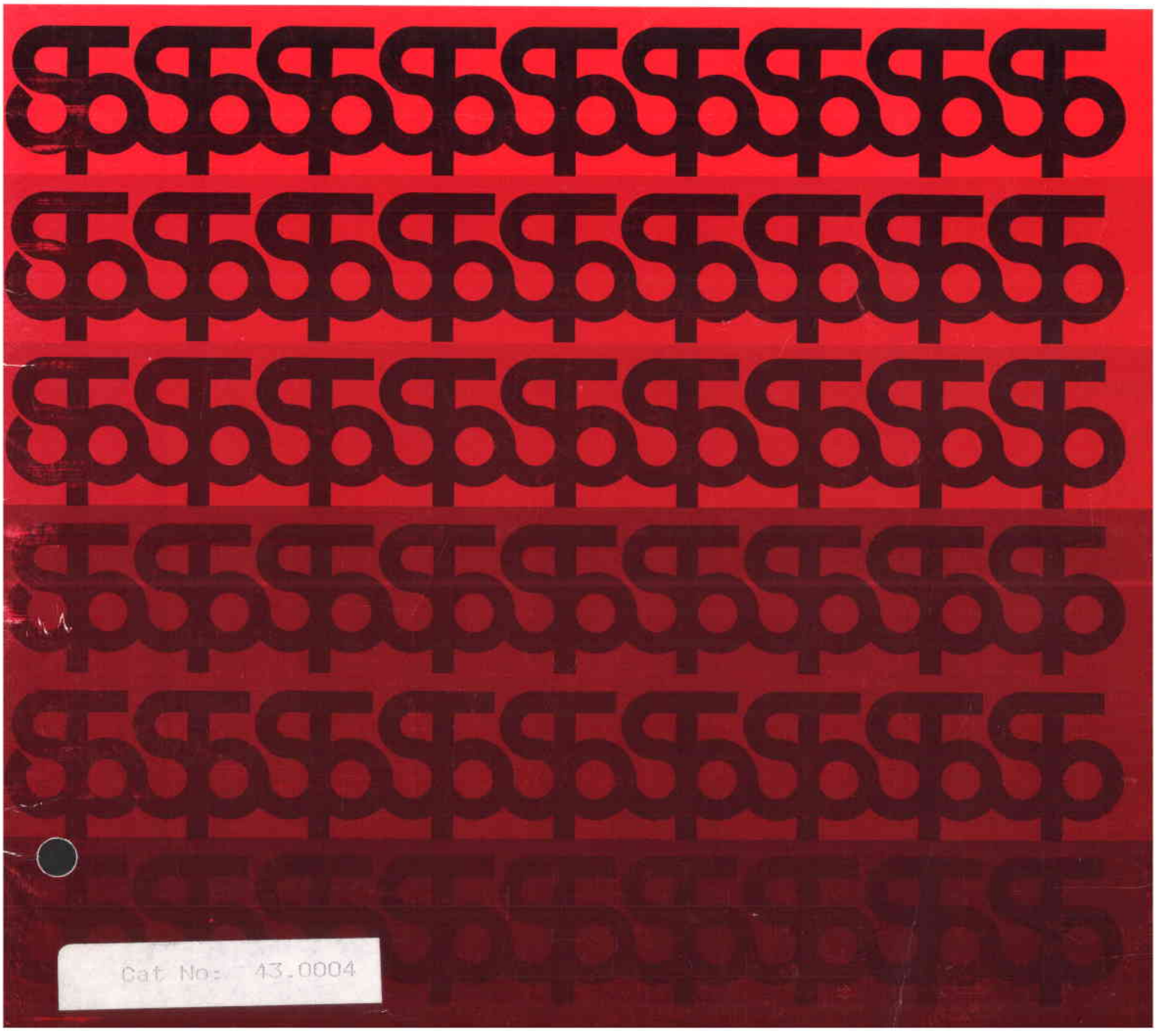
DOE/CS-0027/1

Solar Technology Transfer Program

FY 1977 Program Summary

April 1978

U.S. Department of Energy
Assistant Secretary for Conservation and Solar Applications
Division of Solar Applications



Cat No: 43.0004

Solar Technology Transfer Program

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U.S. Department of Energy
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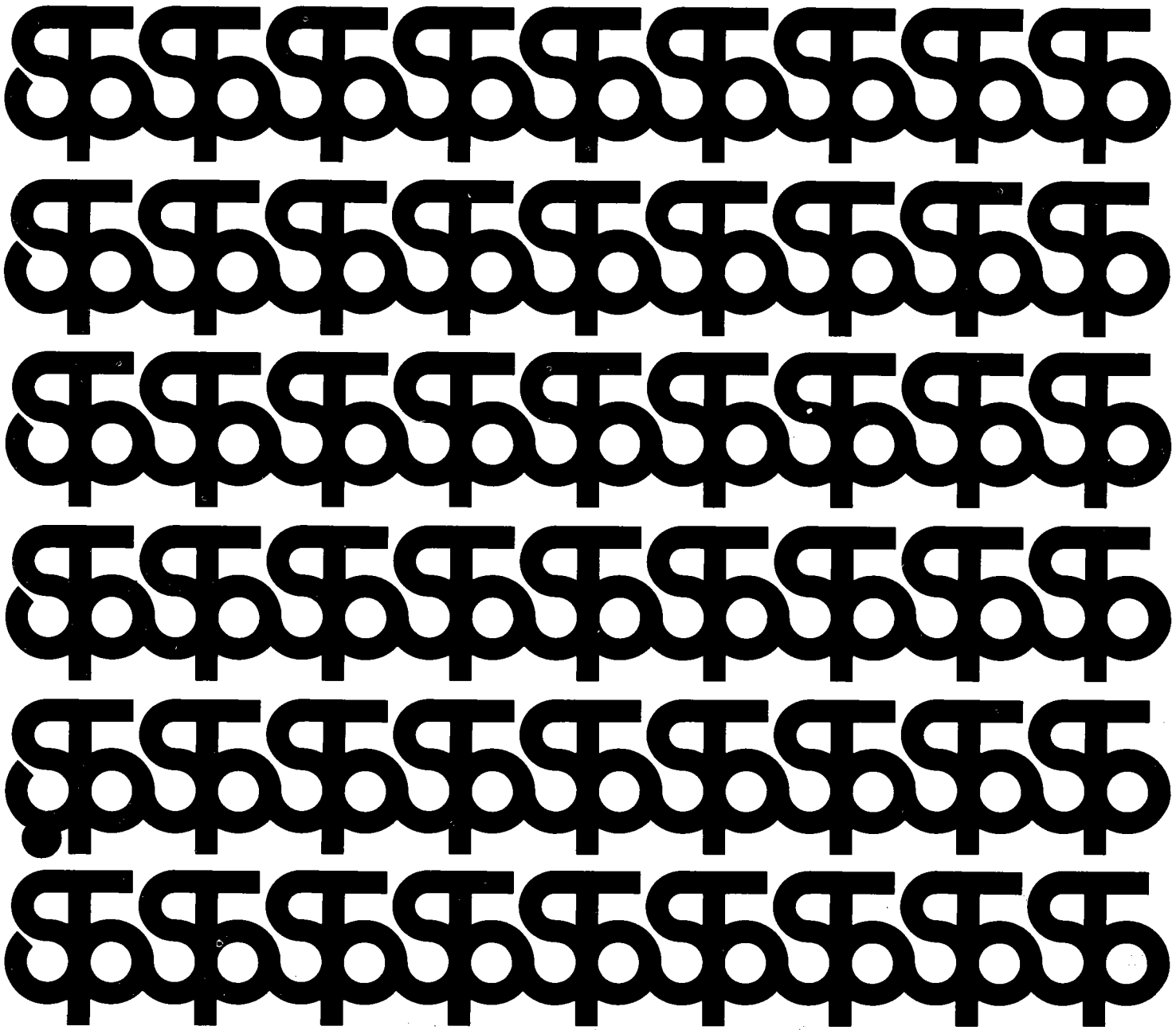
Washington, D.C. 20545



Preface

On October 26, 1974, the Solar Energy Research Development and Demonstration Act (Public Law 93-473) was signed into law, authorizing a vigorous Federal program of research, development and demonstration. Its goal was to provide the nation with the option of using solar energy as a viable source for meeting future energy requirements. In response to the mandates of this act, major efforts were conducted within the Division of Solar Energy (SOLAR) of the Energy Research and Development Administration (ERDA) to work with industry to develop and introduce, at the earliest possible date, economically competitive and environmentally acceptable solar energy systems.

These responsibilities were transferred to the new United States Department of Energy (DOE) on October 1, 1977. SOLAR was reorganized into two distinct organizational components:

- The Division of Solar Technology (SOLAR/ET), as part of the Office of the Assistant Secretary for Energy Technology.
- The Division of Solar Applications (SOLAR/CS), as part of the Office of the Assistant Secretary for Conservation and Solar Applications.

As a result of this reorganization, the Solar Heating and Cooling Program, and the Technology Transfer Program, were transferred into SOLAR/CS. An overview of the current DOE organization is shown in Figure 1.

Program planning continues under the guidelines established by PL 93-473 and three other legislative acts passed by the 93rd Congress: the Solar Heating and Cooling Demonstration Act of 1974 (PL 93-409), the Energy Reorganization Act of 1974 (PL 93-438), the Federal Nonnuclear Energy Research and Development Act of 1974 (PL 93-577). Together these four laws grant DOE and other Federal agencies the authority to pursue a research program aimed at effective solar energy use. Under this authority, SOLAR/CS and SOLAR/ET are working both to promote a fully coordinated solar energy program and to complement efforts in the private sector to develop solar energy resources.

The major programs and subprograms of the Solar Energy Program during 1977 were:

a. Solar Electric Systems
   (1) Wind Energy Conversion
   (2) Photovoltaic Energy Conversion
   (3) Solar Thermal Electric Conversion
   (4) Ocean Thermal Energy Conversion (OTEC)
   (5) Solar Satellite Power Systems
b. Fuels from Biomass
   (1) Production and Collection of Biomass
   (2) Conversion of Biomass
c. Technology Support and Utilization
   (1) Technology Transfer
   (2) Environmental and Resource Assessment
d. Solar Heating and Cooling
   (1) Barriers and Incentives
   (2) Demonstration
   (3) Research and Development
   (4) Agricultural and Industrial Process Heat

This Program Summary describes each of the Technology Transfer projects funded during FY 1977. The accomplishments of the Technology Transfer Program are highlighted; plans for continued activities in this technology area are included.

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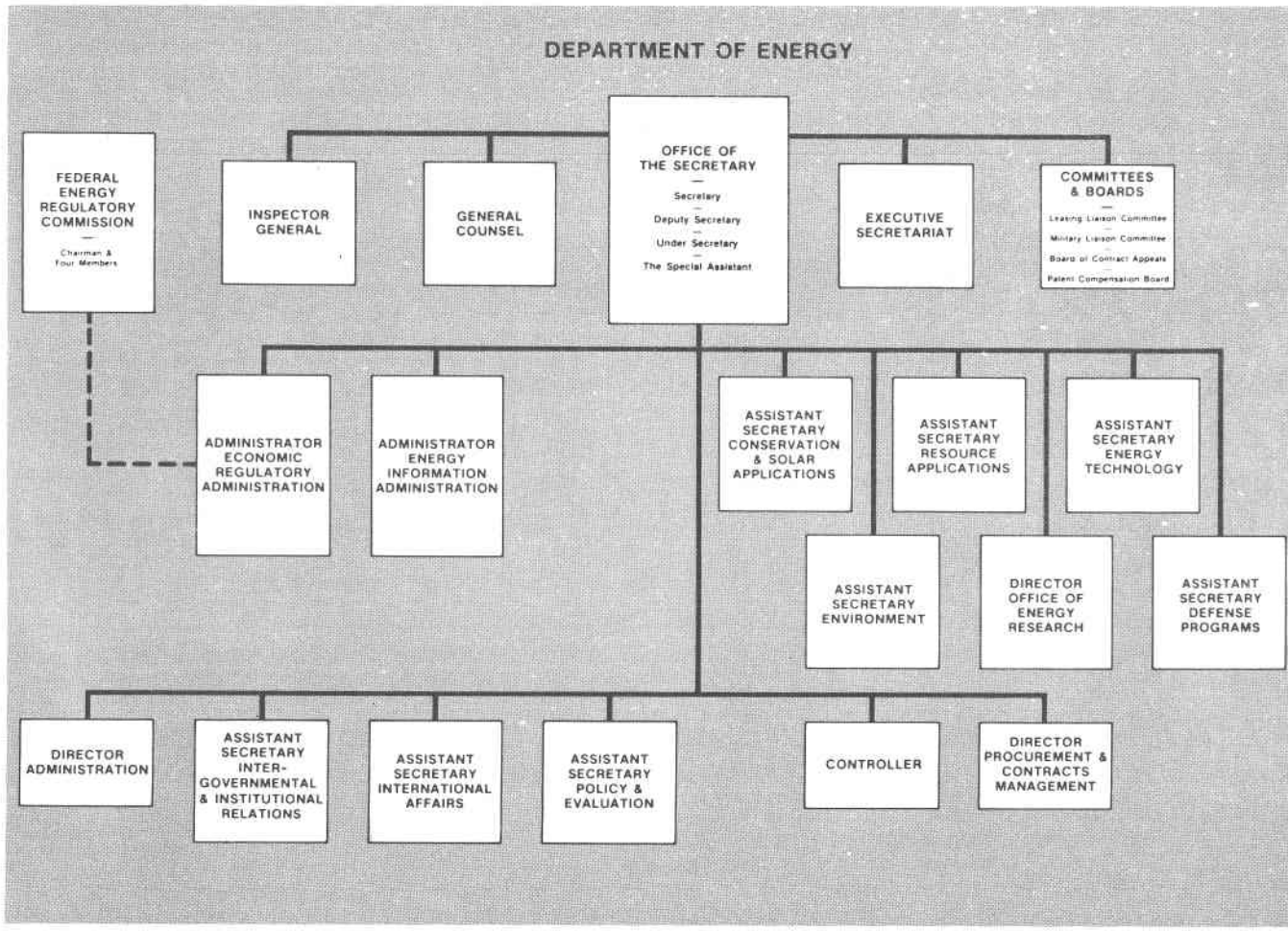
DEPARTMENT OF ENERGY
FEDERAL ENERGY REGULATORY COMMISSION
Chairman & Four Members
INSPECTOR GENERAL
GENERAL COUNSEL
OFFICE OF THE SECRETARY
Secretary
Deputy Secretary
Under Secretary
The Special Assistant
EXECUTIVE SECRETARIAT
COMMITTEES & BOARDS
Leasing Liaison Committee
Military Liaison Committee
Board of Contract Appeals
Patent Compensation Board
ADMINISTRATOR ECONOMIC REGULATORY ADMINISTRATION
ADMINISTRATOR ENERGY INFORMATION ADMINISTRATION
ASSISTANT SECRETARY CONSERVATION & SOLAR APPLICATIONS
ASSISTANT SECRETARY RESOURCE APPLICATIONS
ASSISTANT SECRETARY ENERGY TECHNOLOGY
ASSISTANT SECRETARY ENVIRONMENT
DIRECTOR OFFICE OF ENERGY RESEARCH
ASSISTANT SECRETARY DEFENSE PROGRAMS
DIRECTOR ADMINISTRATION
ASSISTANT SECRETARY INTER-GOVERNMENTAL & INSTITUTIONAL RELATIONS
ASSISTANT SECRETARY INTERNATIONAL AFFAIRS
ASSISTANT SECRETARY POLICY & EVALUATION
CONTROLLER
DIRECTOR PROCUREMENT & CONTRACTS MANAGEMENT

Figure 1

Introduction

Solar Technology Transfer Program (STTP)

The complexity and magnitude of solar data requirements, the rapid dynamics of solar's current level of development, and the broad spectrum of demand for solar technology information requires a program of technology transfer with a sophistication considerably beyond that of conventional information systems. To meet this requirement, the innovative Solar Technology Transfer Program (STTP) was implemented early in Fiscal Year (FY) 1977 within the Division of Solar Energy (SOLAR) of the Energy Research and Development Administration (ERDA).

Solar Technology Transfer is the critical link between the Federal Solar Energy Research, Development, and Demonstration Program and the solar industry. In that regard, the objective of the STTP is to provide the Department of Energy/Office of the Assistant Secretary for Conservation and Solar Applications with a major assist in transferring to industry those solar technologies with a potential for early impact application. Early impact technologies are those which have a potential for significant industry participation within the calendar year 1977-1978. Early impact technologies are defined as:

(1) Solar heating of existing and new homes, mobile homes, and small office buildings, including water heating;
(2) Solar heating and cooling of commercial buildings;
(3) Solar heating and crop drying in small agricultural applications;
(4) Small wind machines.

The Solar Technology Transfer Program has been established to:

- Disseminate user-oriented solar information by means of documents, public media material, exhibits, presentations, workshops, and conferences;
- Disseminate solar information through channels designed to reach small business, universities, and organizations in the minority group community;
- Coordinate information services with the National Solar Heating and Cooling Information Center, established by DOE and the Department of Housing and Urban Development (HUD) to answer questions and provide information on all aspects of solar heating and cooling for homes and commercial buildings—general, scientific, and non-technical;
- Coordinate activities with other Federal agencies, and with the private sector;
- Coordinate technology transfer activities with state and legislative offices, and with local governments;
- Employ the resources of the DOE laboratories, the Technical Information Center, the Operations Offices, and the Solar Energy Research Institute to carry out the STTP outreach function;
- Provide technical support to the Energy Extension Service;
- Identify target opportunities for technologies with direct or related potential for early impact on American industry;
- Develop and implement a broad range of educational programs;
- Develop and implement a consumer representation plan;
- Develop an international program component which can directly or indirectly assist practical and cost-effective deployment and commercialization of solar energy in the U.S. and throughout the world as early as possible.

In concert with DOE barrier and incentive studies, environmental and resource assessments, standards development, and planning direction support programs; the STTP system, a technology itself, functions to accelerate widespread commercialization of solar energy (see Figure 2).

