wim: Yes, and that is to our shame. We found out that new generations of researchers sometimes made the same, less optimal decisions when setting up experiments with compact thermal energy storage materials and components. Obviously, we did not talk enough about the challenges and pitfalls of our research and we have decided to improve this in our follow-up Task.

What is a Task success story from an end-user or industry perspective?

Wim: One success story is the above-mentioned zeolite dishwasher, that was brought to the market by the German manufacturers Bosch and Siemens. Another success is the product of Sunamp, a domestic heat storage based on PCM, that also can be used for peak load shifting.

Will we see more work in this area in the IEA SHC Programme?

Wim: Yes, we will continue the work in two follow-up Tasks: Task 74 will work on the further development of thermal energy storage components, and T75 will continue the improvement of thermal energy storage materials. Both Tasks will kick-off in Stockholm, from 13 to 15 October.

TASK 68

Efficient Solar District Heating Systems

IEA SHC Task 68, "Efficient Solar District Heating Systems" was a 3-year Task that started April 2022 and ended March 2025. It was initially led by Viktor Unterberger, who later handed over this responsibility to Klaus Lichtenegger. Both hold (or held, at the time as Operating Agent) the position of Senior Researchers at BEST – Bioenergy and Sustainable Technologies, an Austrian research institution active in the domain of bio-based products, renewable energy and digital solutions for planning and operation of multi-energy systems, with particular focus on the thermal sector.

The main topic of the Task was to provide a systematic approach for the optimization, integration, and deployment of solar district heating (SDH) systems. This Task aimed to accelerate the adoption of solar thermal in DH networks by improving system design, performance, and policy support. It builds on the legacy of previous SHC efforts (mainly Task 45 and Task 55) and aligns with the IEA's broader mission to support sustainable heating and cooling solutions.

Why This Task?

District heating (DH) systems are a cornerstone of urban energy infrastructure, supplying heat to residential, commercial, and public buildings through centralized networks. Traditionally reliant on fossil fuels, DH systems are now under pressure to decarbonize in line with the dire need for an energy transition, which has partially manifested in national and international climate goals.

Solar thermal energy offers a clean, scalable, and increasingly cost-effective alternative that provides independence from fuel imports — but its integration into DH networks faces technical, economic, and regulatory challenges. We currently have the situation that the expansion of a mature, clean and cost-effective technology stagnates in most regions of the world, largely due to lack of knowledge and due to a dominance of short-term planning (mostly because of business management processes and decisions that are increasing unsuited for a world tumbling towards a climate crisis)

▲ **Solar thermal energy offers a clean, scalable, and increasingly cost-effective alternative that provides independence from fuel imports**

TASK 68

Objectives and Scope

Task 68 was structured around four core goals, which were investigated in corresponding Subtasks:

A) Demonstration of improved efficiency of SDH systems through collector technology and system integration. (Subtask A, led by Magdalena Berberich, Solites, GER)

B) Digitalization and data utilization for monitoring, fault detection, evaluation of performance and use of advanced control. (Subtask B, led by Maria Moser, SOLID SES, AUT)

C) Policies and Costs: Describe and compare policy frameworks, funding and financing schemes and discuss measures for cost reduction. (Subtask C, led by Luuk Beurskens, TNO, NLD)

D) Identify best practices for integrating solar thermal plants in DH infrastructure, for achieving high solar fractions. (Subtask D, led by Joakim Byström, Absolicon, SWE)

Task 68 includes contributions from forty institutions (universities, research centres, and companies) from fourteen countries and was coordinated by experts from leading research institutes and manufacturers. It contributed to the IEA SHC Solar Academy, which provides training and outreach to stakeholders worldwide.

Key Technical Achievements

Subtask A: Technology

The analysis of various collector technologies shows that modern solar collectors can still achieve satisfactory thermal yields even at high operating temperatures (e.g. 100 °C). Deliverable RA1 compares different technologies and evaluates their gross thermal output in Davos (as an example of a Central European alpine location) for different operating temperatures. The significant role of thermal storage is emphasised, particularly the contribution of seasonal storage to achieving high solar fractions.

Planning tasks associated with SDH can improved by simulation tools. These simulation tools were compared in Deliverable RA2. RA3 presents a straightforward method for verifying the annual yield of large solar systems, developed within the ProSolNetz project. This approach is based on ISO/DIN 24194 and includes the methodological procedure, application, and limitations.

Overall, the results of Subtask A demonstrate the advanced state of modern solar collector technology, confirm that European manufacturers remain global leaders in this field, and show that district heating networks requiring relatively high temperatures can be supplied with solar heat to a significant extent. While the combination with other technologies (certainly with storage, and additionally e.g. biomass boilers, high-temperature heat pumps, or geothermal energy) is generally necessary, it can be accomplished effectively.

Examples for modern solar thermal collectors: Ground mounted evacuated tube collectors in Büsingen, Germany; Roof integrated solar thermal collectors on "solar@home" building in Crailsheim, Germany; Demo system of Sun Oyster on a flat roof in Zhangjiakou, China.

Subtask B: Digitalisation and Monitoring

Subtask B proved key foundations for the **standardised acquisition, processing, and evaluation of data** in solar thermal systems. Requirements for measured variables, sensor placement, and data validation were defined in Deliverable RB1.

Initial AI-based fault detection methods were also applied – first presented at ISEC 2022,

further developed, and presented at EuroSun 2022 ("Fault Detective"). The corresponding journal article was published in Solar Energy Advances (DOI: 10.1016/j.seja.2023.100033).

Deliverable RB2 is a practical guide to the application of **ISO 24194:2022** for the performance assessment of solar thermal systems. It supports planners and operators in conducting standard-compliant analyses and ensuring comparability of systems. The guide is available on the Task website and on Zenodo (https://doi.org/10.5281/zenodo.15876487).

Insights from numerous international projects on the control of solar thermal and thermal energy systems were systematically compiled in Deliverable RB3. In addition, new **AI-based control strategies** were investigated, and evaluations are planned for future projects.

Activity B5 focused on a comprehensive analysis of **open data practice**s in the solar thermal sector. This included a systematic literature review and feedback from multiple expert surveys. A structured overview of currently available open datasets relevant to the solar thermal community was created. The main results were published as RB4 and as an article in Solar Energy Advances.

Subtask C: Financing and Cost Reduction

Solar district heating (SDH) systems are a climate-friendly, cost-efficient, and reliable solution for supplying heat to cities and communities. They are characterised by a typical renewable energy cost structure: high upfront investment costs (CAPEX) combined with low operating costs (OPEX). This structure enables long-term stable heat prices and significantly reduces dependence on fossil fuels. However, attractive financing and business models are crucial for large-scale deployment.

Policy Framework

The work in Subtask C shows that a combination of different policy instruments is particularly effective in stimulating investment in solar district heating:

- Direct support instruments such as building and heating regulations, replacement programmes, or binding quotas actively promote the use of renewable heat.
- System-oriented approaches enhance flexibility and efficiency by integrating thermal storage, sector coupling, and smart network strategies.
- Enabling measures create a level playing field, ensure access to financing, set expansion targets, and foster innovation.
- Combined measures, such as simplified permitting, information campaigns, and strategic resource planning, further reduce investment barriers.

Because the economic performance of solar thermal heat strongly depends on site and climate conditions, such measures often are still essential until market conditions and technologies mature further.

Lifecycle

High quality in all project phases is essential for the successful implementation of SDH projects. Task 68 has developed practical checklists that support planners and operators through all stages – from site selection, planning, construction, and operation to eventual decommissioning. A systematic approach ensures that systems operate efficiently and deliver high yields over the long term.

Cost Reduction And Economic Potential

Studies and surveys on potential cost reductions for solar thermal systems by 2050 reveal significant potential:

- Studies and surveys on potential cost reductions for solar thermal systems by 2050 reveal significant potential:
- Investment costs could be reduced by up to 10.9 % through standardisation, industrial prefabrication, and optimised procurement.
- Operating costs could decrease by up to 9.3 % through improved financing conditions, larger plants, and optimised planning processes.
- Overall lifecycle costs could fall by about 22 % – e.g. from 77 €/MWh to around 60 €/MWh in Central Europe.
- More yield improvements through enhanced system design and operation could lead to savings of up to 14.9 %.

The fundamental challenge – that even measures essential for the survival of human civilisation and global ecosystems are often implemented only if they appear economically more attractive than competing investments, which often perpetuate the destructive use of fossil fuels – is not eliminated by these findings. However, they do open the prospect that conventional investment decisions may increasingly favour renewable solutions such as SDH.

