COMMISSION OF THE EUROPEAN COMMUNITIES

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PARTICIPATION OF THE COMMISSION ON BEHALF OF THE COMMUNITY IN ANNEXES VI AND VII OF THE IMPLEMENTING AGREEMENT FOR A PROGRAMME OF R&D IN THE SOLAR HEATING AND COOLING SYSTEMS OF THE INTERNATIONAL ENERGY AGENCY

(Communication of the Commission to the Council)

COMMUNICATION FROM THE COMMISSION TO THE COUNCIL

1. On June 24 and on July 6,1976, an agreement in the form of an exchange of letters was concluded between the European Atomic Energy Community (Euratom) and the European Economic Community on the one hand and the International Energy Agency (IEA) on the other relating to cooperation in the field of Energy Research and Development.

   According to the exchange of letters, the European Communities indicated their intention to negotiate, on a case by case basis, their participation in such "Implementing Agreements" prepared within the framework of the IEA as would contribute to the attainment of the research and development objectives of the Community. For its part, the IEA took note of this intention and confirmed that such participation is open to the European Communities.

2. In application of this exchange of letters ten Implementing Agreements have been concluded which have provided an "umbrella" framework setting forth rules for the execution of a number of R&D "tasks" described in the annexes to each of the said Agreements. Whilst each participant when signing the agreement confirms its intention to participate in one or more tasks, provisions for the development of additional tasks, according to a procedure set out in Article 2(b) of the Implementing Agreement, are also specified.

3. One of these Implementing Agreements concerns a programme to develop and test solar heating and cooling systems and five task annexes were prepared, in which the Commission participated in Annexes I, III, IV and V all relating to various aspects of standardisation of information and measurement techniques in this field. The Commission signed the Agreement on behalf of the Community on 5 October 1977.

4. The Executive Committee which manages the research done under this Agreement has now drawn up two new task annexes, referred to as Annexes VI and VII in the attached documents. These relate to :

   - the performance of solar heating, cooling and hot water systems using evacuated collectors (Annex VI)
   - central solar heating plants with seasonal storage ; a feasibility study and design (Annex VII)

5. The Commission considers Community participation is justified for the following reasons. Annex VI proposes to build up an inventory of knowledge about the performances of various evacuated collector systems and compare their results. Each participant will develop his own system according to specification drawn up in agreement with

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other participants and information about performance will be regularly exchanged. For the Commission, the advantage of participating in this project is that it will obtain complementary research material about heating and cooling systems done elsewhere and so provide useful material for furthering the Community's own research objectives in this important field. Annex VII concerns the technical feasibility and cost effectiveness of large scale, seasonal storage solar energy systems. Again, the research will involve information exchange and evaluation of different systems which will have been studied by the participants with a view to ultimately selecting a possible system for a pilot demonstration. The Commission's participation in this Annex will again provide additional comparative research material useful for the development of the Community's own programme. Both annexes will also give the Commission access to R&D being done by countries, such as Switzerland, Sweden, the US and Japan, all of whom are acknowledged as advanced in this field.

6. As far as dissemination of information and intellectual property is concerned, no provisions to that effect are inserted in these annexes, but it is understood that the relevant provisions of the umbrella Agreement which the Commission has already signed, will apply. However, it is the Commission's understanding and a condition of its participation that the information obtained is for the benefit of the Community as a whole and is unrelated to any particular benefits acquired by individual Member States of the Community who also participate in the Agreement. Any information received by the Community may be made available to all Member States.

7. Since both projects are task sharing there are no financial implications for Commission participation. Each participant will be responsible for his own costs and is expected to contribute a man year equivalent of between two to five in the case of Annex VI and about two and half man years in the case of Annex VII. However, in both cases the Commission's contribution will not involve extra staffing and can be met out of on going work at the JRC in Ispra.

8. The Advisory Committee for programme management (ACPM) was consulted and gave its unanimous approval for Community participation in both projects at its meeting of September 1981.

