SERI/TP-43-355

August 1979

Proceedings: Joint Organizers' Conference

International Symposium

Non-Technical Obstacles to the Use of Solar Energy

Brusseis, Belgium
June 21-22, 1979

Co-sponsored by
Commission of the European Communities/
U.S. Department of Energy

Coordinated by
Solar Energy Research Institute
A Division of Midwest Research Institute

1536 Cole Boulevard
Golden, Colorado 80401

COMMISSION OF THE EUROPEAN COMMUNITIES / US DEPARTMENT OF ENERGY

JOINT ORGANIZERS' CONFERENCE

INTERNATIONAL SYMPOSIUM

NON-TECHNICAL OBSTACLES TO THE USE OF SOLAR ENERGY

EC Headquarters, 200 Rue de la Loi, 1040 Brussels
Berlaymont Building, Floor -2, Room S 16
20/21 June 1979

Report prepared by

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Canada

Conference Chairmen

Albert Strub,
Commission of the European Communities

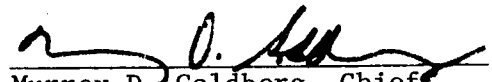
Robert Spongberg,
Solar Energy Research Institute

Meeting Purpose: To organize a major international Symposium for 1980 with the following objectives:

1. To identify non-technical obstacles which can impede the wider use and exploitation of solar energy in industrialized countries; and
2. to identify and evaluate measures which are being or could be used to minimize or overcome the impacts of the identified obstacles.

FOREWORD

This report was written in compliance with Contract Number EG-77-C-01-4042 for the Office of Solar Applications of the U.S. Department of Energy. The coordination of this conference was carried out by the International Programs Division of the Solar Energy Research Institute on behalf of the Technology Commercialization Division and the International Programs Division. Considerable assistance was provided by the Market Analysis and Evaluation Branch of the Office of Solar Applications.



Murrey D. Goldberg, Chief
Developed Countries Branch
International Programs Division

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JOINT ORGANIZERS' CONFERENCE FOR AN INTERNATIONAL SYMPOSIUM ON NON-TECHNICAL OBSTACLES TO THE USE OF SOLAR ENERGY

BRUSSELS, 2-21 JUNE 1979

A REPORT ON THE HIGHLIGHTS OF THE MEETING

BACKGROUND TO THE CONFERENCE

A key question facing policy-makers in Europe and North America is how to accelerate the adoption of non-conventional sources of energy, such as the harnessing of the sun. Although several of these sources offer considerable potential for reducing the gap between the demand for and the supply of petroleum, none has been developed to any appreciable extent so far. To some degree the reasons lie in the fact that the technology is not ripe for exploitation: deficiencies have been discovered in its ability to perform continuously or under a variety of environmental conditions. In most cases, however, the slow rate of progress stems from various non-technical obstacles, such as deficiencies in legal codes, lack of warranties, a lengthy pay-out period compared with conventional forms, or an inability to adapt the technology to the existing housing stock. There has been a growing appreciation on both sides of the Atlantic of the difficulties imposed by these obstacles, particularly in the wake of

expanded research and development efforts in the field of solar energy in certain countries, notably in the United States, Canada, and a number of the European countries. Thus far, however, the research effort in this connection has been modest, particularly in Europe.

Believing that much might be learned from an in-depth discussion of the subject, the United States, Canada, and countries of the European Economic Community proposed an international symposium, to be held in Brussels in May or June, 1979. Initially, it was intended that papers would be presented by countries on the two sides of the Atlantic, enabling some concrete comparisons of experiences with respect to various obstacles. It turned out, however, that much more work had been done in this regard in North America than in Europe, and countries in the EEC were unable to meet the deadline to produce the proposed papers. A wiser course, the organizers concluded, was to hold a smaller, exploratory meeting in Brussels in June 1979, and to set the groundwork for a more comprehensive review for a symposium in Europe the following Spring.

Briefly, the proposed exploratory meeting was to be entitled a "Joint Organizers' Conference for an International Symposium on Non-Technical Obstacles to the Use of Solar Energy." It was to be held in Brussels in the period 20-21 June, 1979 and would draw together an Advisory Group composed of representatives from the United States, Canada, and

members of the European Economic Community. It would have two major objectives:

(a) the identification of the non-technical obstacles to the wider use and exploitation of solar energy in industrialized countries, as technologies are developed and costs are reduced, and

(b) the identification and evaluation of measures which are being or could be used to minimize or overcome the impacts of the obstacles so indicated.

A small steering group was established to organize the 1980 International Symposium, composed of representatives of the EEC, U.S. government officials, and a number of consultants. This group included the following people:

EEC		U.S. & CANADA	
W. Martin	D.G. XVII	R. Bezdek	DOE
W. Palz	D.G. XII	R. Spongberg	DOE /SERI
T.C. Steemers	D.G. XII	A. Hirschberg	Consultants
A. Strub	D.G. XII	A. Miller	
J. Van Caneghem		W. Sewell	
F. Treble	Consultants	T. Sparrow	
L. Valette		G. Bradley	U.S. Mission to EEC

THE JOINT ORGANIZERS' CONFERENCE

The basic aim of the Joint Organizers' Conference was to lay the groundwork for the International Symposium to be held

in 1980. It was meant to provide a broad indication of the existing state of knowledge of barriers to the adoption of solar technology and to generate concrete recommendations for the scope, content and conduct of the 1980 meeting. To facilitate this, the governments of the United States and Canada, and the EEC invited a number of consultants to prepare Background Papers and present them in a plenary Session. A second Session was devoted to an in-depth discussion of non-technical obstacles to the adoption of solar technology, drawing upon experience of the group at large. An attempt was made to develop a broad classification of such obstacles which might be used for organizing the 1980 meeting. A final Session was concerned with the development of specific recommendations as to the structure, participation, and keynote speakers for the meeting.

Chairmen and Reporters for the various Sessions at the Joint Organizers' Conference were as follows:

Session I	Overviews of Obstacles in North America and Europe	
	Chairman:	A. Strub
	Reporter:	L. Valette
Session II	Development of a Classification of Obstacles	
	Chairman:	W.R.D. Sewell
	Reporter:	W. Martin
Session III	Planning of the 1980 International Symposium	
	Chairman:	R. Spongberg
	Reporter:	F. Treble

A copy of the agenda for the Conference is attached hereto as Appendix A and a list of the members of the Advisory Group attending the meeting as Appendix B.

The Conference was preceded on 19 June 1979 by a meeting of the U.S. delegation and its consultants, at the U.S. Mission to EEC. The aim was to familiarize Mission staff with the purposes of the Conference. Later, the delegation and the consultants met with other members of the Steering Group at EEC Headquarters to discuss the details of the Conference.

