IEA
SOLAR R&D

INTERNATIONAL ENERGY AGENCY

solar heating and
cooling programme

task II
coordination of R&D on solar heating and cooling components and systems

summary of solar energy R&D projects for solar heating and cooling systems and components

subtask A

august 1984

SUMMARY OF SOLAR ENERGY R&D PROJECTS

T. Noguchi

Solar Research Laboratory, GIRI Nagoya
AIST, MITI Japan

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This report is part of the work within the IEA Solar Heating and Cooling Programme,
Task II:Co-ordination of Research and Development on Solar Heating and Cooling Components and Systems,
Subtask A: Summary of Solar Energy R&D Projects

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Additional copies can be ordered from: T. Noguchi,
Solar Research Laboratory
GIRIN
1 Hirate-cho, Kita-ku, Nagoya
Japan 462

ABSTRACT

This document provides information on national solar heating and cooling R&D projects for both active and passive & hybrid systems and components. The compilation is based on the reports submitted during 1983 and 1984 by the representatives of countries participating in Task II of International Energy Agency (IEA) Solar Heating and Cooling Programme. The countries which contributed reports are Austria, Belgium, Denmark, Greece, Japan, the Netherlands, Norway, Sweden and the United States. The contact persons for each country participating in Task II are listed in Appendix 2.

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1. PREFACE

International Energy Agency

In order to strengthen cooperation in the vital area of energy policy, an agreement on an International Energy Programme was formulated among a number of industrialized countries in November, 1974. The International Energy Agency (IEA) was established as an autonomous body within the Organization for Economic Cooperation and Development (OECD) to administer that agreement. Twenty countries are currently members of the IEA with the Commission of the European Communities participating under a special arrangement.

As one element of the International Energy Programme the participants undertake cooperative activities in energy research, development, and demonstration. A number of new and improved energy technologies which have the potential of making significant contributions to our energy needs were identified for collaborative efforts. The IEA committee for energy, research and development (CRD), assisted by a small Secretariat, coordinated the energy research development, and demonstration programme.

Solar Heating and Cooling Programme

In July, 1975 Solar Heating and Cooling was selected as one of the sixteen technology fields for multilateral cooperation. The objective was to undertake cooperative research, development demonstrations and exchanges of information in order to advance the activities of all participants in the field of solar heating and cooling systems. Several tasks were developed in key areas of solar heating and cooling. A formal implementing agreement was prepared, covering the contributions, obligations and rights of the participants, as well as the scope of each task. The agreement has been signed by the seventeen countries and the Commission of the European Communities. The overall programme is managed by an Executive Committee, while the management of each task is the responsibility of an Operating Agent who acts on behalf of the other participants. The tasks of the IEA Solar Heating and Cooling Programme and their respective Operating Agents (lead organization responsible for the task) are:

I Investigation of the Performance of Solar Heating and Cooling systems - Technical University of Denmark

II Coordination of Research and Development on Solar Heating and Cooling Components - Agency of Industrial Science and Technology, Japan

III Performance Testing of Solar Collectors - Kernforschungsanlage Jülich, Federal Republic of Germany

IV Development of an Insolation Handbook and Instrumentation Package - United States Department of Energy.

V Use of Existing Meteorological Information for Solar Energy Applications - Swedish Meteorological and Hydrological Institute.

VI Performance of Solar Heating, Cooling and Hot Water Systems Using Evacuated Collectors - United States Department of Energy.

VII Central Solar Heating with Seasonal Storage - Swedish Council for Building Research.

VIII Passive and Hybrid Solar Low Energy Buildings - United States Department of Energy.

IX Solar Radiation and Pyranometer Studies - Canadian Atomospheric Environment Service.

Collaboration in additional areas may be considered as projects are completed or fruitful topics for cooperation are identified.

TASK II - COORDINATION OF RESEARCH AND DEVELOPMENT ON SOLAR HEATING AND COOLING COMPONENTS AND SYSTEMS

The objective of this Task is to increase the effectiveness of the national R&D programmes related to the development of solar heating, cooling and hot water supply systems and components for buildings, including the application in industrial process heat. By the sharing of information and expertise it is hoped that duplication of effort can be avoided and development of solar heating & cooling components and systems accelerated.

The subtasks included in this project are:

A. Summary of Solar Energy R&D Projects

B. Survey and Review of Existing R, D&D Plans

C. Survey on Commercialization of and Operating Experience with Solar Heating and Cooling Systems and Components

D. Organization of Workshops

The Participants in this Task are Austria, Belgium, Denmark, Greece, Italy, Japan, the Netherlands, Norway, Sweden and the U.S.A.

2. INTRODUCTION

During the first phase of IEA Task II, activities focused on information exchange related to solar component R&D programmes and projects. In 1981, an extention and modification of Task II activities was approved to include information exchange not only on solar components R&D but on solar heating and cooling systems for active, passive and industrial process heat applications.

The objective of the Subtask A work under Task II is to share information on solar energy R&D projects in the participating countries. It is intended that this sharing of information will help to avoid redundancy of research efforts, avoid repetition of similar mistakes, and inform researchers of related work being done by their colleagues in other countries.

Survey formats were developed for reporting government-funded R&D projects, and a number of surveys have been compiled since 1977. The last survey was published in 1980; others have been distributed as internal task working documents. A January 1983 working document served as the basis for the present report. The task participants revised their input to that document as the final contribution to Subtask A. (Task II formally concluded on June 30, 1984.)

This report is a compilation of each country's national solar R&D project summaries as well as a brief discussion of each country's national programme. Two out of the eleven participants (Italy and Spain) did not contribute to the report and are thus not included. However, based on the recent ISES Congresses and the First EC Conference on Solar Heating (May, 1984), the Operating Agent concludes that positive R&D activities are taking place in both Spain and Italy.

The format of this report is different from the former one in that there is an increased number of R&D projects because both components and systems R&D projects were surveyed. In order to avoid having an overly large report, the reporting format has been simplified. However, sufficient information is provided on each solar R&D project to enable the reader to determine whether a particular project is of interest and allow him to contact the relevant researcher for further information.

The survey is presented alphabetically by country with each country's summaries divided into Passive/Hybrid Solar Projects and Active Solar Projects. Each project is assigned a number, and a listing of the projects and the corresponding organization precedes the surveys.

The key words used in the surveys are found in Section 5 to help the reader identify projects of specific interest. Each key word is listed alphabetically followed by the project code numbers for easy reference.

3. BRIEF SUMMARY OF SOLAR R&D PROJECT SURVEYS

The expansion of Task II's activities to include information exchange on solar heating and cooling systems for active, passive and solar industrial process heat, in addition to solar component R&D, reflects a similar expansion of R&D activities in the participating countries. The progress achieved in both the systems and components R&D has been quite significant each year and has resulted in a substantial growth in the solar energy industries of the participating countries. Increased interest and activity in passive solar heating and cooling concepts in the 1980's is evident throughout the surveys, especially since the creation of IEA Task VIII, Passive and Hybrid Solar Low Energy Buildings. Despite the world-wide economic recession, the "oil glut," lower oil prices and other factors which have impeded solar R&D policy and funding in the participating countries, new and innovative concepts for both active and passive solar heating and cooling systems and components appear every year. This report provides a brief indication of the present status of solar heating and cooling R&D projects in the participating countries. The trends of national R&D policies and plans will be reported in the Task II, Subtask B technical report to be published shortly.

Systems and Components R&D Projects

A classification of the project surveys can be found in Tables 1 and 2. Table 1, "Active Solar Heating and Cooling Components and Systems R&D Projects," presents a breakdown of the active projects by categories. Table 1 indicates that there are a total of 201 active R&D projects in the participating countries, the highest figures so far in the Task II reports. It must be remembered that systems R&D often encompass component R&D activities as well as simulation, monitoring and evaluation.

It is interesting to note that there has been a substantial increase in testing and evaluation and simulation and modelling projects from the 1980 surveys. Moreover, new project topics are found in most countries. Within testing and evaluation R&D, projects on certification and standardization are seen with increasing frequency. As market penetration grows

larger, active domestic hot water systems and solar collectors are the main areas of R&D in the systems and component categories. Active solar cooling remains a target of research because it is far from being cost-effective. Industrial process heat applications are being investigated more heavily now.

Table 2, "Passive System and Components R&D Projects," presents a breakdown of the 125 passive and hybrid R&D projects. The table indicates that major efforts have been concentrated on passive heating technologies in all participating countries while passive cooling and daylighting projects have been pursued only by Japan and the USA. The major areas of passive heating research have focussed on testing and evaluation and simulation and modelling. The passive DHW projects refer to thermosiphon systems and bread-box type solar water heaters. Thermal storage materials projects are found in the "Storage" column. Thus, the "Materials" column does not include storage materials.

Current Topics on Solar Heating and Cooling Systems and Components

In the component R&D area, most of the standard active solar collector designs appeared in the seventies and current efforts are concentrated on achieving cost effective, high performance collector design. Inexpensive unglazed collectors, roof integrated structures, and so-called on-site collectors are being investigated, tested and marketed. Moreover, advanced flat plate collectors such as the evacuated tubular collector, honeycomb structure (convection suppression device) and heat pipe collectors have been developed for higher performance at high temperature levels such as 130° - 200°C. Within the last couple of years, rather unique designs of unglazed collectors coupled with heat pumps and phase change heat transfer media such as freon have appeared. These collector designs are available in both forced circulation and thermosiphon type systems. Unfortunately, no standardized testing

Table 1. Classification of Active Solar Heating and Cooling Components and Systems R&D Projects

Country	Active Solar Systems R&D				Components R&D				Testing & Evaluation	Simulation & Modelling	Others	Total
	DHW	H.DHW.	H.C. DHW.	IPH	Collector	Storage	Air Cond.	Others				
AUSTRIA	9	6	1	---	---	---	---	---	1	---	---	17
BELGIUM	2	2	1	4	1	---	---	---	---	---	---	10
DENMARK	4	2	---	---	4	5	---	---	2	2	---	19
GREECE	---	---	---	---	1	1	---	---	2	---	---	4
ITALY												
JAPAN	---	---	3	9	8	10	1	---	3	2	1	37
NETHERLANDS	1	6	---	---	4	1	---	4	7	16	2	41
NORWAY	2	4	1	---	2	2	---	---	---	---	---	11
SPAIN												
SWEDEN	6	2	1	---	5	1	---	---	5	10	---	30
USA	---	---	2	---	7	---	6	2	9	6	---	32
Total	24	22	9	13	32	20	7	6	29	36	3	201

Table 2. Classification of Passive System and Components R&D Projects

	Passive Heating								Passive Cooling	Day Lighting	Total
	Hybrid System	DHW	System Study, Experimental	Testing and Evaluation	Simulation & Modelling	Collector	Storage	Materials			
AUSTRIA	---	---	2	---	---	---	---	---	---	---	2
BELGIUM	1	---	---	---	---	---	---	1	---	---	2
DENMARK	1	1	---	2	---	1	1	---	---	---	6
GREECE	---	---	3	---	---	---	---	---	---	---	3
ITALY											
JAPAN	---	---	5	2	5	---	2	1	2	1	18
NETHERLANDS	---	---	---	1	---	1	1	---	---	---	3
NORWAY	1	---	3	1	---	---	1	---	---	---	6
SPAIN											
SWEDEN	1	---	5	6	19	2	---	---	---	---	33
USA	---	---	3	13	12	4	6	6	2	6	52
Total	4	1	21	25	36	8	11	8	4	7	125

procedures for these systems have been developed yet. Solar water heaters consisting of thermosiphon type passive collectors coupled with water storage tanks and the so-called bread-box types are being re-evaluated because of their economical characteristics.

It has been apparent that the complex factors which contribute to significant optical, thermal, and mechanical losses in large collector arrays are not well understood. Recently an IEA workshop on the design and performance of large solar thermal collector arrays (more than 1,000 m^2) was held in the U.S. The papers presented at the workshop indicated that the efficiency of the components has gradually improved over the last ten years while system efficiencies have remained relatively low. Cost effectiveness, durability, reliability and service life were some of the areas identified as needing R&D. The workshop participants agreed that numerous problems on the design, construction and operation of solar heating and cooling systems need to be solved in order to improve system efficiency and obtain high reliability and durability. Some of these efforts have begun and can be seen in the project survey forms.

Thermal energy storage R&D is not as advanced as solar collector R&D. Most of the marketed solar storage installations are dependent on water tanks for DHW systems and macadam vessels for air heating systems. Latent heat storage units for both active and passive systems are in early stages of R&D and thus have not entered the marketplace. Long term storage, seasonal storage and underground storage research are in the demonstration stages and the focus of cooperative work under IEA Task VII, "Central Solar Heating Plants with Seasonal Storage" which was initiated in 1980.

Several R&D projects related to Task VII appear in this report, especially in the Netherlands and Sweden. There has been a renewed interest in components and materials R&D throughout the participating countries with much research focused on cost effective solar heating and cooling systems.

With the initiation of IEA Task VIII, "Passive and Hybrid Solar Low Energy Buildings," in 1982, passive and hybrid systems R&D appears in all Task II participating countries. It is interesting to note that in Sweden and the United States there were more passive and hybrid systems projects than active.

In general, active solar heating and cooling systems R&D is in the demonstration and commercialization stages, while there is a high demand for new innovative components and materials among the participanting countries. Projects which concentrate on testing and evaluation, testing procedures, and system performance analysis of solar heating and cooling systems are extremely important to the commercialization and market penetration of the products. Certification and standardization are indispensable steps towards the maturity of the solar energy industry. Japan and the U.S.A. as well as other participating countries have directed strong efforts to these types of programmes. Major R&D efforts in the Netherlands and Sweden are concentrated on simulation and modelling and testing and evaluation.

Among the Task II participants, emphasis is placed upon air heating systems in Norway, district heating in Denmark, the Netherlands and Sweden, heat pump systems in Austria, and industrial process heat application in Japan.

Desalination by the use of advanced flat plate collectors rather than a basin type distiller, agricultural use for drying purposes, steam generation and hot water supply for industrial process heat are among the other topics in active solar heating systems R&D.

4. SOLAR HEATING AND COOLING R&D PROJECT SUMMARIES

This section presents the results of the survey of Task II Participants' national solar heating and cooling R&D projects, organized by country. Each country's survey forms are preceded by a brief summary of the national solar R&D programme and a listing of the projects, corresponding code numbers, and responsible organizations.

Each survey form provides the following information: project title, for solar system R&D, type of system, type of research; for component R&D, type of component, type of research application; keywords; name of organization, name of principal researcher; address; project duration; and funding in U.S.$.

4.1 SOLAR ENERGY R,D AND D PROGRAMMES IN AUSTRIA

METEOROLOGICAL CONDITIONS AND POTENTIAL FOR SOLAR ENERGY UTILIZATION

In Austria the insolation values vary as follows: March to May up to 450 kwh/m^2, June to August 520 kwh/m^2, September to November 250 kwh/m^2 and December to February up to 160 kwh/m^2. The annual global radiation sum is of the order to 1,000 to 1,400 kwh/m^2.

The daily sum of insolation on cloudless days in the summer period may be as high as 8 kwh/m^2d.

The daily variations of insolation on cloudless days are highly dependent on the seasonal cycle. In summer, the maximum attains some 0.9 kw/m^2, in spring some 0.6 kw/m^2 and in winter some 0.25 kw/m^2.

During the period from May to September, an average of 45 percent of total insolation is diffuse radiation, from October to April about 65 percent.

The unfavorable ratio of maximum (June) and minimum (December) irradiation in Austria is obvious. Ratios of 8 : 1 are possible. In the case of space heating, energy demand is thus highest when supply is lowest.

Due to the meteorological conditions solar systems in Austria are used mainly for domestic hot water heating and for swimming pool heating during the summer period.

MARKET PENETRATION

The use of solar systems has been increasing in Austria since 1975. Until the end of 1983 about 134,000 m^2 of collector area were installed, about 65 % of which are used for swimming pool heating and 35 % for domestic hot water heating.

At present state of technology, the direct utilization of solar energy for space heating is not yet economical in Austria. Otherwise heat pump systems are increasingly used for space heating with air, water or soil as sources of heat.

RESEARCH, DEVELOPMENT AND DEMONSTRATION IN THE FIELD OF SOLAR HEATING SYSTEMS

Research and development works in connection with components and systems for utilization of solar energy were concentrated in Austria in past years on the following subjects:

> The development and testing of economical and efficient collectors and solar systems for swimming pool and domestic water heating; the objective is to reach a life time of more than ten years.
>
> The development and testing of heating systems with direct (collectors) or indirect (heat pumps) utilization of solar energy, special consideration being given to ecological and economic aspects.

In order to add to scientific findings specific data and experience with operating systems, the "Austrian Measurement Network for the Utilization of Solar Energy" was established in 1976. On behalf of the Austrian Federal

Ministry for Science and research about 50 test stations with solar and/or heat pump systems were installed by the end of 1983. The Austrian Solar and Space Agency (ASSA) co-ordinates these test stations, evaluates the results and provides all those interested with the information required.

The experiments undertaken have contributed not only to the improvement of serial production of components and systems, but also to the establishment of standards and guidelines to be followed in the design, construction and operation of solar and heat pump systems.

ENERGY POLICY AND RESEARCH

A. THE INSTITUTIONAL SYSTEM

Austria is a Federal State. The Federal Government (BUND) and the Federal Provinces(Länder), within their respective fields of competence, are each responsible for energy matters including research and development.

At the federal level, Federal Ministries are responsible for energy matters, including research and development, with respect to their specific area of activity.

Matters of energy policy are handled by the Federal Ministry for Trade, Commerce and Industry.

The responsibility for the co-ordination of energy research and development at the federal level rests with the Federal Ministry for Science and Research.

B. GOALS AND PRINCIPLES OF ENERGY POLICY

To secure Austria's energy supply and to minimize negative impacts on the economy and on the environment, the energy policy and research in Austria are aimed at:

Optimizing the exploration for and the use of domestic resources of energy, in particular by further exploitation of hydropower, and new sources of energy or those rarely used up to now, such as biomass, solar and geothermal energy,

Substituting hydrocarbons as far as possible,

Reducing energy consumption through more efficient energy use,

Securing the necessary energy imports by diversifying supplier countries and energy sources.

The energy policy of the Federal Government emphasizes the exploration for oil, natural gas and coal deposits, and in particular the expansion of both large- and small-scale hydropower. The power plant expansion programme provides for the continuous expansion of hydropower. Besides the construction of large- and medium-size plants, particular attention is given to the expansion of small hydropower plants. As such small plants have considerable potential for future energy supply, a number of measures have been taken for their promotion, such as tax reduction, loans and interest allowances.

C. GOALS AND PRINCIPLES OF ENERGY RESEARCH

The objective of the Austrian Concept of Energy Research is to ensure that work sponsored from public funds is in conformity with the goals of Austria's energy policy and takes into consideration concerns of the economic and research policy, including environmental factors. Austria's Concept of Energy Research was first established in 1974 and is being updated periodically.

D. SPECIAL MEASURES FOR THE PROMOTION OF SOLAR TECHNOLOGIES

If their application meets specific energy policy requirements, solar systems qualify for tax advantages as energy saving investments.

Standards for solar collectors are already available in Austria. Guidelines and recommendations for planning, design and operation of solar systems have been elaborated by the Austrian Solar and Space Agency (ASSA) based on the results gained with existing facilities.

Reliability, cost-effectiveness, serial production of parts and components, and better information on technologies are preconditions of using new and renewable sources of energy. Appropriate documentation, teaching and demonstration materials have been elaborated in Austria, in order to provide information to all interested and to promote the use of solar systems.

The introduction of new technologies requires good training of technical manpower. For this purpose, seminars are held in regular intervals, dealing with the planning design and operation of solar systems. Between 1977 and 1983 more than 250 seminars were held in Austria on this subjects.

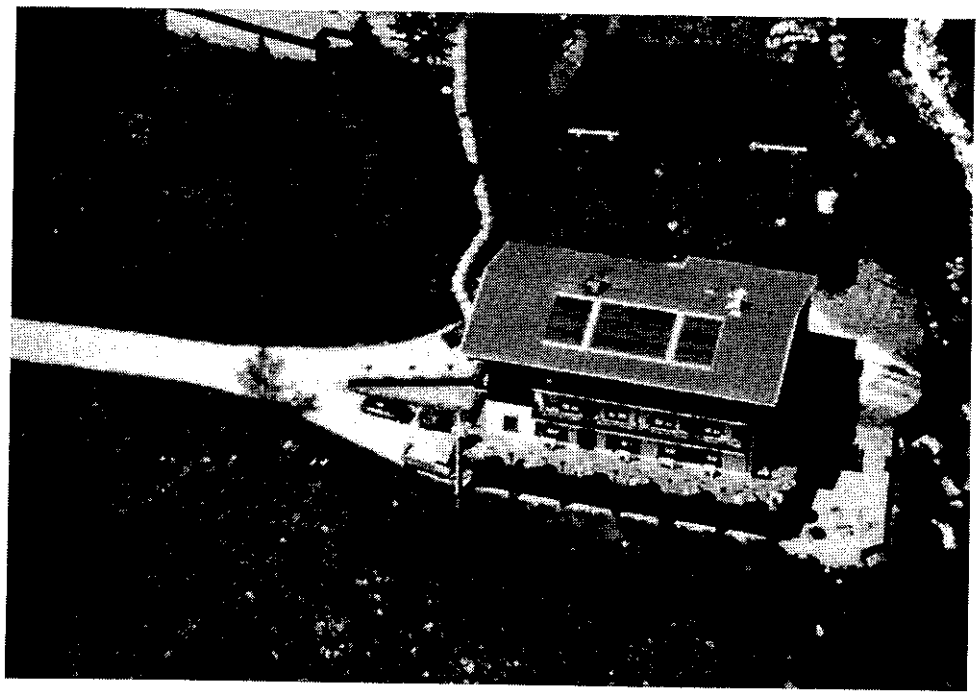
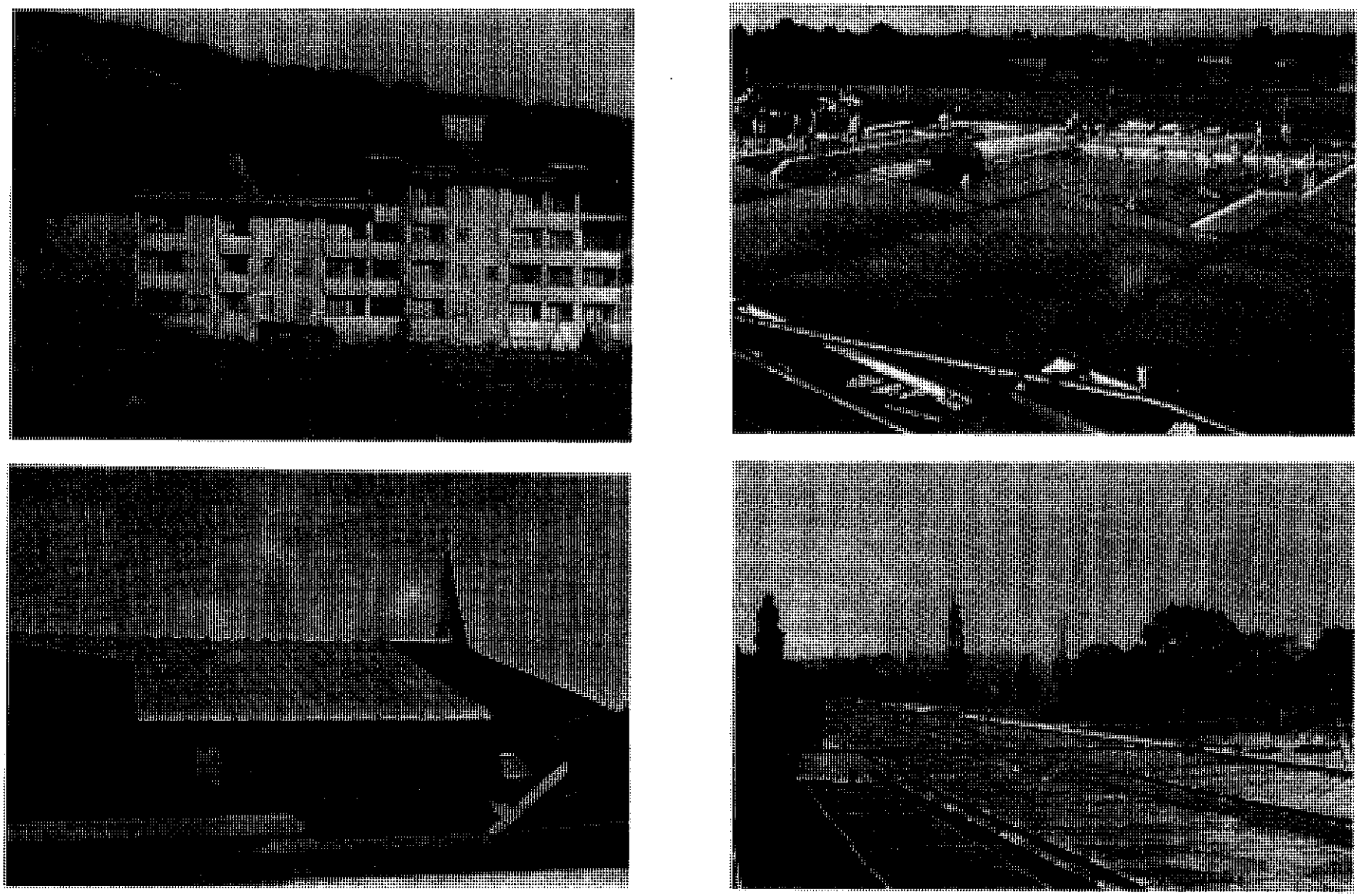


Fig. 1. Integration of solar collectors in buildings: example of a hotel.



a) Domestic Water Heating

b) Swimmimg Pool Heating

Fig. 2. Examples of Solar Heating Systems

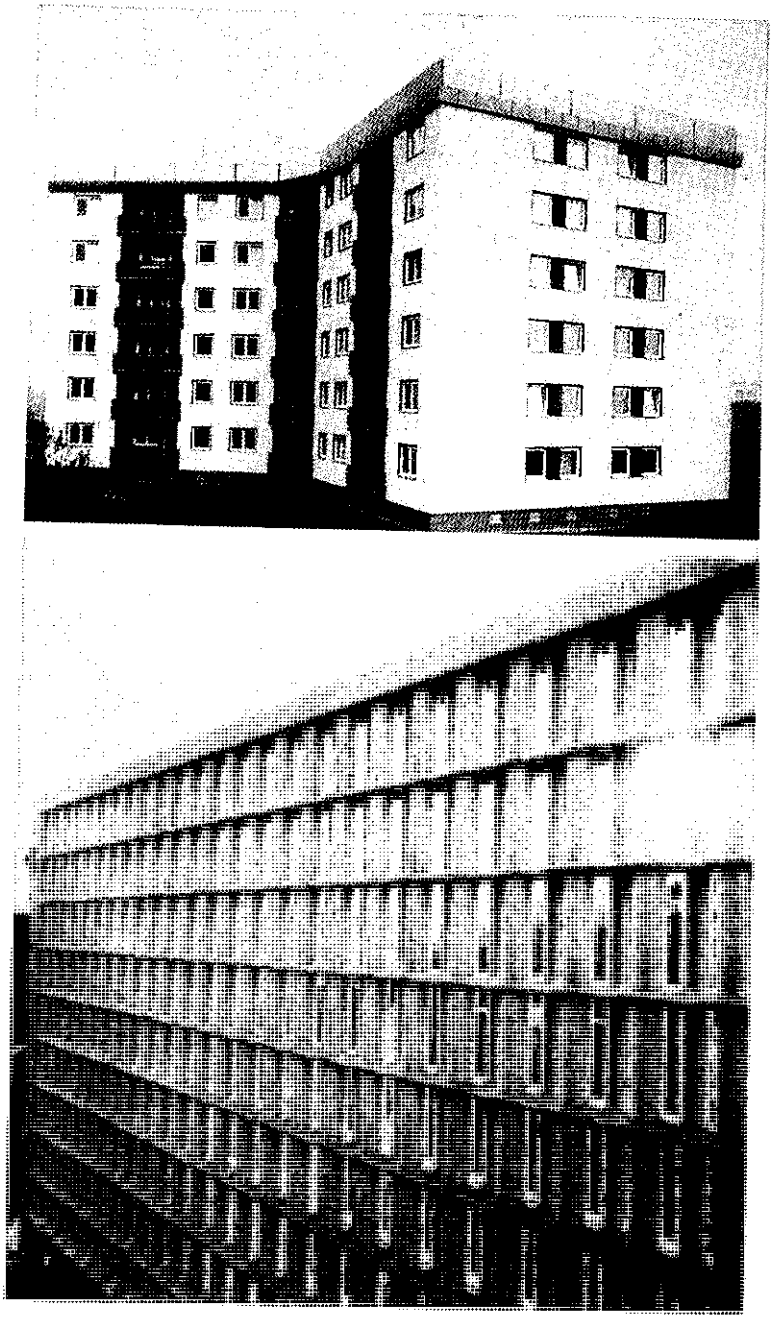


Fig. 3. Solar assisted heat pump system for space heat and domestic hot water heating.

SOLAR R&D PROJECTS IN AUSTRIA
(1983)

PASSIVE AND HYBRID R&D PROJECTS

Code #	Project Title	Research Laboratory
A - 1	Solar House at Göfis, Vorarlberg	Austrian Solar and Space Agency
A - 2	Solar House Bludenz, Vorarlberg	Private

Code No.: A - 1 Date Prepared: 10. 1. 1984

1. TITLE OF PROJECT:
Solar House at Göfis, Vorarlberg

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ■ Durability and Reliability

3. KEYWORDS:
residential building, single family energy balance, heat storage

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Austrian Solar and Space Agency

5. NAME OF PRINCIPAL RESEARCHER:
G. Faninger

6. ADDRESS:
Garnisongasse 7, A-1090 Vienna

7. DURATION OF PROJECT (Give Dates)
1977 - 1983

8. FUNDING IN $ U.S.:
50.000,--

Code No.: A - 2 Date Prepared: 10. 1. 1984

1. TITLE OF PROJECT:
Solar House Bludenz, Vorarlberg

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ■ Durability and Reliability

3. KEYWORDS:
residential building, energy balance, ground coupled heat pump

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
private

5. NAME OF PRINCIPAL RESEARCHER:
H. Rünzler

6. ADDRESS:
Bahnhofstraße 8, 6700 Bludenz

7. DURATION OF PROJECT (Give Dates)
1978 - 1983

8. FUNDING IN $ U.S.:
50.000,--

SOLAR R&D PROJECTS IN AUSTRIA
(1983)

ACTIVE R&D PROJECTS

Code #	Project Title	Research Laboratory
A - 3	Wohnform Rankweil, Vorarlberg	Austrian Solar and Space Agency
A - 4	Kranebitten, Tyrol	Institut für Bauforschung
A - 5	Ampass, Tyrol	University Innsbruck
A - 6	Institut für Molekularbiologie, Salzburg	Institut für Allgemeine Physik
A - 7	Hospital Leongang, Upper Austria	MEA
A - 8	Gebietskrankenkasse, Lower Austria	Institut für Bauforschung
A - 9	Solar System for the Austrian Press Agency (APA), Vienna	Austrian Solar and Space Agency
A - 10	Solar System at Vogel & Noot, Wartberg, Styria	Vogel & Noot
A - 11	Swimming Pool, Eggersdorf, Styria	Research Centre Graz
A - 12	Photolabor Grafo, Graz	Austrian Solar and Space Agency
A - 13	Solar House Obdach, Styria	Austrian Solar and Space Agency
A - 14	DHW-systems in Carinthia	Austrian Solar and Space Agency
A - 15	Swimming Pool Spittal/Drau, Carinthia	Austrian Solar and Space Agency
A - 16	Hotel Sonnhof, Tyrol	Austrian Solar and Space Agency
A - 17	Solar Operated Absorption Cooling Aggregate	Institut für Umweltforschung
A - 18	Thermosyphon Solar System	Austrian Solar and Space Agency
A - 19	Solar Simulator	Bundesversuchs und Forschungsanstalt Arsenal

Code No.: A - 3 Date Prepared: 10. 1. 1984

1. TITLE OF PROJECT:
Wohnform Rankweil, Vorarlberg

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ■ Durability and Reliability

3. KEYWORDS:
ground coupled heat pump
multi family building

APPLICATION:

■ ~~Solar~~ Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Austrian Solar and Space Agency

5. NAME OF PRINCIPAL RESEARCHER:
G. Faninger

6. ADDRESS:
Garnisongasse 7, A-1090 Vienna

7. DURATION OF PROJECT (Give Dates)
1982 - 1983

8. FUNDING IN $ U.S.:
100.000,--

Code No.: A - 4 Date Prepared: 10.1.1984

1. TITLE OF PROJECT:
Kranebitten, Tyrol

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ■ Durability and Reliability

3. KEYWORDS:
office building
ground coupled heat pump, energy balance

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Institut für Bauforschung

5. NAME OF PRINCIPAL RESEARCHER:
G. Spielmann

6. ADDRESS:
An der Langen Lüssen 1, A-1190 Vienna

7. DURATION OF PROJECT (Give Dates)
1981 -

8. FUNDING IN $ U.S.:
50.000,--

Code No.: A - 5 Date Prepared: 10.1.1984

1. TITLE OF PROJECT:
Ampass, Tyrol

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ■ Component Development, ■ Durability and Reliability

3. KEYWORDS:
single family building
solar collector

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling,
☒ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
University Innsbruck

5. NAME OF PRINCIPAL RESEARCHER:
G. Milborn

6. ADDRESS:
Technikerstraße 5, A-6020 Innsbruck

7. DURATION OF PROJECT (Give Dates)
1977 - 1980

8. FUNDING IN $ U.S.:
10.000,--

Code No.: A - 6 Date Prepared: 10.1.1984

1. TITLE OF PROJECT:
Institut für Molekularbiologie, Salzburg

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ■ Component Development, ■ Durability and Reliability

3. KEYWORDS:
research institute, solar collector
data acquisition

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling,
■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Institut für Allgemeine Physik

5. NAME OF PRINCIPAL RESEARCHER:
F. Viehböck

6. ADDRESS:
Technical University, Karlsplatz 13, A-1040 Vienna

7. DURATION OF PROJECT (Give Dates)
1977 - 1981

8. FUNDING IN $ U.S.:
50.000,--

Code No.: A - 7

Date Prepared: 10.1.1984

1. TITLE OF PROJECT:
Hospital Leongang, Upper Austria

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ■ Durability and Reliability

3. KEYWORDS:
hospital, energy balance

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
MEA

5. NAME OF PRINCIPAL RESEARCHER:
M. Mittasch

6. ADDRESS:
Engerwitzdorf , 4210 Gallneukirchen

7. DURATION OF PROJECT (Give Dates)
1982 -

8. FUNDING IN $ U.S.:
5.000,--

Code No.: A - 8

Date Prepared: 10.1.1984

1. TITLE OF PROJECT:
Gebietskrankenkasse, Lower Austria

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ■ Durability and Reliability