9. The Commission has now completed its negotiations on both Annexes VI and VII, but before formally participating in the projects it proposes, as was done before the "umbrella" agreement was signed, to inform the Council beforehand. (*)

10. Consequently the Commission informs the Council of its intention to participate in the additional tasks referred to as Annexes VI and VII specified for the Implementing Agreement for a programme of R&D to develop and test solar heating and cooling systems.

(*) Council of 18 July 1977, doc. R 1615/77 (ATO 62)

ANNEX VI

PERFORMANCE OF SOLAR HEATING, COOLING AND HOT WATER SYSTEMS USING EVACUATED COLLECTORS

1. Objective of Task

The objective of this Task is to further the understanding of the performance of evacuated collectors in solar heating, cooling and hot water systems, and to study, document and compare the performance characteristics of such collectors in different systems and climates. Systems using either tubular or flat evacuated collectors may be included in this Task.

2. Means

Each Participant in this Task will be responsible for the operation and analysis of at least one evacuated collector solar heating and/or cooling system. At their first meeting, the Participants concerned with the execution of this Annex will define the general characteristics of acceptable systems and installations and develop a detailed programme of work.

After adoption of the programme of work, the Participants shall conduct the following activities:

(a) Design of Evacuated Collector Systems:

Each Participant shall develop and submit to the other Participants a design or a modification of its experimental system, including procurement related thereto, in order to accommodate evacuated collectors. Each Participant's system design, including data collection instrumentaion plan and a plan for conducting the performance evaluation, shall be reviewed by the other Participants, who shall also make recommendations. Those Participants who already have an evacuated collector system in operation at the time of initiation of this Task shall submit to the other Participants a description of the existing facility and equipment for a determination by the other Participants as to whether this facility and equipment meet the agreed upon requirements. The Participants shall determine the content, form, and the manner of distribution among the Participants of the semi-annual and final results.

(b) Construction and Operation of Installations

For those designs designated by the Participants, acting by unanimity, as being in accordance with the general characteristics of acceptable systems and installations as defined by the Participants at their first meeting, for implementation, each Participant will build the installations or make the required modifications to existing installations as the case may be and assemble and install the solar system components and the data collection system. The Participants will conduct the system performance tests in accordance with the programme of work. The system performance tests will include, but not be limited to, evaluation of the overall system performance, reduction and analysis of data, and supplemental simulation and system studies as may be required, to strengthen and extend test results.

(c) Analysis and Reporting of System Performance

All of the Participants shall prepare and exchange semi-annual status reports on the performance of the selected systems. The Participants shall also prepare and exchange reports at the conclusion of the system performance testing.

The Operating Agent will organise annual meetings of the Participants, alternating the location of the meetings among the Participants' countries. Status, results, and need for modification of the systems will be the main topics for discussion and analysis.

3. Time Schedule

Three years (July 1982 to December 1985)

4. Results

The results of this task will be : (a) Semi-annual reports of the Participants on the performance of the various evacuated collector systems operated under this Task. (b) Final reports, to be prepared by each Participant on its work under the Task, using the system performance reporting format developed under Annex I of this Implementing Agreement. The reports will contain

performance data, results and their interpretation, and conclusions. The Operating Agent will summarise the reports in a paper to be submitted to the Executive Committee, as well as to the Participants.

5. Responsibilities of the Operating Agent

In addition to the responsibilities described above, the Operating Agent will be responsible for the overall management of this Task and for implementing actions required by the Executive Committee.

6. Budget

(a) Each Participant will bear its own costs in carrying out the Task, including costs of the installation, instrumentation, reporting and travel.

(b) The costs of meeting organisation will be borne by the host country.

(c) Participation in this Annex is expected to involve an annual level of two to five man-years on the part of each Participant, in addition to the costs for the development or procurement of the evacuated collectors, other system components, and data collection equipment.

7. Operating Agent

The United States Department of Energy

8. Participants

The Contracting Parties which are Participants in this Task are the following: Canada
Germany
Japan
Netherlands
Sweden
Switzerland
United Kingdom
United States

ANNEX VII

CENTRAL SOLAR HEATING PLANTS WITH SEASONAL STORAGE : FEASIBILITY STUDY AND DESIGN

Objectives of Task

The objectives of this Task are to determine the technical feasibility and cost-effectiveness of large-scale, seasonal storage solar energy systems for the heating of buildings; to evaluate the merits of alternative large-scale system designs for collecting, storing and using solar energy; and to prepare detailed system designs for specific site parameters.

