SERI/TR-751-752

March 1981

Ocean Energy Researchers Information User Study

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SERI

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A Division of Midwest Research Institute

1617 Cole Boulevard
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Operated for the
U.S. Department of Energy
under Contract No. EG-77-C-01-4042

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Printed in the United States of America
Available from:
National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161
Price:
Microfiche $3.00
Printed Copy $ 6.50

SERI/TR-751-752
UC CATEGORY: UC-58c,64

OCEAN ENERGY RESEARCHERS INFORMATION USER STUDY

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PREPARED UNDER TASK NO. 8420.11

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FOREWORD

This document reports the results of studies of users of ocean energy information. It identifies two groups of ocean energy researchers, their information needs, the priority of those needs, and methods of disseminating information to each group. This is one of a series of ten reports covering many different solar technologies. These results will play an integral part in the planning of new information products and data bases for the Solar Energy Information Data Bank (SEIDB).

This study was performed under Contract No. ET-77-C-01-4042, FY 1980 Task Number 8420.11 and FY 1981 Task Number 1023.11.

Paul Notari, Chief
Information Outreach and
Dissemination Branch

Approved for

SOLAR ENERGY RESEARCH INSTITUTE

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ACKNOWLEDGMENTS*

The authors would like to thank the following people for their valuable technical advice and review.

R. N. Hazelwood
Global Marine Development, Inc.

M. E. McCormick
U. S. Naval Academy

R. A. Meyer
Solar Ocean Energy Liaison

T. Penney
Ocean Systems Program Division
SERI

N. F. Sather
Argonne National Laboratory

*Note: This work was submitted to DOE Program Management on 11 December 1980 and again on 6 February 1981 for their information and commentary as appropriate.

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OCEAN ENERGY RESEARCHERS INFORMATION NEEDS STUDY MANAGEMENT SUMMARY

This report describes the results of a series of telephone studies of potential, near-term (2-3 years) users of information on ocean energy systems. Due to the relative infancy of this technology, these studies were restricted to researchers. These studies, part of a larger study covering many different solar technologies, identified:

- the types of information each group of researchers needed, and
- the ways to get information to that group.

This ocean energy report is one of the ten discussing the results of these studies. In most of these studies, a variety of groups were interviewed regarding each solar technology. However, in this report, only researchers were interviewed. Due to the newness of the technology, no sample frames were available except those for researchers.

BACKGROUND

The purpose of the overall study was to obtain baseline data about the information needs of the solar community. Very little previous work has been done in this area; the studies that have been done were generally restricted to solar heating and cooling of buildings. The present study is the only one known to investigate all of the following technological areas:

- Photovoltaics
- Passive Solar Heating and Cooling
- Active Solar Heating and Cooling
- Biomass Energy
- Solar Thermal Electric Power
- Industrial and Agricultural Process Heat
- Wind Energy
- Ocean Energy
- Solar Energy Storage

There have been a few previous studies which asked homeowners what solar information they needed, but this is the only known study to provide data on the solar information that such groups as researchers, manufacturers, architects, engineers, installers, lawyers, bankers, insurers, public interest groups, state energy offices, and agricultural extension agents themselves say they want.

The data from this study will be used along with other data to determine what new information products and services the Solar Energy Research Institute (SERI), the Solar Energy Information Data Bank (SEIDB) Network, and the entire solar information outreach community should be preparing for and disseminating to the solar community.

STUDY CHARACTERISTICS

Between 3 September 1979 and 13 October 1979 Market Opinion Research, Inc. of Detroit, Michigan—under subcontract to SERI—conducted telephone interviews with 86 distinct groups of solar information users taken from across the nine different technological areas. Approximately nine respondents were interviewed from each group. Interviews were based upon professionally reviewed and tested questionnaires that utilized a mixture of open-ended and closed-ended questions. The interviews took an average of 18 minutes to complete.

The respondents proved to be very cooperative. Considering the length and nature of the telephone interviews, it was surprising that only about 3% of the respondents terminated an interview or refused to be interviewed. This finding supported the interviewers' statements that the respondents were very interested in telling what they were doing in solar energy, in obtaining solar information, and in specifying what solar information would prove the most valuable.

SAMPLE SIZE

Studies of 86 groups, each interested either in one of nine specific solar technologies or in solar energy in general, provided an extremely broad view of the information needs of the solar community. Although the sample size of only nine respondents per group was small, the data still proved to be adequate for planning purposes. It was possible to determine the information most important to the respondents and the best channel for dissemination. A variety of valid statistical tests were performed, both to compare the priorities a group gave to different information items and to compare the priorities different groups gave to the same item (see Section 2.3 and Appendix E).

OCEAN ENERGY GROUPS STUDIED

The results of an earlier study identified the groups of information users constituting the ocean energy community [1] and determined the priority (to accelerate commercialization of solar energy) of getting information to each user group. In the current study only high-priority groups were included. Considerable effort (e.g.; library searches, phone calls, subcontractors) went into obtaining the names of people who were professionally involved with ocean energy. However, sufficient names could only be obtained for researchers. Respondents in the following two groups were queried about their need for information on ocean energy technologies:

- DOE-Funded Ocean Energy Researchers, and
- Non-DOE-Funded Ocean Energy Researchers.

Groups that it would have been desirable to study, but for whom adequate lists of names could not be obtained, included ocean energy systems equipment manufacturers and facility and systems designers. Several of the groups discussed in another report from this study [2] also indicated an interest in information on ocean energy (see Section 2.2.4).

RESULTS

Only two groups (both Researchers) were interviewed in this study. For purposes of comparison, the following tables list results for All Researchers who were interviewed in all nine solar technologies.

Usefulness of General Types of Information

The most important result obtained from the study of Ocean Energy Researchers was the identification of the ocean energy information categories ranked the most useful by each group (see Table S-1). Ocean energy respondents in both groups gave high ratings to information on:

- Research in progress,
- The state of the art,
- Cost/performance,
- Installation/operation costs, and
- Regulations affecting siting and installation.

Rankings by the two groups were quite similar, except for "climatological data," "tax credits," and "lists of technical experts."

Usefulness of Specific Information Products

The same questions also provided information on how valuable a set of specifically proposed information products would be to the respondents. Probably the most interesting results for Ocean Energy Researchers (Table S-2) were:

- The relatively high level of interest in calendars of events,
- The usefulness of both manual analytical tools and computer models to Non-DOE-Funded Ocean Researchers, and
- Lower levels of interest in all items by DOE-Funded Ocean Researchers compared to Non-DOE-Funded Ocean Researchers.

Sources Used to Obtain Information

Table S-3 lists the proportion of each group that had used different sources to obtain any type of solar information in the past few years.

The information sources most familiar to both ocean energy groups were:

- Directly from the U.S. Department of Energy (DOE);
- Workshops, conferences, or training sessions;
- Periodicals, newspapers, or magazines;
- An organizational or local library;

Table S-1. COMPARATIVE USEFULNESS OF GENERAL TYPES OF INFORMATION ON OCEAN ENERGY

General Information Types	Ocean DOE-Funded Researchers	Ocean Non-DOE-Funded Researchers	Total Ocean Researchers	All Solar Researchers[c]
	Ranking[a]	Ranking	Ranking	Ranking[c]
State of the Art in Ocean Energy Research	1	1	1	2
Ocean Energy Research in Progress	2	2	2	1
Oceay Energy Systems Installation/ Operation Costs	2	2	2	(4)[d]
Ocean Energy Systems Cost/Performance	5	2	4	3
Regulations for Ocean Energy Systems	2	5	5	(16)
Climatological Data	7	14	10	(7)
Educational Institutions Offering Ocean Energy-Related Courses	17	17	17	20
Standards, Specifications, or Certification for Ocean Energy Systems	15	14	15	(13)
Institutional, Social, Environmental, or Legal Aspects of Ocean Energy Applications	13	11	13	14
Expected Developments in Ocean Energy ("Next 10 Years")	9	7	7	5
International Ocean Energy Markets, Research, Programs, Industry	14	16	16	17
Tax Credits, Grants, Incentives	16	7	14	(12)
Coming Events in Ocean Energy	7	11	7	9
Ocean Energy Information Sources	5	7	6	6
Technical Experts on Ocean Energy Systems	10	5	7	11
Technical Descriptions of Ocean Energy Systems	10	7	10	8
Nontechnical Descriptions of Ocean Energy Systems	18	18	18	(21)
Ocean Energy Systems Design[b]	12	13	12	10
Sample Size	10	7	17	181

[a]The Ranking was based upon asking respondents how useful each item would be to them (see text of main report). If items were tied, they were all given the highest possible rank.

[b]This item was derived by combining the results from four distinct questions related to systems design (see Question 8a; items 4, 8, 10, and 11 in Appendix D).

[c]All Researchers were asked general information types which applied to their specific technology. They were asked about more types of information (21) than were Ocean Researchers. Rankings by All Researchers are over 21 items, not just the 12 shown here.

[d]"( )" means the question was not asked of all of the groups in this particular set of respondents. For example, "(4)" means that this item was ranked 4th by those who were asked about this source. In no case were fewer than nine respondents asked.

Table S-2. VALUE ASSESSMENT OF SPECIFIC OCEAN ENERGY INFORMATION PRODUCTS

Specific Information Products	Ocean DOE-Funded Researchers	Ocean Non-DOE-Funded Researchers	Total Ocean Researchers	All Solar Researchers[b]
	Percent[a]	Percent	Percent	Percent
Bibliography of General Readings on Ocean Energy Systems	30	57	41	39
Calendar of Ocean Energy Conferences and Programs	60	71	65	49
Ocean Energy System Diagrams or Schematics	44	57	50	42
Ocean Energy System Design/Installation Handbooks, Reference Tables	30	57	41	46
Manual Analytical Tools for Ocean Energy System Design	20	71	41	52
Computer Analytical Tools (Models) for Ocean Energy System Design	40	57	47	44
Lists of Ocean Energy Technical Experts	40	71	53	45
Technical Descriptions of Ocean Energy Systems	30	71	47	56
Nontechnical Descriptions of Ocean Energy Systems	10	0	6	(14)[c]
List of Ocean Energy Information Sources	50	71	59	57
Sample Size	10	7	17	181

[a]Percent is the percentage of respondents rating the item as "essential" or "very useful" (as opposed to "somewhat useful" or "not at all useful").

[b]All Researchers were asked about specific information products as applied to their specific technology.

[c]"( )" means the question was not asked of all of the groups in this particular set of respondents. For example, "(44)" means that 44% of those who were asked had used that source. In no case were fewer than nine respondents asked.

Table S-3. SOURCES USED TO OBTAIN SOLAR INFORMATION (Percent[a])

Information Sources	Ocean DOE-Funded Researchers	Ocean Non-DOE-Funded Researchers	Total Ocean Researchers	All Solar Researchers
Public Media				
Radio or TV	30	29	29	(28)[b]
Periodicals, newspapers, or magazines	80	71	76	(94)
Private Solar-Involved Organizations				
Private solar energy or environmental organizations	30	57	41	53
International Solar Energy Society (ISES) (including publications)	20	29	24	48
Solar Energy Industries Association (SEIA) (including publications)	10	29	18	33
Contacts With Professionals				
Solar installer, builder, designer, or manufacturer	50	71	59	65
Workshops, conferences, or training sessions	80	86	82	88
Information Services				
Respondent's organizational library or local library	80	57	71	84
Commercial data base	30	57	41	38
Smithsonian Science Information Exchange (SSIE)	10	0	6	17
Federal library or information center	50	29	41	54
Government Printing Office (GPO)	70	71	71	74
National Technical Information Service (NTIS)	80	57	71	64
Technical Information Center (TIC)	30	43	35	40
Government Solar-Involved Organizations				
Directly from the U.S. Department of Energy (DOE)	100	86	94	80
National Solar Heating & Cooling Information Center (NSHCIC)	10	0	6	29
Regional Solar Energy Centers (RSECs)	10	14	12	23
State energy or solar offices	20	29	24	48
Other				
Some other state or local government office or publication	20	29	24	28
Public utility company	30	43	35	51
Law of the Sea Institute	10	43	24	NA[c]
National Oceanic and Atmospheric Administration	70	71	71	NA
Sample Size	10	7	17	181

[a]Percent is the percentage of respondents who used the source to obtain any solar information in the past few years.

[b]"( )" means the question was not asked of all of the groups in this particular set of respondents. For example, "(44)" means that 44% of those who were asked had used that source. In no case were less than nine respondents asked.

[c]"NA" means the question was not asked of this particular set of respondents.

- Government Printing Office (GPO);
- National Technical Information Services; and
- National Oceanic and Atmospheric Administration (NOAA).

Technical Areas of Interest

Table S-4 lists the proportion of each group interested in information on different types of ocean energy system topics. The major results were:

- Fairly high levels of interest by Non-DOE-Funded Researchers in underwater transmission cable, heat exchange and materials, biofouling and corrosion; and
- Lower levels of interest in all areas by DOE-Funded Researchers than by Non-DOE-Funded Researchers except for tidal systems and salinity gradient systems.

Advanced Information Acquisition Methods Used

Table S-5 lists the proportion of each group that had used selected advanced acquisition methods to obtain information in the past year. The following results were observed for Ocean Researchers:

- Computer terminals were used more widely than microforms by Non-DOE-Funded Ocean Researchers, but it was just the opposite for DOE-Funded Ocean Researchers.
- Ocean Energy Researchers were less likely than All Researchers to use either advanced acquisition method.

Additional Findings

- Although "ocean systems design" was ranked 12th by DOE-Funded Ocean Researchers, there was substantial difference in the rankings given to the four individual items. "System diagrams or schematics" ranked 5th for this group, "computer models" 11th, and "manual methods" and "system design handbooks," 17th.
- Similarly, although "ocean systems design" was ranked 13th by the Non-DOE-Funded Ocean Researchers, there was substantial difference in the rankings given to the four individual items. "Manual methods" ranked 5th, "computer models" 13th, "system diagrams" 16th, and "system design handbooks," 19th.
- Both groups of Ocean Energy Researchers ranked "system design handbooks" lower than did All Researchers.

Table S-4. INTEREST IN INFORMATION ON OCEAN ENERGY TOPICS

Topics	Ocean DOE-Funded Researchers	Ocean Non-DOE-Funded Researchers	Total Ocean Researchers
	Percent[a]	Percent	Percent
Materials, Biofouling, Corrosion	60	86	71
Heat Exchange	50	86	65
Platform, Hull Design, Mooring	60	71	65
Cold Water Pipe	60	71	65
Underwater Transmission Cable	40	86	59
Rotary Equipment, Pumps, Turbines	40	71	53
Wave Energy Systems	60	71	65
Tide Energy Systems	60	57	59
Salinity Gradient Energy Systems	50	43	47
Sample Size	10	7	17

[a]Percent is the percentage of respondents interested in the topic.

Table S-5. ADVANCED INFORMATION ACQUISITION METHODS USED

Acquisition Methods	Ocean DOE-Funded Researchers	Ocean Non-DOE Funded Researchers	Total Ocean Researchers	All Researchers
	Percent[a]	Percent	Percent	Percent
Computer Terminal Access to Data Banks	10	29	18	34
Microform (microfiche, microfilm sheets or rolls, COM, etc.)	50	14	35	40
Sample Size	10	7	17	181

[a]Percent is the percentage of respondents who used the method in the past year.

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SECTION 1.0

INTRODUCTION

This report describes the results of a series of telephone interviews with potential near-term (2-3 years) users of information on ocean energy systems. Due to the relative infancy of this technology, this study was restricted to researchers. This study, part of a larger study covering nine different solar technologies, identified:

- the type of information each group of researchers needed, and
- the best way of getting information to that group.

This section explains the background of the study, places this report in the context of the overall program, and describes the structure of this report.

1.1 BACKGROUND

The rapid, widespread commercialization of solar energy will be necessary if the United States is to meet the energy crises of the next 50 years. But the use of solar energy will never reach meaningful levels without both the recognition that information transfer is essential to commercialization and the deliberate development of systems for the transfer of information. For example: scientists need the latest solar research results to enhance their own efforts; engineers and installers need performance data to design solar systems; public interest groups need environmental impact data to support solar technologies against conventional energy alternatives; potential owners of solar energy systems need cost information to make purchase decisions; the general public needs basic information to weigh which public policies to support.

In 1974 the Congress, noting the importance of information transfer and recognizing the value to the solar community of an integrated, comprehensive data collection and information dissemination system, called for the implementation of a Solar Energy Information Data Bank (SEIDB). In The Solar Energy Research and Development Act (P.L. 93-473) Congress stated that the SEIDB should be established " for the purpose of collecting, reviewing, processing, and disseminating information and data . . . in all of the solar energy technologies."

The U.S. Department of Energy (DOE) has assigned the Solar Energy Research Institute (SERI) the task of serving as the lead center to fulfill this Congressional mandate to collect all types of solar-related information, to convert it into a user-oriented format, and to disseminate this information to the widest possible range of persons and groups with an interest in solar energy. These groups range from decision makers at all levels of government to manufacturers of solar products; from solar architects, installers, and service persons to home or farm owners; and from banks and financial institutions to scientists and researchers. In accord, SERI's Information Systems Division (ISD) is now in the process of collecting solar information, building data bases, and preparing and disseminating information through a variety of products and services.

The long-range objective of the SEIDB is a centrally coordinated network to ensure that all individuals concerned with solar energy have prompt and efficient access to whatever information is necessary to support sound decisions. Ultimately this information will be

accessible through a variety of means (publications, computer data systems, audiovisual products, the Solar Energy Information Center, inquiry and referral services, etc.) to serve the diverse requirements of the solar community.

1.2 SOLAR ENERGY INFORMATION DATA BANK PROGRAM PLANNING

In the past decade information scientists have studied many organizations responsible for data collection and information product development. A consistent finding of this research is that a key to the successful, efficient operation of such an organization is to design the entire system with the potential information user in mind. It is essential that development of information products and data bases be targeted for specific users rather than merely developed spontaneously. The information users, their information needs, and the priority of those needs must all be identified before effective information products and services can be developed efficiently. To ensure that the SEIDB is responsive to the high-priority information needs of the solar community, the Information Market Research Section of ISD is performing the following tasks:

1. Defining the community of solar information users,
2. Setting priorities as to which groups of information users have the most important near-term information needs,
3. Determining the near-term information needs of the high-priority users,
4. Determining the information channels which can be effectively used to reach the high-priority users,
5. Determining what high-priority information needs are being met fully by existing products and services, and
6. Recommending additional, targeted, cost-effective information products and services to meet high-priority needs.

The results of the first two tasks are described in a previous document [1]. First, for each solar technology, those members or potential members of the solar community who will need solar information were identified; second, the relative importance of meeting the near-term information needs of each group of information users was described. This document provides guidelines to SEIDB planners as to who might be using the SEIDB and whose near-term needs are the most important.

The results of the third and fourth tasks are described in the current set of ten reports (see Section 1.3). These reports document the high-priority information needs and the most familiar information channels for each of 86 groups which were interviewed by telephone.

There have been a few previous studies which asked homeowners what solar information they needed, but this is the only known study to provide data on the solar information that such groups as researchers, manufacturers, architects, engineers, installers, lawyers, bankers, insurers, public interest groups, state energy offices, and agricultural extension agents themselves say they want.

The data from this study will be used along with other data to determine what new information products and services SERI, the SEIDB Network, and the entire solar information outreach community should be preparing for and disseminating to the solar com-

munity. These data will include (but not be limited to): contacts with SERI specialists; review of the Annual Operating Plans, Institutional Plans, and Program Plans of DOE and SERI; reviews of other solar literature; development of an "information user profile" data base from mailing list response cards; information user panels; direct contacts with members of the solar community at conferences, training sessions, etc.; visits to headquarters of national associations of users; and feedback provided by users of existing information products. Since information needs and priorities will continuously change, these tasks will necessarily be ongoing.

1.3 REPORT CONTENTS

This ocean energy report is one of ten issued on the results of these studies of solar energy information users. The full set of reports covers:

- Photovoltaics
- Passive Solar Heating and Cooling
- Active Solar Heating and Cooling
- Biomass Energy
- Solar Thermal Electric Power
- Industrial and Agricultural Process Heat
- Wind Energy
- Ocean Energy
- Solar Energy Storage
- General Solar Energy

Section 2.0 of this report describes the type of study conducted and the resulting constraints. The method used to select these groups is also described in Section 2.0. Several groups discussed in another report from this study also indicated an interest in information on ocean energy. These groups are listed in Section 2.2.4. Section 3.0 describes the results of studies of:

- DOE-Funded Ocean Energy Researchers, and
- Non-DOE-Funded Ocean Energy Researchers.

These respondents were asked specifically about their needs for information on ocean energy systems. In each of these sections describing study results, a standard presentation format has been used.

The appendices contain a list of all 86 groups interviewed (including the technologies other than ocean energy). They also contain a description of how the study was developed, a copy of the letter of introduction, a sample questionnaire, a description of the statistical tests used, and the data from the studies of the two ocean energy groups.

