



ISO/TC 180, SOLAR ENERGY

Clause 2.1.2 of the ISO/IEC Directives, Part 1

ISO/TC 180 Chair



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Message from the Chair

Transitioning to renewable, CO2 free heating is an economic and ecological imperative. Technological innovation—especially advanced solar thermal systems, heat pumps, and hybrid PVT collectors—can decarbonize heating, but must be accompanied by suitable policy frameworks, including building and heating plans, regulations, subsidies, and the removal of fossil-fuel support. Transparent data on performance, feasibility, and system interaction are needed to map robust solution pathways.

Solar energy for heating is highlighted as highly efficient and environmentally friendly, capable of significantly reducing emissions when combined with existing fossil systems or heat pumps. Integrating solar thermal energy into heating networks, using excess power, and managing thermal storage can enable CO2 free, grid-connected heating and effective sector coupling, even beyond the fossil era.

This message stresses the importance of a methodical, fact-based approach and broad stakeholder participation, including active engagement in standardization. Collaboration among experts from industry, research, and policy is seen as key to developing intelligent, integrated, and economically viable heating systems that fit modern societal needs.

I would express gratitude to contributors and organizers, and encourage open dialogue and knowledge sharing to accelerate the energy transition and expand the market for renewable heating systems in the years ahead.

What is the main market trend?

The wide variation in product types and the high market growth rate drives the requirement for more widely agreed testing protocols to meet the need for exchange of data obtained on a uniform, fair and comparable basis.

What benefits can standards bring?

Solar Water Heating Systems contribute strongly to sustainability goals and help to mitigate climate change.

Standards support the international trade in solar water and air heaters by providing a means for harmonization of performance and other requirements across international borders.

Who participates in standards development in this topic?

ISO/TC 180's work involves a wide range of stakeholders. TC 180 maintains a strong cooperation with the IEA Solar Heating and Cooling Program and other relevant international programs.

What are the committee's strategic priorities?

To deliver market driven, meaningful, good standards.

How can you get involved?

Speak with your National Standards Body or one of the extensive range of international-level liaisons to ISO/TC 180.

ISO/TC 180 standards support the following SDGs



[iso.org/sdg](https://www.iso.org/sdg)

Introduction

The evolution of formal strategic planning in ISO Technical Committees is a key measure in supporting the ISO Strategy 2030 vision of making lives easier, safer and better. This document is designed to aid committees and their stakeholders in:

- Identifying benefits and vision of standardization within the committee's field of activity
- Linking benefits to higher strategic imperatives (ISO Strategy 2030, SDGs, London Declaration Action Plan)
- Prioritizing among projects and allocating resources
- Providing transparency and communicating through a format adapted to three key audiences (general public, TMB and other TCs, and internal TC stakeholders)
- Supporting data-driven continuous improvement, including user perspectives where available
- Maintaining strategic flexibility for different market cadences

International standards embody the essential principles of global openness and transparency, consensus and technical coherence. These are safeguarded through its development in ISO Technical committees, representative of all interested parties, supported by a WTO TBT-compliant public enquiry phase.

International standards are developed through a member-driven market-centric process, where any P-member may submit a proposal for new work.

This document represents an important filter through which new work items should be considered by P-members of a committee and shall be referenced in new work item proposals submitted to the committee per clause 2.3.4 of the ISO/IEC Directives, Part 1.

Beginning in 2026, deviations from this strategy shall be rationalized in new work item proposals.

Meeting global needs

To realize our vision, we must develop consensus-based standards that are relevant and respond to current and future challenges. We must focus on getting the right standards to market at the right time, and with the right content and in the right format.



Business environment and future trends

The following political, economic, technical, regulatory, legal and social dynamics describe the business environment of the industry sector, products, materials, disciplines or practices related to the scope of this ISO/TC, and they may significantly influence how the relevant standards development processes are conducted and the content of the resulting standards:

Solar energy is seen as an increasingly valuable source of energy. Its value is perceived at present as a secure, non-polluting, environmentally friendly heat source, and as a heat source which is increasingly economically competitive.

Fossil fuel-based energy instrumentalities (gas and electricity supply) increasingly see the use of solar heating as a means of limiting their rate of use of fossil fuels, through demand side management. This is increasingly so as governments undertake to reduce emission of atmospheric contaminants from combustion of fossil fuels.

With the increasing use of solar water heaters and the realization that they are amongst the most effective renewable energy technologies available, many governments are providing support to increase sales of solar water heaters. The reasons for provision of this support vary, but in most cases they include:

- **Industry development:** Regional production of solar heating systems embedded in global trade with guaranteed local installers creates a modern value chain, which is fitting to many regions' economic development goals.
- **Security of energy service:** With a solar heater, availability of heat is less likely to be interrupted by disruption to conventional energy supplies.
- **Cost savings:** Use of solar heaters is always resulting in lower running costs which, in almost all situations, will pay back any additional capital investment within a few years.