OVERVIEWS OF OBSTACLES IN NORTH AMERICA AND EUROPE

Following a brief welcoming address outlining the origins and objectives of the Conference, A. Strub of EEC introduced six speakers who had been invited to prepare Background Papers. Each presented a short summary of his Paper, and there followed a brief discussion of points raised therein. Abstracts of the various Background Papers are attached hereto as Appendix C. The main highlights of the papers are noted below.

1. *Accelerating the Acceptance of Solar Heating: North American Experience and International Implications*
   W.R.D. Sewell (Canada)

This paper presented a discussion of the contrasting approaches to the acceleration of adoption of solar home heating taken in Canada and the United States. Noting that

the solar technology delivery system is controlled by at least 14 different groups of actors, all of whom have differing perceptions of the advantages and difficulties associated with it, the paper described how the United States has decided to attack the problem on a broad front while Canada seems to have chosen to move more cautiously.

In the United States a wide range of strategies are being applied at various points in the technology delivery system. Investment is being made in numerous kinds of solar energy technology. Application is following rapidly in the wake of invention, pushed by various incentives at federal and state levels of government. In contrast, the Canadian programme is evolving much more slowly. The effort has been focussed on the early stages of diffusion and incentives are being applied to producers rather than consumers. Interest has been much greater in individual applications than in possibilities of centralized energy production.

There are advantages and risks associated with both approaches. If the United States succeeds in finding a reliable technology, available at a low cost, it is likely to gain an enormous lead in this field. If, on the other hand, it pushes the technology too rapidly, and there are some major failures, it may alienate public acceptance and set the technology back many years. The Canadian approach of caution has the advantage of allowing the technology to prove itself over a longer time span. It may, however, fail

to allow the technology to make the level of contribution required to fill the emerging gap in energy supply.

2. *U.S. Activities to Minimize the Impact of Non-Technical Issues*
Roger Bezdek (United States)

The United States government has made a firm commitment to accelerate the development of alternative energy sources, particularly solar energy. This commitment has been made explicitly in legislation, policy statements and in allocation of funds for research and development, demonstration programmes and various kinds of incentives to potential adopters.

This paper provided a brief but succinct review of the efforts and experience to date. It noted that in the period 1975 to 1979 the U.S. federal government had allocated some $1,177 million to research, development and demonstration, and over $100 million to various incentive programmes geared directly to the consuming public and manufacturers. The latter include HUD $400 grants to adopters of solar hot water systems, and a programme of tax credits introduced by the federal government. Allocations to the solar programme promise to continue at a high level, with almost $800 million being spent on various elements this year, and some $1,030 million recommended for the next fiscal year.

Thus far the major emphasis in the U.S. programme has been on a search for an optimal technology or technologies. There is an important interest nevertheless on the non-

technical aspects and a programme of research costing some $10 million a year has been underway for the past four years. The Department of Energy, and its predecessor, the Energy Research and Development Administration, have undertaken or sponsored studies on obstacles to the diffusion of solar technology, and ways in which such barriers might be removed. Research has also been undertaken on the impact of various incentive programmes in stimulating more widespread adoption. More recently, the federally-sponsored Solar Energy Research Institute has been fostering studies in this connection, both in-house and under contract. Attention was drawn to various reports resulting from Department of Energy, Energy Research and Development Administration, and Solar Energy Research Institute sponsorship.

3. *A Manufacturer's Case Study from the United Kingdom*
P. Owens (United Kingdom)

There has been growing interest amongst manufacturers in the possibilities of harnessing the sun, notably those who have had experience in the production of glass, plumbing equipment, and automobiles. For the most part the experience to date has been that of a backyard industry, with a few hardy pioneers trying to advance the field, usually with little capital and only limited marketing capabilities. At the same time a number of major industrial companies have begun to take an interest, and a few have even established research and development divisions. This has been true both

in Europe and in North America.

The paper was focussed primarily on experience with a major glass manufacturer, Pilkingtons, in the United Kingdom. The author described his company's research and development effort in this field, and work of the British Standards Institute in this connection. His view was that most manufacturers in the U.K. are taking a cautious approach, watching developments elsewhere with interest but not entering the field in a large way. The main barrier in the U.K. and in Europe in general appears to be the high initial cost of solar technology compared with other forms, although it is probable that in some applications passive solar is already cost competitive with alternatives, and that in many places solar hot water systems are now cost effective. His view was that there is insufficient incentive from governments to enter the field, and that architects have generally dragged their feet in promoting the use of this technology.

Finally, the author drew attention to a publication of the Solar Trade Association, *Solar Water Heating: Code of Practice* (London, July 1979). Copies were distributed to participants.

4. *Early Market Experience of Solar Energy in the United States*
Alan Hirschberg (United States)

A recent review of U.S. solar energy policy concluded that if oil prices rise to $32 per barrel, solar energy could provide between 8 and 13 percent of U.S. energy consumption

by the year 2000. The attainment of this contribution, however, might be extremely difficult, given the various economic, institutional and other barriers. This paper focussed upon these obstacles in the U.S., examining actual experience in six areas of the country (Phoenix; Denver; Washington, D.C.; Los Angeles; Boston and the State of Florida). It described a study undertaken by a firm of consultants in the U.S., involving library research and interviews with manufacturers and consumers.

The results of the investigation revealed that the solar manufacturing industry in the United States is highly diverse in terms of scale of production, nature of product, and market areas served. Although there are many companies, a few now account for the major portion of the market. Few companies enjoy more than a local clientele.

Some interesting changes appear to be underway. While initially the manufacturers sold directly to the consumer, there is now a growing tendency to involve a large range of specialists--such as dealers, installers, and maintenance companies. The larger firms are now beginning to dominate the industry.

The paper focussed on a number of specific barriers to the diffusion of solar energy technology, notably building codes, financing constraints, organization of the building industry, regulatory policies (particularly with respect to natural gas), and lack of information. It also furnished an

in-depth review of developments in the market of photovoltaics, noting contrasts in the organization of that branch of the solar technology industry from other branches. Presently there are only a few firms involved, the market is highly fragmented, and there is very heavy reliance on government support for research and development and purchase of products.

5. *Legal Obstacles to Solar Energy*
Allen S. Miller (United States)

The energy industry in the United States is subject to a wide variety of governmental interventions at several levels of administration. These include both regulations and incentives of different kinds. Research and development subsidies, gas and oil price controls, and subsidies for the use of specific forms of energy are important federal programmes. State governments also impose regulations on gas and electricity prices, the siting of power plants, and require the provision of warranties on certain kinds of equipment. Local authorities have used land use regulations and building codes as means of controlling the types and volumes of energy used.

