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UNITED NATIONS CONFERENCE ON NEW  
AND RENEWABLE SOURCES OF ENERGY

Technical Panel on Solar Energy  
First Session

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PROVISIONAL AGENDA

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ANNOTATIONS TO THE PROVISIONAL AGENDA

1. Nomination of officers

Nomination of the Chairman and the Rapporteur. The Chairman will assume the chair.

2. Adoption of the agenda and organization of work

The agenda is based on the terms of reference of the Solar Energy Technical Panel. The Panel may wish to refer to figure 1.

3. Global insolation and solar energy resource base

Issue 3(A)      What is the global distribution of insolation and the corresponding solar energy potential?

Comment.      The Panel may wish to comment on the most suitable ways of collecting and presenting the data on solar energy potential, in particular, for a proposed Atlas of New and Renewable Sources of Energy. Should the data be presented by quarter of a year? Should it show direct sunlight and diffuse sunlight separately? Are there additional data such as ambient temperature and degree days of low ambient temperature which might be taken into account to give an index of areas suitable for particular applications such as domestic hot water, solar greenhouses, etc?

4. National and local insolation and solar energy assessments

Issue 4 (A)      What specific recommendations can be made to assist governments in their assessments of solar radiation data and solar energy potential?

Comment:      What advice should be included in a proposed technical note to assist governments in establishing a low cost but effective solar energy data collection network for assessing the potential for different types of solar energy application, including evaluation of exceptional sites suitable for large-scale power conversion? Where detailed data is not available at a particular location to what extent, and by what methods, can it be inferred or extrapolated from known data at other locations?

5. Solar thermal energy technologies: passive systems; stationary collectors; solar ponds.

Passive solar systems include solar architecture (habitat) and applications in agriculture such as greenhouses in which the technology cannot be separated from the application.

Issue 5 (A)      Under what conditions are architectural applications of passive solar technologies likely to be cost-effective and socially acceptable?

Comment: There are many examples of traditional housing in developing countries which embody sound solar design, as well as some new housing in developed countries. In view of the relatively slow turn-over of the housing stock in most countries, and the close relationship between housing and social customs, what are the prospects for reducing space heating and cooling requirements and optimizing comfort in residential and public buildings, by the adoption of good solar design principles?

Issue 5 (B) What are the prospects for conventional greenhouse agriculture and for the newer "plastic" agriculture especially in developing countries?

Comment: Plastic agriculture, in particular, appears to be making rapid progress in certain developed and developing countries and the Panel may wish to comment on the circumstances in which it is cost-effective or, if appropriate, recommend a consultant study of this technology.

Stationary solar thermal collectors from simple black plastic bags containing water, to sophisticated evacuated tubes with selective coatings and non-imaging focussing devices, are now proliferating all over the world. They correspond to different applications and temperature requirements as well as different levels of technical sophistication.

Issue 5 (C) What are the main trends and problems in stationary collector design and what advice can be given to developing countries contemplating local production of such devices?

Comment: While there are clearly no single "best" designs it should be possible to draw preliminary conclusions from the mounting experience in collector design and fabrication in a number of countries both developed and developing.

Solar ponds, by contrast with other stationary collector systems, are still in an early stage of experimental development.

Issue 5 (D) Based on the limited experience to date what are the prospects for solar ponds?

Comment: Solar ponds are proposed for industrial process heat, cooling, power production and desalination. Would an assessment possibly by a consultant study be premature?

6. Solar thermal energy technologies: line focussing; point focussing; central receiver systems.

Issue 6 (A) What are the prospects for concentrating thermal collector systems especially in developing countries?

Comment: Concentrating systems permit higher temperatures and consequently higher quality applications including electric power generation

as compared to stationary non-concentrating collectors. However, because the concentrators must track the sun, which must be visible, they are technically more sophisticated and cost-effectiveness and appropriate design for various applications is not clear and must in any event be decided on a case by case basis. Developing countries are especially in need of guidance for such applications as water pumping (irrigation) and small-scale electric power generation in remote areas, for which the technology may be too sophisticated especially by comparison with solar photovoltaics.

7. Solar photovoltaics.

Issue 7 (A) What are the prospects for small-scale solar photovoltaic electric power supplies for remote communities especially in developing countries?