SECTION 2.0

STUDY DESCRIPTION

This section gives a brief description of the study. Appendix B gives additional information on how the study was designed and conducted. This section also explains how groups from the ocean energy community were selected as those to be sampled and gives a few comments on interpretation of study results. The study findings are reported in Section 3.0.

2.1 STUDY CHARACTERISTICS

Between 3 September 1979 and 13 October 1979 Market Opinion Research, Inc. (MOR) of Detroit, Michigan—under subcontract to the Solar Energy Research Institute (SERI)—conducted telephone interviews with 86 distinct groups of solar information users. Approximately nine respondents were interviewed from each group. Interviews were based upon professionally reviewed and tested questionnaires (see Appendix D); they took an average of 18 minutes to complete. The 86 groups, selected to cover 9 solar technologies/applications, are listed in Appendix A. The results discussed in this report are from the 2 of those 86 studies which dealt specifically with ocean energy systems.

Studies of 86 groups, each interested either in one of nine specific solar technologies or in solar energy in general, provided an extremely broad view of the information needs of the solar community. Although the sample size of nine respondents per group was small, the data still proved to be quite adequate for planning purposes. It was possible to determine which information was the most important to the respondents and what was the best channel for disseminating that information. A variety of valid statistical tests were performed, both to compare the priorities a group gave to different information items and to compare the priorities different groups gave to the same item.

The respondents proved to be very cooperative. Considering the length and nature of the telephone interviews, it was surprising that only about 3% of the respondents terminated an interview or refused to be interviewed. This finding supported the interviewers' statements that the respondents were very interested in telling what they were doing in solar energy, in obtaining solar information, and in specifying what solar information would prove the most valuable. It was also observed that the number of respondents answering "don't know" or not answering a question was quite low. Including those cases where the potential respondent could not be reached within three attempts (or before the required number of interviews was completed), where the respondent refused to be interviewed, where the respondent terminated the interview prematurely, etc., the completion rate for the entire study was about 75%. The completion rate for each individual group is given in the section in which that group is discussed.

2.2 GROUPS STUDIED

One of the most important tasks was the selection of the groups of potential users of solar information to be studied. Before this could be done, however, it was necessary to list the important groups constituting the ocean energy community and to develop a conceptual framework within which selections could be made.

2.2.1 Target Audiences, Classes, and Groups

An important information science concept in developing information products and services is that of the "target audience" or "target group." These are generally defined as a collection of individuals or organizations who have similar information needs and information-acquiring habits. People in the same group tend to need information on the same subjects, at a similar technical level, and within a similar timeframe. In developing an information product program, it is important to begin with a typology that assigns information users who have similar needs to common groupings. This allows development of efficient, targeted information products to meet identified needs of specific users, without inundating other members of the solar community with unneeded information.

In Solar Information User Priority Study [1] such a typology was developed. Under this system members of the solar community were placed in distinct "user groups." A set of user groups formed a "user class" and a collection of user classes formed a "target audience." For more precise definitions:

- A User Group is the most basic category of information users who can be combined together under a single definitive title (e.g., Civil Engineers). A single information user group should be addressable by many specific information products. The purpose of defining distinct information User Groups is to identify a single set of users who can be served by the same information product (e.g., a civil engineers' handbook).
- A User Class is a set of information user groups which exhibit many common distinguishing characteristics (e.g., Facility or System Designers). A single information user class should be addressable by many general information products. The purpose of defining separate information User Classes is to identify sets of two or more groups of users who can be served by similiar information products (e.g., solar heating and cooling system design models).
- A Target Audience is a set of information user classes which exhibit some common distinguishing characteristics (e.g., Researchers). A single target audience should be addressable by one or more distinct types of information products. The purpose of defining separate information user Target Audiences is to identify broad sets of users who can be served by the same generic types of information products (e.g., research-in-progress newsletters).

Following this system, all solar information users fall within one or more of five Target Audiences. These Target Audiences are:

Researchers - those who are actively involved in researching, developing, and testing of new state-of-the-art technical developments in solar energy.

Applications Technologists - those involved in translating research results into marketable equipment and services. This classification includes manufacture, distribution, sales, design, installation, and maintenance of solar systems or components.

Facilitators - those whose decisions or actions directly aid (in either a positive or negative manner) the commercialization of solar energy. Thus, congressmen would be Facilitators in that they have the ability to pass legislation giving incentives; lobbyists in that they can affect legislation; state energy offices in that they can initiate demonstration projects; and the Environmental Protection Agency (EPA) in that it can forbid construction of a manufacturing plant at a specific site.

Users or Prospective Users - those individuals or organizations who have already applied this type of solar energy technology in their operations or have a reasonable chance of doing so in the near future.

General Public - Individuals who are not likely to utilize solar energy in the near future. An important aspect of this audience is its ability to influence the course of solar development through political influence, pro or con.

Based upon this scheme, the ocean energy information user community has been defined. Table 2-1 enumerates the user groups comprising the ocean energy information community and shows into which target audience each falls [1].

2.2.2 Criteria for Selection of Groups to Study

From Table 2-1 it is rapidly evident that there are many user groups who will eventually be needing information on ocean energy systems. The problem was, thus, to select those groups to be included as a part of this study. To determine which groups would be studied, each group was evaluated with respect to the following selection criteria:

- Appropriateness of using a structured telephone interview to collect information from the group on information needs and habits,
- Relative priority of the group's short- or medium-range information needs, and
- Availability of a sample frame for the group.

First, for many groups a structured telephone interview was not an appropriate method for defining information needs. It was not practical to interview the U.S. Department of Energy (DOE) or an organization like the Electric Power Research Institute, nor to interview a group like Congressional committee staff which would be too busy to respond. Rather than defining the information needs of these groups by telephone interview, they will be contacted directly in FY 1981.

Second, only those groups with a high immediate or potential need for ocean energy information were selected. Further, since fulfilling short-range information needs is critical, it was decided that in most cases those people who were already involved with ocean energy systems would be sampled. It was felt that these were the people who would be primary users of the Solar Energy Information Data Bank (SEIDB) over the next few years. These groups had been identified earlier in the Solar Information User Priority Study [1].

Finally, for many of the groups, lists of persons to be interviewed could not be developed or acquired. In the absence of sample frames, studies of such groups were not possible. (For more detail on sample frame development, see Appendix B.)

2.2.3 Groups Included in the Ocean Energy Study

After all decision criteria and constraints had been applied, it was determined that studies of the following two groups would be conducted to ask respondents about their need for information on ocean energy systems:

Table 2-1. OCEAN ENERGY INFORMATION USERS

Target Audiences
- User Classes
  - User Groups

1.0 Researchers

1.1 DOE-Funded Researchers or Developers
- Contractors
- National Laboratories

1.2 Non-DOE, Federally Funded Researchers or Developers
- U.S. Department of Commerce (DOC)-Maritime Administration (MARAD)
- DOC—National Oceanic and Atmospheric Administration (NOAA)
- U.S. Navy
- National Aeronautics and Space Administration (NASA)
- National Science Foundation (NSF)

1.3 Nonfederally Funded Researchers or Developers
- Universities
- Ocean Energy System-Related Manufacturers or Potential Manufacturers
- Trade Research Associations
  - Electric Power Research Institute (EPRI)
- Utilities
- National Energy Laboratory of Hawaii
- Ammonia-Producing Industry

2.0 Applications Technologists

2.1 Ocean Energy System—Related Manufacturers
- Cold Water Pipe Manufacturers
- Wire and Cable Companies
- Aerospace Industry
- Shipbuilding Industry
- Offshore Drilling Platform Construction Industry
- Platform Components Manufacturers
- Heat Exchanger Manufacturers
- Pump Manufacturers
- Rotary Equipment Manufacturers
- Other Ocean Energy Systems Component Manufacturers

2.2 Ocean Energy Facility or System Designers
- System Designers/Engineers
- Architectural/Engineering Design Firms
- Power Engineers
- Mechanical Engineers

Table 2-1. OCEAN ENERGY INFORMATION USERS (Continued)

Corrosion Engineers
Marine Engineers/Architects
Marine Surveyors
Electrical Engineers

2.3 Builders, Fabricators, or Contractors
General Contractors
Architectural/Engineering Construction Firms
Construction Engineers
Mechanical Engineering Contractors
Shipbuilders
Aerospace Contractors
Marine Construction Contractors

2.4 Ocean Energy Facility Service Workers
Shipbuilding Workers
Marine Construction Workers
Maintenance Workers

3.0 Facilitators

3.1 Legislators or Staff
Congressmen
Congressional Committee Staff
State Legislators in Florida, Hawaii, and Puerto Rico
National Conference of State Legislatures

3.2 Local Government Organizations

3.3 Government Solar-Active Organizations
DOE—Conservation and Solar Energy (C&SE)
DOE—Energy Information Administration (EIA)
DOE—Energy Research (ER)
DOE—Regional Energy Offices
DOE—Federal Energy Regulation Commission (FERC)
International Energy Agency
DOC—NOAA
DOC—MARAD
Florida, Hawaii, and Puerto Rico State Governments
Other Seacoast State Governments

3.4 Government Solar-Concerned Organizations
Council on Environmental Quality (CEQ)

3.5 Nongovernment Solar-Active Organizations
Solar Trade Associations
Ocean Energy Council
Solar Professional Societies
Solar Public Interest Groups
Solar Lobbyists

Table 2-1. OCEAN ENERGY INFORMATION USERS (Continued)

3.6	Nongovernment Solar-Concerned Organizations
	Public Interest Organizations
	Environmental Organizations
	Nonsolar Professional Societies
	Nonsolar Trade Associations
	National Ocean Industry Association
	Atlantic States Fisheries Commission
	DOC
3.7	Regulatory, Codes, or Standards Community
	Environmental Protection Agency (EPA)
	Occupational Safety and Health Administration (OSHA)
	Army Corps of Engineers
	American Society for Testing Materials (ASTM)
	National Electrical Manufacturers Association (NEMA)
	American Bureau of Shipping
	U.S. Coast Guard
3.8	Utility Community
	Southeastern State Utility Commissions
	Utility Trade Associations
	OTEC Utilities Users' Council
	SE USA Electric Utilities
	Utilities in Hawaii, Puerto Rico, and Maine
3.9	Financial Community
	Bankers
	Venture Capital Brokers
	Government Loan Agencies
	Stock Brokers
3.10	Legal Community
	Patent Attorneys
	Maritime Lawyers
	Maritime Arbitrators
	Law of the Sea Institute
3.11	Insurance Community
3.12	Educational Community
	High School Science Teachers
	University Faculty
	Vocational Instructors
	Career Counselors
	Seminar Organizers and Instructors
3.13	Information Intermediaries
	Federal Technical Libraries
	Industrial Technical Libraries
	Academic or Nonprofit Technical Libraries
	Public Libraries

Table 2-1. OCEAN ENERGY INFORMATION USERS (Concluded)

Federal Information Centers
On-Line Information Services
Bookstores
Film Distributors

3.14 Media
Newspapers or Magazines
Technical and Trade Journals
Television
Radio
Book Publishers

3.15 Labor Organizations
Maritime Construction Workers Unions
Aerospace Unions
Maritime Unions
Shipbuilding Workers Unions

4.0 Users or Prospective Users

4.1 Government, Commercial, or Industrial Users
Electric Utilities
Ocean Industries
U.S. Navy

4.2 Residential or Farming Users

5.0 General Public

Secondary School Students
College Students
Adults

- DOE-Funded Ocean Energy Researchers, and
- Non-DOE-Funded Ocean Energy Researchers.

The results from these studies are reported in Section 3.0.

Groups considered for these studies, but for whom adequate sample frames could not be obtained, included ocean energy systems equipment manufacturers and facility and systems designers.

2.2.4 Ocean Energy-Concerned Groups Included in the General Solar Study

Additionally, as a part of the overall study a number of groups were queried about their need for information on solar energy in general, rather than on a specific technology like ocean energy. While it was determined that all respondents in these groups had some involvement with solar energy, for many of them it was likely that this involvement was not, nor would it become, a primary factor in their professional work. Rather, for most—if not all—of them, solar energy was a new but minor issue which they were beginning to address within the scope of their existing jobs. Because each of these groups had peripheral interests in more than one solar technology, yet had not become fully involved with any, they were asked for general solar information needs rather than technology-specific solar information needs.

The results of the general solar study are reported in another document [2]. For ocean energy systems the following two groups were especially relevant because for each group at least three of the nine respondents indicated ocean energy was one of the areas in which they were "particularly interested in obtaining information":

- Public Interest Groups, and
- Lawyers.

The general solar energy report [2] also discusses the results of studies in which the state solar/energy office representatives were asked about their general, rather than technology-specific, solar information needs. Thirty-one percent of these representatives were interested in ocean energy systems information.

2.3 DATA INTERPRETATION

This subsection describes several points the reader should keep in mind in interpreting the data and results presented in the following sections.

2.3.1 Impact of the Sample Frames: Who was Sampled?

There were several ways in which the method of constructing the sample frames impacted the data. First, in some of the sample frames one geographic region was relatively over-represented, while another was relatively under-represented. For a study of sample size nine, however, such biases were generally not bothersome since the results were principally qualitative rather than quantitative.

Second, the sample frames were only as good as the sources. For example, the Smithsonian Science Information Exchange (SSIE) data base and DOE's Research in Progress (RIP) data base were principal sources in developing lists of researchers. The

SSIE was not always up-to-date, often did not include the name of the correct principal investigator, and did not contain much of the nonfederally funded research. RIP had similar problems, varying greatly in quality according to which technology was involved. Each of these problems could cause biases as to which researchers were included and which were excluded from the samples.

Third, many arbitrary decisions were necessary in developing the sample frames. For example, it was important not to interview a respondent more than once, even if he or she was working in more than one technical area. Thus, if Researcher X at Company Y was listed as principal investigator both for one project in ocean energy and for another in solar thermal electric power, then X was arbitrarily assigned to one of the two technologies, usually to the one with the smaller set of names.

The most important advice for the reader is to study carefully the description of how the sample frame was developed for each individual group. The reader must review sample frame development carefully to understand just who was being studied.

2.3.2 Statistical Tests

The statistical tests used are described in Appendix E. In the following section, test results are reported only if the statistical tests were significant at the $P < 0.05$ level. Thus, if a test result indicated that a difference between two means was statistically significant ($P < 0.05$), it meant that there was a maximum of a 1-in-20 chance that the two means were not different.

2.3.3 Hypotheses Versus Conclusions

Because of the limitations of sample size it was not always possible to draw definitive conclusions. In certain cases, when definitive conclusions could not be drawn, the authors have instead formed hypotheses based upon the results.

2.3.4 Significance of Rankings

One of the most valuable results of this study was the development of a ranked list of information topics or products which would be useful to the members of each group (for example, see Fig. 3-1). Typically, statistical significance tests (see Appendix E) indicated that the four-to-six top-ranked items were rated significantly higher than the bottom four-to-six items. Thus, typically there was no statistically significant difference between the top-rated item and the second-rated item—or even between the top-rated and the fourteenth-rated item. If the sample size had been greater, the number of combinations in which one item was rated significantly higher than the other would also have been greater. Even if every sample size had been raised by a factor of 10, however, it is highly unlikely that all pairs of items would have had significantly different ratings.

How, then, should the reader treat two items which were not significantly different in rating? Was there any meaning to the ranking system?

Yes, the fact that there were statistically significant differences between the top-rated and the bottom-rated items established the validity of the ranking scale as a whole. Despite the fact that two ratings are not significantly different, they still have the statistical property of being the Best Linear Unbiased Estimators. For example, even if Item 1 (with a rating of 3.4) was not significantly greater than Item 2 (with a rating of

3.1), Item 1 should still be considered the more important need unless there is additional, outside information to the contrary. (In determining which information products to develop, of course, one must also consider additional factors such as the cost of the product, the proportion of the group which will be reached, and the degree to which the information need will be met.)

2.3.5 Alternative Measures of Usefulness

The ranking of selected information items (in usefulness to the respondent) was based upon the rating developed by assigning a "4" for each response of "essential," a "3" for "very useful," a "2" for "somewhat useful," and a "1" for "not at all useful"; summing the responses for the entire group; then dividing by the number of responses in the group. Using the rating was the preferable way to establish rankings within a group because it fully used the information on the differences between "essential" and "very useful," between "somewhat useful" and "not at all useful."

There were several alternative ways of comparing the usefulness of items, one of which was to calculate the percentage of respondents who classified the item as either "essential" or "very useful." Using this percentage was quite handy in considering how useful a product designed for more than one group would be. For example, both "a calendar (of solar events)" and "a bibliography" were examples of information products that would be designed for many groups to use. In comparing the two potential products as to usefulness, this method (calculating for each item the percentage of the respondents who considered the item either "essential" or "very useful") provided a much more meaningful comparison than, for example, summing the ranks for all groups.

2.3.6 Combining Results From Different Groups

It should be pointed out that combining results from both ocean energy groups interviewed will not provide unbiased estimates of the total ocean energy community. First, the proportions of respondents from one group interviewed in this study may not correspond to the proportion of such persons in each entire community as only researchers were interviewed in the ocean technology. Second, the peculiarities of each individual sample frame were responsible for varying degrees of bias for each group. Third, some of the important groups in the ocean energy community were not studied (see Section 2.2).

2.3.7 Specific Information Products

Several specific information products were included among the items for which usefulness was assessed. It is important that responses to these items not be interpreted as totally generic responses. People who gave "a bibliography of general readings on ocean energy systems" a low rating may have done so either because of the level and content of the subject matter (i.e., general readings on ocean energy) or because of the format (i.e., bibliography). These people may or may not want bibliographies on other topics.

2.3.8 Information Sources

Another important question investigated how many respondents had used specific information sources. In using these results to plan how specific information is to be transmitted, it will be essential to specify fully both the information products or services and the groups to be reached before making the final decision of which information channels are to be used. One cannot assume, for example, that the two or three top-rated sources should be used for all, or even most, of the information transmissions to the group.

There were two other issues related to this question. The first was the decision not to ask respondents whether they had used SERI as an information source. The reasons are discussed in Appendix D.

The second issue concerned possible bias in responses to the question "have you obtained any solar information directly from the U.S. Department of Energy?" The intent of the question was to find out if respondents had contacted DOE directly for information, rather than if they had obtained DOE-produced information from other sources [such as SERI, National Technical Information Service (NTIS), Government Printing Office (GPO), National Solar Heating and Cooling Information Center (NSHCIC), Regional Solar Energy Centers (RSECs), libraries, etc.]. There was, however, no assurance that respondents interpreted the question in this light. In cases where the response "directly from DOE" was high, there was the possibility that respondents were referring to information authored or funded by DOE, but obtained from other sources.

SECTION 3.0

INFORMATION NEEDS OF OCEAN ENERGY RESEARCHERS

3.1 DESCRIPTION OF RESPONDENTS

3.1.1 Description of Sample

This section describes the results of two telephone studies to determine the needs of researchers for information on ocean energy systems. In one study 10 DOE-Funded Ocean Energy Researchers were interviewed, in the other 7 Non-DOE-Funded Ocean Energy Researchers were interviewed.

The sample frame for DOE-Funded Ocean Energy Researchers was constructed from the MITRE Solar Energy Technical Information Dissemination Program Reference Directory: Ocean Thermal Energy Conversion (OTEC) [3], the U.S. Department of Energy (DOE) December 1978 Ocean Systems Program Summary [4], the Research in Progress (RIP) [5] and the Smithsonian Science Information Exchange (SSIE) [6] data bases. Only those projects in progress during some part of FY 1978 or FY 1979 were included. From the data base searches, only those projects receiving at least some funding from DOE and involving ocean thermal or wave energy were selected. Entries without contact names (i.e., principal investigator) were eliminated. In addition, this sample frame was compared to other Researcher sample frames (for active and passive solar heating and cooling, photovoltaics, wind, solar thermal electric power, industrial process heat, agricultural process heat, and storage) and duplicate principal investigator names were deleted. One large organization was sampled in both the DOE-funded and the non-DOE-funded studies, but two separate divisions were represented. After all adjustments were made, the 10 interview candidates were randomly selected from a sample frame of 150 names.

The sample frame for Non-DOE Funded Ocean Energy Researchers was constructed by reviewing searches of SSIE and RIP files, the MITRE Reference Directory, and updates to the Reference Directory provided by the Mid-American Solar Energy Complex [7], then selecting those projects which had not received any funding from DOE. Only those projects in progress during some part of FY 1978 or FY 1979 were included. Duplicates were handled the same as for the DOE-Funded Ocean Energy Researchers, except that principal investigators who had received any DOE funding during FY 1978 or FY 1979 were eliminated from the Non-DOE-Funded Ocean Energy Researchers. After all adjustments were made, the 7 interview candidates were randomly selected from a sample frame of 40 names.

Respondents. In making the telephone calls to contact the randomly selected interview candidates, it sometimes occurred that the person could not be reached. In this event another randomly selected name was substituted for the original name. When individuals were contacted it was verified that they had been involved in ocean energy (and had or had not received funding from DOE as appropriate for the specific group), and would be needing information on ocean energy within the next year. If they were not both involved and needing information, they were asked if they could refer the interviewer to someone else in their organization who would be an appropriate respondent. If such a referral was made, a call was then made to this new candidate; if no intraorganizational referral was made, a new candidate was randomly selected from the sample frame. The results of this process may be seen in Table 3-1.