Target groups and impact

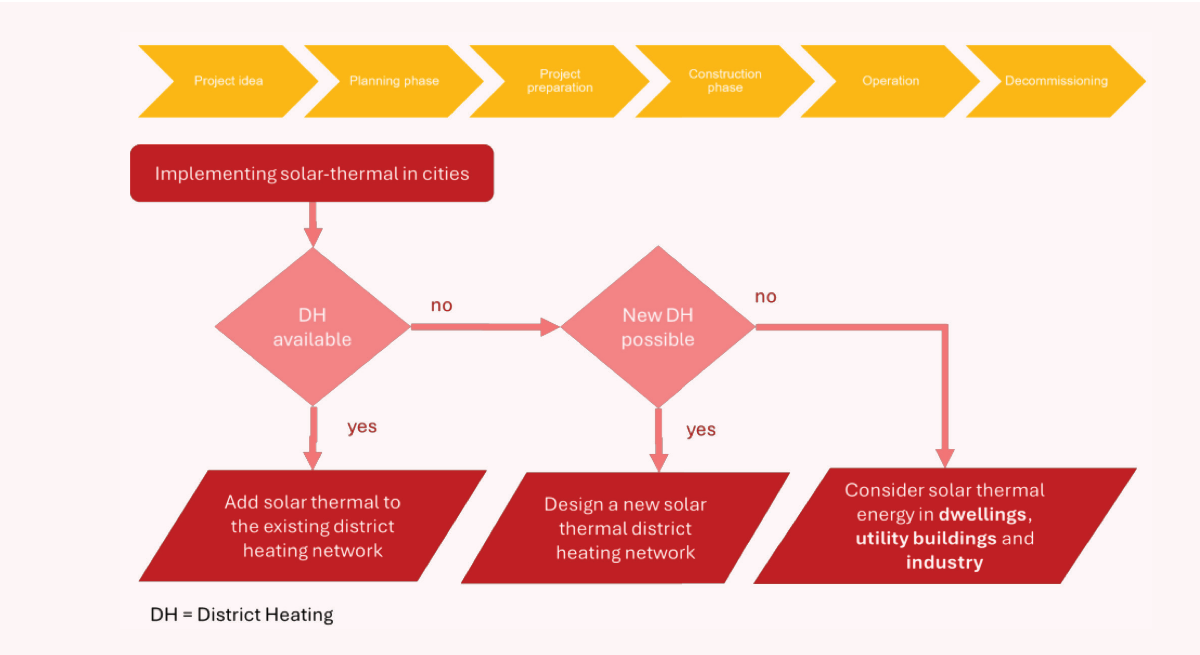
The findings from Subtask C are aimed at policymakers, urban planners, energy utilities, and technology providers. They offer concrete approaches for policy frameworks and business models that can help investment and accelerate the deployment of solar district heating. In doing so, Subtask C makes an important contribution to the heat transition and to achieving climate goals at local and national levels.

Subtask D: Best Practices and Dissemination

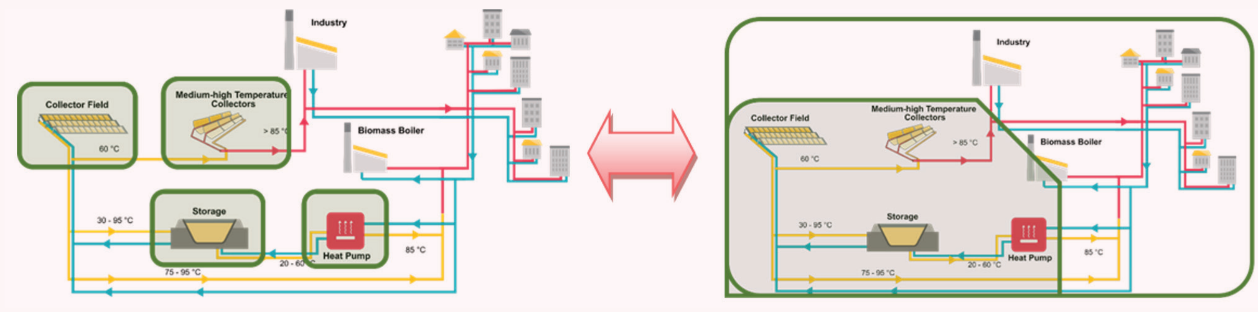
Deliverable RD1 describes seven solar district heating plants that are particularly successful and characterize examples of best practices. Of particular interest are systems combining solar thermal generation with seasonal storage, such as the plant in Dronninglund, Denmark, which achieves a 40 % solar fraction using a 60,000 m^3 pit storage. This shows that by combining suitable technologies – especially by shifting heat from summer to winter through seasonal storage – solar fractions can exceed the often-cited 20 % threshold considered the upper limit for “conventional” solar thermal systems.

Space requirements and potential analysis

The space requirements for solar thermal solutions are comparable to those of other infrastructure projects such as airports, motorway interchanges, or golf courses. Table 2 lists the area needed to achieve a 20 % solar share for several European cities, and Figure 4 shows corresponding maps. Several such examples, along with useful links and further information, are collected on the website https://solardistrictheating.eu. Due to some open questions about copyright, this page is currently not publicly accessible. However, the password is known to active Task 68 experts and the ExCo, allowing the material to be used for dissemination activities within this circle.

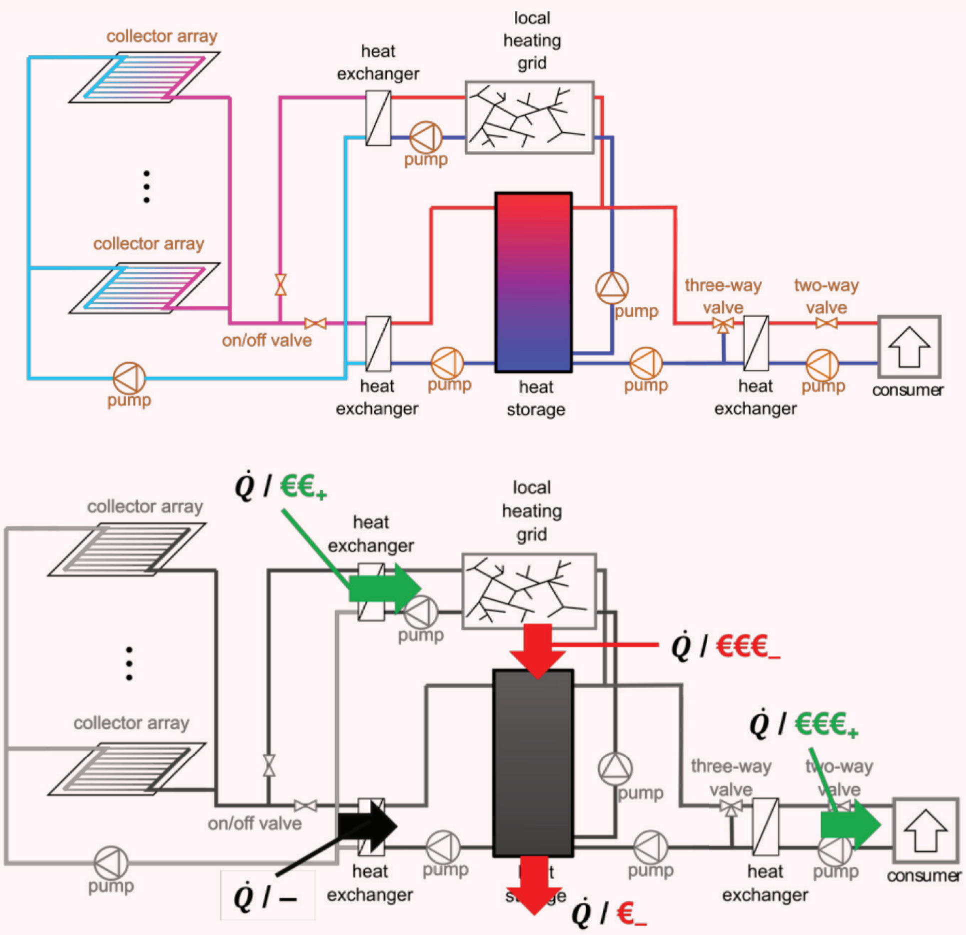


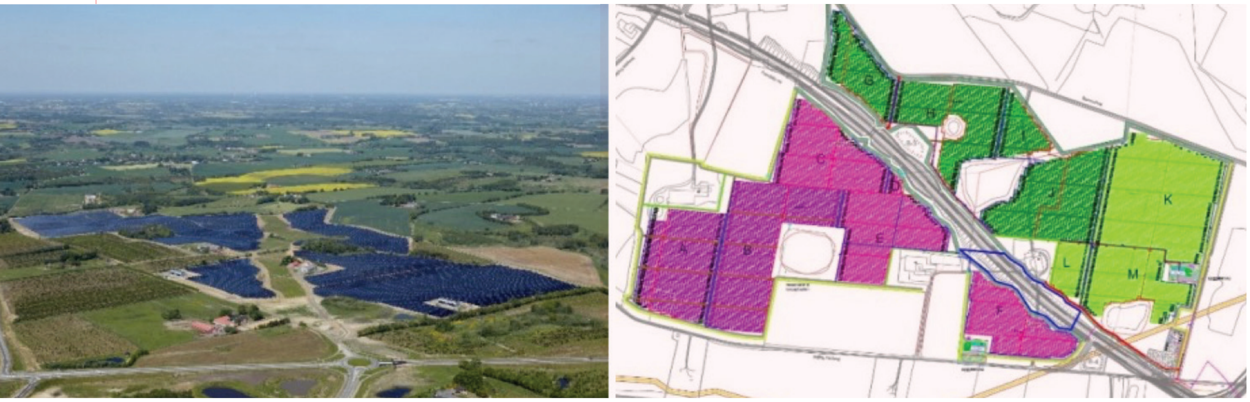
Stages in the solar thermal plant life cycle (top), flow chart for the decision about implementation of solar district heating (bottom)



▲ **Contrasting the component-level control for a thermal energy system composed of solar collectors, storage and heat pump, which, together with a biomass boiler, supplies heat to industry and households via a district heating grid.**

General structure of solar district heating (top) as well as important heat and revenue streams (bottom) ▶





Overview over the large-scale solar thermal plant in Silkeborg, Denmark (left) and schematic showing the different sections and piping of the installation (right)

Policy Relevance: Enabling Solar District Heating

The findings of IEA SHC Task 68 offer valuable guidance for policymakers seeking to accelerate the transition to low-carbon heating systems. Solar district heating (SDH) has proven to be both technically practical and economically competitive, especially when supported by thoughtful policy frameworks.

Task 68 has proved that solar district heating systems are economically viable, particularly those incorporating seasonal thermal energy storage, can achieve a levelized cost of heat (LCOH) ranging between €30 and €50 per megawatt-hour. This cost range is competitive with fossil-based heating in many regions, especially when long-term operational savings and carbon pricing are considered. The economic case for SDH is strongest when systems are integrated during the planning or retrofitting of district heating networks, allowing for optimized design and reduced infrastructure costs.

