



TASK 66

SOLAR ENERGY BUILDINGS

Integrated solar energy supply concepts for climate-neutral buildings and communities for the "City of the Future"

ANNEX PLAN

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Task 66

Solar Energy Buildings

1. Definitions

(a) Description of Technical Sector

On global level the operation of buildings accounts for around 40 % of the primary energy consumption and approximately 25 % of the greenhouse gas emissions. In Europe buildings are responsible for 40 % of energy consumption and 36 % of CO₂ emissions. Additionally, large amounts of energy are embodied in the building's construction materials.

A significant reduction of the fossil energy demand of buildings can be achieved by using solar thermal and solar electric (photovoltaic) energy for the operation of the buildings.

Numerous research projects have shown that 100 % solar fractions of the electricity and heat requirements for individual buildings (mostly single-family homes) are basically feasible. However, these demonstrators were all in economic terms not nearly competitive with conventional energy supply solutions and were characterized much more by a high degree of self-sufficiency. The proposed IEA SHC task will focus on the development of economical energy supply concepts for high solar fractions of single-family buildings, multi-story residential buildings and building blocks or distinguished parts of a city (communities) for both, new buildings and the comprehensive refurbishment of existing buildings. A central component of the energy supply concept development is the synergetic consideration of the interaction with grid infrastructures (electricity and heat) in the sense of bidirectional flexibility.

(b) Definitions

The IEA SHC Task will focus on the development of economic and ecologic feasible solar energy supply concepts with high solar fractions for new and existing single buildings and building blocks or communities. The targeted solar thermal and solar electrical fractions depend significantly on the climate zone. For central European climate conditions solar fractions:

- of at least 85% of the heat demand
- 100% of the cooling demand and
- at least 60% of the electricity requirements
- for households and e-mobility should be achieved.

In the context of this proposed SHC Task the separation between (single) buildings and building blocks or communities is based on the aspect whether the buildings are connected to a thermal grid or not. This separation is based on the fact, that in general all buildings will be connected to an electricity grid. Hence, with regard to the interexchange ability of energy between different buildings the only difference is the aspect if the buildings are connected to a thermal grid or not.

2. Purpose and Objectives

The content of this new proposed project was defined based on know-how from the expert knowledge of approx. 50 participants from around 15 different countries and position papers, such the strategic research agenda of the European Solar Thermal Technology Panel, the European Technology and Innovation Platform on Renewable Heating & Cooling (RHC-ETIP) and the experience of several national projects in the field of solar energy buildings.

The main goals and objectives of the activity will be:

Objective 1: Identifying and mapping of the relevant involved stakeholders (energy suppliers, housing developers, urban planning, industry, research, and governmental (local, regional, national) and their needs and roles as well as supporting and inhibiting (legal) framework conditions.

Objective 2: To give an overview on various technology options and the available technology portfolio, taking into account existing and emerging technologies with the potential to be successfully applied within the context of this Task. Furthermore, strategies will be elaborated how challenges in an economical context can be overcome.

Objective 3: To exploit the new degrees of freedom and possibilities by linking individual technologies from the technology portfolio and to optimize the interaction of local generation, storage, consumption at the building and district level enabling interactions with the grid capitalizing on new technological opportunities and unlocking new revenue streams

Objective 4: To develop and define optimized integrated and grid-interacting energy supply concepts for heat, cold, domestic electricity demand and e-mobility with intelligent control concepts and promoting user oriented approaches.

Objective 5: To give recommendations to policy makers and energy related companies on how they can influence the uptake of cost-effective solutions related to the planning and implementation of Solar Energy Buildings.

3. Activities

(a) *Main activities*

- Development and implementation of promising concepts for single solar energy buildings (SEB) and building blocks or communities respectively
- Identification and (further) development of current and future technologies in a technology portfolio and the techno-economic assessment of newly developed solutions
- Definition of KPIs and Dissemination

(b) *Sub-activities*

The activities will be performed in 4 subtasks:

Subtask A: Boundary Conditions, KPIs, Definitions and Dissemination

A1: Define performance assessment methodology for SEBs including KPIs

A2: Assessment of SEB's

A3: Organize Industry Workshops

A4: Preparation of guidelines for policy makers, municipalities, and energy related companies

Subtask B: New and existing single buildings

B1: Demonstration cases

B2: Planning and implementation methodology

B3: Modelling, simulation and optimization tools

Subtask C: New and existing building blocks / communities

C1: Demonstration cases

C2: Planning and implementation methodology

C3: Modelling, simulation and optimization tools

Subtask D: Current and future technologies and components

D1: Documentation and analysis of current and future technologies

D2: Classification and techno-economic technology assessment

D3: Development SEB solution sets and guidelines

(c) Workshops and Seminars

Industry workshops will be held in conjunction with every second Task meeting. Provided the meetings can take place as physical meetings, the workshops will be organized in the host country of the meeting and all relevant target groups will be invited.