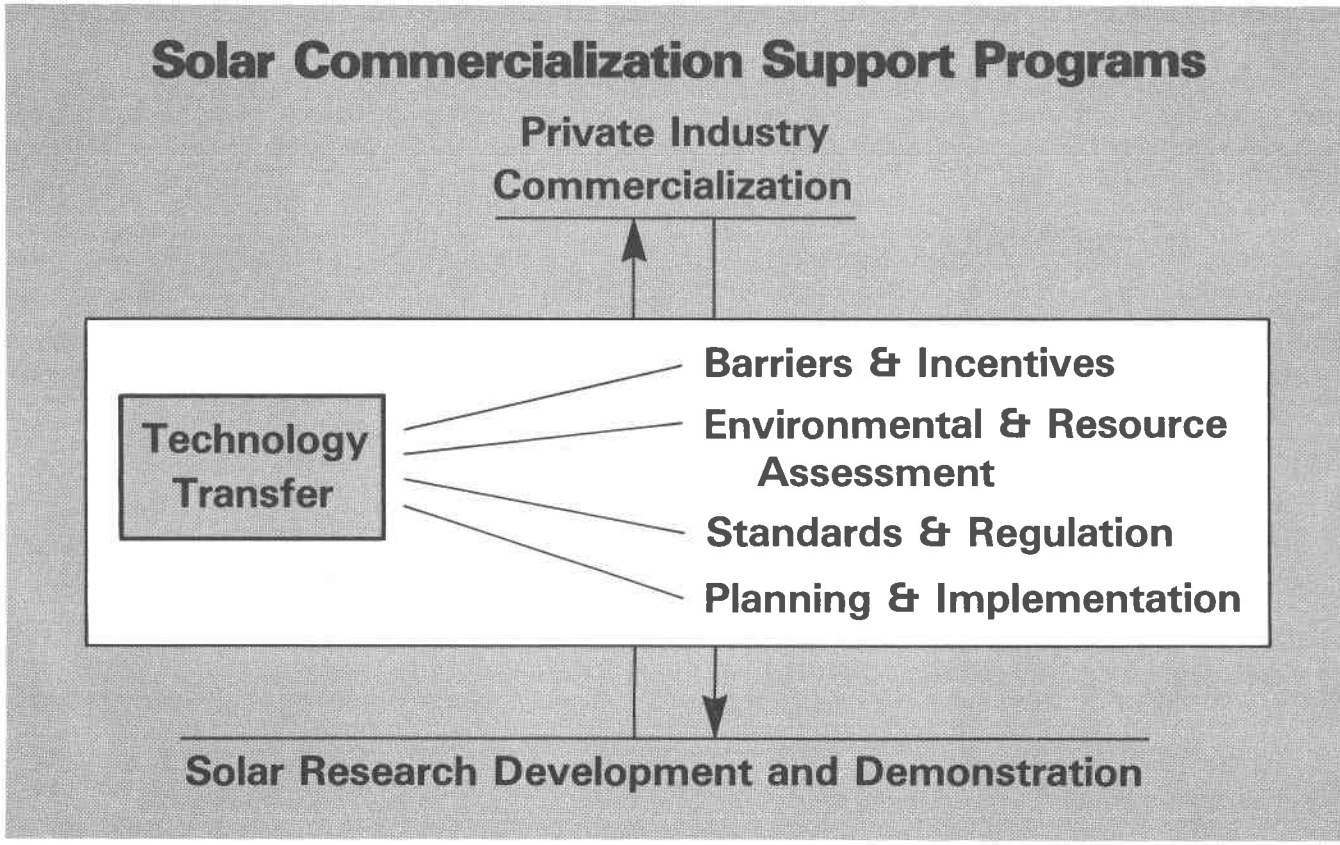
Solar Commercialization Support Programs
Private Industry
Commercialization
Technology
Transfer
Barriers & Incentives
Environmental & Resource
Assessment
Standards & Regulation
Planning & Implementation
Solar Research Development and Demonstration

Figure 2

The Program

The heart of the STTP is a synergistic delivery system working in conjunction with other solar-related organizations. Centralized at DOE headquarters for the purpose of directing and monitoring a nationwide network, the technology transfer system is characterized by the following:

- Accountability
- Adaptability
- Innovation
- Interaction
- Technology processes
- A rapid response to input

Synergistic Delivery System

Figures 3 and 4 show the relationship of STTP to other solar-oriented organizations. Figure 3 details relationships between the sources of solar energy information, the organizations carrying out the information transfer activity, and the users. Figure 4 demonstrates how the entire technology transfer process utilizes extensive feedback.

The Energy Extension Service, regional offices, and the Solar Energy Research Institute (SERI) all function as resource multipliers. These multiplier groups provide an important link between many different information systems and the information receiver, or conversely, one information system and many different types of information receivers.

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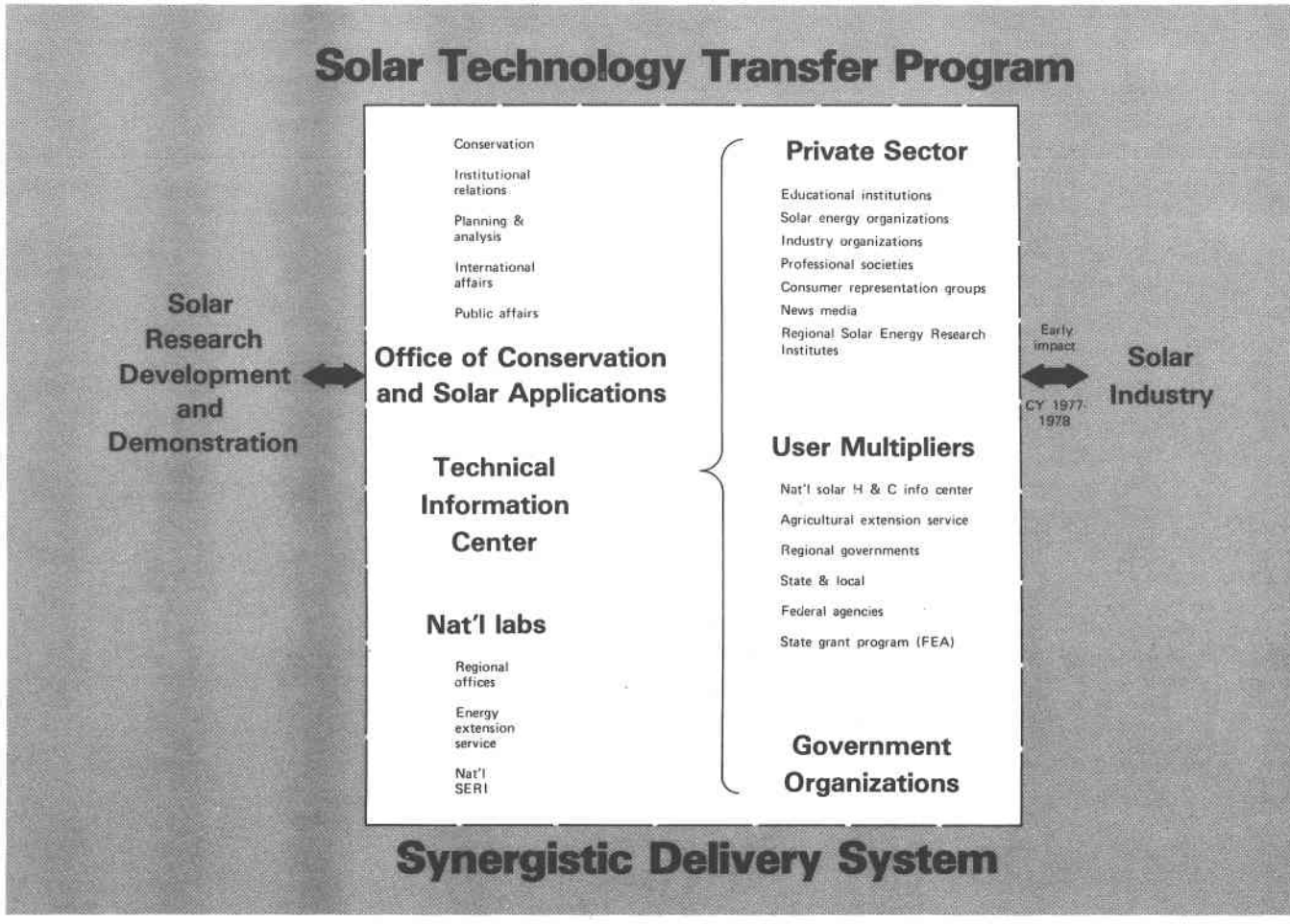
Solar Technology Transfer Program
Solar Research Development and Demonstration
Conservation
Institutional relations
Planning & analysis
International affairs
Public affairs
Office of Conservation and Solar Applications
Technical Information Center
Nat'l labs
Regional offices
Energy extension service
Nat'l SERI
Private Sector
Educational institutions
Solar energy organizations
Industry organizations
Professional societies
Consumer representation groups
News media
Regional Solar Energy Research Institutes
User Multipliers
Nat'l solar H & C info center
Agricultural extension service
Regional governments
State & local
Federal agencies
State grant program (FEA)
Government Organizations
Early impact
CY 1977-1978
Solar Industry
Synergistic Delivery System

Figure 3

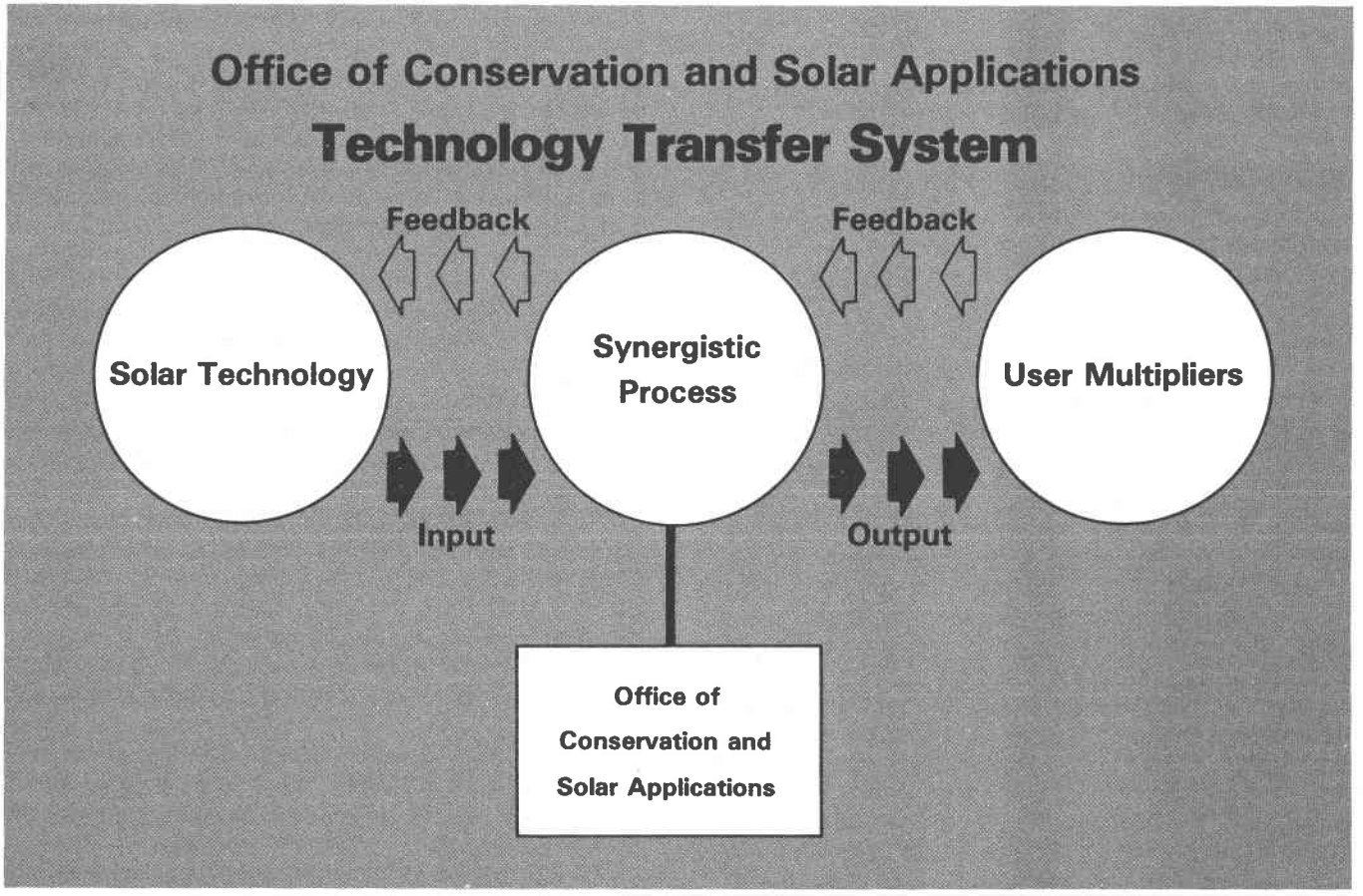
Office of Conservation and Solar Applications
Technology Transfer System
Feedback
Feedback
Solar Technology
Synergistic Process
User Multipliers
Input
Output
Office of Conservation and Solar Applications

Figure 4

Solar Research, Development, and Demonstration is shown as the input to the system, while the objective and final effect of the system is to stimulate the development of a solar industry.

Responsibilities

The STTP has divided its responsibilities into six main program elements:

- National Laboratories Regional Outreach
- Installer Training and Education
- Information Dissemination
- Workshops, Conferences and Exhibits
- Program Support
- Consumer Representation

The **National Laboratories Outreach** program element provides an outreach capability to ensure face-to-face communications with the target audiences. Five National laboratories comprise a nationwide network of field management and technology transfer activities in direct support to the Solar Technology Transfer Program (FY 77-78) early impact objectives. Through the Laboratories' outreach activities, which include education and installer training, technical assistance, conferences, workshops, DOE has been able to take immediate steps in reducing time delays and technical uncertainties in the commercialization process, on a regional basis. The Laboratories are working with target audiences which include such industry-related groups as architects, builders, engineers, lenders, contractors, plumbers, manufacturers, distributors; and such resource multiplers as state and local offices, library systems, and industry organizations.

The facilities which participate in this outreach effort are:

FACILITY	REGION
Brookhaven National Laboratory	Northeast
Oak Ridge National Laboratory	South
Sandia Laboratories	Southwest
Lawrence Livermore Laboratory	West
Pacific Northwest Laboratory	Northwest
Chicago Operations Office	Midwest

The **Installer Training and Education** program element provides installer training and education programs aimed at ensuring the early availability of competent solar equipment installers for the solar industry. The current emphasis is on the dissemination of an accredited correspondence course for those with skills in the air conditioning and plumbing crafts, and a program to train community college and vocational/technical instructors in solar energy systems installation.

The **Information Dissemination** program element functions to provide users and potential users of solar technologies with the most up-to-date technical and economic data relating to solar systems. Information dissemination activities are aimed at all sectors, including individuals, contractors, and lending institutions.

Workshops, Conferences, and Exhibits activities serve to promote interest in the solar technologies. They present current solar energy topics, stimulate interest, and bring together the diverse groups interested in solar technologies.

The **Program Support** element provides for effective management and direction of the overall Solar Technology Program. These activities include planning and guiding the direction of the program by anticipating needs of users, and the development of new technology that may have an early commercial impact.

The **Consumer Representation** program element provides a forum for user feedback through evaluation of Federally funded solar technology transfer programs, both ongoing and planned.

Accomplishments

Accomplishments of Prior Years:

Prior to FY 1977, the Technology Transfer System did not exist as a technology and was termed the SOLAR Technology Utilization and Information Dissemination (TUID) Branch. Its primary accomplishment was the creation of the Solar Energy Data Bank at the Technical Information Center, as mandated by the Energy Reorganization Act and the Solar Energy Development and Demonstration Act. The Branch was responsible for directing the Transportable Solar Laboratory, originally a National Science Foundation (NSF) project, which ha[illegible] visited most regions of the nation; hosting speci[illegible]

meetings of the solar energy decision makers of the future, and sponsoring workshops for architects, engineers, and contractors in the solar energy field.

The TUID Branch was primarily print and broadcast media oriented: it coordinated the production and editing of the definitive SOLAR program plan, "National Solar Energy Research, Development, and Demonstration Program" (ERDA-49); it was responsible for the production of five motion pictures promoting the feasibility of solar energy; it produced a series of pamphlets for the general public, each emphasizing a particular solar technology.

Fiscal Year 1977 Accomplishments

Emerging from this media-centered information dissemination role to that of a technology, the new STTP began to look in other directions in formulating an early impact technology delivery system.

Technology Delivery System

A structural model of the Solar Energy Technology Delivery System was designed and developed during 1977. This Delivery System functions as a program planning tool in the formulation and management of the Information Outreach Program. The model represents an important step in the development of analytical tools and strategies for a Technology Delivery System.

The model accounts for the influences, interactions, and information needs of the participants in the delivery process. It includes a critical path analysis as an aid in achieving effective technology delivery for specific solar technologies. A monitoring system also has been developed to measure the effectiveness of the delivery process. Figure 5 shows the major elements of the model. This model assists in the creation of new solar technology transfer mechanisms capable of operating in a rapidly changing environment. The STTP is conducting a review of these analytical tools and strategies along with a general review of the Federal STTP through the formation of an oversight committee consisting of consumer groups, private industry, government agencies, industrial associations, solar energy associations, and education institutions.

Performing a major function in this Technology Delivery System is the National Laboratories Regional Outreach program. Outreach programs are targeted mainly at industry-related liaison groups. This program is the only operational regionalized solar commercialization capability currently available to DOE on a nationwide basis.

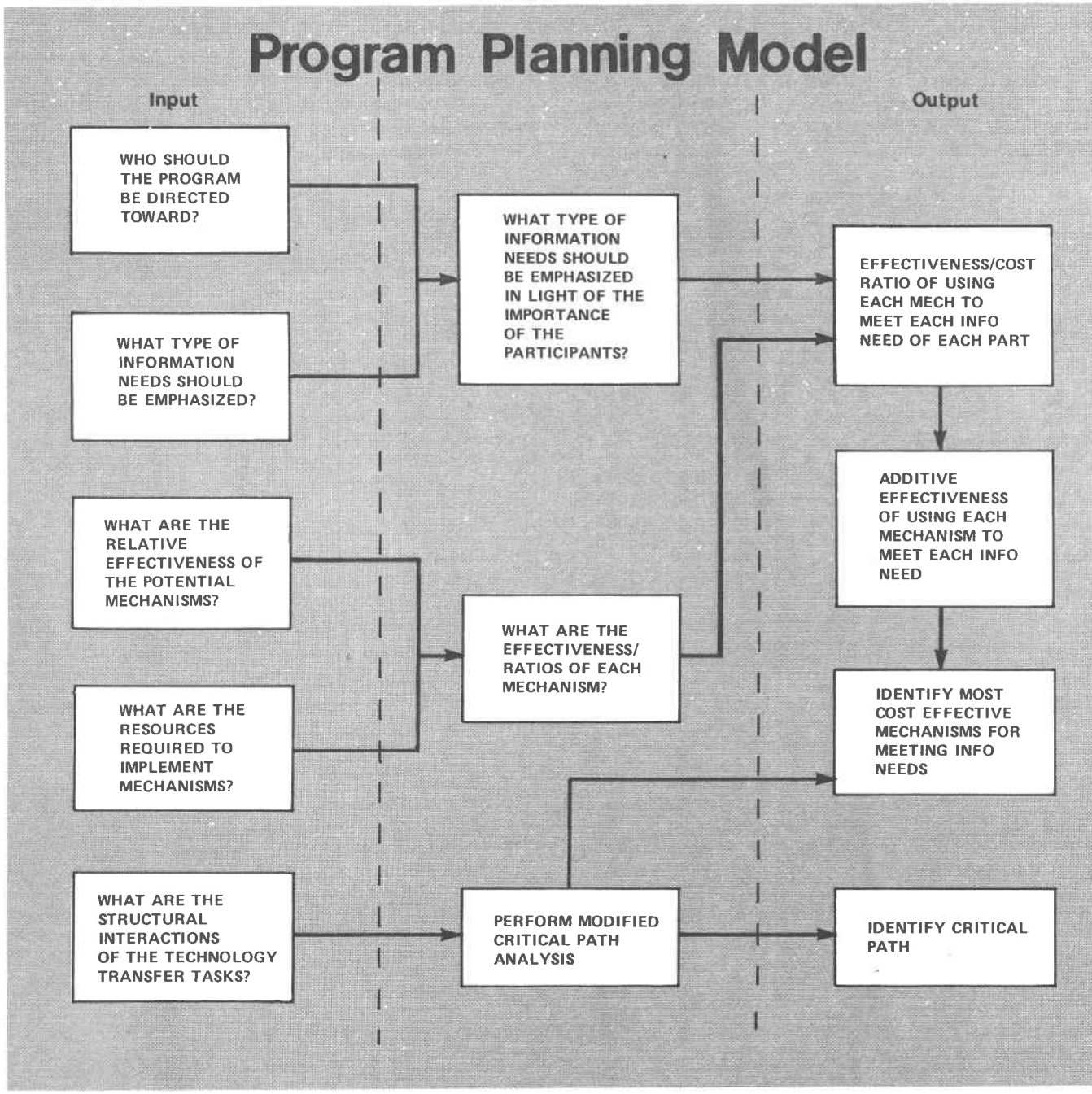
Program Planning Model
Input
Output
WHO SHOULD THE PROGRAM BE DIRECTED TOWARD?
WHAT TYPE OF INFORMATION NEEDS SHOULD BE EMPHASIZED?
WHAT ARE THE RELATIVE EFFECTIVENESS OF THE POTENTIAL MECHANISMS?
WHAT ARE THE RESOURCES REQUIRED TO IMPLEMENT MECHANISMS?
WHAT ARE THE STRUCTURAL INTERACTIONS OF THE TECHNOLOGY TRANSFER TASKS?
WHAT TYPE OF INFORMATION NEEDS SHOULD BE EMPHASIZED IN LIGHT OF THE IMPORTANCE OF THE PARTICIPANTS?
WHAT ARE THE EFFECTIVENESS/ RATIOS OF EACH MECHANISM?
PERFORM MODIFIED CRITICAL PATH ANALYSIS
EFFECTIVENESS/COST RATIO OF USING EACH MECH TO MEET EACH INFO NEED OF EACH PART
ADDITIVE EFFECTIVENESS OF USING EACH MECHANISM TO MEET EACH INFO NEED
IDENTIFY MOST COST EFFECTIVE MECHANISMS FOR MEETING INFO NEEDS
IDENTIFY CRITICAL PATH

Figure 5

Solcost

One of the four major informational needs of potential solar energy users is the economic feasibility of the solar technologies. In anticipation of these informational needs, STTP has coordinated the development of SOLCOST, a convenient, easily used tool that cost-optimizes proposed solar energy systems for space heating, cooling, and/or domestic hot water. SOLCOST, a digital computer design tool for solar energy systems, uses two national computer time-sharing networks (CDC's CYBERNET and GE's Mark III Service). This computerized information service provides a degree of standardization for the technology, lowers barriers to commercialization, provides small firms with a competitive position in relation to large firms, and provides numerous small business opportunities in the growing solar energy field.