Table 3-1. COMPLETION OF INTERVIEWS: OCEAN ENERGY RESEARCHERS

Event	Number of Candidates	
	DOE Funded	Non-DOE Funded
Interview completed with sample frame candidate	10	5
Interview completed with referral candidate	0	2
Refusal or candidate termination	1	0
Contact attempted: could not reach candidate within three attempts or before interviews were completed	3	4
Subtotal	14	11
Contact attempted: invalid candidate (e.g.; inappropriate field of interest, no telephone)	2	7
TOTAL	16	18
Sample frame error rate[a] (Percent)	13	39
Completion rate[b] (Percent)	71	64

[a]Invalid candidates divided by TOTAL
[b]Completed interviews divided by Subtotal

Comparisons. For additional insight into the information needs and the information habits of these two groups of Ocean Energy Researchers, results from these groups are compared to the results from all of the researchers interviewed in this study (All Researchers). The list of all the groups contained in All Researchers can be found in Table F-2 of Appendix F. In performing any statistical comparisons the totals for Ocean Energy Researchers (one or both groups as appropriate) have been subtracted from the totals for All Researchers. The data for DOE-Funded Ocean Energy Researchers, Non-DOE-Funded Ocean Energy Researchers, and All Researchers can be found in Appendix F.

3.1.2 Current Status of Respondents

Role. Three of the DOE-Funded Ocean Energy Researchers were employed by universities, 3 were working for the Federal Government or national laboratories, 2 for manufacturers, and 2 for research organizations. Four of the Non-DOE-Funded Ocean Energy Researchers were employed by universities, 1 by the planning center of a large manufacturer, 1 by a research organization, and 1 by the Federal Government.

Current activities of the DOE-Funded respondents included: research, design, and development, program management for the National Oceanic and Atmospheric Administration (NOAA), and program support. Almost all activities were concerned with OTEC specifically. Topics in which they were involved covered: heat transfer, heat exchange, fluid mechanics, condensation and evaporation of ammonia, off-shore structures, physical and environmental impact, power transmission and cable, and infrared satellite imagery to collect data on the thermal resource at potential OTEC sites.

Current activities of the Non-DOE-Funded respondents included: research, consulting, policy analysis, and manufacture. They were involved in: heat exchange hardware, cable protection, corrosion, biofouling, federal and United Nations policy, energy analysis, and data on coastal wind and water.

Involvement. Six of the 10 (60%) DOE-Funded Ocean Energy Researchers and 3 of the 7 (43%) Non-DOE-Funded Ocean Energy Researchers said that they were "very involved" with ocean energy systems. This compares to 107 of the 181 (59%) of All Researchers who said they were very involved with their respective solar technologies.

Informedness. Seven of the 10 (70%) DOE-Funded Ocean Energy Researchers considered themselves "very informed," compared to 3 of the 7 (43%) Non-DOE-Funded Ocean Energy Researchers and 117 of the 181 (65%) of All Researchers.

3.1.3 Background of Respondents

Eight of the 10 (80%) DOE-Funded Ocean Energy Researchers, but only 2 of the 7 (29%) Non-DOE-Funded Ocean Energy Researchers held doctoral degrees. This compares to 52% (95 of the 181) of All Researchers who held doctorates. The remainder (2) of the DOE-Funded Ocean Energy Researchers held master's degrees, as did 4 of the Non-DOE-Funded Ocean Energy Researchers. The other Non-DOE-Funded Ocean Energy Researcher held a bachelor's degree.

Three of the DOE-Funded Ocean Energy Researchers had received their most recent degree 5-10 years ago, 6 from 10-20 years ago, and 1 over 25 years ago. Similarly, 2 of the Non-DOE-Funded Ocean Energy Researchers had degrees granted 5-10 years ago, 2 from 10-20 years ago, and 3 from 20-25 years ago. Sixty-seven percent (122 of the 181) of All Researchers had received degrees within the past 20 years compared to 90% (9 of the 10) of DOE-Funded Ocean Energy Researchers, and only 57% (4 of the 7) of Non-DOE-Funded Researchers.

Six of the DOE-Funded group had their most recent degrees in engineering (civil, ocean, mechanical, or chemical). Other degrees were in: mechanics, biochemistry, physical oceanography, and law. Three respondents were teaching as well as doing research. Other professions mentioned included company president, manager or director (R&D laboratory, research, technical, ocean engineering development system), engineer (structural, development), technician, and physical oceanographer. All but 2 had been in their present profession for over 10 years.

Most (5) of the Non-DOE-Funded Ocean Energy Researchers also held degrees in engineering (ocean, marine, civil, electrical). The remainder (2) held degrees in oceanography and microbiology. Only 1 respondent was currently teaching. Four were coastal or ocean engineers. Others described their professions as microbiologist, synergist, and marketing sales staff. Four had been in their present profession for more than 10 years, 3 for 3-5 years.

3.2 INFORMATION NEEDS OF RESPONDENTS

3.2.1 Technical Areas

Ocean Energy Researchers were asked to choose those areas in which they were "particularly interested in obtaining information" from a list of selected technical areas in ocean energy systems. (See Table 3-2).

One of the Non-DOE-Funded Ocean Energy Researchers also expressed an interest in geothermal and biomass energy systems in addition to ocean energy systems. One of the DOE-Funded Researchers was also interested in wind systems.

Table 3-2. AREAS OF INTEREST: OCEAN ENERGY RESEARCHERS

Technical Area of Interest	DOE Funded		Non-DOE Funded		Total Ocean Energy Researchers	
	No.	Percent	No.	Percent	No.	Percent
Materials, Biofouling, Corrosion	6	60	6	86	12	71
Heat Exchange	5	50	6	86	11	65
Platform, Hull Design, Mooring	6	60	5	71	11	65
Cold Water Pipe	6	60	5	71	11	65
Underwater Transmission Cable	4	40	6	86	10	59
Rotary Equipment; Pumps, Turbines	4	40	5	71	9	53
Wave Energy Systems	6	60	5	71	11	65
Tidal Energy Systems	6	60	4	57	10	59
Salinity Gradient Energy Systems	5	50	3	43	8	47
Total Respondents	10	100	7	100	17	100

3.2.2 Types of Information

Ocean Energy Researchers were asked to name the information about ocean energy that was important for them to obtain. Nine of the 10 respondents in the DOE-Funded group volunteered one or more items of information which they considered important. None of the DOE-Funded Ocean Energy Researchers specifically mentioned cost information as important. Rather, their economic concern centered on levels of federal funding. Three

respondents wanted information on federal budgets: the amount of money available for ocean power plant development, 5-year budget plans, the commitment of the government to obtaining 20% of the nation's power from renewable resources, and information on how many ocean systems will actually be installed in the next few years. Four respondents wanted information on design: OTEC structure components, open-cycle systems, other potential OTEC systems, detailed engineering values and parameters for all major subsystems, and integration of major OTEC subsystems (specifically mentioned were platform, cold-water pipe, intake, and heat exchanger). Physical data was needed by the respondents on: biofouling, corrosion, ocean depth, chemical and biological characteristics of the ocean in the vicinity of potential OTEC sites, environmental site conditions, wave defraction, and material characteristics. Also mentioned were: computer software; materials modeling; heat transfer testing; current status of development; new patents; logistic support; and Environmental Protection Agency (EPA), U.S. Coast Guard, and regulatory requirements.

Five of the Non-DOE-Funded group responded to the question regarding important information. Two respondents requested cost or economics information and 2 requested information on Congressional and DOE policy activities and trends. Other information of primary concern to this group included: level of industrial involvement; availability of energy resources; "factual data vs. people's opinions"; performance data on and requirements for OTEC, wind, and wave systems; current, head-wind, and oceanographic data; and information on environmental concerns.

Information that 4 of the DOE-Funded Ocean Energy Researchers volunteered that they needed but were unable to get included: accurate sea floor topographical information, data on ocean temperature and current, and a British research report on wave energy. One respondent complained about the delayed publication of his/her own report. This report had been in the DOE printing procedure for a year and a half and the author felt the information would be out of date when published, and that this publication of out-of-date results was a serious mistake.

Three Non-DOE-Funded Ocean Energy Researchers needed but were unable to get: economic data, ocean energy system performance information (especially on wave energy systems), and related fundamental science information.

Choice Between Specific Needs. A list of 10 types of ocean energy system information products and 12 types of ocean energy system information categories was read to each respondent. Each respondent described the usefulness of each particular item by assigning it a value of "essential," "very useful," "somewhat useful," or "not at all useful." The results are given in Figs. 3-1 (DOE-Funded Ocean Energy Researchers) and 3-2 (Non-DOE Funded Ocean Energy Researchers). For the purpose of comparison, Fig. 3-3 shows results for All Researchers; it is not limited to ocean energy system information items, but cuts across solar research technologies.

DOE-Funded Ocean Energy Researchers gave both items in the research category high ratings. Their five top-rated information categories/products were:

- The state of the art,
- Research in progress,
- Costs of installing and operating an ocean energy system compared to a conventional system,
- Regulations affecting siting or installation, and
- System diagrams or schematics.

Question #8. I will read a list of potential information or information products on solar systems. For each, please tell me how useful that information would be to you. Would the following be: essential, very useful, somewhat useful, or not at all useful?

Type of Information or Information Product*	Rank**	Average Usefulness*** (1.0 1.5 2.0 2.5 3.0 3.5 4.0)	Number of Responses: Essential (4)	Very useful (3)	Somewhat useful (2)	Not at all useful (1)
Information Categories:						
Research Information Categories:						
The state of the art	1		3	3	4	0
Research in progress	2		1	5	4	0
Cost Information Categories:						
Costs of installing and operating a solar system compared to a conventional system	2		3	3	2	2
Costs and performance of systems	6		3	1	5	1
Site-Specific Information Categories:						
Regulations affecting siting or installation of systems	2		4	1	3	2
Climatological data such as wind, weather, or amount of sunshine	8		2	4	1	3
Marketing Information Categories:						
Marketing statistics and sales projections	NA		NA	NA	NA	NA
Information on how to market and sell systems including guidelines on obtaining financial support	NA		NA	NA	NA	NA
Other Information Categories:						
Educational institutions and other organizations offering related courses on system design or application	21		0	2	4	3
Standards, specifications, or certification programs for equipment	17		1	2	3	4
Institutional, social, environmental, and legal aspects of system applications	15		1	3	3	3
Expected major developments during the next 10 years	10		1	3	5	1
Solar system programs, research, industries, and markets outside the United States	16		1	2	4	3
Tax credits, grants, or other economic incentives	20		2	0	3	5
Information Products:						
Reference Information Products:						
A bibliography of general readings	11		1	2	6	1
A calendar of conferences and programs	8		0	6	3	1
A list of sources for information	6		1	4	5	0
A list of technical experts	11		2	2	3	3
Lists of local lenders, insurers, builders, engineers, installers, manufacturers, or distributors	NA		NA	NA	NA	NA
Descriptive Information Products:						
A non-technical description of how a particular system works	22		1	0	5	4
A technical description of how a particular system works	11		1	2	6	1
System diagrams or schematics	5		2	2	5	0
Design Information Products:						
System design handbooks, installation handbooks, or reference tables	17		1	2	3	4
Manual methods for sizing and predicting the engineering performance or life cycle costs of systems	17		1	1	5	3
Computer models for sizing and predicting the engineering performance or life cycle costs of systems	11		3	1	2	4

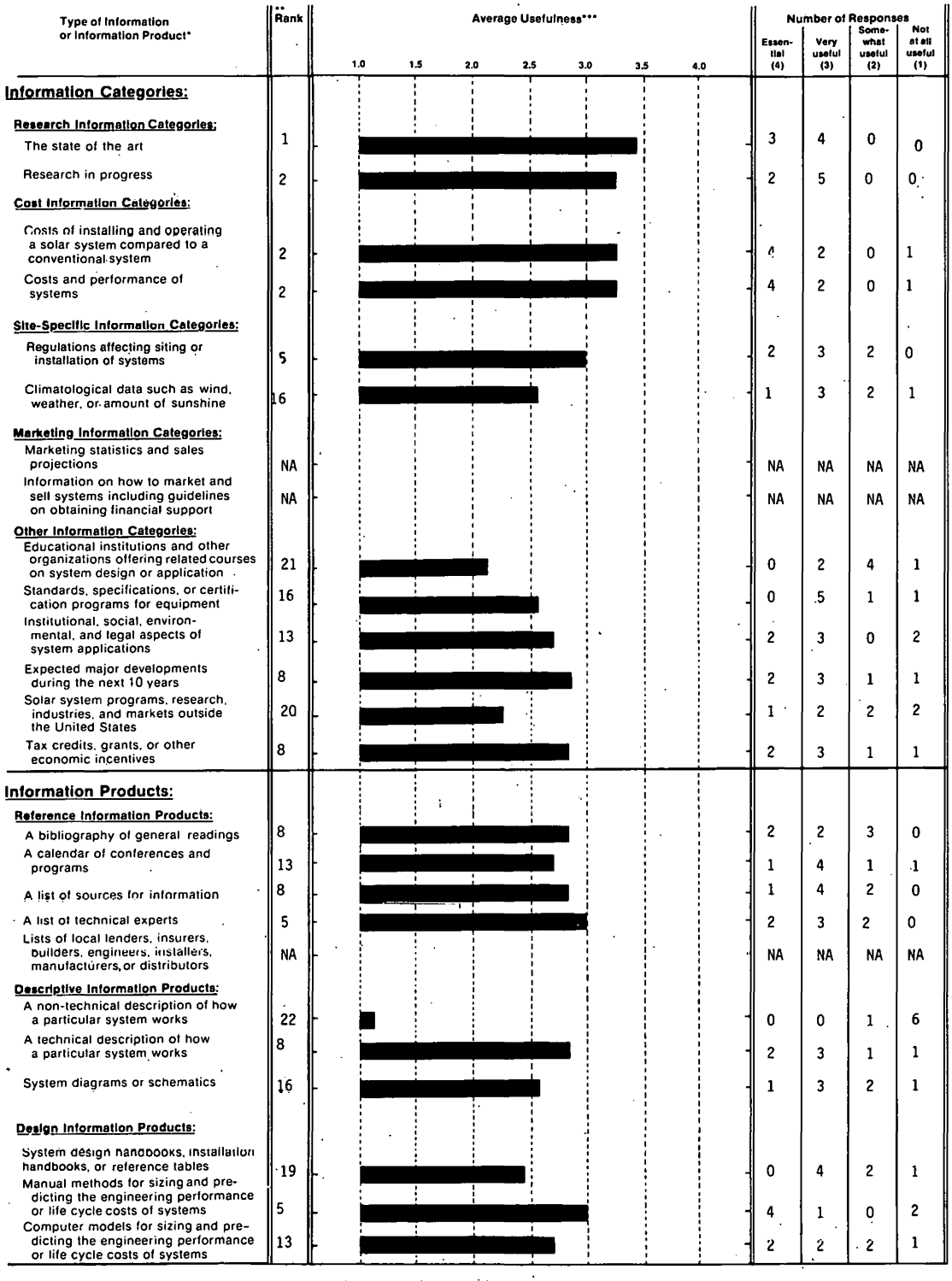
* Each sample frame of users was questioned on information and information products in the context of their specific technology. For example, biomass sample frames were asked about "a bibliography of general readings on biomass", "a calendar of upcoming biomass conferences and programs", etc.

** Rank—Each information product was assigned a rank based on average usefulness. Thus, the product with the highest average usefulness was assigned the rank of "1"; the product with the lowest average usefulness would be ranked "25" where all items were asked. If two or more information products were tied for 2nd, they were both assigned a "2". The next highest ranking was then assigned a "4".

*** Average usefulness was calculated by assigning the responses on a 1-4 scale from a "4" for "essential" to a "1" for "not very useful".

Figure 3-1. Usefulness of Selected Information Items: DOE-Funded Ocean Energy Researchers

Question #8. I will read a list of potential information or information products on solar systems. For each, please tell me how useful that information would be to you. Would the following be: essential, very useful, somewhat useful, or not at all useful?



Type of Information or Information Product*	Rank**	Average Usefulness***	Number of Responses: Essential (4)	Very useful (3)	Somewhat useful (2)	Not at all useful (1)
Information Categories:						
Research Information Categories:						
The state of the art	1		3	4	0	0
Research in progress	2		2	5	0	0
Cost Information Categories:						
Costs of installing and operating a solar system compared to a conventional system	2		4	2	0	1
Costs and performance of systems	2		4	2	0	1
Site-Specific Information Categories:						
Regulations affecting siting or installation of systems	5		2	3	2	0
Climatological data such as wind, weather, or amount of sunshine	16		1	3	2	1
Marketing Information Categories:						
Marketing statistics and sales projections	NA		NA	NA	NA	NA
Information on how to market and sell systems including guidelines on obtaining financial support	NA		NA	NA	NA	NA
Other Information Categories:						
Educational institutions and other organizations offering related courses on system design or application	21		0	2	4	1
Standards, specifications, or certification programs for equipment	16		0	5	1	1
Institutional, social, environmental, and legal aspects of system applications	13		2	3	0	2
Expected major developments during the next 10 years	8		2	3	1	1
Solar system programs, research, industries, and markets outside the United States	20		1	2	2	2
Tax credits, grants, or other economic incentives	8		2	3	1	1
Information Products:						
Reference Information Products:						
A bibliography of general readings	8		2	2	3	0
A calendar of conferences and programs	13		1	4	1	1
A list of sources for information	8		1	4	2	0
A list of technical experts	5		2	3	2	0
Lists of local lenders, insurers, builders, engineers, installers, manufacturers, or distributors	NA		NA	NA	NA	NA
Descriptive Information Products:						
A non-technical description of how a particular system works	22		0	0	1	6
A technical description of how a particular system works	8		2	3	1	1
System diagrams or schematics	16		1	3	2	1
Design Information Products:						
System design handbooks, installation handbooks, or reference tables	19		0	4	2	1
Manual methods for sizing and predicting the engineering performance or life cycle costs of systems	5		4	1	0	2
Computer models for sizing and predicting the engineering performance or life cycle costs of systems	13		2	2	2	1

* Each sample frame of users was questioned on information and information products in the context of their specific technology. For example, biomass sample frames were asked about "a bibliography of general readings on biomass", "a calendar of upcoming biomass conferences and programs", etc.

** Rank—Each information product was assigned a rank based on average usefulness. Thus, the product with the highest average usefulness was assigned the rank of "1"; the product with the lowest average usefulness would be ranked "25" where all items were asked. If two or more information products were tied for 2nd, they were both assigned a "3". The next highest ranking was then assigned a "4".

*** Average usefulness was calculated by assigning the responses on a 1-4 scale from a "4" for "essential" to a "1" for "not very useful".

Figure 3-2. Usefulness of Selected Information Items: Non-DOE-Funded Ocean Energy Researchers

Question #8. I will read a list of potential information or information products on solar systems. For each, please tell me how useful that information would be to you. Would the following be: essential, very useful, somewhat useful, or not at all useful?

Type of Information or Information Product*	Rank**	Average Usefulness*** (1.0 1.5 2.0 2.5 3.0 3.5 4.0)	Number of Responses: Essential (4)	Very useful (3)	Somewhat useful (2)	Not at all useful (1)
Information Categories:						
Research Information Categories:						
The state of the art	2		34	93	44	9
Research in progress	1		33	102	39	7
Cost Information Categories:						
Costs of installing and operating a solar system compared to a conventional system	4		32	70	45	16
Costs and performance of systems	3		39	78	49	14
Site-Specific Information Categories:						
Local building codes or other regulations affecting siting or installation of systems	20		19	38	58	48
Climatological data such as wind, weather, or amount of sunshine	7		34	55	46	28
Marketing Information Categories:						
Marketing statistics and sales projections	19		14	38	56	38
Information on how to market and sell systems including guidelines on obtaining financial support	23		3	0	7	8
Other Information Categories:						
Educational institutions and other organizations offering related courses on system design or application	24		1	26	99	54
Standards, specifications, or certification programs for equipment	17		18	55	53	37
Institutional, social, environmental, and legal aspects of system applications	18		13	51	73	26
Expected major developments during the next 10 years	5		24	88	51	17
Solar system programs, research, industries, and markets outside the United States	22		13	51	68	48
Tax credits, grants, or other economic incentives	15		27	44	52	40
Information Products:						
Reference Information Products:						
A bibliography of general readings	16		15	55	89	22
A calendar of conferences and programs	10		19	69	71	22
A list of sources for information	6		23	79	67	11
A list of technical experts	11		16	66	72	27
Lists of local lenders, insurers, builders, engineers, installers, manufacturers, or distributors	20		12	39	56	39
Descriptive Information Products:						
A non-technical description of how a particular system works	25		3	18	62	70
A technical description of how a particular system works	8		18	84	63	16
System diagrams or schematics	13		14	62	78	25
Design Information Products:						
System design handbooks, installation handbooks, or reference tables	12		17	67	65	31
Manual methods for sizing and predicting the engineering performance or life cycle costs of systems	9		30	65	63	33
Computer models for sizing and predicting the engineering performance or life cycle costs of systems	13		28	51	62	40

* Each sample frame of users was questioned on information and information products in the context of their specific technology. For example, biomass sample frames were asked about "a bibliography of general readings on biomass", "a calendar of upcoming biomass conferences and programs", etc.