3. KEYWORDS:
office building
energy balance

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Institut für Bauforschung

5. NAME OF PRINCIPAL RESEARCHER:
M. Wachberger

6. ADDRESS:
An der Langen Lüssen 1, A-1190 Vienna

7. DURATION OF PROJECT (Give Dates)
1981 -

8. FUNDING IN $ U.S.:
12.000,--

Code No.: A - 9 Date Prepared: 1o.1.1984

1. TITLE OF PROJECT:
Solar System for the Austrian Press Agency (APA), Vienna

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ■ Durability and Reliability

3. KEYWORDS:
office building
energy balance

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Austrian Solar and Space Agency

5. NAME OF PRINCIPAL RESEARCHER:
M. Bruck

6. ADDRESS:
Garnisongasse 7, A-1090 Vienna

7. DURATION OF PROJECT (Give Dates)
1979 - 1982

8. FUNDING IN $ U.S.:
25.000,--

Code No.: A - 10 Date Prepared: 10.1.1984

1. TITLE OF PROJECT:
Solar System at Vogel & Noot, Wartberg, Styria

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
manufactoring facilities

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Vogel & Noot

5. NAME OF PRINCIPAL RESEARCHER:

6. ADDRESS:
8661 Wartberg

7. DURATION OF PROJECT (Give Dates)
1979 - 1982

8. FUNDING IN $ U.S.:
10.000,--

Code No.: A - 11 Date Prepared: 10.1.1984

1. TITLE OF PROJECT:
Swimming pool, Eggersdorf, Styria

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ■ Durability and Reliability

3. KEYWORDS:
public swimming pool

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Research Centre Graz

5. NAME OF PRINCIPAL RESEARCHER:

6. ADDRESS:
Elisabethstraße 11, 8010 Graz

7. DURATION OF PROJECT (Give Dates)
1977 - 1979

8. FUNDING IN $ U.S.:
10.000,--

Code No.: A - 12 Date Prepared: 10.1.1984

1. TITLE OF PROJECT:
Photolabor Grafo, Graz

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ■ Durability and Reliability

3. KEYWORDS:
commercial building
energy balance

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION
Austrian Solar and Space Agency

5. NAME OF PRINCIPAL RESEARCHER:
M. Bruck

6. ADDRESS:
Garnisongasse 7, A-1090 Vienna

7. DURATION OF PROJECT (Give Dates)
1978 - 1982

8. FUNDING IN $ U.S.:
25.000,--

Code No.: A - 13 Date Prepared: 10.1.1984

1. TITLE OF PROJECT:
Solar house Obdach, Styria

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ■ Component Development, ■ Durability and Reliability

3. KEYWORDS:
single family building
ground coupled heat pump

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Austrian Solar and Space Agency

5. NAME OF PRINCIPAL RESEARCHER:
M. Bruck

6. ADDRESS:
Garnisongasse 7, A-1090 Vienna

7. DURATION OF PROJECT (Give Dates)
1980 -

8. FUNDING IN $ U.S.:
50.000,--

Code No.: A - 14 Date Prepared: 10.1.1984

1. TITLE OF PROJECT:
DHW-systems in Carinthia

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & OHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ■ Durability and Reliability

3. KEYWORDS:

single family buildings

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Austrian Solar and Space Agency

5. NAME OF PRINCIPAL RESEARCHER:
G. Faninger

6. ADDRESS:
Garnisongasse 7, A-1090 Vienna

7. DURATION OF PROJECT (Give Dates)
1980 -

8. FUNDING IN $ U.S.:
100.000,--

Code No.: A - 15

Date Prepared: 10.1.1984

1. TITLE OF PROJECT:
Swimming pool Spittal/Drau, Carinthia

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ■ Durability and Reliability

3. KEYWOROS:
public swimming pool
energy balance

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Austrian Solar and Space Agency

5. NAME OF PRINCIPAL RESEARCHER:
G. Faninger

6. ADDRESS:
Garnisongasse 7, A-1090 Vienna

7. DURATION OF PROJECT (Give Dates)
1981 -

8. FUNDING IN $ U.S.:
5.000,--

Code No.: A - 16

Date Prepared: 10.1.1984

1. TITLE OF PROJECT:
Hotel Sonnhof, Tyrol

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ■ Durability and Reliability

3. KEYWOROS:
hotel
energy balance

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☑ Industrial Process Heat

4. NAME OF ORGANIZATION
Austrian Solar and Spaee Agency

5. NAME OF PRINCIPAL RESEARCHER:
G. Faninger

6. ADDRESS:
Garnisongasse 7, A-1090 Vienna

7. DURATION OF PROJECT (Give Dates)
1983 -

8. FUNDING IN $ U.S.:
10.000,--

Code No.: A - 17 Date Prepared: 10.1.1984

1. TITLE OF PROJECT:
solar operated absorption cooling aggregate

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ■ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ■ Component Development, ■ Durability and Reliability

3. KEYWORDS:
absorption cycle

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Institut für Umweltforschung

5. NAME OF PRINCIPAL RESEARCHER:
E. Podesser

6. ADDRESS:
Elisabethstraße 11, A-8010 Graz

7. DURATION OF PROJECT (Give Dates)
1981

8. FUNDING IN $ U.S.:
100.000,--

Code No.: A - 18 Date Prepared: 10.1.1984

1. TITLE OF PROJECT:
Thermosyphon solar system

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ■ Component Development, ■ Durability and Reliability

3. KEYWORDS:
solar water heater
energy balance

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Austrian Solar and Space Agency

5. NAME OF PRINCIPAL RESEARCHER:
G. Faninger

6. ADDRESS:
Garnisongasse 7, A-1090 Vienna

7. DURATION OF PROJECT (Give Dates)
1982 -

8. FUNDING IN $ U.S.:
25.000,--

Code No.: A - 19 Date Prepared: 10.1.1984

1. TITLE OF PROJECT:
solar simulator

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

solar simulator

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Bundesversuchs- und Forschungsanstalt Arsenal

5. NAME OF PRINCIPAL RESEARCHER:

6. ADDRESS:
Lilienthalgasse, A-1030 Vienna

7. DURATION OF PROJECT (Give Dates)

1980 -

8. FUNDING IN $ U.S.:

50.000,--

4.2 SOLAR HEATING AND COOLING R&D IN BELGIUM

Most of the R&D projects concerning solar heating and cooling are treated within the National R&D Energy Program.

This program is managed by the Sciences Policy Office of Belgium. The Projects are executed by university laboratories, research centers and industries.

The last two years research in the field of active solar heating for domestic purposes is less intensive. Experience with existing commercial installaions has shown that most of them are technically good but that pay off time is too high to permit large scale commercialization.

This is mainly due to the high systems cost and the rather low solar energy potential in Belgium (around 950 KWh/m² year). Supplementary efforts have been initiated for the development of passive solar heating, which can make a substantial contribution to energy conservation in Belgium.

The other research efforts are concentrated on solar drying of agricultural products, air conditionning and cooling and desalination.

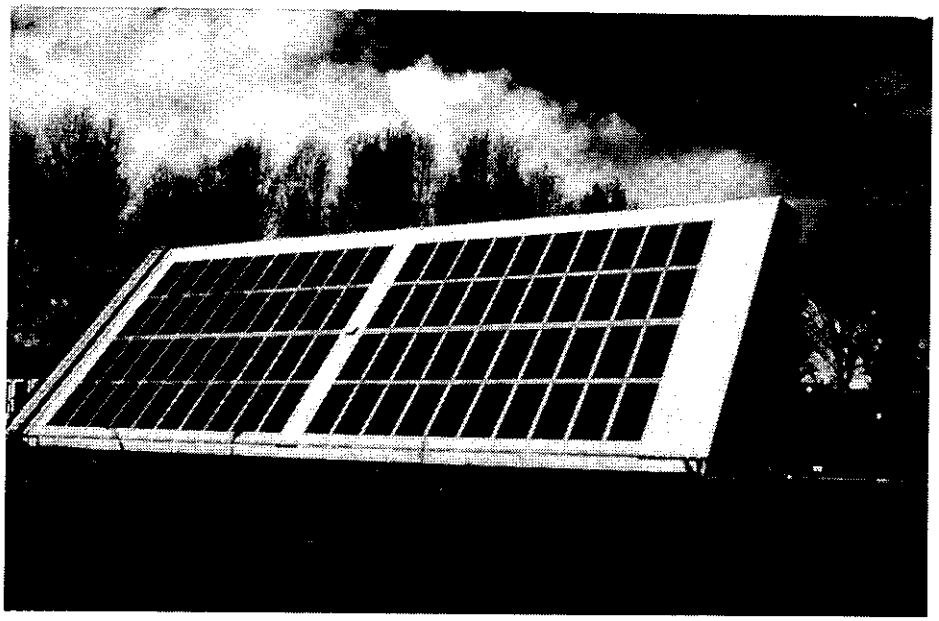


Photo 1. Pilot Test Facility - Katholieke Universiteit Leuven (B-5, B-7)

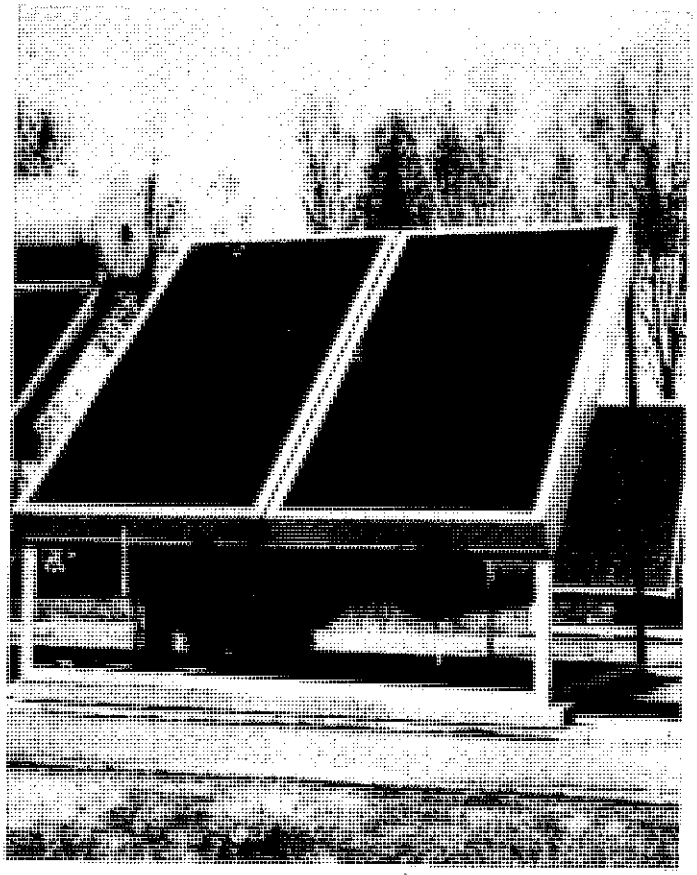


Photo 2. Nobels Peelman High Efficiency Aircollector.

(B-5)

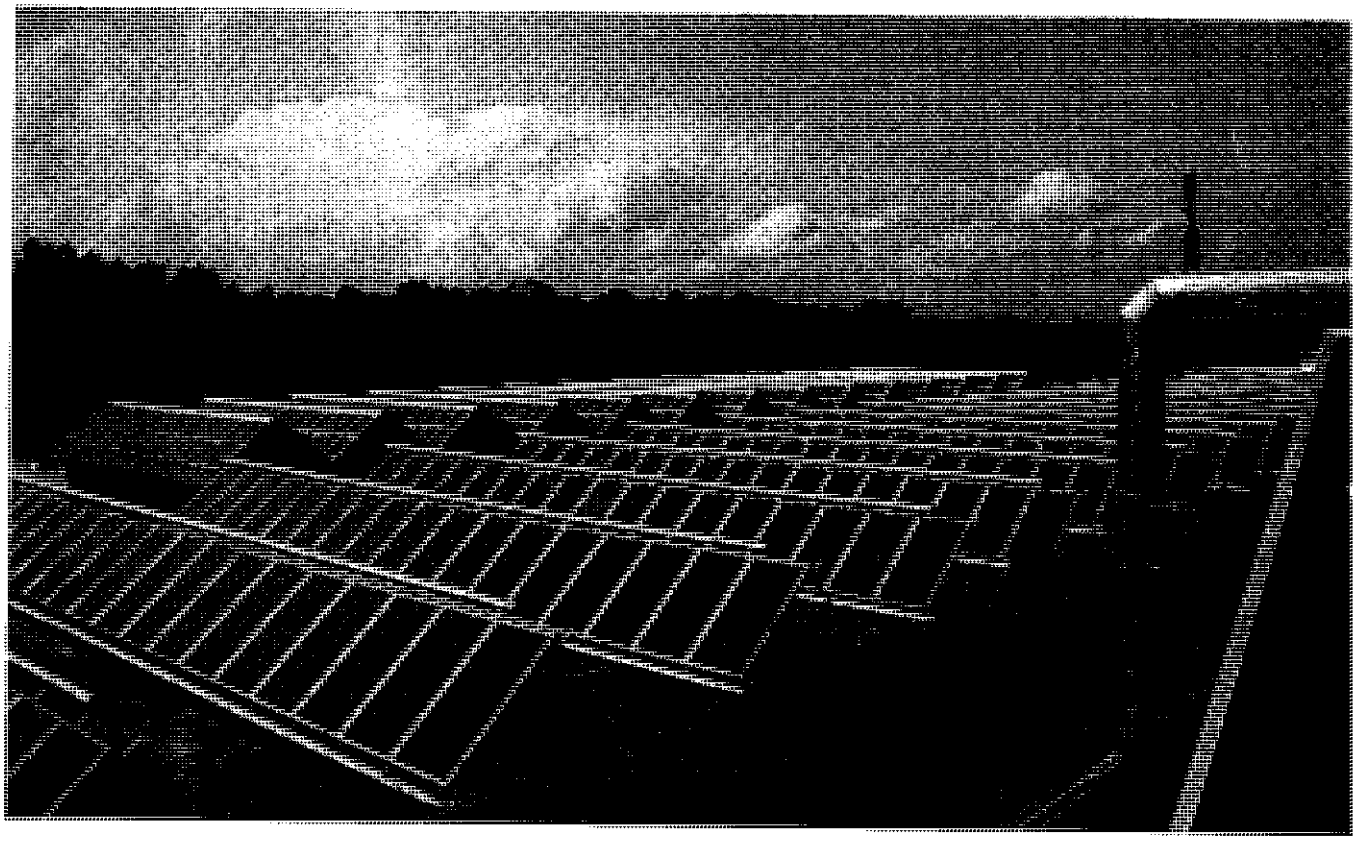


Photo 3. Solar Heating of the Chevetogne sport complex (2.132 m²) - I.D.E.

SOLAR R&D PROJECTS IN BELGIUM

(1983)

PASSIVE AND HYBRID R&D PROJECTS

Code #	Project Title	Research Laboratory
B - 1	Integration of Passive Solar Energy in Buildings	Fak. Toeg. Wetenschappen - VUB
B - 2	Solar Passive and Hybrid Low Energy Houses	Unité d'Architecture - UCL

Code No.: B - 1 Date Prepared: 26 March 1984

1. TITLE OF PROJECT: Integration of Passive Solar Energy in Buildings

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Passive Heating

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

VRIJE UNIVERSITEIT BRUSSEL

5. NAME OF PRINCIPAL RESEARCHER:

Prof. J. VAN LOEY

6. ADDRESS: VUB - Fakulteit Toegepaste Wetenschappen
Pleinlaan 2 - 1050 Brussels (Belgium)

7. DURATION OF PROJECT (Give Dates)

1982.09.01 until 1986.08.31

8. FUNDING IN $ U.S.:

US $ 124 545 (1 US $ = 55 BF)

Code No.: B - 2 Date Prepared: 26 March 1984

1. TITLE OF PROJECT: SOLAR PASSIVE AND HYBRID LOW ENERGY HOUSES

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Passive heating

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Université Catholique de Louvain

5. NAME OF PRINCIPAL RESEARCHER:

André DE HERDE

6. ADDRESS: UCL - Facultés des Sciences Appliquées - Unité d'Architecture
Place du Levant 1 - 1348 Louvain-La-Neuve (Belgium)

7. DURATION OF PROJECT (Give Dates)

1983.01.01 until 1986.06.03

8. FUNDING IN $ U.S.:

US $ 109 090 (1 US $ = 55 BF)

SOLAR R&D PROJECTS IN BELGIUM

(1983)

ACTIVE R&D PROJECTS

Code #	Project Title	Research Laboratory
B - 3	Study of Solar Domestic Heat Water Systems Installed in Belgium	Test Aankoop
B - 4	Study of Solar Domestic Heat Water Systems Instaaled in Belgium	Belgian Building Research Center
B - 5	Case Study on Low Energy Buildings: Solar Applications	Afd. Toeg. Mechanica - KUL
B - 6	Case Study on Low Energy Buildings: Solar Applications	Centre de Rech. sur l'Energie Solaire - FMPs
B - 7	Application of Solar Energy for Agriculture	Afd. Toeg. Mechanica - KUL
B - 8	Application of Solar Energy for Agriculture	Centre de Rech. sur l'Energie Solaire - FMPs
B - 9	Application of Solar Energy for Agriculture	Centre de Rech. Agronom. de Gembloux
B - 10	Application of Solar Energy for Agriculture: Solar Drying of Tabacco	TRACTIONEL S.A.
B - 11	Study of Sensible Heat Storage	Foundation Universitaire Luxembourgeoise
B - 12	Solar Energy - Thermal Conversion	Studiecentrum Voor Kernenergie

Code No.: B - 3 Date Prepared: 26 March 1984

1. TITLE OF PROJECT: Study of solar, domestic heat water systems installed in Belgium

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Hot Water Supply System, Solar Water Heater

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

TEST AANKOOP v.z.w.

5. NAME OF PRINCIPAL RESEARCHER:

Dr. A. DE WASCH

6. ADDRESS: Hollandstraat 13
1060 Brussels (Belgium)

7. DURATION OF PROJECT (Give Dates)

1983.10.01 until 1984.09.30

8. FUNDING IN $ U.S.:

US $ 33 182 (1 US $ = 55 BF)

Code No.: B - 4 Date Prepared: 26 March 1984

1. TITLE OF PROJECT: Study of the Solar Domestic Heat Water Systems installed in Belgium

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Hot Water Supply System, Solar Water Heater

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Belgian Building Research Center

5. NAME OF PRINCIPAL RESEARCHER:

J. UYTTENBROECK

6. ADDRESS: Lombardstraat 41
1000 Brussels (Belgium)

7. DURATION OF PROJECT (Give Dates)

1983.10.01 until 1984.09.30

8. FUNDING IN $ U.S.:

US $ 17 298 (1 US $ = 55 BF)

Code No.: B - 5 Date Prepared: 26 March 1984

1. TITLE OF PROJECT: Case Studies on Low Energy Buildings. Solar Applications

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ■ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Air Systems, Evaporative cooling, Flat plate collector

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Katholieke Universiteit te Leuven

5. NAME OF PRINCIPAL RESEARCHER:
Prof. W. DUTRE

6. ADDRESS: KUL - Afdeling Toegepaste Mechanica en Energieconversie
Celestijnenlaan 300 A - 3030 HEVERLEE (Belgium)

7. DURATION OF PROJECT (Give Dates)
1982.09.01 unitl 1986.08.31

8. FUNDING IN $ U.S.:
US $ 266 091 (1 US $ = 55 BF)

Code No.: B - 6 Date Prepared: 26 March 1984

1. TITLE OF PROJECT: Case Studies on Low Energy Buildings : solar applications

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Integrated system/Liquid heating collector/Sensible heat Storage/Testing and evaluation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Centre de Recherches sur l'Energie Solaire

5. NAME OF PRINCIPAL RESEARCHER:
Prof. J. BOUGARD

6. ADDRESS: Service Thermo dynamique
Faculté Polytechnique de Mons
Boulevard Dolez 31 - 7000 Mons (Belgium)

7. DURATION OF PROJECT (Give Dates)
1982.09.01 until 1986.04.30

8. FUNDING IN $ U.S.:
US $ 186 273 (1 US $ = 55 BF)

Code No.: B - 7 Date Prepared: 26 March 1984

1. TITLE OF PROJECT: Application of solar energy for agriculture

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive
■ Drying ■ Greenhouses

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Dehumidifying Cycle, Drying, Greenhouse

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Katholieke Universiteit te Leuven

5. NAME OF PRINCIPAL RESEARCHER:

Prof. W. DUTRE

6. ADDRESS: KUL - Afd. Toegepaste Mechanica en Energieconversie
Celestijnenlaan 300 A - 3030 Heverlee (Belgium)

7. DURATION OF PROJECT (Give Dates)

1982.09.01 until 1985.08.31

8. FUNDING IN $ U.S.:

US $ 153 273 (1 US $ = 55 BF)

Code No.: B - 8 Date Prepared: 26 March 1984

1. TITLE OF PROJECT: Application of solar energy for Agriculture

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive
■ Cooling ■ Desalination

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Desalination, Regrigeration

APPLICATION:

☐ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Centre de Recherches sur l'Energie Solaire

5. NAME OF PRINCIPAL RESEARCHER:

Prof. J. BOUGARD

6. ADDRESS: Faculté Polytechnique de Mons - Service de Thermodynamique
Boulevard Dolez 31 - 7000 Mons

7. DURATION OF PROJECT (Give Dates)

1982.09.01 until 1985.08.31

8. FUNDING IN $ U.S.:

US $ 153 273 (1 US $ = 55 BF)

Code No.: B - 9 Date Prepared: 26 March 1984

1. TITLE OF PROJECT: Application of Solar energy for Agriculture

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive ■ Drying

TYPE OF RESEARCH

☐ Simulation& Modelling, ☒ Experimental, ☒ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Dehumidifying Cycle, Drying

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Centre de Rech. Agronom. de Gembloux

5. NAME OF PRINCIPAL RESEARCHER:

A. PLETINCKX

6. ADDRESS: Station de Génie Rural
Chaussée de Namur 146
5800 Gembloux (Belgium)

7. DURATION OF PROJECT (Give Dates)

1984.01.01 until 1986.08.31

8. FUNDING IN $ U.S.:

US $ 98 909 (1 US $ = 55 BF)

Code No.: B - 10 Date Prepared: 26 March 1984

1. TITLE OF PROJECT: Application of Solar Energy for Agriculture : Solar drying of Tabacco

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive ■ Drying

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Dehumidifying Cycle, Drying

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

TRACTIONEL S.A.

5. NAME OF PRINCIPAL RESEARCHER:

A. LECLERCQ

6. ADDRESS: Rue de la Science 31
1040 Brussels (Belgium)

7. DURATION OF PROJECT (Give Dates)

1983.12.01 until 1984.11.30

8. FUNDING IN $ U.S.:

US $ 175 455 (1 US $ = 55 BF)

Code No.: B - 11 Date Prepared: 20 March 1984

1. TITLE OF PROJECT: Study of sensible heat storage

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Sensible heat storage

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Fondation Universitaire Luxembourgeoise

5. NAME OF PRINCIPAL RESEARCHER:

J.P. PONCELET

6. ADDRESS: Fondation Universitaire Luxembourgeoise
Rue des Deportés 140
6700 Arlon (Belgium)

7. DURATION OF PROJECT (Give Dates)

1982.10.15 until 1986.10.31

8. FUNDING IN $ U.S.:

200 000 US $ (1 US $ = 55 BF)

Code No.: B - 12 Date Prepared: April 19, 1984

1. TITLE OF PROJECT:

Solar Energy - Thermal Conversion

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ■ Durability and Reliability

3. KEYWORDS:

Evacuated Flat Plate Collector

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Studiecentrum Voor Kernenergie

5. NAME OF PRINCIPAL RESEARCHER:

Vandeplas

6. ADDRESS: Studiecentrum Voor Kernenergie
Boeretang 200, B-2400 Mol (Belgium)

7. DURATION OF PROJECT (Give Dates)

Several years

8. FUNDING IN $ U.S.:

US$ 454.545/year (1 US$ = 55 Bf)

4.3 R&D PROJECTS IN DENMARK

Research Laboratories

As can be observed from the attached list of R&D projects in Denmark all but one of the projects are carried out by either the Thermal Insulation Laboratory at the Technical University of Denmark or at the Technological Institute.

Passive Systems

Part of the work is focused on the development of new components, solar walls, hybrid solar walls, thermo-siphon solar water heaters (D1, D2, D3, D4). By the participation in Task III of the International Energy Agency Solar Heating and Cooling Programme a broad range of problem areas of passive and hybrid solar low energy buildings, i.e. from system simulation to the monitoring of demonstration projects.

Active Systems

Active solar heating systems for domestic hot water and heating is still the dominating area of solar research in Denmark. The main emphasis is put on obtaining reliable, cost-effective systems (D7, D10, D11, D12, D15, D16, D17, D18, D19, D21, D22). The development of new or improved components is the aim of six projects (D8, D9, D10, D12, D13, D14) and the rest covers systems development.

Seasonal Storage

The two projects on seasonal storage both deal with aspects of uninsolated large scale warm water stores.

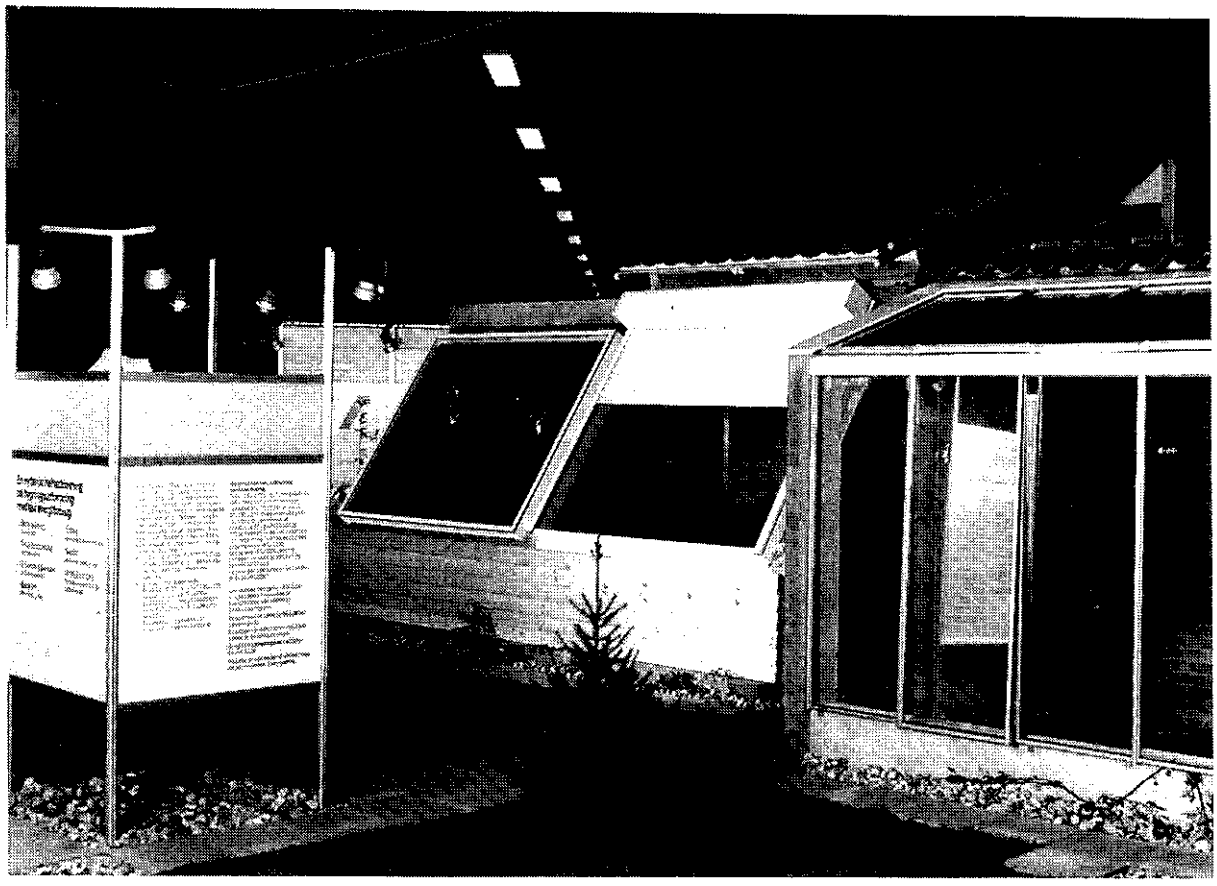


Photo 1. View of the south facade of the Danish Task VIII Solar Low Energy House. (D-6)

SOLAR R&D PROJECTS IN DENMARK
(1983)

PASSIVE AND HYBRID R&D PROJECTS

Code #	Project Title	Research Laboratory
D - 1	Hybrid Solar System	Thermal Insulation Lab.
D - 2	Thermal Siphon Domestic Hot Water System	Thermal Insulation Lab.
D - 3	Hydrofile Collector	Thermal Insulation Lab.
D - 4	Solar Walls	Thermal Insulation Lab.
D - 5	KAB Buildings	Technological Institute
D - 6	IEA Task VIII, Passive & Hybrid Solar Low Energy Buildings	Thermal Insulation Lab.

Code No.: D - 1 Date Prepared: Jan 30, 1984

1. TITLE OF PROJECT: Hybrid solar system	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Hybrid system, phase change materal, intergrated system	APPLICATION: ☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION Thermal Insulation Laboratory	5. NAME OF PRINCIPAL RESEARCHER: Ole Balslev-Olesen
6. ADDRESS: Technical University of Denmark, Building 118, DK-2800 Lyngby	
7. DURATION OF PROJECT (Give Dates) Jan 84 - Jun 84	8. FUNDING IN $ U.S.: 15000

Code No.: D - 2 Date Prepared: Jan 30. 1984

1. TITLE OF PROJECT: Thermal siphon domestic hot water system	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Hot water supply system	APPLICATION: ☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION Thermal Insulation Laboratory	5. NAME OF PRINCIPAL RESEARCHER: Sten Melson
6. ADDRESS: Technical University of Denmark, Building 118, DK-2800 Lyngby	
7. DURATION OF PROJECT (Give Dates) Jan 83 - Dec 84	8. FUNDING IN $ U.S.: 30.000

Code No.: D - 3 Date Prepared: Jan 30. 1984

1. TITLE OF PROJECT: Hydrofile collector	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☒ Experimental, ☐ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ■ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Heat transmission thermal insulation	APPLICATION: ■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION Thermal Insulation Laboratory	5. NAME OF PRINCIPAL RESEARCHER: Lars Olsen
6. ADDRESS: Technical University of Denmark, Building 118, DK-2800 Lyngby	
7. DURATION OF PROJECT (Give Dates) 1/4 - 31/12-84	8. FUNDING IN $ U.S.: 30.000

Code No.: D - 4 Date Prepared: Jan 30. 1984

1. TITLE OF PROJECT: Solar Walls	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☒ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Passive Heating system simulation	APPLICATION: ■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION Thermal Insulation Laboratory	5. NAME OF PRINCIPAL RESEARCHER: Lars Olsen
6. ADDRESS: Technical University of Denmark, Building 118, DK-2800 Lyngby	
7. DURATION OF PROJECT (Give Dates) 1/3 - 1/12-84	8. FUNDING IN $ U.S.: 25.000

Code No.: D - 5 Date Prepared: 30. January 1984

1. TITLE OF PROJECT: KAB BUILDINGS

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Passive heating, Measurement Residential building single family, thermal energy storage materials.

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION: Technological Institute

5. NAME OF PRINCIPAL RESEARCHER: Erwin Petersen

6. ADDRESS: Department of Energy Technology, DK-2630 Taastrup, Denmark

7. DURATION OF PROJECT (Give Dates): 1983-1-1 - 1985-1-1

8. FUNDING IN $ U.S.: 10.000

Code No.: D - 6 Date Prepared: 30 jan, 84

1. TITLE OF PROJECT: IEA Task VIII, Passive & Hybrid Solar Low Energy Buildings

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☒ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Hybrid Systems, Integrated System, Passive heating, system simulation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION: Thermal Insulation Lab.

5. NAME OF PRINCIPAL RESEARCHER: Ove Jørgensen

6. ADDRESS: Technical University of Denmark, Building 118, DK-2800 Lyngby

7. DURATION OF PROJECT (Give Dates): Jan 1982 - Dec 1986

8. FUNDING IN $ U.S.: 45000/year

SOLAR R&D PROJECTS IN DENMARK

(1983)

ACTIVE R&D PROJECTS

Code #	Project Title	Research Laboratory
D - 7	Measurements and Evaluation of Existing Solar Energy Systems	Thermal Insulation Lab.
D - 8	Chemical Heatpump	Thermal Insulation Lab.
D - 9	Combined Storage/Collector Unit	Thermal Insulation Lab.
D - 10	Solar Collector Construction	Thermal Insulation Lab.
D - 11	Solar Energy in New Building	Thermal Insulation Lab.
D - 12	Collector Construction Handbook	Thermal Insulation Lab.
D - 13	Solar Air System	Thermal Insulation Lab.
D - 14	Thermal Heat Storage for Solar Heating System for Domestic Hot Water Supply	Thermal Insulation Lab.
D - 15	Solar Hot Water Systems in Large Buildings	Birch & Krogboe
D - 16	Durability of Absorber Coatings	The Technological Institute
D - 17	Test Facility for Solar Plants - DHW	The Technological Institute
D - 18	Durability of Solar Collectors	The Technological Institute
D - 19	Optimization of Solar Heating Plants	The Technological Institute
D - 20	Solar Heat in Combination with Other Energy Sources	The Technological Institute
D - 21	Solar Heating Plants in Public Buildings, Demonstration	The Technological Institute
D - 22	Demonstration Plant at Old People's Home	The Technological Institute
D - 23	Combined Solar Heating System	Thermal Insulation Lab.
D - 24	Seasonal Heat Storage in Underground Warm Water Pit (Design of 30-50,000 m^3 Storage)	Thermal Insulation Lab.
D - 25	Seasonal Heat Storage in Underground Warm Water Stores	Thermal Insulation Lab.