Installer Training and Education

The STTP has been responsible for the development and distribution of an accredited correspondence course to train heating, air conditioning, and plumbing technicians in the required skills for installation, operation, and maintenance of solar systems.

In addition, the program office has begun work to develop a solar-related curriculum for elementary and high schools.

Plans

Figure 6—Solar Technology Transfer Program Key Activities—illustrates STTP's continuing efforts toward meeting its early impact objectives. Future program plans include expanding the National Laboratories Outreach activities, implementing the Technology Transfer and Delivery System developed specifically for the program; and, in general, broadening all activities within program elements, such as selecting a consortium of community colleges to develop and to disseminate instructor training procedures and curriculum materials.

The STTP will employ all the services of the Solar Energy Research Institute (SERI) as a resource for technical support. This coordinated effort will also be established with the four Regional Solar Energy Centers, using their services as multipliers in the outreach-to-industry effort. A cooperative relationship is planned with state energy offices, as well as with state legislative offices, to develop incentives for use of solar technology.

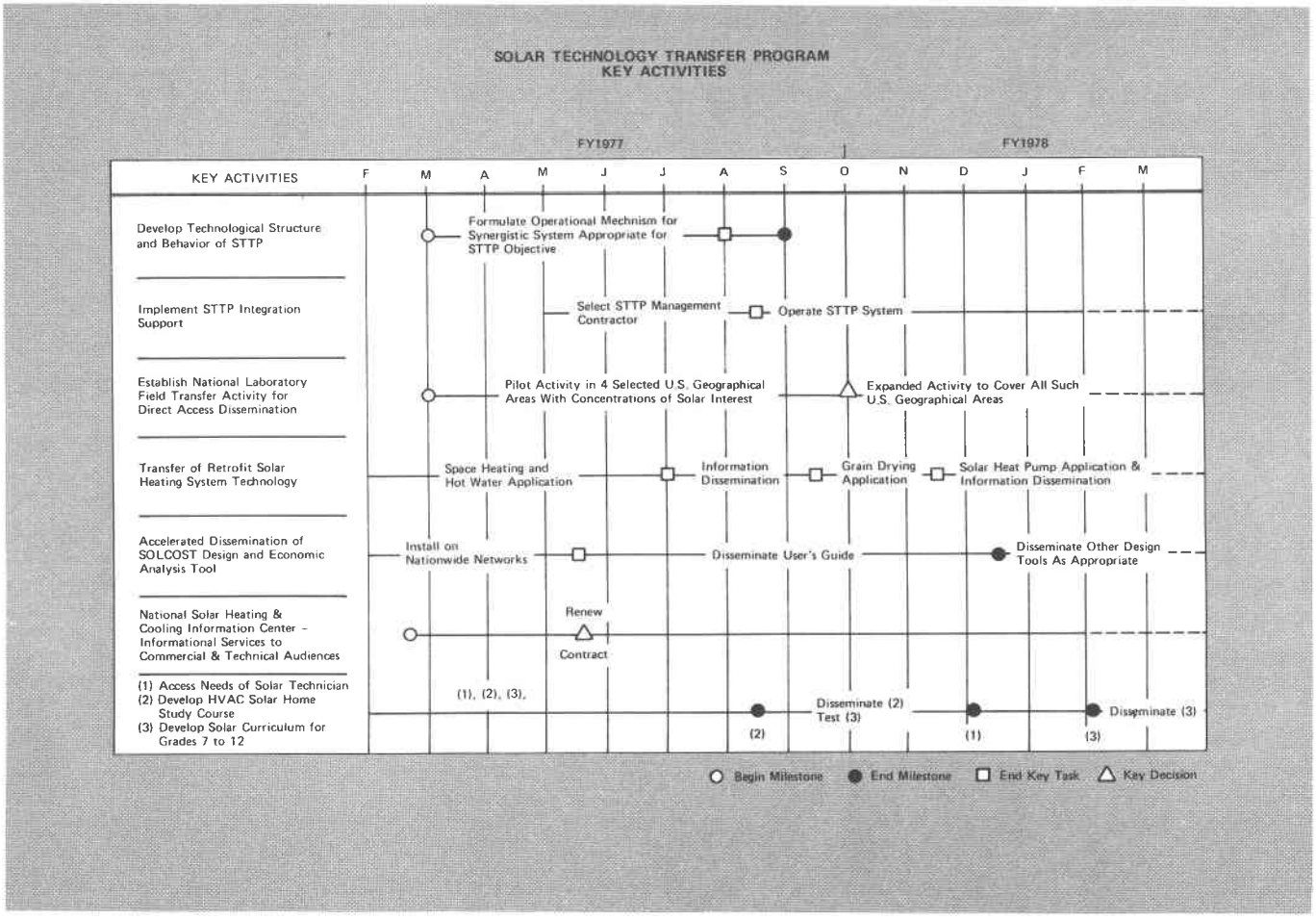
SOLAR TECHNOLOGY TRANSFER PROGRAM
KEY ACTIVITIES
FY1977
FY1978
KEY ACTIVITIES
F M A M J J A S O N D J F M
Develop Technological Structure and Behavior of STTP
Formulate Operational Mechnism for Synergistic System Appropriate for STTP Objective
Implement STTP Integration Support
Select STTP Management Contractor
Operate STTP System
Establish National Laboratory Field Transfer Activity for Direct Access Dissemination
Pilot Activity in 4 Selected U.S. Geographical Areas With Concentrations of Solar Interest
Expanded Activity to Cover All Such U.S. Geographical Areas
Transfer of Retrofit Solar Heating System Technology
Space Heating and Hot Water Application
Information Dissemination
Grain Drying Application
Solar Heat Pump Application & Information Dissemination
Accelerated Dissemination of SOLCOST Design and Economic Analysis Tool
Install on Nationwide Networks
Disseminate User's Guide
Disseminate Other Design Tools As Appropriate
National Solar Heating & Cooling Information Center - Informational Services to Commercial & Technical Audiences
Renew
Contract
(1) Access Needs of Solar Technician
(2) Develop HVAC Solar Home Study Course
(3) Develop Solar Curriculum for Grades 7 to 12
(1), (2), (3),
Disseminate (2) Test (3)
Disseminate (3)
(2)
(1)
(3)
Begin Milestone
End Milestone
End Key Task
Key Decision

Figure 6

The Organizational and Functional Responsibilities of the Program

The STTP is centrally managed at the DOE SOLAR headquarters in Washington. The STTP headquarters is establishing and operating the system on a regionalized basis. Program implementation is decentralized to the network of national labs and the Chicago Operations Office. SERI will play an important technical support role. The Energy Extension Service (EES), to be implemented on a state-by-state basis, will establish localized channels for communication and feedback.

The STTP employs the services of two major contractors with programmatic responsibilities. One contractor, Mitre/Metrek, is responsible for the operational system design. Its functional responsibilities include:

- Developing a structural model of the Solar Technology Transfer and Delivery System that will be used as a program planning tool in the formulation and management of effective information outreach programs directed toward the commercialization of five early impact technologies;
- Developing a monitoring system for evaluating program efficiency and effectiveness;
- Coordinating oversight committee advisory activities whose tasks include the review of program analytic tools and strategies, and the general review of Federal solar technology transfer efforts; and
- Preparation of a report containing the details of the oversight committee review of Federal solar technology transfer programs.

The second contractor employed by STTP for programmatic responsibilities is International Business Services. This corporation is responsible for system integration. Its specific programmatic responsibilities involve:

- Integrating and coordinating outreach planning and implementation for the five early impact technologies using a structural model of technology transfer and delivery system, as well as a strategy for monitoring system efficiency and effectiveness;
- Maintaining baseline files for the participants, principal decision makers, and multipliers comprising the system;
- Coordinating all STTP activities;
- Consumer representation planning;
- Preparing selected information packages.

The STTP headquarters organization is presented in Figure 7. Program management of the National Solar Heating and Cooling Information Center refers to those activities of the center which are directly tasked by SOLAR.

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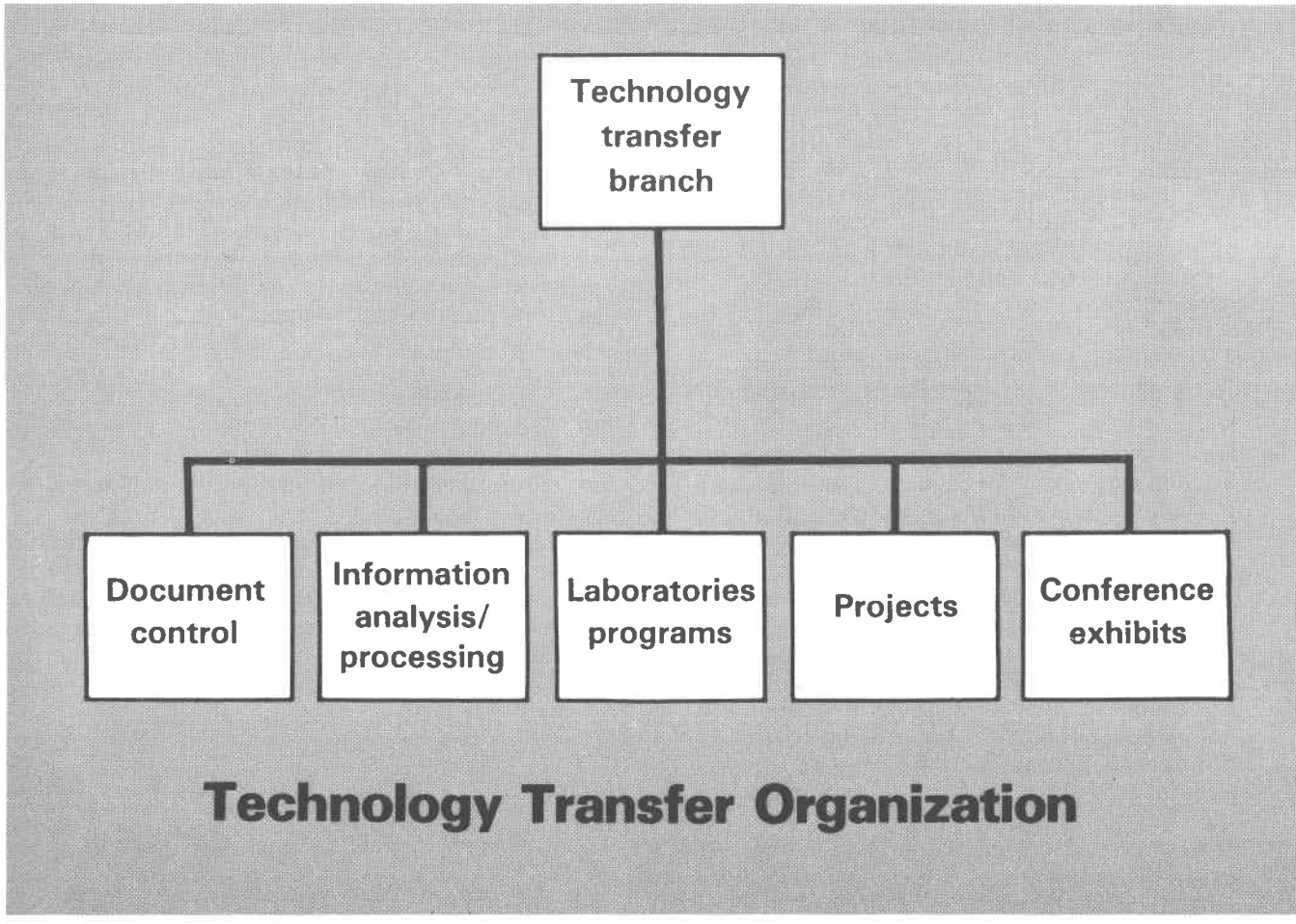
Technology transfer branch
Document control
Information analysis/ processing
Laboratories programs
Projects
Conference exhibits
Technology Transfer Organization

Figure 7

Table 1
FY 1977 Summary Tables
Program Element
National Laboratories Regional Outreach

Organization	Title	Projected Contribution
Sandia Laboratories	Solar Energy Technology Transfer in the Southwest (NM, COLO)	Identifies organizations most suited to accelerate commercial development of solar technology.
Lawrence Livermore Laboratory[1]	Solar Technology Transfer in the West	Accelerates dissemination of technical information to industrial and professional organizations, and state and local governments.
Battelle-Pacific Northwest Laboratories[2]	Solar Technology Transfer for the Pacific Northwest	Implements regional technology transfer delivery program on a regional basis.
Oak Ridge National Laboratories[3]	Solar Technology Transfer in the South	Implements regional technology transfer delivery program on a regional basis.
Brookhaven National Laboratories[4]	Solar Technology Transfer Program in the Northeast	Implements regional technology transfer delivery program on a regional basis.

[1]California, Nevada, Arizona, Hawaii.
[2]Washington, Oregon, Idaho, Montana, Utah, North Dakota, South Dakotal Alaska.
[3]Virginia, North Carolina, South Carolina, Kentucky, West Virginia, Tennessee, Texas, Arkansas, Alabama, Florida, Georgia, Mississippi, Louisiana.
[4]New Hampshire, Vermont, Maine, New York, New Jersey, Massachusetts, Rhode Island, Maryland, Delaware, District of Columbia, Pennsylvania.

Table 2
FY 1977 Summary Tables
Program Element
Installer Training and Education

Organization	Title	Projected Contribution
Navarro Community College	Assessment of Need for Developing and Implementing Technical and Skilled Worker Training for the Solar Energy Industry	Develops information required in the design of a solar technician curriculum.
State University of New York at Albany	Development, Pilot Testing and Infusion of Solar Energy Related Curriculum Materials into Secondary School Programs (Grades 6-12)	Provides curriculum materials for introduction of solar energy concepts at the secondary and high school levels.
Sheet Metal and Air Conditioning Contractors' National Association, Inc.	An Independent Study Program for Installation and Operation of Solar Space Heating and Cooling and Domestic Water Heating for Residential Structures	Develops an accredited home study course in the installation and maintenance of solar heating and cooling equipment for technicians with skills in the air conditioning and plumbing crafts.

Table 3
FY 1977 Summary Tables
Program Element
Information Dissemination

Organization	Title	Projected Contribution
DOE Technical Information Center	Reporting and Disseminating Technical Information	Disseminates information resulting from DOE funded energy projects. Support to the Solar Technology Transfer Program regional outreach activity.
Norman Hodges and Associates	Development of a Rapid Response Solar Technology System and Implementation within the Minority Community	Provides for widespread dissemination of solar information to the minority community.
McGraw-Hill Information Systems, Co.	Indexing, Classifying, and Dissemination of Solar Information in Sweet's Catalog	Disseminates solar technical information through established medium.
Franklin Institute	Solar Heating and Cooling Information Dissemination	Integrates efforts of DOE and Department of Housing and Urban Development in disseminating solar information

Table 4
FY 1977 Summary Tables
Program Element
Workshops, Conferences, and Exhibits

Organization	Title	Projected Contribution
Franklin Institute	Solar Conference Exhibits-Scheduling, Constructing, Transporting, and Maintenance	Provides exhibits for display which will facilitate informing the public as well as technical audiences on the DOE solar research and development programs.
Office of Public Affairs Department of Energy	Solar Conference Exhibits-Scheduling, Constructing, Transporting, and Maintenance	Provides exhibits for display which will facilitate informing the public as well as technical audiences on the DOE solar research and development programs.
International Business Services, Inc.	Solar Technology Transfer Workshop I	Provides forum for planned technology transfer activities for national laboratories personnel.
University of Delaware	Conference on Sharing the Sun	Disseminates solar data through technical working meetings.
DOE Pittsburgh Energy Research Center	Carnegie-Mellon University Solar Symposium	Provides for citizen participation in energy related matters.
International Solar Energy Society	1977 International Solar Energy Society Meeting (American Section)	Provides channel of communication with professional society membership.

Organization	Title	Projected Contribution
Interuniversity Communication Council	Background Analysis of Extension Services	Provides review and analysis of Federal and state energy extension programs.
University of Miami	Preparation, Execution and Evaluation of Conference "Alternative Energy Sources—A National Symposium"	Conducts national symposium and evaluation of its effect in the technology transfer process.
University of Michigan	Midwest Solar Energy Conference at the University of Michigan	Conducted outreach effort aimed at manufacturers, engineers, and architects.
International Business Services, Inc.	Development of Exhibits	Provides for SOLCOST exhibits for use at conferences.
Oak Ridge Associated Universities	Solar Conference Exhibits	Provides for solar exhibits for use at conferences.
Division of Solar Technology, Public Affairs Office	Solar Conference Exhibits	Provides for solar heating and cooling exhibits for use at conferences.
Northwest College and University Association for Science	Showing of the Solar Conference Exhibit	Provided for display of solar exhibits.
U.S. Department of Agriculture	Retrofit Test of the General Electric Solar Air Source Unit	Provides for testing and monitoring of solar equipment applied to an existing residential structure and to exhibit applicability of solair source unit for agricultural applications.
Franklin Institute	Solar Conference Exhibits	Provides for solar heating and cooling exhibits for use at conferences.

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Table 5
FY 1977 Summary Tables
Program Element
Program Support

Organization	Title	Projected Contribution
International Business Services, Inc.	Implementation of a Solar Energy Technology Transfer System in Support of Early Impact Objectives	Provides for accelerating use of SOLCOST services and other computer aides for the residential and commercial industries.
International Business Services, Inc.	Solcost Information Dissemination	Introduces SOLCOST to broad segments of population through user oriented documents and display materials.
Solar Environmental Engineering Company	SOLCOST Technical Support	Serves as the center for SOLCOST services to individuals and organizations.
Solar Engineering Publishers, Inc.	Development of a List of Titles and Manufacturers	Provides indexing of solar equipment manufacturers and products.
OAO Corporation	Development of Formatted Responses and Processing Assistance	Provides for rapid response to solar energy inquiries.
MITRE Corporation (METREK Division)	Analytic Tools and Strategies for Solar Energy Technology Transfer	Provides procedures for effective technology transfer process; models the technology transfer delivery system; provides management of the delivery process.
International Business Services, Inc.	Solar Technology Transfer Program	Defines activities required for acceleration of solar Technology Transfer.