To support the deployment of SDH systems, policymakers should consider implementing targeted financial mechanisms. These may include upfront capital subsidies for solar collector fields and seasonal storage systems, low-interest financing options, and feed-in tariffs for renewable heat. Task 68 recommends performance-based incentives that reward systems based on their solar fraction, energy efficiency, and verified carbon savings. Such incentives can help de-risk investments and encourage innovation.

Regulatory frameworks play a critical role in enabling solar integration. One effective approach is to mandate solar readiness in new district heating networks, ensuring that infrastructure is compatible with future solar thermal additions. Zoning regulations should also facilitate the allocation of land for collector fields and storage units, particularly in urban and peri-urban areas. Furthermore, carbon pricing mechanisms and renewable heat mandates can create market conditions that favour SDH over fossil alternatives.

Municipal governments are key actors in the successful deployment of solar district heating. They can coordinate utilities, developers, and community stakeholders to align interests and streamline project development. Task 68 emphasizes the importance of transparent communication and inclusive planning processes. Public-private partnerships, community ownership models, and educational outreach can all contribute to broader acceptance and long-term success.

Next Steps

In potential follow-up activities for IEA SHC Task 68, the focus will shift toward:

- Enhanced system integration with complementary technologies
- Scaling up deployment in urban and rural contexts.
- Promoting digital solutions and the extended use of open data
- Refining cost and business models to support investment planning.
- Enhancing policy engagement through targeted briefs and stakeholder workshops.
- Expanding training programs via the IEA SHC Solar Academy.

The Task will also contribute to broader IEA efforts on sector coupling, grid flexibility, and climate resilience.

Conclusion and Key Takeaways

IEA SHC Task 68 has been an important initiative for advancing solar district heating as a mainstream solution for low-carbon urban energy. Its technical innovations, real-world case studies, and policy contributions are helping shape the future of sustainable heating systems.

Key Takeaways:

- **Solar district heating is technically mature and economically viable at scale, though the high investment costs and the space demand often pose serious challenges.**
- **Seasonal storage and smart control strategies are essential enablers of high solar fractions.**
- **Hybrid systems with sector-coupling enhance flexibility and efficiency.**
- **Task 68 provides validated tools and guidelines for design, operation and monitoring of solar district heating systems.a**

Collaboration across energy sectors and a holistic view on planning are a key to accelerating deployment and meeting climate goals.

INTEVIEW

Klaus Lichtenegger

The SHC Programme finalized its work on Efficient Solar District Heating (SHC Task 68) in 2025. To learn firsthand about the Task's impact, we asked the Task 68 Manager, Klaus Lichtenegger of BEST, to share his thoughts on this exciting project.

Why was a project like this needed?

Klaus Lichtenegger (Klaus): Because the decarbonisation of the heat sector is essential if we are to meet our climate goals – and it has lagged far behind the electricity transition. About half of global final energy consumption is for heating and cooling, yet this is still dominated by fossil fuels. Solar thermal energy offers a local, renewable, and, during operation extremely low-cost source of heat.

However, despite its potential, the expansion of large-scale solar district heating in Europe has stagnated lately. There are technical challenges, digitalisation gaps, and economic barriers that need to be addressed. Task 68 was created to tackle exactly these issues: integrating solar thermal more efficiently into district heating networks operating at higher temperatures, improving digital tools and data use, reducing costs, identifying business models that accelerate deployment and presenting best-practice examples.

How has the Task's work supported capacity and skill building?

Klaus: Task 68 has significantly strengthened both technical and institutional capacity in the field of solar district heating. Through international collaboration, we have:

- Developed guidelines for data collection, validation, and performance assessment (including a comprehensive guide to ISO 24194).
- Studied the capacities of advanced AI-based methods for fault detection and discussed different approaches to predictive control (rule-based, optimization-based, AI-based).
- Mapped the status quo of open data for solar thermal systems and highlighted the importance of providing and using open data.
- Provided planners and operators with practical tools and checklists for the entire project lifecycle – from planning and design to operation and decommissioning.
- Facilitated training and knowledge exchange through webinars, workshops, and publicly available reports.

Many partners – including utilities, municipalities, and SMEs – now have new skills and digital competences that directly support the wider deployment of solar district heating.

What is the future of solar district heating?

Klaus: Humanity currently faces a parting of the ways. If we continue the current path of short-sighted decisions, increasing consumption of fossil fuels and destruction of the global ecosystem, we head towards a crisis that will most likely crush human civilization as we know it today. In this case, there is no future for solar district heating, as, on a wrecked, uninhabitable planet, there will be no future for anything we know (except a few extraordinarily tough species that will survive even such a disaster). Unfortunately, on the current course, this is the most likely outcome.

If, however, we manage the turnaround, solar district heating can be expected be a cornerstone of decarbonised urban energy systems. As cities move towards fossil-free heating, combining solar thermal with seasonal storage, heat pumps, biomass, or waste heat will provide stable, secure, and affordable energy. In such a scenario, we expect to see higher solar shares – not just 20%, but 40% or more – especially when seasonal storage and advanced control systems are included. The technology is already mature and proven; the next step is scaling up, standardising solutions, and integrating them into broader renewable energy and sector coupling strategies. With the right policies and digital tools, solar district heating can become a mainstream solution in the next decades.

What is the status of the applications used for solar district heating?

Klaus: Technically, solar district heating is ready. Modern collector technologies achieve high efficiencies even above 100°C. Several European cities already operate large systems, and seasonal storages allow impressive solar fractions.

Widespread deployment, however, is still limited by a lack of attractive business models (or lack of an economic system that incentivizes reasonable activities instead of growth at any cost and of production of short-lived stuff that quickly turns into junk). It is also hampered by insufficient integration of storage and underdeveloped digitalisation. Also, policy frameworks often focus on electricity and overlook renewable heat. Yet the systems that exist today – in Denmark, Austria, Germany, and other countries – prove that the technology works reliably and cost-effectively. The challenge now is scaling these solutions to many more cities and regions.

What were the benefits of running this as an IEA SHC Task?

Klaus: The IEA SHC framework provides something unique: a neutral, trusted platform where research institutions, industry, utilities, and policymakers from many countries can collaborate in a very friendly and positive atmosphere. This international exchange is crucial because the challenges are similar everywhere, but solutions can be adapted and improved by learning from each other.

The Task allowed us to pool expertise across disciplines – technology, digitalisation, economics, and policy – and to build consensus on best practices, standards, and research priorities. It also gave visibility to the topic globally and connected national projects to a broader strategic vision.

Is there one result/outcome that surprised you?

Klaus: When we started to work on the topic of open data – an activity that culminated in the publication of a peer-reviewed journal article – we were not aware of the wealth of data already available to researchers and industry, on websites like https://solarheatdata.eu/, which can be put to good use in all stages of the plant life cycle. By increasing digitalization and establishing incentives to share data, advanced digital methods (like AI-based monitoring or optimization-based predictive control) can be game changers for this branch of industry.

What is a Task success story from an end-user or industry perspective?

One standout example is the deployment of the SunPeek tool for automated performance checks based on ISO 24194. Developed also within the Task and now available as open-source software, it enables utilities and operators to monitor system performance with minimal effort.

Other success stories are the textbook-quality report on modern collector technologies (RA1), the checklist for solar thermal plants in district heating (report RC2) and the collection of best-practice examples (report RD1) that all are extremely valuable documents for anyone interest in implementing solar district heating solutions.

Will we see more work in this area in the IEA SHC Programme?

Klaus: I sincerely hope so. Task 68 was an important step, but this story is not yet finished. Future work will likely focus on higher solar shares, integration of seasonal storage, sector coupling, and open data ecosystems for planning and benchmarking.

There is strong momentum to continue this collaboration – possibly in a follow-up Task – because the combination of solar thermal, district heating, and storage is one of the most powerful tools we have to decarbonise urban heat. And it's not just about technology; it's also about building markets, policies, skills and public awareness.

The IEA SHC Programme is uniquely positioned to drive this transformation, and Task 68 has laid a strong foundation for the next phase.

The Cost of Sunshine: System Boundaries and their Impacts on LCoH in Solar Thermal Systems

In an upcoming publication, Y. Louvet and K. Vajen from the University of Kassel, Germany proposes a comprehensive framework for calculating the levelized cost of heat (LCoH) for solar thermal systems in residential buildings. The study identifies key system boundaries for the energy and costs and introduces a nomenclature to differentiate LCoH values based on these boundaries. Combination with other heating technologies is considered so that the proposed framework can be applied to many heating systems. The proposed nomenclature shall define a scientific standard for studies dealing with the LCoH of solar heating systems.