** Rank—Each information product was assigned a rank based on average usefulness. Thus, the product with the highest average usefulness was assigned the rank of "1"; the product with the lowest average usefulness would be ranked "25" where all items were asked. If two or more information products were tied for 2nd, they were both assigned a "2". The next highest ranking was then assigned a "4."

*** Average usefulness was calculated by assigning the responses on a 1-4 scale from a "4" for "essential" to a "1" for "not very useful".

Figure 3-3. Usefulness of Selected Information Items: All Researchers

Non-DOE-Funded Ocean Energy Researchers also gave high ratings to the two items in the research information category. In addition, their other two top-rated information category/products included:

- Costs of installing and operating an ocean energy system compared to a conventional system, and
- Costs and performance of systems.

Among Researcher groups generally, high ratings were always given to the two research items. The high rating which DOE-Funded Ocean Energy Researchers gave to site-specific information was unusual for Researchers.

DOE-Funded Ocean Energy Researchers assigned the lowest relative ratings to:

- A nontechnical description of how a particular system works;
- Educational institutions and other organizations offering courses;
- Tax credits, grants, or other economic incentives;
- Standards, specifications, or certification programs;
- Design handbooks, installation handbooks, or reference tables; and
- Manual methods for sizing and predicting performance or costs.

Non-DOE-Funded Ocean Energy Researchers were in agreement in assigning their lowest relative ratings to the same first two items. Also among their lowest four were:

- Solar energy programs, research, industries, and markets outside the United States; and
- Design handbooks, installation handbooks, or reference tables.

Statistical tests indicated that for DOE-Funded Ocean Energy Researchers, differences between the five highest-rated and six lowest-rated items were significant ($P<0.05$). Similarly, differences between the four highest-rated and four lowest-rated items for Non-DOE-Funded Ocean Energy Researchers were statistically significant ($P< 0.05$).

The low rating for "educational institutions" and "a nontechnical description" which were found for both groups of Ocean Energy Researchers was typical of All Researchers and probably reflects the already high educational levels of Researchers as well as the already high levels of technical involvement.

It should be noted that these lower-rated items were not necessarily of no worth to the Ocean Energy Researchers. For example, 2 of the 10 (20%) DOE-Funded Ocean Energy Researchers and 2 of the 7 (29%) Non-DOE-Funded Ocean Energy Researchers thought "educational institutions . . . offering courses" was "very useful." Thus, these information categories/products could be useful to some Ocean Energy Researchers, but were of a lower relative priority to the entire group.

Statistical tests were also used to determine whether the DOE-Funded Ocean Energy Researchers rated any of these information items significantly higher (or lower) than they were rated by the Non-DOE-Funded Ocean Energy Researchers, or whether either of these groups differed significantly from All Researchers. Some groups, however, tended to give higher scores in general than did other groups. To compensate for this effect, these statistical tests compared the "relative rating" given by one group to the "relative rating" given by the other groups. The procedure for calculating the relative rating is described in Appendix E. The average overall rating DOE-Funded Ocean Energy Researchers gave to all items was 2.33; for Non-DOE-Funded Ocean Energy Researchers it was 2.75; and for All Researchers, 2.41.

In comparing the results for DOE-Funded Ocean Energy Researchers with Non-DOE-Funded Ocean Energy Researchers, the former group rated "a nontechnical description" significantly ($P < 0.05$) higher than did the latter. No other statistically significant differences were found.

Compared to All Researchers, DOE-Funded Ocean Energy Researchers rated "a nontechnical description" significantly lower ($P < 0.05$). They also appeared to rate "regulations affecting siting or installations" and "system diagrams or schematics" higher than did All Researchers.

Non-DOE-Funded Ocean Energy Researchers appeared to rate "regulations affecting siting or installations," "tax credits (etc.)," "a bibliography," and "a list of technical experts" higher than All Researchers did.

3.3 ACQUISITION OF INFORMATION BY RESPONDENTS

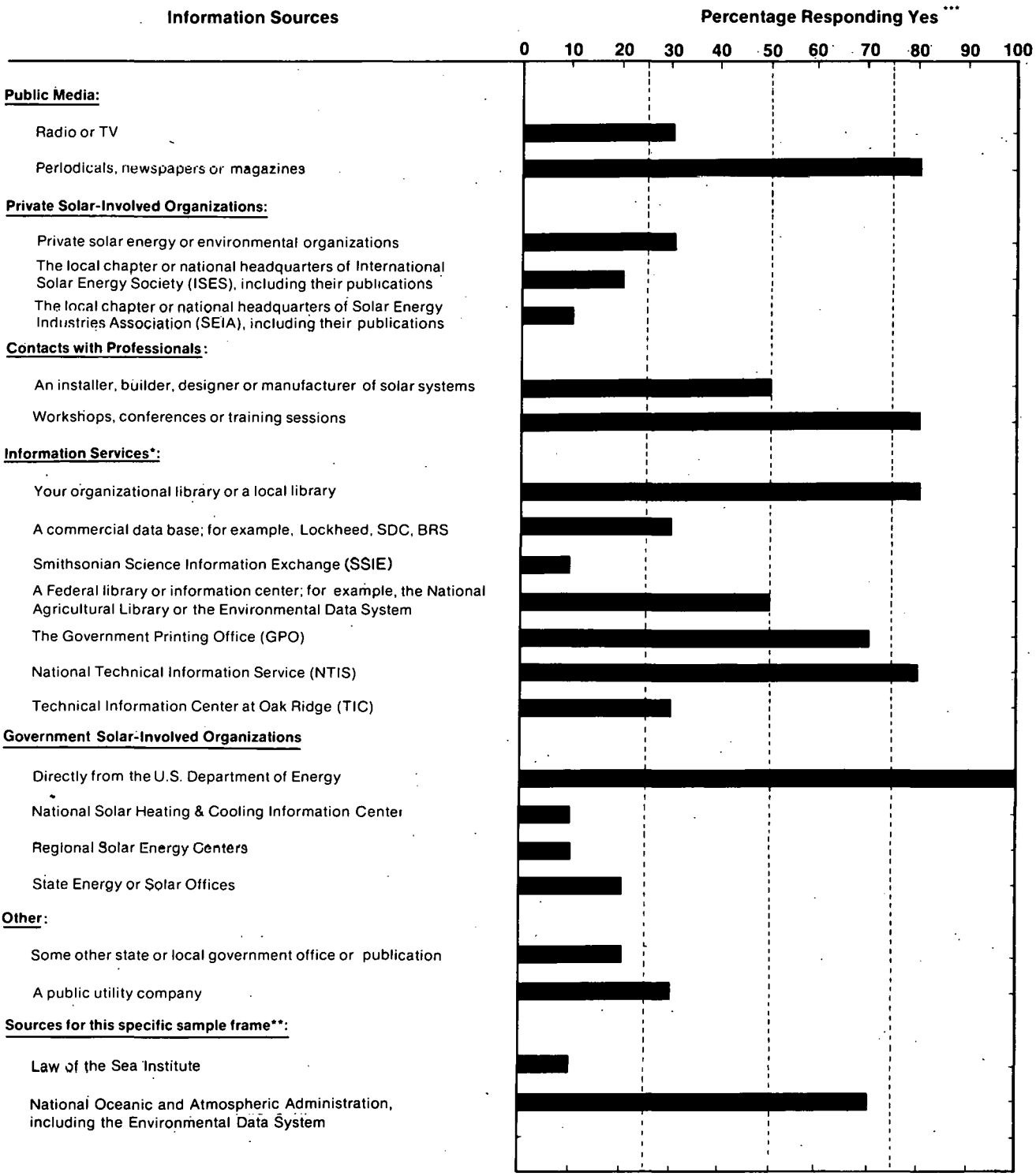
3.3.1 Use of Selected Information Sources

Ocean Energy Researchers were asked which of 22 different potential sources of solar information they had used in the past few years. For this question, the respondents were not asked if they had obtained information on ocean energy systems, but instead were asked if they had obtained any solar information from each specific source. Thus, the question sought to determine which information sources were the most familiar to respondents. The results for the DOE-Funded and Non-DOE-Funded groups are shown in Fig. 3-4 and 3-5. For comparison, Fig. 3-6 shows the results for All Researchers.

The information sources mentioned most often by DOE-Funded Ocean Energy Researchers were:

- Directly from DOE;
- Periodicals, newspapers, or magazines;
- Workshops, conferences, or training sessions;
- An organizational library or a local library;
- National Technical Information Service (NTIS);
- Government Printing Office (GPO); and
- NOAA.

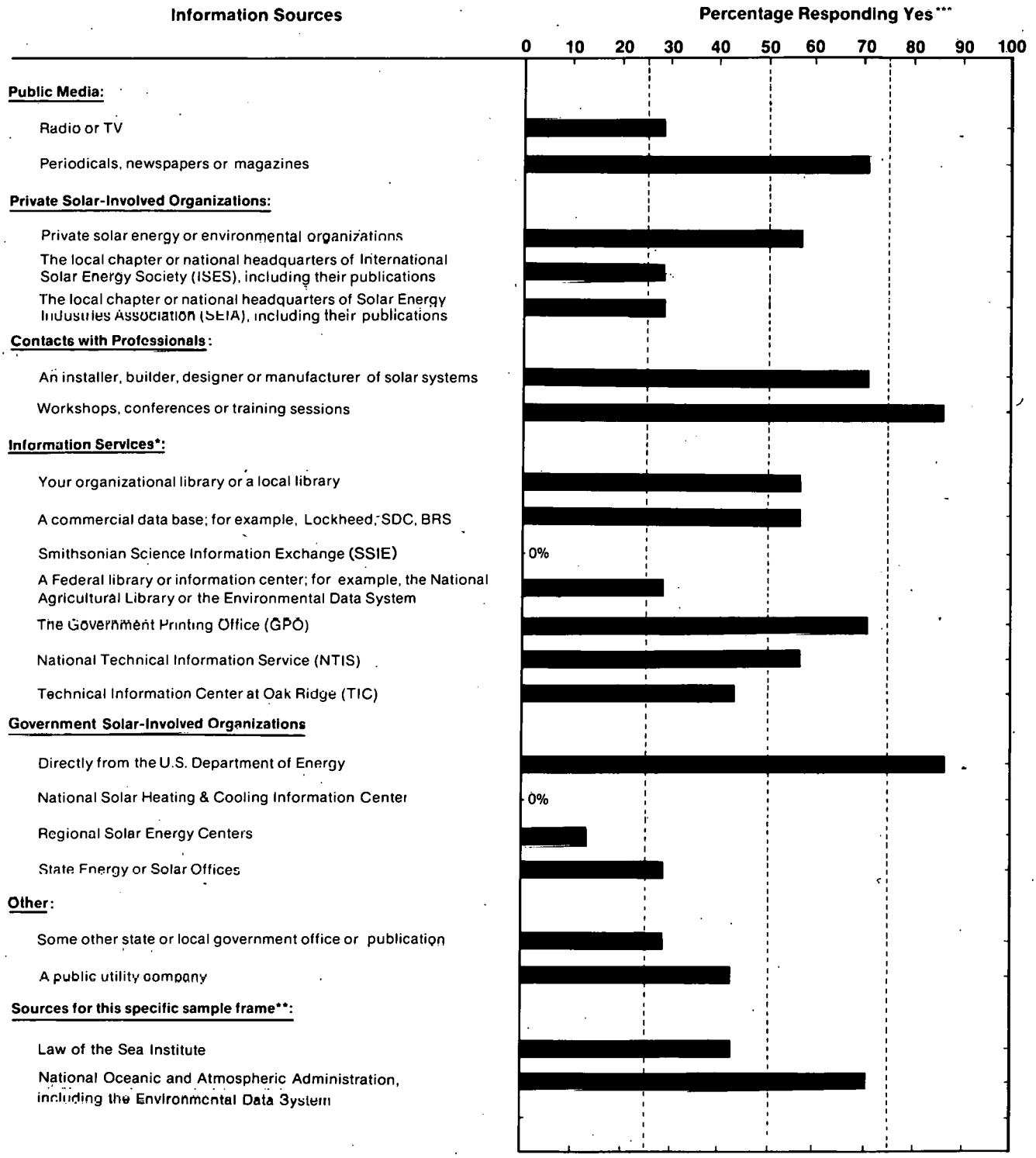
Question #11. In the past few years, have you obtained any type of solar information from any of the following sources?



* Services and centers whose primary purpose is to disseminate information.
** Some sample frames were questioned about additional information sources which are applicable to their technology. For example, the manufacturers of biomass conversion equipment were also asked if they have obtained any type of solar information from: "the local or national office of the U.S. Department of Agriculture, including Extension and Forestry."
*** These data are based upon a total of 10 respondents.

Figure 3-4. Use of Selected Information Sources: DOE-Funded Ocean Energy Researchers

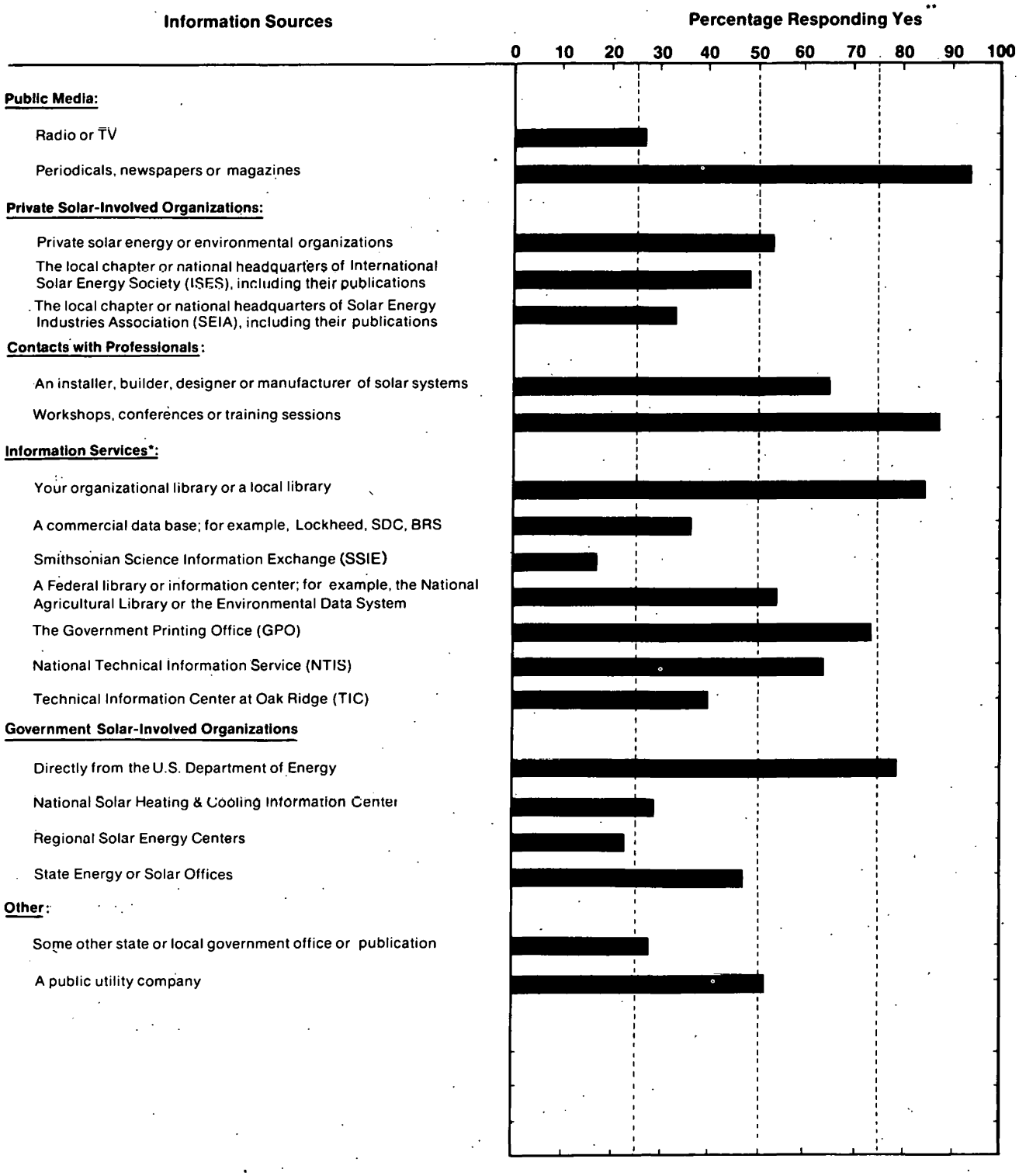
Question #11. In the past few years, have you obtained any type of solar information from any of the following sources?



* Services and centers whose primary purpose is to disseminate information.
** Some sample frames were questioned about additional information sources which are applicable to their technology. For example, the manufacturers of biomass conversion equipment were also asked if they have obtained any type of solar information from: "the local or national office of the U.S. Department of Agriculture, including Extension and Forestry."
*** These data are based upon a total of 7 respondents.

Figure 3-5. Use of Selected Information Sources: Non-DOE-Funded Ocean Energy Researchers

Question #11. In the past few years, have you obtained any type of solar information from any of the following sources?



* Services and centers whose primary purpose is to disseminate information.
** These data are based upon a total of 181 respondents.

Figure 3-6. Use of Selected Information Sources: All Researchers

Those mentioned most often by Non-DOE-Funded Ocean Energy Researchers were:

- Workshops, conferences, or training sessions;
- DOE;
- Periodicals, newspapers, or magazines;
- An installer, builder, designer, or manufacturer;
- GPO; and
- NOAA.

All of these sources (except NOAA) had also been used by at least 60% of All Researchers.

The information sources used least often by DOE-Funded Ocean Energy Researchers (only 1 of the 10 had used them) were:

- Solar Energy Industries Association (SEIA),
- Smithsonian Science Information Exchange (SSIE),
- National Solar Heating and Cooling Information Center (NSHCIC),
- Regional Solar Energy Centers (RSECs), and
- Law of the Sea Institute.

The information sources mentioned least often by Non-DOE-Funded Ocean Energy Researchers were:

- SSIE,
- NSHCIC, and
- RSECs.

It appears that both groups, but especially the Non-DOE-Funded Researchers (with relatively low ratings for TIC and very high ratings for "research in progress") may have inadequate access to sources for research-in-progress information. However, none had mentioned (see Section 3.2.2) research-in-progress information as information they were unable to get. The low familiarity with the RSECs and with NSHCIC probably indicates that most of the Ocean Energy Researchers were not involved in other technologies.

No significant differences were found between DOE-Funded and Non-DOE-Funded Ocean Energy Researchers in the information sources they had used. However, there were some significant ($P<0.05$) differences between Ocean Energy Researchers and All Researchers: Non-DOE-Funded Ocean Energy Researchers were less likely than All Researchers to have used "periodicals (etc.)," "a . . . library," or NSHCIC. Total Ocean Energy Researchers (the two groups combined) were significantly ($P<0.05$) less likely than All Researchers to have used state energy or solar offices, again not particularly surprising.

3.3.2 Membership in Solar-Interested Organizations

Seven of the 10 DOE-Funded Ocean Energy Researchers studied were members of a professional, technical, or other organization with an interest in solar energy. These organizations (and the number of times mentioned) included:

- American Academy of Microbiology,
- American Geophysical Union,
- American Institute of Chemical Engineers,
- American Society of Civil Engineers,
- American Society of Mechanical Engineers,
- American Society for Microbiology,
- American Society of Naval Engineers,
- American Society of Engineers,
- International Solar Energy Society (2),
- Ocean Energy Council,
- Optical Society of America,
- Sigma Xi, and
- Society of Naval Architects and Marine Engineers.

Also mentioned were two organizations which the authors could not verify. One was "ACI" (Alloy Casting Institute or American Concrete Institute?), the other "Environmental Committee to Council for the Government."

Four of the 7 Non-DOE-Funded Ocean Energy Researchers mentioned belonging to:

- American Association for the Advancement of Science (1),
- American Society for Microbiology,
- Marine Technology Society,
- National Society of Professional Engineers, and
- New York Academy of Science.

Also mentioned were some organizations which the authors could not verify. These included "ISTA," "STEA," "ITS," and "Offshore Technology Conference" (which is not a membership organization).

3.3.3 Exposure to Publications on Solar Energy

During the past 6 months, all 10 DOE-Funded Researchers and all 7 Non-DOE Funded Researchers had read publications which included information on ocean energy. The publications they could specify (and the number mentioning each) included for DOE-Funded Ocean Energy Researchers:

- Applied Ocean Research,
- DOE Ocean Systems Branch reports,

- DOE publications (reports on OTEC projects) (3),
- Marine Technology,
- Maritime reports,
- NOAA contract documents (technical reports generated under contract to develop ocean energy technology for OTEC),
- Ocean Industry,
- Oceanographic publications,
- OTEC conference papers (2),
- OTEC meeting reports (on biofouling, qualifications of aluminum in heat exchange, corrosion),
- OTEC Liasion (currently titled Solar Ocean Energy Liasion) (2),
- OTEC publications,
- Sea Technology, and
- Solar Energy Research Institute publications.