Table 6
FY 1977 Summary Tables
Program Element
Consumer Representation

Organization	Title	Projected Contribution
Brookhaven National Lab	New England Electric Task Force	Reviews New England Electric Solar Hot Water Experiment; Provides consumer protection guidelines for HUD hot water initiative.
MITRE Corporation (METRE Division)	Committee Assessing Federally Funded Solar Technology Transfer Activities	Provides independent evaluation of the federally funded solar technology transfer programs, ongoing and planned.

Solar Technology Transfer Program
National Laboratories and Regional Outreach Program Element

Title	Organization
Solar Energy Technology Transfer Project	Sandia Laboratories Albuquerque, NM
Amount $235,000	**Principal Investigator** R.P. Stramberg/A. Norath

Work Location	Duration-Award Date		Contract No.
Albuquerque, NM	open	28 February 1977	S-189-77-16

Project Summary:

This project's objective is to provide for the early impact and use of solar technology through the dissemination of technical information to amplifier/multiplier groups and hands-on training to users of solar technology in the southwest. The objective will be accomplished by:

a. Seeking organizations which can transform solar technology into commercial practice, and supplying them with appropriate hardware and/or information. These groups, known as multiplier groups, may be trade associations, professional groups, trade unions, and other organizations.
b. Supplying selected technology to those amplifier/multiplier groups best suited to the rapid transfer of a commercial capability, with emphasis on early-impact technology. A continuing program will be implemented to help accelerate long-term options.
c. Providing feedback to the Office of Conservation and Solar Applications program management about suggested changes in program emphasis based on needs identified in outreach efforts.
d. Designing and constructing specialized equipment for rapid use by industry. Selective plating processes and reflectance measurement equipment will be constructed and made available to small manufacturers so they can evaluate their products in terms of new, specialized requirements for solar components.
e. Forming joint programs of information exchange between Sandia Laboratories and regional, state, and local organizations.
f. Offering support services to industries interested in early-impact solar technologies.

Title	Organization
Solar Technology Transfer Assistance Program	Lawrence Livermore Laboratory University of California Livermore, CA
Amount $145,000	**Principal Investigator** R.C. Maninger

Work Location	Duration-Award Date		Contract No.
Livermore, CA	open	1 January 1977	S-189-77-7

Project Summary:

The objective of this program is to provide for early impact and use of solar technology through the dissemination of technical information to amplifier/multiplier groups and hands-on training to users of solar technology in the western region of the U.S. The Lawrence Livermore Laboratory Technology Transfer Group is responsible for:

a. Disseminating solar energy information to multiplier groups consisting of industrial and professional organizations, and regional, state, and local energy offices. It will be the responsibility of the Technology Transfer Group to make field visits to the multiplier groups, do follow-up work at the Laboratory, and locate additional sources of information.
b. Initiating a solar technology training program aimed at users, suppliers, financiers, and regulators. This program will feature concentrated, short courses and emphasize practical, hands-on training.
c. Supplying selected technology to amplifier/multiplier groups best suited to the rapid transfer of a commercial capability, with emphasis on early-impact technology. A continuing program will be implemented to help accelerate long-term options.
d. Providing feedback to the Division of Solar Technology (DST) program management about suggested changes in program emphasis based on needs identified in outreach efforts.

Title		Organization	
Solar Technology Transfer for the Pacific Northwest		Battelle Pacific Northwest Laboratory (PNL)	
Amount		**Principal Investigator**	
$170,000		H.L. Parry/E.V. Werry	
Work Location	**Duration-Award Date**		**Contract No.**
Rockland, WA	open	February, 1977	S-189-77-23

Project Summary:

The objective of this program is to provide for early impact and use of solar technology through the dissemination of technical information to amplifier/multiplier groups and hands-on training to users of solar technology in the Pacific Northwest. Pacific Northwest Laboratory's (PNL) responsibilities include:

a. Searching for groups in the Pacific Northwest with problems that could be solved by solar technology. Participating groups will represent state or regional education associations, state energy agencies, public housing authorities, planning officials, homebuilders, consulting engineers, food processors, apartment owners, bankers, manufacturers, and industries requiring large quantities of low-grade heat or hot water. Discussions will be held with those who currently own solar systems in the Pacific Northwest to determine the applicability of their systems to other users in the area. Government sponsored programs will be reviewed to determine their applicability to Northwest users.
b. Conducting a review to find both the appropriate solar technology that can solve the problems identified and the organizations that can help supply these technologies. This review will include solar heating and cooling systems, process heating and light manufacturing applications, solar designs for retrofit applications, and solar energy conservation systems.
c. Selecting from the many problems identified by the contact groups specific solar projects for in-depth development and implementation.
d. Adapting solar technology to these specific projects. Technical questions involving energy

loads, materials, orientation, weather characteristics, and type of solar components will be considered. Local zoning and building codes, financial policies of lending institutions, and economic factors such as life-cycle cost analysis, alternative fuel pricing, and legislated incentives for solar or conservation investments will be assessed. An information package will be prepared by the PNL team for each of the projects selected. Adaptations of solar technology will be carefully documented so future users can insert their own parameters and apply these technologies to their own needs and circumstances.

e. Presenting information to the public through lectures, library presentations, news releases, and consultations.

Title	Organization
Solar Technology Transfer In The South	Oak Ridge National Laboratory P.O. Box X Oak Ridge, TN 37830
Amount $220,000	**Principal Investigator** S.I. Kaplan

Work Location	Duration-Award Date		Contract No.
Southern United States	open	March, 1977	S-189-77-1

Project Summary:

The program's objectives are to maximize the use of existing information and organizations and to transfer information in appropriate forms to end users; to provide a mechanism where appropriate for direct access to solar technologies in DOE and to the public; to monitor and audit the information transfer system to determine its success; and to demonstrate technology transfer, first in Tennessee [using the University of Tennessee (UT), Tennessee Valley Authority (TVA) Solar House as a program-to-public interface] and later throughout the South.

The purpose of this project is to plan and implement the transfer of information in the Solar Energy Research and Development Program so that prospective users in the southern states will be able to make decisions about ways to use solar energy. One objective of the project is to establish the Oak Ridge National Laboratory (ORNL) as the agency through which the transfer is made to those organizations which act as agents in the South. (This would include at least Virginia, the Carolinas, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Texas, and Arkansas.) These agents include state energy offices, state Departments of Education, University extension systems, technical societies, consumer organizations, industry groups, architects and engineering consultants, and the local offices of government agenices. Each of these organizations is a route or transfer agent to particular user groups.

Project strategy includes developing ORNL's access to existing information and technical expertise, developing relations with each of the transfer agents, implementing the flow of information to and from agents and the end users, and evaluating the entire operation for effectiveness. Workshops and information meetings will be held.

Specific project tasks include:

a. Selecting a management team of solar technologists and information experts;
b. Making arrangements with each information source (DOE Technical Information Center, RECON, and Solar Heating and Cooling Information Center) and organizing the transfer of information from the source to the transfer agents and users;
c. Developing relations with and a plan for working

with each transfer agent. This includes visiting and developing memoranda of understanding with Federal, state, and local agencies and contacting industry, technical societies, architects, consumer organizations, and others;

d. Organizing workshops and information meetings to introduce and explain the program to the participating agencies and user organizations;
e. Working with the Information Officer in the Oak Ridge Operations Office to develop information releases in the news media that will inform the public about the technology transfer system and their access to it;
f. Continuing to implement the program, providing feedback and redesign, as needed.

Items, a. through f. will be implemented over a 2-year period. The program will be tested in Tennessee before being extended to other states. Exhibits will be held in DOE-UT-TVA solar and conservation homes to publicize the Technology Transfer Program and provide literature about how to use the program.

Title		Organization	
Solar Technology Transfer Program In The Northeast		Brookhaven National Laboratory	
Amount		**Principal Investigator**	
$120,000		W. Graves	
Work Location	**Duration-Award Date**		**Contract No.**
Northeast United States	open	February, 1977	S-189-77-14

Project Summary:

The objective is to provide for early impact and use of solar technology through the dissemination of technical information to amplifier/multiplier groups and hands-on training to users of solar technology in the eastern region of the U.S.

The purpose is to provide contractors with detailed technical support in the design and construction of solar energy housing in the New England area. Licensed HVAC engineers and architects will work directly with builders and subcontractors to:

a. Assist architects, engineers, and industry in the design, construction, and sale of solar heating units
b. Assess and report on the performance of existing systems
c. Accelerate the mass marketing of solar heating systems in the region, aiming for maximum market penetration in new housing by 1980

The approach of this program is to establish a program office with members from Brookhaven National Laboratory in order to provide detailed technical support in the design and construction of new and retrofit projects. This program employs the contractor/builder as the means for delivering current technology. This strategy draws upon the contractor/builder's physical resources, close association with the user market and the private sector, and access to private investment capital.

Solar Technology Transfer Program Installer Training and Education Program Element

Title	Organization
Assessment of Need for Developing and Implementing Technical and Skilled Worker Training for the Solar Energy Industry	Navarro Community College
Amount	**Principal Investigator**
$234,135	C. Paul Green

Work Location	Duration-Award Date	Contract No.
Corsicana, TX	12 mo. 27 October 1976	EG-77-S-04-3869

Project Summary:

The objective of this project was to obtain the information needed to design a solar technician curriculum. The contractor conducted a survey of solar heating and cooling systems equipment, reviewed existing consumer demand studies to forecast manpower requirements, and conducted a skills study to determine the type of curriculum required to produce training technicians.

Title	Organization
Development, Pilot Testing, and Infusion of Solar Energy-Related Curriculum Materials into Secondary School Programs	State University of New York at Albany
Amount	**Principal Investigator**
$110,027	Thomas Boehm

Work Location	Duration-Award Date	Contract No.
Albany, NY	16 mo. 21 March 1977	EA-02-03/57-70-91

Project Summary:

The objective of the program is to develop curriculum materials to be used in junior and senior high school science classes. The project is divided into three phases.

In the initial phase, three 1-week workshops were held during the summer of 1977 for 81 science teachers from New York State. The workshops provided the teachers with background information on solar energy, and the teachers began to develop curriculum materials. Later in the summer, the curriculum writing committee completed the first draft of the curriculum.

The second phase involves testing the curriculum by the project participants in their science classes. To refine the curriculum, two 2-day feedback sessions are to be conducted during the school year. The writing committee will then evaluate and revise the curriculum. The materials should be completed and ready to use by the 1978 school year.

The third and final phase will disseminate the curriculum to schools throughout the nation.

Title	Organization
An Independent Study Program for Installation and Operation of Solar Space Heating and Cooling and Domestic Water Heating for Residential Structures	Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA)
Amount	**Principal Investigator**
$60,362	Buddy Mawyer

Work Location	Duration-Award Date	Contract No.
McLean, VA	6 1/2 mo. 1 April 1977	EA-02-03/57-79-01

Project Summary:

SMACNA, in cooperation with the Home Study Institute, a division of the North American Heating and Air Conditioning Wholesalers Association, has developed an independent home study program. The program is based on the Solar technician curriculum developed by Colorado State University.

The objective of the course is to inform individuals, with previous experience in the heating and cooling industry, of solar system installation and operation. Diplomas and certification will be given to those who successfully complete the program.

The program which is accredited by the Home Study Institute, costs approximately $100.00. Enrollment for this course will begin during February-March, 1978.

Solar Technology Transfer Program Information Dissemination Program Element

Title	Organization
Reporting and Disseminating Technical Information	United States Department of Energy Technical Information Center
Amount	**Principal Investigator**
$300,000	Phil Rosser

Work Location	Duration-Award Date	Contract No.
Oak Ridge, TN	open	N/A

Project Summary:

The objective here is to make the information generated through solar energy research, development, and demonstration activities accessible to various sectors. Information from solar energy programs carried out with DOE support is used by Government program managers, other organizations' staffs performing related work, potential state and local Government users, private sector industries, professional societies, and educational institutions. This task entails the collection of all solar scientific and technical information developed through the support of DOE. The information gathered includes reports, conference papers and proceedings, journal articles, books, theses, and translations. All of the information is printed and/or disseminated by the Technical Information Center and is made a part of the information data base. The information is then disseminated within DOE and contractors, and is made accessible to the general public when suitable.

Title	Organization
Development of a Rapid Response Solar Technology System and Implementation Within the Minority Community	Norman Hodges and Associates Energy Research Group 666 11th Street, N.W. Washington, D.C. 20001
Amount	**Principal Investigator**
$102,000	Mr. George A. Kilpatrick

Work Location	Duration-Award Date		Contract No.
Washington, D.C.	6 mo.	September, 1977	EG-77-01-4067

Project Summary:

The objective of this project is to advance the widespread use of solar energy as an alternative energy supply. This task requires the development and implementation of a rapid response technology transfer and diffusion system, aimed at the minority community and tailored for the early impact requirements of the DOE Solar Technology Transfer Program. Particular emphasis is given to the processing and rapid dissemination of solar information which can serve the needs of business and multiplier organizations in the minority community.

Title	Organization
Indexing, Classifying, and Dissemination of Solar Information in Sweet's Catalog	McGraw Hill Information Systems Co. 8728 Colesville Road Silver Spring, MD 20910
Amount $9,892	**Principal Investigator** Jean Olson

Work Location	Duration-Award Date	Contract No.
Silver Spring, MD	N/A 18 July 1977	EG 77-X-01-4020

Project Summary:

The objective here is to disseminate information to engineers, architects, general contractors, building owners, and other professionals involved with the design, construction, and maintenance of buildings.

To accomplish this task, McGraw Hill Information Systems Company will index and classify DOE solar heating and cooling systems information in the following: (1) Sweet's Mechanical Consulting Engineering Catalog File; (2) Sweet's General Building Catalog File; and (3) Sweet's Light Residential Catalog File.

Title	Organization
Solar Heating and Cooling Information Dissemination	Franklin Institute 20th & Race Streets Philadelphia, PA 19103
Amount $120,000	**Principal Investigator** Mr. Jeremy Lifsey

Work Location	Duration-Award Date	Contract No.
Philadelphia, PA	open	E (49-26)-1020

Project Summary:

The Department of Housing and Urban Development (HUD) in cooperation with the DOE funds the National Solar Heating and Cooling Information Center, which is operated by the Franklin Research Institute.

The objective of this information center is to increase awareness of the feasibility of solar energy and to encourage the public and industry to consider solar energy systems for homes and commercial buildings.

The Franklin Research Institute conducted a conference in support of the Commercial Demonstration Program. A follow-up evaluation of the conference and workshop is also being provided by Franklin.

A third phase of this contract calls for a model of a commercial solar heated structure equipped with a working solar system; and four modular displays to be provided by Franklin for use as a traveling exhibit.

Solar Technology Transfer Program Workshops, Conferences, and Exhibits Program Element

Title	Organization
Solar Conference Exhibits-Scheduling, Constructing, Transportation, and Maintenance	Franklin Institute Philadelphia, PA
Amount	**Principal Investigator**
$40,000	Jeremy Lifsey
Work Location / **Duration-Award Date**	**Contract No.**
Germantown, MD / 12 months	

Project Summary:

The objective of this project is to provide the general public and technical audiences with displays informing them of DOE solar research and development programs.

Plans have been made for five new exhibits. Four exhibits are of the backdrop type and are 10 x 10 in dimensions. The fifth exhibit is a desk sized, architect type model of the General Service Administration's new Saginaw, Michigan, facility. This facility was equipped with a solar heating and cooling system as part of the DOE Commercial Demonstration Program. The exhibit contains a miniature working solar heating system.

Solar heating and cooling is the subject of these new exhibits. They are intended to support the programmatic requirements of the Office of Conservation and Solar Applications to introduce solar heating and cooling into national use at the earliest possible date.

Title	Organization
Solar Conference Exhibits-Scheduling, Constructing, Transporting, and Maintenance	Exhibit Branch, Office of Public Affairs (OPA) U.S. Department of Energy
Amount	**Principal Investigator**
$60,000	John Bradburne (DOE-OPA)
Work Location / **Duration-Award Date**	**Contract No.**
Germantown, MD / 12 months	

Project Summary:

The objective of this project is to provide the general public and technical audiences with displays informing them of DOE solar research and development programs.

A 10 x 20 conference exhibit has been added to the existing exhibit inventory. Solar exhibits appeared at many of the outstanding trade shows, conferences, workshops, and seminars held in FY 1977.

Title	Organization
Solar Technology Transfer Workshop I	International Business Services, Inc. 1010 Vermont Avenue, N.W. Washington, D.C. 20005 (202) 628-1470
Amount	**Principal Investigator** C. Hansen
Work Location Washington, D.C.	**Duration-Award Date** **Contract No.**

Project Summary:

This workshop's objective is to introduce representatives from the national laboratories and to stimulate idea exchange. The DOE Solar Technology Transfer Program is contracting with national laboratories to serve as the operational agents in the synergistic process. The laboratories would then work with the user/industry organizations to stimulate the transfer of solar technology.

The program approach entails a workshop designed to sensitize the laboratory teams to options in solar technology transfer, practical procedures, methods, and priorities in a synergistic system for technology transfer. In addition, the workshop was designed to identify and enumerate possible courses of action, and to develop specific plans for technology transfer which stress innovative approaches that meet the requirements of the solar technology transfer strategy for early impact.

A report was produced containing the syntheses of some of the ideas which were generated and discussed at the workshop.

Title	Organization
Conference on Sharing the Sun	University of Delaware
Amount $15,000	**Principal Investigator** E.A. Trabant
Work Location Winniped, CA	**Duration-Award Date** 5 days 15 August 1976 **Contract No.** E(49-21)1030

Project Summary:

The objective of this project, "Conference on Sharing the Sun—Solar Technology in the Seventies," was to disseminate technical data to those working in the field, and to provide interested parties with an overview of the progress in the broad spectrum of solar technology and application.

To accomplish this objective, the conference conducted a series of technical sessions reviewing the activities in the solar energy field.

Title	Organization
Carnegie-Mellon University Solar Symposium	DOE Pittsburgh Energy Research Center Pittsburgh, PA
Amount $2,500	**Principal Investigator** I. Wenfor

Work Location	Duration-Award Date	Contract No.
Pittsburgh, PA	2 days 1 June 1977	G 22 77 2601

Project Summary:

The objective of this solar-symposium, held June 1 and 2, 1977, at Carnegie-Mellon University, was to bring inter-government relationships into focus, to provide citizen participation in the solar energy field, and to relate the current level of development of solar energy technology to the requirements of the Pittsburgh area.

These funds were transferred to the Pittsburgh Energy Research Center Information Financial plan to provide ERDA support to the solar-symposium.

Title	Organization
1977 International Solar Energy Society (American Section) Annual Meeting, June 6-10, 1977.	International Solar Energy Society (American Section)
Amount $20,000	**Principal Investigator** Charles D. Beach

Work Location	Duration-Award Date	Contract No.
Florida Solar Energy Center Cape Canaveral, FL	6 June 1977 to 6 December 1977	EG 77-G-05-5526

Project Summary:

This award provided funds to plan, carry out, and evaluate the annual meeting of the International Solar Energy Society, held June 6-10, 1977. The Society will provide the Solar Technology Transfer Branch with two hundred sets of the conference proceedings and with a follow-up evaluation of the conference's effectiveness with six months of the date of the meeting.