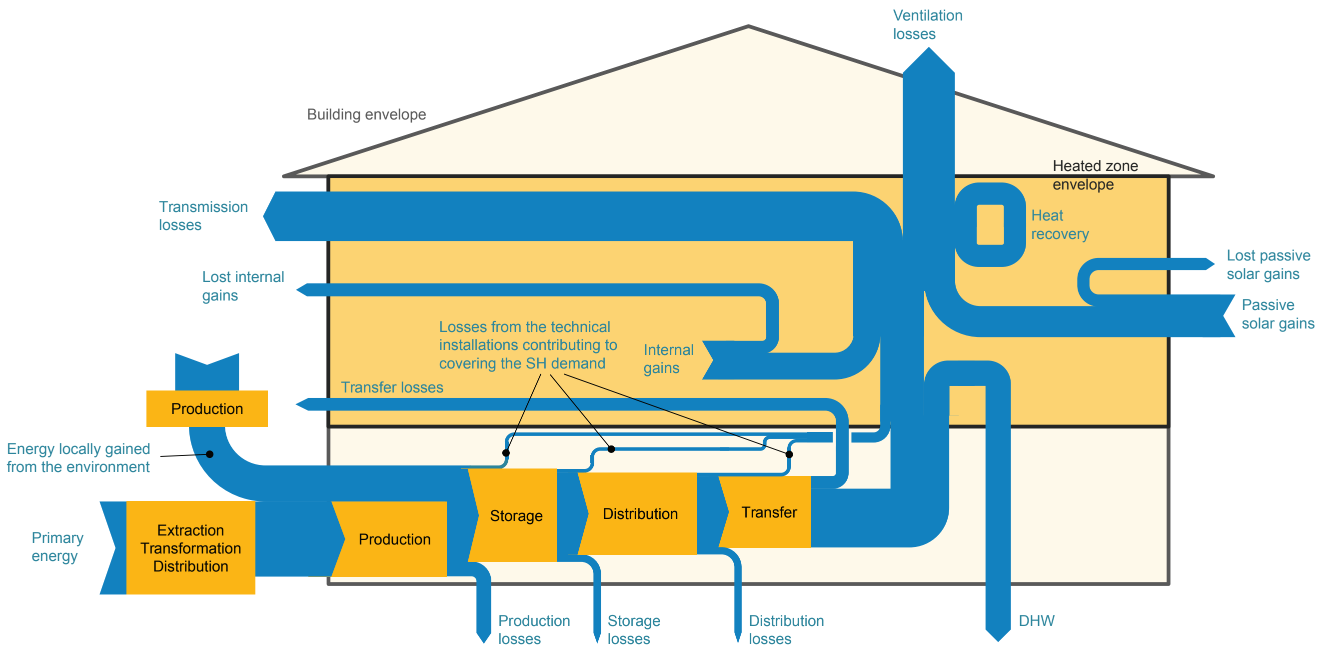
IEA SHC Task 71 focuses on the life cycle and cost assessment of heating and cooling technologies. In this context, it was deemed necessary to define a harmonised method for calculating the environmental impacts as well as the costs of solar thermal systems and, beyond that, of heating systems in general. With regards to costs, the publication presented here draws on the results of IEA SHC Task 54 (2015-2018) and starts from the observation that the LCoH for solar thermal systems is not uniformly defined in the literature.

The LCoH is an indicator commonly used to compare different technical solutions from an economic perspective. It is a ratio between all the costs occurring over a given period and a reference energy characterising the system over the same period. Should the costs of the distribution system and/or radiators be included in the calculations? Should the reference energy be defined at the heat storage outlet, or should heat losses from the storage and/or auxiliary boiler be included in the reference energy? These are examples of questions that arise when performing LCoH calculations, and different answers lead to different LCoH values. The paper highlights this point using concrete examples.

To address this issue, the publication aims to rationalise LCoH calculations through a framework defining the possible system boundaries for energy and costs. Boundaries for the reference energy are derived from the analysis of building energy balances as defined in existing standards. For the costs, "levels of analysis" are defined, which delimit the components to

"The publication aims to rationalise LCoH calculations through a framework defining the possible system boundaries for energy and costs."

Y. LOUVET
SHC Task 71 Manager



be included or not and depend mainly on the scope of the analysis carried out: assessing the size of the heat storage on the LCoH does not require the same components to be taken into account as assessing the impact of replacing the auxiliary boiler with a heat pump, for instance.

Overall, the work aims to raise awareness of the fact that the choice of system boundaries has a significant impact on the results of LCoH calculations. For this reason, it is important to always clearly state the assumptions and system boundaries when performing calculations, to facilitate interpretation and to enable comparisons of the results. The nomenclature proposed in the publication shall define a scientific standard and could be useful for this purpose.

Please visit the Task 71 website for updates and publications, including the upcoming *https://task71.iea-shc.org/* the full article will be published on the website.

▲ **Energy Streams in Buildings**

TRANSPIRED SOLAR AIR:

Plenty of Room to Grow

Ventilation is an essential requirement for buildings' indoor air quality (IAQ), and most commercial and industrial facilities require large amounts of fresh air to maintain a healthy work environment. In cold climates, ventilation is associated with significant heating loads, as fresh air can be much colder than the desired indoor temperature. Transpired solar air collectors were developed to reduce the usage of conventional energy resources in such systems. The work was pioneered in the late 1980s by researchers from the US National Renewable Energy Laboratory (NREL) and the Canadian company Conserval Engineering.

Behind sophisticated science and engineering lies an elegant and straightforward concept: air is sucked through perforated plates exposed to the sun, pre-heating the ventilation air. This creates a system that is cost-effective and reliable. Air suction provides an effective way to reduce heat losses caused by wind, and most transpired air collectors have no glazing. They are mounted on a wall, integrated into the façade, and operate in open-loop mode, that is, the air does not recirculate from the building back into the collector.

Many innovations have been introduced to transpired solar air systems in the last 35 years: two-stage collectors with a glazed second-stage, collectors for flat-roof mounting, photovoltaics-thermal (PVT) models, transpired glazings, models with integrated heat-recovery and, more recently, collectors with spectrally selective coatings, which can reduce thermal losses.

Applications have also evolved from traditional building usage, and many systems have been installed to support drying operations and even radiant cooling.

Despite its initial success, solar air systems still face important challenges. Many solar thermal supporting policies and programs do not include transpired solar air systems in their technology scope. This is in part due to a lack of knowledge from program developers but also due to a difficulty in representing the laboratory-tested performance data as a set of simple equations that can be easily incorporated in simulation tools, as is the case with liquid glazed solar thermal collectors. Also, the configuration and large size of commercial and institutional building-integrated solar air systems make predicting their operation and performance more difficult. Heat losses from the building's surface (and the system's performance) depend on the local air velocity and turbulence level of the wind adjacent to the building wall, which is difficult to estimate.

Moreover, full-size systems perform better than small samples used for laboratory testing, but the extent of this improvement is not fully understood, and less has been done in terms of experimental and theoretical analysis of newer variations, such as the PVT model.

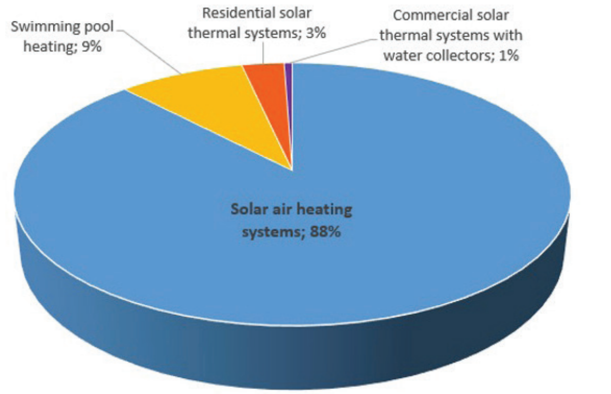
The result is that improved test and rating methods need to be developed, and design tools must be adapted to all new variations. This will allow for a better assessment of system efficiency, energy delivery, economic viability, and CO2 emission reductions. With a clear understanding of the Key Performance Factors and how to characterize them, system modeling and optimization will be possible, limiting the adoption of such systems. To date, such a focused and extensive analysis of such systems and their performance metrics has yet to be conducted.

Within the SHC TCP, transpired solar air systems have been the subject of collaborative research in three Tasks. SHC Task 14: Advanced Active Solar Energy Systems presented the most extensive work on this subject among all Tasks and investigated laboratory and field evaluation of several systems, with a review of the theoretical analysis and simulation tools, all for unglazed wall-mounted systems. SHC Task 19: Solar Air Systems presented basic design guidelines and built examples for a large variety of solar air systems, including unglazed transpired ones. SHC Task 29: Solar Crop Drying investigated the application of solar air systems for drying, including unglazed transpired air systems.

CanmetENERGY-Ottawa has been conducting research in this area to address some of the challenges mentioned above. This includes testing both large and small samples in controlled laboratory settings, in collaboration with Prof. Stephen Harrison's team from Queen's University Solar Calorimetry Laboratory in Kingston, Canada.

Early results from this research were presented at the EuroSun 2024 conference in Limassol, Cyprus. However, it is obvious that much more needs to be done to help this technology reach its full potential. The time is right once again to join our efforts within the SHC TCP community to support and advance this technology.
This includes working on test methods and simulation tools not only for first-generation systems but also for the wide range of innovations introduced since our last Task in this area.

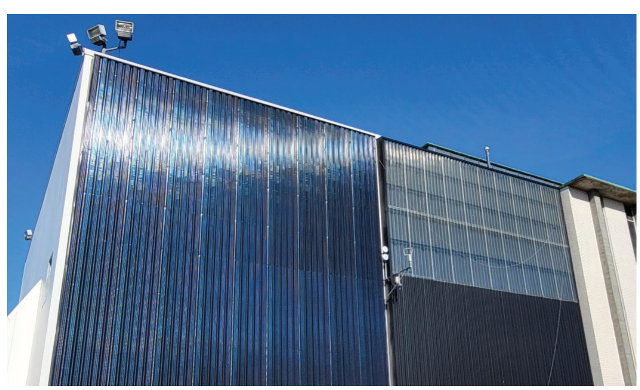
This article was contributed by Stephen Harrison, PhD, PEng. Director, Solar Calorimetry Laboratory, Queen's University, Kingston, Canada



Gross collector area sold in Canada in 2023 according to application (total sales of 31,338 m2). Transpired solar air systems corresponded to 88% of the Canadian solar thermal market that year.

(Source: NRCan Canadian Solar Thermal Market Survey 2024 edition)

Laboratory testing of transpired solar collectors at the Canadian National Solar Test Facility.



OPINION

Reflections from the Chair

The year of 2025 has been another dynamic and productive period for the Solar Heating and Cooling Technology Collaboration Programme (SHC TCP). Thanks to the dedicated efforts of our Executive Committee, Task Managers, and experts, we've achieved significant milestones in advancing our Programme's mission.