Means

The task will be undertaken in the following Phases in order to accomplish the foregoing objectives :

Phase I : Literature survey, development of subsystem and system simulation and optimization of computer codes, selection of system components system optimization, and preliminary designs.

Phase II : Detailed system designs for specific site parameters

Phase I

Phase I will be devided into five Subtasks. Close co-ordination of the work under the Subtasks will be maintained through information exchange, reports by the Operating Agent and periodic review meetings of all Participants.

(a) Systems Studies and Optimization

(Lead Country : Canadian Participant)

Under the guidance of the Lead Country, the Participants will review the available literature concerning existing models suitable for the analysis and optimization of solar seasonal heating systems. The validity and completeness of these models will be tested by the Participants.

The Participants will develop computer codes for parameters (size, performance, cost, etc.) optimization and for simulation of solar seasonal heating systems based on the best available solar subsystem and systems models. Data from Subtasks 1 (b), 1 (c) and 1 (d) as described below will be utilized by the Participants in performing design optimization and analysis studies using different collector, storage and distribution subsystems, for different climates (weather tapes). These studies will involve preliminary code development, components input and system analysis, followed by successively more refined cycles of code development, components input and system analysis, leading finally to one or more recommended complete solar seasonal heating systems.

At all stages, the Participants will examine the economic as well as technical aspects and will establish criteria for evaluating the systems which are developed.

(b) Solar Collector Subsystems

(Lead Country : United States Participant)

The Lead Country will co-ordinate the work of the Participants who will review solar collector subsystems and who will identify those most suitable for large-scale seasonal storage systems, based on performance and cost-effectiveness.

The Participants will compile cost and performance data on the recommended collector subsystems and the Lead Country will provide this data for use in Subtask 1 (a). Initial computer codes and system studies from 1 (a) will be utilized by the Participants in providing more refined inputs to recommendations and data on collector subsystems, as a function of operating temperature, orientation, etc. . The Participants will identify requirements for technical improvements or cost reduction.

(c) Heat Storage

(Lead Country : Swiss Participant)

The Participants will conduct a review of heat storage concepts and technology and those most suitable for large-scale seasonal storage will be identified on a performance and cost-effective basis.

The Participants will compile characteristics of recommended heat storage subsystems and the Lead Country will provide this data for use in Subtask 1 (a).

The Participants will also identify requirements for technical improvement or cost reduction.

Participants under this Subtask shall discuss with the Participants of one or more Annexes to the IEA Implementing Agreement for a Programme of Research and Development on Energy Conservation through Energy Storage concerning possible co-ordination of efforts. With the approval of the respective Executive Committees, the Participants in such Annexes would enter into a written arrangement with the Participants in this Subtask setting forth the precise terms and conditions of such co-ordination.

(d) Heat Distribution System

(Lead Country : Swedish Participant)

The Participants will review heat distribution concepts and technology and those most suitable for large-scale seasonal storage will be identified on a performance and cost-effective basis.

The Participants will compile characteristics of recommended heat distribution systems and the Lead Country will provide this data for use in Subtask 1 (a). Requirements for technical improvement or cost reduction will be identified by the Participants.

(e) Site Inventory and Preliminary Site Specific System Design

(Lead Country : Swedish Participant)

Each Participant will conduct an inventory of potential sites, and will develop a preliminary design, including cost analyses, for a large-scale solar heating plant with seasonal storage, for one or more specific sites. They will utilize for this purpose the recommended computer programs and optimized parameters developed in Subtask 1 (a).

At the conclusion of Phase 1, all Participants will meet to review the preliminary site-specific designs prepared under this Subtask. They will then select those which are suitable for further design and evaluation work. The selected system designs may use existing technology only, or require improved components (which may be already under development or for which development must be initiated).