Title	Organization
Background Analysis of Extension Services	Interuniversity Communication Council
Amount	**Principal Investigator**
$15,676	

Work Location	Duration-Award Date	Contract No.
Princeton, NJ	3 mo. 28 February 1977	EG 77-C-01-4036

Project Summary:

The objective of this project was the commissioning of EDUCOM to analyze and to review Federal and State technological extension programs for the purpose of identifying specific policies, procedures, and practices, that lead to success or failure.

To accomplish this objective, a report was prepared which covered the areas of past experience. A briefing was conducted by the Project Director for selected DOE personnel. The Project Director and DOE personnel then planned and organized a briefing for selected personnel from other Federal agencies. The Project Director attended a meeting of state energy extension personnel in Washington, D.C., to report results of the analysis.

Title	Organization
Preparation, Execution, and Evaluation of Conference: "Alternative Energy Sources, A National Symposium."	Clean Energy Research Institute, University of Miami
Amount	**Principal Investigator**
$18,556*	Dr. T. Nejat Veziroglu

Work Location	Duration-Award Date	Contract No.
Coral Gables, FL	11 mo. 1 May 1977	EG 77-G-05-5569

Project Summary:

The objective of this conference, "Alternative Energy Sources, a National Symposium," has been to inform scientists, engineers, and policy makers, in technical sessions, of recent and anticipated technical advances in solar and other energy fields.

To accomplish this objective, the award has provided funds to plan, carry out, and evaluate this conference held December 4-7, 1977, in Miami Beach, Florida. The Clean Energy Research Institute shall provide the Solar Technology Transfer Branch with two hundred copies of the conference proceedings and an evaluation of the conference.

Title	Organization
Midwest Solar Energy Conference at the University of Michigan	University of Michigan
Amount	**Principal Investigator**
$7,000	
Work Location	**Duration-Award Date** / **Contract No.**
	24 May 1977 / EG 77-C-02-4360

Project Summary:

A major objective of this project was to generate increased manufacturing interest and design activity in the production of components, materials, and systems for solar energy application. Attendees included specialists in manufacturing, engineering, and architecture.

To accomplish this objective, the award provided funds to plan, carry out, and evaluate the conference held May 24, 1977, at the University of Michigan. The University of Michigan will deliver the conference brochure, copies of papers presented, and the summary report of the conference.

Title	Organization
Solar Conference Exhibit	Oak Ridge Associated Universities
Amount	**Principal Investigator**
$15,000	R.J. Hart
Work Location	**Duration-Award Date** / **Contract No.**
Oak Ridge, TN	open 26 April 1977 / S189

Project Summary:

The objective for displaying the conference exhibit, built by Design and Productions Inc., under the direction of Oak Ridge Associated Universities (ORAU), is to increase awareness of the problems and potentials of solar energy technologies.

In order to achieve this objective, ORAU displays the exhibit at conferences attended by professionals, business, civic leaders, and other target audiences. A promotional brochure and other materials were also designed for the exhibit for distribution by ORAU.

After each show, a report outlining attendance, audience reception of the exhibit, and volume of the distributed literature is submitted by ORAU.

Title	Organization
Showing of the Solar Conference Exhibit	Northwest College & University Association for Science (NORCUS) 100 Sprout Road Richland, WA 99352
Amount $9,000	**Principal Investigator** Dr. Bryan Vallett

Work Location	Duration-Award Date	Contract No.
Varied	open 1 October 1976	EY-77-C-06-1011

Project Summary:

The Northwest College and University Association for Science (NORCUS) was responsible for managing and showing the Solar Conference exhibit for the U.S. Department of Energy. The exhibit was shown in two cities: Dallas, Texas and Portland, Oregon.

Title	Organization
Retrofit Test of the General Electric Solar Source Unit	U.S. Department of Agriculture
Amount $65,986	**Principal Investigator** Mr. Walter A. Gumthorp

Work Location	Duration-Award Date	Contract No.
varied	open 3 December 1976	EX-77-A-29-1068

Project Summary:

The objective of this project is twofold: (1) to further the development of SOLAIRSOURCE, a potentially low-cost solar forced air heating system developed by the General Electric Company under an ERDA contract, and (2) to disseminate information about SOLAIRSOURCE performance to the public with the aim of stimulating industrial and agricultural interest in the SOLAIRSOURCE concept and thereby accelerating the transfer of this technology.

To further SOLAIRSOURCE development, the Technology Transfer Branch of ERDA and the Rural Development Service of the U.S. Department of Agriculture jointly sponsored field performance tests of two SOLAIRSOURCE units under varying climatic conditions through 1977 and into 1978. Field tests have been conducted by Arizona State University at Phoenix, Arizona, and by South Dakota University at Brookings, South Dakota. The unit at Brookings is to be used in residential space heating; because of the relatively mild climate in Arizona, the unit at Phoenix is provided with an air-to-water heat exchanger so that it can be used for both residential space heating and domestic hot water preheating.

Solar Technology
Transfer Program
Program Support Element

Title	Organization
Implementation of a Solar Technology Transfer System in Support of Early Impact Objectives	International Business Services Inc. 1010 Vermont Avenue, N.W. Washington, D.C. 20005 (202) 628-1470
Amount $130,393	**Principal Investigator** Charles E. Hansen

Work Location	Duration-Award Date	Contract No.
Washington, D.C.	16 mo. 1 September 1976	EX-76-C-01-2531

Project Summary:

The objective of this research project is to assess the potential use and describe the means for accelerating the diffusion of SOLCOST, or similar computerized solar estimating techniques, for the residential and light commercial building industries.

SOLCOST, an advanced simplified design tool for easily determining the sizing and economic analysis of standard solar heating, cooling, and hot water systems is used in residential and small office building applications. It is intended for use by the architect, contractor, engineer, and other members of the heating, ventilation, and air conditioning industry, who are responsible for making decisions on justifiable investments in solar heating, or heating and cooling systems.

By providing an easily accessible baseline estimating and design method, it is anticipated that acceptance of residential and light commercial solar systems will be accelerated. In-depth interviews were carried out with researchers, manufacturers, suppliers, architects, engineers, contractors, and other groups involved in solar technologies and light construction.

Title	Organization
SOLCOST Information Dissemination	International Business Services, Inc. 1010 Vermont Avenue, N.W. Washington, D.C. 20005 (202) 628-1470
Amount	**Principal Investigator** Charles E. Hansen

Work Location	Duration-Award Date	Contract No.
Washington, D.C.	9 mo. 3 April 1977	EX-76-C-01-2531

Project Summary:

The objective of this project was to implement findings from a previous survey by introducing SOLCOST to a broad segment of the population, emphasizing the most effective channels of information dissemination.

To accomplish this effort, a user-oriented set of introductory and operating documents and display materials have been developed. A system for servicing user inquiries, ensuring their rapid response, and channeling information has been developed. Recommendations of a technical and operational nature have also been developed and implemented which have resulted in improved system operation.

Title	Organization
SOLCOST Technical Support	Solar Environment Engineering Co. Inc. P.O. Box 1914 Ft. Collins, CO 30522
Amount	**Principal Investigator**
$71,160	Byron Winn

Work Location	Duration-Award Date	Contract No.
Ft. Collins, CO	12 mo. 1 August 1977	EG 77-C-02-4567

Project Summary:

The objective here is to establish a minicenter that serves as a focal point for technical support. This minicenter is available to firms and individuals who request SOLCOST, the DOE-sponsored, simplified computer design program for estimating the optimal size and cost benefits of solar heating and cooling systems. To accomplish the task, the minicenter is to be established at the SOLCOST Service Center and operate in direct support of DOE to transfer SOLCOST technology to industry. This minicenter will also serve as a prototype for developing and standardizing the activities of solar energy technical service and training in industry.

Title	Organization
Development of a List of Titles and a List of Manufacturers	Solar Engineering Publishers, Inc.
Amount	**Principal Investigator**
$8,760	Anna Fay Friedlander

Work Location	Duration-Award Date		Contract No.
8435 N. Stemmons Freeway Suite 880, Dallas, TX 75247	3 mo.	5 July 1977	EG 77-X-01-3485

Project Summary:

The objective of this project was to provide the broad and narrow scope titles of solar products to be included in the Uniform Construction Index, the standard reference for the construction industry. For this task the contractor completed a list of solar manufacturers and their products. The list is made available to the Solar Energy Industries Association, the Construction Specification Institute, and its data system contractor, Information Handling Service.

Title	Organization
Development of Formatted Responses and Processing Assistance	OAO Corporation 5050 Powder Mill Road Beltsville, MD 20705
Amount	**Principal Investigator**
$9,820	Gary Prince

Work Location	Duration-Award Date		Contract No.
50/50 Powder Mill Road Beltsville, MD 20705	16 wks.	5 July 1977	ES-77-X-01-3356

Project Summary:

The objective here was to create formatted responses to letter inquiries. To accomplish this task, the OAO Corporation developed a library of formatted responses, which can be typed by a word processor. This system allows for easy access to a specific letter and number of copies needed to respond.

The contractor has also provided assistance to the Technology Transfer Branch in facilitating the processing of sensitive control mail.

The results of the effort are currently being used to provide responses to public, industrial, and congressional inquiries.

Title	Organization
Analytic Tools and Strategies for Solar Energy Technology Transfer	The MITRE Corporation (METREK Division)
Amount	**Principal Investigator**
$213,288 (additional $91,935 requested to cover add-on commitment)	G. Neville Gadsby (703)790-6639

Work Location	Duration-Award Date	Contract No.
McLean, VA	7 mo. 14 July 1977	EG 77-C-01-4041

Project Summary:

The objective of this project is to analyze tasks and strategies of the Solar Technology Transfer Program (STTP). To accomplish this, the following tasks are being undertaken:

a. Development of analytic procedures for the planning and management of solar energy technology transfer programs in the near term time frame;
b. Formulation of recommendations for information outreach strategies;
c. Outlining of techniques and procedures for monitoring and effectiveness of solar technology transfer initiatives;
d. Development of a computerized, structural model for solar energy technology delivery systems for: (1) the comparative evaluation of technology transfer strategies, and (2) the adjustment of priorities to reflect changing requirements;
e. Compilation of a concise Data Book as an aid to the management of STTP;
f. Organization of an independent consultative committee to view federal funded solar technology transfer activities.

These tasks are transferring technology for immediate applications of water heating, space heating, and combined water and space heating in the residential, commercial, and agricultural sectors.

The following work has been completed:

a. Analysis of pertinent technology delivery systems: participants, decision makers/liaisons, their interactions and solar-related concerns (Draft Working Papers 12488, 12643);
b. Analysis and prioritization of informational needs;
c. Characterization of information dissemination mechanisms (Draft Working Paper 12634);
d. Analysis of Traget Markets (Draft Working Paper 12633).

Continued efforts are being made to:

a. Develop an analysis of informational needs (preliminary analysis completed);
b. Formulate monitoring procedures;
c. Model the technology transfer process;
d. Compile a Technology Transfer Data Book.

Work to be done includes:

a. Completion of previously described tasks;
b. Application of the STT model to develop preferred strategies;
c. Preparation of (Draft) final report;
d. Revision of draft report as appropriate;
e. Publication of draft report.

Solar Technology Transfer Program
Consumer Representation
Program Element

Title	Organization
Solar Technology Transfer Program in the Northeast	Brookhaven National Laboratory
Amount	**Principal Investigator**
$120,000	W. Graves

Work Location	Duration-Award Date		Contract No.
Northeast United States	open	February 1977	S-189-77-14

Project Summary:

The objective of this project is to provide for early impact and use of solar technology through the dissemination of technical information to amplifier/multiplier groups and hands-on training to users of solar technology in the northeastern region of the U.S.

The purpose is to provide contracts with detailed technical support in the design and construction of solar energy housing in the New England area. Licensed HVAC engineers and architects will work directly with builders and subcontractors to:

a. Assist architects, engineers, and industry in the design, construction, and sale of solar heating units.
b. Assess and report on the performance of existing systems.
c. Accelerate the mass marketing of solar heating systems in the region, aiming for maximum market penetration in new housing by 1980.

The approach is to establish a program office with members from Brookhaven National Laboratory in order to provide detailed technical support in the design and construction of new and retrofit projects. This program utilizes the contractor/builder as the means for delivering current technology. This strategy draws upon the contractor/builder's physical resources, close association with the user market and the private sector, and access to private investment capital.

Title	Organization
Committee Assessing Federally Funded Solar Technology Transfer	The MITRE Corporation (METREK Division)
Amount	**Principal Investigator**
Note: Add on to existing contract*	N. Gadsby

Work Location	Duration-Award Date	Contract No.
McLean, VA	6 months	EG-77-C-01-4041

Project Summary:

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U.S. Department of Energy
Washington, D.C. 20545

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Title	Organization
Solar Technology Transfer Workshop I	International Business Services, Inc. 1010 Vermont Avenue, N.W. Washington, D.C. 20005 (202) 628-1470
Amount	**Principal Investigator** C. Hansen
Work Location Washington, D.C.	**Duration-Award Date** **Contract No.**

Project Summary:

This workshop's objective is to introduce representatives from the national laboratories and to stimulate idea exchange. The DOE Solar Technology Transfer Program is contracting with national laboratories to serve as the operational agents in the synergistic process. The laboratories would then work with the user/industry organizations to stimulate the transfer of solar technology.

The program approach entails a workshop designed to sensitize the laboratory teams to options in solar technology transfer, practical procedures, methods, and priorities in a synergistic system for technology transfer. In addition, the workshop was designed to identify and enumerate possible courses of action, and to develop specific plans for technology transfer which stress innovative approaches that meet the requirements of the solar technology transfer strategy for early impact.

A report was produced containing the syntheses of some of the ideas which were generated and discussed at the workshop.

Title	Organization
Conference on Sharing the Sun	University of Delaware
Amount $15,000	**Principal Investigator** E.A. Trabant
Work Location Winniped, CA	**Duration-Award Date** 15 August 1976 **Contract No.** E(49-21)1030

Project Summary:

The objective of this project, "Conference on Sharing the Sun—Solar Technology in the Seventies," was to disseminate technical data to those working in the field, and to provide interested parties with an overview of the progress in the broad spectrum of solar technology and application.

To accomplish this objective, the conference conducted a series of technical sessions reviewing the activities in the solar energy field.

Title	Organization
Carnegie-Mellon University Solar Symposium	DOE Pittsburgh Energy Research Center Pittsburgh, PA
Amount	**Principal Investigator**
$2,500	I. Wenfor

Work Location	Duration-Award Date	Contract No.
Pittsburgh, PA	2 days 1 June 1977	G 22 77 2601

Project Summary:

The objective of this solar-symposium, held June 1 and 2, 1977, at Carnegie-Mellon University, was to bring inter-government relationships into focus, to provide citizen participation in the solar energy field, and to relate the current level of development of solar energy technology to the requirements of the Pittsburgh area.

These funds were transferred to the Pittsburgh Energy Research Center Information Financial plan to provide ERDA support to the solar-symposium.

Title	Organization
1977 International Solar Energy Society (American Section) Annual Meeting, June 6-10, 1977.	International Solar Energy Society (American Section)
Amount	**Principal Investigator**
$20,000	Charles D. Beach

Work Location	Duration-Award Date	Contract No.
Florida Solar Energy Center Cape Canaveral, FL	6 June 1977 to 6 December 1977	EG 77-G-05-5526

Project Summary:

This award provided funds to plan, carry out, and evaluate the annual meeting of the International Solar Energy Society, held June 6-10, 1977. The Society will provide the Solar Technology Transfer Branch with two hundred sets of the conference proceedings and with a follow-up evaluation of the conference's effectiveness with six months of the date of the meeting.

Title	Organization
Background Analysis of Extension Services	Interuniversity Communication Council
Amount	**Principal Investigator**
$15,676	

Work Location	Duration-Award Date	Contract No.
Princeton, NJ	3 mo. 28 February 1977	EG 77-C-01-4036

Project Summary:

The objective of this project was the commissioning of EDUCOM to analyze and to review Federal and State technological extension programs for the purpose of identifying specific policies, procedures, and practices, that lead to success or failure.

To accomplish this objective, a report was prepared which covered the areas of past experience. A briefing was conducted by the Project Director for selected DOE personnel. The Project Director and DOE personnel then planned and organized a briefing for selected personnel from other Federal agencies. The Project Director attended a meeting of state energy extension personnel in Washington, D.C., to report results of the analysis.

Title	Organization
Preparation, Execution, and Evaluation of Conference: "Alternative Energy Sources, A National Symposium."	Clean Energy Research Institute, University of Miami
Amount	**Principal Investigator**
$18,556*	Dr. T. Nejat Veziroglu

Work Location	Duration-Award Date	Contract No.
Coral Gables, FL	11 mo. 1 May 1977	EG 77-G-05-5569

Project Summary:

The objective of this conference, "Alternative Energy Sources, a National Symposium," has been to inform scientists, engineers, and policy makers, in technical sessions, of recent and anticipated technical advances in solar and other energy fields.

To accomplish this objective, the award has provided funds to plan, carry out, and evaluate this conference held December 4-7, 1977, in Miami Beach, Florida. The Clean Energy Research Institute shall provide the Solar Technology Transfer Branch with two hundred copies of the conference proceedings and an evaluation of the conference.

Title	Organization
Midwest Solar Energy Conference at the University of Michigan	University of Michigan
Amount	**Principal Investigator**
$7,000	
Work Location	**Duration-Award Date** / **Contract No.**
	24 May 1977 / EG 77-C-02-4360

Project Summary:

A major objective of this project was to generate increased manufacturing interest and design activity in the production of components, materials, and systems for solar energy application. Attendees included specialists in manufacturing, engineering, and architecture.

To accomplish this objective, the award provided funds to plan, carry out, and evaluate the conference held May 24, 1977, at the University of Michigan. The University of Michigan will deliver the conference brochure, copies of papers presented, and the summary report of the conference.

Title	Organization
Solar Conference Exhibit	Oak Ridge Associated Universities
Amount	**Principal Investigator**
$15,000	R.J. Hart
Work Location	**Duration-Award Date** / **Contract No.**
Oak Ridge, TN	open 26 April 1977 / S189

Project Summary:

The objective for displaying the conference exhibit, built by Design and Productions Inc., under the direction of Oak Ridge Associated Universities (ORAU), is to increase awareness of the problems and potentials of solar energy technologies.

In order to achieve this objective, ORAU displays the exhibit at conferences attended by professionals, business, civic leaders, and other target audiences. A promotional brochure and other materials were also designed for the exhibit for distribution by ORAU.

After each show, a report outlining attendance, audience reception of the exhibit, and volume of the distributed literature is submitted by ORAU.

Title	Organization
Showing of the Solar Conference Exhibit	Northwest College & University Association for Science (NORCUS) 100 Sprout Road Richland, WA 99352
Amount $9,000	**Principal Investigator** Dr. Bryan Vallett

Work Location	Duration-Award Date		Contract No.
Varied	open	1 October 1976	EY-77-C-06-1011

Project Summary:

The Northwest College and University Association for Science (NORCUS) was responsible for managing and showing the Solar Conference exhibit for the U.S. Department of Energy. The exhibit was shown in two cities: Dallas, Texas and Portland, Oregon.

Title	Organization
Retrofit Test of the General Electric Solar Source Unit	U.S. Department of Agriculture
Amount $65,986	**Principal Investigator** Mr. Walter A. Gumthorp

Work Location	Duration-Award Date		Contract No.
varied	open	3 December 1976	EX-77-A-29-1068

Project Summary:

The objective of this project is twofold: (1) to further the development of SOLAIRSOURCE, a potentially low-cost solar forced air heating system developed by the General Electric Company under an ERDA contract, and (2) to disseminate information about SOLAIRSOURCE performance to the public with the aim of stimulating industrial and agricultural interest in the SOLAIRSOURCE concept and thereby accelerating the transfer of this technology.