Such interventions have influenced the use of solar energy technology in the United States, both positively and negatively. One of the most pervasive barriers is the lack of a legal guarantee of access to the sun. While numerous changes have been suggested to accommodate this problem,

only in a few instances have modifications been made. In the author's view, radical changes in the nature of property rights would probably be premature. In new developments, relatively common planning procedures may be adequate to address the problem.

Another important issue is the control of aesthetics. The paper showed that there may be severe objections to the installation of solar collectors on houses, especially where this would introduce an element totally out of keeping with the overall appearance of an area. Since a considerable portion of the existing housing stock is in long settled areas, these objections are likely to be strong and widespread.

A third set of issues has to do with the regulation of investor-owned utilities which provide gas and electricity in the United States. In some instances such utilities have tried to discourage the adoption of solar technology by introducing discriminatory rate structures.

The paper concluded with a discussion of the legal protection of the consumer, particularly through the introduction of government-approved standards and warranties for equipment. The author emphasized the importance of providing this protection if consumer confidence in solar technology was to be developed and sustained.

The paper also drew attention to the expanding volume of research on the legal obstacles in the United States,

undertaken both at universities, research institutes, and through government agencies. The magnitude of the effort, however, remains small in comparison to the complexity of the issues and the perceptual barriers to be overcome. Finally, mention was made of a new journal in this field, published by the Solar Energy Research Institute, the *Solar Law Reporter*.

6. *Solar Energy Economics in the U.S.*
F.T. Sparrow (United States)

One of the major barriers to the diffusion of solar technology in the United States is its high first cost. Solar heating equipment in most parts of the United States is still more expensive than that employed with conventional sources. Despite major increases in the price of conventional sources of energy, in only a few parts of the United States has the rise in costs been sufficient to persuade consumers to substitute alternative forms. As a consequence, heavy reliance is being placed on various forms of incentive, such as tax credits and government purchases, to accelerate the diffusion of the technology.

The paper discussed the prospects for reductions in the first costs of solar technology, and considered their impact on diffusion, using varying assumptions about shifts in fuel prices and incentive programmes offered by various levels of government. The author noted that current projections, based on a doubling of real energy prices by the year 2000 and a

40 to 50 percent reduction in the cost of solar equipment, called for 13.4 million (14.6 percent of all) residential and 0.5 million (5 percent of all) commercial decentralized solar systems to be installed by the year 2000.

The paper concluded with a discussion of the present federal and state government programmes of incentives. It noted the need to evaluate these in terms of effectiveness, efficiency and equity. The author suggested that there was probably not only a case for such incentives as "corrective" measures designed to reduce biases introduced through various government policies which improve the competitive position of alternative forms of energy, but also as a means of meeting major U.S. government goals of energy self-sufficiency, full employment, and preservation or improvement of environmental quality.

7. *The Relation between Solar Energy and the Utilities*
F.T. Sparrow (United States)

An important consideration in accelerating the adoption of solar technology in North America is the position taken by the gas and electricity utilities. Their policies as to rates which the consumer must pay for gas or electricity, either on a continuous basis or for back-up supplies, and as to provision of heating or cooling equipment may profoundly affect the decisions made by potential adopters of solar technology.

This paper examined the likely impact of the sections of the U.S. National Energy Act of 1978 which discourage U.S. public utilities from participating in the commercialization of solar energy, and require them to offer solar back-up rates that are non-discriminatory, and to provide information about solar options to their customers. The author suggested that in many ways the discouragement was surprising since they have considerable experience in the heating and cooling field, they have a "captive" market, and they could exert considerable control over quality. At the same time he pointed out, however, there were fears about allowing the utilities to enter the field. Such fears were founded on the possible use of the utilities' monopoly power to stifle the development of solar energy, or alternatively to develop such a large influence that smaller competitors would be squeezed out. With respect to the structuring of rates, the author suggested that the use of increasing rates for additional quantities of energy would tend to favour the development of solar since it would increase its value.

CLASSIFICATION OF OBSTACLES TO THE DIFFUSION OF SOLAR TECHNOLOGY

The discussions in Session I made it abundantly clear that there are a wide variety of non-technical obstacles to the diffusion of solar technology. The nature and magnitude of such barriers doubtless varies from one country to another, depending upon traditions, legal and institutional frameworks,

and economic conditions, as well as the cost and availability of alternative sources of energy. The focus of most of the discussion in Session I was on North American experience and it was recognized that it was possible that different kinds of obstacles might be encountered on the European scene. To this end, a plenary Session was convened with three broad objectives in mind:

(1) development of a concrete list of obstacles that are perceived as major impediments to the diffusion of solar energy. Such a list was to furnish a major input into the organization of the 1980 meeting.

(2) provision of a list of research projects being undertaken in participants' countries that are concerned with various obstacles to the adoption of solar technology.

(3) identification of possible ways in which various barriers might be removed.

The first step was to develop a list of possible obstacles. Three kinds of input were used in this regard. The first was a questionnaire survey administered at the Conference in which participants were asked to identify the obstacles which they believed to be the most critical in their respective countries. A second source was in-depth studies undertaken in North America. These include papers by Bezdek, Warkow and others on the United States, and Sewell and Foster in Canada. The third was suggestions gathered during the

discussion of the two foregoing sources.

Briefly, the questionnaire survey revealed the following list of obstacles.

Obstacles	Frequency of mention
Economic	16
Legal	5
Fiscal	8
Regulatory	11
Consumer attitudes	8
Education	3
Public information	12
Manpower	4
Marketing	5
Financial	6
Consumer protection	10
Existing stock of houses	1
Architects	1
Government organizations	2
Limited use of solar	3
Trade unions	1
Repairs and maintenance	3
Uncertainty about fuel costs	4
Need for back-up energy	4
Utility attitudes	7

Following discussion of this list and a brief review of some of the in-depth studies undertaken in North America (led by the various consultants), the participants agreed that there are three major groups of obstacles to the more widespread adoption of solar technology, namely,

1. economic;
2. legal and institutional;
3. consumer concerns and other obstacles.

It was pointed out that the third category was rather wide, and might perhaps be divided into consumer concerns, environmental concerns and other obstacles. Some participants also felt that there should be a special category on the utility interface.

It was noted that this classification might be applied to:

(a) the various kinds of solar technology that are now available (such as flat plate collectors or photovoltaics);

(b) different kinds of climatic or economic regions (such as the Sun Belt of the U.S. or Alaska);

(c) different groups of actors involved in the diffusion process (such as the inventors, manufacturers, architects, financiers, or government servants).