Code No.: D - 7

Date Prepared: jan 30, 1984

1. TITLE OF PROJECT: Measurements and evaluation of existing solar energy systems

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Testing and evaluation system analysis, measurement

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Thermal Insulation Laboratory

5. NAME OF PRINCIPAL RESEARCHER:

Svend Erik Mikkelsen

6. ADDRESS:

Technical University of Denmark, Building 118, DK-2800 Lyngby

7. DURATION OF PROJECT (Give Dates)

Jan 84 - Dec 84

8. FUNDING IN $ U.S.:

25000

Code No.: D - 8

Date Prepared: Jan 30. 1984

1. TITLE OF PROJECT: Chemical heatpump

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Chemical heat pump
thermal energy storage material

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Thermal Insulation Laboraty

5. NAME OF PRINCIPAL RESEARCHER:

Otto Dyrnum

6. ADDRESS:

Technical University of Denmark, Building 118, DK-2800 Lyngby

7. DURATION OF PROJECT (Give Dates)

Jan 84 - Jun 84

8. FUNDING IN $ U.S.:

25000

Code No.: D - 9 Date Prepared: Jan 30. 1984

1. TITLE OF PROJECT: Combined storage/collector unit	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Integrated system	APPLICATION: ☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION Thermal Insulation Laboratory	5. NAME OF PRINCIPAL RESEARCHER: Simon Furbo
6. ADDRESS: Technical University of Denmark, Building 118, DK-2800 Lyngby	
7. DURATION OF PROJECT (Give Dates) Jan 84 - Jun 84	8. FUNDING IN $ U.S.: 17.500

Code No.: D - 10 Date Prepared: Jan 30. 1984

1. TITLE OF PROJECT: Solar collector construction	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS: durability, flat plate collector	APPLICATION: ☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION Thermal Insulation Laboratory	5. NAME OF PRINCIPAL RESEARCHER: Peder Vejsig Pedersen
6. ADDRESS: Technical University of Denmark, Building 118, DK-2800 Lyngby	
7. DURATION OF PROJECT (Give Dates) Jan 84 - Dec 84	8. FUNDING IN $ U.S.: 17500

Code No.: D - 11 Date Prepared: Jan 30. 1984

1. TITLE OF PROJECT: Solar energy in new building

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation ■ Other

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Roof structure, integrated systems

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Thermal Insulation Laboratory

5. NAME OF PRINCIPAL RESEARCHER:

Ole Balslev-Olesen

6. ADDRESS:

Technical University of Denmark, Building 118, DK-2800 Lyngby

7. DURATION OF PROJECT (Give Dates)

Jan 84 - Nov 84

8. FUNDING IN $ U.S.:

17.500

Code No.: D - 12 Date Prepared: Jan 30. 1984

1. TITLE OF PROJECT: Collector construction handbook

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation ■ Other

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Flat plate collector, durability

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Thermal Insulation Laboratory

5. NAME OF PRINCIPAL RESEARCHER:

Søren Ø. Jensen

6. ADDRESS:

Technical University of Denmark, Building 118, DK-2800 Lyngby.

7. DURATION OF PROJECT (Give Dates)

May 84 - Dec 84

8. FUNDING IN $ U.S.:

10.000

Code No.: D - 13 Date Prepared: Jan 30. 1984

1. TITLE OF PROJECT: Solar air system	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ■ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Airheating, pebble bed stratification	APPLICATION: ■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION Thermal Insulation Laboratory	5. NAME OF PRINCIPAL RESEARCHER: Ole Balslev-Olesen
6. ADDRESS: Technical University of Denmark, Building 118, DK-2800 Lyngby	
7. DURATION OF PROJECT (Give Dates) Jan 83 - July 84	8. FUNDING IN $ U.S.: 20.000

Code No.: D - 14 Date Prepared: Jan 30. 1984

1. TITLE OF PROJECT: Thermal Heat Storage for Solar Heating System for domestic hot water supply.	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ■ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Heat of fusion, hot water storages, stratification	APPLICATION: ■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION Thermal Insulation Laboratory	5. NAME OF PRINCIPAL RESEARCHER: Simon Furbo
6. ADDRESS: Technical University of Denmark, Building 118, DK-2800 Lyngby	
7. DURATION OF PROJECT (Give Dates) Jan 82 - Dec 84	8. FUNDING IN $ U.S.: 40.000

Code No.: D - 15

Date Prepared: Jan 30 1984

1. TITLE OF PROJECT:
Solar hot water systems in large buildings

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
DHW

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Birch & Krogboe

5. NAME OF PRINCIPAL RESEARCHER:
Jørgen S.R. Nielsen

6. ADDRESS:
Teknikerbyen 34, 2830 Virum

7. DURATION OF PROJECT (Give Dates)
Jan 1.1984 - April 1985

8. FUNDING IN $ U.S.:
230.000

Code No.: D - 16

Date Prepared:

1. TITLE OF PROJECT:
Durability of absorber coatings

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☒ Durability and Reliability

3. KEYWORDS:
Durability

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
The Technological Institute

5. NAME OF PRINCIPAL RESEARCHER:
Per Engkjær

6. ADDRESS:
Surface Coating Technology, Gregersensvej, 2630 Taastrup, Denmark

7. DURATION OF PROJECT (Give Dates)
1 January 1983 - 31 December 1985

8. FUNDING IN $ U.S.:
10,000

Code No.: D - 17 Date Prepared:

1. TITLE OF PROJECT:
Test facility for solar plants - DHW

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☒ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
System analysis

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
The Technological Institute

5. NAME OF PRINCIPAL RESEARCHER:
Per Engkjær

6. ADDRESS:
Department of Energy Technology, Gregersensvej, 2630 Taastrup, Denmark

7. DURATION OF PROJECT (Give Dates)
1 January 1980 - 1 January 1986

8. FUNDING IN $ U.S.:
50,000

Code No.: D - 18 Date Prepared:

1. TITLE OF PROJECT:
Durability of solar collectors

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ■ Durability and Reliability

3. KEYWORDS:
Durability
Outdoor exposure test

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
The Technological Institute

5. NAME OF PRINCIPAL RESEARCHER:
Per Engkjær

6. ADDRESS:
Department of Energy Technology, Gregersensvej, 2630 Taastrup,Denmark

7. DURATION OF PROJECT (Give Dates)
1 Aug 1981 - 1 Aug 1984

8. FUNDING IN $ U.S.:
10,000

Code No.: D - 19

Date Prepared: 30 January 1984

1. TITLE OF PROJECT: Optimization of solar heating plants

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Economics
Payback period
Performance

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Technological Institute

5. NAME OF PRINCIPAL RESEARCHER:

Mads Lange

6. ADDRESS:

Department of Energy Technology, DK 2630 Taastrup, Denmark

7. DURATION OF PROJECT (Give Dates)

Ultimo 1984

8. FUNDING IN $ U.S.:

10,000

Code No.: D - 20

Date Prepared: 30 January, 1984

1. TITLE OF PROJECT: Solar heat in combination with other energy sources

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

District heating
Heat pump
Seasonal storage

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Technological Institute

5. NAME OF PRINCIPAL RESEARCHER:

Mads Lange

6. ADDRESS:

Department of Energy Technology, DK-2630 Taastrup, Denmark

7. DURATION OF PROJECT (Give Dates)

Medio 1983 - ultimo 1984

8. FUNDING IN $ U.S.:

30,000

Code No.: D - 21

Date Prepared: 30 January, 1984

1. TITLE OF PROJECT: Solar heating plants in public buildings, demonstration	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Commercial building, hospital. Office building, sports facilities and others	APPLICATION: ☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION Technological Institute	5. NAME OF PRINCIPAL RESEARCHER: Mads Lange
6. ADDRESS: Department of Energy Technology, DK-2630 Taastrup, Denmark	
7. DURATION OF PROJECT (Give Dates) Medio 1983 to ultimo 1985	8. FUNDING IN $ U.S.: 40,000

Code No.: D - 22

Date Prepared: 30 January, 1984

1. TITLE OF PROJECT: Demonstration plant at old people's home	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Hot water supply system Control system Heat loss	APPLICATION: ☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION Technological Institute	5. NAME OF PRINCIPAL RESEARCHER: Mads Lange
6. ADDRESS: Department of Energy Technology, DK-2630 Taastrup, Denmark	
7. DURATION OF PROJECT (Give Dates) October 1983 - January 1985	8. FUNDING IN $ U.S.: 40,000

Code No.: D - 23 Date Prepared: Jan 30. 1984

1. TITLE OF PROJECT: Combined solar heating system

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Optimization, flat plate collector

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Thermal Insulation Laboratory

5. NAME OF PRINCIPAL RESEARCHER:

Nick B. Andersen

6. ADDRESS:

Technical University of Denmark, Building 118, DK-2800 Lyngby

7. DURATION OF PROJECT (Give Dates)

Jan 84 - Dec 84

8. FUNDING IN $ U.S.:

50.000

Code No.: D - 24 Date Prepared: Jan. 30, 1984

1. TITLE OF PROJECT: Seasonal Heat Storage in Underground Warm Water Pit (Design of 30-50.000 m^3 Storage)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☒ Component Development, ■ Durability and Reliability

3. KEYWORDS:

Underground heat storage
Seasonal storage

APPLICATION:

■ Solar Heating, ☒ Solar Cooling, ☐ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION

Thermal Insulation Laboratory

5. NAME OF PRINCIPAL RESEARCHER:

Vagn Ussing

6. ADDRESS: Technical University of Denmark
Building 118, 2800 Lyngby

7. DURATION OF PROJECT (Give Dates)

Jan. 1, 1982-Febr. 29, 1984

8. FUNDING IN $ U.S.:

160.000 $

Code No.: D - 25

Date Prepared: Jan. 30, 1984

1. TITLE OF PROJECT: Seasonal Heat Storage in Underground Warm Water Stores

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☒ Component Development, ■ Durability and Reliability

3. KEYWORDS:

Heat loss, System simulation
Seasonal storage
Underground heat storage

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION

Thermal Insulation Laboratory

5. NAME OF PRINCIPAL RESEARCHER:

Vagn Ussing

6. ADDRESS: Technical University of Denmark
Building 118, 2800 Lyngby

7. DURATION OF PROJECT (Give Dates)

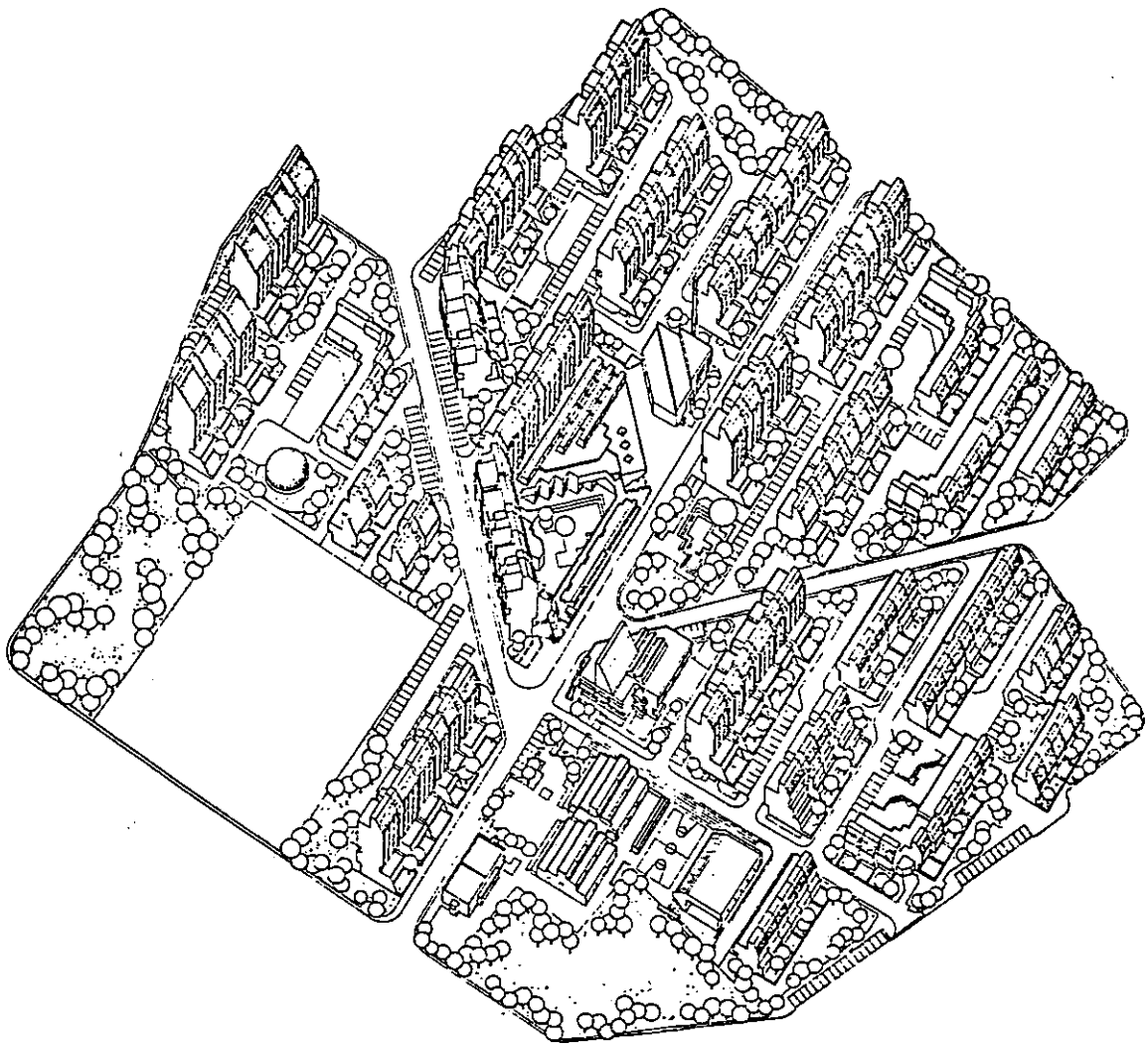
Nov. 1, 1982-June 30, 1983

8. FUNDING IN $ U.S.:

100.000 $

4.4 SURVEY OF SYSTEMS AND COMPONENTS R&D FOR SOLAR HEATING, COOLING AND INDUSTRIAL PROCESS HEAT SYSTEMS IN GREECE

According to the five-year national programme, the solar energy research and development has an important role to play. For the moment the following projects are under application or active.



Solar Village in Lykovrissi (G - 1)

47 buildings with total number of 500 flats have already designed for passive heating.

Marathon passive solar house (G - 2)

South and east faces

SOLAR R&D PROJECTS IN GREECE

PASSIVE AND HYBRID R&D PROJECTS

CODE #	PROJECT TITLE	RESEARCH LABORATORY
G - 1	Solar Village in Lykovrissi	Ministry of Res. and Technology Ministry of Labor
G - 2	Marathon Passive Solar House - Direct Gain -	Vassilis Bouriotis Architecte DPLG
G - 3	Sofianos Residence - Direct Gain and Greenhouse	Meletitiki Co. Ltd.

Code No.: G - 1 Date Prepared:

1. TITLE OF PROJECT: SOLAR VILLAGE IN LYKOVRISSI

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation
☐ DEMONSTRATION

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

ENERGY BALANCE, ECONOMICS

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
MINISTRY OF RES. AND TECHNOLOGY
MINISTRY OF LABOR

5. NAME OF PRINCIPAL RESEARCHER: GREEK-GERMAN , BILATERAL TEAM

6. ADDRESS: ERMOU STREET 2, ATHENS 10563, GREECE

7. DURATION OF PROJECT (Give Dates)
3 years 1.8.84 - 1.8.87

8. FUNDING IN $ U.S.:
30,000,000

Code No.: G - 2 Date Prepared: 2.24.1984

1. TITLE OF PROJECT:
Marathon Passive solar house - Direct Gain -

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

passive heating, economics

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Vassilis Bouriotis Architecte DPLG

5. NAME OF PRINCIPAL RESEARCHER:
Vassilis Bouriotis

6. ADDRESS:
35, rue Notara ATHENS 148 Grece

7. DURATION OF PROJECT (Give Dates)
1983

8. FUNDING IN $ U.S.:

Code No.: G - 3

Date Prepared: 3.13. 1984

1. TITLE OF PROJECT:
Sofianos Residence - Direct Gain and Greenhouse

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Direct gain, greenhouse

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Meletitiki Co. Ltd.

5. NAME OF PRINCIPAL RESEARCHER:
Alexandros N. Tombazis

6. ADDRESS:
1, Aristodemou str., Athens 140 Greece

7. DURATION OF PROJECT (Give Dates)
1983

8. FUNDING IN $ U.S.:

SOLAR R&D IN GREECE

ACTIVE R&D PROJECTS

CODE #	PROJECT TITLE	RESEARCH LABORATORY
G - 4	Heat Pipe and Production of Cooling Using a Thermocompressor (Ejector)	G.A.E.C./N.R.C. Demokritos
G - 5	Flat Plate Collector Test Facility	Greek Atomic Energy Commission Nuclear Res. Center Demokritos
G - 6	Flat Plate Collector Test Facility	Dimocrition Univ. of Thrace
G - 7	Heating Air Cooling Through Inter-seasonal Storage in the Ground	Univ. of Ioannina

Code No.: G - 4 Date Prepared: 4.1.1984

1. TITLE OF PROJECT: HEAT PIPE AND PRODUCTION OF COOLING USING A THERMOCOMPRESSOR (EJECTOR)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ■ Component Development, ■ Durability and Reliability

3. KEYWORDS:

HEAT PIPE AND REFRIGERATION

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

G.A.E.C./N.R.C. DEMOKRITOS

5. NAME OF PRINCIPAL RESEARCHER:

A.V. SPYRIDONOS

6. ADDRESS: AGHIA PARASKEVI ATTIKIS, GREECE GR 153

7. DURATION OF PROJECT (Give Dates)

TWO YEARS

8. FUNDING IN $ U.S.:

3000

Code No.: G - 5 Date Prepared: 4.1.1984

1. TITLE OF PROJECT: FLAT PLATE COLLECTOR TEST FACILITY

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

TESTING AND EVALUATION

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

GREEK ATOMIC ENERGY COMMISSION
NUCLEAR RES. CENTER DEMOKRITOS

5. NAME OF PRINCIPAL RESEARCHER:

PETROS ANDRONIKOS

6. ADDRESS: AGHIA PARASKEVI, ATTIKI, GREECE GR 153

7. DURATION OF PROJECT (Give Dates)

8. FUNDING IN $ U.S.:

Code No.: G - 6 Date Prepared: 4.1.1984

1. TITLE OF PROJECT: FLAT PLATE COLLECTOR TEST FACILITY

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

TESTING AND EVALUATION

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ■ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION

DIMOCRITION UNIV. OF THRACE

5. NAME OF PRINCIPAL RESEARCHER:

PROF. GEORGE VACHTSEVANOS

6. ADDRESS: THRACE UNIVERSITY, XANTHI GR 67100, GREECE

7. DURATION OF PROJECT (Give Dates)

8. FUNDING IN $ U.S.:

Code No.: G - 7 Date Prepared:

1. TITLE OF PROJECT: HEATING AIR COOLING THROUGH INTERSEASONAL STORAGE IN THE GROUND

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

UNDERGROUND HEAT STORAGE

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

UNIV. OF IOANNINA

5. NAME OF PRINCIPAL RESEARCHER:

F. TRIANTIS

6. ADDRESS:

IOANNINA, GREECE

7. DURATION OF PROJECT (Give Dates)

2 YEARS

8. FUNDING IN $ U.S.:

4.5 SUMMARY OF JAPANESE SOLAR HEATING AND COOLING RD&D PROGRAMS

ORGANIZATION

The Sunshine Project Promotion Headquarters, AIST, MITI is responsible for R&D on active solar heating and cooling systems as well as on solar industrial process heat systems. The passive solar systems and components R&D is subsidized by the Housing Industry Division on MITI.

Active SHC System

The first generation R&D on active solar heating and cooling systems have terminated by 1980 (as 7 year program since 1974). Basic studies on materials and components as well as testing procedures both on component and systems are still being pursued after 1980, while commercialization efforts are vigorously concentrated by the industry.

R&D and D works on solar industrial process heat and long term heat storage have been the main topics in the second step projects (1980 - 1985) in the active solar heating and cooling program. The cascading temperature SIPH system is studied by a textile dyeing model, and the other SIPH system project is on the agricultural warehouse model. The long term heat storage projects are subdivided into underground heat storage program and also chemical reaction heat storage program by metal hydrides.

PASSIVE AND HYBRID SYSTEMS

R&D Projects on passive and hybrid systems as well as materials and components have been inaugurated since 1980 as for the five year program in which eleven private sectors are being funded. System analysis and components research are the main topics in these projects. Another 6 year program on passive system is also funded by the Ministry of Education to 7 - 19 universities since 1980 for system analysis studies.

FUNDING

FY(M yen)

	1983	1984
Active solar	1,270	706
Passive solar	385	242
Total	1,655	948

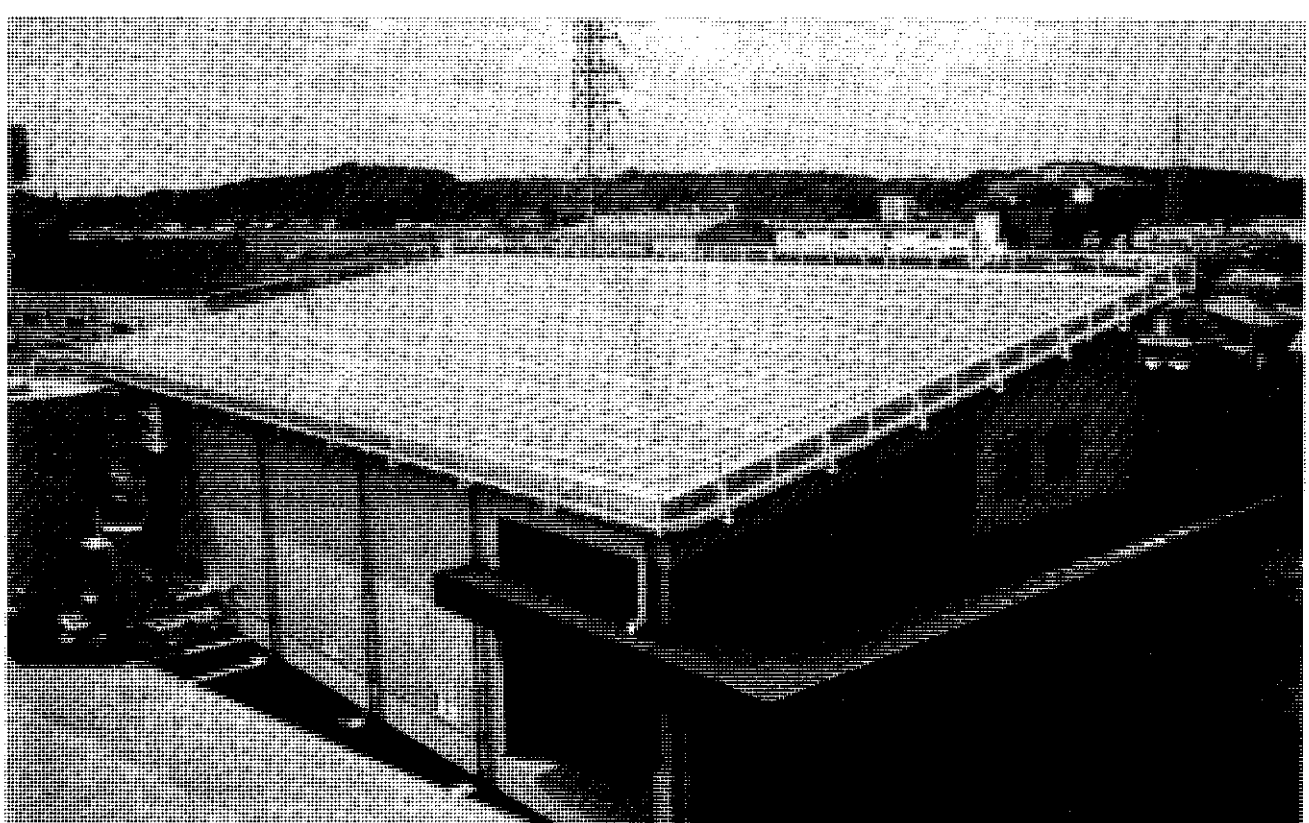


Photo 1. Agricultural Warehouse (SIPH) in Miyazaki. (J-40)
Solar collector of 682 m^2 and Water storage tank
of 75 m^3 with absorption chiller 32,000 Kcal/h.

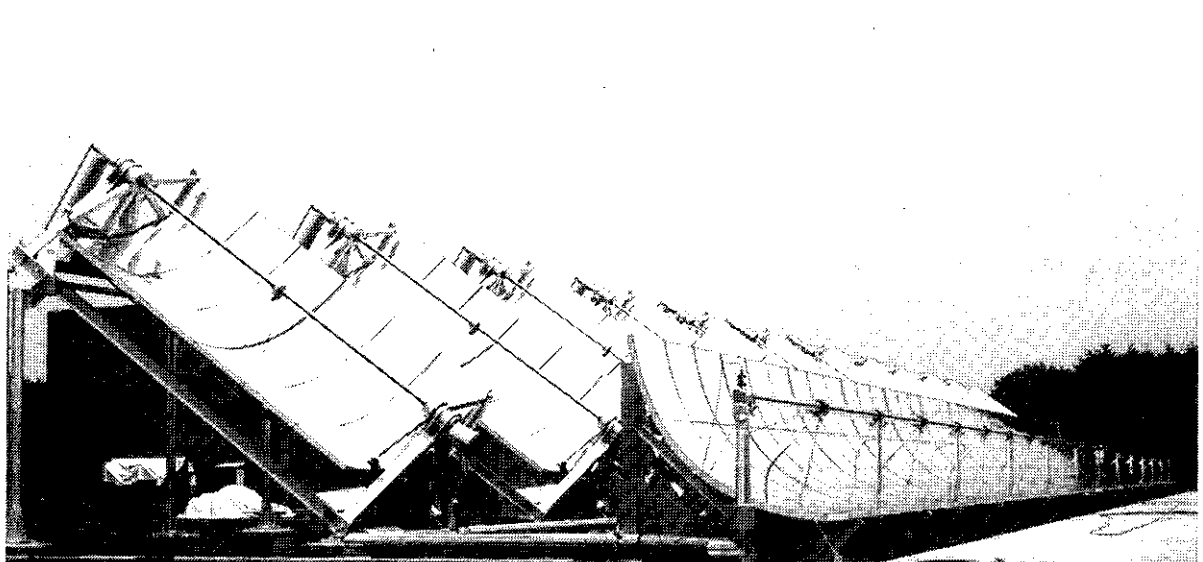


Photo 2. SIPH and power generation system at Tsukuba. (J53 - J55)
(45 KW thermal + 15 KW electric)

SOLAR R&D PROJECTS IN JAPAN

(1983)

PASSIVE AND HYBRID R&D PROJECTS

Code #	Project Title	Research Laboratory
J - 1	R&D on Passive Solar House (1) Basic research	The Institute of Applied Energy
J - 2	R&D on Passive Solar House (2) Construction & operation experimental passive solar house (I)	Daiwa House Industry, Co., Ltd.
J - 3	R&D on Passive Solar House (2) Construction & operation experimental passive solar house (II)	Matsushita Electric Work, Ltd.
J - 4	R&D on Passive Solar House (2) Construction & operation experimental passive solar house (III)	Toshiba House Industry, Ltd.
J - 5	R&D on Passive Solar House (3) Development of simulation programme	Matsushita Electric Work, Ltd.
J - 6	R&D on Passive Solar House (4) Evaluation of thermal effect on residents	Research Institute of Labour Science
J - 7	R&D on Passive Solar House (5) Development of passive solar system component	Daiwa House Industry, Ltd.
J - 8	R&D on Passive Solar House (6) Development of air circulation type passive solar system	Toshiba House Industry, Ltd.
J - 9	R&D on Passive Solar House (7) Development of latent thermal storage materials	Sekisui Chemical Industry, Ltd.
J - 10	R&D on Passive Solar House (8) Development of heat transfer materials	Shouwa Aluminium, Ltd.
J - 11	R&D on Passive Solar House (9) Development of solar thermal dehumidifying system	Sharp, Ltd.
J - 12	Evaluation of Energy Performance of Passive Solar Systems	Dept. of Architecture, Faculty of Engineering, Tohoku University

Code #	Project Title	Research Laboratory
J - 13	Optimum Temperature Profile to be Established by Natural Convection in a Passive Solar Room	Okayama University
J - 14	Utilization of the Day Light for the Indoor Illumination by a Rectangular Duct which Induces the Sky Light	Kanazawa Institute of Technology
J - 15	Effects of the Sun on the Natural Temperature of the House	Architectural Department, Hokkaido University
J - 16	Reduction of Artificial Energy in Housing Environment Control by Utilizing Natural Energy	Research Institute of Industrial Science, Kyushu University
J - 17	Solar Control by Plants around Buildings and its Energy Conservation Effects	Kyushu University
J - 18	Passive Cooling System by Utilizing Water Evaporation and Atmospheric Radiation	Section of Environmental Engineering, Dept. of Arch., Faculty of Engineering, Kyushu University

Code No.: J - 1

Date Prepared: Jan. 28, 1984

1. TITLE OF PROJECT:
R&D on Passive Solar House (1) Basic Research

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Data aquisition system, Measurement, Passive heating, Passive cooling

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
The Institute of Applied Energy

5. NAME OF PRINCIPAL RESEARCHER:
Yoriyasu ANDO

6. ADDRESS:
Toshin Building, 1-1-13 Shinbashi, Minato-ku, Tokyo 105 Japan

7. DURATION OF PROJECT (Give Dates)
1980FY - 1984FY

8. FUNDING IN $ U.S.:
38,000 US$ (1983FY)

Code No.: J - 2

Date Prepared: Jan. 28, 1984

1. TITLE OF PROJECT: R&D on Passive Solar House (2) Construction & operation of experimental passive solar house (I)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Passive heating, Passive cooling, Single family, Performance, Measurement

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Daiwa House Industry, Co., Ltd.

5. NAME OF PRINCIPAL RESEARCHER:
Yasuhiko KABAYASHI

6. ADDRESS:
4-2-2 Nishi-Kujou, Nara Japan

7. DURATION OF PROJECT (Give Dates)
1983FY - 1984FY

8. FUNDING IN $ U.S.:
a part of 810,000 US$ (1983FY)

Code No.: J - 3 Date Prepared: Jan. 28, 1984

1. TITLE OF PROJECT: R&D on Passive Solar House (2) Construction & operation of experimental passive solar house (II)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Passive heating, Passive cooling, Single family, Performance, Measurement

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Matsushita Electric Works, Ltd.

5. NAME OF PRINCIPAL RESEARCHER:

Tadao NAKAMURA

6. ADDRESS: 3-10-1 Higashi-Mita, Tama-ku, Kawasaki, Kanagawa Pref. Japan

7. DURATION OF PROJECT (Give Dates)

1983FY - 1984FY

8. FUNDING IN S U.S.:

a part of 810,000 US$ (1983FY)

Code No.: J - 4 Date Prepared: Jan. 28, 1984

1. TITLE OF PROJECT: R&D on Passive Solar House (2) Construction & operation of experimental passive solar house (III)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Passive heating, Passive cooling, Single family, Performance, Measurement

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Toshiba House Industry, Ltd.

5. NAME OF PRINCIPAL RESEARCHER:

T. KOIZUMI

6. ADDRESS: Shufu-no-Tomo Building No.2
1-6 Kanda-Surugadai, Shiyoda-ku Tokyo Japan

7. DURATION OF PROJECT (Give Dates)

1983FY - 1984FY

8. FUNDING IN S U.S.:

a part of 810,000 US$ (1983FY)

Code No.: J - 5 Date Prepared: Jan. 28, 1984

1. TITLE OF PROJECT: R&D on Passive Solar House
(3) Development of simulation programme

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Passive heating, Passive cooling, System simulation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Matsushita Electric Works, Ltd.

5. NAME OF PRINCIPAL RESEARCHER:

Tadao NAKAMURA

6. ADDRESS: 3-10-1 Higashimita, Tama-ku, Kawasaki, Kanagawa Pref. Japan

7. DURATION OF PROJECT (Give Dates)

1983FY - 1984FY

8. FUNDING IN $ U.S.:

170,000 US$ (1983FY)

Code No.: J - 6 Date Prepared: Jan. 28, 1983

1. TITLE OF PROJECT: R&D on Passive Solar House
(4) Evaluation of thermal effect on residents

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: simulation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Research Institute of Labour Science

5. NAME OF PRINCIPAL RESEARCHER:

Toyohiko MIURA

6. ADDRESS: 1544 Sugao, Miyamae-ku, Kawasaki, Kanagawa Pref. Japan

7. DURATION OF PROJECT (Give Dates)

1980FY - 1984FY

8. FUNDING IN $ U.S.:

41,000 US$ (1983FY)

Code No.: J - 7 Date Prepared: Jan. 28, 1984

1. TITLE OF PROJECT: R&D on Passive Solar House
(5) Development of passive solar system component

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit
Window materials

TYPE OF RESEARCH

■ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Latent heat storage, Reflecting mirror, Selective absorber, Solar insolation, Sensible heat storage

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Daiwa House Industry, Ltd.

5. NAME OF PRINCIPAL RESEARCHER:

Yasuhiko KOBAYASHI

6. ADDRESS:
4-2-2 Nishi-Kuhou-machi, Nara Japan

7. DURATION OF PROJECT (Give Dates)

1980FY - 1984FY

8. FUNDING IN $ U.S.:

100,000 US$ (1983FY)

Code No.: J - 8 Date Prepared: Jan. 28, 1984

1. TITLE OF PROJECT: R&D on Passive Solar House
(6) Development of air circulation type passive solar system

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Air system

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Toshiba House Industry, Ltd.

5. NAME OF PRINCIPAL RESEARCHER:

T. KOIZUMI

6. ADDRESS: Shufu-no-Tomo Building No.2
1-6 Kanda-Surugadai, Chiyoda-ku, Tokyo Japan

7. DURATION OF PROJECT (Give Dates)

1980FY - 1984FY

8. FUNDING IN $ U.S.:

13,000 US$ (1983FY)

Code No.: J - 9 Date Prepared: Jan. 28, 1984

1. TITLE OF PROJECT: R&D on Passive Solar House
(7) Development of latent thermal storage materials

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Latent heat storage, Phase change material, Seasonal storage

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Sekisui Chemical Industry, Ltd.

5. NAME OF PRINCIPAL RESEARCHER:

Kozo KANAMORI

6. ADDRESS: 2-1 Momoyama, Shimamoto-cho, Mishima-gun, Osaka Pref. Japan

7. DURATION OF PROJECT (Give Dates)

1980FY - 1984FY

8. FUNDING IN $ U.S.:

60,000 US$ (1983FY)

Code No.: J - 10 Date Prepared: Jan. 28, 1984

1. TITLE OF PROJECT: R&D on Passive Solar House
(8) Development of heat transfer materials

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ■ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Heat transfer, Heat pipe, Phase change material

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Shouwa Aluminium, Ltd.

5. NAME OF PRINCIPAL RESEARCHER:

S. MURAMOTO

6. ADDRESS: 480 Inuzuka, Oyama, Tochigi Pref. Japan

7. DURATION OF PROJECT (Give Dates)

1983FY - 1984FY

8. FUNDING IN $ U.S.:

38,000 US$ (1983FY)

Code No.: J - 11 Date Prepared: Jan. 28, 1984

1. TITLE OF PROJECT: R&D on Passive Solar House
(9) Development of solar thermal dehumidifying system

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ■ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Dehumidifying cycle, Heat exchanger

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Sharp, Ltd.