To further SOLAIRSOURCE development, the Technology Transfer Branch of ERDA and the Rural Development Service of the U.S. Department of Agriculture jointly sponsored field performance tests of two SOLAIRSOURCE units under varying climatic conditions through 1977 and into 1978. Field tests have been conducted by Arizona State University at Phoenix, Arizona, and by South Dakota University at Brookings, South Dakota. The unit at Brookings is to be used in residential space heating; because of the relatively mild climate in Arizona, the unit at Phoenix is provided with an air-to-water heat exchanger so that it can be used for both residential space heating and domestic hot water preheating.

Solar Technology Transfer Program Program Support Element

Title	Organization
Implementation of a Solar Technology Transfer System In Support of Early Impact Objectives	International Business Services Inc. 1010 Vermont Avenue, N.W. Washington, D.C. 20005 (202) 628-1470
Amount $130,393	**Principal Investigator** Charles E. Hansen

Work Location	Duration-Award Date		Contract No.
Washington, D.C.	16 mo.	1 September 1976	EX-76-C-01-2531

Project Summary:

The objective of this research project is to assess the potential use and describe the means for accelerating the diffusion of SOLCOST, or similar computerized solar estimating techniques, for the residential and light commercial building industries.

SOLCOST, an advanced simplified design tool for easily determining the sizing and economic analysis of standard solar heating, cooling, and hot water systems is used in residential and small office building applications. It is intended for use by the architect, contractor, engineer, and other members of the heating, ventilation, and air conditioning industry, who are responsible for making decisions on justifiable investments in solar heating, or heating and cooling systems.

By providing an easily accessible baseline estimating and design method, it is anticipated that acceptance of residential and light commercial solar systems will be accelerated. In-depth interviews were carried out with researchers, manufacturers, suppliers, architects, engineers, contractors, and other groups involved in solar technologies and light construction.

Title	Organization
SOLCOST Information Dissemination	International Business Services, Inc. 1010 Vermont Avenue, N.W. Washington, D.C. 20005 (202) 628-1470
Amount	**Principal Investigator** Charles E. Hansen

Work Location	Duration-Award Date		Contract No.
Washington, D.C.	9 mo.	3 April 1977	EX-76-C-01-2531

Project Summary:

The objective of this project was to implement findings from a previous survey by introducing SOLCOST to a broad segment of the population, emphasizing the most effective channels of information dissemination.

To accomplish this effort, a user-oriented set of introductory and operating documents and display materials have been developed. A system for servicing user inquiries, ensuring their rapid response, and channeling information has been developed. Recommendations of a technical and operational nature have also been developed and implemented which have resulted in improved system operation.

Title	Organization
SOLCOST Technical Support	Solar Environment Engineering Co. Inc. P.O. Box 1914 Ft. Collins, CO 30522
Amount	**Principal Investigator**
$71,160	Byron Winn

Work Location	Duration-Award Date	Contract No.
Ft. Collins, CO	12 mo. 1 August 1977	EG 77-C-02-4567

Project Summary:

The objective here is to establish a minicenter that serves as a focal point for technical support. This minicenter is available to firms and individuals who request SOLCOST, the DOE-sponsored, simplified computer design program for estimating the optimal size and cost benefits of solar heating and cooling systems. To accomplish the task, the minicenter is to be established at the SOLCOST Service Center and operate in direct support of DOE to transfer SOLCOST technology to industry. This minicenter will also serve as a prototype for developing and standardizing the activities of solar energy technical service and training in industry.

Title	Organization
Development of a List of Titles and a List of Manufacturers	Solar Engineering Publishers, Inc.
Amount	**Principal Investigator**
$8,760	Anna Fay Friedlander

Work Location	Duration-Award Date		Contract No.
8435 N. Stemmons Freeway Suite 880, Dallas, TX 75247	3 mo.	5 July 1977	EG 77-X-01-3485

Project Summary:

The objective of this project was to provide the broad and narrow scope titles of solar products to be included in the Uniform Construction Index, the standard reference for the construction industry. For this task the contractor completed a list of solar manufacturers and their products. The list is made available to the Solar Energy Industries Association, the Construction Specification Institute, and its data system contractor, Information Handling Service.

Title	Organization
Development of Formatted Responses and Processing Assistance	OAO Corporation 5050 Powder Mill Road Beltsville, MD 20705
Amount	**Principal Investigator**
$9,820	Gary Prince

Work Location	Duration-Award Date		Contract No.
50/50 Powder Mill Road Beltsville, MD 20705	16 wks.	5 July 1977	ES-77-X-01-3356

Project Summary:

The objective here was to create formatted responses to letter inquiries. To accomplish this task, the OAO Corporation developed a library of formatted responses, which can be typed by a word processor. This system allows for easy access to a specific letter and number of copies needed to respond.

The contractor has also provided assistance to the Technology Transfer Branch in facilitating the processing of sensitive control mail.

The results of the effort are currently being used to provide responses to public, industrial, and congressional inquiries.

Title	Organization
Analytic Tools and Strategies for Solar Energy Technology Transfer	The MITRE Corporation (METREK Division)
Amount	Principal Investigator
$213,268 (additional $91,935 requested to cover add-on commitment)	G. Neville Gadsby (703)790-6039
Work Location	Duration-Award Date / Contract No.
McLean, VA	7 mo. 14 July 1977 EG-77-C-01-4041

Project Summary:

The objective of this project is to analyze tasks and strategies of the Solar Technology Transfer Program (STTP). To accomplish this, the following tasks are being undertaken:

a. Development of analytic procedures for the planning and management of solar energy technology transfer programs in the near term time frame;
b. Formulation of recommendations for information outreach strategies;
c. Outlining of techniques and procedures for monitoring and effectiveness of solar technology transfer initiatives;
d. Development of a computerized, structural model for solar energy technology delivery systems for: (1) the comparative evaluation of technology transfer strategies, and (2) the adjustment of priorities to reflect changing requirements;
e. Compilation of a concise Data Book as an aid to the management of STTP;
f. Organization of an independent consultative committee to view federal funded solar technology transfer activities.

These tasks are transferring technology for immediate applications of water heating, space heating, and combined water and space heating in the residential, commercial, and agricultural sectors.

The following work has been completed:

a. Analysis of pertinent technology delivery systems: participants, decision makers/liaisons, their interactions and solar-related concerns (Draft Working Papers 12488, 12643);
b. Analysis and prioritization of informational needs;
c. Characterization of information dissemination mechanisms (Draft Working Paper 12634);
d. Analysis of Traget Markets (Draft Working Paper 12633).

Continued efforts are being made to:

a. Develop an analysis of informational needs (preliminary analysis completed);
b. Formulate monitoring procedures;
c. Model the technology transfer process;
d. Compile a Technology Transfer Data Book.

Work to be done includes:

a. Completion of previously described tasks;
b. Application of the STT model to develop preferred strategies;
c. Preparation of (Draft) final report;
d. Revision of draft report as appropriate;
e. Publication of draft report.

Solar Technology Transfer Program
Consumer Representation
Program Element

Title	Organization
Solar Technology Transfer Program in the Northeast	Brookhaven National Laboratory
Amount	**Principal Investigator**
$120,000	W. Graves

Work Location	Duration-Award Date		Contract No.
Northeast United States	open	February 1977	S-189-77-14

Project Summary:

The objective of this project is to provide for early impact and use of solar technology through the dissemination of technical information to amplifier/multiplier groups and hands-on training to users of solar technology in the northeastern region of the U.S.

The purpose is to provide contracts with detailed technical support in the design and construction of solar energy housing in the New England area. Licensed HVAC engineers and architects will work directly with builders and subcontractors to:

a. Assist architects, engineers, and industry in the design, construction, and sale of solar heating units.
b. Assess and report on the performance of existing systems.
c. Accelerate the mass marketing of solar heating systems in the region, aiming for maximum market penetration in new housing by 1980.

The approach is to establish a program office with members from Brookhaven National Laboratory in order to provide detailed technical support in the design and construction of new and retrofit projects. This program utilizes the contractor/builder as the means for delivering current technology. This strategy draws upon the contractor/builder's physical resources, close association with the user market and the private sector, and access to private investment capital.

Title	Organization
Committee Assessing Federally Funded Solar Technology Transfer	The MITRE Corporation (METREK Division)
Amount	**Principal Investigator**
Note: Add on to existing contract*	N. Gadsby

Work Location	Duration-Award Date	Contract No.
McLean, VA	6 months	EG-77-C-01-4041

Project Summary:

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Preface

On October 26, 1974, the Solar Energy Research Development and Demonstration Act (Public Law 93-473) was signed into law, authorizing a vigorous Federal program of research, development and demonstration. Its goal was to provide the nation with the option of using solar energy as a viable source for meeting future energy requirements. In response to the mandates of this act, major efforts were conducted within the Division of Solar Energy (SOLAR) of the Energy Research and Development Administration (ERDA) to work with industry to develop and introduce, at the earliest possible date, economically competitive and environmentally acceptable solar energy systems.

These responsibilities were transferred to the new United States Department of Energy (DOE) on October 1, 1977. SOLAR was reorganized into two distinct organizational components:

- The Division of Solar Technology (SOLAR/ET), as part of the Office of the Assistant Secretary for Energy Technology.
- The Division of Solar Applications (SOLAR/CS), as part of the Office of the Assistant Secretary for Conservation and Solar Applications.

As a result of this reorganization, the Solar Heating and Cooling Program, and the Technology Transfer Program, were transferred into SOLAR/CS. An overview of the current DOE organization is shown in Figure 1.

Program planning continues under the guidelines established by PL 93-473 and three other legislative acts passed by the 93rd Congress: the Solar Heating and Cooling Demonstration Act of 1974 (PL 93-409), the Energy Reorganization Act of 1974 (PL 93-438), the Federal Nonnuclear Energy Research and Development Act of 1974 (PL 93-577). Together these four laws grant DOE and other Federal agencies the authority to pursue a research program aimed at effective solar energy use. Under this authority, SOLAR/CS and SOLAR/ET are working both to promote a fully coordinated solar energy program and to complement efforts in the private sector to develop solar energy resources.

The major programs and subprograms of the Solar Energy Program during 1977 were:

a. Solar Electric Systems
   (1) Wind Energy Conversion
   (2) Photovoltaic Energy Conversion
   (3) Solar Thermal Electric Conversion
   (4) Ocean Thermal Energy Conversion (OTEC)
   (5) Solar Satellite Power Systems
b. Fuels from Biomass
   (1) Production and Collection of Biomass
   (2) Conversion of Biomass
c. Technology Support and Utilization
   (1) Technology Transfer
   (2) Environmental and Resource Assessment
d. Solar Heating and Cooling
   (1) Barriers and Incentives
   (2) Demonstration
   (3) Research and Development
   (4) Agricultural and Industrial Process Heat

This Program Summary describes each of the Technology Transfer projects funded during FY 1977. The accomplishments of the Technology Transfer Program are highlighted; plans for continued activities in this technology area are included.

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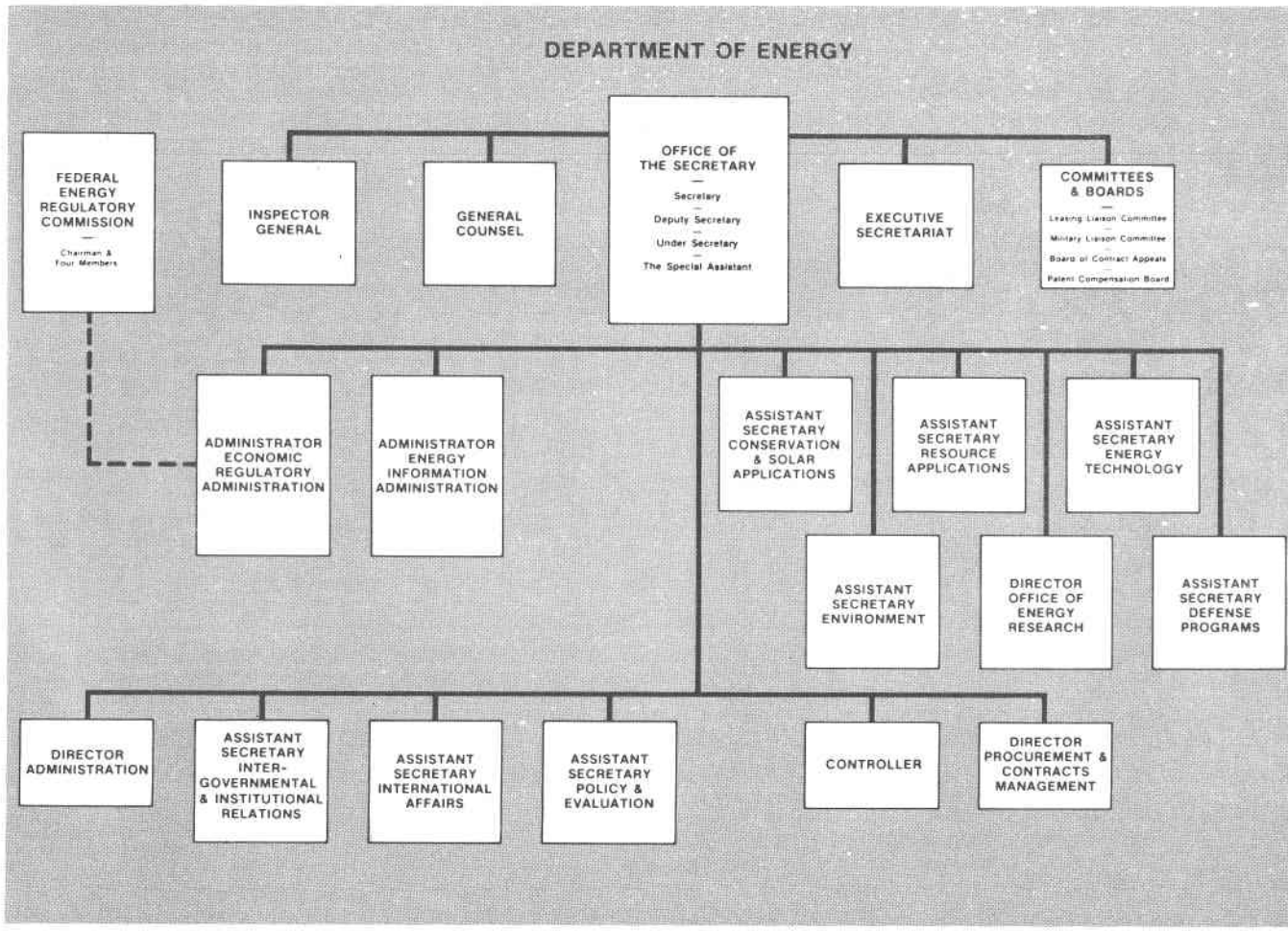
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GENERAL COUNSEL
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ASSISTANT SECRETARY POLICY & EVALUATION
CONTROLLER
DIRECTOR PROCUREMENT & CONTRACTS MANAGEMENT

Figure 1

Introduction

Solar Technology Transfer Program (STTP)

The complexity and magnitude of solar data requirements, the rapid dynamics of solar's current level of development, and the broad spectrum of demand for solar technology information requires a program of technology transfer with a sophistication considerably beyond that of conventional information systems. To meet this requirement, the innovative Solar Technology Transfer Program (STTP) was implemented early in Fiscal Year (FY) 1977 within the Division of Solar Energy (SOLAR) of the Energy Research and Development Administration (ERDA).

Solar Technology Transfer is the critical link between the Federal Solar Energy Research, Development, and Demonstration Program and the solar industry. In that regard, the objective of the STTP is to provide the Department of Energy/Office of the Assistant Secretary for Conservation and Solar Applications with a major assist in transferring to industry those solar technologies with a potential for early impact application. Early impact technologies are those which have a potential for significant industry participation within the calendar year 1977-1978. Early impact technologies are defined as:

(1) Solar heating of existing and new homes, mobile homes, and small office buildings, including water heating;
(2) Solar heating and cooling of commercial buildings;
(3) Solar heating and crop drying in small agricultural applications;
(4) Small wind machines.

The Solar Technology Transfer Program has been established to:

- Disseminate user-oriented solar information by means of documents, public media material, exhibits, presentations, workshops, and conferences;
- Disseminate solar information through channels designed to reach small business, universities, and organizations in the minority group community;
- Coordinate information services with the National Solar Heating and Cooling Information Center, established by DOE and the Department of Housing and Urban Development (HUD) to answer questions and provide information on all aspects of solar heating and cooling for homes and commercial buildings—general, scientific, and non-technical;
- Coordinate activities with other Federal agencies, and with the private sector;
- Coordinate technology transfer activities with state and legislative offices, and with local governments;
- Employ the resources of the DOE laboratories, the Technical Information Center, the Operations Offices, and the Solar Energy Research Institute to carry out the STTP outreach function;
- Provide technical support to the Energy Extension Service;
- Identify target opportunities for technologies with direct or related potential for early impact on American industry;
- Develop and implement a broad range of educational programs;
- Develop and implement a consumer representation plan;
- Develop an international program component which can directly or indirectly assist practical and cost-effective deployment and commercialization of solar energy in the U.S. and throughout the world as early as possible.

In concert with DOE barrier and incentive studies, environmental and resource assessments, standards development, and planning direction support programs; the STTP system, a technology itself, functions to accelerate widespread commercialization of solar energy (see Figure 2).

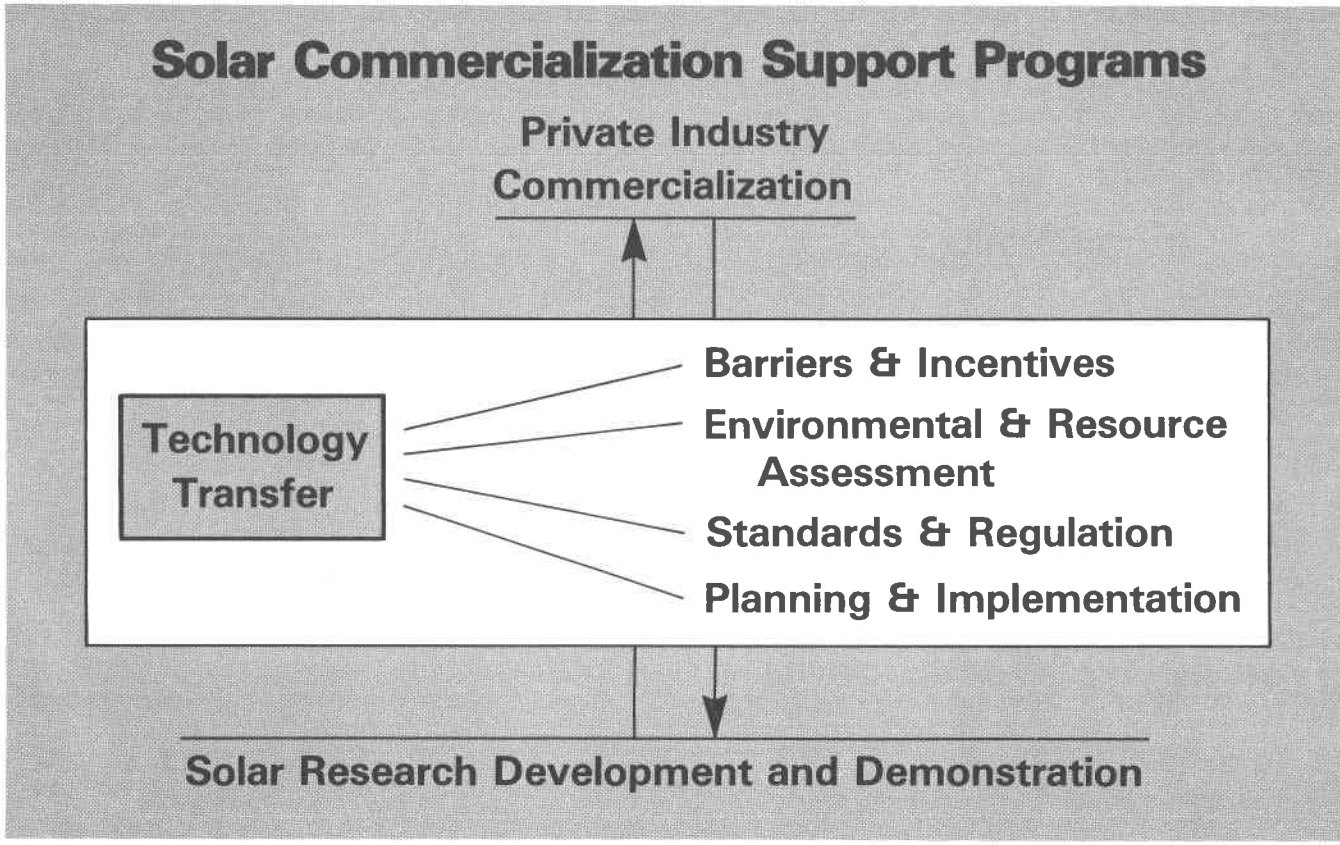
Solar Commercialization Support Programs
Private Industry
Commercialization
Technology
Transfer
Barriers & Incentives
Environmental & Resource
Assessment
Standards & Regulation
Planning & Implementation
Solar Research Development and Demonstration

Figure 2

The Program

The heart of the STTP is a synergistic delivery system working in conjunction with other solar-related organizations. Centralized at DOE headquarters for the purpose of directing and monitoring a nationwide network, the technology transfer system is characterized by the following:

- Accountability
- Adaptability
- Innovation
- Interaction
- Technology processes
- A rapid response to input

Synergistic Delivery System

Figures 3 and 4 show the relationship of STTP to other solar-oriented organizations. Figure 3 details relationships between the sources of solar energy information, the organizations carrying out the information transfer activity, and the users. Figure 4 demonstrates how the entire technology transfer process utilizes extensive feedback.