Comment: One of the most promising applications of solar cells may be the provision of small (5 - 100 kW) "stand-alone" power for remote communities (the "photoelectric village"). Its viability depends on projected costs of photovoltaic arrays, balance of system costs (including storage and power conditioning) usually in competition with hard to maintain diesel generator sets using expensive fuel oil. Developing countries are in need of guidance on a methodology for establishing the viability of such proposals as well as on the feasibility in regions where there may be no technical skills to install and maintain the facility.

Issue 7 (B) What are the prospects for small solar photovoltaic water pumps in developing countries?

Comment: Guidance is needed on the viability of small (less than 1 kW) low lift irrigation pumps for small farmers in developing countries.

Issue 7 (C) What are the prospects for local manufacture (or at least assembly) of solar photovoltaic power systems in developing countries?

Comment: Two or three of the more industrially advanced developing countries are already undertaking prototype fabrication of photovoltaic cells and their attractiveness would be enhanced if there is a possibility of local manufacture. Although the manufacturing technology is still in a state of flux it may not be too early to make a preliminary assessment of the prospects for solar cell manufacture in some developing countries.

8. Solar energy applications: habitat, agriculture.

In addition to issues discussed in earlier agenda items the Panel may wish to consider the following:

Issue 8 (A) What are the prospects for solar desalination to produce fresh water?

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Comment: The economic viability of water desalination depends on the value of the product, in particular, whether it is to be used for people, cattle, or irrigation and also whether the feed water is seawater or brackish water. Solar stills have been used for desalination in a number of remote areas but have not been entirely successful. There are now proposals for more sophisticated solar desalination technologies including multi-stage flash distillation using stationary solar thermal collectors and solar photovoltaic systems using vapour compression desalination or reverse osmosis or electrodialysis of brackish water. Guidance is required.

Issue 8 (B) What are the prospects for solar refrigeration and icemaking?

Comment: Low cost refrigeration or icemaking for the preservation of food would be of great benefit to developing countries. Options include solar photovoltaic electric power combined with a standard vapour compression refrigeration cycle, and new developments with absorption cycles including zeolites and ammonia and calcium chloride. Guidance on this subject is urgently needed.

Issue 8 (C) What are the prospects for solar crop-drying?

Comment: Natural sun-drying of agricultural products (and of lumber) has been traditionally practised. Improvements using stationary solar thermal collectors have been widely experimented with but results have not been encouraging. The Panel may wish to comment on this issue.

Issue 8 (D) What are the prospects for solar cooking?

Comment: For a variety of by now well-known reasons solar cookers have not been successful. However, given that 80% or more of rural energy demand in many developing countries is for heat for cooking, and that in many of these countries the use of fuelwood is leading to a supply and ecological crisis, the Panel may wish to review this subject.

9. Solar energy applications: industrial process heat: electric power

Issue 9 (A) What are the prospects for the application of solar energy to industrial process heat especially in developing countries?

Comment: This application is just beginning in developed countries and the prospects for developing countries should be reviewed.

Issue 9 (B) What are the prospects for the application of solar energy to central power generation especially in developing countries?

Comment: Small scale solar power has been discussed in earlier agenda items. The Panel may now wish to discuss the prospects for central power generation with special reference to the comparative advantages distributed point focus systems with stirling cycle engines, central receiver systems with Rankine cycle engines, and large

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photovoltaic arrays (possibly with concentrator systems and combined with low temperature heat).

Issue 9 (C) What are the requirements and problems of energy shortage and power conditioning in connection with power generation?

Comment: Energy storage is a major problem and may be dealt with by a special working group. However, a preliminary review is required. Both electrochemical batteries and thermal storage systems need review as well as the problems of interfacing a solar system with a large power grid and also hybrid thermal cycles using fuel firing of the working fluid at night or during long periods of cloud. The related problems of power conditioning to match solar power outputs with applications inputs needs comment especially in view of recent developments with alternating current synthesizers based on power transistors and microprocessors.

10. Special problems of solar energy in developing countries.

Over and above specific technology and applications issues already raised there are a number of general issues of special relevance to developing countries.

Issue 10(A) What are the special comparative advantages and disadvantages of developing countries in the application of solar energy?

Comment: On the whole developing countries which are situated in low latitudes, have as much as twice the insolation of mid-latitude developed countries with correspondingly lower costs. They also have fewer central power distribution grids so that solar power is typically competing with higher cost diesel power. However, if systems cannot be fabricated locally there is a likelihood that imported capital will be substituted for imported oil without visible net improvement. These and other issues need review.