Key Highlights

Among the most notable developments:

- **Publication of Solar Heat Worldwide** – our flagship report continues to serve as a vital reference for global solar thermal data and trends.
- **97th and 98th Executive Committee Meeting** – held in Bratislava, Slovakia and Virtually these meetings brought together ExCo members to review progress and plan future initiatives.
- **Task 68 – Efficient Solar District Heating** – delivered Subtask D-1 best practices guidelines and case studies for utilities and policy makers.
- **Task 69 – Solar Hot Water for 2030** – Advanced key themes including standardization, certification and gender equality, hosting the joint SOLTRAIN/IEA SHC symposium in Windhoek, Namibia.
- **Strengthening Collaboration with Other TCPs** – two collaborative Tasks start with Energy Storage TCP – Task 74/47 and Task 75/48

In parallel, our Task Managers have been actively advancing work under Tasks 68 through 73. Task 67, focused on Compact Thermal Energy Storage Materials, officially concluded in June. However, its legacy continues through the launch of Tasks 74 and 75—both collaborative efforts with the IEA Energy Storage TCP.

Farewells and New Beginnings

After 22 years of dedicated service, our esteemed colleague Ken Guthrie is stepping down as Australia's ExCo member. Ken's contributions have been instrumental to the SHC TCP, and we extend our deepest gratitude to him. He will continue to serve as alternate ExCo member for the time being. We warmly welcome Dr. Robert Taylor, Task Manager of Task 69 and current alternate, as his successor.

Reflections from the Chair

Expanding Our Community

In September, the new Secretariat—Ben Stinson and I—traveled to Mexico City for InterSolar Mexico to engage with local experts and policymakers. The goal: to encourage Mexico's return to the SHC TCP. The visit was a resounding success, with strong interest expressed across academia, industry, and government. It was a great opportunity to learn more about Mexican activities in our sector and we were impressed by the depth and breadth of current undertakings.

We were also pleased to welcome Jason Andalcio from CCREEE to the 97th ExCo meeting. Jason shared updates on CCREEE's activities and provided valuable insights into the solar thermal market in Barbados and the broader Caribbean region.

Looking Ahead

2025 has already been a year of progress. We've successfully concluded key Tasks on solar water heating (Task 69) and solar district heating (Task 68), while launching new initiatives focused on thermal energy storage and PVT technologies.

Looking forward, the SHC TCP is preparing several exciting developments in 2026. We encourage you to stay connected by joining our LinkedIn group for the latest updates and opportunities to engage.

Newsletter Schedule Update

Lastly, we've revised the publication schedule for the Solar Update newsletter. Previously released in June and December, starting in 2026 we will follow a new schedule—February and September (March and October?)—is designed to better align with engagement cycles and maximize impact. We hope this change enhances your experience, and as always, we welcome your feedback, questions, and suggestions.

Intersolar Crew 2025

National Day Shines Light on Future Potential & Market Realities

The Slovak Republic (SR) became an independent nation in 1993. In 2000, it became a member of the Organization for Economic Cooperation and Development (OECD), a Member State of the European Union (EU) in May 2004, a member of the International Energy Agency (IEA) in 2007, and in 2016 joined the IEA SHC Programme, represented by the Slovak Innovation and Energy Agency (SIEA). Slovakia is currently represented on the SHC Executive Committee by Mr. Eduard Jambor.

"Slovakia finds being a member of the IEA SHC Programme to be very valuable, participating in SHC Task 65 on Solar Cooling for the Sunbelt Regions and Task 61 on Integrated Solutions for Daylighting and Electric Lighting and most recently Hosting the 97th ExCo meeting at the Slovak Innovation and Energy Agency (SIEA) headquarters in Bratislava. This included a 'National Day' on June 3rd, 2025, which brought together academics, industry representatives and policy experts to present and discuss the goals and objectives in relation to Solar Heating and Cooling in Slovakia.

National Day Presentations:

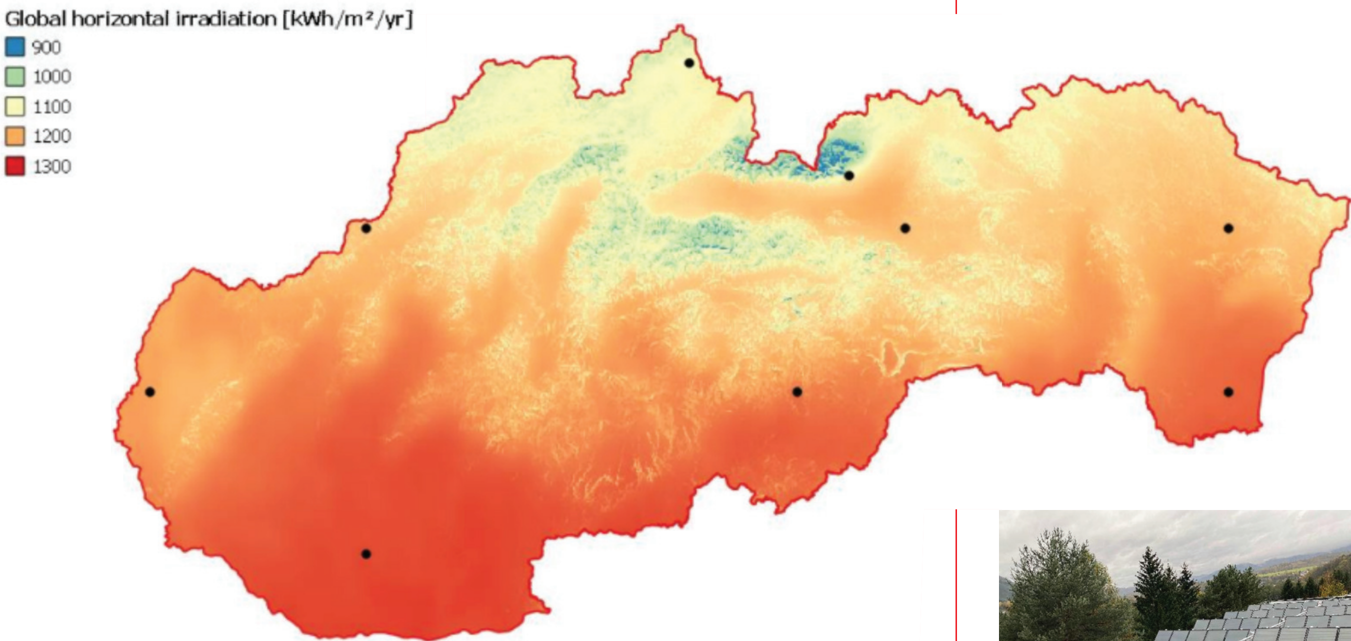
- Ms. Lucia Bogdanyova (SIEA) on the activities of SIEA, including information on the current subsidy for solar thermal in Slovakia which offer residential and commercial customers up to 575 Euros per installed kW.
- Prof. Michal Masaryk, Slovak Technical University, presented his teams work on thermally powered cooling and AC systems developed at the Slovak Technical University. Prof Masaryk also participated in Task 65.
- Quality and lifespan of solar thermal collectors and heating of energy efficient houses by Dr. Marian Jezo of Thermo/Solar
- The importance of battery storage in the energy system of the energy community by Assoc. Prof. Peter Durcanksy of the University of Zilina.
- Solar Photoreactors for Production of Fuels and Chemicals – description of Task 72 activities (DIin Dr.in Bettina Muster-Slawitsch, AEE - Institut für Nachhaltige Technologien)

The SHC Executive Committee members at SIEA, Bratislava, June 2025

In addition to its participation in the SHC TCP, Slovakia understand the value of solar technologies due to its abundant solar radiation, see Figure 2 and it has recently undertaken two national projects that were remarkably successful in promoting and installing solar thermal technology. These projects were supported by the work of the IEA SHC Programme, "Advanced Lighting Solutions for Retrofitting Buildings" and the "Building Integrated Solar Envelope Systems for HVAC and Lighting".

Subsidies were granted for 1,260 renewable installations across residential buildings, and 1,723 vouchers were awarded, valued at EUR 3.6 million. This primarily supported solar water heaters, with 259 installations in the first round and 897 in the second. Eligibility was restricted to Solar Keymark certified collectors, installed by professionals registered with SIEA, ensuring adherence to high standards.

▼ **Figure: Global horizontal irradiation in Slovakia. Source: Rooftop PV Energy Potential in Slovakia.**



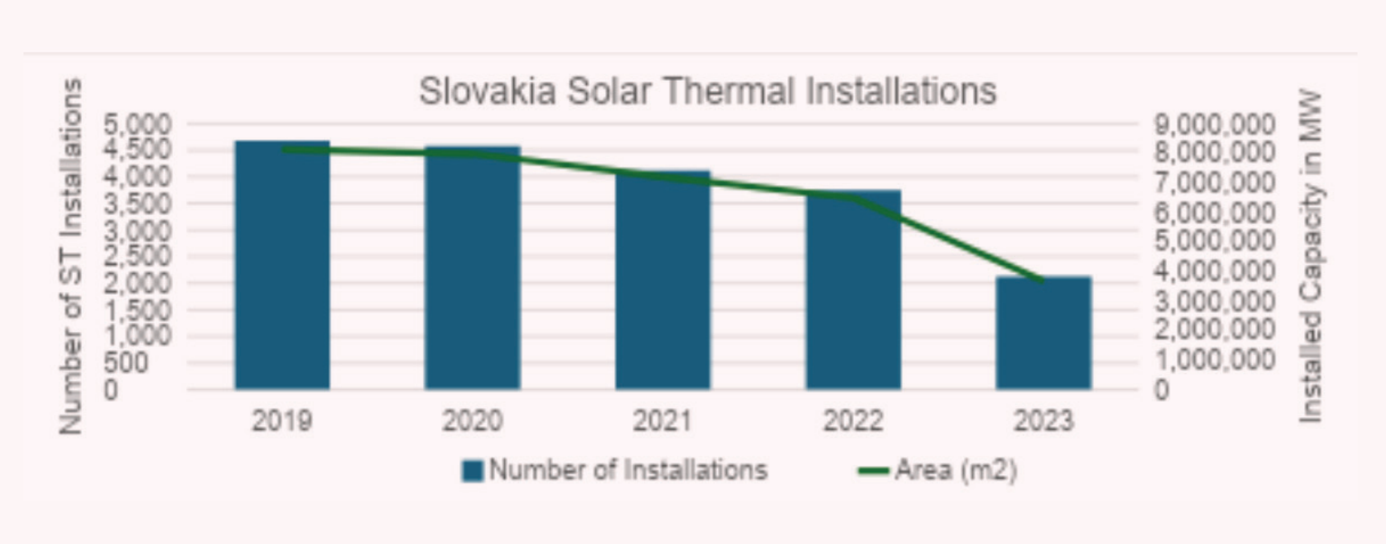
Future government projects like Green for Households, which is a €107.7 million voucher program to support the installation of small-scale renewable energy projects and covers up to 50% of the eligible costs. The Green Solidarity program, which is aimed at households at risk of energy poverty, specifically in rural areas, with €28.4 million in vouchers, covering up to 90% of eligible system costs. And the Green for Business program with over €66 million in vouchers to support businesses with renewable energy projects covering up to €50,000 per project.