5. NAME OF PRINCIPAL RESEARCHER:

Kenji MATSUKI

6. ADDRESS:

282-1 Shinjo-cho, Kitakatsuragi-gun, Nara Pref. Japan

7. DURATION OF PROJECT (Give Dates)

1980FY - 1984FY

8. FUNDING IN $ U.S.:

11,000 US$ (1983FY)

Code No.: J - 12 Date Prepared: Jan. 23, 1984

1. TITLE OF PROJECT: Evaluation of Energy Performance of Passive Solar Systems

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Heat transfer, Passive heating, Passive cooling, Performance, Residential building, Sensible heat storage, Testing and evaluation, Thermal insulation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Department of Architecture, Faculty of Engineering, Tohoku University

5. NAME OF PRINCIPAL RESEARCHER:

Fusao Hasegawa

6. ADDRESS:

Aramaki, Sendai, 980, Japan

7. DURATION OF PROJECT (Give Dates)

1980.4 ~ 1984.3

8. FUNDING IN $ U.S.:

40,000 US$

Code No.: J - 13 Date Prepared: Jan. 17, 1984

1. TITLE OF PROJECT: Optimum temperature profile to be established by natural convection in a passive solar room

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

flat plate collector, heat transfer, honeycomb collector, passive heating

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Okayama University

5. NAME OF PRINCIPAL RESEARCHER:

Hiroyuki OZOE

6. ADDRESS:

School of Engineering, Okayama University, Okayama 700 Japan

7. DURATION OF PROJECT (Give Dates)

April 1983 March 1984

8. FUNDING IN $ U.S.:

$9700/year

Code No.: J - 14 Date Prepared: Jan. 23, 1984

1. TITLE OF PROJECT: Utilization of the Day Light for the indoor Illumination by a Rectangular Duct which Induces the Sky Light

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit Light Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Day Lighting,
Energy balance,
Reflecting mirror

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat Natural Lighting

4. NAME OF ORGANIZATION

Kanazawa Institute of Technology

5. NAME OF PRINCIPAL RESEARCHER:

Akio NAKATANI

6. ADDRESS:

7-1 Ōgigaoka, Nonoichi-cho, Ishikawa Pref. 921 Japan

7. DURATION OF PROJECT (Give Dates)

April 1, 1982 - March 31, 1984

8. FUNDING IN $ U.S.:

8,500 US$

Code No.: J - 15 Date Prepared: Feb. 1, 1984

1. TITLE OF PROJECT: Effects of the Sun on the Natural Temperature of the House

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit
Window,Insulation,Thermal mass,Ventilation

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
Architectural Synthesis

3. KEYWORDS: Passive heating, Passive cooling, System simulation, Thermal insulation, Waste heat recovery

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
Natural Cooling and Heating

4. NAME OF ORGANIZATION: Architectural Department, Hokkaido Univ.

5. NAME OF PRINCIPAL RESEARCHER: Noboru Aratani

6. ADDRESS: North 13, West 8, Kitaku, Sapporo, 060 Japan

7. DURATION OF PROJECT (Give Dates): Continuous Project

8. FUNDING IN $ U.S.:

Code No.: J - 16 Date Prepared: Feb. 1, 1984

1. TITLE OF PROJECT: Reduction of artifical energy in housing environment control by utilizing natural energy

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: passive cooling, natural ventilation, housing environment control

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION: Research Institute of Industrial Science, Kyushu University.

5. NAME OF PRINCIPAL RESEARCHER: Tetsu, FUJII

6. ADDRESS: Kasuga-shi, 816, JAPAN

7. DURATION OF PROJECT (Give Dates): 1983.4.1 - 1984.3.31

8. FUNDING IN $ U.S.: 7,200$U.S.

Code No.: J - 17 Date Prepared: Jan. 23, 1984

1. TITLE OF PROJECT: Solar Control by Plants Around Buildings and Its Energy Conservation Effects

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Solar control, Thermal comfort, Rooftop planting layer, Ivy Sunscreen, Row of evergreens, Heating and cooling load, Planting, ...

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Kyushu University

5. NAME OF PRINCIPAL RESEARCHER:

Dr. Akira HOYANO

6. ADDRESS: Specializing in Thermal Energy System, Division of Engineering, Kyushu University 36 Kigashi-ku, Fukuoka 812 Japan

7. DURATION OF PROJECT (Give Dates)

1979 -

8. FUNDING IN $ U.S.:

about 5,000 US$/year

Code No.: J - 18 Date Prepared: Feb. 7, 1984

1. TITLE OF PROJECT: Passive Cooling System by Utilizing Water Evaporation and Atmospheric Radiation

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

Walls and Roof Enhanced in Evaporative/ Radiative Cooling

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Passive cooling, Evaporative and radiative cooling, Thermal insulation, Outdoor exposure test, Test and evaluation

APPLICATION:

☐ Solar Heating, ☒ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Section of Environmental Engineering, Dep. of Arch., Fac. of Eng., Kyushu Univ.

5. NAME OF PRINCIPAL RESEARCHER:

Dr. Yoshimi URANO, Professor

6. ADDRESS:

6-10-1 Hakozaki, Higashi-ku, Fukuoka 812 Japan

7. DURATION OF PROJECT (Give Dates)

1980 - 1984

8. FUNDING IN $ U.S.:

about 9,000 US$/year

SOLAR R&D PROJECTS IN JAPAN

(1983)

ACTIVE R&D PROJECTS

Code #	Project Title	Research Laboratory
J - 19	Establishment of Durability and Reliability Testing Method (a) The laboratory simplified method to evaluate degradation of η_0 value & heat loss coefficient of Evacuated Tubular Collector	Solar Research Laboratory, G.I.R.I, Nagoya, AIST, MITI
J - 20	The Establishment of the Testing of the Solar Collector (b) The method to evaluate the thermal characteristics of Solar Collector	Solar Research Laboratory, G.I.R.I, Nagoya, AIST, MITI
J - 21	Basic Research on Solar Collector Materials (a) R&D on methodology of evaluation of selective absorption (i) Determination of optical refractive index by elipsometry	Solar Research Laboratory, G.I.R.I, Nagoya, AIST, MITI
J - 22	Basic Research on Solar Collector Materials (a) R&D on methodology of evaluation of selective absorption (ii) The simplified evaluation method	Solar Research Laboratory, G.I.R.I, Nagoya, AIST, MITI
J - 23	Basic Research on Solar Collector Materials (b) Physical mechanism to generate the selective absorption	Solar Research Laboratory, G.I.R.I, Nagoya, AIST, MITI
J - 24	Basic Research on Solar Collector Materials (c) Degradation mechanism of selective absorbing materials	Solar Research Laboratory, G.I.R.I, Nagoya, AIST, MITI
J - 25	Materials for Thermal Energy Storage	Solar Research Laboratory, G.I.R.I, Nagoya, AIST, MITI
J - 26	Materials for Thermal Energy Storage Dehumidifying process	Solar Research Laboratory, G.I.R.I, Nagoya, AIST, MITI
J - 27	Materials for Thermal Energy Storage Chemical reaction	Solar Research Laboratory, G.I.R.I, Nagoya, AIST, MITI

Code #	Project Title	Research Laboratory
J - 28	Materials for Thermal Energy Storage Solar pond	Solar Research Laboratory, G.I.R.I, Nagoya, AIST MITI
J - 29	Research and Development of Long-Term Thermal Energy Storage Technology Using Chemical Reaction Heat	Sanyo Electric Co., Ltd., Research Center
J - 30	Development of Concrete Heat Storage Tank Buried in the Ground	Ohbayashi-Gumi
J - 31	Long Term Thermal Storage in the Earth Ground	Faculty of Engineering, Kobe University
J - 32	Selective Properties of Black Coatings	Waseda University
J - 33	Open Cycle Solar Cooling System Combined with Domestic Water Supply	Waseda University
J - 34	Storage of Solar Energy by Gas/Solid Particle or Liquid/Solid Particle Mixture	Tohoku University
J - 35	Estimation of the Hourly Solar Radiation by the Other Climatic Elements	Kagoshima University
J - 36	Absorption Refrigerating Machine for Solar Energy Utilization	Faculty of Engineering, Kansai University
J - 37	High Performance Latent Heat TES Capsule (Transient Characteristics of a Flat Plate Solar Collector)	Tokyo Institute of Technology
J - 38	Complex Solar Cooling System Using Wind Energy for a College Building	Yatsushiro National College of Technology
J - 39	Sunshine Project - Solar System for Industrial Process - Cascade-Temperature Heat Process	New Energy Development Organization
J - 40	Sunshine Project - Solar System for Industrial Process - Fixed-Temperature Heat Process	New Energy Development Organization
J - 41	A Heating and Cooling System by Hybrid Use of Solar and Wind Energy	Hiroshima University
J - 42	Fundamental Study on the Multi-Solar Distillation Systems	Keio University
J - 43	Survey Research on Thermal Application of Solar Pond	Engineering Advancement Association of Japan
J - 44	Solar Energy Desalination Project	Engineering Advancement Association of Japan

Code #	Project Title	Research Laboratory
J - 45	Developing Technologies of Multi-Effect Solar Distillation Process	Water Re-Use Pormotion Center
J - 46	Research on Standardization of Solar Systems & its Simulation Method	Japan Testing Center for Construction Materials
J - 47	Construction & Operation of Solar Simulater	Japan Machinery & Metals Inspection Institute
J - 48	Research on Patent Information	Japan Industrial Technology Association
J - 49	Japanese Industrial Standards on Solar Collectors and Storage Tanks	Solar System Development Association
J - 50	Seasonal Heat Storage Under Ground Using Solar Energy	Hokkaido University
J - 51	Solar Desalination Program - I Basin type still	Mechanical Social Systems Foundation
J - 52	Solar Desalination Program - II Hybrid System Composed of Multistage Flush Evaporator and Electro-Dializer	Mechanical Social Systems Foundation
J - 53	System Optimization	Electrotechnical Laboratory
J - 54	R&D on Solar Collector	Electrotechnical Laboratory
J - 55	R&D on Thermal Energy Storage System	El ectrotechnical Laboratory

Code No.: J - 19 Date Prepared: Jan. 12, 1984

1. TITLE OF PROJECT: Establishment of Durability and Reliability Testing Method - (a) The laboratry simplified method to evaluate degradation of n_0 value & heat loss coefficient of Evacuated Tubular Collector

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ■ Durability and Reliability

3. KEYWORDS:

Evacuated Tubular Collector, Degradation, Heat loss, Durability

APPLICATION:

■ Solar Heating, ☒ Solar Cooling, ☐ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION

Solar Res. Lab., GIRI, Nagoya, AIST, MITI

5. NAME OF PRINCIPAL RESEARCHER:

Dr. Sakae TANEMURA

6. ADDRESS:

1 Hirate-cho, Kita-ku, Nagoya 462 Japan

7. DURATION OF PROJECT (Give Dates)

1981 - 1987

8. FUNDING IN $ U.S.:

125,400 $US (1983)

Code No.: J - 20 Date Prepared: Jan. 12, 1984

1. TITLE OF PROJECT: The Establishment of the Testing of the Solar Collector (b) The method to evaluate the thermal characteristics of Solar Collector

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

any systems

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

■ Testing methodology

3. KEYWORDS:

Testing & Evaluation, Evacuated Tubular Collector, Flat Plate Collector, Honeycomb Collector, Indoor Testing, Outdoor Exposure Test, Heat loss

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION

Solar Res. Lab., GIRI, Nagoya, AIST, MITI

5. NAME OF PRINCIPAL RESEARCHER:

Mr. Atsushi FUJII

6. ADDRESS:

1 Hirate-cho, Kita-ku, Nagoya 462 Japan

7. DURATION OF PROJECT (Give Dates)

1981 - 1987

8. FUNDING IN $ U.S.:

30,900 $US (1983)

Code No.: J - 21 Date Prepared: Jan. 12, 1984

1. TITLE OF PROJECT: Basic Research on Solar Collector Materials - (a) R&D on methodology of evaluation of selective absorption - (i) Determination of optical refractive index by elipsometry

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Selective Absorber, Measurement

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION

Solar Res. Lab., G.I.R.I. Nagoya, AIST, MITI

5. NAME OF PRINCIPAL RESEARCHER:

Dr. Sakae TANEMURA

6. ADDRESS:

1 Hirate-cho, Kita-ku, Nagoya 462 Japan

7. DURATION OF PROJECT (Give Dates)

1981 - 1987

8. FUNDING IN $ U.S.:

53,800 $US (1983)

Code No.: J - 22 Date Prepared: Jan. 12, 1984

1. TITLE OF PROJECT: Basic Research on Solar Collector Materials - (a) R&D on methodology of evaluation of selective absorption - (ii) The simplified evaluation method.

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Selective Absorber, Measurement

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Solar Res. Lab., GIRI, Nagoya, AIST, MITI

5. NAME OF PRINCIPAL RESEARCHER:

Mr. Mutsuo SANDO

6. ADDRESS:

1 Hirate-cho, Kita-ku, Nagoya 462 Japan

7. DURATION OF PROJECT (Give Dates)

1982 - 1987

8. FUNDING IN $ U.S.:

60,400 $US (1983)

Code No.: J - 23 Date Prepared: Jan. 12, 1984

1. TITLE OF PROJECT: Basic Research on Solar Collector Materials - (b) Physical mechanism to generate the selective absorption

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Selective Absorbers, Measurement

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Solar Res. Lab., GIRI, Nagoya, AIST, MITI

5. NAME OF PRINCIPAL RESEARCHER:

Dr. Sakae TANEMURA

6. ADDRESS:

1 Hirate-cho, Kita-ku, Nagoya 462 Japan

7. DURATION OF PROJECT (Give Dates)

1981 - 1987

8. FUNDING IN $ U.S.:

7,000 $US (1983)

Code No.: J - 24 Date Prepared: Jan. 12, 1984

1. TITLE OF PROJECT: Basic Research on Solar Collector Materials - (c) Degradation mechanism of selective absorbing materials

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Selective Absorber, Degradation, Measurement

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION

Solar Res. Lab., GIRI, Nagoya, AIST, MITI

5. NAME OF PRINCIPAL RESEARCHER:

Dr. Sakae TANEMURA

6. ADDRESS:

1 Hirate-cho, Kita-ku, Nagoya 462 Japan

7. DURATION OF PROJECT (Give Dates)

1981 - 1987

8. FUNDING IN $ U.S.:

8,300 $US (1983)

Code No.: J - 25 Date Prepared: Jan. 23, 1984

1. TITLE OF PROJECT:
Materials for Thermal Energy Storage

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Phase change material,
Chemical energy storage,
Latent heat storage

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ■ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION
Solar Res. Lab., G.I.R.I, Nagoya, AIST, MITI

5. NAME OF PRINCIPAL RESEARCHER:
Dr. Mineo KOSAKA & Mr. Tadashi ASAHINA

6. ADDRESS:
1 Hirate-cho, Kita-ku, Nagoya 462 Japan

7. DURATION OF PROJECT (Give Dates)
1981 - 1987

8. FUNDING IN $ U.S.:
49,800 US$ (1983)

Code No.: J - 26 Date Prepared: Jan. 23, 1984

1. TITLE OF PROJECT:
Materials for Thermal Energy Storage- Dehumidifying process

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ■ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Desiccant cycle,
TES,
Materials,
System analysis

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Solar Res. Lab., G.I.R.I, Nagoya, AIST, MITI

5. NAME OF PRINCIPAL RESEARCHER:
Dr. Mineo KOSAKA

6. ADDRESS:
1 Hirate-cho, Kita-ku, Nagoya 462 Japan

7. DURATION OF PROJECT (Give Dates)
1981 - 1987

8. FUNDING IN $ U.S.:
64,200 US$ (1983)

Code No.: J - 27 Date Prepared: Jan. 23, 1984

1. TITLE OF PROJECT: Materials for Thermal Energy Storage -Chemical reaction

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Optical chemical change materials

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Solar Res. Lab., G.I.R.I, Nagoya, AIST, MITI

5. NAME OF PRINCIPAL RESEARCHER:
Dr. Kiyoshi HAYAKAWA

6. ADDRESS:
1 Hirate-cho, Kita-ku, Nagoya 462 Japan

7. DURATION OF PROJECT (Give Dates)
1981 - 1987

8. FUNDING IN $ U.S.:
46,800 US$ (1983)

Code No.: J - 28 Date Prepared: Jan. 23, 1984

1. TITLE OF PROJECT: Materials for Thermal Energy Storage -Solar pond

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Solar pond, Durability, Working fluid, Heat balance

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION
Solar Res. Lab., G.I.R.I, Nagoya, AIST, MITI

5. NAME OF PRINCIPAL RESEARCHER:
Dr. Akira WATANABE

6. ADDRESS:
1 Hirate-cho, Kita-ku, Nagoya 462 Japan

7. DURATION OF PROJECT (Give Dates)
1982 - 1987

8. FUNDING IN $ U.S.:
37,000 US$ (1983)

Code No.: J - 29 Date Prepared: Jan. 31, 1984

1. TITLE OF PROJECT: Research and Development of Long-Term Thermal Energy Storage Technology Using Chemical Reaction Heat

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Chemical energy storage, Chemical heat pump, Seasonal storage, Solar industrial process heat, Thermal energy storage materials

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ☒ Industrial Process Heat

4. NAME OF ORGANIZATION

Sanyo Electric Co., LTD. Research Center

5. NAME OF PRINCIPAL RESEARCHER:

Takashi SAKAI

6. ADDRESS:

1-18-13 Hashiridani, Hirakata, Osaka 573 Japan

7. DURATION OF PROJECT (Give Dates)

1980FY - 1985FY

8. FUNDING IN $ U.S.:

2,200,000 US$

Code No.: J - 30 Date Prepared: Jan. 17, 1984

1. TITLE OF PROJECT:

Development of Concrete Heat Storage Tank Buried in the Ground

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Underground heat storage

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION

Ohbayashi-Gumi

5. NAME OF PRINCIPAL RESEARCHER:

Tatsuaki TANAKA

6. ADDRESS:

4-640 Shimokiyoto, Kiyose, Tokyo

7. DURATION OF PROJECT (Give Dates)

April 1983 - March 1985

8. FUNDING IN $ U.S.:

Code No.: J - 31 Date Prepared: Jan. 17, 1984

1. TITLE OF PROJECT:
Long Term Thermal Storage in the Earth Ground

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Underground heat storage

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Faculty of Engineering, Kobe University

5. NAME OF PRINCIPAL RESEARCHER:
Mamoru MATSUMOTO

6. ADDRESS:
Rokko-dai, Naka-ku, Kobe Japan

7. DURATION OF PROJECT (Give Dates)
3 years

8. FUNDING IN $ U.S.:
50,000 US$

Code No.: J - 32 Date Prepared: January 1984

1. TITLE OF PROJECT:
Selective Properties of Black Coatings

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Collector, Black Coating, Selectivity

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
Fundamental

4. NAME OF ORGANIZATION
Waseda University

5. NAME OF PRINCIPAL RESEARCHER:
Prof. Dr. Shigetomo UEDA

6. ADDRESS:
3-4-1 Ohkubo, Shinjuku-ku, Tokyo 160 Japan

7. DURATION OF PROJECT (Give Dates)
1980 - 1982

8. FUNDING IN $ U.S.:
ab. 25,000 US$

Code No.: J - 33 Date Prepared: Jan. 24, 1984

1. TITLE OF PROJECT: Open cycle solar cooling system combined with domestic water supply

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☑ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ■ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

absorption cycle, dehumidifying cycle, desiccant cycle, evaporative cooling, hot water supply system,integrated system performance

APPLICATION:

☐ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Waseda University

5. NAME OF PRINCIPAL RESEARCHER:

Ken-ichi Kimura

6. ADDRESS:

Okubo 3-4-1, Shinjuku, Tokyo 160 Japan

7. DURATION OF PROJECT (Give Dates)

1980 — present

8. FUNDING IN $ U.S.:

Approx. $12,000/year

Code No.: J - 34 Date Prepared: Jan. 12, 1984

1. TITLE OF PROJECT: Storage of Solar Energy by Gas/Solid Particle or Liquid/Solid Particle mixture

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Thermal energy storage materials, Air heating, Liquid heating collector

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION

5. NAME OF PRINCIPAL RESEARCHER:

Toshio AIHARA

6. ADDRESS:

Institute of High Speed Mechanics, Tohoku University, Sendai 980 Japan

7. DURATION OF PROJECT (Give Dates)

1 year

8. FUNDING IN $ U.S.:

20,000 US$

Code No.: J - 35 Date Prepared: Jan. 12, 1984

1. TITLE OF PROJECT: Estimation of the hourly solar radiation by the other climatic elements

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Diffuse solar radiation
Solar insolation
Standardization

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Kagoshima University

5. NAME OF PRINCIPAL RESEARCHER:

Hiroshi AKASAKA

6. ADDRESS:

1-21-40 Korimoto,Kagoshima Japan

7. DURATION OF PROJECT (Give Dates)

April 1983 - March 1984

8. FUNDING IN $ U.S.:

10,000 US$

Code No.: J - 36 Date Prepared: Jan. 25, 1984

1. TITLE OF PROJECT:

Absorption Refrigerating Machine for Solar Energy Utilization

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ■ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Absorption cycle, Corrosion, Heat pump, Measurement, Refrigeration, Selective absorbents

APPLICATION:

☐ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Faculty of Engineering, Kansai Univ.

5. NAME OF PRINCIPAL RESEARCHER:

Tadashi UEMURA and Shigeke IYOKI

6. ADDRESS:

3-3-35 Yamate-cho, Suita, Osaka Pref. 564 Japan

7. DURATION OF PROJECT (Give Dates)

April 1, 1980 - March 31, 1981

8. FUNDING IN $ U.S.:

7,500 US$

Code No.: J - 37 Date Prepared: Jan. 28, 1984

1. TITLE OF PROJECT: High Performance Latent Heat TES Capsule (Transient Characteristics of a Flat Plate Solar Collector)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Flat plate collector, Heat Transfer, Hot water supply system, Latent Heat Storage, Performance

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION

Tokyo Institute of Technology

5. NAME OF PRINCIPAL RESEARCHER:

Akio SAITO

6. ADDRESS: Mech. Engng. Dept., Tokyo Institute of Technology
2-12-1 Ookayama, Meguro-ku, Tokyo

7. DURATION OF PROJECT (Give Dates)

8. FUNDING IN $ U.S.:

Code No.: J - 38 Date Prepared: January 27 1984

1. TITLE OF PROJECT: Complex Solar Cooling System Using Wind Energy for a College Building

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Complex utilization, Cooling and heating, Solar energy, Wind power, COP, Control system.

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Yatsushiro National College of Technology

5. NAME OF PRINCIPAL RESEARCHER:
Kenji KAWAKITA

6. ADDRESS: 2627 Hirayamashin-machi, Yatsushiro-shi, Kumamoto-ken, 866 Japan

7. DURATION OF PROJECT (Give Dates)
from April 1980 to March 1985

8. FUNDING IN $ U.S.:
96,000. $

Code No.: J - 39 Date Prepared: Jan. 23, 1984

1. TITLE OF PROJECT: Sunshine Project - Solar Systems for Industrial Process - CASCADE-TEMPERATURE HEAT PROCESS

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Commercial building
Evacuated tublar collector
Industrial hot water

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

New Energy Development Organization

5. NAME OF PRINCIPAL RESEARCHER:

Mr. Nagayasu Ikeda(senior researcher)

6. ADDRESS:

Sunshine 60, 3-1-1 Higashi-Ikebukuro Toshima-ku, Tokyo, JAPAN

7. DURATION OF PROJECT (Give Dates)

1980FY - 1985FY

8. FUNDING IN $ U.S.:

2,275,000 $US (1983)

Code No.: J - 40 Date Prepared: Jan. 23, 1984

1. TITLE OF PROJECT: Sunshine Project - Solar System for Industrial Process - FIXED-TEMPERATURE HEAT PROCESS

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive
■ Industrial Process Heat

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Solar industrial process heat
Agricultural use
Dehumidifying cycle

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION

New Energy Development Organization

5. NAME OF PRINCIPAL RESEARCHER:

Mr. Nagayasu Ikeda (Senior Researcher)

6. ADDRESS:

Sunshine 60, 3-1-1 Higashi-Ikebukuro Toshima-ku, Tokyo Japan

7. DURATION OF PROJECT (Give Dates)

1980 - 1985 FY

8. FUNDING IN $ U.S.:

1,420,000 $US (1983)

Code No.: J - 41 Date Prepared: Jan. 12, 1984

1. TITLE OF PROJECT: A Heating and Cooling System by Hybrid use of solar and wind energy

2A. SOLAR SYSTEM R&O

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Combination of other energy sources, Data acquisition system, Desiccant cycle, Evacuated tubular collector, Hybrid system

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Hiroshima University

5. NAME OF PRINCIPAL RESEARCHER:

Hiroshi SASAKI

6. ADDRESS: Department of Electrical Engineering, Hiroshima University
Shitami Saijo-cho, Higashi Hiroshima City, Japan 724

7. DURATION OF PROJECT (Give Dates)

August 1982 - March 1984

8. FUNDING IN $ U.S.:

$26,000.00

Code No.: J - 42 Date Prepared: Feb. 1, 1984

1. TITLE OF PROJECT:
Fundamental Study on the Multi-solar Distillation Systems

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & OHW, ☐ Heating, Cooling & DHW, ☐ Passive
■Others (Solar desalination)

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Desalination

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Keio University

5. NAME OF PRINCIPAL RESEARCHER:

Prof. Koichi WATANABE

6. ADDRESS: Department of Mechanical Engineering, Keio University
3-14-1 Hiyoshi, Kohoku-ku, Yokohama 223 Japan

7. DURATION OF PROJECT (Give Dates)

Since 1975

8. FUNDING IN $ U.S.:

Around 10,000 US$ per year

Code No.: J - 43 Date Prepared: Feb. 6, 1984

1. TITLE OF PROJECT: Survey Research on Thermal Application of Solar Pond

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ■ Component Development, ■ Durability and Reliability

3. KEYWORDS:

Solar pond

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION

Engineering Advancement Association of Japan

5. NAME OF PRINCIPAL RESEARCHER:

Tetsuo NOGUCHI

6. ADDRESS:

Toranomon Takagi Bldg., 1-7-2 Nishi-shinbashi, Minato-ku, Tokyo Japan

7. DURATION OF PROJECT (Give Dates)

Nov. 21, 1983 - Feb. 28, 1985

8. FUNDING IN $ U.S.:

65,000 US$

Code No.: J - 44 Date Prepared: Feb. 1, 1984

1. TITLE OF PROJECT:

Solar Energy Desalination Project

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

■ Heating and Desalination

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

Desalination

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ■ Durability and Reliability

3. KEYWORDS:

Desalination

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION

Engineering Advancement Association of Japan

5. NAME OF PRINCIPAL RESEARCHER:

Jun KATO

6. ADDRESS:

Toranomon Takagi Bldg., 1-7-2 Nishi-shinbashi, Minato-ku, Tokyo Japan

7. DURATION OF PROJECT (Give Dates)

Jan., 1983 - Mar. 31, 1986

8. FUNDING IN $ U.S.:

7,500,000 US$

Code No.: J - 45 Date Prepared: Feb. 6, 1984

1. TITLE OF PROJECT:
Developing Technologies of Multi-Effect Solar Distillation Process

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ■ Durability and Reliability

3. KEYWORDS:
Desalination,
Testing and evaluation,
Reliability

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling,
☐ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION
Water Re-Use Promotion Center

5. NAME OF PRINCIPAL RESEARCHER:
H. INABA

6. ADDRESS:
2-3-4 Akasaka, Minato-ku, Tokyo 107 Japan

7. DURATION OF PROJECT (Give Dates)
Apr. 1982 - Mar. 1985

8. FUNDING IN $ U.S.:
Approx. 400,000 US$ (Total)

Code No.: J - 46 Date Prepared: Jan. 28, 1984

1. TITLE OF PROJECT: Research on Standardization of Solar Systems & its Simulation Method

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Standardization

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling,
☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Japan Testing Center for Construction Materials

5. NAME OF PRINCIPAL RESEARCHER:
Shigeki OKA

6. ADDRESS:
1-3 Nihonbashi, Kobuna-cho, Chuo-ku, Tokyo Japan

7. DURATION OF PROJECT (Give Dates)
1983FY -

8. FUNDING IN $ U.S.:
120,000 US$ (1983FY)

Code No.: J - 47 Date Prepared:

1. TITLE OF PROJECT: Construction & Operation of Solar Simulater

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ■ Durability and Reliability

3. KEYWORDS:
Durability,
Reliability
Solar simulator

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Japan Machinery & Metals Inspection Institute

5. NAME OF PRINCIPAL RESEARCHER:
Kazuya FUJISAWA

6. ADORESS:
1-9-15 Akasaka, Minato-ku, Tokyo Japan

7. DURATION OF PROJECT (Give Dates)
1981FY -

8. FUNDING IN $ U.S.:
460,000 US$ (1983FY)

Code No.: J - 48 Date Prepared: Feb. 2, 1984

1. TITLE OF PROJECT:
Research on Patent Information

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ■ Heating & DHW, ■ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation
Patent Survey (Patent applications laid open to the public)

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Patentship on Solar Heating, Cooling and DHW System

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Japan Industrial Technology Association

5. NAME OF PRINCIPAL RESEARCHER:
Kazuo KURIHARA

6. ADDRESS:
No.20 Mori Bldg., 2-7-4 Nishi-shinbashi, Minato-ku, Tokyo 105 Japan

7. DURATION OF PROJECT (Give Dates)
From July, 1974 up to present

8. FUNDING IN $ U.S.:
Approx. 30,000 US$/Y

Code No.: J - 49 Date Prepared: Jan. 23, 1984

1. TITLE OF PROJECT: Japanese Industrial Standards on Solar Collectors and Heat Storage tanks

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability ■ Standardization

3. KEYWORDS:

Standardization Certification
Testing and evaluation
Solar collector, Storage tank

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Solar System Development Organization

5. NAME OF PRINCIPAL RESEARCHER:

Dr. T. Noguchi

6. ADORESS:

1-4-10 Mori Bldg. No.3, Nishi-Shinbashi, Minato-ku, Tokyo 105 Japan

7. DURATION OF PROJECT (Give Dates)

1983 - 1984

8. FUNDING IN $ U.S.:

7,800 $US

Code No.: J -50 Date Prepared: Feb. 29, 1984

1. TITLE OF PROJECT: Seasonal heat storage under ground using solar energy

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS: seasonal storage, underground heat storage, ground coupled heat pump, air heating

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION Hokkaido University, Faculty of Engineering

5. NAME OF PRINCIPAL RESEARCHER:

Kiyoshi Ochifuji

6. ADORESS: West 8, North 13 Sapporo, Japan

7. DURATION OF PROJECT (Give Oates)

August 1980 - 1984

8. FUNDING IN $ U.S.:

20,000 $

Code No.: J - 51 Date Prepared: Feb. 9, 1984

1. TITLE OF PROJECT: Solar Desalination Program I -- Basin type still

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Desalination

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Mechanical Social Systems Foundation

5. NAME OF PRINCIPAL RESEARCHER:
T. Kutsuwada

6. ADDRESS:
1 - 4 - 28, 22th Floor, Mita International Bldg., Mita, Minato-ku, Tokyo 108

7. DURATION OF PROJECT (Give Dates)
1978 - 1982

8. FUNDING IN $ U.S.:
343,400 $

Code No.: J - 52 Date Prepared: Feb. 9, 1984

1. TITLE OF PROJECT: Solar Desalination Program II -- Hybrid system composed of multi-stage flush evaporator and electro-dializer

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Desalination, Evacuated tubular collector, flat plate collector

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Mechanical Social Systems Foundation

5. NAME OF PRINCIPAL RESEARCHER:
T. Kutsuwada

6. ADDRESS:
1 - 4 -28, 22th Floor, Mita International Bldg., Mita, Minato-ku, Tokyo 108

7. DURATION OF PROJECT (Give Dates)
1979 - 1983

8. FUNDING IN $ U.S.:
1,288,000 $

Code No.: J - 53 Date Prepared: Feb. 7, 1984

1. TITLE OF PROJECT: System Optimization

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive
■ IPH and Electric

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

System analysis Economics
Control System Rankine cycle.

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Electrotechnical Laboratory

5. NAME OF PRINCIPAL RESEARCHER:

Dr. T. Tani

6. ADDRESS:

1-1-4 Umezono Sakuramura Niihari-gun IBARAKI, JAPAN 305

7. DURATION OF PROJECT (Give Dates)

1974～

8. FUNDING IN $ U.S.:

$ 783,000 (1983)

Code No.: J - 54 Date Prepared: Feb. 7, 1984

1. TITLE OF PROJECT: R & D on Solar Collector

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Solar Concentrators
Selective absorbers
Livear concentrators

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION

Electrotechnical Laboratory

5. NAME OF PRINCIPAL RESEARCHER:

Mr. K. Sakuta

6. ADDRESS:

1-1-4 Umezono Sakuramura Niihari-gun IBARAKI, JAPAN 305

7. DURATION OF PROJECT (Give Dates)

1974～

8. FUNDING IN $ U.S.:

$ 85,000 (1983)

Code No.: J - 55

Date Prepared: Feb. 7, 1984

1. TITLE OF PROJECT: R & D on Thermal Energy Storage System

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Latent heat storage
Phase change material

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION

Electrotechnical Laboratory

5. NAME OF PRINCIPAL RESEARCHER:

Dr. M. Kamimoto

6. ADDRESS:

1-1-4 Umezon Sakuramura Niihari-gun IBARAKI, JAPAN 305

7. DURATION OF PROJECT (Give Dates)

1974～

8. FUNDING IN $ U.S.:

4.6 THE NETHERLANDS NATIONAL RESEARCH PROGRAMME ON SOLAR ENERGY

The 44 described Solar Projects are operated under the umbrella of a national research programme on solar energy. This coordinated programme is dedicated to the research, development and field testing of solar energy conversion systems. The main goal is the introduction of solar systems that proved to be the most successful in phase I of the programme. This means mainly thermal conversion of solar energy for low temperature applications.

Swimming pool heating by solar energy, a mature technique now, is no longer supported. Also no support is given to cooling and climate control due to the specific climatological conditions. Solar boilers have been demonstrated sufficiently, although the market response is slow.

A central focus in the programme is space heating. Simplified systems, passive installations and seasonal storage are the main topics. A very important activity is the transfer of knowledge and information.