Internalization of CO2 pricing and trends of reduced subsidies for fossil fuel foster this trend.

- **Reductions in greenhouse gases and pollution:** The installation of a solar heating system has the potential to reduce greenhouse gas emissions and pollution allocated with heating by 50% over most of the world.

Interest in the efficiency and reliability of solar energy conversion/utilization systems has recently increased in the medium to long term as government support programs and consumers target purchase of more cost-effective products.

Development of markets in regional areas is driven by a range of factors and consequently products have different regional characteristics. In many regions solar products are provided with integrated back up boosting to provide heat at times of low solar radiation. These types of hybrid equipment are covered in some system performance standards. Combinations of different renewables can also vary in the level of integration. The activation of solar heat as a heat source for heat pumps for example is a deeply integrating trend another coupling is to use Solar Thermal to re-charge ground heat storages and bore holes. PVT as technological integration of photovoltaics and solar thermal energy conversion is another recently crowing example. Applications rising for solar thermal are as well in connection with district heating. High temperature applications of heat for example to drive chillers for air conditioning is an application field continuing being challenging.

This wide variation in product types and the high market growth rate drives the requirement for more widely agreed testing protocols to meet the need for exchange of data obtained on a uniform, fair and comparable basis.

Currently ISO/TC 180 has not included recycling of solar equipment at end of service life, however, some interest has been shown in this area and so it will be included when resources become available.

As of the end of 2023, the total operational solar thermal capacity reached 560 GWth, equivalent to 800 million square meters of collector area. This means a net increase of 18 GWth or 26 million square meters of collector area in 2023, or in other words, an increase in cumulative global installed capacity of 3% in 2023 compared to 2022. The annual solar thermal energy yield of this installed capacity amounted to 456 TWh, which correlates to savings of 49.1 million tons of oil and 158.4 million tons of CO2. Despite the overall increase in total installed capacity, it's noteworthy that the installed capacity of 21 GWth or 30 million square meters of collector area in 2023 marked a decrease from the previous year's figure of 22.7 GWth. This indicates a 7% decline in the global solar thermal market compared to 2022. Large-scale solar heating systems for district heating or residential, commercial, and public buildings In 2023, 28 new large-scale solar heating systems (>350 kWth, 500 m²) were constructed, totaling 139 MWth capacity. This brought the global count to 598 systems, with a combined capacity of 2,285 MWth, corresponding to 3.3 million square meters of collector area.




The largest sub-sector of large-scale solar thermal heating systems is solar district heating, comprising 336 systems with 1,908 MWth capacity (2.73 million square meters). Solar heat for industrial processes (SHIP) In 2023, at least 116 new SHIP plants with a capacity of 94 MWth were installed worldwide. This means a tripling of installed capacity compared to 2022. Even though this is a very good development, it should be noted that this corresponds to the average installed capacity in the solar process heat sector over the last seven years. The total number of SHIP plants is approximately 1,200 systems, with a 1.4 million square meters collector area and a capacity of 951 MWth. Photovoltaic-Thermal (PVT) collectors After experiencing steady growth averaging 9% annually between 2017 and 2020, followed by an alltime high of 13% in 2021, the trend took a sharp turn in 2022. The decline, driven by the end of subsidies for PVT in certain countries, led to market slumps of 51% in 2022 and 30% in 2023. The newly installed capacity in 2023 was 29.5 MWth and 14.5 Mwpeak. Thus, the cumulative installed PVT collector area is 1.6 million square meters, which relates to a thermal capacity of 822 MWth and an electrical capacity of 292 Mwpeak. Photovoltaic-generated heat systems An emerging trend is the utilization of photovoltaic generated heat. This can be seen in the small system sector with directly coupled "PV2Heat" systems in South Africa, where 34,000 systems of this type have been installed. In addition, with a growing number of solar combisystems providing hot water and space heating supply in residential buildings, and the two PV district heating systems built in 2023 (Source: Solar Heat World Wide 2024 edition, p.8).



Benefits of standards and vision for


ISO/TC 180's current areas of priority interest will provide the following outcomes:

- a) **Communication of information** – standards for climatic data, including instrumentation standards and measurement procedures, with particular reference to resource evaluation, and monitoring of test conditions.
- b) **Uniformity of test methods** – standard test methods to promote data exchange between different test sites, users and to facilitate trade.