Also mentioned was one publication which the authors could not verify, "ENTS."

The Non-DOE-Funded Ocean Energy Researchers had read:

- Congressional publications,
- DOE ocean energy mailings,
- DOE publications,
- Marine Engineering/Log,
- Marine Technology,
- McMullen, J.J. reviews and reports,
- Navy magazine,
- Ocean Industry (2),
- Ocean Science News,
- OTEC material,
- Oceanus,
- Offshore, and
- Sea Technology.

3.3.4 Use of Special Acquisition Methods

The respondents were asked whether they had obtained any information (not just ocean energy or solar energy) in the past year by computer terminal, by Computer Output Microform (COM), or by other microform (e.g., mirofiche, microfilm sheets or rolls) (see Table 3-3).

More DOE-Funded than Non-DOE-Funded Ocean Energy Researchers had used "other microforms." However, DOE-Funded Ocean Energy Researchers had less use of computer terminals for acquiring information than among All Researchers.

Table 3-3. USE OF SPECIAL ACQUISITION METHODS: OCEAN ENERGY RESEARCHERS AND ALL RESEARCHERS

Acquisition Method	Ocean Researcher Group					
	DOE Funded		Non-DOE Funded		All Researchers	
	No.	Percent	No.	Percent	No.	Percent
Computer Terminal	1	10	2	29	62	34
Computer Output Microform (COM)	1	10	0	0	16	9
Other Microforms	5	50	1	14	72	40
Total Respondents	10	100	7	100	181	100

3.4 SUMMARY AND COMMENTS

Seventeen ocean energy system researchers were interviewed. Ten were funded by DOE, seven received funding from other sources. Most respondents were employed by universities or by federal agencies or laboratories. The DOE-Funded Researchers were somewhat more likely to be working on some facet of ocean thermal energy conversion, while the Non-DOE-Funded group was also involved with other ocean energy systems and with ocean energy policy. The DOE-Funded Researchers held more advanced academic degrees and were both more involved and more informed than their non-DOE-funded counterparts.

Ocean Energy Researchers attributed the greatest utility to information on:

- The state of the art in ocean energy systems,
- Ocean energy system research in progress,
- Costs of installing and operating an ocean energy system compared to a conventional system,
- Costs and performance of ocean energy systems, and
- Regulations affecting siting or installation of ocean energy systems.

Much of this information appeared difficult for them to obtain in up-to-date form.

They gave low ratings to "a nontechnical description," "educational institutions," "ocean energy system programs, research, industries, and markets outside the United States," and "design handbooks, installation handbooks, or reference tables."

Both groups of Ocean Energy Researchers most often received information through "periodicals, newspapers, or magazines," "workshops, conferences, or training sessions," DOE, GPO, and NOAA. The DOE-Funded group also often used NTIS and libraries, while the Non-DOE-Funded group received much information from "an installer, builder, designer, or manufacturer." With the exception of NOAA, all of these sources were also popular with All Researchers.

SECTION 4.0

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SERI

APPENDIX A

GROUPS INCLUDED IN STUDY


SERI

The following table (Table A-1) lists the 86 groups included in this study of solar information users. Major headings are the same as those of individual reports. Ten separate reports analyzing the study results by technology will be issued.

In general, results for each group are reported in only one volume, although comparisons to similar groups in other technologies are often part of the analysis. There are two exceptions: the results for Concentrating Collector Manufacturers are discussed in both the Solar Thermal Electric Power and the Industrial and Agricultural Process Heat reports; the results for Nonconcentrating Collector Manufacturers are discussed in both the Active Solar Heating and Cooling and the Industrial and Agricultural Process Heat reports.

Table A-1. GROUPS STUDIED

A. PHOTOVOLTAICS

1. DOE-Funded Researchers
2. Non-DOE-Funded Researchers
3. Researcher Manufacturers
4. Manufacturers
5. Electric Power Engineers
6. Utilities
7. Educators

B. PASSIVE SOLAR HEATING AND COOLING

1. Federally Funded Researchers
2. Manufacturers
3. Architects
4. Builders
5. Educators
6. Cooperative Extension Service (CES) County Agents
7. Homeowners with Passive Systems

Table A-1. GROUPS STUDIED (Continued)

C. ACTIVE SOLAR HEATING AND COOLING

1. DOE-Funded Researchers
2. Non-DOE-Funded Researchers
3. Heating and Cooling System Manufacturers
4. Water Heating System Manufacturers
5. Nonconcentrating Collector Manufacturers (see also Industrial and Agricultural Process Heat)
6. Other Component Manufacturers
7. Distributors
8. Installers
9. Architects
10. Builders
11. Planners
12. Heating, Ventilating, and Air Conditioning Engineers
13. Industrial Engineers
14. Utilities
15. Educators
16. CES County Agents
17. Homeowners with Space Heating Systems
18. Homeowners with Water Heating Systems
19. Owners/Managers of Buildings (with SHAC Systems)

D. BIOMASS ENERGY

1. Federally Funded Researchers in Production and Collection
2. Federally Funded Researchers in Conversion
3. Nonfederally Funded Researchers in Production and Collection
4. Nonfederally Funded Researchers in Conversion

Table A-1. GROUPS STUDIED (Continued)

D. BIOMASS ENERGY (Continued)

5. Production and Collection Equipment Manufacturers
6. Conversion Equipment Manufacturers
7. State Forestry Offices
8. Private Foresters
9. Forest Products Engineers and Consultants
10. Educators
11. CES County Agents
12. Owners/Managers of Biomass Systems

E. SOLAR THERMAL ELECTRIC POWER

1. DOE-Funded Researchers
2. Non-DOE-Funded Researchers
3. Concentrating Collector Manufacturers (see also Industrial and Agricultural Process Heat)
4. Electric Power Engineers
5. Utilities
6. Educators

F. INDUSTRIAL (IPH) AND AGRICULTURAL (APH) PROCESS HEAT

1. IPH Researchers
2. APH Researchers
3. Concentrating Collector Manufacturers (see also Solar Thermal Electric Power)
4. Total Nonconcentrating Collector Manufacturers (see also Active Solar Heating and Cooling)
5. Plant Engineers (IPH)
6. Industrial Engineers (IPH)

Table A-1. GROUPS STUDIED (Continued)

F. INDUSTRIAL (IPH) AND AGRICULTURAL (APH) PROCESS HEAT (Continued)

7. Private Agricultural Engineers (IPH)
8. Educators (IPH)
9. State Agricultural Offices (APH)
10. CES County Agents (APH)

G. WIND ENERGY

1. DOE-Funded Researchers
2. Non-DOE-Funded Researchers
3. Manufacturers
4. Distributors
5. Wind Engineers
6. Electric Power Engineers
7. Utilities
8. Educators
9. CES County Agents
10. Small Wind Energy System Owners

H. OCEAN ENERGY SYSTEMS

1. DOE-Funded Researchers
2. Non-DOE-Funded Researchers

I. SOLAR ENERGY STORAGE

1. DOE-Funded Researchers
2. Non-DOE-Funded Researchers

Table A-1. GROUPS STUDIED (Concluded)

J. GENERAL SOLAR

1. Loan Officers
2. Real Estate Appraisers
3. Tax Assessors
4. Insurers
5. Lawyers
6. Nonsolar Utilities
7. Public Interest Groups
8. CES State Agricultural Specialists
9. CES State Information Specialists
10. State Energy/Solar Offices (Western SUN states)
11. State Energy/Solar Offices (MASEC states)
12. State Energy/Solar Offices (NESEC states)
13. State Energy/Solar Offices (SSEC states)


SERI

APPENDIX B

STUDY DEVELOPMENT AND PROCEDURE

This appendix describes several aspects of the way in which the studies were developed and conducted.

FACTORS IN STUDY DESIGN

Studies of 86 groups, each interested either in one of nine different solar technologies or in solar energy in general, provided an extremely broad view of the information needs of the solar community. Although the sample size of nine respondents per group was small, the data still proved to be quite adequate for planning purposes. It was possible to determine which information was the most important to the respondents and what was the best channel for disseminating that information. There were a number of valid statistical tests that could be made, both to compare the priorities a group gave to different information items and to compare the priorities different groups gave to the same item.

Several major factors resulted in the decision to conduct a study with these characteristics. First, there were very few data available on the information needs and information-acquiring activities of the various segments of the solar community, and those data that did exist were related almost exclusively to the area of active solar heating and cooling. Many people had strong opinions as to which information products should be developed first, but data obtained directly from the information users was virtually nonexistent. Due to this general lack of information, most of the potential users of the findings of these studies could not define highly-specific questions that they needed to have answered by these studies. Instead, baseline data was needed. It did not make sense to ask a researcher detailed questions on whether he needed a calendar of solar events to be updated monthly or updated quarterly, when no one knew whether he even needed calendars at all. Thus, the lack of baseline data dictated that most of the potential users of study findings framed their questions at the level of "What information do you need the most?" For such a level of questions there was obviously no great need to use large sample sizes to obtain extremely precise, quantitative answers. Since qualitative data would be quite adequate, there was no need for a large sample size.

Further, there was a need to obtain this baseline data as rapidly as possible so that real-time programmatic decisions about development of information products and data bases could be based upon data rather than conjecture. As a result, the decision was made to conduct the studies by telephone in an attempt to speed up the data collection process. Interviewing by telephone also had the result of improving the response rates (over those using a mail questionnaire).

Thus, these factors dictated the final study design: a broad-based study (the final number of groups included, 86, was determined primarily by the number of meaningful sample frames that could be constructed) to collect qualitative data by obtaining completed telephone interviews, with approximately 9 randomly selected respondents from each of the 86 groups being interviewed.

Impact on Questionnaires

As a result of using telephone interviews to conduct the studies, it was necessary to limit the number of questions to be asked. Telephone interviews had to be kept relatively short (preferably under 20 minutes) to keep the respondents from prematurely terminating the interview. Even if a respondent did not hang up in mid-questionnaire, his attention span could be tried severely by lengthy interviews; respondents would then answer questions without much thought in order to terminate the interview as rapidly as possible. In the final study the interviews took an average of about 18 minutes to complete (with a range from 10 minutes to 50 minutes) and incorporated very simple question formats, sometimes open-ended questions. For each of the 86 studies a separate and distinct sample frame, letter of introduction, and questionnaire were developed and separate computer runs and analyses were performed.

Perhaps a more important effect of deciding to do a telephone study was the necessity of using interviewers without solar backgrounds to conduct the study. With almost 800 interviews to be conducted, each requiring an average of 35 to 40 minutes to complete an 18-minute interview (due to callbacks, referrals, busy signals, wrong numbers, etc.), there was too much effort required to conduct the interviews using internal staff. Thus, the effort had to be contracted. The choice was whether to conduct the interviews by contracting solar experts (who would not know anything about interviewing techniques) or by contracting a professional telephone interview firm (whose interviewers would not know anything about solar energy). Due to the significantly lower cost and to the significantly reduced chance of biasing the responses, it was decided to use a professional telephone interview firm.

As a consequence of this decision, there were some problems caused by using nonsolar interviewers to pose questions of solar experts. If a respondent asked for a question to be clarified, the interviewer could not assist. Instead, the interviewer could only repeat the question. The biggest problem involved the open-ended questions. Sometimes the interviewer simply did not understand what the respondents were talking about. Interviewers were briefed in solar terminology and instructed to ask respondents to spell out words the interviewers did not understand. Nevertheless, some of the verbatims (i.e., quotes from the respondents that were copied down verbatim by the interviewers) were not intelligible. For example, one interviewer recorded "small square train feeders" when the respondent really said "small-scale terrain features," another recorded "nel lenses" instead of "Fresnel lenses." To minimize errors in translation, all of the questionable verbatim items listed in this report were reviewed and verified by Solar Energy Research Institute (SERI) technical experts. However, based upon listening to live interviews and comparing the results to the verbatims, usually the interviewers were able to transcribe the salient points of the responses.

Impact on Statistical Characteristics

The sample size of nine respondents per group was limiting for the analyst. To illustrate the lack of precision in the results, if five of the nine respondents answered "yes" to a particular question, there was a 95% chance that the true proportion saying "yes" was between 0.212 and 0.862. Obviously, this was an extremely wide confidence interval. For such a small sample size, it was not feasible to make national estimates (e.g., the number of DOE-Funded Advanced Ocean Energy Researchers in the country who need bibliographies), and it was not meaningful to construct cross-classification tables (e.g., "type of information needed" versus "degree of informedness"). Because of these small sample sizes, the authors were sometimes forced to propose hypotheses rather than draw conclusions.

Nonetheless, the results were extremely useful when taken as qualitative, baseline results. Certain statistical tests could still be performed (see Appendix E). One could test whether Ocean Energy Researchers wanted "state-of-the-art" information significantly more than they wanted "climatological data." Several tests could be made comparing one group to another. Thus, one could test whether DOE-Funded Researchers wanted "cost data" significantly more than did Non-DOE-Funded Researchers. This type of comparison usually highlighted basic differences between technologies. One could also test whether Ocean Energy Researchers responded differently from All Researchers.

Comparisons of this type were valuable for several reasons. First, they allowed the comparison of the information needs of a relatively unknown group against those of a more familiar group. For example, the information needs of Wind Manufacturers were easier to understand when compared to the more familiar information needs of Solar Heating and Cooling Manufacturers.

Second, if one can establish basic similarities in information habits and the types of information needed, it will eventually become possible to use the results of other information science studies. For example, many studies have detailed the types of information researchers need and the ways of getting information to them. Thus, if Ocean Energy Researchers were quite similar in needs to All Researchers, it was an indication that many of the well-known findings for researchers in general may also apply for Ocean Energy Researchers.

STUDY DEVELOPMENT

There were several tasks which had to be completed before the studies could be conducted. These tasks are described in the following subsection.

Development of Sample Frames

Sample frame development was the single most difficult, time-consuming task in the entire study. As discussed in Section 2.2, the initial attempt was to obtain lists of the names, addresses, and phone numbers of members of as many meaningful groups as possible. A total of about 86 such sample frames was the maximum that could be developed adequately within a reasonable amount of time.

The services of reference and research librarians were used in this process, much of it on a subcontractor basis. Over 200 documentary sources (printed, published and unpublished sources, and data bases) were consulted. Staff searched the Solar Energy Information Center and Denver-area public and academic libraries to examine directories, catalogs, periodicals, and data bases. Directories of professionals, organizations and associations, and solar-related individuals and groups were examined, both to obtain sample frames and to obtain individual names. Periodicals were searched both to identify associations whose members might be eligible for sample frames and to identify authors who could be contacted because they represented certain target groups. Various data bases were identifed which contained names of individuals categorized by sample frame categories (e.g.; educators, researchers, manufacturers). Lists of conference attendees were accumulated. Sample frames were also constructed by establishing numerous personal contacts with professional, technical, and special interest organizations; authors of solar articles; technical staff at SERI; federal offices; publishers; solar groups; at least 30 state solar and state energy offices, etc.

Both the Mid-American Solar Energy Complex and the Northeast Solar Energy Center were subcontracted to provide additional names and addresses. Western SUN also provided many names on a voluntary basis. The Southern Solar Energy Center was asked to participate on either a contractual or a voluntary basis, but declined. Additionally, the Technical Information Dissemination (TID) program subcontracted a consulting firm to develop lists of members of the solar community. Although the resulting lists were significantly smaller than had been anticipated, they provided valuable backup information for some sample frames. The National Solar Heating and Cooling Information Center provided several of the data bases and other lists used.

It sometimes occurred that the person contacted was not in the presumed field; for example, an installer was no longer involved with solar energy. The proportion of the time that this or a similar sample-frame error occurred has been calculated for each group and is included in the section documenting the results for the group. Sample frame error included such factors as no known telephone number, individual not in the specified field or employment sector, etc. Averaging over all groups, approximately 20%-25% of the candidates in the sample frames were no longer valid.

Pilot Testing

In August 1979, Market Opinion Research (MOR) conducted a pilot test by doing telephone studies of 10 groups (9 respondents for each). The groups were:

- Wind: Engineers,
- Wind: County Extension Agents,
- Active Solar Heating and Cooling: DOE-Funded Researchers,
- Active Solar Heating and Cooling: Installers,
- Active Solar Heating and Cooling: Utilities,
- Active Solar Heating and Cooling: Educators,
- Active Solar Heating and Cooling: Commercial Building Owners,
- Passive Solar Heating and Cooling: Equipment Manufacturers,
- Solar Industrial Process Heat: Industrial Engineers, and
- General Solar Energy: Lawyers.

These groups were selected specifically to test a range of questionnaires, the peculiarities of selected sample frames, and the receptiveness of certain target groups to telephone interviews on solar energy. The persons contacted in the pilot were not contacted in the full study.

The pilot test proved very useful. There were no major revisions resulting, but several refinements improved the interview procedure and the questionnaire content and format. The interviews were completed within a reasonable time, an average of about 18 minutes per interview. The most important finding of the pilot test was the enthusiasm of the respondents for solar energy. Most respondents were very cooperative and were excited about receiving solar information. Because of this attitude, interviewers had no difficulty in getting respondents through long lists of information products and sources or in keeping respondents on the telephone to finish the interview.

SERI personnel visited MOR while the pilot test was being conducted, personally participating in monitoring interviews, reviewing tape recordings of previously conducted interviews, and debriefing interviewers. Based upon these inputs, several changes were made in the basic questionnaire concept, resulting in changes for each of the 86 distinct questionnaires. Among these changes were the addition of a question designed to defuse the respondent by allowing expression of the respondent's individual concerns, deleting two questions which were not working, changing the sequence of a few questions, making a few small wording changes to sharpen questions, and changing MOR's suggested questionnaire format in order to minimize interviewer errors.

Upon realizing that there was more sample frame error than had been anticipated, the screening procedure was revised to a double screening procedure. Only people who said they needed solar information within the next year, and who were truly in the proper group (e.g., "a DOE-Funded Researcher doing work on ocean energy systems") were to be interviewed. The rules for handling referrals were revised to allow interviews with intraorganizational referrals only.

Perhaps the most important change was in the interviewer training procedure. More specific instructions were developed for each question so that the interviewers would know the real point of the question, would ask the question properly, and would know what to emphasize. Lists of words being mispronounced by the interviewers were developed. Specific interviewers with pronunciation problems were singled out for additional coaching. Because of the interviewers' lack of familiarity with solar energy terminology, glossaries and other background information on solar energy were provided to interviewers.

Interviewer Training and Monitoring

The MOR interviewers used for these studies were all experienced interviewers. They went through three separate training sessions: a pilot test briefing, a pilot test debriefing (with question and reaction session), and a full study briefing. The full study briefing was held in four separate sessions so that the interviewers could be trained in small groups. SERI representatives were present for and assisted with the second two sessions.

These training sessions covered the purpose of the study, question wording, recording procedures, the screening procedure, and pronunciation of unfamiliar words. The training was built around the use of an annotated briefing questionnaire. Notes concerning each question were written on a questionnaire, which the interviewer studied during the briefing. Additional written materials covered included a list of solar energy terms, a list of common solar acronyms, and a list of words for pronunciation reminders.

Randomized Selection of Respondents

Once the sample frames were developed for each group, a random sample of 30 to 40 potential respondents was drawn by systematic sampling. (If the sample frame for a group only had 30 to 40 names in the beginning, this step was omitted.) These reduced sample frames were then forwarded to MOR. At MOR, these randomly selected names were put through a second randomization process which assigned the order in which these names were to be called. The MOR process used systematic sampling to identify the first nine candidates for interviewing: the total number of potential candidates was divided by nine to obtain "i," the "skip interval." Starting from a random point (R), every i^{th} name then became one of the first nine candidates.

An initial call and up to two callbacks (at different times of the day on different days of the week) were made attempting to reach each designated respondent. If an interview was not completed after three attempts, the interviewer took the questionnaire to the interviewing supervisor. The supervisor then designated the next person in the sequence as the substitute candidate: if the $(R + i)^{th}$ person could not be reached, the $(R + i + 1)^{th}$ became the replacement candidate. If after three attempts to reach the substitute, no interview was completed, this process was repeated. (This time the $(R + i + 2)^{th}$ person would become the candidate, etc.) For the entire study, 54% of the completed interviews were with the originally designated respondent and 26% were with the first substitute. The remainder were completed with a second or higher substitute.

There is evidence that for some sample frames MOR did not use a random starting point to commence the skip interval, but instead used the sequence of 1^{st}, $(1 + i)^{th}$, $(1 + 2i)^{th}$, etc., names for initial candidates. Such a practice clearly does not conform to professional standards. This practice was not critical in those of the sample frames with a large initial size or no particular order, since SERI did a valid random subsampling to reduce the sample size to 30 or 40. In small sample frames or in frames with a definite pattern, however, this procedure could have caused biases.