Photo 1. Architect's Office Building, Shagen (NL-5)

Photo 2. Domestic Hot Water System Demonstration in Alkmaar (NL-5)

SOLAR R&D PROJECTS IN THE NETHERLANDS
(1983)

PASSIVE AND HYBRID R&D PROJECTS

Code #	Project Title	Research Laboratory
NL - 1	Further development of high performance fadade-element	TPD
NL - 2	IEA-Solar VIII Passive an Hybrid Systems	Bouwcentrum
NL - 3	Development of Passive Solar Elements	ERA

Code No.: NL - 1 Date Prepared: June 1984

1. TITLE OF PROJECT: Further development of high performance facade-element (I.5.1)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

heat-pipes
phase change materials

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

TPD

5. NAME OF PRINCIPAL RESEARCHER:

C. den Ouden

6. ADDRESS: P.O. Box 155
2600 AD DELFT

7. DURATION OF PROJECT (Give Dates)

6/83 - 6/84

8. FUNDING IN $ U.S.:

$ 120.000

Code No.: NL - 2 Date Prepared: June 1984

1. TITLE OF PROJECT: IEA-Solar VIII Passive an hybrid systems (I.5.3)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

hybrid systems
direct gain
design methods

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Bouwcentrum

5. NAME OF PRINCIPAL RESEARCHER:

E. van der Graaf

6. ADDRESS: P.O. Box 293
3000 AG ROTTERDAM

7. DURATION OF PROJECT (Give Dates)

1/82 - 12/86

8. FUNDING IN $ U.S.:

$ 650.000

Code No.: NL - 3 Date Prepared: June 1984

1. TITLE OF PROJECT: Development of passive solar elements (I.5.4)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

window-collector
wall-collector

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

ERA

5. NAME OF PRINCIPAL RESEARCHER:

H.Th. Talk

6. ADDRESS: P.O. Box 62
2700 AB ZOETERMEER

7. DURATION OF PROJECT (Give Dates)

1/83 - 12/83

8. FUNDING IN S U.S.:

$ 30.000

SOLAR R&D PROJECTS IN THE NETHERLANDS

(1983)

ACTIVE R&D PROJECTS

Code #	Project Title	Research Laboratory
NL - 4	Further Development of Testprocedures for Reliability and Durability of Solar Collectors	TPD
NL - 5	National Solar Energy Programme	BEOP/PEO
NL - 6	Pilot Test Facility	TPD
NL - 7	IEA - Solar IX: Pyranometry	KNMI
NL - 8	Urban Planning and Solar Energy	Centrum voor Energiebesparing
NL - 9	Evaluation of First National Research Programme on Solar Energy	Burnaby Lautier B.V.
NL - 10	Technical Coordination of Component Development	BEOP
NL - 11	Coordination of Modelling	ECN
NL - 12	Solar Energy in Greenhouses	TPD
NL - 13	Improvement of the Production Process of SnO_x Layers	TPD
NL - 14	Development of a Cheap Plastic Solar System	Stichting Energie Anders
NL - 15	Development of Collector with Double Air System	Isomur/Solair
NL - 16	Development of PCM Storage with Double Air System	Isomur/Solair
NL - 17	Development of Reactively Sputtered Transition-Metals Component on Rough Copper Base Layers	RUG and MT-TNO
NL - 18	Development of Collector Modules with Strip Collector	EBS
NL - 19	Development of Components for Second Generating Solar Systems	EBS
NL - 20	EMGP-2 and Simplified Methods	TPD

Code #	Project Title	Research Laboratory
NL - 21	Reprganisation and Maintenance of TPD-Models	TPD
NL - 22	Function of Thermal Energy Storage	TPD
NL - 23	Extention of EMGP with THE-Subroutines	THE
NL - 24	Comparison of Dutch Models	ECN
NL - 25	Simplification of the Groningen Ground Heat Storage	ITB
NL - 26	Comparison of Growing Ground Heat Storage and an Aquifer Heat Storage	ITB
NL - 27	Assessment Study of Heat Storage in Aquifers	Heidemij
NL - 28	Chemical Effects on Groundwater Caused by Heat Storage	Heidemij
NL - 29	Micro Biological Effects on Groundwater Caused by Ground Heat Storage	Heidemij
NL - 30	Ground-Mechanical Effects Caused by Ground Heat Storage	Heidemij
NL - 31	Analysing Environmental Effects Caused by Ground Heat Storage	Heidemij
NL - 32	Solar Energy with Seasonal Storage	TPD
NL - 33	Comparison of Solar Collectors Suitable for Process Heat	TPD
NL - 34	Development of a Research Program on Non-technical Aspects	Bakkenis, Spits en Co
NL - 35	Development of Second Generation Combined Heating and DHW Systems	Bakkenis, Spits en Co
NL - 36	Development of a Method to Judge Field-experiments	TPD
NL - 37	Inspection of Formerly Realised Solar Systems	TPD
NL - 38	Evaluation of the Amstelveen Project	TPD
NL - 39	Assessment Studies of Solar Energy Applications in Agriculture and Horti-culture	RTB van Heugten
NL -40	Measuring and Evaluation of the Groningen Ground Heat Storage Project	BEOP

Code #	Project Title	Research Laboratory
NL - 41	IEA-Storage III, Dorigny Aquifer	Heidemij
NL - 42	Performance Analysis Alkmaar-Project	PTD
NL - 43	Analysing Effects on Groundwater in the Groningen Heat Storage Project	Heidemij
NL - 44	IEA-Hydrogen-VI, Photocatalytic Water Electrolysis	ITC-TNO

Code No.: NL - 4 Date Prepared: June 1984

1. TITLE OF PROJECT: Further development of testprocedures for reliability and durability of solar collectors (I.1.1)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ■ Durability and Reliability

3. KEYWORDS:

Testing
certification

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

TPD

5. NAME OF PRINCIPAL RESEARCHER:

C. den Ouden

6. ADDRESS: P.O. Box 155
2600 AD DELFT

7. DURATION OF PROJECT (Give Dates)

1/83 - 1/86

8. FUNDING IN S U.S.:

$ 205.000

Code No.: NL - 5 Date Prepared: June 1984

1. TITLE OF PROJECT: National Solar Energy Programme

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

BEOP/PEO

5. NAME OF PRINCIPAL RESEARCHER:

K. Joon

6. ADDRESS: BEOP
P.O. Box 1
1755 ZG Petten

7. DURATION OF PROJECT (Give Dates)

1984-1985

8. FUNDING IN $ U.S.:

Code No.: NL - 6 Date Prepared: June 1984

1. TITLE OF PROJECT: Pilot test facility (I.1.3)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

measurements
testing

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
TPD

5. NAME OF PRINCIPAL RESEARCHER:
C. den Ouden

6. ADDRESS: P.O. Box 155
2600 AD DELFT

7. DURATION OF PROJECT (Give Dates)

8. FUNDING IN $ U.S.:

Code No.: NL - 7 Date Prepared: June 1984

1. TITLE OF PROJECT: IEA - Solar IX: pyranometry (I.1.4)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

pyranometry
measurements

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
KNMI

5. NAME OF PRINCIPAL RESEARCHER:
C.A. Velds

6. ADDRESS: P.O. Box 201
3730 AE DE BILT

7. DURATION OF PROJECT (Give Dates)
6/83 - 6/86

8. FUNDING IN $ U.S.:
$ 140.000

Code No.: NL - 8 Date Prepared: June 1984

1. TITLE OF PROJECT: Urban planning and solar energy (I.1.5)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

urban planning
design aids

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Centrum voor Energiebesparing

5. NAME OF PRINCIPAL RESEARCHER:

P. Bergmeijer

6. ADDRESS: Oude Delft 180
2611 HH DELFT

7. DURATION OF PROJECT (Give Dates)

10/83 - 12/84

8. FUNDING IN S U.S.:

$ 30.000

Code No.: NL - 9 Date Prepared: June 1984

1. TITLE OF PROJECT: Evaluation of first national research programme on solar energy (I.1.6)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

evaluation
research programme

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Burnaby Lautier B.V.

5. NAME OF PRINCIPAL RESEARCHER:

A. Gielisse

6. ADDRESS: Keizer Karelweg 425
1181 RG AMSTELVEEN

7. DURATION OF PROJECT (Give Dates)

10/82 - 10/83

8. FUNDING IN S U.S.:

$ 35.000

Code No.: NL - 10 Date Prepared: June 1984

1. TITLE OF PROJECT: Technical coordination of component development (I.1.7)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

component development

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
BEOP

5. NAME OF PRINCIPAL RESEARCHER:
K. Joon

6. ADDRESS: P.O. Box 1
1755 ZG PETTEN

7. DURATION OF PROJECT (Give Dates)
6/84 - 12/86

8. FUNDING IN S U.S.:
$ 55.000

Code No.: NL - 11 Date Prepared: June 1984

1. TITLE OF PROJECT: Coordination of modelling (I.1.9)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Coordination
modelling

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
ECN

5. NAME OF PRINCIPAL RESEARCHER:
N. van der Kleij

6. ADDRESS: P.O. Box 1
1755 ZG PETTEN

7. DURATION OF PROJECT (Give Dates)
10/83 - 6/84

8. FUNDING IN S U.S.:
$ 35.000

Code No.: NL - 12 Date Prepared: June 1984

1. TITLE OF PROJECT: Solar energy in greenhouses (I.2.1)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

greenhouses
storage
fase-change materials

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

TPD

5. NAME OF PRINCIPAL RESEARCHER:

C. den Ouden

6. ADDRESS: P.O. Box 155
2600 AD DELFT

7. DURATION OF PROJECT (Give Dates)

10/83 - 12/84

8. FUNDING IN $ U.S.:

$ 50.000

Code No.: NL - 13 Date Prepared: June 1984

1. TITLE OF PROJECT: Improvement of the production proces of SnO_x layers (I.2.2)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

selective absorbers

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION

TPD

5. NAME OF PRINCIPAL RESEARCHER:

J. de Jong

6. ADDRESS: P.O. Box 155
2600 AD DELFT

7. DURATION OF PROJECT (Give Dates)

4/84 - 12/85

8. FUNDING IN S U.S.:

$ 100.000

Code No.: NL - 14 Date Prepared: June 1984

1. TITLE OF PROJECT: Development of a cheap plastic solar system (I.2.4)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☒ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

plastic materials

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Stichting Energie Anders

5. NAME OF PRINCIPAL RESEARCHER:

H. Muis

6. ADDRESS: P.O. Box 56
3150 AB HOEK VAN HOLLAND

7. DURATION OF PROJECT (Give Dates)

7/83 - 11/84

8. FUNDING IN $ U.S.:

$ 50.000

Code No.: NL - 15 Date Prepared: June 1984

1. TITLE OF PROJECT: Development of collector with double air system (I.2.5)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

air-system

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Isomur/Solair

5. NAME OF PRINCIPAL RESEARCHER:

T.D. Bokhoven

6. ADDRESS: P.O. Box 7
2833 AA GOUDERAK

7. DURATION OF PROJECT (Give Dates)

7/83 - 5/84

8. FUNDING IN S U.S.:

$ 20.000

Code No.: NL - 16 Date Prepared: June 1984

1. TITLE OF PROJECT: Development of PCM storage with double air system (I.2.6)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

air system

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Isomur/Solair

5. NAME OF PRINCIPAL RESEARCHER:

T.P. Bokhoven

6. ADDRESS: P.O. Box 7
2830 AA GOUDERAK

7. DURATION OF PROJECT (Give Dates)

7/83 - 5/84

8. FUNDING IN S U.S.:

$ 20.000

Code No.: NL - 17 Date Prepared: June 1984

1. TITLE OF PROJECT: Development of reactively sputtered transition-metals component on rough copper base layers (I.2.8)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

surface roughness
sputtering

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

RUG and MT-TNO

5. NAME OF PRINCIPAL RESEARCHER:

J.C. Francken and C. Boor

6. ADDRESS: Nijenborgh 18
9747 AG GRONINGEN

P.O. Box 541
7300 AM APELDOORN

7. DURATION OF PROJECT (Give Dates)

3/83 - 3/84

8. FUNDING IN S U.S.:

$ 100.000

Code No.: NL - 18 Date Prepared: June 1984

1. TITLE OF PROJECT: Development of collector modules with strip collector (I.2.9)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

modules

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION

EBS

5. NAME OF PRINCIPAL RESEARCHER:

M. Baardman

6. ADDRESS: P.O. Box 95
5360 AB GRAVE

7. DURATION OF PROJECT (Give Dates)

5/83 - 5/84

8. FUNDING IN $ U.S.:

$ 130.000

Code No.: NL - 19 Date Prepared: June 1984

1. TITLE OF PROJECT: Development of components for second generating solar systems (I.2.11)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

component development

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

EBS

5. NAME OF PRINCIPAL RESEARCHER:

M. Baardman

6. ADDRESS: P.O. Box 95
5360 AB GRAVE

7. DURATION OF PROJECT (Give Dates)

8. FUNDING IN $ U.S.:

Code No.: NL - 20 Date Prepared: June 1984

1. TITLE OF PROJECT: EMGP-2 and simplified methods (I.3.1)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

simplified methods
validation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

TPD

5. NAME OF PRINCIPAL RESEARCHER:

C. den Ouden

6. ADDRESS: P.O. Box 155
2600 AD DELFT

7. DURATION OF PROJECT (Give Dates)

6/84 - 12/85

8. FUNDING IN S U.S.:

$ 60.000

Code No.: NL - 21 Date Prepared: June 1984

1. TITLE OF PROJECT: Reorganisation and maintenance of TPD-models (I.3.2)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

maintenance
model development

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

TPD

5. NAME OF PRINCIPAL RESEARCHER:

C. den Ouden

6. ADDRESS: P.O. Box 155
2600 AD DELFT

7. DURATION OF PROJECT (Give Dates)

7/83 - 12/84

8. FUNDING IN S U.S.:

$ 70.000

Code No.: NL - 22 Date Prepared: June 1984

1. TITLE OF PROJECT: Function of thermal energy storage (I.3.4)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

direct gain
storage

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

TPD

5. NAME OF PRINCIPAL RESEARCHER:

C. den Ouden

6. ADDRESS: P.O. Box 155
2600 AD DELFT

7. DURATION OF PROJECT (Give Dates)

1/84 - 12/84

8. FUNDING IN S U.S.:

$ 50.000

Code No.: NL - 23 Date Prepared: June 1984

1. TITLE OF PROJECT: Extention of EMGP with THE-subroutines (I.3.9)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

control strategies
stratified storage

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

THE

5. NAME OF PRINCIPAL RESEARCHER:

C.W.J. van Koppen

6. ADDRESS: P.O. Box 513
5600 MB EINDHOVEN

7. DURATION OF PROJECT (Give Dates)

10/83 - 5/84

8. FUNDING IN $ U.S.:

$ 20.000

Code No.: NL - 24 Date Prepared: June 1984

1. TITLE OF PROJECT: Comparison of Dutch models (I.3.10)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

coordination
modelling

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

ECN

5. NAME OF PRINCIPAL RESEARCHER:

N. van der Kleij

6. ADDRESS: P.O. Box 1
1755 ZG PETTEN

7. DURATION OF PROJECT (Give Dates)

10/83 - 6/84

8. FUNDING IN $ U.S.:

$ 50.000

Code No.: NL - 25 Date Prepared: June 1984

1. TITLE OF PROJECT: Simplification of the Groningen ground heat storage (I.4.1)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

grand-heat storage

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

ITB

5. NAME OF PRINCIPAL RESEARCHER:

K. de Wit

6. ADDRESS: P.O. Box 2413
3500 GK UTRECHT

7. DURATION OF PROJECT (Give Dates)

6/83 -- 8/84

8. FUNDING IN $ U.S.:

$ 50.000

Code No.: NL - 26 Date Prepared: June 1984

1. TITLE OF PROJECT: Comparison of growing ground heat storage and an aquifer heat storage (I.4.2)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Aquifer -heat storage
ground heat storage

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

ITB

5. NAME OF PRINCIPAL RESEARCHER:

K. de Wit

6. ADORESS: P.O. Box 2413
3500 GK UTRECHT

7. DURATION OF PROJECT (Give Dates)

2/84 - 10/84

8. FUNOING IN $ U.S.:

$ 40.000

Code No.: NL - 27 Date Prepared: June 1984

1. TITLE OF PROJECT: Assessment study of heat storage in aquifers (I.4.3)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

aquifer storage
assessment study

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Heidemij

5. NAME OF PRINCIPAL RESEARCHER:

A. Snijders

6. ADDRESS: P.O. Box 264
6800 AG ARNHEM

7. DURATION OF PROJECT (Give Dates)

3/83 - 2/84

8. FUNDING IN $ U.S.:

$ 60.000

Code No.: NL - 28 Date Prepared: June 1984

1. TITLE OF PROJECT: Chemical effects on groundwater caused by heat storage (I.4.7)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

chemical effects
ground-heat storage

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Heidemij

5. NAME OF PRINCIPAL RESEARCHER:

A. Snijders

6. ADDRESS: P.O. Box 264
6800 AG ARNHEM

7. DURATION OF PROJECT (Give Dates)

10/83 - 3/84

8. FUNDING IN S U.S.:

$ 45.000

Code No.: NL - 29 Date Prepared: June 1984

1. TITLE OF PROJECT: Micro biological effects on groundwater caused by ground heat storage (I.4.8)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE DF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

micro-biological effects
ground heat storage

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Heidemij

5. NAME OF PRINCIPAL RESEARCHER:

A. Snijders

6. ADDRESS: P.O. Box 264
6800 AG ARNHEM

7. DURATION OF PROJECT (Give Dates)

10/83 - 3/84

8. FUNDING IN S U.S.:

$ 20.000

Code No.: NL - 30 Date Prepared: June 1984

1. TITLE OF PROJECT: Ground-mechanical effects caused by ground heat storage (I.4.9)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

ground-mechanical effects
ground heat storage

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Heidemij

5. NAME OF PRINCIPAL RESEARCHER:

A. Snijders

6. ADDRESS: P.O. Box 264
6800 AG ARNHEM

7. DURATION OF PROJECT (Give Dates)

10/83 - 3/84

8. FUNDING IN S U.S.:

$ 20.000

Code No.: NL - 31 Date Prepared: June 1984

1. TITLE OF PROJECT: Analysing environmental effects caused by ground heat storage (I.4.10)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

environmental effects

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Heidemij

5. NAME OF PRINCIPAL RESEARCHER:

A. Snijders

6. ADDRESS: P.O. Box 264
6800 AG ARNHEM

7. DURATION OF PROJECT (Give Dates)

6/84 - 6/85

8. FUNDING IN $ U.S.:

$ 80.000

Code No.: NL - 32 Date Prepared: June 1984

1. TITLE OF PROJECT: Solar energy with seasonal storage (I.4.11)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

comparison of storage systems
heat pumps

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

TPD

5. NAME OF PRINCIPAL RESEARCHER:

C. den Ouden

6. ADDRESS: P.O. Box 155
2600 AD DELFT

7. DURATION OF PROJECT (Give Dates)

6/83 - 6/84

8. FUNDING IN S U.S.:

$ 90.000

Code No.: NL - 33 Date Prepared: June 1984

1. TITLE OF PROJECT: Comparison of solar collectors suitable for proces heat (I.6.1)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

process heat

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION

TPD

5. NAME OF PRINCIPAL RESEARCHER:

C. den Ouden

6. ADDRESS: P.O. Box 155
2600 AD DELFT

7. DURATION OF PROJECT (Give Dates)

8/83 - 4/84

8. FUNDING IN $ U.S.:

$ 10.000

Code No.: NL - 34 Date Prepared: June 1984

1. TITLE OF PROJECT: Development of a research program on non-technical aspects (I.6.5)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

non-technical aspects

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Bakkenis, Spits en Co

5. NAME OF PRINCIPAL RESEARCHER:

J.G. Wissema

6. ADDRESS: Nieuwe Uitleg 15
2514 BP DEN HAAG

7. DURATION OF PROJECT (Give Dates)

8/83 - 3/84

8. FUNDING IN $ U.S.:

$ 70.000

Code No.: NL - 35 Date Prepared: June 1984

1. TITLE OF PROJECT: Development of second generation combined heating and DHW systems (I.7.1)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

assessment study

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

TPD

5. NAME OF PRINCIPAL RESEARCHER:

C. den Ouden

6. ADDRESS: P.O. Box 155
2600 AD DELFT

7. DURATION OF PROJECT (Give Dates)

10/83 - 10/84

8. FUNDING IN $ U.S.:

$ 120.000

Code No.: NL - 36 Date Prepared: June 1984

1. TITLE OF PROJECT: Development of a method to judge field-experiments (I.7.3)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

assessment study

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

TPD

5. NAME OF PRINCIPAL RESEARCHER:

C. den Ouden

6. ADDRESS: P.O. Box 155
2600 AD DELFT

7. DURATION OF PROJECT (Give Dates)

11/83 - 7/84

8. FUNDING IN $ U.S.:

$ 30.000

Code No.: NL - 37 Date Prepared: June 1984

1. TITLE OF PROJECT: Inspection of formerly realised solar systems (I.7.4)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

inspection
evaluation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

TPD

5. NAME OF PRINCIPAL RESEARCHER:

C. den Ouden

6. ADDRESS: P.O. Box 155
2600 AD DELFT

7. DURATION OF PROJECT (Give Dates)

6/83 - 6/86

8. FUNDING IN $ U.S.:

$ 30.000

Code No.: NL - 38 Date Prepared: June 1984

1. TITLE OF PROJECT: Evaluation of the Amstelveen project (I.7.7)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

evaluation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

TPD

5. NAME OF PRINCIPAL RESEARCHER:

C. den Ouden

6. ADDRESS: P.O. Box 155
2600 AD DELFT

7. DURATION OF PROJECT (Give Dates)

this project did not start yet

8. FUNDING IN $ U.S.:

$ 25.000

Code No.: NL - 39 Date Prepared: June 1984

1. TITLE OF PROJECT: Assessment studies of solar energy applications in agriculture and horticulture (I.7.8)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

agriculture
horticulture
assessment study

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

RTB van Heugten

5. NAME OF PRINCIPAL RESEARCHER:

P.H.H. Leyendeckers

6. ADDRESS: P.O. Box 305
6500 AH NIJMEGEN

7. DURATION OF PROJECT (Give Dates)

1/83 - 3/84

8. FUNDING IN $ U.S.:

$ 70.000

Code No.: NL - 40 Date Prepared: June 1984

1. TITLE OF PROJECT: Measuring and evaluation of the Groningen ground heat storage project (I.7.10)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

ground heat storage

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

BEOP

5. NAME OF PRINCIPAL RESEARCHER:

K. Joon

6. ADDRESS: P.O. Box 1
1755 ZG PETTEN

7. DURATION OF PROJECT (Give Dates)

this project did not start yet

8. FUNDING IN S U.S.:

$ 200.000

Code No.: NL - 41 Date Prepared: June 1984

1. TITLE OF PROJECT: IEA-storage III, Dorigny aquifer (I.7.12)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

aquifer storage

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Heidemij

5. NAME OF PRINCIPAL RESEARCHER:

A. Snijders

6. ADDRESS: P.O. Box 264
6800 AG ARNHEM

7. DURATION OF PROJECT (Give Dates)

6/83 - 1/86

8. FUNDING IN $ U.S.:

$ 40.000

Code No.: NL - 42 Date Prepared: June 1984

1. TITLE OF PROJECT: Performance analysis Alkmaar-project (I.7.13)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

aircollector system

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

PTD

5. NAME OF PRINCIPAL RESEARCHER:

C. den Ouden

6. ADDRESS: P.O. Box 155
2600 AD DELFT

7. DURATION OF PROJECT (Give Dates)

8. FUNDING IN S U.S.:

$ 5.000

Code No.: NL - 43 Date Prepared: June 1984

1. TITLE OF PROJECT: Analysing effects on groundwater in the Groningen heat storage project (I.7.16)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

chemical effects
micro-biological effects
ground heat storage

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Heidemij

5. NAME OF PRINCIPAL RESEARCHER:

A. Snijders

6. ADDRESS: P.O. Box 264
6800 AG ARNHEM

7. DURATION OF PROJECT (Give Dates)

3/83 - 3/85

8. FUNDING IN S U.S.:

$ 45.000

Code No.: NL - 44 Date Prepared: June 1984

1. TITLE OF PROJECT: IEA-Hydrogen-VI, photocatalytic water electrolysis (II.1.1)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

ITC-TNO

5. NAME OF PRINCIPAL RESEARCHER:

A. Mackor

6. ADDRESS: P.O. Box 5009
3502 JA UTRECHT

7. DURATION OF PROJECT (Give Dates)

1/83 - 1/84

8. FUNDING IN $ U.S.:

$ 130.000

4.7 STATUS AND TRENDS IN THE NORWEGIAN SOLAR ENERGY R&D PROGRAMME

Solar energy is not expected to take a substantial part of the total national energy demand in Norway in this century. Norway has a very favourable energy situation and almost 60% of the domestic energy consumption is renewable hydro electricity. The oil production in 1983 was 10 times the oil consumption.

Since 1975, 15 mill.NOK (2 mill.US$) have been funded to 30 solar energy projects. The governmental fundings have been decreased from 1980 to 84, corresponding to appr. 8 man-years in 1980 and 3-4 in 84. In addition to the R&D fundings there is a budget for experimental buildings. The amount for solar energy from this budget is appr. 0.5 mill.NOK in 1984.

Solar radiation

About 20 - 30% of the R&D fundings has been used in projects to get a better understanding of the amount and distribution of solar radiation. The global radiation per year differs between 1,000 KWh/m² in the south-east part to 600 KWh/m² in the northern part. The global radiation during the heating season is at about the same level in both the northern and the southern part. This is due to the fact that the heating season is almost 300 days in the north of Norway compared to about 200 days in the south.

A "Radiation Handbook" for Norway will be completed in 1984. The handbook will be updated with new radiation datas from measureing stations in the coming years.

Passive solar projects

Norway participates the IEA passive solar project and the national programme is therefore almost identical with the Task VIII programme. All the Norwegian passive solar activities are canalized through this project. At least two experimental buildings will be built in connection with this work.

The Norwegian passive project is a cooperation between different research institutions and we have made a reference group with representatives from industries, energy suppliers, consulting engineers and architects.

Active solar systems

There is almost none R&D projects in Norway dealing with commercial solar water heating systems, neither for DHW or space heating. The Norwegian research programme in active solar systems deals mostly with building integrated systems. Most of the systems are air-heating systems. The only present R&D system with a water-collector is a project with a tricklet solar collector. The system using this collector is integrated in walls and roofs and the cost is expected to about appr. 350 NOK/m² (50US$/m²).

The air-heating solar systems are both for DHW and space heating. The most promising one is a 150 m² air-collector system on a Squash-center producing hot water for showers etc. The total installation cost for the system is about 500 NOK/m². The system will be measured in 1983/84.

Photo 1.

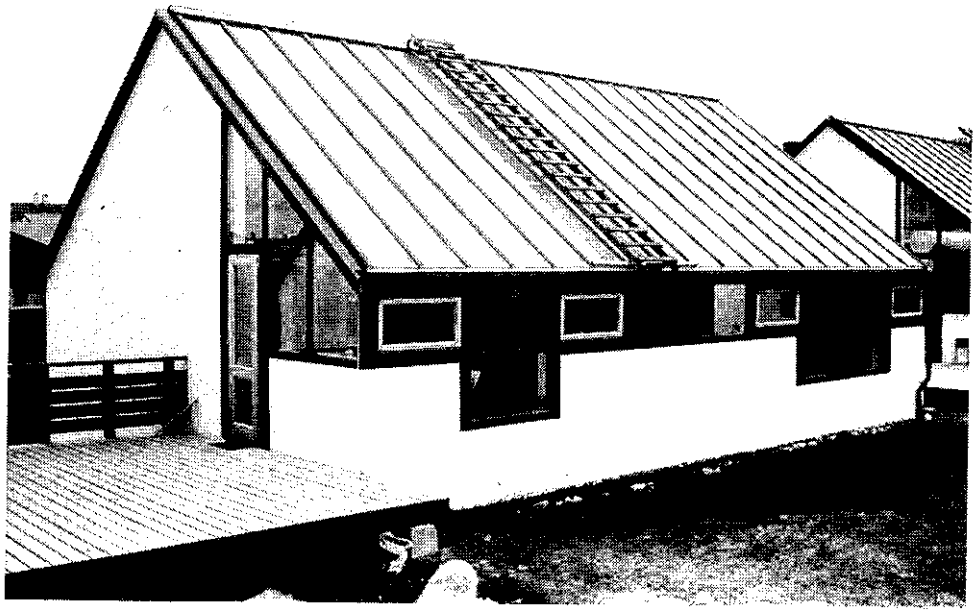


Photo 2.

Photo 1 & 2.

Double-shell one family house from a solar energy project at SINTEF in Trondheim. (N-4)

A project at the Technical University in Trondheim plans to use the indoor solar simulator to do thermal small scale experiments with buildings and solar systems. The scope is to get theoretical models which can be used in practical small scale experiments.

By 1984 an evaluation report of the Norwegian active solar houses will be worked out, and this will be the basis for the future R&D projects.

Commercial

The commercial activity is for the moment almost zero, but a lot of architects has been interested to build big semi-climatic glaszones in larger buildings. It is expected that those types of buildings can be well suited for solar energy systems at reasonable costs.

SOLAR R&D PROJECTS IN NORWAY
(1983)

PASSIVE AND HYBRID R&D PROJECTS

Code #	Project Title	Research Laboratory
N - 1	Passive Solar House	Kilde
N - 2	Solar Systems in Excisting Buildings	SINTEF
N - 3	Solar Energy House, Tyholt	SINTEF 62
N - 4	Low Energy Buildings Heimdal	SINTEF 62
N - 5	Solar Heating with Chemical Energy Storage	Meierienes Bygningskontor
N - 6	House Parmann	Architect Harald N. Røstvik

Code No.: N - 1 Date Prepared: 6/1-84

1. TITLE OF PROJECT:
Passive solar house

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Air heating, Hybrid System
Passive heating

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Kilde

5. NAME OF PRINCIPAL RESEARCHER:
Matias Ringheim

6. ADDRESS:
Kilde, Postboks 229, 5701 Voss, Norway

7. DURATION OF PROJECT (Give Dates)
1980-81

8. FUNDING IN $ U.S.:
7.000,-

Code No.: N - 2 Date Prepared: 6/1-84

1. TITLE OF PROJECT:
Solar Systems in Ex isting Buildings

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Hybrid System, Measurement

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
SINTEF

5. NAME OF PRINCIPAL RESEARCHER:
Anne Grethe Hestnes

6. ADDRESS:
SINTEF-62, 7034 TRONDHEIM-NTH, Norway

7. DURATION OF PROJECT (Give Dates)
1980-85

8. FUNDING IN $ U.S.:
50.000,-

Code No.: N - 3 Date Prepared: 6/1-84

1. TITLE OF PROJECT: Solar Energy House, Tyholt

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Air heating, Flat plate collector
Passive heating

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
SINTEF 62

5. NAME OF PRINCIPAL RESEARCHER:
Johs. Gunnarshaug

6. ADDRESS:
SINTEF 62, 7034 TRONDHEIM- NTH, Norway

7. DURATION OF PROJECT (Give Dates)
1975-81

8. FUNDING IN $ U.S.:
290.000,-

Code No.: N - 4 Date Prepared: 6/1-84

1. TITLE OF PROJECT: Low energy buildings Heimdal

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Air Systems
Hybrid System,
Greenhouse

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
SINTEF 62

5. NAME OF PRINCIPAL RESEARCHER:
Helge Raaen

6. ADDRESS:
SINTEF 62, Trondheim-NTH, Norway

7. DURATION OF PROJECT (Give Dates)
1978-84

8. FUNDING IN $ U.S.:
650.000,-

Code No.: N - 5 Date Prepared: 6/1-84

1. TITLE OF PROJECT:
Solar Heating with Chemical Energy Storage

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Air heating, integrated System, Office Building, Phase Change Materials

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Meierienes Bygningskontor

5. NAME OF PRINCIPAL RESEARCHER:
Dag Borgen

6. ADDRESS:
Meierienes Bygningskontor, Postboks 9066 Vaterland, Oslo 1, Norway

7. DURATION OF PROJECT (Give Dates)
1980 - 85

8. FUNDING IN $ U.S.:
120.000,-

Code No.: N - 6 Date Prepared: 6/1-84

1. TITLE OF PROJECT:
House Parmann

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Air heating, Greenhouse, Hybrid System

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Arch. Harald N. Røstvik

5. NAME OF PRINCIPAL RESEARCHER:
Architect Harald N. Røstvik

6. ADDRESS:
Steingaten 87, 4000 Stavanger, Norway

7. DURATION OF PROJECT (Give Dates)
1981-84

8. FUNDING IN $ U.S.:
25.000,-

SOLAR R&D PROJECTS IN NORWAY
(1983)

ACTIVE R&D PROJECTS

Code #	Project Title	Research Laboratory
N - 7	Solar Air Collector	SINTEF
N - 8	Solar Air Heating System in Detached Houses	Architect Harald N. Røstvik
N - 9	Selective Absorber	Institutt for Energiteknikk
N - 10	Solar Systems for Heating	Fysisk Institutt
N - 11	Chemical Energy Storage	SINTEF 21
N - 12	Energy Storage in Salt	Institutt for Energiteknikk
N - 13	Prefabricated Solar Air Heating House	Moelven Brug A/S
N - 14	Low Energy House, Skafjell	Norsk Dampkjelforening
N - 15	Active Solar Systems	Inst. for Energiteknikk
N - 16	Stavanger Squash Centre	Architect Harald N. Røstvik
N - 17	Idrettens Hus, Active Solar System	Institutt for Energiteknikk

Code No.: N - 7 Date Prepared: 6/1-84

1. TITLE OF PROJECT: Solar Air Collector

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Air system, flat plate collector
Testing and evaluation

APPLICATION:

■ Solar Heating, ☐ Solar Cooling,
■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

SINTEF,

5. NAME OF PRINCIPAL RESEARCHER:

Terje Jacobsen

6. ADDRESS:

7034 TRONDHEIM-NTH, Norway

7. DURATION OF PROJECT (Give Dates)

1978-1983

8. FUNDING IN $ U.S.:

33.000

Code No.: N - 8 Date Prepared: 6/1-84

1. TITLE OF PROJECT: Solar air heating system in detached houses

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Air heating, Flat plate collector, Measurement, Pebble bed, Residential buildings, economics

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling,
☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Arch. Harald N. Røstvik

5. NAME OF PRINCIPAL RESEARCHER:

Architect Harald N. Røstvik

6. ADDRESS:

Steingaten 87, 4000 Stavanger, Norway

7. DURATION OF PROJECT (Give Dates)

1979-1983

8. FUNDING IN $ U.S.:

33.000

Code No.: N - 9 Date Prepared: 6/1-84

1. TITLE OF PROJECT: Selective absorber

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ■ Durability and Reliability

3. KEYWORDS:

Selective absorber , durability, Indoor testing

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Institutt for energiteknikk

5. NAME OF PRINCIPAL RESEARCHER:

Kjetil Videm

6. ADDRESS:

IFE, Postboks 40, 2007 Kjeller, Norway

7. DURATION OF PROJECT (Give Dates)

1980-1982

8. FUNDING IN $ U.S.:

93.000,-

Code No.: N - 10 Date Prepared: 6/1-84

1. TITLE OF PROJECT: Solar Systems for Heating

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Flat plate collector, Liquid heated collector

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Fysisk Institutt

5. NAME OF PRINCIPAL RESEARCHER:

John Rekstad

6. ADDRESS: Universitetet, Postboks 1048, Blindern, Oslo 3, Norway

7. DURATION OF PROJECT (Give Dates)

1979-85

8. FUNDING IN $ U.S.:

100.000,-

Code No.: N - 11 Date Prepared: 6/1-84

1. TITLE OF PROJECT:
Chemical Energy Storage

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Chemical energy storage
Chemical heat pump

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION
SINTEF 21

5. NAME OF PRINCIPAL RESEARCHER:
Per T. Roterud

6. ADDRESS:
SINTEF 21, 7034 TRONDHEIM- NTH, Norway

7. DURATION OF PROJECT (Give Dates)
1979-82

8. FUNDING IN $ U.S.:
75.000,-

Code No.: N - 12 Date Prepared: 6/1-84

1. TITLE OF PROJECT:
Energy Storage in Salt

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Chemical energy storage
Phase change material

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION
Institutt for energiteknikk

5. NAME OF PRINCIPAL RESEARCHER:
N. Gjelsvik

6. ADDRESS:
IFE, Postboks 40, 2007 Kjeller, Norway

7. DURATION OF PROJECT (Give Dates)
1981-82

8. FUNDING IN $ U.S.:
28.000,-

Code No.: N - 13 Date Prepared: 6/1-84

1. TITLE OF PROJECT: Prefabricated solar air heating house

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Air Heating, Pebbe bed, Flat plate collector, integrated System

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Moelven Brug A/S

5. NAME OF PRINCIPAL RESEARCHER:

Jostein Takle

6. ADDRESS:

Moelven Brug A/S, 2390 MOELV, Norway

7. DURATION OF PROJECT (Give Dates)

1978-81

8. FUNDING IN $ U.S.:

7.000,-

Code No.: N - 14 Date Prepared: 6/1-84

1. TITLE OF PROJECT:

Low Energy House, Skafjell

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Heat Pump, Flat Plate Collector, Liquid heating

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Norsk Dampkjelforening

5. NAME OF PRINCIPAL RESEARCHER:

Haugland

6. ADDRESS:

Norsk Dampkjelforening, Hoffsveien 13, Oslo 2, Norway

7. DURATION OF PROJECT (Give Dates)

1979-84

8. FUNDING IN $ U.S.:

50.000,-

Code No.: N - 15 Date Prepared: 6/1-84

1. TITLE OF PROJECT: Active solar systems

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

3. KEYWORDS:
Swimming Pool, Hotel,
Liquid Heated Collector
Flat plate Collector

4. NAME OF ORGANIZATION
Inst. for energiteknikk

5. NAME OF PRINCIPAL RESEARCHER:
Terje Ormhaug

6. ADDRESS:
IFE, Postboks 40, 2007 KJELLER, Norway

7. DURATION OF PROJECT (Give Dates)
1981-83

8. FUNDING IN $ U.S.:
30.000,-

Code No.: N - 16 Date Prepared: 6/1-84

1. TITLE OF PROJECT: Stavanger Squash Centre

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

3. KEYWORDS:
Air System
Integrated System
Measurement

4. NAME OF ORGANIZATION
Arch. Harald N. Røstvik

5. NAME OF PRINCIPAL RESEARCHER:
Harald N. Røstvik

6. ADDRESS:
Architect Harald N. Røstvik, Steingt. 87, 4000 STAVANGER, Norway

7. DURATION OF PROJECT (Give Dates)
1981 - 85

8. FUNDING IN $ U.S.:
100.000,-

Code No.: N - 17 Date Prepared: 6/1-84

1. TITLE OF PROJECT: Idrettens Hus, Active solar system

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Flat plate collector
Liquid heating collector

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Inst. for energiteknikk

5. NAME OF PRINCIPAL RESEARCHER:

Terje Ormhaug

6. ADDRESS:

Boks 40, 2007 KJELLER, Norway

7. DURATION OF PROJECT (Give Dates)

1981-83

8. FUNDING IN $ U.S.:

10.000,-

4.8 THE SWEDISH SOLAR HEATING PROGRAMME

Background

The solar programme for space heating is managed by the Swedish Council for Building Research. The main goal of the Swedish energy policy is to reduce the oil dependence. This has so far been achieved by energy conservation, nuclear energy introduction, use of other fuels and heat pumps. As a result of a referendum and parliament dicision nuclear power is to be gradually phased out until the year 2010. Therefore, Sweden interest is now directed towards R&D on domestic energy sources.