Solar Thermal

Slovakia has a robust solar thermal market, boasting two established manufacturers, Thermosolar and Solárne Slovensko. Both these companies manufacture and install locally as well as internationally. Thermosolar, who presented at the SHC National Day, has recently launched its DUO system, using a vacuum flat plate solar thermal collector coupled with a small ground-source heat pump. These companies boast several large installations on schools and hospitals in Slovakia.

▲ **Figure 3: Solar Thermal Collectors on a Secondary School in Podbrezova, Slovakia. Source: Thermsolar**

▲ **Figure 4: Solar Domestic Hot Water System on the roof of a dormitory of the Slovak University of Agriculture in Nitra, Slovakia: Photo SHC**



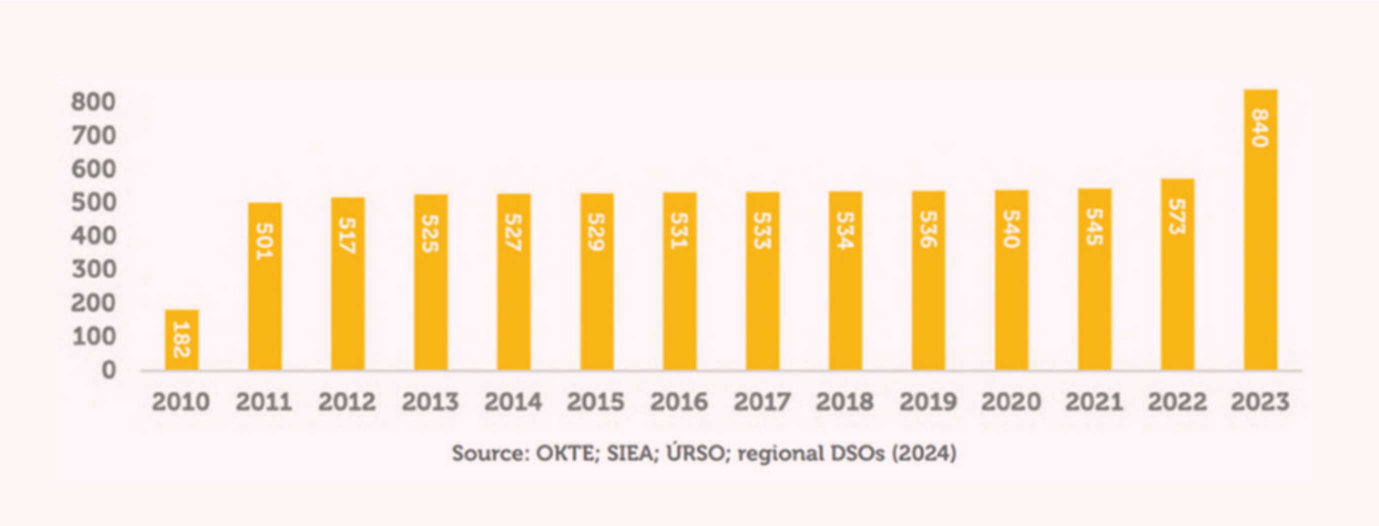
Slovakia finds itself in a similar situation to the rest of Europe with regards to its declining solar thermal installations, see Figure 4. However, thanks to the above-mentioned government subsidy programs and the strong local industry this trend is set to reverse.

Figure 5: Slovakia Solar Thermal Installations. Source IHC - Status of Solar Heating/Cooling and Solar Buildings - 2023 Status of the Market for Solar Thermal Systems

Solar PV

In 2023, the installed capacity of solar PV saw a big increase, reaching 840 MW. This is a major jump compared to the previous years, where the capacity remained steady between 525 MW and 573 MW from 2014 to 2022, see Figure 6 and Figure 7. The growth in 2023 can be linked to various funding schemes aimed at promoting solar PV systems, supported by EU funds and the National Recovery and Resilience Plan. While the demand for subsidies for biomass boilers under the Green for Households program dropped by 35% between 2022 and 2023, interest in heat pumps increased by 70%, and for solar PV there was a remarkable year-on-year growth of 280%.

Figure 6: Installed capacity of solar PV from 2010 to 2023 (in MW). Source: Slovak Market Outlook for Renewables 2023. *https://www.sapi.sk/files/261_sapi-slovak-market-outlook-for-renewables-2023.pdf*



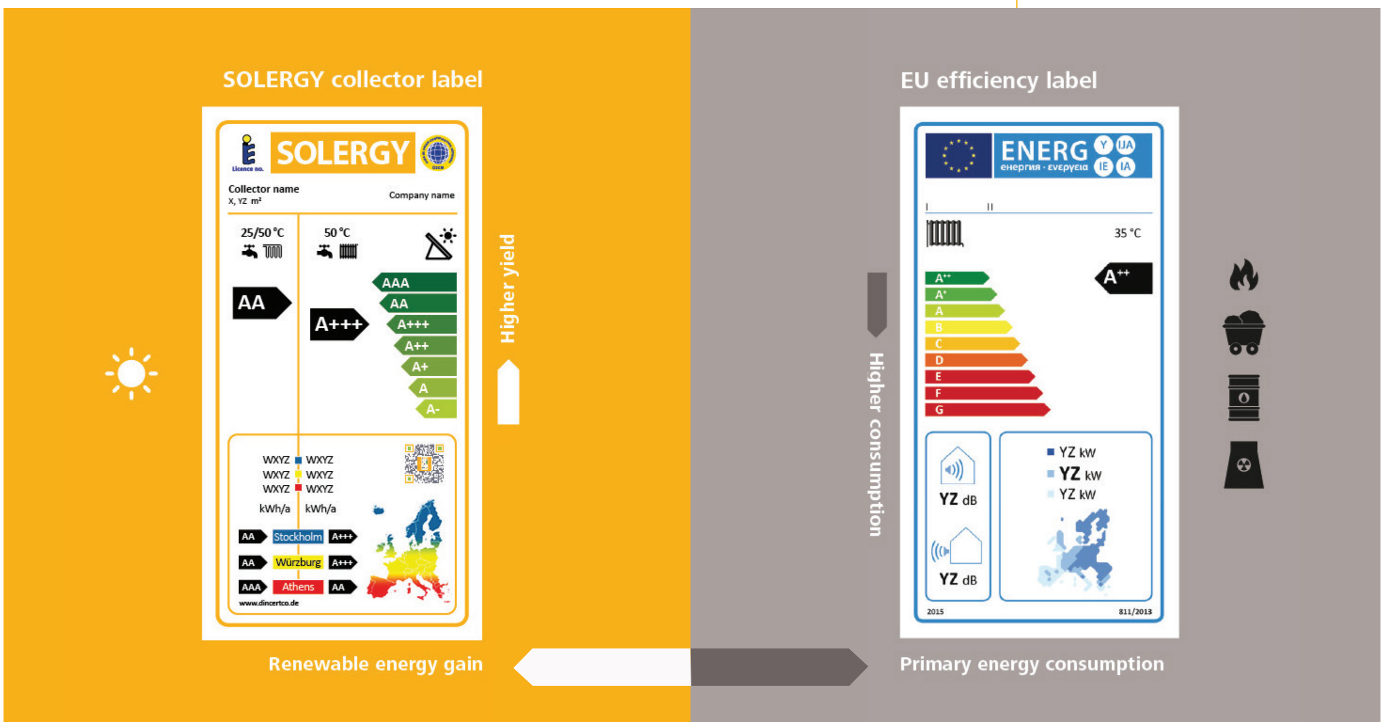
According to the data of regional DSOs on newly connected power plants in 2023, a total of 21,307 new photovoltaics with a total capacity of 266.9 MW were connected throughout Slovakia – approximately 200 MW more than the capacity connected in 2022. The largest increase of 11,202 plants with a total capacity of 107.8 MW was evidenced in western Slovakia (about 54% of both the number of installations and installed capacity), followed by central Slovakia with 6,028 new plants with a total capacity of 102.8 MW.

An example of a modern use of solar PV can also be found at the University of Žilina - the installed capacity of the PV plant is 154.50 kWp. Production in the first year was 108.9 MWh. (The system has been in operation for just over 1 year. The maximum monthly production in volume was 18,160 kWh in July 2024. The minimum monthly production in the volume of 1,633 kWh was in December 2023.