<p>standardization in the field of activity</p>	<p>c) Provision of test methods, and where appropriate, specifications for materials for solar energy applications, as an aid to designers.</p> <p>It is ISO/TC 180's policy to direct its efforts primarily towards preparation of test methods, rather than performance specifications, as it is considered that any ISO specification of product performance would only serve to inhibit development of new products.</p>
 <p>Reflections on current publications and their market impacts</p>	<p>ISO/TC 180 has established its general objectives for standards in its fields of activity and these provide a basis against which new work proposals should be judged.</p> <p>The allocation of subcommittee secretariats, and consequently the work items related to the subcommittees has been generally a result of the specific fields of technical expertise available to the member body providing the secretariat. In this situation there has been a tendency for work items to be undertaken partially on the basis of the subcommittee Secretariat's interest in the subject, rather than the broad general support for the work. However, with only a few exceptions, all work items are slowly showing progress. Those that are not showing progress will be referred to the subcommittee Secretariats concerned for a review of their viability.</p> <p>To achieve the defined objectives, ISO/TC 180 will maintain its existing standards and develop new standards within the existing ISO Directives timescales.</p> <p>Existing standards are regularly being revised to ensure that the standards are suitable for products currently manufactured for export and import and that performance in climates appropriate to developing markets can be assessed using these standards.</p>
 <p>UN Sustainable Development Goals</p>	<p>Solar Water Heating Systems contribute strongly to sustainability goals and help to mitigate climate change. The materials, production, products operation and recycling are suited to be climate positive. The Committee provides standards to derive all necessary input data for respective standards on declaring and calculating relevant characteristics. The technology is surplus enhancing local, de-centralized and resilient energy supply. With this allowing for a just and low priced access to energy. Reducing inequalities not only on the national levels but also on the day to day lives. Going together with access to hot water for better hygienic and food processing processes.</p>
 <p>ISO's Climate Commitment</p>	<p>Solar Water Heating Systems contribute strongly to sustainability goals and help to mitigate climate change. The materials, production, products operation and recycling are suited to be climate positive. The Committee provides standards to derive all necessary input data for respective standards on declaring and calculating relevant characteristics. No land use for deployment of fossil fuels is necessary, and the Installations can widely be double used, as either roof space or agricultural purposes. Even adding via shading value to agriculture and biodiversity.</p>

All voices heard

We need to ensure that we attract and retain the best experts and enable everyone to participate. We must listen to all voices, both in the development of standards and when making decisions as an organization.

 <p>Stakeholder mixture and engagement</p>	<p>The resources available to ISO/TC 180 have remained static since its formation. These resources are unlikely to expand soon. In strategic overlapping topics a strong cooperation with IEC TC 117 is organized.</p> <p>Accordingly, ISO/TC 180 will make more productive use of existing resources, such as seeking to gain additional project editors from among those P-members not currently holding Secretariat responsibilities and seeking more input from government and industry in areas of high market growth.</p> <p>A point of concern has lately been the fact that few industry-based delegates attend meetings of TC 180, (compared with researchers). It is expected that the P-members of TC 180, in forming delegations and in handling ISO/TC 180 work, will attempt to get a suitable balance between the interests of research organizations, and those of industry. Holding the meetings predominantly online, is hoped for to increase participations.</p>
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Developing
country
perspectives

Solar thermal water heater systems are applied around the world. The technic has a wide variety suiting the different market boundaries. The standards are seeking to reflect and represent this. To create non discriminating, helpful and representative methods for the different technics, climate zones and application.

ISO Standards used everywhere

To encourage the widespread use of ISO standards and attract experts to the development process, we must clearly demonstrate the benefits of using ISO standards.

ISO/TC 180 prepares International Standards for the development, testing, installation and servicing of equipment and systems related to solar thermal energy conversion. The committee's major activity is in relation to thermal applications for local water and space heating, solar district heating and solar heat applied in industrial processes. The committee also prepares standards on the instrumentation and procedures used for measuring solar energy and solar measurement.

ISO/TC 180's aims regarding international standards in this area are:

- To facilitate regional and international trade in a fair and transparent manner.
- To provide means of assessment of products regarding their performance and safety; and
- To facilitate accurate measurement of solar resources.
- To provide reference method to trade solar heat as a service

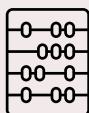
The committee acts in liaison with IEC/TC 82 Solar photovoltaic energy systems, the World Meteorological Organization, IEC/TC 117 Solar thermal electric plants, The International Energy Agency's Solar Heating and Cooling Technology Collaboration Program and more. The Standards are developed for a market of approximately \$US 24 billion per annum.

The technological aspects of solar energy use for thermal or energy conversion processes have been known for over a hundred years. The concern for conservation of energy resources since the 1970s and the consequent growth of solar heating industries led many countries to begin work on solar heating standards. The increased global understanding of the very adverse global environmental effects of greenhouse pollution from combustion of fossil fuels on a large scale has also stimulated increased use of solar energy as a substitute for fossil fuel-based energy. Many Governments worldwide are actively supporting the market for solar heating systems as a cost-effective means to reduce greenhouse pollution, increase energy security and develop sustainable industries. (At government level, solar is often considered in conjunction with other renewables, e.g. wind, wave and hydroelectric power). Transparency over the technical and economic potential of products is essential for a sustainable market development.