The Solar Programme

Solar insolation amounts to about 1000 kwh/m^2 year on a horizontal surface, i.e. about the same as in central Europe. However the distribution of this energy throughout the year is less favourable than in many other countries. Irradiation on a horizontal surface in Stockholm is about 15 times less in December than in June, and in the far north the insolation is zero during some winter months. Further limitations on solar energy are imposed by the proportion of diffuse radiation, which amounts to about 50 % of global radiation, and the number of days with alternating sun and cloud cover.

A target-oriented solar energy programme, known as the Solar 85 programme, was established at the end of the 1970s. Apart from R&D the programme contained a market goal of solar contribution by 1990 in the range of 1-3 TWh. The R&D part of this work is administered by the council.

Objectives for the solar heating programme:

- component development:	Increased performance and reduced costs, better durability
- solar heated domestic hot water:	Development of low cost systems for multi-family housing units and monitoring of systems in detached houses
- solar collectors in combination with district heating and block centrals:	Establishment of full scale systems and monitoring of systems already in operation

The first stage of the programme was directed towards the development and evaluation of a variety of system concepts. During the second stage, from 1982 and onwards, a few interesting system types developed towards better cost efficiency. The programme is now in its third stage which also includes evaluation of the programme and the technology.

The market

Several small industries developed during 1974 - 1980. Most of them concentrated on domestic hot water systems. Production reached its peak in 1980, more than 20,000 m^2 of collectors sold. After that sales decreased rapidly. In all some 60,000 m^2 of collectors have been installed during the last ten years. (See Fig. 1). Favourable subsidies have been offered to buyers of solar equipment. This year, 1984, 50 % of the approved installation cost is subsidized. The low price of electricity has been the major obstacle for solar introduction.

A number of evaluation groups freestanding from the council have been following different parts of the programme. Apart from the evaluation they have contributed with input data for the solar 85 model (see Fig. 2), the market model used for the prediction of solar storage and heat pump contribution to the Swedish solar energy system.

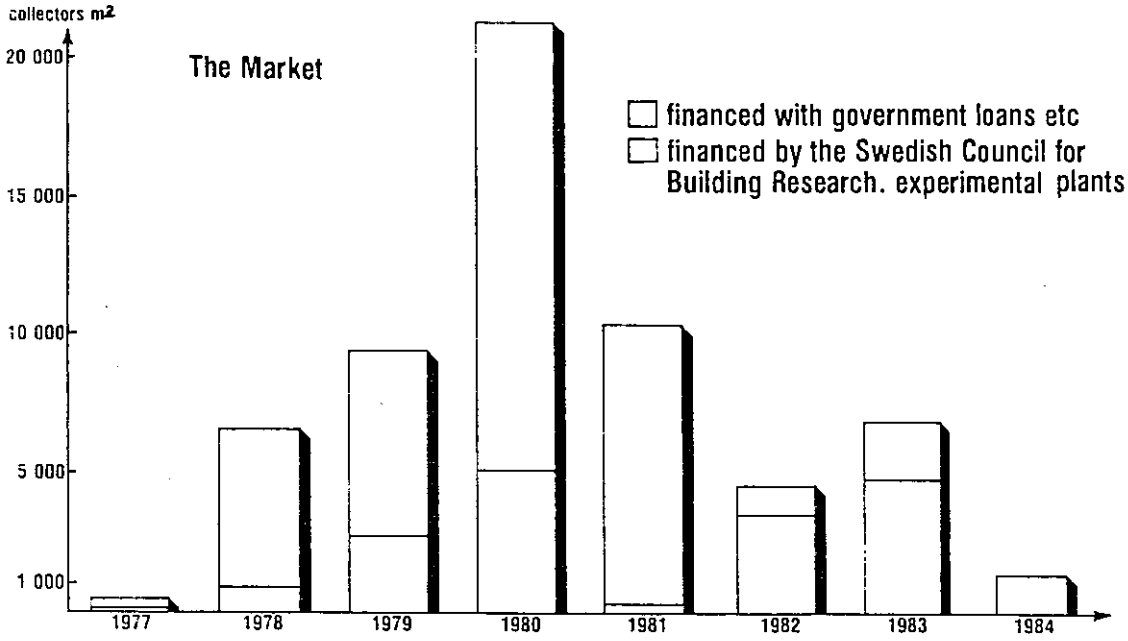


fig 1 The Market

- The market reached its peak shortly after the second oil crisis and the referendum on nuclear energy.
- From 1982 and on many house-owners have changed from oil to electricity.
- Systems financed by the Council are mainly for seasonal storage, district heating and domestic hot water in multifamily houses.

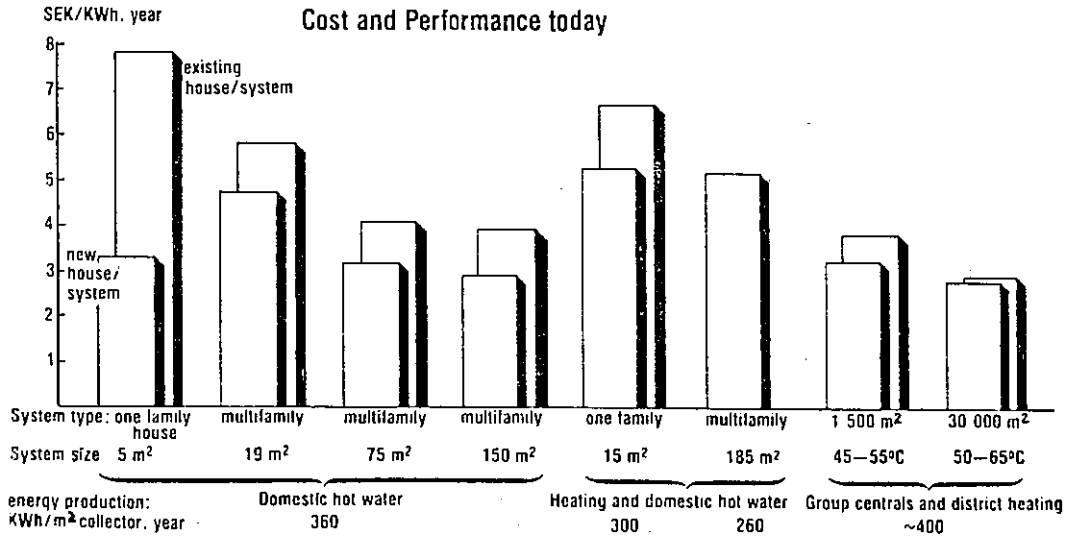


fig 2 Cost/performance for installed systems. (Investment cost per yearly produced KWh.).

- These data are input to the solar 85 model, see fig 5.
- The data represent the best systems today.
- A significant decrease in cost and increase in performance has been experienced the last few years.
- Further improvements are expected, especially for large solar fields.

SOLAR R&D PROJECTS IN SWEDEN
(1983)

PASSIVE AND HYBRID R&D PROJECTS

Code #	Project Title	Research Laboratory
SWED - 1	Energy Flow through Windows	Lunds Institute of Technology
SWED - 2	Lowenergyhouses in Taberg	Community of Jönköpin
SWED - 3	Calculation Methods to Predict Energy Savings in Residentral Buildings	Lunds Institute of Technology
SWED - 4	Modification of Standardhouse to Fit with Solar System for Heat Storage	Climator AB
SWED - 5	Calculation of Time Constant for New Office Building	Skanska
SWED - 6	Calculationmethods for Lowenergy Design	Formverkstand
SWED - 7	Utilizing Solar Energy through Efficient Building Plan	Lunds Institute of Technology
SWED - 8	Utilizing Solar Energy through Planning the Building	Lunds Institute of Technology
SWED - 9	Passive Solar Experiment in Hässelby	K-Konsult
SWED - 10	Energy Saving through Insulation of Windows in Existing Buildings	RBB
SWED - 11	Application of Passive Solar Heating in Karlstad	EFEM
SWED - 12	Roof as Solar Collector	AB Fastighetsanalys
SWED - 13	Passive Solar Energy Houses in Teleborgs Området, Växjö	Scandinavian Consulting
SWED - 14	Heatcapacity in Building Constructions Availabilty for Heatstorage	Paul Peterson Konstr. byrå AB
SWED - 15	Lowenergy Applicated Multifamily Houses with Passive Technic in Gothenburg	K-Konsult
SWED - 16	Development and Translation of MEPA, Micro Computer Energy Program for Architects	Institute of Technology
SWED - 17	Energyconsumption in Passive Heated Houses (Sparsamprojektet)	Institute of Technology

Code #	Project Title	Research Laboratory
SWED - 18	Simple Method for Estimating Solar Heat in Buildings	Can arkitekter
SWED - 19	Insulation through Glazing of Backyards, Norrköping	Citadellet AB
SWED - 20	Solar Structure. Part of Project: Energy Efficient Multifamily Houses in Stockholm	Comm of Stockholm
SWED - 21	Covered Yards in the Block Stettin. Evaluation of Influence of Energyconsumption and Comfort	Johnsson Ingenjörsbyrå AB
SWED - 22	Glazed Rooms and Outdoor Environments	Lunds Institute of Technology dep Buildingconstr.
SWED - 23	Application of Passive Systems in Karlstad. Monitoring and Evaluation	National Testing Institute Borås
SWED - 24	Passive Systems for Single Family Houses Computer Calculations and from analysis	K-Konsult
SWED - 25	Solar Collector Intergrated with the Roof in Multi-family Houses. Part of Project: Energy Efficient Multi-family Houses in Stockholm	Community of Stockholm
SWED - 26	Glazed Balconies, Energyaspects	VIAK AB
SWED - 27	Saving Energy through Glazing in Blocks. Feasivility Study	Scandiaconsult AB
SWED - 28	Office/House with Glazed Yards Alternative Design	ABV
SWED - 29	Passive Heated House with Wintergarden and Heatstorage	Lars Göran Pettersson
SWED - 30	Large Scale Application of Passive Solar System - Feasibility Study - Gothernburg	Lund & Valentin Arkitekter AB
SWED - 31	Passive Solar Heat and Constant Air Tightness in Concrete Wood Structured Buildings	Stig Peterzen
SWED - 32	Covering Yards in Existing Buildings	Arne Hohnsson, Ingenjörsbyrå AB
SWED - 33	Hybrid Solar Systems in Existing Buildings Feasibility Study	Nordström & Cø Ark-Kontor

Code No.: SWED - 1 Date Prepared:

1. TITLE OF PROJECT: Energy flow through windows	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Passive system, heat transmission	APPLICATION: ☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION Lunds inst of techn	5. NAME OF PRINCIPAL RESEARCHER: Bertil Jonsson
6. ADDRESS: LTH, Po box 725, S-220 07 LUND	
7. DURATION OF PROJECT (Give Dates) 1978-1982	8. FUNDING IN $ U.S.: 54 000

Code No.: SWED - 2 Date Prepared:

1. TITLE OF PROJECT: Lowenergyhouses in Taberg	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Passive system, Testing and Evaluation	APPLICATION: ☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION Community of Jönköpin	5. NAME OF PRINCIPAL RESEARCHER: Kent Kienninger
6. ADDRESS:	
7. DURATION OF PROJECT (Give Dates) 1978-1980	8. FUNDING IN $ U.S.: 19 000 + 119 000 (loan)

Code No.: SWED - 3 Date Prepared:

1. TITLE OF PROJECT: Calculation methods to predict energy savings in residentral build·ings

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Energy saving

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Lunds inst. of techn

5. NAME OF PRINCIPAL RESEARCHER:

Kurt Källstad

6. ADDRESS:

LTH, Po box 785, S-220 07 LUND

7. DURATION OF PROJECT (Give Dates)

1979-1983

8. FUNDING IN S U.S.:

77 500

Code No.: SWED - 4 Date Prepared:

1. TITLE OF PROJECT: Modification of standardhouse to fit with solar solar system for heat storage

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Passive system, heat storage

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Climator AB

5. NAME OF PRINCIPAL RESEARCHER:

Rolf Ulfengren

6. ADDRESS:

S-545 00 TÖREBORDA

7. DURATION OF PROJECT (Give Dates)

1979-1981

8. FUNDING IN S U.S.:

10 000 (loan)

Code No.: SWED - 5 Date Prepared:

1. TITLE OF PROJECT: Calculation of time constant for new office building

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Passive system, Time constant

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Skanska

5. NAME OF PRINCIPAL RESEARCHER:

Tor Wadenmark

6. ADDRESS:

Vendevägen S- Danderyd

7. DURATION OF PROJECT (Give Dates)

1979-1982

8. FUNDING IN $ U.S.:

15 500

Code No.: SWED - 6 Date Prepared:

1. TITLE OF PROJECT: Calculationmethods for lowenergy design

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Energyplanning

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Formverkstand

5. NAME OF PRINCIPAL RESEARCHER:

Harry Klava

6. ADDRESS:

Tjärhovsgatan 44, S-116 29 STOCKHOLM

7. DURATION OF PROJECT (Give Dates)

1980-1981

8. FUNDING IN $ U.S.:

3 000

Code No.: SWED - 7 Date Prepared:

1. TITLE OF PROJECT: Utilizing solar energy through efficient building plan

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Energy planning

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Lund inst. of techn

5. NAME OF PRINCIPAL RESEARCHER:

Staffan Salö

6. ADDRESS:

LTH, Pobox 752, S-220 07 LUND

7. DURATION OF PROJECT (Give Dates)

1980-1984

8. FUNDING IN S U.S.:

110 000

Code No.: SWED - 8 Date Prepared:

1. TITLE OF PROJECT: Utilizing solar energy through planning the building,

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Energy planning

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Lund inst of techn

5. NAME OF PRINCIPAL RESEARCHER:

Bo Adamson

6. ADDRESS:

LTH, Po Box 725, S-220 07 LUND

7. DURATION OF PROJECT (Give Dates)

1981-1982

8. FUNDING IN S U.S.:

225 000

Code No.: SWED - 9 Date Prepared:

1. TITLE OF PROJECT: Passive solar experiment in Hässelby	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Passive heating	APPLICATION: ☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION: K-Konsult	5. NAME OF PRINCIPAL RESEARCHER: Laszlo Marko
6. ADDRESS: Liljeholmstorg 7 Stockholm	
7. DURATION OF PROJECT (Give Dates): 1980 - 1986	8. FUNDING IN S U.S.: 168 000

Code No.: SWED - 10 Date Prepared:

1. TITLE OF PROJECT: Energy saving through insulation of windows in existing buildings	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Energy saving	APPLICATION: ☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION: RBB	5. NAME OF PRINCIPAL RESEARCHER: Carl-Hugo Olsson
6. ADDRESS:	
7. DURATION OF PROJECT (Give Dates): 1981-1984	8. FUNDING IN S U.S.: 68 000

Code No.: SWED - 11 Date Prepared:

1. TITLE OF PROJECT: Application of passive solar heating in Karlstad

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Passive heating

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

EFEM

5. NAME OF PRINCIPAL RESEARCHER:

Hans Eek

6. ADDRESS:

Göteborg

7. DURATION OF PROJECT (Give Dates)

1981-1985

8. FUNDING IN S U.S.:

52 000

Code No.: SWED - 12 Date Prepared:

1. TITLE OF PROJECT: Roof as solar collector

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Roof structure

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

AB Fastighetsanalys

5. NAME OF PRINCIPAL RESEARCHER:

Hans Lönn

6. ADDRESS:

Våruddsringen 136 Skärholmen

7. DURATION OF PROJECT (Give Dates)

1981-1985

8. FUNDING IN S U.S.:

10 000

Code No.: SWED - 13 Date Prepared:

1. TITLE OF PROJECT: Passive solar energy houses in Teleborgs området, Växjö

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Passive heating

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Scandinavian Consulting

5. NAME OF PRINCIPAL RESEARCHER:

Bo Ulmås

6. ADDRESS:

Scancon Sandgärdsgatan 24, S-352 34 VÄXJÖ

7. DURATION OF PROJECT (Give Dates)

1980-1982

8. FUNDING IN S U.S.:

83 000 (loan)

Code No.: SWED - 14 Date Prepared:

1. TITLE OF PROJECT: Heatcapacity in building constructions. availabilty for heatstorage

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Comparison of light, heavy construction

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Paul Peterson Konstr, byrå AB

5. NAME OF PRINCIPAL RESEARCHER:

David Södergren

6. ADDRESS:

Barnhusgatan 3 Stockholm

7. DURATION OF PROJECT (Give Dates)

1981 -

8. FUNDING IN S U.S.:

10 800

Code No.: SWED - 15 Date Prepared:

1. TITLE OF PROJECT: Lowenergy-applicated multifamily houses with passive technic in Gothenburg

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Low energy dwelling

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
K-Konsult

5. NAME OF PRINCIPAL RESEARCHER:
Gunnar Nordfeldt

6. ADDRESS:

Drottninggatan 38-44, S-411 07 GÖTEBORG

7. DURATION OF PROJECT (Give Dates)
1981

8. FUNDING IN S U.S.:
81 500

Code No.: SWED - 16 Date Prepared:

1. TITLE OF PROJECT: Development and translation of MEPA,Micro computer energy program for architects

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Simulation program

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Inst of technology

5. NAME OF PRINCIPAL RESEARCHER:
Bengt Hidemark

6. ADDRESS:

KTH - Husbyggnad, Fack, S-100 44 STOCKHOLM

7. DURATION OF PROJECT (Give Dates)
1981-1984

8. FUNDING IN S U.S.:
25 600

Code No.: SWED - 17 Date Prepared:

1. TITLE OF PROJECT: Energyconsumption in passive heated houses (Sparsam-projektet)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experi-mental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Testing and evaluation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Inst of techn

5. NAME OF PRINCIPAL RESEARCHER:

Arne Elmroth

6. ADDRESS:

KTH-Energi o Byggnad, Fack, S-100 44 STOCKHOLM

7. DURATION OF PROJECT (Give Dates)

1981 - 1985

8. FUNDING IN S U.S.:

100 000

Code No.: SWED - 18 Date Prepared:

1. TITLE OF PROJECT: Simple method for estimating solar heat in buildings

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experi-mental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Simulation program

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Can arkitekter

5. NAME OF PRINCIPAL RESEARCHER:

Roland Persson

6. ADDRESS:

Drottninggatan 57, S-111 21 STOC_HOLM

7. DURATION OF PROJECT (Give Dates)

1981

8. FUNDING IN S U.S.:

2 000

Code No.: SWED - 19 Date Prepared:

1. TITLE OF PROJECT: Insulation through ~~staying~~ glazing of backyards, Norrköping

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Simulation and modelling

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Citadellet AB

5. NAME OF PRINCIPAL RESEARCHER:

Carl-Gustaf Pettersson

6. ADDRESS:

Pobox 3212, S-103 64 STOCKHOLM

7. DURATION OF PROJECT (Give Dates)

1983-1984

8. FUNDING IN S U.S.:

3 000

Code No.: SWED - 20 Date Prepared:

1. TITLE OF PROJECT: Solar Structure. Part of project: Energy efficient multi-family houses in Stockholm

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Passive heating, multi-family house

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Comm of Stockholm

5. NAME OF PRINCIPAL RESEARCHER:

Mats Thorén

6. ADDRESS:

Po box 8314, S-104 20 STOCKHOLM

7. DURATION OF PROJECT (Give Dates)

1982-1984

8. FUNDING IN S U.S.:

45 000

Code No.: SWED - 21 Date Prepared:

1. TITLE OF PROJECT: Covered yards in the block Stettin. Evaluation of influence of energyconsumption and comfort

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Testing and evaluation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Johnsson Ingenjörsbyrå AB

5. NAME OF PRINCIPAL RESEARCHER:

Arne Sahlström

6. ADDRESS:

7. DURATION OF PROJECT (Give Dates)

1983-1984

8. FUNDING IN S U.S.:

13 000

Code No.: SWED - 22 Date Prepared:

1. TITLE OF PROJECT: Glazed rooms and outdoor environments

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Simulation and modelling

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Lund inst. o techn. dep Buildingconstr.

5. NAME OF PRINCIPAL RESEARCHER:

Bo Adamsson

6. ADDRESS:

LTH, Po Box 725, S-220 07 LUND

7. DURATION OF PROJECT (Give Dates)

1983-1984

8. FUNDING IN S U.S.:

25 000

Code No.: SWED - 23

Date Prepared:

1. TITLE OF PROJECT: Application of passive systems in Karlstad. ~~Metning~~ Monitoring and evaluation

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Testing and evaluation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

National testing inst. Borås

5. NAME OF PRINCIPAL RESEARCHER:

Åke Blomsterberg

6. ADDRESS:

SP, Po Box 857, S-501 15 BORÅS

7. DURATION OF PROJECT (Give Dates)

8. FUNDING IN S U.S.:

46 500

Code No.: SWED - 24

Date Prepared:

1. TITLE OF PROJECT: Passive systems for single family houses computer calculations and form analysis

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Simulation and modelling

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

K-Konsult

5. NAME OF PRINCIPAL RESEARCHER:

Gunnar Nordfeldt

6. ADDRESS:

Drottninggatan 38-44 S-411 07 GÖTEBORG

7. DURATION OF PROJECT (Give Dates)

1982-1984

8. FUNDING IN S U.S.:

16 000

Code No.: SWED - 25 Date Prepared:

1. TITLE OF PROJECT: Solar collector intergrated with the roof in multi family houses. Part of project: Energy efficent multifamily houses in Stockholm

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Roof structure

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Community of Stockholm

5. NAME OF PRINCIPAL RESEARCHER:

Mats Thoren

6. ADDRESS:

Po Box 8314, S-104 20 STOCKHOLM

7. DURATION OF PROJECT (Give Dates)

!)(!_!)($

8. FUNDING IN $ U.S.:

38 700

Code No.: SWED - 26 Date Prepared:

1. TITLE OF PROJECT: Glazed ~~calcoier~~ balconies, Energyaspects

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Direct gain

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

VIAK AB

5. NAME OF PRINCIPAL RESEARCHER:

Peter Kjaerboe

6. ADDRESS:

Po Box 519, S-162 15 VÄLLINGBY

7. DURATION OF PROJECT (Give Dates)

1982-1984

8. FUNDING IN $ U.S.:

5 000

Code No.: SWED - 27 Date Prepared:

1. TITLE OF PROJECT: Saving energy through glazing in blocks. Feasibility study

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Passive heating

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Scandiaconsult AB

5. NAME OF PRINCIPAL RESEARCHER:

Bengt Leidner

6. ADDRESS:

Po Box 4560, S-102 65 STOCKHOLM

7. DURATION OF PROJECT (Give Dates)

1982-1984

8. FUNDING IN $ U.S.:

3 000

Code No.: SWED - 28 Date Prepared:

1. TITLE OF PROJECT: Office/House with glazed yards Alternative design

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Passive heating

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

ABV

5. NAME OF PRINCIPAL RESEARCHER:

Gunnar Franzén

6. ADDRESS:

Po Box 246, S-201 22 MALMÖ

7. DURATION OF PROJECT (Give Dates)

1981- 1984

8. FUNDING IN $ U.S.:

33 000

Code No.: SWED - 29 Date Prepared:

1. TITLE OF PROJECT: Passive heated house with wintergarden and heatstorage

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Passive heating

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

-

5. NAME OF PRINCIPAL RESEARCHER:

Lars Göran Pettersson

6. ADDRESS:

7. DURATION OF PROJECT (Give Dates)

1981-1984

8. FUNDING IN S U.S.:

2 000

Code No.: SWED - 30 Date Prepared:

1. TITLE OF PROJECT: Large Scale application of passive solar system - feasibility study - Gothenburg

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Passive heating

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Lund & Valentin Arkitekter AB

5. NAME OF PRINCIPAL RESEARCHER:

Bo Karlberg

6. ADDRESS:

Po Box 3194, S-400 10 GÖTEBORG

7. DURATION OF PROJECT (Give Dates)

1981-1984

8. FUNDING IN S U.S.:

19 000

Code No.: SWED - 31 Date Prepared:

1. TITLE OF PROJECT: Passive solar heat and constant air lightness in concrete wood structured buildings

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Passive heating

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

5. NAME OF PRINCIPAL RESEARCHER:

Stig Peterzen

6. ADDRESS:

7. DURATION OF PROJECT (Give Dates)

1982-1984

8. FUNDING IN S U.S.:

21 000

Code No.: SWED - 32 Date Prepared:

1. TITLE OF PROJECT: Covering yards in existing buildings

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Passive heating

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Arne Johnsson, Ingenjörsbyrå AB

5. NAME OF PRINCIPAL RESEARCHER:

Per Olof Carlsson

6. ADDRESS:

Göteborg

7. DURATION OF PROJECT (Give Dates)

1983-1984

8. FUNDING IN S U.S.:

40 600

Code No.: SWED - 33

Date Prepared:

1. TITLE OF PROJECT: Hybrid solar systems in existing buildings Feasibility study

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Passive heating, Hybrid system

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Nordström & Co Ark-kontor

5. NAME OF PRINCIPAL RESEARCHER:

Christer Nordström

6. ADDRESS:

Åsstigen 14, S-436 00 ASKIM

7. DURATION OF PROJECT (Give Dates)

1982-1984

8. FUNDING IN $ U.S.:

9 ,300

SOLAR R&D PROJECTS IN SWEDEN

(1983)

ACTIVE R&D PROJECTS

Code #	Project Title	Research Laboratory
SWED - 34	Cost Trends for Different Energy Sources Related to the Economy for Heat Pump Installations, Solar Plants and Storage Systems	Margen-Consult
SWED - 35	Energy Strategies, Sol-85-Evaluation	Prognoskonsult i Sverige AB
SWED - 36	Fullscale Experiment with Massproduced Solar House with Solar Collectors and Heat Pump	Chalmers Institute of Technology
SWED - 37	Sun-sec, Fullscale Experiment with Massproduced Solar House with Solar Collector and Heat Pump	Skanska AB
SWED - 38	Solar Heated Domestic Hotwater for Nursinghome, Limhamn	Joel Österbergs Ing. byrå AB
SWED - 39	Solar Energy for Districtheating on Larsberg Feasibility Study	John Matsson förvaltning
SWED - 40	Evaluation, Solar Energy for an Industrial Building	Lunds Institute of Technology
SWED - 41	Monitoring and Evaluation of a Solar Plant in Ölsfors	National Testing Institute Borås
SWED - 42	Energy Flows in a Solar Collector Plant	ÅF-Energikonsult
SWED - 43	Large on-site Built Solar Collectors	Bengt Dahlgren AB
SWED - 44	Distribution of Flow in solar Collectors	Bengt Dahlgren AB
SWED - 45	Solar Collector for District Heating in Torvalla, Predesign	Östersund District Heating AB
SWED - 46	Evaluation, Domestic Hot Water Heating with Solar Energy	Institute of Technology, Stockholm
SWED - 47	Dehumidification of Storage with Solar Energy	ÅF Energikonsult AB
SWED - 48	Solar Energy System for Space Heating and Domestic Hot Water in a Single Family Home, Feasibility Study	K-Konsult

Code #	Project Title	Research Laboratory
SWED - 49	Solar Energy for Domestic Hot Water Heating in Shops Conditions and Demand	Gotherm Svenska Varv
SWED - 50	Application of Tubular Solar Collectors, Feasibility Study	Hugo Theorells Ing. byrå AB
SWED - 51	Solar Energy for Domestic Hot Water Heating in Multi-family Buildings	Gothernburg Housing Comp
SWED - 52	Domestic Hot Water Systems for Single-family Houses Based on Solar Energy	Andersson & Hultmark
SWED - 53	Swedish - Danish Domestic Hot Water Project with Solar Energy Design	Andersson & Hultmark AB
SWED - 54	Solar Heating Plants, Running and Maintenance Cost	Institute of Technology, Stockholm
SWED - 55	Solar Energy Storage in Rockcaverns	Community of Partille
SWED - 56	Evaluation of Solar Heating Plant Lambohov - Monitoring	Studsvik Energiteknik AB
SWED - 57	Evalutation of Solar Heating Plant in Lambohov	VIAK AB
SWED - 58	Central Solar Heating Plant in Ingelstad Växjö. Follow Up and Evaluation	Chalmers Institute of Technology
SWED - 59	Calculation of Optimal Relation between Collector Area and Storage Capacity	Lund Institute of Technology
SWED - 60	Evaluation of Materials in the Heat Storage, Central Solar Heating Plant in Ingelstad	National Testing Institute, Boras
SWED - 61	IEA-Central Solar Heating Plants. Optimization, Solar Collector Capabilities and System Studies	Studsvik Energiteknik AB
SWED - 62	Central Solar Heating Plant in Lambohov, Linköping. Monitoring and Evaluation	Chalmers Institute of Technology
SWED - 63	Central Solar Heating Plant in Södertälje Predesign, IEA Annex VII	Södertälje Power

Code No.: SWED - 34 Date Prepared:

1. TITLE OF PROJECT: Cost trends for different energy sources related to the economy for heat pump installations, solar plants and storage systems

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Economy, heat pump, solar energy, heat storage, energy prizes, implementation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Margen-Consult

5. NAME OF PRINCIPAL RESEARCHER:

Peter Margen

6. ADDRESS:

7. DURATION OF PROJECT (Give Dates)

1982-1983

8. FUNDING IN $ U.S.:

4 300

Code No.: SWED - 35 Date Prepared:

1. TITLE OF PROJECT:

Energy strategies, Sol-85-evaluation

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Testing and evaluation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Prognoskonsult i Sverige AB

5. NAME OF PRINCIPAL RESEARCHER:

Ilja Kordi

6. ADDRESS:

Mörbyleden 20, S-182 32 DANDERYD

7. DURATION OF PROJECT (Give Dates)

1982-1984

8. FUNDING IN $ U.S.:

85 000

Code No.: SWED - 36 Date Prepared:

1. TITLE OF PROJECT: Fullscale experiment with massproduced solar house with solar collectors and heat pump

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit ■ Heat Pump

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Heat pump

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Chalmers Inst of Technology

5. NAME OF PRINCIPAL RESEARCHER:

Hans Nordenström

6. ADDRESS:

CTH, S-412 96 GÖTEBORG

7. DURATION OF PROJECT (Give Dates)

1980-1983

8. FUNDING IN $ U.S.:

71 000

Code No.: SWED - 37 Date Prepared:

1. TITLE OF PROJECT: Sun-sec, fullscale experiment with massproduced solar house with solar collector and heat pump

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

heat pump

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Skanska AB

5. NAME OF PRINCIPAL RESEARCHER:

Curt Ivarsson

6. ADDRESS:

Vendevägen 89, S-182 25 DANDERYD

7. DURATION OF PROJECT (Give Dates)

1980-1981

8. FUNDING IN $ U.S.:

7 500

Code No.: SWED - 38 Date Prepared:

1. TITLE OF PROJECT: Solar heated domestic hotwater for nursinghome, Limhamn

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Domestic hot water supply

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Joel Österbergs Ing.byrå AB

5. NAME OF PRINCIPAL RESEARCHER:

Stig Gustavsson

6. ADDRESS:

7. DURATION OF PROJECT (Give Dates)

1980-1981

8. FUNDING IN $ U.S.:

11 000

Code No.: SWED - 39 Date Prepared:

1. TITLE OF PROJECT: Solar energy for districtheating on Larsberg feasibility study

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Simulation and modelling
District heating

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

John Matsson förvaltning

5. NAME OF PRINCIPAL RESEARCHER:

Weine Widell

6. ADDRESS:

Sergelgatan 1 Stockholm

7. DURATION OF PROJECT (Give Dates)

1980-1981

8. FUNDING IN $ U.S.:

12 000

Code No.: SWED - 40 Date Prepared:

1. TITLE OF PROJECT: Evaluation, solar energy for an industrial building

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Testing and evaluation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Lund inst. o techn.