The implication is that the importance of specific obstacles will vary according to the technology considered, the region in question, or who is asked.

There was a lively discussion both of the classification and the various items included in it. It clearly indicated that although there were common concerns on both sides of the Atlantic about certain obstacles--such as economics, and the role of solar energy in overall energy policy--there were

also some important differences. In particular, there appeared to be much more anxiety about the role of the utilities in the solar energy field in North America than there is in Europe. In addition, it was suggested that the typical adopter in Europe may not resemble his fairly affluent, well-educated counterpart in North America. Stress was given to the need for much more broadly based and active programmes of information and education relating to solar energy in the two regions.

PLANNING OF THE 1980 INTERNATIONAL SYMPOSIUM

The broad objectives of the 1980 international symposium on non-technical obstacles to the diffusion of solar energy technology were drawn up by the Steering Committee. Decisions remained to be made, however, as to such matters as to the date, venue, participants, and format of the meeting. Session III was convened to provide input from the Advisory Group on such matters.

Date and Venue

It was decided that the meeting should be held in the period 20-22 May 1980. There was some discussion of possible venues. It was noted that although there are advantages to convening it in Brussels, particularly the fact that the EEC Headquarters are there, there are also some problems. Costs of accommodation and meals are extremely high in Brussels, and there may be some difficulties in finding the

kind of meeting rooms that are required for 100 people in early Spring 1980. A number of alternatives were considered including Paris, and a research institute at Ispra in northern Italy. Support for the latter suggestion was relatively small, due largely to the difficulties of access. Paris would have several advantages, even though costs there are also high. A tentative agreement was made to stage the meeting in Brussels. Presumably the Steering Committee will review this matter once more precise information is available.

Title of the Meeting

The title of the meeting was tentatively set as an "International Symposium on Non-Technical Obstacles to the Use of Solar Energy." While most participants appeared to be in agreement with this title, some felt that it conveyed a rather negative connotation. It was suggested that some additional thought should be given to this matter. Participants were asked to offer specific suggestions in the questionnaire that was to be returned by 6 July 1979 (Appendix D).

Participating Countries and Agencies

It was agreed that the following countries should be invited to participate in the Symposium:

Australia	Ireland	Portugal
Austria	Israel	Spain
Belgium	Italy	Sweden
Canada	Japan	Switzerland
Denmark	Luxembourg	Turkey
France	Netherlands	United Kingdom
Germany	New Zealand	United States of America
Greece	Norway	

This list includes all the members of the European Economic Community and of the International Energy Agency.

The Advisory Group also recommended that a number of international agencies and other bodies be invited to send representatives. These might include the following:

IEA (International Energy Agency)

IIASA (International Institute for Applied Systems Analysis)

ISES (U.S. Section)

ISES HQ (Australia)

COMPLES (France)

UNICE

Solar Trade Association in the U.K. and similar bodies elsewhere

Specified environmental groups.

Delegates

It was agreed that the number of delegates to the Symposium should be limited to about 100. Any addition to this number would make the meeting less manageable, and would impair the attainment of its objectives. Each invited country would be asked to nominate suitable delegates in one or more of the following areas of responsibility or expertise:

† Representative of government Department of Energy.

† Representative of a Town Planning or Land Use Regulation Authority

† Architect

† Expert on Building Codes

† Representative of a Gas or Electric Power Utility

† Economist

† Banker

† Representative of a Building Society

† Lawyer

† Representative of a Consumers' Association

† Representatives of Environmental Groups

† Representatives of Solar Trade Association

† Representatives of Trade Unions

It was agreed that the Steering Committee would select from the names submitted, aiming to furnish a reasonable balance of the above categories. In general, no more than three participants would be invited from each country, although there might be some slight exceptions to this rule when a given country possesses expertise that would be especially useful to the meeting.

Keynote Speakers

The members of the Advisory Group were requested to submit to Mr. Steemers at EEC the names of persons that might be considered as keynote speakers at the Symposium. These names were to be sent to him by 6 July 1979.

Structure of the Symposium

It was agreed that the structure of the Symposium should follow a format similar to that set out below:

TUESDAY 20 MAY 1980

Morning — Opening Session

Opening speeches and invited papers.

Afternoon — Session I. Industrial and Economic Aspects

including:

† Early market experiences

† Economic and financial issues

† Marketing problems

† Manpower, training, and demarcation problems

WEDNESDAY 21 MAY 1980

Morning — Session II. Legal, Fiscal and Regulatory Factors

including:

† Protection of rights to solar energy

† Tax incentives and disincentives

† Building codes

† Planning requirements

† Solar equipment standards and codes of practice

† Warranties

Afternoon — Session III. Utility Issues

including:

† Problems posed to energy supply companies and authorities by the growth of solar energy usage

† Involvement of energy suppliers in energy exploitation

† Tariff policy

THURSDAY 22 MAY 1980

Morning — Session IV. Consumer and Other Aspects

including:

† Consumer and other attitudes

† Environmental and aesthetic problems

† Public information and education

† Other aspects not dealt with in other sessions

Afternoon — Session V. Overview and Conclusions

It was proposed that each session should start with an invited paper, presented by a keynote speaker and that this should be followed by discussion from the floor. The sessions would be presided over by a Chairman and a Rapporteur would record significant points made in the discussion and later prepare an account for publication in the Proceedings of the meeting.

Working Document

It was agreed that a Working Document would be sent to all participants in advance to the Symposium, thus enabling everyone to have a common data base, and a stimulus for discussion. Background Papers would be included in the Document, dealing with topics listed in the first four Sessions of the Symposium. These papers would be prepared by experts selected by the Steering Committee, and would be drawn from Europe, North America and elsewhere.

It was also agreed that the Commission would invite a special Working Paper from Israel while the United States would invite special papers from Japan and Australia.

The Background Papers and other relevant material would be submitted to Mr. Steemers at EEC no later than 31 December 1979. A complete set of these papers and materials, to be described as a Working Document, would then be sent to each of the participants invited to attend the Symposium.

Output of the Symposium

The output of the Symposium will be in the form of Proceedings, containing the full texts of all invited papers and rapporteurs' accounts of the discussions. It may include some broad conclusions, contained perhaps in the paper presented in the final Overview Session. There will be no recommendations or resolutions resulting from the meeting, although the Steering Committee may decide to offer some general advice to the organizers on particular matters arising out of the Symposium.

The Proceedings will be published as soon as possible after the event and a free copy will be mailed to each participant. Responsibilities for editing and publishing this material will be decided at the next meeting of the Steering Committee.