STUDY PROCEDURE

The procedure was the same for each study. Each of the potential respondents was sent a letter of introduction one to three weeks before they were telephoned (see Appendix C). This letter explained that the person was selected as a candidate and may be called by MOR, that MOR was calling for SERI, the purpose of the call, the type of information being sought, and that the respondent's identity would be kept confidential.

The telephone interviews were conducted in one of MOR's two telephone rooms, with each individual interviewer in an acoustically insulated booth. Throughout the study, interviews were monitored by MOR's phone room supervisors. They were responsible for randomly listening to interviews to determine whether the operators were conducting the interviews correctly. If mistakes were being made, the supervisor explained the proper procedure to the interviewer. The supervisors were able to monitor calls without the interviewers knowing they were being monitored.

Candidates were telephoned during business hours (except for homeowners who were called during the early evening and weekends). If the interview candidate could not be contacted in the initial call, as many as two additional callbacks were made. These callbacks were made at different times of the day and on different days of the week. If no interview was completed after three attempts, a substitute candidate replaced the initial candidate and the process started over. If a secretary indicated the candidate would be in later at a specified time and day, the callback was scheduled correspondingly. If a candidate was too busy to talk when initially contacted, an appointment was made to call back at a specified time. Only 3% of the candidates contacted refused to be interviewed or terminated the interview before it was completed. Once a candidate was contacted, a screening procedure was used to verify that the respondents being interviewed actually represented the group to which they ostensibly belonged. For example, a respondent who was presumably a DOE-Funded Researcher doing research on ocean energy was read the following statement at the beginning of the interview:

> Hello (respondent's name). This is (interviewer's name) of Market Opinion Research. A week or so ago you were sent a letter from the Solar Energy Research Institute describing a survey of solar energy information needs and requesting your participation.
>
> Your name has been provided to us as someone who has been doing DOE-funded research related to ocean energy systems. Is that correct?

If the respondent answered "yes," the interview continued. If the respondent answered "no," then the respondent was not interviewed but instead was asked if there was another person within the same organization who was doing DOE-funded research related to ocean energy systems. If the initial candidate could give the name of another person, the referral person (or "referral") was called as a substitute for the initial candidate. If no intraorganizational referral was given, another candidate was telephoned.

A second screen was used to eliminate those people who did not feel they would be needing information in the near future. For example, ocean energy respondents were asked the following two questions:

- In the next year do you expect to need information on ocean energy systems for your job?
- In the next year do you expect to need information on ocean energy systems outside your job?

If the answer to both questions was "no," the interview was terminated and a substitute candidate telephoned. No request for a referral was made.

Once an interview was completed, the questionnaire was reviewed for completeness by the phone room supervisor. Incomplete questionnaires were returned to interviewers to recall the respondents.

Completed questionnaires were forwarded from the phone rooms to the Coding Department where they were checked in and assigned a unique identification number. They were subsequently sent to the Data Entry Department where they were keyed directly into computer data files. Since no computerized editing system could prevent the incorrect entry of a data value that was within the proper range (e.g., entering a "3" when the correct number was a "2" but where the numbers "1," "2," "3," and "4" are all valid numbers), SERI did a random sample of supposedly correct values to verify that they were correct. Out of 225 allowable values reviewed, only 1 had been incorrectly entered. Once the data were entered on the computer file, data tables were printed and analyzed.

Nonuniform Group Sample Size. The study was originally designed to sample nine respondents from each group. For most groups this was done correctly. Upon analysis of the completed questionnaires, however, it was sometimes apparent that a respondent obviously belonged in a group other than the one in which originally sampled. This was generally due to two simultaneous errors: a sample frame error and a screening error.

First, the person was included on the wrong sample frame. For example, a person listed as doing non-DOE-funded research could have received DOE funding after the sample frames were completed. Second, the screening process did not successfully remove this person from the Non-DOE-Funded Researchers; instead the interview was completed. During the interview the respondent mentioned that he was receiving DOE funds for his research. As a result the analyst received eight interviews completed with Non-DOE-Funded Researchers and one completed with a DOE-Funded Researcher.

For such cases, the dissimilar interview was removed from the original group (in the example above, the Non-DOE-Funded Researchers). If there was another group into which that interview naturally fit (above, the DOE-Funded Researchers), the interview was included with the interviews for the second group. Although the added interview did not have exactly the same probability of selection as did the original interviews, the resulting inaccuracy was minimal given the qualitative nature of the data.

APPENDIX C

LETTER OF INTRODUCTION

All potential respondents from the initial sample frames were sent the following letter (see Fig. C-1) from one to three weeks prior to being contacted by telephone. There were three phrases (underlined in this example) which were changed to describe the group and the solar technology. For example, "a researcher" was changed to read "a manufacturer" or "an educator," etc., as appropriate for the specific sample frame. Similarly, "passive solar heating and cooling" read "photovoltaics" or "wind energy systems," etc., according to the technology about which this potential respondent was to be interviewed. About 3,500 such letters were mailed over a period of several weeks. Less than 100 were returned as undeliverable.

It should be noted that in cases where the actual respondent was a referral, the respondent had not necessarily received this letter.

There were numerous telephone calls to Solar Energy Research Institute (SERI) from people who had received this letter. Most volunteered they were eager to participate (and concerned that they had not yet been called) or that they wanted study results. A few volunteered referrals or gave the best times for them to be called.

September, 1979

Dear Colleague:

The Solar Energy Research Institute (SERI) is currently developing a Solar Energy Information Data Bank (SEIDB). The SEIDB is designed to include many categories of solar information and will serve the needs of a variety of groups: among them, researchers, manufacturers, architects, builders, lawyers, and homeowners. Services provided to you by the SEIDB may include an inquiry response service, computer access to models or large sets of data and free brochures, handbooks, etc.

The U.S. Department of Energy has defined solar energy as encompassing technologies which involve both direct and indirect uses of sunlight; information for all of the following technologies will be included in the SEIDB:

Solar heating and cooling (active)
Solar heating and cooling (passive)
Solar agricultural process heat
Solar industrial process heat
Wind energy conversion systems
Biomass energy systems
Photovoltaics (direct conversion of sunlight to electricity)
Ocean energy systems
Solar thermal electric power
Solar energy storage

So that this data bank can be developed to meet your present or future solar information needs, SERI is surveying information users like yourself. You have been selected as a candidate for this interview because you are a researcher with an active or potential interest in passive solar heating and cooling.

We believe your participation in this survey will be beneficial to you and to the country. If called, you will have an opportunity to express your opinions and to define your solar information needs. This will help us ensure that the data bank will be responsive to the needs of researchers as well as those of other groups.

Market Opinion Research of Detroit, Michigan, has been chosen to conduct this survey for SERI. A trained interviewer may contact you within two weeks to interview you. The telephone interview will last no more than 20 minutes. You can be assured that your responses to this survey are strictly confidential. No names will be used in reporting the results.

If you have questions about this survey, its purpose, or the interview methods to be used, please feel free to contact me at (303) 231-1155. Thank you for your assistance.

Sincerely,

Barbara L. Wood

Barbara L. Wood,
Staff Market Research Information Specialist,
Information Dissemination Branch,
Information Systems Division

Figure C-1. Letter of Introduction

APPENDIX D

STUDY QUESTIONNAIRE

A different questionnaire was developed for each distinct group in this study. These questionnaires were very similar, however, in that the same type of information was being sought from each of the groups. The individual questionnaires were developed by constructing a core questionnaire, then making appropriate revisions, additions, and deletions to produce a distinctly tailored questionnaire for each group.

The questionnaire used in the ocean energy study was very similar to those used for the other studies. The instrument which follows (see Fig. D-1) contains references to ocean energy systems in Questions 1 through 9. Questionnaires that were used for respondents from other technologies substituted references to their appropriate technologies instead of ocean energy.

Question 5. This question asked, "What is the most important information that could be provided to you about ocean energy systems?" This question allowed respondents to volunteer the information need that came to mind spontaneously, without reflecting any of the biases of the questionnaire designers as to what was the most important. Most of the time, however, it did not result in an answer which could be compared to another respondent's answer. For nine respondents, there were typically seven or eight distinct answers given. Since each respondent did not rate each of these items, it was impossible to determine which of these information needs was the most important. Afforded a second thought, respondents often gave items they had mentioned as "most important" in Question 5 a lower rating in Question 8 than they gave to items that they had not even mentioned in Question 5. As a result, the data from Question 5 could not provide a valid measurement of the most important information items which could be provided to the respondent. Therefore, this report refers to the responses to Question 5 as "information which was important for the respondents to obtain."

Question 6. In this question, a list of different ocean energy technologies was read to the respondent and the respondent was asked which technology he was particularly interested in obtaining information for. After this was completed, respondents were asked, "Are there any other areas of ocean energy for which you are particularly interested in obtaining information?" Responses to this question fell into one of two areas: additional ocean energy applications of interest or specific types of information wanted. The former were discussed with other results from Question 6; the latter were included with the responses from Question 5.

Question 8. In this question a list of up to 25 specific information products or types of information was read to the respondent. The respondent rated each item as "essential," "very useful," "somewhat useful," or "not at all useful" as it applied to himself. In contrast to Question 5, this question assessed each respondent's ratings for each of a set of items that the study designers thought might be important to the respondents. Question 8 did not allow respondents to add and rate items not already on the list. To reduce the possibility of introducing bias due to item order within Question 8, the interviewers rotated their starting point by randomly selecting which item would be read to the respondent first. Items in Question 8a were rotated separately from those in Question 8b.

Question 9. This question asked, "Is there any ocean energy information which you need but are not able to get?" Unfortunately, this question just did not work. Answering Questions 8a and 8b required the respondent to assign a rating to each of 22 information items. By the time the respondents had completed Question 8 they were usually starting to get fatigued with the interview. As a result many did not answer Question 9 at all.

1. In the next year do you expect to need information on ocean energy systems. . . . .

(a) For your job? Yes. . . . . 1 → (IF "YES" CONTINUE. OTHERWISE TERMINATE
No. 2
Don't know. 8
NA. 9

(b) NOT ASKED. 0

31
32

---

2. To what extent are you currently involved with ocean energy systems? Would you say you are:

Very involved. 4
Moderately involved, or. 3
Slightly involved. 2
Not at all involved (VOLUNTEERED). .1
Don't know. 8
NA. 9

33

---

3. What are you doing in the field of ocean energy? (ASK AS OPEN END)

Verb.

---

4. How well informed would you say you are about ocean energy systems? Would you say you are:

Very informed. 4
Moderately informed, or. 3
Slightly informed 2
Not at all informed (VOLUNTEERED). . 1
Don't know. 8
NA. 9

34

---

5. What is the most important information that could be provided to you about ocean energy system? (INTERVEIWER: THIS INCLUDES INFORMATION WHICH COULD BE PROVIDED BY AN INFORMATION CENTER)

35 C+V

1st mention

2nd mention

Figure D-1. Questionnaire

6. For which of the following areas of ocean energy systems are you particularly interested in obtaining information? [READ LIST. CIRCLE ONE RESPONSE PER ITEM.] 11-40 Blk

		Yes	No	Don't Know	NA	
(1)	Platform, hull design, mooring	1	2	8	9	41
(2)	Underwater transmission cable	1	2	8	9	42
(3)	Rotary equipment, pumps, turbines	1	2	8	9	43
(4)	Cold water pipe	1	2	8	9	44
(5)	Heat exchange	1	2	8	9	45
(6)	Materials, biofouling, corrosion	1	2	8	9	46
(7)	Wave-energy systems	1	2	8	9	47
(8)	Tide-energy systems	1	2	8	9	48
(9)	Salinity gradient energy systems	1	2	8	9	49

59 50-75 Blk
76 Cd#
77-80 Job#

Are there any other areas of ocean energy for which you are especially interested in obtaining information?
(SPECIFY)

Cd 3
1-10 as 1
11-43 Blk

(1st Mention) _____

44 C+V

(2nd Mention) _____

45-51 Blk

7. What publications have you read in the past six months that include information on ocean energy systems?

None. 001

Read, but can't remember titles. . . . . 002 (VOLUNTEERED)

Read too many to name (VOLUNTEERED). 003
(ASK) Which are most important?
(RECORD TITLES)

Names publications (RECORD TITLES). 004

52-54

1st Mention _____

2nd Mention _____

3rd Mention _____

CL

55-75 Blk
76 Cd #
77-80 Job #

Figure D-1. Questionnaire (continued)

8a. I will read a list of potential information products on ocean energy systems. For each, please tell me how useful that information would be to you. Would the following be: essential, very useful, somewhat useful, or not at all useful? [READ LIST. ROTATE. CIRCLE ONE RESPONSE PER ITEM]

	Essential	Very Useful	Somewhat Useful	Not At All Useful	Don't Know	NA	
(1) A bibliography of general readings on ocean energy systems.	4	3	2	1	8	9	43
(2) A list of sources for information on ~~particular~~ ocean energy systems. .	4	3	2	1	8	9 ✓	44
(3) A calendar of upcoming ocean energy system conferences and programs. .	4	3	2	1	8	9	45
(4) Diagrams or schematics of an ocean energy system.	4	3	2	1	8	9 ✓	46
(5) A non-technical description of how a particular ocean energy system works. . . .	4	3	2	1	8	9	47
(6) A technical description of how a particular ocean energy system works. . . .	4	3	2	1	8	9	48
(7) NOT ASKED.						0	49
(8) Ocean energy system design handbooks, ~~installation handbooks~~ or reference tables.	4	3	2	1	8	9 ✓	50
(9) A list of technical experts in ~~a specific area of~~ ocean energy. . . .	4	3	2	1	8	9 ✓	51
(10) Manual methods for sizing and predicting the engineering performance or life cycle costs of ocean energy systems.	4	3	2	1	8	9	52
(11) Computer models for sizing and predicting the engineering performance or life cycle costs . . .	4	3	2	1	8	9	53

Figure D-1. Questionnaire (continued)

8b. I will next read a list of types of information on ocean energy systems. For each, please tell me how useful information of that type would be to you. Would the following be: essential, very useful, somewhat useful or not at all useful? (READ LIST. ROTATE. CIRCLE ONE RESPONSE PER ITEM).

		Essential	Very Useful	Somewhat Useful	Not At All Useful	Don't Know	NA	
(1)	Educational institutions and other organizations offering courses on ocean energy systems	4	3	2	1	8	9	55
(2)	Ocean energy research currently in progress.	4	3	2	1	8	9	56
(3)	The state-of-the-art in ocean energy systems.	4	3	2	1	8	9	57
(4)	Costs and performance of ocean energy installations	4	3	2	1	8	9	58
(5)	Costs of installing and operating an ocean energy system compared to a conventional system.	4	3	2	1	8	9	59
(6)	Regulations affecting siting or installation of ocean energy systems.	4	3	2	1	8	9	60
(7)	Tax credits, grants, or other economic incentives for ocean energy systems.	4	3	2	1	8	9	61
(8)	Standards, specifications, or certification programs for ocean energy equipment and installations. . . .	4	3	2	1	8	9	62
(9)	NOT ASKED						0	63
(10)	Ocean energy programs, research, industries and markets outside the United States. . . .	4	3	2	1	8	9	64
(11)	NOT ASKED						0	65
(12)	Institutional, social, environmental, and legal aspects of ocean energy applications.	4	3	2	1	8	9	66
(13)	Expected major developments in ocean energy systems during the next ten years.	4	3	2	1	8	9	67
(14)	Climatological data such as wind, weather, or amount of sunshine. . .	4	3	2	1	8	9	68

69-75Blk
76 Cd#
77-80
Job #

Figure D-1. Questionnaire (continued)

9. Is there ocean energy information which you need but are not able to get?

1-10 as 1

- Yes 1
- Yes (BUT CAN'T DESCRIBE) 2
- No 3
- Don't know 8 11
- NA 9

(IF YES) What information do you need?

1st Mention

2nd Mention

Verb.

10. In the past year have you obtained any information, not just ocean or solar, in the following forms? (READ LIST. CIRCLE ONE RESPONSE PER ITEM).

	Yes	No	Don't Know	NA	
(a) On-line access to a central data bank via computer terminal	1	2	8	9	12
(b) Microform from a computer, sometimes referred to as C-O-M	1	2	8	9	13
(c) Other microforms, for example, microfiche, microfilm sheets or rolls	1	2	8	9	14

Figure D-1. Questionnaire (continued)

11. Solar information refers to information about any solar technology, and factors which may relate to its use such as weather, economics, legislation, architecture, environment, etc. In the past few years, have you obtained any type of solar information from any of the following sources? [READ LIST. CIRCLE ONE RESPONSE PER ITEM.]

		Yes	No	Don't Know	NA	
(1)	Your organizational library or a local library. . .	1	2	8	9	17
(2)	A public utility company. . .	1	2	8	9	18
(3)	An installer, builder, designer or manufacturer of solar systems. . .	1	2	8	9	19
(4)	Workshops, conferences or training sessions. . .	1	2	8	9	20
(5)	A commercial data base, for example, Lockheed, SDC, BRS. .	1	2	8	9	21
(6)	A Federal library or information center, for example, the National Agricultural Library or the Environmental Data System. . .	1	2	8	9	22
(7)	Smithsonian Science Information Exchange (SSIE) . . .	1	2	8	9	23
(8)	The Government Printing Office (GPO)	[1]	2	8	9	24

How would you evaluate the service you received from GPO?

Good	3
Fair	2
Poor	1
Don't know	8
NA	9

25

What are some of the reasons you do not consider their service "good"?

1st Mention _____

2nd Mention _____

Vert

(9) National Technical Information Service (NTIS). . . . [1] 2 8 9 26

How would you evaluate the service you received from NTIS?

Good	3
Fair	2
Poor	1
Don't know	8
NA	9

27

What are some of the reasons you do not consider their service "good"?

1st Mention _____

2nd Mention _____

Vert

Figure D-1. Questionnaire (continued)

(Cont'd)

	Yes	No	Don't know	NA	
(10) Technical Information Center at Oak Ridge (TIC) . . .	1	2	8	9	28

How would you evaluate the service you received from TIC?

Good	3
Fair	2
Poor	1
Don't know	8
NA	9

29

What are some of the reasons you do not consider their service "good"?

1st Mention_____

2nd Mention_____ Verb.

(11) National Solar Heating and Cooling Information Center. .	1	2	8	9	30

How would you evaluate the service you received from the Center?

Good	3
Fair	2
Poor	1
Don't know	8
NA	9

31

What are some of the reasons you do not consider their service "good"?

1st Mention_____

2nd Mention_____ Verb

(12) Regional Solar Energy Centers. . . .	1	2	8	9	32

How would you evaluate the service you received from your regional center?

Good	3
Fair	2
Poor	1
Don't know	8
NA	9

33

What are some of the reasons you do not consider their service "good"?

1st Mention_____

2nd Mention_____ Verb

Figure D-1. Questionnaire (continued)

(Cont'd)		Yes	No	Don't Know	NA	
(13)	Directly from the U. S. Department of Energy. . .	1	2	8	9	34
(14)	Radio or TV	1	2	8	9	35
(15)	Periodicals, newspapers or magazines. . . .	1	2	8	9	36
(16)	Private solar energy or environmental organizations . . .	1	2	8	9	37
(17)	State Energy or Solar Offices . . .	1	2	8	9	38
(18)	Some other state or local government office or publication.	1	2	8	9	39
(19)	The local chapter or national headquarters of the International Solar Energy Society (ISES), including their publications.	1	2	8	9	40
(20)	The local chapter or national headquarters of the Solar Energy Industries Association (SEIA), including their publications. . . .	1	2	8	9	41
(21)	Law of the Sea Institute.	1	2	8	9	42
(22)	National Oceanic and Atmospheric Administration (NOAA) including the Environmental Data System (EDS). . . .	1	2	8	9	43
(23)	NOT ASKED				0	44
(24)	NOT ASKED				0	45

46-47 Blk

Figure D-1. Questionnaire (continued)

In conclusion, I would like to ask you some questions about yourself. Your answers will be kept completely confidential.

D1a. What is the highest level of education you have completed? (DO NOT READ)

8th grade or less	01	48-49
Some high school	02	
High school graduate	03	
Post high school vocational/ Technical	04	
Attended college/University:		
No degree	05	
Associate (2 year junior/ Community college)	06	
Bachelors	07	
Masters	08	
Ph.D/Doctorate	09	
JD/LLD	10	
Other _____ (SPECIFY)	11	
Don't know	98	
NA	99	

D1b. In what field is your most recent degree? _____ (RECORD) Verb.

D1c. In what year did you get that degree? _____ (YEAR) 50-51

D2a. Please describe your present profession by completing the following statement: "Based on my total education and experience, I now regard myself professionally as a (an) "_____." (AVOID USING JOB TITLE IF POSSIBLE). Verb.

D2b. How many years have you been in this profession? (CIRCLE CODE)

0-2	1	52
3-5	2	
6-10	3	
Over 10	4	
NA	9	

Figure D-1. Questionnaire (continued)

D3. Do you belong to any professional, technical, or other organizations which have an interest in solar?