5. NAME OF PRINCIPAL RESEARCHER:

Lars Jensen

6. ADDRESS:

Po box 725, S-220 07 LUND

7. DURATION OF PROJECT (Give Dates)

1981-1982

8. FUNDING IN $ U.S.:

7 000

Code No.: SWED - 41 Date Prepared:

1. TITLE OF PROJECT: ~~Metering~~ (Monitoring and) evalutation of solar plant in Olsfors

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Testing and evaluation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

National Testing inst. Borås

5. NAME OF PRINCIPAL RESEARCHER:

Kurt-Olof Lagerkvist

6. ADDRESS:

Po box 857, S-501 15 BORAS

7. DURATION OF PROJECT (Give Dates)

1981-1984

8. FUNDING IN $ U.S.:

9 800

Code No.: SWED - 42 Date Prepared:

1. TITLE OF PROJECT: Energy flows in a solar collector plant

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Simulation and modelling

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

AF-Energikonsult

5. NAME OF PRINCIPAL RESEARCHER:

Eva Nilsson

6. ADDRESS:

Stensjögatan 3, S-217 65 MALMÖ

7. DURATION OF PROJECT (Give Dates)

1980-1981

8. FUNDING IN $ U.S.:

1 500

Code No.: SWED - 43 Date Prepared:

1. TITLE OF PROJECT: Large on-site ~~unit~~ built solar collectors

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☒ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

On-site collector

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Bengt Dahlgren AB

5. NAME OF PRINCIPAL RESEARCHER:

Göran Hultmark

6. ADDRESS:

Göteborg

7. DURATION OF PROJECT (Give Dates)

1980-1982

8. FUNDING IN $ U.S.:

6 800

Code No.: SWED - 44 Date Prepared:

1. TITLE OF PROJECT: Distribution of flow in solar collectors

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Flow distribution

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Bengt Dahlgren AB

5. NAME OF PRINCIPAL RESEARCHER:

Göran Hultmark

6. ADDRESS:

Göteborg

7. DURATION OF PROJECT (Give Dates)

1982-1983

8. FUNDING IN $ U.S.:

15 000

Code No.: SWED - 45 Date Prepared:

1. TITLE OF PROJECT: Solar Collector for district heating in Torvalla, Predesign

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

district heating
simulation and modelling

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Östersund district heating AB

5. NAME OF PRINCIPAL RESEARCHER:

Tage Öhlund

6. ADDRESS:

Östersund

7. DURATION OF PROJECT (Give Dates)

1981-1982

8. FUNDING IN $ U.S.:

9 300

Code No.: SWED - 46 Date Prepared:

1. TITLE OF PROJECT: Evaluation, domestic hot water heating with solar energy	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Testing and evaluation	APPLICATION: ☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION Inst o techn, Stockholm	5. NAME OF PRINCIPAL RESEARCHER: Folke Peterson
6. ADDRESS: KTH, U o V, Fack, S-100 44 STOCKHOLM	
7. DURATION OF PROJECT (Give Dates) 1981-1984	8. FUNDING IN S U.S.: 16 000

Code No.: SWED - 47 Date Prepared:

1. TITLE OF PROJECT: Dehumidification of storage with solar energy	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Dehumidifying cycle	APPLICATION: ☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION AF Energikonsult AB	5. NAME OF PRINCIPAL RESEARCHER: Eva Nilsson
6. ADDRESS: Stensjögatan 3, S-217 65 MALMÖ	
7. DURATION OF PROJECT (Give Dates) 1982-1983	8. FUNDING IN S U.S.: 4 100

Code No.: SWED - 48 Date Prepared:

1. TITLE OF PROJECT: Solar energy system for heating and domestic hot water *in a* ~~heating~~, single family home, Feasibility study	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Simulation and modelling single family building	APPLICATION: ☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION K-Konsult	5. NAME OF PRINCIPAL RESEARCHER: Gunnar Nordfelt
6. ADDRESS: Drottninggatan 38-44, S-411 07 GÖTEBORG	
7. DURATION OF PROJECT (Give Dates) 1982-1983	8. FUNDING IN $ U.S.: 9 300

Code No.: SWED - 49 Date Prepared:

1. TITLE OF PROJECT: Solar energy for domestic hot water heating in shops conditions and demand	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Simulation and modelling	APPLICATION: ☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION Gotherm Svenska Varv	5. NAME OF PRINCIPAL RESEARCHER: Hans Frendin
6. ADDRESS: Po Box 8763, S-402 76 GÖTEBORG	
7. DURATION OF PROJECT (Give Dates) 1982-1983	8. FUNDING IN $ U.S.: 2 000

Code No.: SWED - 50 Date Prepared:

1. TITLE OF PROJECT: Application of ~~simular~~ tubular solar collectors, feasibility study

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Tubular collector

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Hugo Theorells Ing.byrå AB

5. NAME OF PRINCIPAL RESEARCHER:

Lars Olof Matsson

6. ADDRESS:

Po Box 1261, S-171 21 SOLNA

7. DURATION OF PROJECT (Give Dates)

!)(?_!)(!

8. FUNDING IN $ U.S.:

6 000

Code No.: SWED - 51 Date Prepared:

1. TITLE OF PROJECT: Solar energy for domestic hot water heating in multi-familybuildings

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Multifamily building

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Gothenburg Housing Comp

5. NAME OF PRINCIPAL RESEARCHER:

Göran Hultmark

6. ADDRESS:

Andersson & Hultmark, Po Box 24135, 400 22 GÖTEBORG

7. DURATION OF PROJECT (Give Dates)

1983-84

8. FUNDING IN S U.S.:

31 400

Code No.: SWED - 52 Date Prepared:

1. TITLE OF PROJECT: Domestic hot water systems for single family houses based on solar energy

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Single family building simulation and modelling

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Andersson & Hultmark

5. NAME OF PRINCIPAL RESEARCHER:

Göran Hultmark

6. ADDRESS:

Po Box 24135 , S-400 22 GÖTEBORG

7. DURATION OF PROJECT (Give Dates)

1983-1984

8. FUNDING IN S U.S.:

3 000

Code No.: SWED - 53 Date Prepared:

1. TITLE OF PROJECT: Swedish - Danish domestic hot water project with solar energy design

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Simulation and modelling

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Andersson & Hultmark AB

5. NAME OF PRINCIPAL RESEARCHER:

Göran Hultmark

5. ADDRESS:

Po Box 24 135, S-400 22 GÖTEBORG

7. DURATION OF PROJECT (Give Dates)

1983-84

8. FUNDING IN S U.S.:

15 000

Code No.: SWED - 54 Date Prepared:

1. TITLE OF PROJECT: Solar heating plants, running and maintenance cost

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Testing and evaluation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Inst. of techn, Stockholm

5. NAME OF PRINCIPAL RESEARCHER:

Folke Peterson

6. ADDRESS:

KTH- Inst f U o V, Fack, S-100 44 STOCKHOLM

7. DURATION OF PROJECT (Give Dates)

1983-1984

8. FUNDING IN S U.S.:

6 000

Code No.: SWED - 55 Date Prepared:

1. TITLE OF PROJECT: Solar energy storage in rock caverns

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Underground heat storage

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Community of Partille

5. NAME OF PRINCIPAL RESEARCHER:

Leif Lund

6. ADDRESS:

Viak AB, Mölndalsvägen 85, S-412 85 GÖTEBORG

7. DURATION OF PROJECT (Give Dates)

1980-1981

8. FUNDING IN S U.S.:

83 000

Code No.: SWED - 56 Date Prepared:

1. TITLE OF PROJECT: Evaluation of solar heating plant Lambohov – monitoring

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☒ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Testing and evaluation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Studsvik Energiteknik AB

5. NAME OF PRINCIPAL RESEARCHER:

Per Holst

6. ADDRESS:

S-611 82 NYKÖPING

7. DURATION OF PROJECT (Give Dates)

1980-1982

8. FUNDING IN S U.S.:

126 000

Code No.: SWED - 57 Date Prepared:

1. TITLE OF PROJECT: Evalutation of solar heating plant in Lambohov

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Testing and evaluation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

VIAK AB

5. NAME OF PRINCIPAL RESEARCHER:

Kjell Norbäck

6. ADDRESS:

Po box 242. S-791 26 FALUN

7. DURATION OF PROJECT (Give Dates)

1980-1982

8. FUNDING IN S U.S.:

98 000

Code No.: SWED - 58 Date Prepared:

1. TITLE OF PROJECT: Central solar heating plant in Ingelstad Växjö. Follow up and evaluation	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Testing and evaluation	APPLICATION: ☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION Chalmers inst of techn.	5. NAME OF PRINCIPAL RESEARCHER: Enno Abel
6. ADDRESS: CTH, Installationsteknik, S-412 96 GÖTEBORG	
7. DURATION OF PROJECT (Give Dates) 1980-1983	8. FUNDING IN $ U.S.: 130 000

Code No.: SWED - 59 Date Prepared:

1. TITLE OF PROJECT: Calculation of optimal relation between collector area and storage capacity	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Simulation and modelling	APPLICATION: ☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION Lund inst of techn.	5. NAME OF PRINCIPAL RESEARCHER: Sven-Erik Ransmark
6. ADDRESS: Po box 725, S-220 07 LUND	
7. DURATION OF PROJECT (Give Dates) 1980-1981	8. FUNDING IN $ U.S.: 4 500

Code No.: SWED - 60 Date Prepared:

1. TITLE OF PROJECT: Evaluation of materials in the storage heat ~~ackumulator~~, central solar heating plant in Ingelstad

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Storage materials

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

National testing inst. Borås

5. NAME OF PRINCIPAL RESEARCHER:

Hans Wennerholm

6. ADDRESS:

Po box 857, S-501 15 BORAS

7. DURATION OF PROJECT (Give Dates)

1980-1983

8. FUNDING IN S U.S.:

24 000

Code No.: SWED - 61 Date Prepared:

1. TITLE OF PROJECT: IEA-central solar heating plants. Optimization, solar collector capabilities and system studies.

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Simulation and modelling

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Studsvik Energiteknik AB

5. NAME OF PRINCIPAL RESEARCHER:

Hans Gransell

6. ADDRESS:

S-611 82 NYKÖPING

7. DURATION OF PROJECT (Give Dates)

1980-1984

8. FUNDING IN S U.S.:

247 000

Code No.: SWED - 62 Date Prepared:

1. TITLE OF PROJECT: Central solar heating plant in Lambohov, Linköping. ~~Metering~~ Monitoring and evaluation

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Testing and evaluation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Chalmers inst of techn.

5. NAME OF PRINCIPAL RESEARCHER:
Enno Abel

6. ADDRESS:
CTH-Installationsteknik, S-412 96 GÖTEBORG

7. DURATION OF PROJECT (Give Dates)
1981-1984

8. FUNDING IN S U.S.:
70 000

Code No.: SWED - 63 Date Prepared:

1. TITLE OF PROJECT: Central solar heating plant in Södertälje predesign, IEA Annex VII

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

District heating

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Södertälje Power

5. NAME OF PRINCIPAL RESEARCHER:
Thomas Bruce

6. ADDRESS:
Södertälje energiverk, S-151 89 SÖDERTÄLJE

7. DURATION OF PROJECT (Give Dates)
1982-1984

8. FUNDING IN S U.S.:
18 800

4.9 SUMMARY OF U.S. SOLAR HEATING AND COOLING RD&D PROGRAM

ORGANIZATION

Solar heating and cooling is the responsibility of the U.S. Department of Energy's Office of Solar Heat Technologies which comes under the Assistant Secretary for Conservation and Renewable Energy. The Program is divided between the Active Heating and Cooling and the Passive and Hybrid Systems Division.

PROGRAM GOALS

The goal of the U.S. Solar Heating and Cooling Program is to provide industry with a technology base that will enable it to develop components and systems that efficiently and cost-effectively convert solar energy into usable thermal energy. This is accomplished by (1) supporting long range and high risk R&D having high benefit potential and by (2) transferring research results to industry.

Specific goals of the Active Solar Program are:

- To improve cost/performance ratios by a factor of two to four over that of today's state-of-the-art active solar systems
- To achieve improvements in component and system reliability and durability to assure 20-year service life of active solar systems.

Specific goals of the Passive Solar Program are:

- To facilitate development of solar cooling technologies that, when integrated with daylighting strategies, are capable of reducing the amount of electricity used in nonresidential buildings by 60 percent.
- To developed advanced technologies that improve performance of passive and hybrid solar heating systems by at least a factor of two over current technology, while mitigating off-season adverse effects.

PROGRAM EMPHASIS

To achieve the above goals, the following areas of program emphasis have been established:

Active Solar

1. Advanced Research and Analysis
   - . Collector Materials & Components
   - . Thermal Storage
   - . Absorption Cooling
   - . Rankine Cooling
   - . Desiccant Cooling
2. Systems Research and Analysis
   - . Systems Testing and Analysis
   - . Performance monitoring
   - . System Effectiveness Research
   - . Test Procedures and Performance Criteria

Passive Solar

1. Systems R&D
   - . Passive Heating and Cooling Performance Analysis
     - . Non-residential buildings
     - . Residential buildings
     - . Daylighting systems
     - . Cooling
   - . Performance Testing and Evaluation
     - . Performance monitoring
     - . Simulation Code Validation
     - . Design Tools
   - . Heat Transfer Research
2. Advanced Materials and Components
   - . Solar Load Control
     - . Aperture Materials and Components
     - . Daylighting enhancement
   - . Thermal Storage Materials
     - . Phase change materials
     - . Masonry
     - . Desiccants
   - . Thermal Transport Subsystems
     - . Thermal diodes

FUNDING

	(In millions $U.S.) FY83	FY84
Active Solar	6.7	8.4
Passive Solar	5.0	8.5

SOLAR R&D PROJECTS IN THE UNITED STATES (May 11, 1984)

PASSIVE AND HYBRID R&D PROJECTS

CODE #	PROJECT TITLE	RESEARCH LABORATORY
US-1	Performing Building Energy Analyses to Evaluate the Energy Potential of Advanced Aperture Materials and Devices	Lawrence Berkeley Laboratory
US-2	Building Energy Use Characterization	Lawrence Berkeley Laboratory
US-3	Building Diagnostics	Solar Energy Research Institute
US-4	Building Energy Analysis Validation	Solar Energy Research Institute
US-5	Building Element Vector Analysis	Solar Energy Research Institute
US-6	Validation of New Heat Transfer Algorithms	National Bureau of Standards
US-7	Passive System Integration	Los Alamos National Laboratory
US-8	Performance Evaluation of Experimental Systems	Lawrence Berkeley Laboratory
US-9	Occupancy Evaluation	Lawrence Berkeley Laboratory
US-10	Mechanism Level Monitoring and Algorithm Development	Solar Energy Research Institute
US-11	Class A Data Program	National Bureau of Standards
US-12	Energy Characterization of Roof Apertures in Commercial Buildings	Lawrence Berkeley Laboratory
US-13	Roof Aperture Design Integration	Lawrence Berkeley Laboratory
US-14	Beam Daylighting Projection Devices	Lawrence Berkeley Laboratory
US-15	Daylighting Systems Research	Solar Energy Research Institute
US-16	Solar Radiation Research	Solar Energy Research Institute
US-17	Sensitivity of Building Energy Consumption to Variations in Convection Coefficients	Lawrence Berkeley Laboratory
US-18	Natural Ventilation Heat Removal	Lawrence Berkeley Laboratory

CODE #	PROJECT TITLE	RESEARCH LABORATORY
US-19	Effect of Variable Convection Coefficients on Thermal Energy Storage in Buildings	Lawrence Berkeley Laboratory
US-20	Natural Convection Inside Buildings	Los Alamos National Laboratory
US-21	Convection Research	Solar Energy Research Institute
US-22	Engineering Concept Design for Non-Residential Passive Cooling Systems	Lawrence Berkeley Laboratory
US-23	Hybrid Ventilation	Lawrence Berkeley Laboratory
US-24	Cooling Demand Avoidance	Los Alamos National Laboratory
US-25	Transparent Insulating Materials for Windows	Lawrence Berkeley Laboratory
US-26	Durable Low-Emittance Coatings	Lawrence Berkeley Laboratory
US-27	Chromogenic Materials	Lawrence Berkeley Laboratory
US-28	Angle Selective Films	Lawrence Berkeley Laboratory
US-29	Light Guides	Lawrence Berkeley Laboratory
US-30	Aperture Performance Criteria and Characteristics	Lawrence Berkeley Laboratory
US-31	Optical Switching Apertures Research	Solar Energy Research Institute
US-32	Thermal Performance of Passive Solar Apertures and Storage Components	National Bureau of Standards
US-33	Phase Change Storage Materials	Solar Energy Research Institute
US-34	High Specific Heat Passive Storage Media	National Bureau of Standards
US-35	Vapor-Phase Transport	Los Alamos National Laboratory
US-36	Convection Diodes	Los Alamos National Laboratory
US-37	Selective Opaque Coating Research	Los Alamos National Laboraotry

CODE #	PROJECT TITLE	RESEARCH LABORATORY
US-38	Daylighting and Resource Characterization: A Demographic Study of Building Energy Use	American Institute of Architects/ Foundation
US-39	Development of a Standard Test Method for Design Tools	Building Energy Design Tool Development Council
US-40	Advanced Daylighting Systems and Materials Research	DOE Chicago Operations Office
US-41	Study of Controls for Heating and Cooling Systems	Construction Engineering Research Laboratory
US-42	Industry-Based Residential Building Thermal Performance Evaluation Program	NAHB Research Foundation
US-43	Solar Building Energy Analysis Code Development and Validation - Non-Residential Experimental Buildings Program	DOE Chicago Operations Office
US-44	Heat Transfer in Buildings	Lawrence Berkeley Laboratory
US-45	Advanced Optical and Thermal Technologies for Aperture Control	Lawrence Berkeley Laboratory
US-46	Passive Solar Manufactured Buildings Development and Analysis	Solar Energy Research Institute
US-47	Research of Advanced Energy Storage Devices and Systems for Passive Solar Residential Applications for Market Housing	NAHB Research Foundation
US-48	Data Collection and Analysis at the REPEAT Facility (Experimental Passive Building)	Colorado State University
US-49	Active-Passive Hybrid Heating Systems (simulation of)	University of Wisconsin-Madison
US-50	Variable Transmittance Electrochromic Windows	EIC Laboratories, Inc.
US-51	Optics and Materials Research	Tufts University
US-52	Phase Change Materials for Use in Passive and Hybrid Solar Heating and Cooling	Univ. of Dayton Research Inst.

Code No.: US-1 Date Prepared: 10 May 1984

1. TITLE OF PROJECT: Performing Building Energy Analyses to Evaluate the Energy Potential of Advanced Aperture Materials and Devices

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Daylighting, roof structure, performance

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:

Wayne Place

6. ADDRESS: Building 90
University of California
Berkeley, CA 94720

7. DURATION OF PROJECT (Give Dates)

Multi-year

8. FUNDING IN $ U.S.:

FY 1984: $100K; Total: $220K

Code No.: US-2 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:

Building Energy Use Characterization

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Passive heating, passive cooling, daylighting, performance, system simulation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:

W.L. Carrol

6. ADDRESS: Building 90
University of California
Berkeley, CA 94720

7. DURATION OF PROJECT (Give Dates)

Multi-year

8. FUNDING IN $ U.S.:

FY 1984: $100K; Total: $200K

Code No.: US-3 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Building Diagnostics

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
System simulation, computer design

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Solar Energy Research Institute

5. NAME OF PRINCIPAL RESEARCHER:
Craig Christensen

6. ADDRESS: 1617 Cole Blvd.
Golden, CO 80401

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $50K; FY 1983: $75K

Code No.: US-4 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Building Energy Analysis Validation

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
System analysis, error analysis

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Solar Energy Research Institute

5. NAME OF PRINCIPAL RESEARCHER:
R. Judkoff

6. ADDRESS: 1617 Cole Blvd.
Golden, CO 80401

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $150K

Code No.: US-5 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Building Element Vector Analysis

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Performance, data aquisition system, passive cooling, passive heating

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Solar Energy Research Institute

5. NAME OF PRINCIPAL RESEARCHER:
Kris Subarro

6. ADDRESS: 1617 Cole Blvd.
Golden, CD 80401

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $115K; FY 1983: $100K

Code No.: US-6 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Validation of New Heat Transfer Algorithms

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
System simulation, passive heating, passive cooling, heat transfer

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
National Bureau of Standards

5. NAME OF PRINCIPAL RESEARCHER:
Michael McCabe

6. ADDRESS: Washington, DC 20234

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $140K; Total: $305K

Code No.: US-7 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Passive System Integration

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Passive heating, integrated system

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Los Alamos National Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
William O. Wray

6. ADDRESS:
Los Alamos, New Mexico 87545

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $140K

Code No.: US-8 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Performance Evaluation of Experimental Systems

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Passive heating, passive cooling, daylighting, roof structure, performance

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
Brandt Andersson

6. ADDRESS: Building 90
University of California
Berkeley, CA 94720

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $225K; Total: $325K

Code No.: US-9 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Occupancy Evaluation

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Performance, passive heating, passive cooling, daylighting

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
Brandt Andersson

6. ADDRESS: Building 90
University of California
Berkeley, CA 94720

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $0K; FY 1983: $80K

Code No.: US-10 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Mechanism Level Monitoring and Algorithm Development

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Data aquisition system, heat loss

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Solar Energy Research Institute

5. NAME OF PRINCIPAL RESEARCHER:
Dave Wortman

6. ADDRESS: 1617 Cole Blvd.
Golden, CO 80401

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $225K; FY 1983: $275K

Code No.: US-11 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Class A Data Program

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Data aquisition system, passive heating, testing and evaluation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
National Bureau of Standards

5. NAME OF PRINCIPAL RESEARCHER:
Bal Hahajan, Joseph Greenberg

6. ADDRESS:
Washington, DC 20234

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $305K; Total: $1539K

Code No.: US-12 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Energy Characterization of Roof Apertures in Commercial Buildings

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Daylighting, roof structure

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
Wayne Place

6. ADDRESS: Building 90
University of California
Berkeley, CA 94720

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $165K; Total: $345K

Code No.: US-13 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Roof Aperture Design Integration

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Roof structure

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
Wayne Place

6. ADDRESS: Building 90
University of California
Berkeley, CA 94720

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $150K; Total: $180K

Code No.: US-14 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Beam Daylighting Projection Devices

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Daylighting

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
Wayne Place

6. ADDRESS: Building 90
University of California
Berkeley, CA 94720

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $50K; Total: $60K

Code No.: US-15 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Daylighting Systems Research

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Daylighting, solar insolation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Solar Energy Research Institute

5. NAME OF PRINCIPAL RESEARCHER:
Claude Robbins

6. ADDRESS: 1617 Cole Blvd.
Golden, CO 80401

7. DURATION OF PROJECT (Give Dates)
10/82 - continuing

8. FUNDING IN $ U.S.:
FY 1984: $180K; FY 1983: $175K

Code No.: US-16 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Solar Radiation Research

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Daylighting, solar insolation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Solar Energy Research Institute

5. NAME OF PRINCIPAL RESEARCHER:
R.L. Hulstrom

6. ADDRESS: 1617 Cole Blvd.
Golden, CO 80401

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $40K

Code No.: US-17 Date Prepared: 9 May 1984

1. TITLE OF PROJECT: Sensitivity of Building Energy Consumption to Variations in Convection Coefficients

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Heat transfer, system simulation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
Fred Bauman

6. ADDRESS: Building 90
University of California
Berkeley, CA 94720

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $75K; Total: $125K

Code No.: US-18 Date Prepared: 9 May 1984

1. TITLE OF PROJECT:
Natural Ventilation Heat Removal

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Oevelopment, ☐ Durability and Reliability

3. KEYWORDS:
Passive cooling, heat transfer, system simulation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
Fred Bauman

6. ADDRESS: Building 90
University of California
Berkeley, CA 94720

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $75K; Total: $325K

Code No.: US-19 Date Prepared: 9 May 1984

1. TITLE OF PROJECT: Effect of Variable Convection Coefficients on Thermal Energy Storage in Buildings

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Heat transfer, thermal energy storage

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
Fred Bauman

6. ADDRESS: Building 90
University of California
Berkeley, CA 94720

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $100K; Total: $125K

Code No.: US-20 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Natural Convection Inside Buildings

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Heat transfers, measurement

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Los Alamos National Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
J. Douglas Balcomb

6. ADDRESS:
Los Alamos, New Mexico 87545

7. DURATION OF PROJECT (Give Oates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $195K; Total: $555K

Code No.: US-21 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Convection Research

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Heat transfer, performance

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Solar Energy Research Institute

5. NAME OF PRINCIPAL RESEARCHER:
M. Bohn

6. ADDRESS: 1617 Cole Blvd.
Golden, CO 80401

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $400K; FY 1983: $300K

Code No.: US-22 Date Prepared: 9 May 1984

1. TITLE OF PROJECT:
Engineering Concept Design for Non-Residential Passive Cooling Systems

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Commercial building, passive cooling

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
Marlo Martin

6. ADDRESS:

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $15DK

Code No.: US-23 Date Prepared: 9 May 1984

1. TITLE OF PROJECT:
Hybrid Ventilation

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
System analysis, system simulation, passive cooling, commercial building

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
Marlo Martin

6. ADDRESS: Building 90
University of California
Berkeley, CA 94720

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984; $50K

Code No.: US-24 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Cooling Demand Avoidance

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Residential buildings, system simulation, passive heating, passive cooling

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Los Alamos National Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
Robert McFarland

6. ADDRESS: Los Alamos, New Mexico 87545

7. DURATION OF PROJECT (Give Dates)
10/82 - continuing

8. FUNDING IN $ U.S.:
FY 1984: $295K; Total: $595K

Code No.: US-25 Date Prepared: 9 May 1984

1. TITLE OF PROJECT:
Transparent Insulating Materials for Windows

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Thermal insulation, control system, selective absorbers, commercialization

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:

Arlon Hunt

6. ADDRESS: Building 90
University of California
Berkeley, CA 94720

7. DURATION OF PROJECT (Give Dates)

7/82 - 7/86

8. FUNDING IN $ U.S.:

FY 1984: $150K; Total: $320K

Code No.: US-26 Date Prepared: 9 May 1984

1. TITLE OF PROJECT:
Durable Low-Emittance Coatings

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Heat transfer

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:

M. Rubin, C.M. Lampert

6. ADDRESS: Building 90
University of California
Berkeley, California 94720

7. DURATION OF PROJECT (Give Dates)

Multi-year

8. FUNDING IN $ U.S.:

FY 1984: $120K; Total: $230K

Code No.: US-27 Date Prepared: 9 May 1984

1. TITLE OF PROJECT:
Chromogenic Materials

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Daylighting, passive heating

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
C.M. Lampert

6. ADDRESS: Building 90
University of California
Berkeley, CA 94720

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $165K; Total: $275K

Code No.: US-28 Date Prepared: 9 May 1984

1. TITLE OF PROJECT:
Angle Selective Films

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Passive heating, passive cooling, daylighting

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
C.M. Lampert

6. ADDRESS: Building 90
University of California
Berkeley, CA 94720

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $40K; Total: $55K

Code No.: US-29 Date Prepared: 9 May 1984

1. TITLE OF PROJECT:
Light Guides

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Daylighting

APPLICATION:

☐ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
Steve Selkowitz

6. ADDRESS: Building 90
University of California
Berkeley, CA 94720

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $120K; Total: $195K

Code No.: US-30 Date Prepared: 9 May 1984

1. TITLE OF PROJECT:
Aperture Performance Criteria and Characteristics

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Daylighting, passive heating, passive cooling, performance

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
Steve Selkowitz

6. ADDRESS: Building 90
University of California
Berkeley, CA 94720

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $65K; Total: $135K

Code No.: US-31 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Optical Switching Apertures Research

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Daylighting, passive heating, passive cooling

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Solar Energy Research Institute

5. NAME OF PRINCIPAL RESEARCHER:
David Benson

6. ADDRESS: 1617 Cole Blvd.
Golden, CO 80401

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $225K; FY 1983: $100K

Code No.: US-32 Date Prepared: 10 May 1984

1. TITLE OF PROJECT: Thermal Performance of Passive Solar Apertures and Storage Components

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Heat transfer, thermal energy storage materials

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
National Bureau of Standards

5. NAME OF PRINCIPAL RESEARCHER:
Michael McCabe

6. ADDRESS: Washington, DC 20234

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $125K; Total: $890K

Code No.: US-33 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Phase Change Storage Materials

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Phase change material, passive heating

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Solar Energy Research Institute

5. NAME OF PRINCIPAL RESEARCHER:
David K. Benson

6. ADDRESS: 1617 Cole Boulevard
Golden, CO 80401

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $265K; FY 1983: $100K

Code No.: US-34 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
High Specific Heat Passive Storage Media

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☒ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Thermal energy storage materials

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
National Bureau of Standards

5. NAME OF PRINCIPAL RESEARCHER:
Dr. Paul W. Brown

6. ADDRESS: Washington, DC 20234

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $65K; Total: $205K

Code No.: US-35 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Vapor-Phase Transport

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Heat transfer, performance, passive heating

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Los Alamos National Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
James C. Hedstrom

6. ADDRESS:
Los Alamos, NM 87545

7. DURATION OF PROJECT (Give Dates)
10/82 - continuing

8. FUNDING IN $ U.S.:
FY 1984: $155K; Total: $255K

Code No.: US-36 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Convective Diodes

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Passive heating, heat transfer, performance

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Los Alamos National Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
Gerard F. Jones

6. ADDRESS:
Los Alamos, New Mexico 87545

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $155K; Total: $295K

Code No.: US-37 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Selective Opaque Coating Research

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Oevelopment, ☐ Durability and Reliability

3. KEYWORDS:
Selective absorbers, passive heating

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Los Alamos National Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
Stanley W. Moore

6. ADDRESS: Los Alamos, New Mexico 87545

7. DURATION OF PROJECT (Give Dates)
Multi-year

8. FUNDING IN $ U.S.:
FY 1984: $80K; Total: $180K

Code No.: US-38 Date Prepared: 10 May 1984

1. TITLE OF PROJECT: Daylighting and Resource Characterization: A Demographic Study of Building Energy Use

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Commercial buildings, daylighting, passive cooling, passive heating

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Amer. Inst. of Architects/Foundation

5. NAME OF PRINCIPAL RESEARCHER:
Susan Tsai

6. ADDRESS: 1735 New York Avenue N.W.
Washington, DC 20006

7. DURATION OF PROJECT (Give Dates)
-10/84

8. FUNDING IN $ U.S.:
FY 1983: $225K (includes archiving experimental buildings data) FY 84: $0K

Code No.: US-39 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Development of a Standard Test Method for Design Tools

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Testing and evaluation, passive heating, passive cooling

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Building Energy Design Tool Development Council

5. NAME OF PRINCIPAL RESEARCHER:
Mike Bell

6. ADDRESS: 6727 Curran Street
McLean, VA 22101

7. DURATION OF PROJECT (Give Dates)
5/83 - 5/84

8. FUNDING IN $ U.S.:
FY 83: $0; FY 84: $0; Total: $250K

Code No.: US-40 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Advanced Daylighting Systems and Materials Research

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Daylighting, phase change material, thermal energy storage materials

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Includes a variety of subcontractors

5. NAME OF PRINCIPAL RESEARCHER:

6. ADDRESS: Managed through: DOE Chicago Operations Office
9800 S. Cass Avenue
Argonne, IL 60439

7. DURATION OF PROJECT (Give Dates)
9/83 - 4/85

8. FUNDING IN $ U.S.:
FY 83: $100,000; FY 84: to be determined

Code No.: US-41 Date Prepared: 10 May 1984

1. TITLE OF PROJECT: Study of Controls for Heating and Cooling Systems

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Control systems, passive heating, passive cooling

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Construction Engineering Research Laboratory

5. NAME OF PRINCIPAL RESEARCHER:

Douglas C. Hittle

6. ADDRESS: P.O. Box 4005
Champaign, IL 61820

7. DURATION OF PROJECT (Give Dates)

-8/86

8. FUNDING IN $ U.S.:

FY 84: $140K; FY 1983: $80K

Code No.: US-42 Date Prepared: 10 January 1984

1. TITLE OF PROJECT: Industry-Based Residential Building Thermal Performance Evaluation Program

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:

Performance, system analysis, data aquisition system

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

NAHB Research Foundation

5. NAME OF PRINCIPAL RESEARCHER:

Don Frey (303) 428-8228

6. ADDRESS: P.O. Box 1627
Rockville, MD 20850

7. DURATION OF PROJECT (Give Dates)

7/83 - 2/85

8. FUNDING IN $ U.S.:

FY 1984: $248K; Total: $549K

Code No.: US-43 Date Prepared: 10 May 1984

1. TITLE OF PROJECT: Solar Building Energy Analysis Code Development and Validation - Non-Residential Experimental Buildings Program

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Performance, commercial buildings, passive heating, passive cooling, data aquisition system

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Includes a variety of subcontractors

5. NAME OF PRINCIPAL RESEARCHER:

6. ADDRESS: managed through: DOE Chicago Operations Office
9800 S. Cass Avenue
Argonne, IL 60439

7. DURATION OF PROJECT (Give Dates)

1/79 - 1/85

8. FUNDING IN $ U.S.:

FY 1984: $355K; Total: $3,536K

Code No.: US-44 Date Prepared: 10 May 1984

1. TITLE OF PROJECT: Heat Transfer in Buildings

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
Heat transfer, system simulation, system analysis, measurement, computer design

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:

Ron Kammerud

6. ADDRESS: Passive Research and Development Group
University of California, Berkeley, California 94720

7. DURATION OF PROJECT (Give Dates)

6/81 - 10/84

8. FUNDING IN $ U.S.:

FY 1983: $150,000

Code No.: US-45 Date Prepared: 10 May 1984

1. TITLE OF PROJECT:
Advanced Optical and Thermal Technologies for Aperture Control

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ■ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Oevelopment, ☐ Durability and Reliability

3. KEYWORDS:
Passive heating, passive cooling, daylighting, selective absorbers, control system

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
Stephen Selkowitz

6. ADDRESS: Applied Science Division - Bldg. 90, Room 3111
University of California, Berkeley, CA 94720

7. DURATION OF PROJECT (Give Dates)
7/82 - continuing

8. FUNDING IN $ U.S.:
FY 1983: $275,000

Code No.: US-46 Date Prepared: 10 May 1984

1. TITLE OF PROJECT: Passive Solar Manufactured Buildings Development and Analysis

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: economics, passive heating, residential building, single family, performance, system simulation, system analysis

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Solar Energy Research Institute

5. NAME OF PRINCIPAL RESEARCHER:
Robert deKieffer

6. ADDRESS: 1617 Cole Boulevard
Goldeon, CO 80401

7. DURATION OF PROJECT (Give Dates)
10/82 - 12/83

8. FUNDING IN $ U.S.:
FY 1983: $55K

Code No.: US-47 Date Prepared: 10 May 1984

1. TITLE OF PROJECT: Research of Advanced Energy Storage Devices and Systems for Passive Solar Residential Applications for Market Housing

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
phase change material, heat transfer, passive heating, testing and evaluation

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
NAHB Research Foundation

5. NAME OF PRINCIPAL RESEARCHER:
Paul Kando

6. ADDRESS: 627 Southlawn Lane
Rockville, Maryland 20850

7. DURATION OF PROJECT (Give Dates)
9/82 - 12/31/83

8. FUNDING IN $ U.S.:
FY 1983: $157,403; Total: $161,499

Code No.: US-48 Date Prepared: 10 May 1984

1. TITLE OF PROJECT: Data Collection and Analysis at the REPEAT Facility (Experimental Passive Building)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☒ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS:
heat transfer, residential building, data acquisition, system analysis, commercial building, passive heating

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Colorado State University

5. NAME OF PRINCIPAL RESEARCHER:
C. Byron Winn

6. ADDRESS: Mechanical Engineering Department, CSU
Fort Collins, Colorado 80523

7. DURATION OF PROJECT (Give Dates)
11/1/79 - 6/30/84

8. FUNDING IN $ U.S.:
FY 1984: TBD; Total: $521,490

Code No.: US-49 Date Prepared: 10 May 1984

1. TITLE OF PROJECT: Active-Passive Hybrid Heating Systems (simulation of)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Integrated system, hybrid system, system simulation, error analysis, system analysis, passive heating

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

University of Wisconsin-Madison

5. NAME OF PRINCIPAL RESEARCHER:

J.A. Duffie

6. ADDRESS: Solar Energy Laboratory
1500 Johnson Drive
Madison, Wisconsin 53706

7. DURATION OF PROJECT (Give Dates)

8/15/81 - 2/4/85

8. FUNDING IN $ U.S.:

FY 1984: TBD; Total: $210,113

Code No.: US - 50 Date Prepared: January, 1984

1. TITLE OF PROJECT: Variable Transmittance Electrochromic Windows

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☒ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Selective absorbers, control system, passive heating, testing and evaluation

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

EIC Laboratories, Inc.