Advisory Group

Dr. Strub suggested that the participants in the Joint Organizers' Conference be retained as an Advisory Group in the organization of the Symposium. In general they would be called upon through correspondence for comments and suggestions on proposed actions. It is possible, however, that the organizers may wish to convene a session involving some or all of the members of the group prior to the Symposium.

SUMMARY OF EARLY ACTIONS

The Steering Committee agreed to a number of specific actions to be taken in the next few months. These were as follows:

(1) Members of the Advisory Group were requested to return the questionnaire to Mr. Steemers at EEC by 6 July 1979, with information on the following matters:

Participating countries
Delegates
Research effort to date
Additional research required
Keynote speakers
Structure of the Symposium
Title of the Symposium

Mr. Steemers would then contact members of the Steering Committee to convey the material so collected.

(2) The EEC and SERI would be responsible for contacting authors of Background Papers and other materials for the Working Document. The EEC would concentrate on contributions from Europe and Israel while SERI would deal with those from North America, Japan and Australia. No deadline was set for such contacts to be made but it was noted that the final date for submission of materials for the Working Document is 31 December 1979. EEC and SERI will need to move on this matter with the utmost despatch.

(3) A tentative budget would be drawn up by L. Vallette and submitted to the Joint Organizers by the end of July, 1979.

(4) The Steering Committee will meet in September or October in Brussels to discuss details of the Symposium, including invitations to Keynote speakers, appointment of Chairmen (or Co-Chairmen) and suggestions for delegates from various countries.

It was suggested that there be a Chairman and a Vice Chairman for each Session, and that an attempt be made to appoint approximately equal numbers from the two sides of the Atlantic for this purpose. A tentative list was as follows:

Session I: Economic Aspects

Chairman - United States
Vice Chairman - Australia

Session II: Legal Aspects

Chairman - EEC
Vice Chairman - U.S. or Canada

Session III: Utility Interface

Chairman - EEC
Vice Chairman - U.S. or Canada

Session IV: Consumer Aspects

Chairman - U.S. or Canada
Vice Chairman - EEC or Israel

Session V: Overview

Chairman - U.S. or Canada
Vice Chairman - EEC

Actual designations of Chairman, however, may differ from the above list, depending on the suggestions received from members of the Advisory Group.

APPENDIX A

AGENDA FOR THE

JOINT ORGANIZERS' CONFERENCE

COMMISSION OF THE EUROPEAN COMMUNITIES / US DEPARTMENT OF ENERGY

JOINT ORGANIZERS' CONFERENCE

INTERNATIONAL SYMPOSIUM

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AGENDA

Wednesday, 20 June 1979	*Session I*	*A. Strub, Chairman*
1200 — 1400	Registration	
1400 — 1430	Welcome — Purpose of Meeting	A. Strub, EC
1430 — 1500	Comparison of U.S. and Canadian Solar Programmes	D. Sewell, Canada
1500 — 1530	U.S. Activities to Minimize the Impact of Non-Technical Issues	R. Bezdek, U.S.
	A Manufacturer's Case Study	P. Owens, UK
	The Issues as seen in the U.S.	A. Hirshberg, U.S. A. Miller, U.S. T. Sparrow, U.S.
1700 — 1715	Break	
1715 — 1900	Discussion of the Presentations	
1900	Reception/Cocktails	
	(Salon Rouge, Berlaymont Building) Speakers: D. Hinton, U.S. Ambassador to the EC G. Schuster, Director-General, EC	

Thursday, 21 June 1979	*Session II*	*D. Sewell, Chairman*
0900 — 1300	Identification of Obstacles which are Common to the Participating Countries.	
	Development of a Classification System	
1300 — 1430	Lunch	

	Session III	*R. Spongberg, Chairman*
1430 — 1700	Planning of the "1980 International Symposium: Non-Technical Obstacles to the Use of Solar Energy"	
	To include discussions on:	
	— Participating Countries	
	— Identification of Individual Participants	
	— Meeting Structure	
	— Date of Meeting	
	— Type of Research Needed	
	— Responsibility of Key Participants	
	— Keynote Speakers	
1700 — 1730	Closing Remarks	A. Strub R. Bezdek

APPENDIX B

LIST OF MEMBERS OF THE ADVISORY GROUP ATTENDING THE MEETING

COMMISSION OF THE EUROPEAN COMMUNITIES / US DEPARTMENT OF ENERGY

JOINT ORGANIZERS' CONFERENCE

INTERNATIONAL SYMPOSIUM

"NON-TECHNICAL OBSTACLES TO THE USE OF SOLAR ENERGY"

Brussels, 20/21 June 1979

LIST OF PARTICIPANTS

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COMMISSION OF THE EUROPEAN COMMUNITIES:

M. E. ARANOVITCH	Joint Research Centre, Ispra
M. J. van CAENEGHEM	Environment and Consumer Protection Service
M. G. GRASSI	DG XII - Research, Science and Education
M. W. MARTIN	DG XVII - Energy
M. W. PALZ	DG XII
M. T.C. STEEMERS	DG XII
M. A. STRUB	DG XII

APPENDIX C

ABSTRACTS OF BACKGROUND PAPERS

EXECUTIVE SUMMARY

EARLY MARKET EXPERIENCE OF SOLAR ENERGY IN THE UNITED STATES

by Alan S. Hirshberg

PURPOSE

A recent review of the U.S. solar energy policy concluded that if oil prices rise to 32$/BBL solar energy could provide between 8 and 13 percent of U.S. energy consumption by the year 2000. Experts believe, however, that this goal will be difficult to reach because of several existing barriers. Recent estimates indicate that about 100,000 solar heating and cooling (SHAC) systems are installed in the U.S., but future growth of solar energy systems is impeded by economic, institutional, and informational barriers. In determining these barriers, this report discusses characteristics of the building industry, the early market experience of SHAC systems, and looks at market economics and government policies of photovoltaics.

REPORT FINDINGS

An economic barrier impeding solar energy growth is the high, initial cost of SHAC systems. Although SHAC systems cost less to operate over the long run than conventional gas, oil, or electric systems, consumers are discouraged from buying SHAC systems because of the long (~10 year) payback period. A solar water heater, for example, will pay for itself before it wears out, but most consumers

want a payback period of no longer than 5 years, and need a greater incentive to buy a SHAC system.

Institutional barriers are caused by the nature of the building industry. This industry is highly fragmented, is subject to regional differences of opinion or practice, and has no one overruling body. These factors tend to slow the acceptance of technological innovations and the craft-based nature of the building industry resists changes. With more than 3000 building code authoritites in the U.S., approval of new ideas by each group is difficult to obtain. Most building codes are "specification"-oriented and constrain the use of new techniques by specifying the use of existing materials and practices. This discourages builders from trying technological innovations that may require code modifications.