The Energy Extension Service, regional offices, and the Solar Energy Research Institute (SERI) all function as resource multipliers. These multiplier groups provide an important link between many different information systems and the information receiver, or conversely, one information system and many different types of information receivers.

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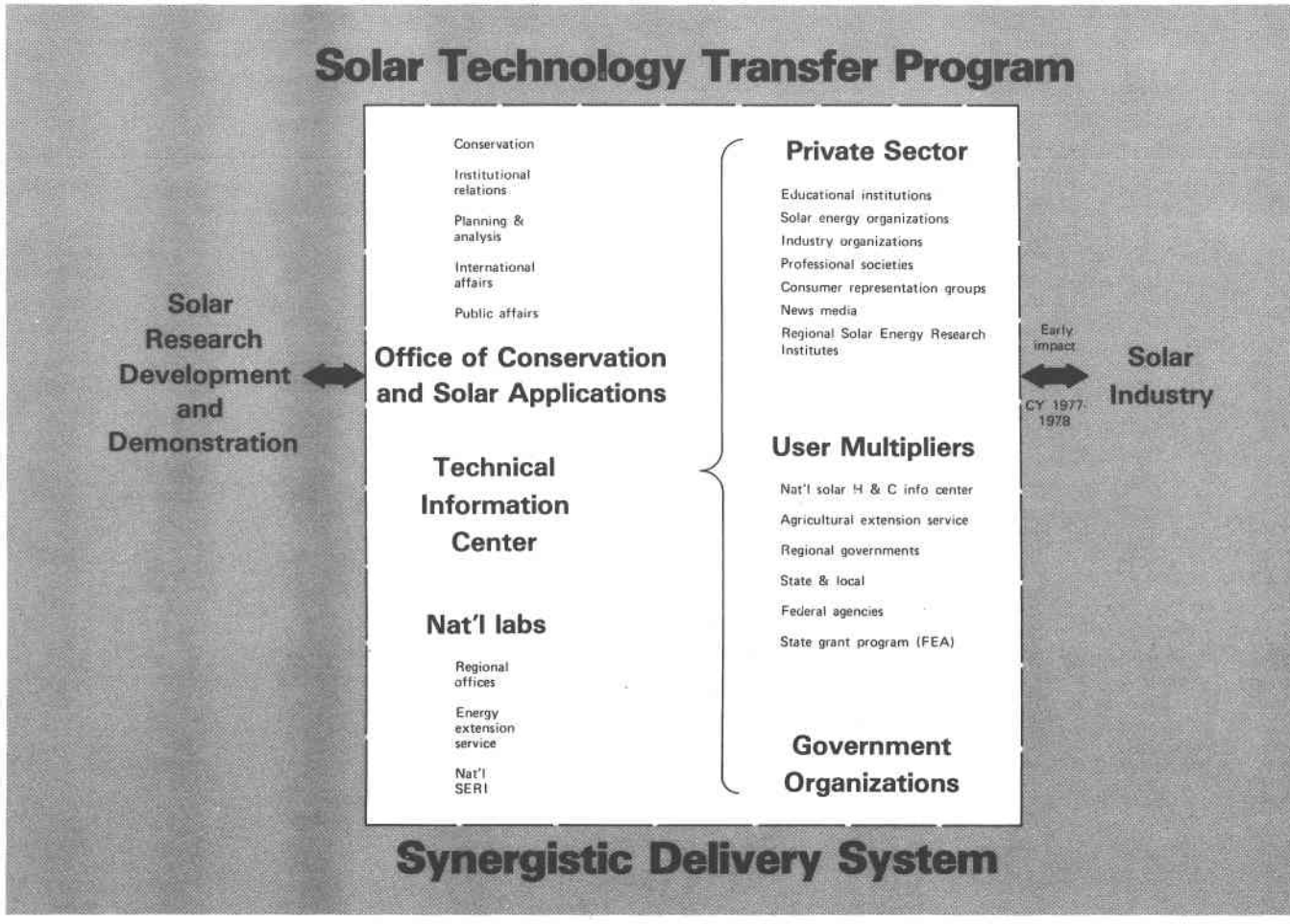
Solar Technology Transfer Program
Solar Research Development and Demonstration
Conservation
Institutional relations
Planning & analysis
International affairs
Public affairs
Office of Conservation and Solar Applications
Technical Information Center
Nat'l labs
Regional offices
Energy extension service
Nat'l SERI
Private Sector
Educational institutions
Solar energy organizations
Industry organizations
Professional societies
Consumer representation groups
News media
Regional Solar Energy Research Institutes
User Multipliers
Nat'l solar H & C info center
Agricultural extension service
Regional governments
State & local
Federal agencies
State grant program (FEA)
Government Organizations
Early impact
CY 1977-1978
Solar Industry
Synergistic Delivery System

Figure 3

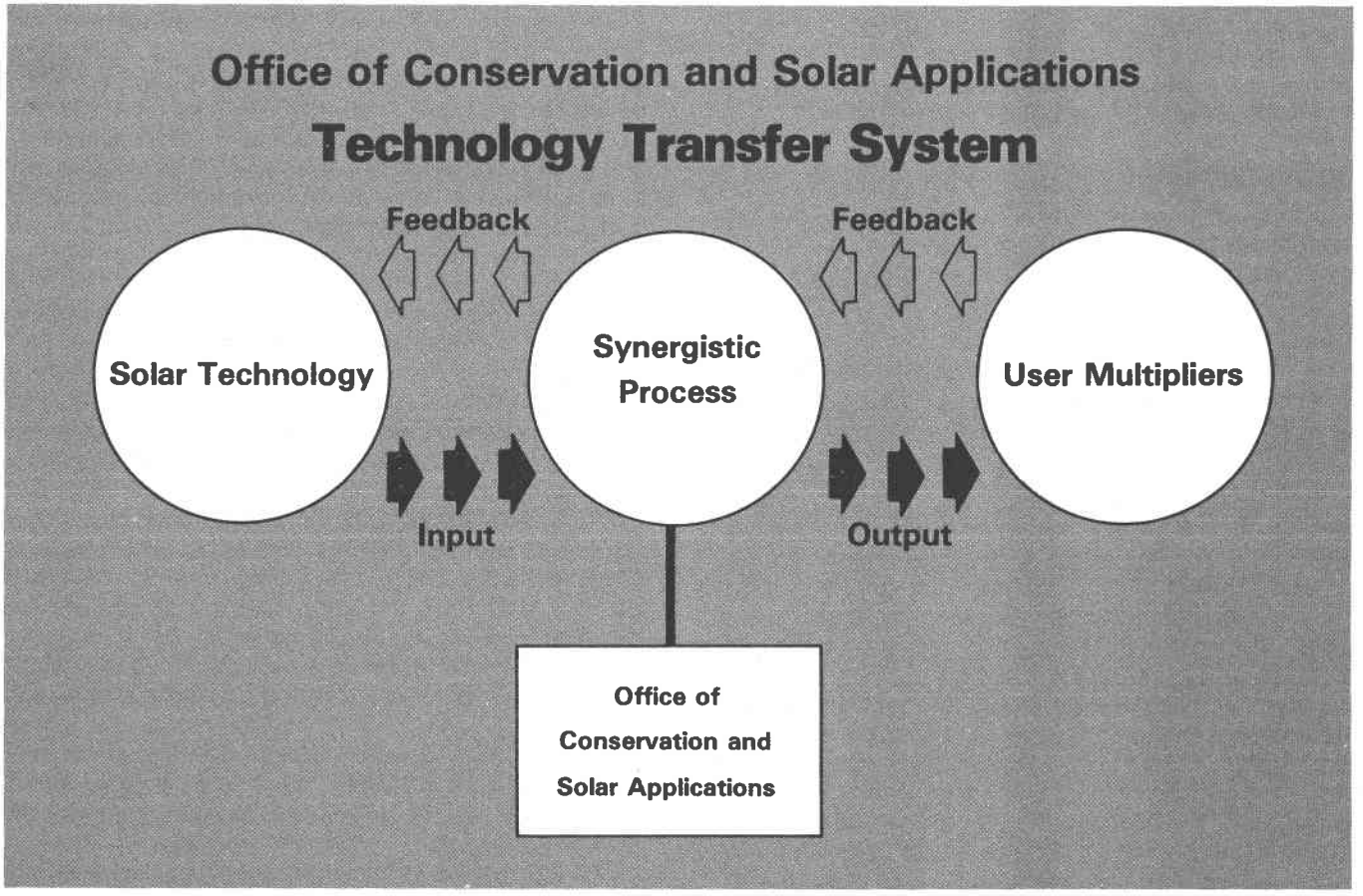
Office of Conservation and Solar Applications
Technology Transfer System
Feedback
Feedback
Solar Technology
Synergistic Process
User Multipliers
Input
Output
Office of Conservation and Solar Applications

Figure 4

Solar Research, Development, and Demonstration is shown as the input to the system, while the objective and final effect of the system is to stimulate the development of a solar industry.

Responsibilities

The STTP has divided its responsibilities into six main program elements:

- National Laboratories Regional Outreach
- Installer Training and Education
- Information Dissemination
- Workshops, Conferences and Exhibits
- Program Support
- Consumer Representation

The **National Laboratories Outreach** program element provides an outreach capability to ensure face-to-face communications with the target audiences. Five National laboratories comprise a nationwide network of field management and technology transfer activities in direct support to the Solar Technology Transfer Program (FY 77-78) early impact objectives. Through the Laboratories' outreach activities, which include education and installer training, technical assistance, conferences, workshops, DOE has been able to take immediate steps in reducing time delays and technical uncertainties in the commercialization process, on a regional basis. The Laboratories are working with target audiences which include such industry-related groups as architects, builders, engineers, lenders, contractors, plumbers, manufacturers, distributors; and such resource multiplers as state and local offices, library systems, and industry organizations.

The facilities which participate in this outreach effort are:

FACILITY	REGION
Brookhaven National Laboratory	Northeast
Oak Ridge National Laboratory	South
Sandia Laboratories	Southwest
Lawrence Livermore Laboratory	West
Pacific Northwest Laboratory	Northwest
Chicago Operations Office	Midwest

The **Installer Training and Education** program element provides installer training and education programs aimed at ensuring the early availability of competent solar equipment installers for the solar industry. The current emphasis is on the dissemination of an accredited correspondence course for those with skills in the air conditioning and plumbing crafts, and a program to train community college and vocational/technical instructors in solar energy systems installation.

The **Information Dissemination** program element functions to provide users and potential users of solar technologies with the most up-to-date technical and economic data relating to solar systems. Information dissemination activities are aimed at all sectors, including individuals, contractors, and lending institutions.

Workshops, Conferences, and Exhibits activities serve to promote interest in the solar technologies. They present current solar energy topics, stimulate interest, and bring together the diverse groups interested in solar technologies.

The **Program Support** element provides for effective management and direction of the overall Solar Technology Program. These activities include planning and guiding the direction of the program by anticipating needs of users, and the development of new technology that may have an early commercial impact.

The **Consumer Representation** program element provides a forum for user feedback through evaluation of Federally funded solar technology transfer programs, both ongoing and planned.

Accomplishments

Accomplishments of Prior Years:

Prior to FY 1977, the Technology Transfer System did not exist as a technology and was termed the SOLAR Technology Utilization and Information Dissemination (TUID) Branch. Its primary accomplishment was the creation of the Solar Energy Data Bank at the Technical Information Center, as mandated by the Energy Reorganization Act and the Solar Energy Development and Demonstration Act. The Branch was responsible for directing the Transportable Solar Laboratory, originally a National Science Foundation (NSF) project, which ha[illegible] visited most regions of the nation; hosting speci[illegible]

meetings of the solar energy decision makers of the future, and sponsoring workshops for architects, engineers, and contractors in the solar energy field.

The TUID Branch was primarily print and broadcast media oriented: it coordinated the production and editing of the definitive SOLAR program plan, "National Solar Energy Research, Development, and Demonstration Program" (ERDA-49); it was responsible for the production of five motion pictures promoting the feasibility of solar energy; it produced a series of pamphlets for the general public, each emphasizing a particular solar technology.

Fiscal Year 1977 Accomplishments

Emerging from this media-centered information dissemination role to that of a technology, the new STTP began to look in other directions in formulating an early impact technology delivery system.

Technology Delivery System

A structural model of the Solar Energy Technology Delivery System was designed and developed during 1977. This Delivery System functions as a program planning tool in the formulation and management of the Information Outreach Program. The model represents an important step in the development of analytical tools and strategies for a Technology Delivery System.

The model accounts for the influences, interactions, and information needs of the participants in the delivery process. It includes a critical path analysis as an aid in achieving effective technology delivery for specific solar technologies. A monitoring system also has been developed to measure the effectiveness of the delivery process. Figure 5 shows the major elements of the model. This model assists in the creation of new solar technology transfer mechanisms capable of operating in a rapidly changing environment. The STTP is conducting a review of these analytical tools and strategies along with a general review of the Federal STTP through the formation of an oversight committee consisting of consumer groups, private industry, government agencies, industrial associations, solar energy associations, and education institutions.

Performing a major function in this Technology Delivery System is the National Laboratories Regional Outreach program. Outreach programs are targeted mainly at industry-related liaison groups. This program is the only operational regionalized solar commercialization capability currently available to DOE on a nationwide basis.

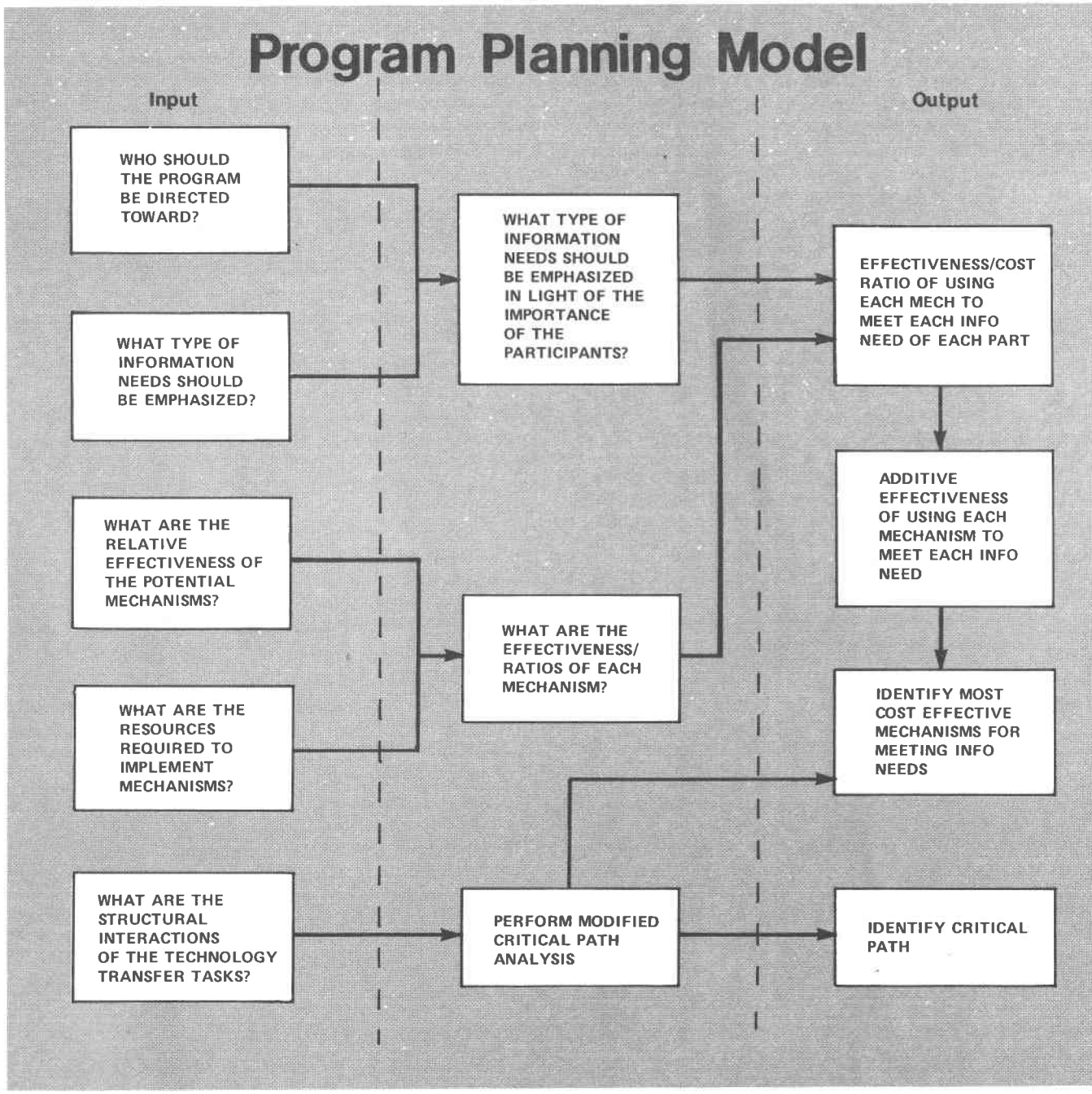
Program Planning Model
Input
Output
WHO SHOULD THE PROGRAM BE DIRECTED TOWARD?
WHAT TYPE OF INFORMATION NEEDS SHOULD BE EMPHASIZED?
WHAT ARE THE RELATIVE EFFECTIVENESS OF THE POTENTIAL MECHANISMS?
WHAT ARE THE RESOURCES REQUIRED TO IMPLEMENT MECHANISMS?
WHAT ARE THE STRUCTURAL INTERACTIONS OF THE TECHNOLOGY TRANSFER TASKS?
WHAT TYPE OF INFORMATION NEEDS SHOULD BE EMPHASIZED IN LIGHT OF THE IMPORTANCE OF THE PARTICIPANTS?
WHAT ARE THE EFFECTIVENESS/ RATIOS OF EACH MECHANISM?
PERFORM MODIFIED CRITICAL PATH ANALYSIS
EFFECTIVENESS/COST RATIO OF USING EACH MECH TO MEET EACH INFO NEED OF EACH PART
ADDITIVE EFFECTIVENESS OF USING EACH MECHANISM TO MEET EACH INFO NEED
IDENTIFY MOST COST EFFECTIVE MECHANISMS FOR MEETING INFO NEEDS
IDENTIFY CRITICAL PATH

Figure 5

Solcost

One of the four major informational needs of potential solar energy users is the economic feasibility of the solar technologies. In anticipation of these informational needs, STTP has coordinated the development of SOLCOST, a convenient, easily used tool that cost-optimizes proposed solar energy systems for space heating, cooling, and/or domestic hot water. SOLCOST, a digital computer design tool for solar energy systems, uses two national computer time-sharing networks (CDC's CYBERNET and GE's Mark III Service). This computerized information service provides a degree of standardization for the technology, lowers barriers to commercialization, provides small firms with a competitive position in relation to large firms, and provides numerous small business opportunities in the growing solar energy field.