Figure 6: Installed capacity of solar PV from 2010 to 2023 (in MW). Source: Slovak Market Outlook for Renewables 2023. Https://www.sapi.sk/files/261_sapi-slovak-market-outlook-for-renewables-2023.pdf

Figure 7: SEQ Figure * ARABIC 8 Solar panels installed on the rooftop of the University of Žilina in Slovakia, 2024. Source: Article contributed by Peter Ďurčanský (Associate Professor), Miriam Nicolanská and Ivan Martinček (PhD. students), Department of Power Engineering, University of Žilina.

Driving Trust And Market Value For Solar Thermal Collectors



▲ **Labels Compared:**
It looks familiar but is quite innovative: the solar label refers to the energy gain instead of the primary energy consumption

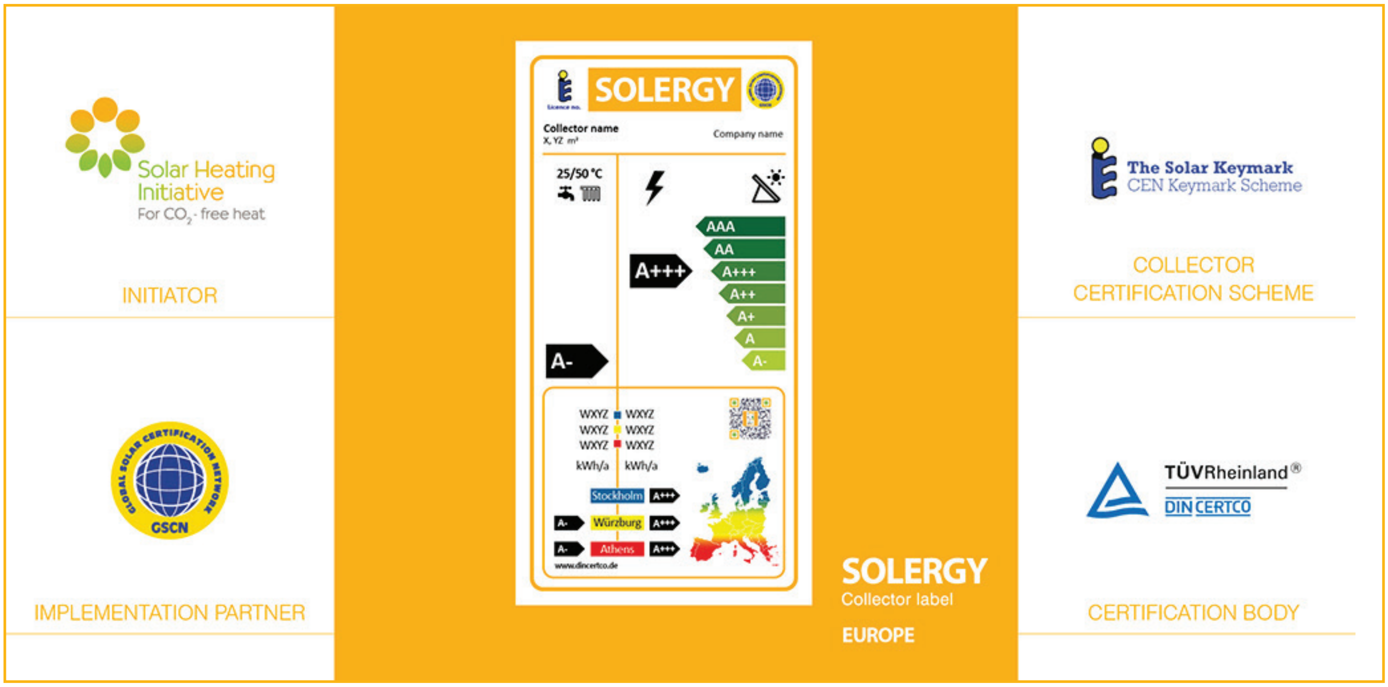
The SOLERGY Label is a trusted marketing tool that communicates the performance of solar thermal collectors in a transparent and consumer-friendly way. It allows manufacturers to showcase independently validated performance data, while helping policymakers and consumers make informed choices about sustainable energy solutions.

A proven history, backed by strong partners

Launched in the European Union in 2016, and extended to North America in 2023, the SOLERGY Label builds on the well-known European Energy Label (ErP). It was developed by DIN CERTCO and the Solar Heating Initiative (SHI), who recognized the need for a clear performance label for solar thermal collectors producing clean heat onsite.

To adapt the label for North America, DIN CERTCO and SHI partnered with the Solar Rating & Certification Corporation (SRCC) in the United States. Since 2021, SHI has also joined forces with the Global Solar Certification Network (GSCN) to expand the reach of the SOLERGY Label worldwide, including Asia and Oceania.

SOLERGY LABEL



How it works

- Collectors are rated with clear A- to AAA grades, showing their energy production capacity for different regions and applications.
- To qualify, collectors must already hold a valid certification such as the Solar KEYMARK in Europe or OG-100 in the U.S., since the performance data from these certification schemes is used to determine the ratings on the label.
- The SOLERGY Label is currently available for flat plate, evacuated tube, and PV-Thermal (PVT) collectors for water heating.

Marketing value for manufacturers

Once awarded, manufacturers receive customized labels they can use on product labels, websites, and marketing materials. SOLERGY-labeled collectors are also listed in DIN CERTCO's online SOLERGY directory, increasing visibility among buyers, project developers, and policymakers. Currently, 28 companies have registered a SOLERGY Label for Europe.

Many leading manufacturers already use the SOLERGY Label to differentiate their products, highlight performance, and strengthen their brand in competitive markets.

Example: a Spanish manufacturer actively integrate the SOLERGY Label into communication and sales strategy. It uses the label in commercial pitches to demonstrate product reliability, displays it at international trade fairs to attract customers, and has even published a blog post on its website to inform clients about the added value of the label. The company reports being very satisfied with the visibility and trust it creates.

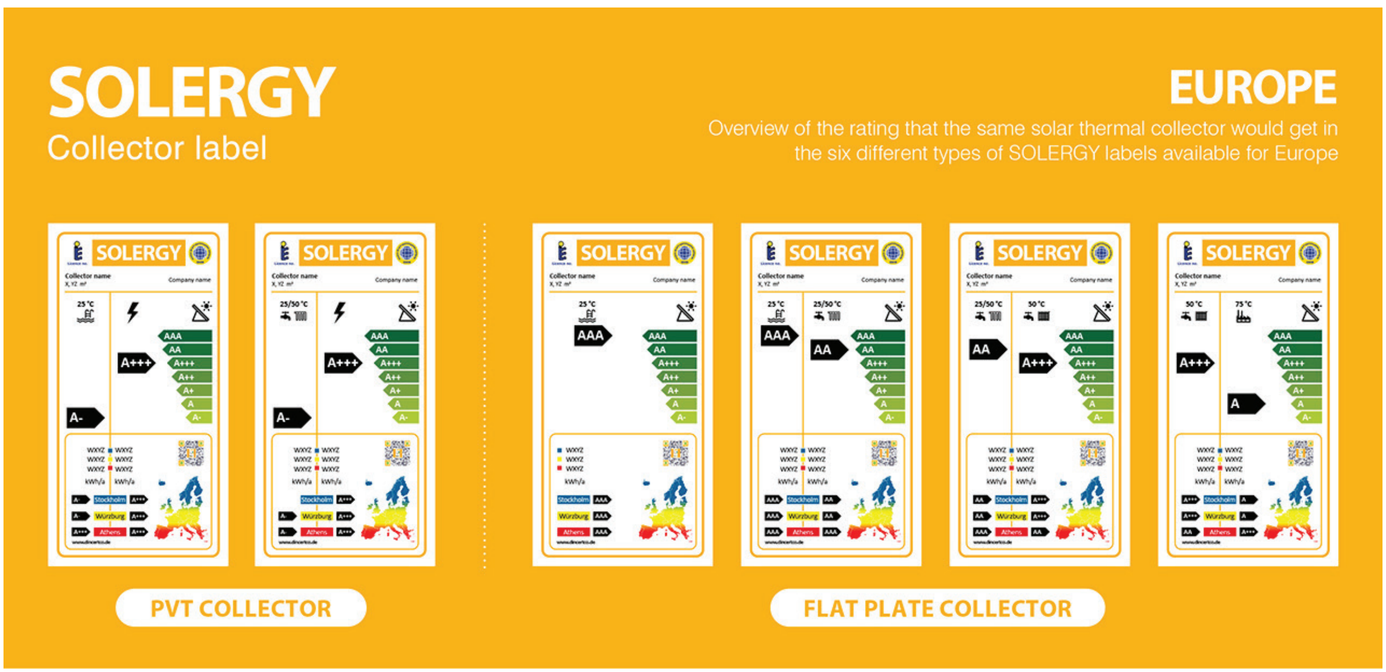
SOLERGY LABEL

Easy application

- For the EU, applications go directly to DIN CERTCO.
- For North America, manufacturers can apply through the SRCC portal.
- Companies can hold one regional label or both, depending on their market strategy.

Why it matters

The SOLERGY Label represents credibility, transparency, and opportunity. Backed by highly respected collector certification schemes and bodies, it offers manufacturers a powerful way to communicate performance, strengthen market positioning, and engage with a growing global audience.



The Solar Keymark
CEN Keymark Scheme
COLLECTOR CERTIFICATION SCHEME

TÜVRheinland®
DIN CERTCO
CERTIFICATION BODY

GET THE LABEL FOR EUROPE

New Tasks

Two new Tasks are now underway! These are collaborative Tasks between the Energy Storage TCP and the Solar Heating and Cooling TCP. This will be the first time that the SHC is involved in a collaborative Task as opposed to a ‘joint’ Task. Task 74 will be an SHC Task corresponding with ES Task 47 and Task 75 will be the SHC Task corresponding to ES Task 48. Both Tasks will share experts and publish materials for both TCPs but Task 74 will be run by an SHC Task Manager and Task 75 will be run by an ES Task Manager.