Financing constraints such as the general scarcity of money, high interest rates, and low profit margins hinder the builder in raising the capital required to install solar energy systems. Builders fear a loss of money from the extended construction time needed for a solar system, and consumers may have difficulty making high initial payments. Lending institutions often restrict the use of solar equipment by setting cost limits based on the historical costs of conventional equipment.

Another institutional barrier is the practice of "rolled in" pricing. Regulatory bodies may "roll in" the cost of new gas supplies with the lower cost of existing supplies, and shield the

consumer from the true, higher cost of new fuel supply. Consumers will find no need for solar heating methods if conventional methods have reasonable prices.

A lack of information about the impact of solar tax incentives to the consumer provides another barrier. Consumers have become increasingly interested in the cost and quality of SHAC systems, but a comprehensive, nationwside data base concerning cost and performance of privately owned SHAC systems has been nonexistent. The Department of Energy (DOE) asked Booz, Allen & Hamilton Inc. to design, test, and implement a system of data analysis. The first phase of this project gives insight into the early market experience with SHAC systems.

After identifying a sample of individual SHAC systems, 30 on-site inspections of separate installations were conducted; the owners were interviewed and design details were examined. These inspections found major design problems with only one installation; most owners reported that any minor installation problems were quickly repaired by the installers and that manufacturers were helpful in providing information. Today, most solar system owners who are in higher income and education brackets are installing SHAC systems for economic benefits, not for environmental or energy-saving reasons of earlier years.

Market research shows that most manufacturers today sell directly to distributors who sell to dealers who, in turn, sell to purchasers.

In early stages of the industry, most solar collectors were sold directly from manufacturers to individual purchasers.

Early market experience with photovoltaics shows dominance by a small number of firms which may increase with government funding over the next 10 years. Solar cell technology, pioneered in the U.S. space program, may provide up to 3 percent of U.S. electricity by the year 2000, according to DOE estimates. However, growth of this industry is slowed by rapid technological development which provides confusing and varied results from different combinations of materials or system configurations. Market growth of photovoltaics technology is slow because most firms are unwilling to commit money to this industry when they fear discouraging market forecasts, the risk of plant obsolescence, and the current underutilization of the industry's capacity.

METHODOLOGY

The task of surveying early market experience of SHAC systems required the formation of a data base. Information was needed on the number of SHAC systems in the U.S., the types of buildings in which they are installed, and the size and cost of the systems. Normal sampling techniques were impossible because SHAC systems were too scattered and hard to locate with limited records from manufacturers. Instead, SHAC systems in six areas of the U.S. were located by an informal network of local contacts. Solar energy experts from six areas of the U.S. (Phoenix; Denver;

Washington, D.C.; Los Angeles; Boston; and the State of Florida) identified the number of solar installations in each area. These contacts led to further information for the SHAC systems data base.

Outline of a Paper on

ACCELERATING THE ACCEPTANCE OF SOLAR HEATING AND COOLING: A CANADIAN PERSPECTIVE ON U.S. EXPERIENCE

W.R. Derrick Sewell

1. Introduction

The attainment of widespread acceptance of a significant innovation in the North American housing market has traditionally taken 30 years or more. The rapid depletion of world oil reserves, and political instability in many of the major supplying nations, however, have made it clear not only that radical changes are required in home heating and cooling technologies but also that it will not be possible to tolerate the conventional time period for diffusion. Efforts need to be made to foster the introduction of new sources of energy, such as the heat from the sun. This means identifying barriers which impede their acceptance, and introducing incentives and regulations which will accelerate the rate of diffusion. The United States, at federal, state, and local levels of administration, has embarked upon a major programme towards this end. Canada and several other countries are now in the process of developing programmes too. The approach taken in the United States, and its implications for efforts elsewhere, therefore, are highly pertinent.

This paper will review the kinds of barriers faced by one non-conventional source of heating and cooling in the United States, solar energy. It will also describe the types of incentives and regulations that have been introduced in an attempt to remove these barriers and to accelerate the introduction of solar home heating and cooling. It will comment on their implications for the Canadian scene and elsewhere.

Particular attention will be paid to the role of perceptions and attitudes of various actors in the diffusion process, and responses of such actors to particular kinds of incentives and/or regulations.

2. The Diffusion Process

The diffusion of any innovation passes through a series of stages, beginning with the discovery of a new technology or concept, its adoption by a few pioneers and subsequent acceptance by the majority of the community. In some instances the diffusion process is very short, lasting a matter of months, as was the case with the hula hoop. In others, it may last 30 years or more, as occurred with the typewriter or lotteries. Solar home heating and cooling appears to be more like the latter than the former, particularly as it faces so many technological, economic, social, political, and other barriers.

The technology relative to solar heating and cooling is conceptually simple, but the related delivery system is highly complex. It involves not only inventors, designers and manufacturers, but a whole host of other actors, notably builders, financiers, and government officials as well. Each has a different perception of the potential contribution of solar energy to the solution of the heating and cooling problem, and each has a different attitude as to which strategy should be adopted to accelerate the acceptance of new technologies. As a consequence, attainment of a consensus is likely to be slow. Only if governments take an active role in promoting rapid adoption of such technologies are the latter likely to overcome the various barriers they face.

This section of the paper will describe the results of a number of studies that have been undertaken to shed light on the perceptions and

attitudes of various actors involved in the diffusion process, and will comment on their relevance to policy formulation and implementation. Particular attention will be paid to studies of such aspects sponsored by the Canadian Department of Energy, Mines and Resources.

3. The United States Experience

The events surrounding the oil crisis in 1974 forced a re-thinking of the approach to energy supply in the United States. It resulted in some major changes in policies and administrative arrangements at national and state levels of administration. In particular it produced three important developments at the federal level: the identification of goals and the establishment of guidelines for their attainment; the re-organization of federal energy management functions; and an attack on the technology delivery system with a wide range of strategies.

This section will describe these developments briefly, and will examine the various strategies adopted in terms of the level of administration involved, geographical distribution of applications, level of investment, and date of introduction. It will then proceed to an evaluation of the response of the technology delivery system. This will examine the actions taken subsequent to the introduction of new policies and administrative arrangements at various levels of administration. Specifically, it will consider the growth rate and changing characteristics of the solar manufacturing industry, developments in the building industry, and consumer reactions. It will note in particular how responses have varied from one region to another, reflecting differences in climatic conditions on the one hand, and the competition of alternative energy sources and differences in economic structure, on the other.