National industry workshops will be organized by Task participants using the information gathered during Task workshops and the material produced by the Task. These will be performed once a year.

Start missions: There is a recognized need to process information from worldwide stakeholders outside the Task, and to start educational missions to relevant countries in the developing and developed world.

(d) Publications/Newsletters

The overall scope and objectives of the Task and the different Subtasks will be described on the Task Website. In addition, the results of the work within the Task will be published at conferences and in journals and magazines.

4. Expected Results/Deliverables

The deliverables, allocated to the 4 subtasks, will be:

Subtask A: Boundary Conditions, KPIs, Definitions and Dissemination

- D.A1 Draft list of KPIs (for discussion within the task)
- D.A2 Final list of KPIs
- D.A3 Draft definition of reference buildings (for discussion within the task)
- D.A4 Final definition of reference buildings
- D.A5 SEB promotion document for investors
- D.A6 Policy oriented document for the promotion of SEB

Subtask B: New and existing single buildings

- D.B1 Summary of demonstration cases (case studies)
- D.B2 Description of processes and tools currently used to design new Solar Energy Buildings
- D.B3 Description of processes and tools currently used to convert existing buildings into Solar Energy Buildings
- D.B4 Catalogue describing optimized solutions of Solar Energy Buildings

Subtask C: New and existing building blocks / communities

- D.C1 Summary of demonstration cases (case studies)
- D.C2 Description of processes and tools currently used to design new Solar Energy Buildings communities
- D.C3 Description of processes and tools currently used to convert the existing building stock into Solar Energy Buildings communities
- D.C4 Catalogue describing optimized solutions of Solar Energy Buildings communities

Subtask D: Current and future technologies and components

- D.D1 Description of available technology portfolio
- D.D2 Description of promising future technologies
- D.D3 Summary of new technologies and components developed within the Task

5. Rights and Obligations of Participants

In addition to the obligations enumerated in Article 4 of the Implementing Agreement:

- (a) Each participating institution/company shall provide the Operating Agent with detailed reports on the results of the work carried out for each Subtask;
- (b) Each participating institution/company shall collect, assess and report to the Operating Agent data on solar heating systems for industrial applications in his country; and
- (c) Each participating institution/company shall participate in the editing and reviewing of draft reports of the Task and Subtasks.

(d) *Operating Agent Meetings*

Each country will bear the costs of its own participation in the Task, including necessary travel costs. The cost of organizing meetings will be borne by the host country.

(e) *Individual Financial Obligations*

Aside from providing the resources required for performing the work of the Subtasks in which they are participating, all Participants are required to commit the resources necessary for activities which are specifically collaborative in nature and which would not be part of activities funded by national or international sources. Examples include the preparation for and participation in Task meetings, co-ordination with Subtask Participants, contribution to the documentation and dissemination work and Task related R&D work which exceeds the R&D work carried out in the framework of the national (or international) activity.

(f) *Task-Sharing Requirements*

The Participants agree on the following funding commitment:

- 1) Each Participant (country) will contribute to this Task a minimum of 3 person months per year of the Task. This means that each participating country shall commit to the Task a minimum of 9 person months over 3 years.
- 2) Participation in the Task requires participation in at least one of the Subtasks.
- 3) The Operating Agent will contribute a minimum of 3.6 person months per year to the Task (a total of 10.8 person months for his/her work as Operating Agent).
- 4) The Subtask Leader shall commit a minimum of 2.5 person months per year for the work (a total of 7.5 person months for his/her work as Subtask Leader).
- 5) Participation may partly involve funding already allocated to a national (or international) activity that is substantially in agreement with the scope of work outlined in this Annex.

6. Management

(a) The Republic of Germany, acting through the IGTE, University of Stuttgart, is designated as Operating Agent. (IGTE: Institute for Building Energetics, Thermotechnology and Energy Storage).