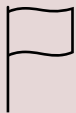

Solar energy is essentially a widely distributed energy resource, and this delivers inherent advantages in terms of energy security. The availability and variation in energy density has inherent requirements on its applications. A widely used solar technic is solar heating systems. The economics is somewhat coupled with the economics of the use of fossil fuels. Often Substituting those and by those savings defining their own economics in the buying decision. In regions with heavily subsidized fossil fuel markets, solar energy systems have not had a strong advantage based on fuel costs. With the increasing understanding that a large proportion of energy is used as heat worldwide and an widely understood obligation to decarbonize energy supply, solar systems have become a more attractive means of further reducing fossil fuels emissions. With changing boundaries conditions in many political systems around the world the advantages of solar thermal energy conversion become more visible. The CO2 saving potential of solar thermal energy conversion technology is enormous and most economical in many applications.

International trade in solar energy related equipment has rapidly increased from a low base since 2000, and there is a significant but highly specialized interest in the description and measurement of solar energy, as part of the broader study of climatic systems.

ISO/TC 180's current areas of priority interest may be summarized as:



Coordination
and cohesion

	<ul style="list-style-type: none"> a) Communication of information – standards for uniformity of terminology and climatic data, including instrumentation standards and measurement procedures, with particular reference to resource evaluation, monitoring of test conditions and traceability of calibration. b) Uniformity of test methods – standard test methods to promote data exchange between different test sites, and to facilitate trade. c) Provision of test methods and where appropriate, specifications for materials for solar energy applications, as an aid to designers, consumers and government agencies providing support for market development. <p>International standards support the international trade in solar water and air heaters by providing a means for harmonization of performance and other requirements across international borders. This limits the costs incurred by manufacturers in accessing new markets and allows consumers a wider and more informed choice of complying products.</p> <p>The ISO technical committee on solar heating, ISO/TC 180, has been operating since 1983. During that time it has produced 16 standards documents, four of which relate to thermal performance of collectors or systems. Many of those documents were produced in the 1990s and are now being updated. New trends/technologies (e.g. digitalization, hybridization of heating solutions, new business models, CO2 pricing) are taking into account in the revisions process.</p>
 <p>National adoption perspectives</p>	<p>TC 180 strongly encourages to adapt and reference the developed standards on national level. Attention and effort are invested in the respective standards development phase to represent global diversity in radiation, economics and technics within the standards in a fair and sustainable way.</p>
 <p>Conformity assessment</p>	<p>The standards of TC 180 are suitable to be applied and referenced in conformity assessment programs on national, regional and international level.</p>

ISO TC 180 Strategic Objectives

Link to ISO Strategy 2030 priorities	TC Strategic objectives	Proposed actions	Responsibility and priority	Measure of success
<i>Priority 2.1: Deliver ISO standards when the market needs them</i>	<ul style="list-style-type: none"> To establish a standardized approach and data input to tendering and procurement activities for energy supplying installations. To increase stakeholder representation in discussions about the sustainable energy supply technologies of today and the future. 	<ul style="list-style-type: none"> Standards development: To revise/publish ISO 24194 in a joint working group with experts from IEC TC 117 	Responsibility of project and committee representatives to incorporate market participants and competitors views to provide a sound compromise.	Have at least 3 experts from both TC involved. And finalize the revision/publication of the joint standard after latest 36 month.
	Deliver market driven meaningful good standards.	Bring the interests of industry and market drivers to the meetings, invite relevant persons to explain the potential and need.	Priority: high	
	Increase number of P-Members; Encourage active involvement from industry, institutions and politics in areas with rapidly developing markets.	Represent the work of ISO TC 180 and the goals in customers communication, conferences, publications and research proposals.	Responsibility: all Priority: high	
	Grow the involved expert's community	Continue to hold meetings in conjunction with committees from all parts of the world.	Priority: high	
	Reduce trade barriers	Be sensitive to existing trade barriers and encourage to overcome those.	Priority: medium	

	<p>Encourage further engagement; with the IEA Solar Heating and Cooling Program, SolarPaces Programs, Certification Programs, other international relevant programs.</p>	<p>Involve in running IEA SHC Task.</p> <p>Mirror into the task work the existing standardisation system and documents.</p> <p>Try to streamline and consolidate efforts towards common goals.</p>	<p>Priority: medium</p>	
	<p>Encourage greater involvement in working meetings; TC, SC and WG by facilitating the use of electronic tools to allow input from experts not able to physically attend the meetings.</p>	<p>Hold hybrid meetings.</p> <p>Invite actively also experts not yet members and encourage membership.</p>	<p>Priority: high</p>	