4. *Implications of the U.S. Experience for Canada and Elsewhere*

The U.S. experience has two broad sets of implications for Canada and other countries involved in the promotion of solar heating and cooling. The first relates to the success (or otherwise) of the legislation, policies and administrative arrangements that have been introduced in an effort to stimulate the adoption of solar technologies. To the extent that other countries have similar economies and cultural attributes, U.S. experience with such institutional modifications could have direct relevance to similar responses being contemplated elsewhere. The second set concerns the likely impact of the U.S. solar manufacturing industry on similar industries in Canada and elsewhere, and on the market for solar technology in general. Clearly there are important implications for capital allocation, trade balances, and the design of energy policy at large.

This section will review some of these implications and outline options which Canada and other countries might consider in developing policies with respect to them.

9 February 1979

Legal Obstacles to Solar Energy: Executive Summary

Alan S. Miller

The production and delivery of all forms of energy is subject to substantial governmental regulation in the United States. Government involvement is not only pervasive but highly fragmented. Federal, state, and local governments all exercise authority, not always consistently. Research and development subsidies, gas and oil price controls, and subsidies for the use of specific forms of energy are important federal programs. Retail pricing of gas and electricity, associated conditions of service, power plant siting, and warranty requirements are usually considered state functions. Building codes and land use regulations are traditionally powers of local governments. However, none of these distinctions are absolute.

In addition to these governmental roles, some related functions are provided by "quasi-public" institutions. For example, private standard associations commonly determine performance requirements for materials which are given legal affect by reference in building codes.

Legal obstacles to solar energy are likely to arise because of both delays inherent to any new technology and because of its specific requirements. For example, building codes have been criticized for delaying the acceptance of many innovations in the building industry. This is due to the conservatism of the industry and the fragmented nature of the process rather than anything about solar energy technologies in particular. The solution is therefore most likely to require working within the system, providing necessary information and suggested code language, rather than in changing the system.

In contrast, providing unobstructed access to sunlight for solar collectors is a new problem not attributable to the existing regulatory framework.

The American legal system long ago concluded that a right to the sun was inconsistent with the needs of a society based upon densely distributed populations. (Landowners can voluntarily create such rights through easements.) So far, there is too little experience to assess the extent of the problem except in central business districts where the conflict is obvious and solar collectors may not be practical. Numerous legal changes have been proposed and a few already adopted to eliminate the uncertainty. However, the adoption of any radical changes in the nature of property rights seems premature. In new developments, relatively common planning procedures may be adequate to address the problem.

Another issue associated with land-use controls is the problem of aesthetics regulation. The external appearance of buildings is subject to both publicly and privately created regulations which have already been used to obstruct the use of solar collectors. Private subdivision controls may be particularly difficult to change or challenge in court.

Numerous extremely complex and controversial issues must be addressed by the state public utility commissions responsible for regulation of the investor-owned utilities which provide most of the gas and electricity services in the United States. One set of issues has to do with the rate structures and service policies of these utilities. As Dr. Sparrow's paper explains in some detail, the rates charged for gas and electricity used as an auxiliary source for solar energy can significantly affect ehe economics of such systems. As a legal matter, these rates have traditionally been set with very little outside review by public utility commissions. However, this is now changing. As a result of several provisions in the National Energy Act, the U. S. Department of Energy now may participate in utility commission proceedings.

A second set of issues has to do with the merits of utility participation in the distribution or financing of solar energy equipment. Such programs also require commission approval but are now essentially prohibited by the National Energy Act.

Consumer protection could raise additional obstacles to solar energy. The substantial number of operating problems due to faulty installation attests to the seriousness of this problem; the entire industry could be injured if consumer confidence is undermined. On the other hand, proposed solutions which require performance ratings or expensive guarantees could impede small manufacturers and innovation in general.

Financial problems are caused by the procedures used to underwrite the cost of a home. These procedures have traditionally discouraged investments with a higher initial cost but lower operating costs. This bias is reinforced by provisions of federal and state tax codes.

Selected Governmental Roles in the Supply and Delivery of Energy in the United States

Federal

Research and Development subsidies

Use subsidies (e.g., tax credits)

Information programs

Gas & Oil pricing

Conditions on federally-insured mortgages

Public resources regulation

Nuclear safety regulation

Power generation (TVA, BP, BuRec)

State

Gas & Electricity retail pricing

Utility services regulation

Power plant siting

Consumer protection

Building Codes

Local

Building Codes

Land Use regulation

Municipally-operated utilities

Quasi-Public

Gas & Electricity services

Standard setting

Principal Legal Obstacles to Solar Energy

Access to sunlight/planning procedures

Building Codes

Aesthetics Controls

Utility rates and service policies

Consumer protection/warranties

Financial issues

Tax policies

Anti-trust law

Patent law

Labor law

Executive Summary: The Relation Between Solar Energy and Utilities

The U. S. National Energy Act of 1978 discourages U.S. public gas and electric utilities from participating in the commercialization of solar energy, requires them to offer solar back-up rates that are non-discriminatory, and to provide information about solar options to their customers.

The discouragement is surprising, since the issue of solar involvement is hardly settled. Major arguments supporting utility involvement in solar commercialization are: (a) they will introduce solar at a socially optimal pace, since they alone see the true cost of conventional systems; (b) their entry will speed solar commercialization by aggregating the market; (c) they will incur less bad debt loss on solar and, hence, can offer it at lower prices; (d) being repeat customers, they can better assure quality control; (e) involvement would allow solar to be "rolled in" to the rate base, permitting cross-subsidization of solar energy by other energy customers.

On the other hand, good arguments exist to support barring utilities: (a) their involvement might permit them to use their monopoly power to stifle solar energy; (b) by aggregating the market, they might lead to too early freezing of the technology; (c) their participation would lead to the emergence of a few large solar producers, reducing competition; (d) solar installations would be overdesigned and overengineered, increasing their cost; (e) their presence would force out other solar equipment retailers.

With regard to costs of conventional energy for back-up of solar systems, time of use rate structures might actually hinder solar commercialization by reducing the value of conventional energy freed by solar.

The inversion of the block rate structure by charging increasing, rather than decreasing rates for additional quantities purchased will in all instances help solar. Such an inversion is likely, given the U.S. push toward rate reform which allows prices to better reflect costs of energy production.

A special situation is developing for central solar thermal systems. The U.S. Coal Conversion Act requires that by 1985 oil and gas fired electric generation stations must convert to other fuels, raising the possibility of repowering such systems with central solar receivers. This would create a market for solar heliostats which might permit the envisioned scale economies in the production of heliostats to emerge, permitting early commercialization of solar thermal systems.

Executive Summary: Solar Energy Economics in the U.S.