5. NAME OF PRINCIPAL RESEARCHER:

R. D. Rauh

6. ADDRESS: 111 Chapel Street
Newton, Massachusetts 02158

7. DURATION OF PROJECT (Give Dates)

7/82 - 7/31/85

8. FUNDING IN $ U.S.: FY 1984: To be determined Total: $227,358

Code No.: US -51 Date Prepared: January, 1984

1. TITLE OF PROJECT: Optics and Materials Research for Controlled Radiant Energy Transfer in Buildings

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Heat transfer, control system, testing and evaluation, passive heating, passive cooling

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Tufts University

5. NAME OF PRINCIPAL RESEARCHER:

Ronald Goldner

6. ADDRESS: Department of Electrical Engineering
Medford, Massachusetts 02155

7. DURATION OF PROJECT (Give Dates)

8/8/82 - 8/31/85

8. FUNDING IN $ U.S.: FY 1984: To be determined
FY 1983: $95,000

Code No.: US - 52 Date Prepared: January, 1984

1. TITLE OF PROJECT: Phase Change Materials for Use in Passive and Hybrid Solar Heating and Cooling Systems

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Phase change material, residential buildings, testing and evaluation, passive heating, passive cooling

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Univ. of Dayton Research Institute

5. NAME OF PRINCIPAL RESEARCHER:

I. O. Salyer

6. ADDRESS: 300 College Park
Dayton, Ohio 45469

7. DURATION OF PROJECT (Give Dates)

9/1/83 - 8/31/85

8. FUNDING IN $ U.S.: FY 1984: To Be determined ; Total: $133,166

ACTIVE R & D PROJECTS

Code #	Project Title	Research Laboratory
US-53	Materials Reliability, Maintainability, and Exposure Tests	Los Alamos National Laboratory
US-54	Establish a Data Base on Corrosion and Fluids	Los Alamos National Laboratory
US-55	Polymer Film Solar Collector Development	Brookhaven National Laboratory
US-56	Design Optimizaiton Studies for Non-Imaging Concentrating Solar Collector Tubes	University of Chicago
US-57	Development of Thin Film Low Cost Solar Collectors	Reynolds Metals Corp.
US-58	Active Solar Cooling Research and Development	Lawrence Berkeley Laboratory
US-59	Development of Solar-Driven Ammonia-Water Absorption Air Conditioners and Heat Pumps	Lawrence Berkeley Laboratory
US-60	Solid Absorbent Solar Refrigeration Systems (Zeolites)	Collier Engineering Services
US-61	Vapor Generating Collector R&D	Argonne National Laboratory
US-62	Development of Chiller Driven by Solar Steam Powered Rankine Engine	University of Pennsylvania
US-63	Development of Advanced Dehumidifier Concepts	Solar Energy Research Institute
US-64	Investigation of Specific Material Properties of Solid Desiccants	Solar Energy Research Institute
US-65	Analytical Evaluation of Hybrid Desiccant Cooling Systems	Solar Energy Research Institute
US-66	Systems Analysis of Innovative Space Heating Concepts	Solar Energy Research Institute
US-67	Analysis of the Performance of Desiccant Systems and Components	University of Wisconsin
US-68	TRNSYS Update With Research on Active Solar Processes	University of Wisconsin
US-69	CSU - DOE Programmatic Grant for Research & Development in Solar Energy Applications	Colorado State University

Code #	Project Title	Research Laboratory
US-70	Solar Heating and Cooling Component Reliability	Solar Energy Research Institute
US-71	Evaluation and Assessment	Solar Energy Research Institute
US-72	Laboratory/Field Coordination	Solar Energy Research Institute
US-73	Controls Optimization for Solar Cooling and Heating Systems	Drexel University
US-74	Environamental Degradation of Polymeric Cover Plate Materials	National Bureau of Standards
US-75	Solar Hot Water Test Program	National Bureau of Standards
US-76	Thermal Test Methods for Solar Collectors	National Bureau of Standards
US-77	Performance Testing of Solar Collectors (IEA Task III)	National Bureau of Standards
US-78	Development of Thin Flim Low Cost Solar Collectors	Acurex Corporation
US-79	Desiccant Systems Testing	Haines-Lundberg-Waehler
US-80	Desiccant Materials Research	Argonne National Laboratory
US-81	Desiccant Systems Analysis	Illinois Institute of Technology
US-82	Second Law Analysis of Domestic Hot Water Systems	National Bureau of Standards
US-83	Studies of Solar Seasonal Thermal Energy Storage Systems	Argonne National Laboratory
US-84	Evaluation of Integrated Collector Storage Domestic Hot Water Systems	National Bureau of Standards

Code No.: US - 53 Date Prepared: January, 1984

1. TITLE OF PROJECT:
Materials Reliability, Maintainability, and Exposure Tests

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ■ Durability and Reliability

3. KEYWORDS: outdoor exposure test, reliability, durability, selective absorbers, economics, commercialization, degradation

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Los Alamos National Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
Robert Jones

6. ADDRESS: Solar Energy Group Q-11; MS/K 571
Los Alamos, New Mexico 87545

7. DURATION OF PROJECT (Give Dates)
10/1/81 -- 10/84

8. FUNDING IN $ U.S.:
FY 1983: $70,000 FY 1984: 100,000

Code No.: US - 54 Date Prepared: January, 1984

1. TITLE OF PROJECT:
Establish a Data Base on Corrosion and Fluids

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: corrosion, data acquisition system, performance, life time, working fluid

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Los Alamos National Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
Robert Jones

6. ADDRESS: Solar Energy Group Q-11; MS/K 571
Los Alamos, New Mexico 87545

7. DURATION OF PROJECT (Give Dates)
10/1/81 -- 10/83

8. FUNDING IN $ U.S.:
FY 1983: $98,000

Code No.: US - 55 Date Prepared: January, 1984

1. TITLE OF PROJECT: Polymer Film Solar Collector Development	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ■ Materials Research, ■ Component Development, ☐ Durability and Reliability
3. KEYWORDS: performance, heat exchanger, testing & evaluation, commercialization, heat pumps, integrated system	APPLICATION: ■ Solar Heating, ■ Solar Cooling, ■ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION Brookhaven National Laboratory	5. NAME OF PRINCIPAL RESEARCHER: William Wilhelm
6. ADDRESS: Upton, Long Island, New York 11973	
7. DURATION OF PROJECT (Give Dates) 10/1/81 -- continuing	8. FUNDING IN $ U.S.: FY 1983: $317,000 FY 1984: $350,000

Code No.: US - 56 Date Prepared: January, 1984

1. TITLE OF PROJECT: Design Optimization Studies for Non-Imaging Concentrating Solar Collector Tubes	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ■ Materials Research, ■ Component Development, ■ Durability and Reliability
3. KEYWORDS: evacuated tubular collector, performance, optimization	APPLICATION: ■ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION University of Chicago	5. NAME OF PRINCIPAL RESEARCHER: Roland Winston
6. ADDRESS: 5801 South Ellis Avenue Chicago, Illinois 60637	
7. DURATION OF PROJECT (Give Dates) 6/21/82 -- 6/85	8. FUNDING IN $ U.S.: FY 1984: $157,000

Code No.: US - 57 Date Prepared: January, 1984

1. TITLE OF PROJECT: Development of Thin Film Low Cost Solar Collectors

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS: solar water heater testing & evaluation, selective absorbers

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION: Reynolds Metals Corp.

5. NAME OF PRINCIPAL RESEARCHER: Walter Foster

6. ADDRESS: 6601 West Broad St. Richmond, Virginia 23261

7. DURATION OF PROJECT (Give Dates): 10/83 - 3/31/86

8. FUNDING IN $ U.S.: FY 83: $934,000; FY 84: $450,000

Code No.: US - 58 Date Prepared: January, 1984

1. TITLE OF PROJECT: Active Solar Cooling Research and Development

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ■ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS: absorption cycle, rankine cycle, performance, economics, flat plate collectors, commercialization, evacuated tubular collector, system simulation, system analysis

APPLICATION:

☐ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION: Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER: Michael Wahlig

6. ADDRESS: Berkeley, California 94720

7. DURATION OF PROJECT (Give Dates): 7/1/74 -- continuing

8. FUNDING IN $ U.S.: FY 1983: $840,000 FY 1984: $818,000

Code No.: US - 59 Date Prepared: January, 1984

1. TITLE OF PROJECT: Development of Solar-Driven Ammonia-Water Absorption Air Conditioners and Heat Pumps

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ■ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS: absorption cycle, heat pump, performance, testing & evaluation, heat exchanger

APPLICATION:

☐ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Lawrence Berkeley Laboratory

5. NAME OF PRINCIPAL RESEARCHER:

Kim Dao/Mike Wahlig

6. ADDRESS: University of California, Bldg. 90, Rm. 2024
Berkeley, California 94720

7. DURATION OF PROJECT (Give Dates)

10/1/76 -- continuing

8. FUNDING IN $ U.S.:

Part of Project US-58

Code No.: US - 60 Date Prepared: January, 1984

1. TITLE OF PROJECT: Solid Absorbent Solar Refrigeration Systems (Zeolites)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ■ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS: performance, absorption cycle, refrigeration

APPLICATION:

☐ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Collier Engineering Services

5. NAME OF PRINCIPAL RESEARCHER:

Kirk Collier

6. ADDRESS: Rt. 2, Box 240
Cave Creek AZ 85331

7. DURATION OF PROJECT (Give Dates)

9/83 - 4/13/84

8. FUNDING IN $ U.S.:

FY 1983: $23,550

Code No.: US - 61 Date Prepared: May 1984

1. TITLE OF PROJECT:
Vapor Generating Collector R&D

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS: concentrating evacuated tube collectors, vapor generation, performance

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ■ Industrial Process Heat

4. NAME OF ORGANIZATION
Argonne National Laboratory

5. NAME OF PRINCIPAL RESEARCHER:
John W. Allen

6. ADDRESS: 9700 South Cass Avenue
Argonne, Illinois 60439

7. DURATION OF PROJECT (Give Dates)
10/77 - continuing

8. FUNDING IN $ U.S.:
FY 1983: $225,000 FY 1984: $200,000

Code No.: US - 62 Date Prepared: January, 1984

1. TITLE OF PROJECT: Development of Chiller Driven by a Solar Steam Powered Rankine Engine

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ■ Thermal Energy Storage, ■ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS: rankine cycle, performance, thermal energy storage materials, testing & evaluation, refrigeration

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
University of Pennsylvania

5. NAME OF PRINCIPAL RESEARCHER:
Noam Lior

6. ADDRESS: Department of Mechnical Engineering
Philadelphia, PA 19174

7. DURATION OF PROJECT (Give Dates)
11/1/79 - 12/84

8. FUNDING IN $ U.S.:
Total: $833,261 FY 1984: $162,000

Code No.: US - 63 Date Prepared: January, 1984

1. TITLE OF PROJECT:
Development of Advanced Dehumidifier Concepts

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ■ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Dehumidifying cycle, performance, environmental aspect, desiccant cycle

APPLICATION:

☐ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Solar Energy Research Institute

5. NAME OF PRINCIPAL RESEARCHER:
Frank Kreith

6. ADDRESS: 1617 Cole Boulevard
Golden, Colorado 80401

7. DURATION OF PROJECT (Give Dates)
10/1/82 - 11/30/85

8. FUNDING IN $ U.S.:
FY 1983: $240,000 FY 1984: $349,000

Code No.: US - 64 Date Prepared: January, 1984

1. TITLE OF PROJECT: Investigation of Specific Material Properties of Solid Desiccants

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ■ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Desiccant cycle, optimization, performance, dehumidifying cycle, measurement, degradation

APPLICATION:

☐ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Solar Energy Research Institute

5. NAME OF PRINCIPAL RESEARCHER:
Frank Kreith

6. ADDRESS: 1617 Cole Boulevard
Golden, Colorado 80401

7. DURATION OF PROJECT (Give Dates)
10/1/82 - 11/30/85

8. FUNDING IN $ U.S.:
FY 1983: $160,000 FY 1984: $296,000

Code No.: US - 65 Date Prepared: January, 1984

1. TITLE OF PROJECT:
Analytical Evaluation of Hybrid Desiccant Cooling Systems

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Hybrid system, desiccant cycle, system simulation, performance, reliability, computer design

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Solar Energy Research Institute

5. NAME OF PRINCIPAL RESEARCHER:
Frank Kreith

6. ADDRESS: 1617 Cole Boulevard
Golden, Colorado 80401

7. DURATION OF PROJECT (Give Dates)
10/1/82 - 11/30/85

8. FUNDING IN $ U.S.:
FY 1983: $100,000 FY 1984: $75,000

Code No.: US - 66 Date Prepared: January, 1984

1. TITLE OF PROJECT:
Systems Analysis of Innovative Space Heating Concepts

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: System analysis, passive heating, integrated system, hybrid system, performance, optimization

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Solar Energy Research Institute

5. NAME OF PRINCIPAL RESEARCHER:
Chuck Kutscher

6. ADDRESS: 1617 Cole Boulevard
Golden, Colorado 80401

7. DURATION OF PROJECT (Give Dates)
10/1/82 - continuing

8. FUNDING IN $ U.S.:
FY 1983: $180,000 FY 1984: $230,000

Code No.: US - 67

Date Prepared: January, 1984

1. TITLE OF PROJECT: Analysis of the Performance of Desiccant Systems and Components

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS: performance, desiccant cycle, system simulation, dehumidifying cycle, system analysis, testing & evaluation

APPLICATION:

☐ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

University of Wisconsin

5. NAME OF PRINCIPAL RESEARCHER:

John Mitchell

6. ADDRESS: 1500 Johnson Drive
Madison, Wisconsin 53706

7. DURATION OF PROJECT (Give Dates)

8/79 - 5/15/85

8. FUNDING IN $ U.S.:

FY 1983: $100,000 FY 1984: $60,000

Code No.: US - 68

Date Prepared: January, 1984

1. TITLE OF PROJECT: TRNSYS Update With Research on Active Solar Processes

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: system analysis, system simulation, performance, control system, thermal energy storage materials

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

University of Wisconsin

5. NAME OF PRINCIPAL RESEARCHER:

Jack Duffie

6. ADDRESS: 1500 Johnson Drive
Madison Wisconsin 53706

7. DURATION OF PROJECT (Give Dates)

5/16/83 - 6/30/85

8. FUNDING IN $ U.S.:

FY 83: $100,000; FY 84: $140,000

Code No.: US - 69 Date Prepared: January, 1984

1. TITLE OF PROJECT: CSU - DOE Programmatic Grant for Research & Development in Solar Energy Applications

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ■ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS: phase change material, heat pipe, absorption cycle, flat plate collector, data acquisition system, evacuated tubular collector

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Colorado State University

5. NAME OF PRINCIPAL RESEARCHER:

Skook Karaki

6. ADDRESS: Fort Collins, Colorado 80523

7. DURATION OF PROJECT (Give Dates)

5/1/83 - 4/30/85

8. FUNDING IN $ U.S.:

FY 83: $550,000; FY 84: $666,000

Code No.: US - 70 Date Prepared: January, 1984

1. TITLE OF PROJECT:

Solar Heating and Cooling Component Reliability

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ■ Thermal Energy Storage, ■ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ■ Component Development, ■ Durability and Reliability

3. KEYWORDS: Control system, reliability, heat pipe, heat pump, testing and evaluation

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Solar Energy Research Institute

5. NAME OF PRINCIPAL RESEARCHER:

Chuck Kutscher

6. ADDRESS: 1617 Cole Boulevard
Golden, Colorado 80401

7. DURATION OF PROJECT (Give Dates)

10/1/82 - 12/84

8. FUNDING IN $ U.S.:

FY 1983: $100,000 FY 1984: $150,000

Code No.: US - 71 Date Prepared: January, 1984

1. TITLE OF PROJECT: Evaluation and Assessment of Reliability and Maintainability Data	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ☐ Heating & DHW, ☒ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS: Data acquisition system, degradation, reliability	APPLICATION: ☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION Solar Energy Research Institute	5. NAME OF PRINCIPAL RESEARCHER: Chuck Kutscher
6. ADDRESS: 1617 Cole Boulevard Golden, Colorado 80401	
7. DURATION OF PROJECT (Give Dates) 10/1/82 - 12/84	8. FUNDING IN $ U.S.: FY 1983: $135,000 FY 1984: $150,000

Code No.: US - 72 Date Prepared: January, 1984

1. TITLE OF PROJECT: Coordination of Laboratory and Field Reliability and Maintainability Data Collection and Evaluation	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ■ Solar Collector, ■ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ■ Durability and Reliability
3. KEYWORDS: Data Acquisition, reliability, testing and evaluation	APPLICATION: ■ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION Solar Energy Research Institute*	5. NAME OF PRINCIPAL RESEARCHER: Chuck Kutscher
6. ADDRESS: 1617 Cole Boulevard Golden, Colorado 80401	
7. DURATION OF PROJECT (Give Dates) 10/1/82 - 12/84	8. FUNDING IN $ U.S.: FY 1983: $265,000 FY 1984: $40,000

Code No.: US - 73 Date Prepared: January, 1984

1. TITLE OF PROJECT: Controls Optimization for Solar Cooling and Heating Systems

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: performance, control system, system analysis and system simulation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

Drexel University

5. NAME OF PRINCIPAL RESEARCHER:

Peter Herczfeld

6. ADDRESS: Department of Electrical Engineering, 32nd & Chestnut Streets, Philadelphia, PA 19108

7. DURATION OF PROJECT (Give Dates)

9/83 - 9/30/85 End Date

8. FUNDING IN $ U.S.:

FY 83: $100,000; FY 84: $84,000

Code No.: US - 74 Date Prepared: January, 1984

1. TITLE OF PROJECT:

Environmental Degradation of Polymeric Cover Plate Materials

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Degradation, environmental aspect, testing and evaluation

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION

National Bureau of Standards

5. NAME OF PRINCIPAL RESEARCHER:

David Waksman

6. ADDRESS: Washington, D. C. 20234

7. DURATION OF PROJECT (Give Dates)

9/82 - continuing

8. FUNDING IN $ U.S.:

FY 83: $250,000; FY 84: $320,000

Code No.: US - 75 Date Prepared: January, 1984

1. TITLE OF PROJECT:
Solar Hot Water Test Program

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Testing and evaluation, performance, environmental impact, solar water heater, measurement

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
National Bureau of Standards

5. NAME OF PRINCIPAL RESEARCHER:
A. H. Fanney

6. ADDRESS:
Washington, D. C. 20234

7. DURATION OF PROJECT (Give Dates)
9/82 - continuing

8. FUNDING IN $ U.S.:
FY 83: $100,000 FY 1984: $175,000

Code No.: US - 76 Date Prepared: January, 1984

1. TITLE OF PROJECT:
Thermal Test Methods for Solar Collectors

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ■ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Solar simulator, testing and evaluation, performance, environmental aspect, flat plate collector, evacuated tubular collector

APPLICATION:

■ Solar Heating, ■ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
National Bureau of Standards

5. NAME OF PRINCIPAL RESEARCHER:
Kent Reed

6. ADDRESS: Washington, D. C. 20234

7. DURATION OF PROJECT (Give Dates)
9/82 - continuing

8. FUNDING IN $ U.S.:
FY 1983: $150,000 FY 1984: $125,000

Code No.: US - 77 Date Prepared: January, 1984

1. TITLE OF PROJECT:
Performance Testing of Solar Collectors (IEA Task III)

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS: Performance, measurement, testing and evaluation, solar simulator, evacuated tubular collector, solar water heater, degradation

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
National Bureau of Standards

5. NAME OF PRINCIPAL RESEARCHER:
Kent Reed

6. ADDRESS: Washington, D. C. 20234

7. DURATION OF PROJECT (Give Dates)
9/82 - continuing

8. FUNDING IN $ U.S.:
FY 1983: $30,000 FY 1984: $65,000

Code No.: US - 78 Date Prepared: May 1984

1. TITLE OF PROJECT:
Development of Thin Film Low Cost Solar Collectors

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

■ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

■ Materials Research, ■ Component Development, ☐ Durability and Reliability

3. KEYWORDS: thin film flat plate polymer collectors, testing and evaluation

APPLICATION:

■ Solar Heating, ☐ Solar Cooling, ■ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Acurex Corporation

5. NAME OF PRINCIPAL RESEARCHER:
Timothy Muller

6. ADDRESS: 485 Clyde Avenue
Mountain View, California 94042

7. DURATION OF PROJECT (Give Dates)
3/22/84 - 3/86

8. FUNDING IN $ U.S.:
FY 1984: $375,000

Code No.: US - 79 Date Prepared: May 1984

1. TITLE OF PROJECT: Desiccant Systems Testing	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ■ Simulation& Modelling, ☐ Experimental, ■ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS: desiccant cooling, model validation	APPLICATION: ☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION: Haines - Lundberg-Waehler	5. NAME OF PRINCIPAL RESEARCHER: Gershon Meckler
6. ADDRESS: 2 Park Avenue, New York, NY 10016	
7. DURATION OF PROJECT (Give Dates): 9/84 - 9/85	8. FUNDING IN $ U.S.: FY 1984: $75,000

Code No.: US - 80 Date Prepared: May 1984

1. TITLE OF PROJECT: Desiccant Materials Research	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ☐ Thermal Energy Storage, ■ Air Conditioning Unit TYPE OF RESEARCH ■ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS: solid desiccants, measurements	APPLICATION: ☐ Solar Heating, ■ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION: Argonne National Laboratory	5. NAME OF PRINCIPAL RESEARCHER: Anthony Fraioli
6. ADDRESS: 9700 South Cass Avenue, Argonne, Illinois 60439	
7. DURATION OF PROJECT (Give Dates): 2/82 - 1985	8. FUNDING IN $ U.S.: FY 1983: $80,000 FY 1984: $285,000

Code No.: US - 81 Date Prepared: May 1984

1. TITLE OF PROJECT:
Desiccant System Analysis

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☐ Heating & DHW, ■ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: second law analysis, desiccant cooling

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
Illinois Institute of Technology

5. NAME OF PRINCIPAL RESEARCHER:
Zalman Lavan

6. ADDRESS: 3300 S. Federal Street
Chicago, Illinois 60616

7. DURATION OF PROJECT (Give Dates)
9/84 - 9/85

8. FUNDING IN $ U.S.:
FY 1984: $55,000

Code No.: US - 82 Date Prepared: May 1984

1. TITLE OF PROJECT:
Second Law Analysis of Solar Domestic Hot Water Systems

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

■ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

■ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: second law analysis, solar water heating systems, evaluation

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION
National Bureau of Standards

5. NAME OF PRINCIPAL RESEARCHER:
Hunter Fanney

6. ADDRESS: Washington, D.C. 20234

7. DURATION OF PROJECT (Give Dates)
10/1/83 - 12/31/84

8. FUNDING IN $ U.S.:
FY 1984: $80,000

Code No.: US - 83 Date Prepared: May 1984

1. TITLE OF PROJECT: Studies of Solar Seasonal Thermal Energy Storage Systems

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☐ DHW, ☒ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☒ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: seasonal storage, large collector arrays, central solar heating plants

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION: Argonne National Laboratory

5. NAME OF PRINCIPAL RESEARCHER: Allen Michaels

6. ADDRESS: 9700 South Cass Avenue, Argonne, Illinois 60439

7. DURATION OF PROJECT (Give Dates): 10/79 - 9/84

8. FUNDING IN $ U.S.: FY 1983: $160,000 FY 1984: $230,000

Code No.: US - 84 Date Prepared: May 1984

1. TITLE OF PROJECT: Evaluation of Integrated Collector Storage Domestic Hot Water Systems

2A. SOLAR SYSTEM R&D

TYPE OF SYSTEM

☒ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive

TYPE OF RESEARCH

☐ Simulation& Modelling, ☐ Experimental, ☒ Testing & Evaluation

2B. COMPONENT R&D

TYPE OF COMPONENT

☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit

TYPE OF RESEARCH

☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability

3. KEYWORDS: performance under indoor and outdoor irradiance conditions, test methods

APPLICATION:

☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat

4. NAME OF ORGANIZATION: National Bureau of Standards

5. NAME OF PRINCIPAL RESEARCHER: Hunter Fanney

6. ADDRESS: Washington, D.C. 20234

7. DURATION OF PROJECT (Give Dates): 10/1/83 - 12/31/84

8. FUNDING IN $ U.S.: FY 1984: $50,000

5. CLASSIFICATION OF R&D PROJECTS BY KEY WORDS

Each survey form includes dey words which help describe the type of R&D activity conducted in the projects and are useful to the reader in finding projects of interest. The researchers who completed the survey forms chose key words are found later in this section.

The passive projects are presented first, and are assigned a code number in which the country code is circled. For example, (J)-2 = Japan passive project number 2, J-32 = Japan active project number 32.

Following is a quick reference to the code numbers for each country's passive and active projects:

Country	Passive and Hybrid		Active	
AUSTRIA	(A)-1	(A)-2	A -3	A -19
BELGIUM	(B)-1	(B)-2	B -3	B -12
DENMARK	(D)-1	(D)-6	D -7	D -25
GREECE	(G)-1	(G)-3	G -4	G -7
JAPAN	(J)-1	(J)-18	J -19	J -55
NETHERLANDS	(NL)-1	(NL)-3	NL -4	NL -44
NORWAY	(N)-1	(N)-6	N -7	N -17
SWEDEN	(SWED)-1	(SWED)-33	SWED -34	SWED -63
USA	(US)-1	(US)-52	US -53	US -84

Although one must be careful about drawing conclusions about R&D emphasis from this classification of key words, the general trend of present R&D activities may be discerned by looking at the breakdown of projects associated with the key words.

The following key words are found at least 10 times on the survey forms:

i) Two Key Words with more than 50 R&D Projects:

- Passive heating
- Testing and evaluation

ii) Six key words with more than 20 R&D Projects:

- Flat plate collector
- Heat transfer
- Measurement
- Passive cooling
- Performance
- System analysis

iii) Sixteen key words with more than 10 R&D Projects:

- Control
- Data acquisition
- Day lighting
- Dehumidification cycle
- Desiccant cycle
- Energy balance
- Evacuated tubular collector
- Heat Pump
- Hybrid system
- Integrated system
- Phase change material
- Residential building (single family)
- Selective absorber
- System analysis
- Thermal energy storage materials
- Underground heat storage

The two key words that appear most frequently, passive heating and testing and evaluation, suggest an increased interest in passive technologies and a shift into the testing and evaluation phase of second generation active systems and components.

The key words with second highest frequency reflect the concentration of components and materials R&D for both active and passive technologies. The breakdown also indicates that collector R&D, heat storage techniques and solar cooling R&D are still being emphasized in the participating countries.

In some projects, participants used words which were not on the list prepared by the Operating Agent. These words were not added to the list, but were included under other related key words. For example, solar pond projects are classified under industrial process heat. Some testing and evaluation projects might include standardization and cretification programs.

It should be noted that a project on solar heating and cooling systems sometimes includes component R&D as well as all the elements of R&D covering testing, evaluation, simulation and modelling. The nature of such projects might be understood by carefully referring to the title of the projects and to the key words.

INDEX BY KEY WORDS

Appendix 1 Reporting Format with List of Keywords

Code No.: _____ Date Prepared: _____

1. TITLE OF PROJECT:	
2A. SOLAR SYSTEM R&D TYPE OF SYSTEM ☐ DHW, ☐ Heating & DHW, ☐ Heating, Cooling & DHW, ☐ Passive TYPE OF RESEARCH ☐ Simulation& Modelling, ☐ Experimental, ☐ Testing & Evaluation	2B. COMPONENT R&D TYPE OF COMPONENT ☐ Solar Collector, ☐ Thermal Energy Storage, ☐ Air Conditioning Unit TYPE OF RESEARCH ☐ Materials Research, ☐ Component Development, ☐ Durability and Reliability
3. KEYWORDS:	APPLICATION: ☐ Solar Heating, ☐ Solar Cooling, ☐ DHW, ☐ Industrial Process Heat
4. NAME OF ORGANIZATION	5. NAME OF PRINCIPAL RESEARCHER:
6. ADDRESS:	
7. DURATION OF PROJECT (Give Dates)	8. FUNDING IN $ U.S.:

Note: Please do not use this space, which will be for the purpose of compilation by the Operating Agent.

Subtask A Task II IEA

SURVEY OF SYSTEMS AND COMPONENTS R&D FOR SOLAR HEATING, COOLING AND INDUSTRIAL PROCESS HEAT SYSTEMS

List of Key Words

Absorption cycle
Air heating
Air system
Agricultural use
Anti-freeze
Aquifers
Automatic control
Auxiliary energy
Bio-conversion
Bottle washing
Chemical energy storage
Chemical heat pump
Combination of other energy sources
Commercial building
    Hospital
    Hotel
    Manufacturing facilities
    Office building
    Restaurant
    Sport Facilities
    Swimming pool
    Others
Commercialization
Computor design
Control system
Corrosion
Data acquisition system
Day lighting
Dehumidifying cycle
Degradation
Desalination
Desiccant cycle
Diffuse solar radiation
District heating/cooling
Drying
Durability
Economics
Energy policy
Energy taxes
Energy balance
Environmental aspect
Error analysis
Evacuated tubular collector
Evaporative cooling
Fishery
Flat plate collector
Food processing
Greenhouse
Ground coupled heat pump
Heat cycle test
Heat exchanger
Heat loss
Heat pipe
Heat pump
Heat sink
Heat transfer
Heat transmission
Honeycomb collector
Hot water supply system
Hybrid system
Indoor testing
Industrial hot water (SIPH)
Integrated system
Laundry
Latent heat storage
Life time
Linear concentrator
Liquid heating collector
Measurement
Outdoor exposure test
Optimization
Passive heating
Passive cooling
Pasteurization
Payback period
Pebble bed
Performance
Phase change material
Photovoltaic cell
Preheating
Process steam
Rankine cycle
Refrigeration
Reflecting mirror
Reliability
Residential building
    Single family
    Multi-family
Retrofit
Roof structure
Seasonal storage
Selective absorbers
Sensible heat storage
Solar concentrators
Solar industrial process heat
Solar insolation
Solar pond
Solar simulator
Solar water heater
Standardization
Stirling cycle
Stratification
Sun tracking
System analysis
System simulation
Testing and evaluation
Textile industry
Thermal energy storage materials
Thermal insulation
Underground heat storage
Waste heat recovery
Water tank
Working fluid

Appendix 2. LIST OF PARTICIPANTS - TASK II

"COORDINATION OF RESEARCH AND DEVELOPMENT ON SOLAR HEATING AND COOLING"

AUSTRIA	Prof. G. Faninger Austrian Solar and Space Agency (ASSA) Garnisongasse 7 A-1090 Vienna	Phone: (0222) 1438177 Telex: 76560 assa a
BELGIUM	Mr. Tony Vijverman Charge de Mission Programme National de R&D Energie Service de Programmation de la Politique Scientifique Rue de la Science 8 B-1040 Brussels	Phone: (02) 230-4100 Telex: 24501 PROSCIENT BRU B
DENMARK	Mr. Ove Jørgensen Thermal Insulation Laboratory Technical University of Denmark Building 118, DK-2800 Lyngby	Phone: (02) 883511 Telex: 375 29 DTH
GREECE	Dr. A. Spyridonos Technology Application Division Nuclear Research Center Democritos, Agia Puraskevi Attiki	Phone: 651 31 11-119
ITALY	Dr. Franco Vivona CNR Progetto Energetica Via Nizza 128 00198 Roma	Phone: (06) 854383/865493 Telex: 612322 CNR PFE I
NETHERLANDS	Dr. K. A. Nater Netherlands Energy Research Foundation P. O. Box 1 1755 ZG Petten	Phone: 02246-6262 Telex: 57211
NORWAY	Mr. Fritjof Salvesen A/S Miljøplan Kjørbuveien 18 1300 Sandvika	Phone: (02) 392416 Telex: 18815 NORCON

SPAIN	Mr. A. Barcala INTA Torrejon de Ardoz Madrid	Phone: 231-6203 Telex: 22026 INTA E
SWEDEN	Mr. E. Öfverholm Swedish Council for Building Research St. Göransgatan 66 S-11233 Stockholm	Phone: (08) 540640 Telex: 10398 BFR S
U. S. A.	Dr. F. H. Morse U.S. Department of Energy Office of Solar Heat Technologies Mail Stop 5H-079 1000 Independence Avenue, S.W. Washington D. C. 20585	Phone: (202) 252-8084 Telex: (TWX) 7108220176 DOE FORSTL WSH
JAPAN (Operating Agent)	Dr. T. Noguchi Solar Research Laboratory Government Industrial Research Institute, Nagoya 1 Hirate-cho, Kita-ku, Nagoya 462	Phone: (052) 911-2111 Telex: 22916 EIDMITI J