Issue 10(B) What are the special institutional and training requirements of developing countries in order to absorb the new solar technologies?

Comment: A shortage of technical services and trained personnel is already a bottleneck in the introduction of solar energy in developed countries and is likely to be even more acute in developing countries. What can be done to overcome this problem?

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11. Demonstration projects and their importance.

In view of the universal availability of solar energy, particularly in the developing countries located in the solar belt of the world (35 deg.N. and 35 deg.S. of the equator) having high solar insolation, and the fact that new materials, new techniques and new technologies of harnessing solar energy have appeared on the scene only recently, the importance of familiarizing the developing countries with the working of the systems involved by establishing demonstration projects may be considered by the panel. Whether such demonstration projects should be tailored to some specific end-uses like generation of electric power or crop drying or water pumping or cold storage etc., or to all of them, may be discussed by the panel. Further, the question whether such demonstration projects should be planned on a regional or sub-regional basis may also be commented upon by the panel. In this connection, the issues of financing and implementation of such projects would need special attention.

12. Solar energy to the year 2000 and beyond

Issue II (A) What contribution can be expected from such exotic (and still speculative) new technologies as solar power satellites and as the production of fuel hydrogen (for transmission by pipeline) in large solar energy facilities in desert areas.

Issue II (B) What methodologies are available for projecting national and global energy requirements and the share of solar energy in meeting these requirements?

13. Recommendations for intersessional activities.

The Panel will make appropriate recommendations, based on its deliberations, for the activities to be undertaken before the next session.

14. Contributions of Panel members and of the United Nations system to the work programme.

The members of the Panel, on behalf of themselves and of the organizations to which they are affiliated, may wish to inform the Secretariat of definite activities related to the Conference, which they would be prepared to undertake before the second session of the Panel late in 1980. Specialized agencies of the United Nations, Inter-Governmental Organizations and Non-Governmental Organizations in consultative status with the United Nations may also wish to volunteer contributions. These contributions should be related to the proposals for working group meetings, consultant studies and other activities arising out of their deliberations and may also include suggestions for further cross-disciplinary and synthetic studies.

15. Adoption of the report of the first session

The final report will be drafted jointly by the Chairman, Rapporteur and Technical Secretary, based on the recommendations for inter-sessional activities and the proposed contributions.

Figure 1 TECHNOLOGY-APPLICATION MATRIX

Application	Market Sector		1	2	3	4	5	6	7	8	9	10	11
			Thermal Passive	Bio. Conv. Woodburning	(5e-i, 5e) Thermal Static	(5d) Solar Ponds	(5e-ii, 5e-c) Thermal Concentrators	Wind Conv.	Adv. Bio. Conv.	(5e-ii) Adv. Thermal Conv.	(5-f) Direct Electric Photovoltaics	Ocean Systems	(5-h) Satellite
			Low Tech.	Low Tech.	Inter. Tech.	Inter. Tech.	Inter. Inter. Tech.	Inter. to High	High Tech.	High Tech.	High Tech.	High Tech.	Ultra High Tech.
1. Greenhouses	Agriculture	5a	x		x	x							
2. Crop Drying	Agriculture	5a	x	x	x								
3. Hot Water	Residential	—	x	x	x	x							
4. Space Heating	Resid./Comm.	5b	x	x	x	x	x						
5. Cooling	Residential	5a		x			x						
6. Ind. Process Heat	Industrial	5e		x	x	x	x						
7. Desalination	Resid./Indus.	5a			x	x	x					x (?)	
8. Ind. Process Steam	Industrial	5e					x		x	x			
9. Transportation	Transportation	—		x			x	x	x	x	x (?)		
10. Mechanical Power	Industrial	—		x			x	x	x	x			
11. Pumping	Agriculture	5a				x (?)	x	x	x	x	x (?)		
12. Sterilization	Resid./Indus.	5a					x	x	x	x	x		
13. Fuels & Chem.	Indus./Trans.	—						x	x	x		x	
14. Space Cooling	Resid./Comm./Indus.	5b	x			x (?)	x	x		x	x		
15. Refrigeration	Same	5a					x	x		x	x		
16. Electric Power	All of above	5e				x (?)		x	x	x	x	x	x