- Yes 1
- Yes (BUT CAN'T NAME) 2
- No 3
- Don't know 8
- NA 9

53

a. What organizations?

1st Mention_____

2nd Mention_____ CL

3rd Mention_____

4th Mention_____

54-69 Blk

Thank you very much for your time.

Figure D-1. Questionnaire (concluded)

Question 11. In this question respondents were not asked if they had obtained solar information from the Solar Energy Research Institute (SERI). The principal reason was the probability of obtaining biased responses. All respondents had received a letter describing the Solar Energy Information Data Bank (SEIDB) and introducing SERI. It was felt that many respondents would attempt to encourage information flows from SERI by responding positively when asked whether they had used SERI as an information source—whether or not they actually received information directly from SERI. Since explaining the nature of SERI and the SEIDB was necessary to promote a good response rate, no questions about SERI were included.

In Question 11, items 21-23 require some explanation: they are shown as "NOT ASKED" on the sample questionnaire (readers may note that data for items 21-23 occur on the tables in Appendix F for some groups). These items were left open for the inclusion of specific organizations which seemed most appropriate for each group. Table D-1 lists the organizations, the respondent groups, and the question numbers for each item used for the groups covered in this report.

Table D-1. SELECTED ORGANIZATIONS ABOUT WHICH OCEAN ENERGY RESPONDENTS WERE ASKED

Item[a]	Organization
21	Law of the Sea Institute
22	National Oceanic and Atmospheric Administration (NOAA) including the Environmental Data System (EDS)

[a] The number of the item in which the group was asked about the particular organization. For example, 21 is Item 21 of Question 11.

APPENDIX E

STATISTICAL TESTING

Despite the small sample sizes, selected statistical tests could be used. All of these tests used a 5% rejection region unless otherwise noted. Thus, if a test result indicated that a difference between two means was statistically significant ($P<0.05$), it meant that there was only a one-out-of-twenty chance that the two means were not different. Actual calculations were made with the Statistical Package for the Social Sciences (SPSS) software and other computer packages.

The tests conducted fell into three main types: tests of proportions between two groups, t-Tests between two groups, and Paired t-Tests within a group. Each of these are discussed below.

For all except Question 8, tests of proportions were used. For example, the proportion of Ocean Energy DOE-Funded Researchers using computer terminals was compared to the proportion of Ocean Energy Non-DOE-Funded Researchers using computer terminals. If the sample sizes were small, Exact Binomial Tests were used. When the sample sizes were larger (e.g., a comparison of Ocean Energy DOE-Funded Researchers to All Researchers), Chi-Square Tests were used.

For analysis of the results from Question 8, t-Tests were used. In Question 8 each respondent was asked to describe the usefulness of up to 25 information products/categories as either "essential," "very useful," "somewhat useful," or "not at all useful." The "average usefulness" rating that the group assigned an item was then calculated by assigning the responses a "4" for "essential," a "3" for "very useful," a "2" for "somewhat useful," and a "1" for "not very useful," then calculating the average for the entire group. A t-Test was used to determine whether group A rated a specific information item significantly higher (or lower) than it was rated by group B. Some groups, however, tended to give higher scores in general than did other groups. To compensate for this effect, these statistical tests compared the "relative rating" given by one group to the "relative rating" given by the other groups. The relative rating given by a group to a particular item was calculated as follows: take the average usefulness rating the group gave that item (for example, suppose "a bibliography" received a 3.15 rating), then subtract the average overall rating this group gave to all items (suppose the average rating the group gave all items was 2.75); the difference was the relative rating (for this example 3.15 - 2.75 = +0.40). The t-Test then was used for the comparison of the relative rating group A gave to the item with the relative rating group B gave the item.

For the tests of proportions (or the t-Tests involving Question 8), if group A was being compared to group B and group A was a subset of group B (e.g., a comparison of DOE-Funded Ocean Energy Researchers to All Researchers), the totals for group A were subtracted from the totals for group B and the proportions (or the relative ratings) for group B were recalculated from the adjusted totals.

For Question 8 it sometimes occurred that the researcher wanted to compare the rating a group gave one item to the rating they gave another item. For example, did DOE-Funded Ocean Energy Researchers rate "lists of sources for information" significantly higher (or lower) than they rated "lists of technical experts?" This test was conducted using a Paired t-Test.

APPENDIX F

OCEAN ENERGY DATA TABLES

In the following data tables, each table entry shows counts and percentages displayed in the format (%#), where % is the column percentage for each group and # is the number of respondents in each group who gave the response shown in the row title. Each column shows the results for an individual group or for a combination of groups.

Table F-1 lists the groups and combinations for which data are shown in the data tables. Table F-2 shows which groups are included in each of the combination groups listed in Table F-1. Table F-3 lists the data tables and Fig. F-1 contains the data tables themselves.

Table F-1. GROUPS AND COMBINATION GROUPS WITH DATA INCLUDED IN APPENDIX F

Group	Report Section
Ocean Energy DOE-Funded Researchers (OCEAN DOE-FUND RES)	3.0
Ocean Energy Non-DOE-Funded Researchers (OCEAN NDOE-FUND RES)	3.0
Total Ocean Energy Researchers (TOTAL OCEAN RES)	3.0
All Researchers (ALL RES)	3.0

Table F-2. COMBINATION GROUPS

Total Ocean Energy Researchers (TOTAL OCEAN RES)

Ocean Energy DOE-Funded Researchers
Ocean Energy Non-DOE-Funded Researchers

All Researchers (ALL RES)

Photovoltaics (PV) DOE-Funded Researchers
PV Non-DOE-Funded Researchers
PV Researcher Manufacturers
Biomass Federally Funded Researchers in Production and Collection
Biomass Federally Funded Researchers in Conversion
Biomass Nonfederally-Funded Researchers in Production and Collection
Biomass Nonfederally-Funded Researchers in Conversion
Wind DOE-Funded Researchers
Wind Non-DOE-Funded Researchers
Solar Thermal Electric Power (STEP) DOE-Funded Researchers
STEP Non-DOE-Funded Researchers
Ocean Energy DOE-Funded Researchers
Ocean Energy Non-DOE-Funded Researchers
Solar Energy Storage DOE-Funded Researchers
Solar Energy Storage Non-DOE-Funded Researchers
Active Solar Heating and Cooling (SHAC) DOE-Funded Researchers
SHAC Non-DOE-Funded Researchers
Passive Federally Funded Researchers
Industrial Process Heat (IPH) Researchers
Agricultural Process Heat (APH) Researchers

Table F-3. LIST OF OCEAN ENERGY DATA TABLES

[a]See Appendix D, Fig. D-1 for the wording of each question.

(OCTOBER, 1979)

NEED FOR INFORMATION ON THE JOB AND OUTSIDE THE JOB (QUESTION 1)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10	7	17	181
	100.	100.	100.	100.
YES FOR JOB	10	7	17	178
	100.	100.	100.	98.
NO FOR JOB				2
				1.
DON'T KNOW/NA				1
				1.
Q1B TOTAL				117
				100.
YES OUTSIDE JOB				48
				41.
NO OUTSIDE JOB				60
				51.
DON'T KNOW/NA				9
				8.
YES, JOB + OUTSIDE				46
				39.

Figure F-1. Ocean Energy Researchers Data Tables

(OCTOBER, 1979)

INVOLVEMENT (QUESTION 2)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10 100.	7 100.	17 100.	181 100.
4. VERY INVOLVED	6 60.	3 43.	9 53.	107 59.
3. MODERATELY INVOLVED	2 20.	1 14.	3 18.	43 24.
2. SLIGHTLY INVOLVED	2 20.	3 43.	5 29.	29 16.
1. NOT AT ALL INVOLVED				1 1.
DON'T KNOW/NA				1 1.
AVERAGE	3.4(	3.0(	3.24	3.42
STANDARD DEVIATION	.8(	.92	.85	.78

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

INFORMEDNESS (QUESTION 3)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10 100.	7 100.	17 100.	181 100.
4. VERY INFORMED	7 70.	3 43.	10 59.	117 65.
3. MODERATELY INFORMED	3 30.	4 57.	7 41.	59 33.
2. SLIGHTLY INFORMED				5 3.
1. NOT AT ALL INFORMED				
DON'T KNOW/NA				
AVERAGE	3.70	3.43	3.59	3.62
STANDARD DEVIATION	.45	.48	.47	.53

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

INTEREST IN SPECIFIED OCEAN ENERGY AREAS (QUESTION 6)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10 100.	7 100.	17 100.	17 100.
PLATFORM, HULL DESIGN, MOORING				
1. YES	6 60.	5 71.	11 65.	11 65.
2. NO	4 40.	2 29.	6 35.	6 35.
DON'T KNOW/NA				
UNDERWATER TRANSMISSION CABLE				
1. YES	4 40.	6 86.	10 59.	10 59.
2. NO	6 60.	1 14.	7 41.	7 41.
DON'T KNOW/NA				
ROTARY EQUIPMENT, PUMPS, TURBINES				
1. YES	4 40.	5 71.	9 53.	9 53.
2. NO	6 60.	2 29.	8 47.	8 47.
DON'T KNOW/NA				
COLD WATER PIPE				
1. YES	6 60.	5 71.	11 65.	11 65.
2. NO	4 40.	2 29.	6 35.	6 35.
DON'T KNOW/NA				
HEAT EXCHANGE				
1. YES	5 50.	6 86.	11 65.	11 65.
2. NO	5 50.	1 14.	6 35.	6 35.
DON'T KNOW/NA				

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

INTEREST IN SPECIFIED OCEAN ENERGY AREAS - CONTINUED (QUESTION 6)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10	7	17	17
	100.	100.	100.	100.
MATERIALS, BIOFOULING, CORROSION				
1. YES	6	6	12	12
	60.	86.	71.	71.
2. NO	4	1	5	5
	40.	14.	29.	29.
DON'T KNOW/NA				
WAVE-ENERGY SYSTEMS				
1. YES	6	5	11	11
	60.	71.	65.	65.
2. NO	4	2	6	6
	40.	29.	35.	35.
DON'T KNOW/NA				
TIDE-ENERGY SYSTEMS				
1. YES	6	4	10	10
	60.	57.	59.	59.
2. NO	4	3	7	7
	40.	43.	41.	41.
DON'T KNOW/NA				
SALINITY GRADIENT ENERGY SYSTEMS				
1. YES	5	3	8	8
	50.	43.	47.	47.
2. NO	5	4	9	9
	50.	57.	53.	53.
DON'T KNOW/NA				

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

USEFULNESS OF SPECIFIED INFORMATION ITEMS (QUESTION 8)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NON-DOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10 100.	7 100.	17 100.	181 100.
Q8A(1) BIBLIOGRAPHY	10 100.	7 100.	17 100.	181 100.
ESSENTIAL	1 10.	2 29.	3 18.	15 8.
VERY USEFUL	2 20.	2 29.	4 24.	55 30.
SOMEWHAT USEFUL	6 60.	3 43.	9 53.	89 49.
NOT AT ALL USEFUL	1 10.		1 6.	22 12.
ESSENTIAL + VERY USEFUL	3 30.	4 57.	7 41.	70 39.
DON'T KNOW				
AVERAGE	2.30	2.86	2.53	2.35
STANDARD DEVIATION	.78	.82	.84	.79
Q8A(2) LIST OF SOURCES	10 100.	7 100.	17 100.	180 100.
ESSENTIAL	1 10.	1 14.	2 12.	23 13.
VERY USEFUL	4 40.	4 57.	8 47.	79 44.
SOMEWHAT USEFUL	5 50.	2 29.	7 41.	67 37.
NOT AT ALL USEFUL				11 6.
ESSENTIAL + VERY USEFUL	5 50.	5 71.	10 59.	102 57.
DON'T KNOW				
AVERAGE	2.60	2.86	2.71	2.63
STANDARD DEVIATION	.66	.62	.64	.79

SCALE: ESSENTIAL = 4, VERY USEFUL = 3, SOMEWHAT USEFUL = 2, NOT AT ALL USEFUL = 1

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

USEFULNESS OF SPECIFIED INFORMATION ITEMS - CONTINUED (QUESTION 8)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10 / 100.	7 / 100.	17 / 100.	181 / 100.
Q8A(3) CALENDAR-CONFERENCES/ PROGRAMS	10 / 100.	7 / 100.	17 / 100.	181 / 100.
ESSENTIAL		1 / 14.	1 / 6.	19 / 10.
VERY USEFUL	6 / 60.	4 / 57.	10 / 59.	69 / 38.
SOMEWHAT USEFUL	3 / 30.	1 / 14.	4 / 24.	71 / 39.
NOT AT ALL USEFUL	1 / 10.	1 / 14.	2 / 12.	22 / 12.
ESSENTIAL + VERY USEFUL	6 / 60.	5 / 71.	11 / 65.	88 / 49.
DON'T KNOW				
AVERAGE	2.50	2.71	2.59	2.47
STANDARD DEVIATION	.67	.89	.76	.83
Q8A(4) DIAGRAMS/SCHEMATICS	9 / 100.	7 / 100.	16 / 100.	179 / 100.
ESSENTIAL	2 / 22.	1 / 14.	3 / 19.	14 / 8.
VERY USEFUL	2 / 22.	3 / 43.	5 / 31.	62 / 35.
SOMEWHAT USEFUL	5 / 56.	2 / 29.	7 / 44.	78 / 44.
NOT AT ALL USEFUL		1 / 14.	1 / 6.	25 / 14.
ESSENTIAL + VERY USEFUL	4 / 44.	4 / 57.	8 / 50.	76 / 42.
DON'T KNOW				
AVERAGE	2.67	2.57	2.63	2.36
STANDARD DEVIATION	.80	.90	.84	.82

SCALE: ESSENTIAL = 4, VERY USEFUL = 3, SOMEWHAT USEFUL = 2, NOT AT ALL USEFUL = 1

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

USEFULNESS OF SPECIFIED INFORMATION ITEMS - CONTINUED (QUESTION 8)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10 100.	7 100.	17 100.	181 100.
Q8A(5) NON-TECHNICAL DESCRIPTION	10 100.	7 100.	17 100.	153 100.
ESSENTIAL	1 10.		1 6.	3 2.
VERY USEFUL				18 12.
SOMEWHAT USEFUL	5 50.	1 14.	6 35.	62 41.
NOT AT ALL USEFUL	4 40.	6 86.	10 59.	70 46.
ESSENTIAL + VERY USEFUL	1 10.		1 6.	21 14.
DON'T KNOW				
AVERAGE	1.80	1.14	1.53	1.70
STANDARD DEVIATION	.87	.35	.77	.74
Q8A(6) TECHNICAL DESCRIPTION	10 100.	7 100.	17 100.	181 100.
ESSENTIAL	1 10.	2 29.	3 18.	18 10.
VERY USEFUL	2 20.	3 43.	5 29.	84 46.
SOMEWHAT USEFUL	6 60.	1 14.	7 41.	63 35.
NOT AT ALL USEFUL	1 10.	1 14.	2 12.	16 9.
ESSENTIAL + VERY USEFUL	3 30.	5 71.	8 47.	102 56.
DON'T KNOW				
AVERAGE	2.30	2.86	2.53	2.57
STANDARD DEVIATION	.78	.98	.91	.80

SCALE: ESSENTIAL = 4, VERY USEFUL = 3, SOMEWHAT USEFUL = 2, NOT AT ALL USEFUL = 1

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

USEFULNESS OF SPECIFIED INFORMATION ITEMS - CONTINUED (QUESTION 8)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10 100.	7 100.	17 100.	181 100.
Q8A(7) LISTS OF SUPPLIERS				146 100.
ESSENTIAL				12 8.
VERY USEFUL				39 27.
SOMEWHAT USEFUL				56 38.
NOT AT ALL USEFUL				39 27.
ESSENTIAL + VERY USEFUL				51 35.
DON'T KNOW				
AVERAGE				2.16
STANDARD DEVIATION				.92
Q8A(8) HANDBOOKS/TABLES	10 100.	7 100.	17 100.	181 100.
ESSENTIAL	1 10.		1 6.	17 9.
VERY USEFUL	2 20.	4 57.	6 35.	67 37.
SOMEWHAT USEFUL	3 30.	2 29.	5 29.	65 36.
NOT AT ALL USEFUL	4 40.	1 14.	5 29.	31 17.
ESSENTIAL + VERY USEFUL	3 30.	4 57.	7 41.	84 46.
DON'T KNOW				1 1.
AVERAGE	2.00	2.43	2.18	2.39
STANDARD DEVIATION	1.00	.72	.91	.87

SCALE: ESSENTIAL = 4, VERY USEFUL = 3, SOMEWHAT USEFUL = 2, NOT AT ALL USEFUL = 1

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

USEFULNESS OF SPECIFIED INFORMATION ITEMS - CONTINUED (QUESTION 8)

OCEAN ENERGY		OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
		10 100.	7 100.	17 100.	181 100.
Q8A(9)	TECHNICAL EXPERTS LIST	10 100.	7 100.	17 100.	181 100.
	ESSENTIAL	2 20.	2 29.	4 24.	16 9.
	VERY USEFUL	2 20.	3 43.	5 29.	66 36.
	SOMEWHAT USEFUL	3 30.	2 29.	5 29.	72 40.
	NOT AT ALL USEFUL	3 30.		3 18.	27 15.
	ESSENTIAL + VERY USEFUL	4 40.	5 71.	9 53.	82 45.
	DON'T KNOW				
	AVERAGE	2.30	3.00	2.59	2.39
	STANDARD DEVIATION	1.10	.75	1.02	.85
Q8A(10)	MANUAL METHODS	10 100.	7 100.	17 100.	181 100.
	ESSENTIAL	1 10.	4 57.	5 29.	30 17.
	VERY USEFUL	1 10.	1 14.	2 12.	65 36.
	SOMEWHAT USEFUL	5 50.		5 29.	53 29.
	NOT AT ALL USEFUL	3 30.	2 29.	5 29.	33 18.
	ESSENTIAL + VERY USEFUL	2 20.	5 71.	7 41.	95 52.
	DON'T KNOW				
	AVERAGE	2.00	3.00	2.41	2.51
	STANDARD DEVIATION	.89	1.30	1.19	.96

SCALE: ESSENTIAL = 4, VERY USEFUL = 3, SOMEWHAT USEFUL = 2, NOT AT ALL USEFUL = 1

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

USEFULNESS OF SPECIFIED INFORMATION ITEMS - CONTINUED (QUESTION 8)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10	7	17	181
COMPUTER MODELS	100.	100.	100.	100.
	10	7	17	181
ESSENTIAL	100.	100.	100.	100.
	3	2	5	28
VERY USEFUL	30.	29.	29.	15.
	1	2	3	51
SOMEWHAT USEFUL	10.	29.	18.	28.
	2	2	4	62
NOT AT ALL USEFUL	20.	29.	24.	34.
	4	1	5	40
ESSENTIAL/VERY USEFUL	40.	14.	29.	22.
	4	4	8	79
DON'T KNOW	40.	57.	47.	44.
AVERAGE	2.30	2.71	2.47	2.37
STANDARD DEVIATION	1.26	1.04	1.19	.99

SCALE: ESSENTIAL = 4, VERY USEFUL = 3, SOMEWHAT USEFUL = 2, NOT AT ALL USEFUL = 1

Figure F-1. Ocean Energy Researchers Data Tables (continued)

USEFULNESS OF SPECIFIED INFORMATION ITEMS - CONTINUED (QUESTION 8)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10 100.	7 100.	17 100.	181 100.
Q8B(1) EDUCATIONAL INSTITUTIONS	10 100.	7 100.	17 100.	181 100.
ESSENTIAL				1 1.
VERY USEFUL	2 20.	2 29.	4 24.	26 14.
SOMEWHAT USEFUL	4 40.	4 57.	8 47.	99 55.
NOT AT ALL USEFUL	3 30.	1 14.	4 24.	54 30.
ESSENTIAL + VERY USEFUL	2 20.	2 29.	4 24.	27 15.
DON'T KNOW	1 10.		1 6.	1 1.
AVERAGE	1.89	2.14	2.00	1.86
STANDARD DEVIATION	.73	.64	.70	.65
Q8B(2) RESEARCH IN PROGRESS	10 100.	7 100.	17 100.	181 100.
ESSENTIAL	1 10.	2 29.	3 18.	33 18.
VERY USEFUL	5 50.	5 71.	10 59.	102 56.
SOMEWHAT USEFUL	4 40.		4 24.	39 22.
NOT AT ALL USEFUL				7 4.
ESSENTIAL + VERY USEFUL	6 60.	7 100.	13 76.	135 75.
DON'T KNOW				
AVERAGE	2.70	3.29	2.94	2.89
STANDARD DEVIATION	.64	.41	.64	.73

SCALE: ESSENTIAL = 4, VERY USEFUL = 3, SOMEWHAT USEFUL = 2, NOT AT ALL USEFUL = 1

Figure F-1. Ocean Energy Researchers Data Tables (continued)

USEFULNESS OF SPECIFIED INFORMATION ITEMS - CONTINUED (QUESTION 8)