If you’re interested in joining and are from an IEA SHC member country, it’s as simple as two steps: contact your national SHC Executive Committee member and reach out to the Task Manager.

Components for Thermal Energy Storage

Thermal energy storage technologies play a pivotal role in switching from a fossil fuels-based energy system to a fully renewable energy system. They provide flexibility in the system when supply and demand are not in sync, they enable a larger uptake of variable renewable sources like solar energy, they maximize waste heat re-utilization in industry, they provide peak power, thus lowering the required auxiliary power and they provide channels to couple the electricity sector with the heating sector, adding flexibility to the electricity system.

The main objective of the Task is to bridge the gap between research on storage materials and practical implementation, with the focus on three key pillars: application-oriented case studies, component design and integration, and determination of the state-of-charge.

Are you an expert on thermal storage or system integration? Do you want to collaborate with an international team on designing components, measurement techniques and proof of concepts?

To learn more, visit the SHC Task 74: *Component for Thermal Energy Storage webpage*.
To explore opportunities for joining the Task, contact the Task Manager,
Dr. Wim van Helden, at *w.vanhelden@aee.at*

Materials for Thermal Energy Storage

Thermal storage systems are key to unlocking the potential of solar thermal technology and other renewable energy resources. The materials used are critical to successfully charging and discharging the units. This Task seeks to investigate a variety of materials, mixtures and composites to develop measurement guidelines, provide an overview of new PCM and TCM related synthesis and production methods, a materials database and to disseminate lessons learned from this Task and associated Tasks.

If you are interested in participating in this exciting Task or just want to learn more please visit the Task 75 website: *Materials for Thermal Energy Storage*. Or contact the Task Manager,
Dr. Christoph Rathgeber at *christoph.rathgeber@zae-bayern.de*

What's New

New Tasks

Collaboration Groups

At the 97th ExCo meeting in Bratislava, Slovakia in June 2025, the ExCo voted to approve the creation of SHC Collaboration Groups.

The objective of Collaboration Groups (CG) is to maintain a basic level of activity in strategic areas of interest to the SHC and support the development of new ideas and workplans and lead to the creation of knowledge products and new Tasks, e.g.,

- Facilitate Collaboration: Promote cooperation and exchange of ideas among members.
- Encourage Discussion: Provide a platform for open and constructive dialogue.
- Share Knowledge: Enable the sharing of knowledge and experiences.
- Repository of knowledge so that ideas are not lost of forgotten
- The level of activity is designed to be minimal with the objective being to maintain contact with experts.

Collaboration Groups currently active:

- Solar Neighbourhoods
- Solar District Heating
- SHIP - Solar Heat for Industrial Processes
- Solar Hot Water
- Solar Cooling

For more information on SHC Collaboration Groups
visit *https://www.iea-shc.org/* or contact Dr. João Cardoso *joao.cardoso@lneg.pt*

In the Pipeline

Follow up to Task 71 - Life Cycle & Cost Assessment for Heating & Cooling Technologies led by Dr. Karl-Anders Weiß. This new Task titled, Life Cycle and Cost Assessment for Energy Systems, seeks to expand upon the original Task and focus on the sustainable heating and cooling industry and how they should be aware of the overall life-cycle-energy and environmental performance of their products, as well as cost-effects. Assessments must consider production, transportation, installation and use as well as end-of-life treatment. Activities in several Tasks have shown that environmental hot spots must be assessed to ensure clean product development but a comparable assessment on the system level – which is the relevant level for decision-taking - is still missing.

For more information please reach out to Dr. Karl-Anders Weiß
Karl-Anders.Weiss@ise.fraunhofer.de

Thank you to our valued Partners

Solar Heat Europe

GSCN

HEAT CHANGERS

solrico

If you are interested in partnering with the SHC please email Ben Stinson

BEN STINSON, Secretariat
secretariat@iea-shc.org

Join the 6th S-Access International Conference

8-10 April, 2026
Palma, Spain

The 6th International Conference on Solar Technologies and Hybrid Mini-Grids for Energy Access (S-Access 2026) will take place from 8–10 April 2026 at the University of the Balearic Islands in Palma, Spain. The conference brings together international experts, practitioners, policymakers, and researchers working across decentralised renewable energy solutions for energy access.

The programme, shaped by diverse field experience and applied research, will address a wide range of topics, including technological and design innovations, policy and business models, sector-specific applications, and cross-cutting issues such as gender, capacity building, the circular economy and much more.

S-Access 2026 will feature expert keynote lectures, interactive roundtables, practitioner-led workshops, and dedicated networking opportunities, all aligned with the conference's mission to translate innovation into action.

The conference also continues to welcome institutional partners, including Partner Organisations, Sponsors, Supporting Organisations, and Media Partners, whose contributions help strengthen the event and foster knowledge exchange across the global energy access community.

Registration and Call For Papers Now Open

More information

EuroSun 2026

14-18 September, 2026
Freiburg, Germany

ISES, the International Solar Energy Society and IEA SHC, the IEA Solar Heating and Cooling Programme are pleased to announce that EuroSun2026 - the ISES and IEA SHC International Conference for Sustainable and Solar Energy for Buidlings and Industry will take place in Freiburg, Germany from 14 - 18 September 2026.

The organizers are especially pleased to announce that the Fraunhofer Institute for Solar Energy Systems ISE, the largest solar research institute in Europe, will join the conference as its scientific host in collaboration with the renewed Albert-Ludwigs-Universität Freiburg. Powered by this partnership, the EuroSun2026 will create a global forum for scientists, researchers, engineers, architects, city planners, and representatives from industry and businesses.

Come and celebrate knowledge, together!

- 30 years of sharing knowledge and top-notch research at EuroSun Conferences.
- 50 years of international research cooperation organized by IEA SHC Programme.
- 70 years of giving solar and sustainable energy a home base at ISES.

Call For Papers Coming Soon

More information

IEA SHC programme

The International Energy Agency was formed in 1974 within the framework of the Organization for Economic Cooperation and Development (OECD) to implement a program of international energy cooperation among its member countries, including collaborative research, development and demonstration projects in new energy technologies. The members of the IEA Solar Heating and Cooling Agreement have initiated over 70 R&D projects (known as Tasks) to advance solar technologies for buildings and industry. The overall Programme is managed by an Executive Committee while the individual Tasks are led by Task Managers.

Current Tasks and Task Managers

Efficient Solar District Heating Systems
Dr. Klaus Lichtenegger
BEST - Bioeenrgy and Sustainable Technologies GmbH
Graz, AUSTRIA
klaus.lichtenegger@best-research.eu

Solar Hot Water for 2030
Dr. Robert Taylor
University of New South Wales
Sydney, AUSTRALIA
robert.taylor@unsw.edu.au

Prof. He Tao
China Academy of Building Research
Beijing, CHINA
iac@vip.sina.com

Low Carbon, High Comfort Integrated Lighting
Dr. Jan de Boer
Fraunhofer IBP
Stuttgart, GERMANY
jan.deboer@ibp.fraunhofer.de

Life Cycle and Cost Assessment for Heating and Cooling Technologies
Dr. Karl-Anders Weiss
Fraunhofer ISE
Freiburg, GERMANY
karl-anders.weiss@ise.fraunhofer.de

Solar Photoreactors for the Production of Fuels and Chemicals
Dr. Bettina Muster-Slawitsch
AEE INTEC
Gleisdorf, AUSTRIA
b.muster@aee.at

Components for Thermal Energy Storage
Dr. Wim van Helden
AEE Intec
Gleisdorf, Austria
w.vanhelden@aee.at

Thermal Energy Storage Materials
Dr. Christoph Rathgeber
Zae-Bayern
Munich, Germany
christoph.rathgeber@zae-bayern.de

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IEA Solar Heating & Cooling Programme Members

AUSTRALIA	Mr. Guthie/Prof. Taylor
AUSTRIA	Mr. Brunner/Mrs. Promok
BELGIUM	Prof. Altomonte
CANADA	Dr. Mesquita
CCREEE	Ms. Fraquaharson
CHINA	Prof. He Tao
DENMARK	Mrs. Thielsen/Mr. Trier
EACREEE	Canon Muhumuza
ECREEE	Mr. Kouhie/Ms. Lopes
EUROPEAN COMMISSION	Mrs. Bozsoki
FRANCE	Mr. Kaaijk/Dr. Mugnier
GERMANY	Ms. Krüger/Dr. Rolf
ISES	Prof. Vajen/Dr. Häberle
ITALY	Dr. Segreto
NETHERLANDS	Mr. van Elburg
NORWAY	Ms. Kopstad Berentsen/Dr. Meir
POLAND	Dr. Martyniuk-Pęczek
PORTUGAL	Dr. Facão/Mr. Cardoso
RCREEE	Dr. Mahmoud
ICIMOD/REEECH	Mr. Malla
SACREEE	Mr. Ndhlukula/Mr. Makaliki
SLOVAKIA	Dr. Jambor
SOLAR HEAT EUROPE	Ms. Séjourné
SOUTH AFRICA	Prof. Moodley/Dr. Surridge
SPAIN	Dr. Ferrera
SWITZERLAND	Mr. Eckmanns/Dr. Mathez
TURKEY	Prof. Yesilata/Dr. Bayraktar
UNITED KINGDOM	Mr. Bennett/Prof. Day

CHAIRMAN
Dr. Lucio Mesquita
Natural Resources Canada
Ontario, Canada
chair@iea-shc.org

SHC SECRETARIAT
Mr. Ben Stinson
QSBR Innovations Inc.
Ontario, Canada
secretariat@iea-shc.org

SOLAR UPDATE

The Newsletter of the IEA Solar Heating and Cooling Programme

Vol. 81, January 2026

Prepared for the IEA Solar Heating and Cooling Executive Committee by QSBR Innovations Inc. Canada

Editor:
Ben Stinson