The competition between solar and conventional systems confronts a new technology with high first costs and insignificant operating costs against established technologies with lower first costs, but higher operating costs. This places the time value of money in a central position, since the choice will depend on the value the purchaser attaches to future savings. Other major issues in the choice mechanism include the impact of uncertainty regarding future fuel prices and solar system performance, alternate formulations of the choice mechanism (payback period), and the differing criteria used in the commercial/industrial sector.

Major determinants of solar market penetration are projected reductions in the installed cost of solar systems due to learning curve effects and emergence of new technologies, and expected increases in the price of conventional fuels. Current projections, based on a doubling of real energy prices by 2000 and a 40 to 50% reduction in cost of solar equipment call for 13.4 million [14.6% of all] residential and .5 million [5% of all] commercial decentralized solar systems installed by 2000; such systems will save .46 and .44 x 10^6 BTU's respectively in the year 2000 with current subsidies.

Government actions taken in 1978 to accelerate solar commercialization include income tax credits for residences and investment tax credits for corporations, although others were considered. State and local subsidies have been enacted well in advance (1975) of federal action; most experience to date is with those acts rather than the national program.

Major issues involved in evaluating government subsidies are the degree they are effective, efficient, and equitable. If such subsidies are viewed as corrective actions to offset already present biases, then such biases fall into three major catagories: (a) past subsidies to conventional fuels; (b) departures of price from replacement cost of conventional fuels; (c) biases introduced by various U.S. tax laws.

Finally, even if incentives are not to be justified by such a "corrective" argument, they might be justified by solar's contribution to project independence, maintenance of full employment, reduction in pollution, and maintenance of stable prices.

I. Solar Energy Economics in the U.S.

II. Basic Criteria;

$$C_t - \sum_{\tau=1}^{T} \frac{S_{t+\tau}}{(1+r)^{t+\tau}} - \frac{V}{(1+r)^{\tau+T}} \gtrless 0$$

where C_t = installed cost of solar equipment at t

$S_{t+\tau}$ = value of fuel saved in period $t+\tau$

r = discount rate

T = lifetime of equipment

V = scrap value of solar equipment at T

III. Issues in Choice mechanism Formulation

- other formulations - "owners payback"
- impact of uncertainty concerning future energy prices and durability of solar equipment
- the choice of the discount rate: the time value of money
- impact of economics on sizing of equipment
- values for commercial/industrial sector

IV. Most Likely Systems of the 80's

- evacuated tube collectors
- off peak charging of storage
- heat pump backup where COP favorable
- anticipated cost reductions

V. Fuel Cost Projections

- real cost expected to almost double by 2000
- issues are type of electricity displaced, speed of oil and gas deregulation, OPEC behavior

VI. Solar Market Projections - Residential

- 1985: 6.5% [4.17 million systems] of water heaters, 2.3% [1.32 million systems] of water and space heating systems, 1% [.17 million] of HVAC combined systems
- 2000: 13.4 million water heaters
- 2000: save $.46 \times 10^{15}$ BTU's, about 2.9% residential demand
- regionally concentrated

VII. Solar Market Projections - Commercial

- 2000: 5% [.5 million units] of market
- 2000: $.44 \times 10^{15}$ BTU savings in 2000

VIII. Government Actions To Speed Commercialization

- NEA subsidies: residential, tax credits; commercial, investment tax credits
- R & D efforts, other alternatives
- state and local subsidies
- problems with subsidies

IX. The Evaluation of Government Actions

- Is it effective?
- Is it efficient?
- Is it equitable?
- The packaging of solar subsidies

X. Subsidies Viewed as Corrective Actions

- off set past subsidies to other energy forms - "reverse discrimination"
- parity in treatment vs. parity in effect
- are sunk subsidies meaningful?
- estimate of current underpricing

XI. Marginal Cost Pricing

- time of day pricing
- "quantity discounts"
- replacement cost pricing

XII. Tax Biases

- consumers vs. utilities
- commercial vs. residential

XIII. Solar Energy and National Goals

- project independence
- maintenance of full employment
- reduction in pollution
- inflationary impact

I. Present Status of U.S. Utility Involvement in Solar Energy

II. The National Energy Act of 1978:

- prohibits utilities from supplying, installing, financing solar equipment except under stringent conditions
- requires utilities to provide back-up electricity at rates which reflect "true cost"
- excludes utilities from receiving solar investment tax credits
- requires utilities to provide information about solar energy, and to perform energy audits of households

III. Conclusion: Utilities discouraged from participation even though based on little information

IV. Arguments For Utility Involvement

- they see true costs, not prices
- speed commercialization by aggregating market
- business risk lower
- better able to insure quality control
- allows for cross-subsidization of solar by energy users
- eliminates tax biases

V. Arguments Against Utility Involvement

- use monopoly power to stifle solar
- force standardization too early
- leads to economic concentration on production side, lack of competition
- will result in "gold plating" of solar installations
- will force out other suppliers
- not a declining cost industry

VI. Backup Rate Structures

- Time of day rates; help or hinder solar?
- interruptable power contracts
- inversion of block rate structure
- the "true" cost of additional energy

VII. Solar Thermal Systems

- present systems - France, U.S.A.
- stand alone vs. hybrid
- impact of Coal Conversion Act
- prospects

APPENDIX D

QUESTIONNAIRE FOR PARTICIPANTS IN JOINT ORGANIZERS' CONFERENCE

COMMISSION OF THE EUROPEAN COMMUNITIES / US DEPARTMENT OF ENERGY

JOINT ORGANIZER'S CONFERENCE

INTERNATIONAL SYMPOSIUM

"NON TECHNICAL OBSTACLES TO THE USE OF SOLAR ENERGY"

Agenda for Session III

21 June 1979

The following items will be discussed during Session III in preparation for the 1980 Symposium:

1) Participating Countries
2) Individual Delegates and Responsibilities
3) Meeting Date Options and Place
4) Research Available and Needed
5) Keynote Speaker Candidates

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1) EC/SERI Organizing Committee suggests that the following countries participate in the 1980 meeting:

- United Kingdom
- Germany
- Italy
- France
- Belgium
- The Netherlands
- Luxembourg
- Denmark
- Ireland
- Sweden
- Norway
- Greece
- Spain
- Turkey
- Israel
- Switzerland
- Austria
- United States
- Canada
- Japan
- Australia
- New Zealand

Others you feel should participate and why:

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2) The Committee suggests three delegates be invited from each of the above countries: one each from government, industry and academia. Delegates should have documentable interest in the problem areas. We welcome your nominations for delegates and indications on why chosen. Delegates will be expected to be an information source for problems and policies in their specific country.

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3) It is proposed that the meeting be held in Brussels on 20-22 May 1980 Please note conflicts, objections and why, preferences and why.

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