OCEAN ENERGY		OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
		10 100.	7 100.	17 100.	181 100.
98B(3)	STATE OF ART	10 100.	7 100.	17 100.	181 100.
	ESSENTIAL	3 30.	3 43.	6 35.	34 19.
	VERY USEFUL	3 30.	4 57.	7 41.	93 51.
	SOMEWHAT USEFUL	4 40.		4 24.	44 24.
	NOT AT ALL USEFUL				9 5.
	ESSENTIAL + VERY USEFUL	6 60.	7 100.	13 76.	127 70.
	DON'T KNOW				1 1.
	AVERAGE	2.90	3.43	3.12	2.84
	STANDARD DEVIATION	.83	.48	.74	.79
98B(4)	COSTS/PERFORMANCE	10 100.	7 100.	17 100.	180 100.
	ESSENTIAL	3 30.	4 57.	7 41.	39 22.
	VERY USEFUL	1 10.	2 29.	3 18.	78 43.
	SOMEWHAT USEFUL	5 50.		5 29.	49 27.
	NOT AT ALL USEFUL	1 10.	1 14.	2 12.	14 8.
	ESSENTIAL + VERY USEFUL	4 40.	6 86.	10 59.	117 65.
	DON'T KNOW				
	AVERAGE	2.60	3.29	2.88	2.79
	STANDARD DEVIATION	1.01	1.01	1.00	.86

SCALE: ESSENTIAL = 4, VERY USEFUL = 3, SOMEWHAT USEFUL = 2, NOT AT ALL USEFUL = 1

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

USEFULNESS OF SPECIFIED INFORMATION ITEMS - CONTINUED (QUESTION 8)

OCEAN ENERGY		OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
		10 100.	7 100.	17 100.	181 100.
Q8B(5)	COSTS INSTALL/OPERATE	10 100.	7 100.	17 100.	163 100.
	ESSENTIAL	3 30.	4 57.	7 41.	33 20.
	VERY USEFUL	3 30.	2 29.	5 29.	70 43.
	SOMEWHAT USEFUL	2 20.		2 12.	45 28.
	NOT AT ALL USEFUL	2 20.	1 14.	3 18.	16 10.
	ESSENTIAL + VERY USEFUL	6 60.	6 86.	12 71.	102 63.
	DON'T KNOW				
	AVERAGE	2.70	3.29	2.94	2.72
	STANDARD DEVIATION	1.10	1.01	1.11	.90
Q8B(6)	BUILDING CODES/REGS	10 100.	7 100.	17 100.	165 100.
	ESSENTIAL	4 40.	2 29.	6 35.	19 12.
	VERY USEFUL	1 10.	3 43.	4 24.	38 23.
	SOMEWHAT USEFUL	3 30.	2 29.	5 29.	59 36.
	NOT AT ALL USEFUL	2 20.		2 12.	49 29.
	ESSENTIAL + VERY USEFUL	5 50.	5 71.	10 59.	57 35.
	DON'T KNOW				
	AVERAGE	2.70	3.00	2.82	2.17
	STANDARD DEVIATION	1.16	.75	1.03	.98

SCALE: ESSENTIAL = 4, VERY USEFUL = 3, SOMEWHAT USEFUL = 2, NOT AT ALL USEFUL = 1

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

USEFULNESS OF SPECIFIED INFORMATION ITEMS - CONTINUED (QUESTION 8)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10 100.	7 100.	17 100.	163 100.
8B(7) TAX/ECONOMIC INCENTIVE	10 100.	7 100.	17 100.	163 100.
ESSENTIAL	2 20.	2 29.	4 24.	27 17.
VERY USEFUL		3 43.	3 18.	44 27.
SOMEWHAT USEFUL	3 30.	1 14.	4 24.	52 32.
NOT AT ALL USEFUL	5 50.	1 14.	6 35.	40 25.
ESSENTIAL + VERY USEFUL	2 20.	5 71.	7 41.	71 44.
DON'T KNOW				
AVERAGE	1.90	2.86	2.24	2.36
STANDARD DEVIATION	1.13	.90	1.10	1.01
8B(8) STANDARDS/SPECS	10 100.	7 100.	17 100.	163 100.
ESSENTIAL	1 10.		1 6.	18 11.
VERY USEFUL	2 20.	5 71.	7 41.	55 34.
SOMEWHAT USEFUL	3 30.	1 14.	4 24.	53 33.
NOT AT ALL USEFUL	4 40.	1 14.	5 29.	37 23.
ESSENTIAL + VERY USEFUL	3 30.	5 71.	8 47.	73 45.
DON'T KNOW				
AVERAGE	2.00	2.57	2.24	2.33
STANDARD DEVIATION	1.00	.78	.93	.95

SCALE: ESSENTIAL = 4, VERY USEFUL = 3, SOMEWHAT USEFUL = 2, NOT AT ALL USEFUL = 1

Figure F-1. Ocean Energy Researchers Data Tables (continued)

USEFULNESS OF SPECIFIED INFORMATION ITEMS - CONTINUED (QUESTION 8)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NON-DOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10 100.	7 100.	17 100.	181 100.
Q8B(9) MARKETING/SALES DATA				146 100.
ESSENTIAL				14 10.
VERY USEFUL				38 26.
SOMEWHAT USEFUL				56 38.
NOT AT ALL USEFUL				38 26.
ESSENTIAL + VERY USEFUL				52 36.
DON'T KNOW				
AVERAGE				2.19
STANDARD DEVIATION				.93
Q8B(10) OUTSIDE US RESEARCH/ INDUSTRY	10 100.	7 100.	17 100.	180 100.
ESSENTIAL	1 10.	1 14.	2 12.	13 7.
VERY USEFUL	2 20.	2 29.	4 24.	51 28.
SOMEWHAT USEFUL	4 40.	2 29.	6 35.	68 38.
NOT AT ALL USEFUL	3 30.	2 29.	5 29.	48 27.
ESSENTIAL + VERY USEFUL	3 30.	3 43.	6 35.	64 36.
DON'T KNOW				
AVERAGE	2.10	2.29	2.18	2.16
STANDARD DEVIATION	.94	1.03	.97	.90

SCALE: ESSENTIAL = 4, VERY USEFUL = 3, SOMEWHAT USEFUL = 2, NOT AT ALL USEFUL = 1

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

USEFULNESS OF SPECIFIED INFORMATION ITEMS - CONTINUED (QUESTION 8)

OCEAN ENERGY		OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
		10	7	17	101
		100.	100.	100.	100.
Q8B(11)	INFO ON MARKETING				16
					16.
	ESSENTIAL				3
					3.
	VERY USEFUL				
	SOMEWHAT USEFUL				7
					39.
	NOT AT ALL USEFUL				8
					44.
	ESSENTIAL + VERY USEFUL				3
					3.
	DON'T KNOW				
	AVERAGE				1.89
	STANDARD DEVIATION				1.04
Q8B(12)	INST/SOCIAL/ENVIRON/ LEGAL	10	7	17	163
		100.	100.	100.	100.
	ESSENTIAL	1	2	3	13
		10.	29.	18.	8.
	VERY USEFUL	3	3	6	51
		30.	43.	35.	31.
	SOMEWHAT USEFUL	3		3	73
		30.		18.	45.
	NOT AT ALL USEFUL	3	2	5	26
		30.	29.	29.	16.
	ESSENTIAL + VERY USEFUL	4	5	9	64
		40.	71.	53.	39.
	DON'T KNOW				
	AVERAGE	2.20	2.71	2.41	2.31
	STANDARD DEVIATION	.97	1.17	1.09	.84

SCALE: ESSENTIAL = 4, VERY USEFUL = 3, SOMEWHAT USEFUL = 2, NOT AT ALL USEFUL = 1

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

USEFULNESS OF SPECIFIED INFORMATION ITEMS - CONTINUED (QUESTION 8)

OCEAN ENERGY		OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
		10 100.	7 100.	17 100.	181 100.
Q8B(13)	EXPECTED DEVELOPMENTS	10 100.	7 100.	17 100.	181 100.
	ESSENTIAL	1 10.	2 29.	3 18.	24 13.
	VERY USEFUL	3 30.	3 43.	6 35.	88 49.
	SOMEWHAT USEFUL	5 50.	1 14.	6 35.	51 28.
	NOT AT ALL USEFUL	1 10.	1 14.	2 12.	17 9.
	ESSENTIAL + VERY USEFUL	4 40.	5 71.	9 53.	112 62.
	DON'T KNOW				1 1.
	AVERAGE	2.40	2.86	2.59	2.66
	STANDARD DEVIATION	.80	.98	.90	.82
Q8B(14)	CLIMATOLOGICAL DATA	10 100.	7 100.	17 100.	163 100.
	ESSENTIAL	2 20.	1 14.	3 18.	34 21.
	VERY USEFUL	4 40.	3 43.	7 41.	55 34.
	SOMEWHAT USEFUL	1 10.	2 29.	3 18.	46 28.
	NOT AT ALL USEFUL	3 30.	1 14.	4 24.	28 17.
	ESSENTIAL + VERY USEFUL	6 60.	4 57.	10 59.	89 55.
	DON'T KNOW				
	AVERAGE	2.50	2.57	2.53	2.58
	STANDARD DEVIATION	1.11	.90	1.03	1.00

SCALE: ESSENTIAL = 4, VERY USEFUL = 3, SOMEWHAT USEFUL = 2, NOT AT ALL USEFUL = 1

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

USE OF SPECIAL ACQUISITION METHODS (QUESTION 10)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10 100.	7 100.	17 100.	181 100.
Q10A COMPUTER TERMINAL				
1. YES	1 10.	2 29.	3 18.	62 34.
2. NO	9 90.	5 71.	14 82.	116 64.
8. DON'T KNOW/NA				3 2.
Q10B MICROFORM - COMPUTER				
1. YES	1 10.		1 6.	16 9.
2. NO	9 90.	7 100.	16 94.	155 86.
8. DON'T KNOW/NA				10 6.
Q10C OTHER MICROFORM				
1. YES	5 50.	1 14.	6 35.	72 40.
2. NO	5 50.	6 86.	11 65.	108 60.
8. DON'T KNOW/NA				1 1.

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

USE OF SELECTED SOLAR INFORMATION SOURCES (QUESTION 11)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10 100.	7 100.	17 100.	181 100.
Q11(1) LIBRARY (ORG/LOCAL)	10 100.	7 100.	17 100.	179 100.
1. YES	8 80.	4 57.	12 71.	150 84.
2. NO	2 20.	3 43.	5 29.	28 16.
8. DON'T KNOW				1 1.
Q11(2) PUBLIC UTILITY	10 100.	7 100.	17 100.	180 100.
1. YES	3 30.	3 43.	6 35.	91 51.
2. NO	7 70.	4 57.	11 65.	88 49.
8. DON'T KNOW				1 1.
Q11(3) INSTALLER/BUILDER/ DESIGNER	10 100.	7 100.	17 100.	180 100.
1. YES	5 50.	5 71.	10 59.	117 65.
2. NO	5 50.	2 29.	7 41.	63 35.
8. DON'T KNOW				
Q11(4) WORKSHOPS/CONFERENCES	10 100.	7 100.	17 100.	180 100.
1. YES	8 80.	6 86.	14 82.	159 88.
2. NO	2 20.	1 14.	3 18.	21 12.
8. DON'T KNOW				

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

USE OF SELECTED SOLAR INFORMATION SOURCES - CONTINUED (QUESTION 11)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10 100.	7 100.	17 100.	181 100.
Q11(5) COMMERCIAL DATA BASE	10 100.	7 100.	17 100.	181 100.
1. YES	3 30.	4 57.	7 41.	68 38.
2. NO	7 70.	3 43.	10 59.	110 61.
8. DON'T KNOW				3 2.
Q11(6) FEDERAL LIBRARY/INFO CENTER	10 100.	7 100.	17 100.	180 100.
1. YES	5 50.	2 29.	7 41.	97 54.
2. NO	5 50.	4 57.	9 53.	78 43.
8. DON'T KNOW		1 14.	1 6.	5 3.
Q11(7) SSIE - SMITHSONIAN	10 100.	7 100.	17 100.	181 100.
1. YES	1 10.		1 6.	30 17.
2. NO	9 90.	6 86.	15 88.	146 81.
8. DON'T KNOW		1 14.	1 6.	5 3.

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(CCTOBER, 1979)

USE OF SELECTED SOLAR INFORMATION SOURCES - CONTINUED (QUESTION 11)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10 100.	7 100.	17 100.	181 100.
Q11(8) GOV'T PRINTING OFFICE-GPO	10 100.	7 100.	17 100.	181 100.
1. YES	7 70.	5 71.	12 71.	134 74.
2. NO	2 20.	2 29.	4 24.	44 24.
8. DON'T KNOW	1 10.		1 6.	3 2.
	10 100.	7 100.	17 100.	181 100.
Q11(9) NATIONAL TECHNICAL INFORMATION SERVICE-NTIS	10 100.	7 100.	17 100.	181 100.
1. YES	8 80.	4 57.	12 71.	115 64.
2. NO	2 20.	3 43.	5 29.	59 33.
8. DON'T KNOW				7 4.
	10 100.	7 100.	17 100.	181 100.
Q11(10) TECHNICAL INFORMATION CENTER - TIC	10 100.	7 100.	17 100.	180 100.
1. YES	3 30.	3 43.	6 35.	72 40.
2. NO	7 70.	4 57.	11 65.	100 56.
8. DON'T KNOW				8 4.

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

USE OF SELECTED SOLAR INFORMATION SOURCES - CONTINUED (QUESTION 11)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10 100.	7 100.	17 100.	181 100.
Q11(11) NATL SOLAR HEATING + COOLING INFO CTR	10 100.	7 100.	17 100.	181 100.
1. YES	1 10.		1 6.	53 29.
2. NO	8 80.	7 100.	15 88.	120 66.
8. DON'T KNOW	1 10.		1 6.	8 4.
	10 100.	7 100.	17 100.	181 100.
Q11(12) REGIONAL SOLAR ENERGY CENTERS	10 100.	7 100.	17 100.	181 100.
1. YES	1 10.	1 14.	2 12.	41 23.
2. NO	9 90.	6 86.	15 88.	133 73.
8. DON'T KNOW				7 4.

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

USE OF SELECTED SOLAR INFORMATION SOURCES - CONTINUED (QUESTION 11)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10 100.	7 100.	17 100.	181 100.
Q11(13) US DEPT. OF ENERGY	10 100.	7 100.	17 100.	181 100.
1. YES	10 100.	6 86.	16 94.	144 80.
2. NO		1 14.	1 6.	36 20.
8. DON'T KNOW				1 1.
Q11(14) RADIO/TV	10 100.	7 100.	17 100.	80 100.
1. YES	3 30.	2 29.	5 29.	22 28.
2. NO	7 70.	5 71.	12 71.	57 71.
8. DON'T KNOW				1 1.
Q11(15) PERIODICALS/ NEWSPAPERS	10 100.	7 100.	17 100.	109 100.
1. YES	8 80.	5 71.	13 76.	103 94.
2. NO	2 20.	2 29.	4 24.	6 6.
8. DON'T KNOW				
Q11(16) PRIVATE SOLAR/ ENVIRONMENTAL ORG.	10 100.	7 100.	17 100.	181 100.
1. YES	3 30.	4 57.	7 41.	96 53.
2. NO	7 70.	3 43.	10 59.	82 45.
8. DON'T KNOW				3 2.

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

USE OF SELECTED SOLAR INFORMATION SOURCES - CONTINUED (QUESTION 11)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10 100.	7 100.	17 100.	181 100.
Q11(17) STATE ENERGY OR SOLAR OFFICES	10 100.	7 100.	17 100.	181 100.
1. YES	2 20.	2 29.	4 24.	86 48.
2. NO	8 80.	5 71.	13 76.	94 52.
8. DON'T KNOW				1 1.
Q11(18) OTHER STATE/ LOCAL GOV'T. SOURCE	10 100.	7 100.	17 100.	178 100.
1. YES	2 20.	2 29.	4 24.	49 28.
2. NO	8 80.	5 71.	13 76.	128 72.
8. DON'T KNOW				1 1.
Q11(19) INTL SOLAR ENERGY SOCIETY-ISES	10 100.	7 100.	17 100.	181 100.
1. YES	2 20.	2 29.	4 24.	87 48.
2. NO	8 80.	5 71.	13 76.	92 51.
8. DON'T KNOW				2 1.
Q11(20) SOLAR ENERGY INDUSTRIES ASSOC.-SEIA	10 100.	7 100.	17 100.	181 100.
1. YES	1 10.	2 29.	3 18.	60 33.
2. NO	9 90.	5 71.	14 82.	118 65.
8. DON'T KNOW				3 2.

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

USE OF SELECTED SOLAR INFORMATION SOURCES - CONTINUED (QUESTION 11)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES
	10	7	17
	100.	100.	100.
Q11(21) QUESTIONNAIRE SOURCE 21	10	7	17
Law of the Sea Institute	100.	100.	100.
1. YES	1	3	4
	10.	43.	24.
2. NO	9	4	13
	90.	57.	76.
8. DON'T KNOW			
Q11(22) QUESTIONNAIRE SOURCE 22	10	7	17
National Oceanic and Atmospheric Administration	100.	100.	100.
1. YES	7	5	12
	70.	71.	71.
2. NO	3	2	5
	30.	29.	29.
8. DON'T KNOW			
Q11(23) QUESTIONNAIRE SOURCE 23			
1. YES			
2. NO			
8. DON'T KNOW			
Q11(24) QUESTIONNAIRE SOURCE 24			
1. YES			
2. NO			
8. DON'T KNOW			

Figure F-1. Ocean Energy Researchers Data Tables (continued)

(OCTOBER, 1979)

YEARS IN CURRENT PROFESSION (QUESTION D2B)

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10	7	17	181
	100.	100.	100.	100.
1. 0-2 YEARS				10
				6.
2. 3-5 YEARS	1	3	4	35
	10.	43.	24.	19.
3. 6-10 YEARS	1		1	33
	10.		6.	18.
4. OVER 10	8	4	12	103
	80.	57.	71.	57.
DON'T KNOW/NA				

Figure F-1. Ocean Energy Researchers Data Tables (continued)

T-052

(OCTOBER, 1979)

MEMBERSHIP IN SOLAR-INTERESTED ORGANIZATIONS (QUESTION D3)
MEMBERSHIPS WITH INTEREST IN SOLAR

OCEAN ENERGY	OCEAN DOE-FUND RES	OCEAN NDOE-FUND RES	TOTAL OCEAN RES	ALL RES
	10	7	17	181
	100.	100.	100.	100.
1. YES BELONG, NAME	7	4	11	136
	70.	57.	65.	75.
2. YES BELONG, CAN'T NAME		1	1	4
		14.	6.	2.
3. NO, DON'T BELONG	3	2	5	40
	30.	29.	29.	22.
DON'T KNOW/NA				1
				1.

Figure F-1. Ocean Energy Researchers Data Tables (concluded)

Document Control Page	1. SERI Report No. TR-751-752	2. NTIS Accession No.	3. Recipient's Accession No.

4. Title and Subtitle

Ocean Energy Researchers Information User Study

5. Publication Date: March 1981

6.

7. Author(s)

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8. Performing Organization Rept. No.

9. Performing Organization Name and Address

Solar Energy Research Institute
1617 Cole Boulevard
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10. Project/Task/Work Unit No. 8420.11

11. Contract (C) or Grant (G) No.
(C)
(G)

12. Sponsoring Organization Name and Address

13. Type of Report & Period Covered: Technical Report

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words) This report describes the results of a series of telephone interviews with groups of users of information on ocean energy systems. These results, part of a larger study on many different solar technologies, identify types of information each group needed and the best ways to get information to each group. The report is 1 of 10 discussing study results. The overall study provides baseline data about information needs in the solar community. It covers these technological areas: photovoltaics, passive solar heating and cooling, active solar heating and cooling, biomass energy, solar thermal electric power, solar industrial and agricultural process heat, wind energy, ocean energy, and solar energy storage. An earlier study identified the information user groups in the solar community and the priority (to accelerate solar energy commercialization) of getting information to each group. In the current study only high-priority groups were examined. Results from 2 groups of researchers are analyzed in this report: DOE-Funded Researchers and Non-DOE-Funded Researchers. The data will be used as input to the determination of information products and services the Solar Energy Research Institute, the Solar Energy Information Data Bank Network, and the entire information outreach community should be preparing and disseminating.

17. Document Analysis

a. Descriptors: Cost ; Data Acquisition ; Data Analysis ; Data Base Management ; Data Compilation ; Evaluated Data ; Information Needs:Q1 ; Marketing Research ; Ocean Thermal Energy Conversion:T1 ; Sampling ; Solar Industry ; Telephones ; Communications ; Conversion ; Data ; Energy Conversion ; Industry ; Information ; Management ; Numerical Data ; Solar Energy Conversion

b. Identifiers/Open-Ended Terms

c. UC Categories: 58c, 64

18. Availability Statement
National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22161

19. No. of Pages: 108

20. Price: $6.50

Form No. 8200-13 (6-79)

☆ U.S. GOVERNMENT PRINTING OFFICE: 1980—777-084/431