In making their selection of systems for further development, the Participants will consider the legal and environmental aspects involved, as well as technical performance and cost. The Operating Agent will prepare a generic environmental impact assessment for Phase I (e) systems.

Phase II - Detailed System Design

Following the completion of Phase I, each Participant desiring to continue in this Task will proceed with the development of a detailed system design for specific site parameters and costing of a large-scale central solar heating plant suited to their needs at a possible site within their country. Two or more Participants may jointly develop such a design and costing. Participants not wishing to continue in this Task may withdraw upon agreement of the Executive Committee in accordance with Article 10 (g) of the Implementing Agreement.

Each Participant's work will include the conduct of experiments as required, and, drawing upon the data and results of Phase I, the selection and design of an appropriate system. Extensive liaison between Participants will be maintained during Phase II. Participants will review all designs at six month intervals to assure information exchange and to avoid errors in design and co-ordination.

If the Phase II Participants so decide, the construction of the solar heating plant and the evaluation of the performance and cost-effectiveness of the plant may become the subject of a new Annex to this Implementing Agreement.

Time Schedule

Four years after the date of approval of this Annex. Work on the Subtasks (a) - (d) of Phase I will commence three months after the approval of the Annex and will be completed 24 months after approval of the Annex. Subtask 1 (e) will be completed 30 months after approval of the Annex. Joint Phase I Subtask meetings will be held semi-annually.

The time schedule for Phase II which is expected to run for 18 months will be decided by those Participants wishing to proceed to Phase II. Phase II design review meetings will be held at six month intervals.

Results

The results of Phase I will be :

(a) A literature survey of the components and subsystems suitable for large-scale solar seasonal storage systems;

(b) An analytic model for simulation and optimization of large-scale solar seasonal storage systems;

(c) A report identifying recommended solar seasonal storage systems, comprised of alternate combinations of recommended components and subsystems;

(d) Recommendations for optimization of the design parameters for these systems;

(e) Recommendations for research and development to improve the technical and economic viability of large-scale solar seasonal storage systems, if required;

Copies of the above documents and reports will be made available to all the Participants in this Task in accordance with paragraph 5 (d) below.

(f) Site inventory and preliminary system design studies within each Participant's country to enable a decision to be made whether or not to proceed with a detailed site-specific system design.

The results of Phase II will be :

(a) A fully costed site-specific design of a large-scale solar system with seasonal storage for each Participant's country, or group of countries.

The results of Phase II will serve as a basis for a decision by the Participants whether or not to proceed with construction.

Responsibilities of Operating Agent

The Operating Agent, in addition to those responsibilities mentioned in Paragraph 2 above, will ensure the overall co-ordination of work among the various Subtasks and will also

be responsible for :

(a) Working with the Lead Countries to co-ordinate the steps required in Phase I (a) - (d) above;

(b) Leading the system design in Phase 1 (e) and Phase II;

(c) Reporting to the Executive Committee and implementing decisions of the Executive Committee;

(d) Compiling and distributing interim and final reports on Task results and recommendations.

Responsabilities of Lead Countries

The Lead Countries for Subtasks 1 (a) - (d) will be responsible for planning and arranging the work in each Subtask in accordance with the schedule which will be developed at the first meeting of the Participants. They will also be responsible for providing the input and data to the other Subtasks as required for the conduct of the work.

Budget

Phase I

Each Participant will bear the cost of its own studies, research, and development, including costs of reporting and travel expenses of representatives. It is expected that the Operating Agent will contribute 6 man-months in Phase I and that the man-month contributions by the other Participants will be as follows :

Subtask	Lead Country (man-months)	Each of the other Participants (man-months)
1(a) System Studies	18	6
1(b) Collector System	6	3
1(c) Storage Systems	12	6
1(d) Distribution Systems	4	2
1(e) Preliminary Design	-	12

Phase II

Each Participant will bear the cost of its own design and costing, or in the case of joint development of design and costing the cost will be borne jointly as agreed between the Participants.

Operating Agent

Swedish Council for Building Research

Participants

The Contracting Parties who are Participants in this Task are the following :

[to be listed]