(b) *The Operating Agent.* The rights, obligations and responsibilities in addition to those indicated in the main body of the Implementing Agreement and the organization of the work under this Annex enumerated in Section 5 of this Agreement, the Operating Agent shall:

- 1) Prepare and distribute the results mentioned in paragraph 4 above;
- 2) Prepare joint assessments of research, development and demonstration priorities for solar heating systems for industrial processes;
- 3) At the request of the Executive Committee, organize workshops, seminars, conferences and other meetings;
- 4) Prepare the detailed Program of Work for the Task in consultation with the Subtask Leaders and the Participants and submit the Program of Work for approval to the Executive Committees of the Solar Heating and Cooling Programme;

- 5) Propose and maintain a methodology and a format for the submission of information on solar heating systems for industrial processes which is collected by the Participants as described in paragraphs 3 and 4 above;
- 6) Provide reports semi-annually to the Executive Committees on the progress and the results of the work performed under the Programme of Work;
- 7) Provide to the Executive Committees, within six months after completion of all work under the Task, a final report for its approval and transmittal to the Agency;
- 8) In co-ordination with the Participants, use its best efforts to avoid duplication with activities of other related programs and projects implemented by or under the auspices of the Agency or by other competent bodies;
- 9) Provide the Participants with the necessary guidelines for the work they carry out with minimum duplication;
- 10) Perform such additional services and actions as may be decided by the Executive Committees, acting by unanimity; and
- 11) Gather documents from Subtask Leaders, edit and distribute the output of the Task either as a printed handbook, electronically or on a website.

(c) *The Subtask Leaders.* Subtask Leaders shall be a Participant that provides to the Subtask a high level of expertise and undertakes substantial research and development in the field of the Subtask. The Subtask Leaders shall be proposed by the Operating Agent and designated by the Executive Committee, acting by unanimity of the Participants. Changes in the Subtask Leaders may be agreed to by the Executive Committee, acting by unanimity of the Participants.

A Subtask Leader for each of the foregoing Subtasks will:

- 1) Co-ordinate the work performed under that Subtask;
- 2) Assist the Operating Agent in preparing the detailed Programme of Work;
- 3) Direct technical workshops and provide the Operating Agent with written summaries of workshops results and
- 4) Edit technical reports resulting from the Subtask and organize their publication.
- 5) Subtask leaders may arrange meetings in between or in association with Experts meetings of the Task.

(d) *Task Meetings:* There will be Experts meetings of the Task at intervals of approximately 6 months. Subtask Leaders may arrange meetings in between or in association with Experts meetings of the Task. Attendance at the Experts Meetings of the Task will be mandatory.

(d) It is intended to organize expert/industry workshops every year, directly linked to Task meetings. The overall scope and objectives of the Task and the different Subtasks will be described on the Task Website. The server should be able to process an automatically distributed electronic newsletter.

Apart from publications of scientific results in conferences, journals and magazines we plan to distribute printed leaflets to describe the scope of the Task. Similarly, there is a recognized need to process information from worldwide stakeholders outside the Task, and to start educational missions to relevant countries in the developing and developed

world.

7. Admission, Participation and Withdrawal of Participants

In addition to the specific obligations, the Operating Agent will produce, promote and distribute the results of the Task. The Participants will support these activities by contributing respective papers and by dissemination activities financed by the individual Participants.

8. Information and Intellectual Property

For purposes of this Annex, in case of conflict with the provisions of the Implementing Agreement, the following provisions shall prevail:

- a) For arising information regarding inventions, the following rules shall apply:
 - 1) Arising information regarding inventions shall be owned in all countries by the inventing Participant. The inventing Participant shall promptly identify and report to the Executive Committee any such information along with an indication whether and in which countries the inventing Participant intends to file patent applications, and
 - 2) Information regarding inventions on which the inventing Participant intends to obtain a patent protection shall not be published or publicly disclosed by the Operating Agent or the other Participants until a patent has been filed, provided, however, that this restriction on publication or disclosure shall not extend beyond twelve months from the date of reporting of the invention. It shall be the responsibility of the inventing Participants to appropriately mark Task reports that disclose inventions that have not been appropriately protected by filing a patent application.

- (b) The inventing Participant shall license proprietary information arising from the Task for non-exclusive use as follows:
 - 1) To Participants in the Task:
 - a. On the most favorable terms and conditions for use by the participants in their own country; and
 - b. On favorable terms and conditions for the purpose of sub-licensing others for use in their own country.
 - 2) Subject to sub-paragraph above, to each participant in the Task for use in all countries, on reasonable terms and conditions; and
 - 3) To the government of any Agency Member country and nationals designated by it, for use in such country in order to meet its energy needs.

Royalties, if any, under licenses pursuant to this paragraph shall be the property of the inventing Participant.

9. Entry into Force, Term and Extension

This Annex shall enter into force on 1st of July 2021 and shall remain in force for a period of 3 years until 30th of June 2024. At the conclusion of that period, this Annex can be extended by at least two Participants, acting in the Executive Committee, for a period to be determined at that time, provided that in no event shall the Annex continue beyond the current term, or actual termination, of the Implementing Agreement.