Installer Training and Education

The STTP has been responsible for the development and distribution of an accredited correspondence course to train heating, air conditioning, and plumbing technicians in the required skills for installation, operation, and maintenance of solar systems.

In addition, the program office has begun work to develop a solar-related curriculum for elementary and high schools.

Plans

Figure 6—Solar Technology Transfer Program Key Activities—illustrates STTP's continuing efforts toward meeting its early impact objectives. Future program plans include expanding the National Laboratories Outreach activities, implementing the Technology Transfer and Delivery System developed specifically for the program; and, in general, broadening all activities within program elements, such as selecting a consortium of community colleges to develop and to disseminate instructor training procedures and curriculum materials.

The STTP will employ all the services of the Solar Energy Research Institute (SERI) as a resource for technical support. This coordinated effort will also be established with the four Regional Solar Energy Centers, using their services as multipliers in the outreach-to-industry effort. A cooperative relationship is planned with state energy offices, as well as with state legislative offices, to develop incentives for use of solar technology.

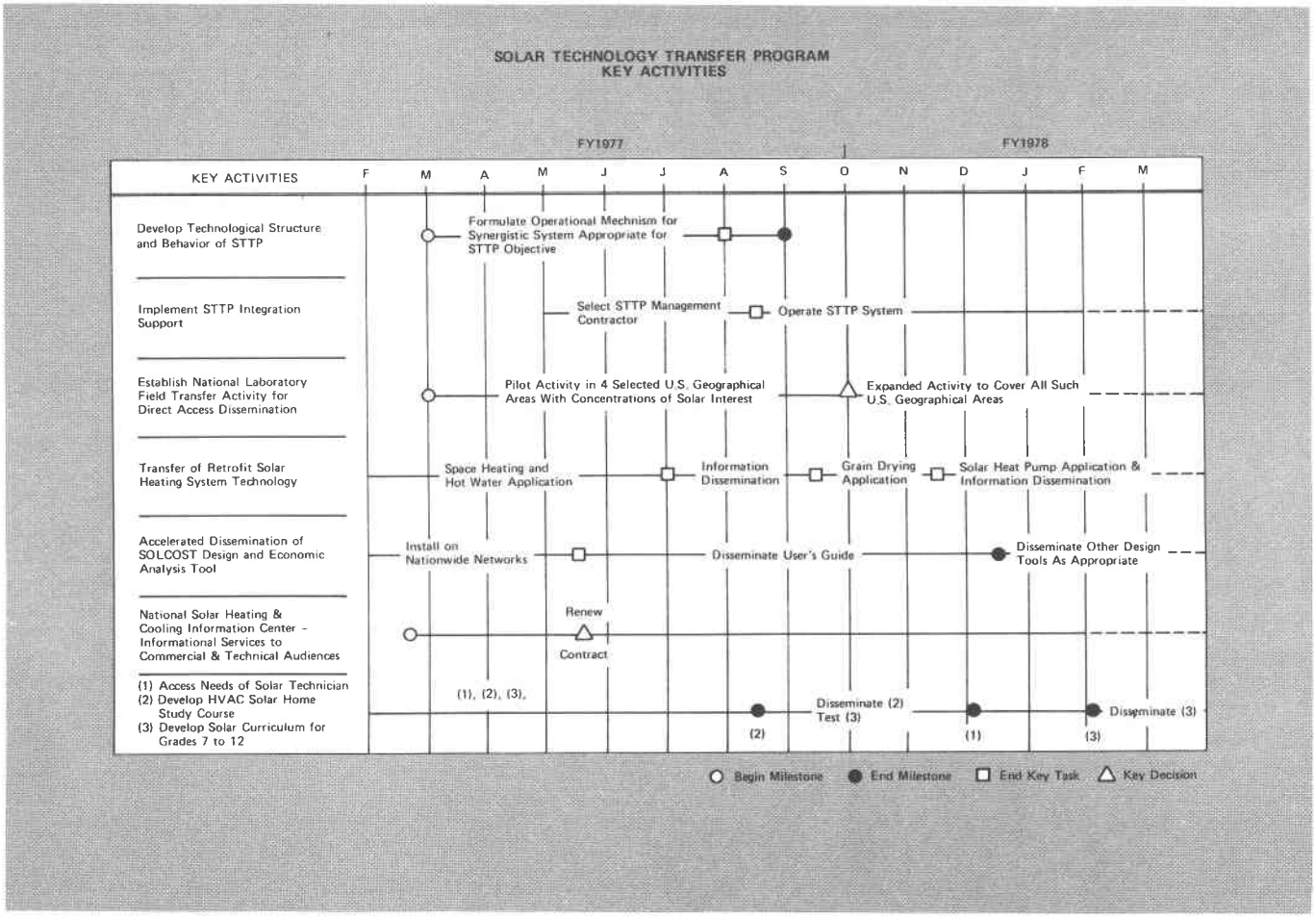
SOLAR TECHNOLOGY TRANSFER PROGRAM
KEY ACTIVITIES
FY1977
FY1978
KEY ACTIVITIES
F M A M J J A S O N D J F M
Develop Technological Structure and Behavior of STTP
Formulate Operational Mechnism for Synergistic System Appropriate for STTP Objective
Implement STTP Integration Support
Select STTP Management Contractor
Operate STTP System
Establish National Laboratory Field Transfer Activity for Direct Access Dissemination
Pilot Activity in 4 Selected U.S. Geographical Areas With Concentrations of Solar Interest
Expanded Activity to Cover All Such U.S. Geographical Areas
Transfer of Retrofit Solar Heating System Technology
Space Heating and Hot Water Application
Information Dissemination
Grain Drying Application
Solar Heat Pump Application & Information Dissemination
Accelerated Dissemination of SOLCOST Design and Economic Analysis Tool
Install on Nationwide Networks
Disseminate User's Guide
Disseminate Other Design Tools As Appropriate
National Solar Heating & Cooling Information Center - Informational Services to Commercial & Technical Audiences
Renew
Contract
(1) Access Needs of Solar Technician
(2) Develop HVAC Solar Home Study Course
(3) Develop Solar Curriculum for Grades 7 to 12
(1), (2), (3),
Disseminate (2) Test (3)
Disseminate (3)
(2)
(1)
(3)
Begin Milestone
End Milestone
End Key Task
Key Decision

Figure 6

The Organizational and Functional Responsibilities of the Program

The STTP is centrally managed at the DOE SOLAR headquarters in Washington. The STTP headquarters is establishing and operating the system on a regionalized basis. Program implementation is decentralized to the network of national labs and the Chicago Operations Office. SERI will play an important technical support role. The Energy Extension Service (EES), to be implemented on a state-by-state basis, will establish localized channels for communication and feedback.

The STTP employs the services of two major contractors with programmatic responsibilities. One contractor, Mitre/Metrek, is responsible for the operational system design. Its functional responsibilities include:

- Developing a structural model of the Solar Technology Transfer and Delivery System that will be used as a program planning tool in the formulation and management of effective information outreach programs directed toward the commercialization of five early impact technologies;
- Developing a monitoring system for evaluating program efficiency and effectiveness;
- Coordinating oversight committee advisory activities whose tasks include the review of program analytic tools and strategies, and the general review of Federal solar technology transfer efforts; and
- Preparation of a report containing the details of the oversight committee review of Federal solar technology transfer programs.

The second contractor employed by STTP for programmatic responsibilities is International Business Services. This corporation is responsible for system integration. Its specific programmatic responsibilities involve:

- Integrating and coordinating outreach planning and implementation for the five early impact technologies using a structural model of technology transfer and delivery system, as well as a strategy for monitoring system efficiency and effectiveness;
- Maintaining baseline files for the participants, principal decision makers, and multipliers comprising the system;
- Coordinating all STTP activities;
- Consumer representation planning;
- Preparing selected information packages.

The STTP headquarters organization is presented in Figure 7. Program management of the National Solar Heating and Cooling Information Center refers to those activities of the center which are directly tasked by SOLAR.

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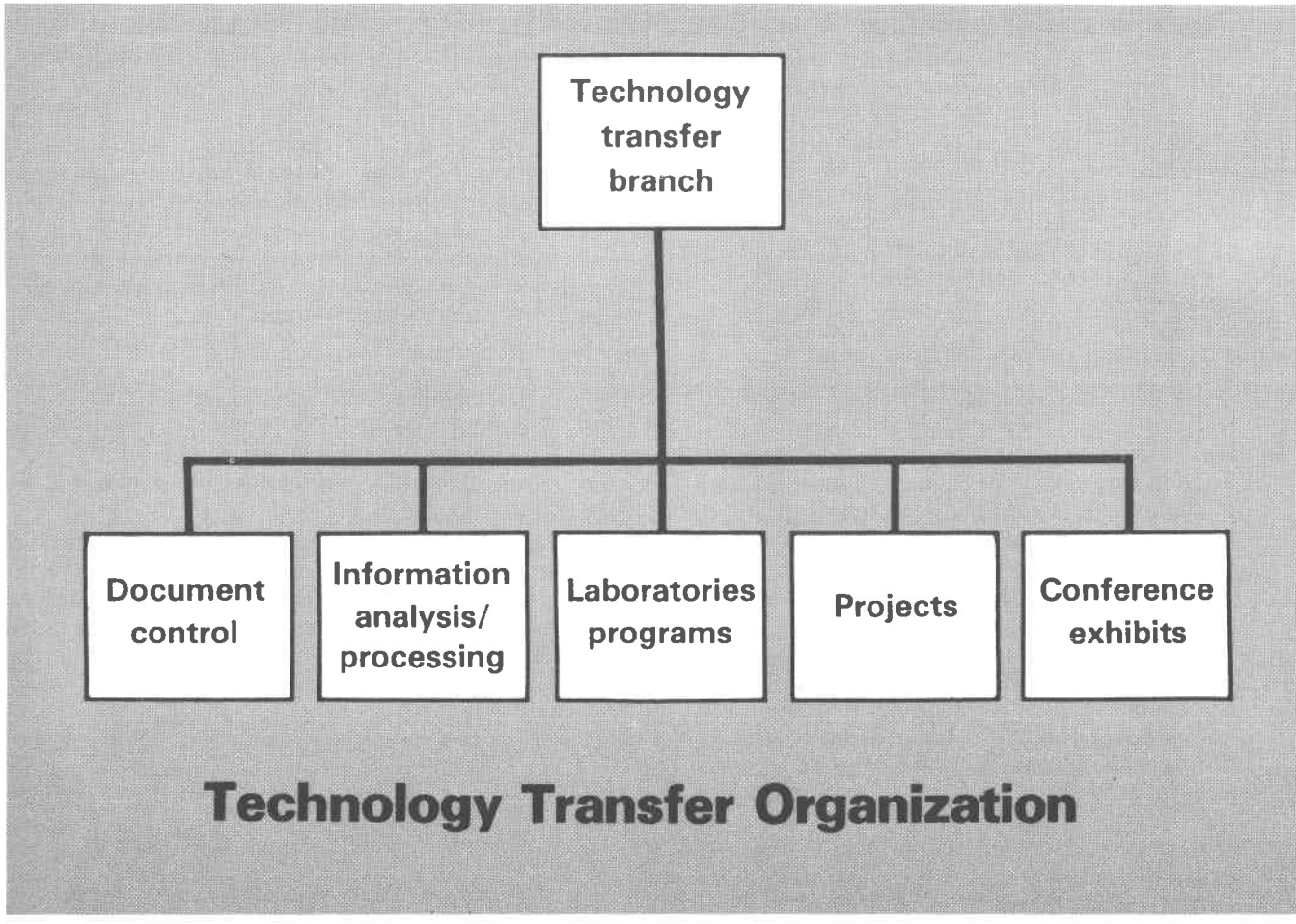
Technology transfer branch
Document control
Information analysis/ processing
Laboratories programs
Projects
Conference exhibits
Technology Transfer Organization

Figure 7

Table 1
FY 1977 Summary Tables
Program Element
National Laboratories Regional Outreach

Organization	Title	Projected Contribution
Sandia Laboratories	Solar Energy Technology Transfer in the Southwest (NM, COLO)	Identifies organizations most suited to accelerate commercial development of solar technology.
Lawrence Livermore Laboratory[1]	Solar Technology Transfer in the West	Accelerates dissemination of technical information to industrial and professional organizations, and state and local governments.
Battelle-Pacific Northwest Laboratories[2]	Solar Technology Transfer for the Pacific Northwest	Implements regional technology transfer delivery program on a regional basis.
Oak Ridge National Laboratories[3]	Solar Technology Transfer in the South	Implements regional technology transfer delivery program on a regional basis.
Brookhaven National Laboratories[4]	Solar Technology Transfer Program in the Northeast	Implements regional technology transfer delivery program on a regional basis.

[1]California, Nevada, Arizona, Hawaii.
[2]Washington, Oregon, Idaho, Montana, Utah, North Dakota, South Dakotal Alaska.
[3]Virginia, North Carolina, South Carolina, Kentucky, West Virginia, Tennessee, Texas, Arkansas, Alabama, Florida, Georgia, Mississippi, Louisiana.
[4]New Hampshire, Vermont, Maine, New York, New Jersey, Massachusetts, Rhode Island, Maryland, Delaware, District of Columbia, Pennsylvania.

Table 2
FY 1977 Summary Tables
Program Element
Installer Training and Education

Organization	Title	Projected Contribution
Navarro Community College	Assessment of Need for Developing and Implementing Technical and Skilled Worker Training for the Solar Energy Industry	Develops information required in the design of a solar technician curriculum.
State University of New York at Albany	Development, Pilot Testing and Infusion of Solar Energy Related Curriculum Materials into Secondary School Programs (Grades 6-12)	Provides curriculum materials for introduction of solar energy concepts at the secondary and high school levels.
Sheet Metal and Air Conditioning Contractors' National Association, Inc.	An Independent Study Program for Installation and Operation of Solar Space Heating and Cooling and Domestic Water Heating for Residential Structures	Develops an accredited home study course in the installation and maintenance of solar heating and cooling equipment for technicians with skills in the air conditioning and plumbing crafts.

Table 3
FY 1977 Summary Tables
Program Element
Information Dissemination

Organization	Title	Projected Contribution
DOE Technical Information Center	Reporting and Disseminating Technical Information	Disseminates information resulting from DOE funded energy projects. Support to the Solar Technology Transfer Program regional outreach activity.
Norman Hodges and Associates	Development of a Rapid Response Solar Technology System and Implementation within the Minority Community	Provides for widespread dissemination of solar information to the minority community.
McGraw-Hill Information Systems, Co.	Indexing, Classifying, and Dissemination of Solar Information in Sweet's Catalog	Disseminates solar technical information through established medium.
Franklin Institute	Solar Heating and Cooling Information Dissemination	Integrates efforts of DOE and Department of Housing and Urban Development in disseminating solar information

Table 4
FY 1977 Summary Tables
Program Element
Workshops, Conferences, and Exhibits

Organization	Title	Projected Contribution
Franklin Institute	Solar Conference Exhibits-Scheduling, Constructing, Transporting, and Maintenance	Provides exhibits for display which will facilitate informing the public as well as technical audiences on the DOE solar research and development programs.
Office of Public Affairs Department of Energy	Solar Conference Exhibits-Scheduling, Constructing, Transporting, and Maintenance	Provides exhibits for display which will facilitate informing the public as well as technical audiences on the DOE solar research and development programs.
International Business Services, Inc.	Solar Technology Transfer Workshop I	Provides forum for planned technology transfer activities for national laboratories personnel.
University of Delaware	Conference on Sharing the Sun	Disseminates solar data through technical working meetings.
DOE Pittsburgh Energy Research Center	Carnegie-Mellon University Solar Symposium	Provides for citizen participation in energy related matters.
International Solar Energy Society	1977 International Solar Energy Society Meeting (American Section)	Provides channel of communication with professional society membership.

Organization	Title	Projected Contribution
Interuniversity Communication Council	Background Analysis of Extension Services	Provides review and analysis of Federal and state energy extension programs.
University of Miami	Preparation, Execution and Evaluation of Conference "Alternative Energy Sources—A National Symposium"	Conducts national symposium and evaluation of its effect in the technology transfer process.
University of Michigan	Midwest Solar Energy Conference at the University of Michigan	Conducted outreach effort aimed at manufacturers, engineers, and architects.
International Business Services, Inc.	Development of Exhibits	Provides for SOLCOST exhibits for use at conferences.
Oak Ridge Associated Universities	Solar Conference Exhibits	Provides for solar exhibits for use at conferences.
Division of Solar Technology, Public Affairs Office	Solar Conference Exhibits	Provides for solar heating and cooling exhibits for use at conferences.
Northwest College and University Association for Science	Showing of the Solar Conference Exhibit	Provided for display of solar exhibits.
U.S. Department of Agriculture	Retrofit Test of the General Electric Solar Air Source Unit	Provides for testing and monitoring of solar equipment applied to an existing residential structure and to exhibit applicability of solair source unit for agricultural applications.
Franklin Institute	Solar Conference Exhibits	Provides for solar heating and cooling exhibits for use at conferences.

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Table 5
FY 1977 Summary Tables
Program Element
Program Support

Organization	Title	Projected Contribution
International Business Services, Inc.	Implementation of a Solar Energy Technology Transfer System in Support of Early Impact Objectives	Provides for accelerating use of SOLCOST services and other computer aides for the residential and commercial industries.
International Business Services, Inc.	Solcost Information Dissemination	Introduces SOLCOST to broad segments of population through user oriented documents and display materials.
Solar Environmental Engineering Company	SOLCOST Technical Support	Serves as the center for SOLCOST services to individuals and organizations.
Solar Engineering Publishers, Inc.	Development of a List of Titles and Manufacturers	Provides indexing of solar equipment manufacturers and products.
OAO Corporation	Development of Formatted Responses and Processing Assistance	Provides for rapid response to solar energy inquiries.
MITRE Corporation (METREK Division)	Analytic Tools and Strategies for Solar Energy Technology Transfer	Provides procedures for effective technology transfer process; models the technology transfer delivery system; provides management of the delivery process.
International Business Services, Inc.	Solar Technology Transfer Program	Defines activities required for acceleration of solar Technology Transfer.

Table 6
FY 1977 Summary Tables
Program Element
Consumer Representation

Organization	Title	Projected Contribution
Brookhaven National Lab	New England Electric Task Force	Reviews New England Electric Solar Hot Water Experiment; Provides consumer protection guidelines for HUD hot water initiative.
MITRE Corporation (METRE Division)	Committee Assessing Federally Funded Solar Technology Transfer Activities	Provides independent evaluation of the federally funded solar technology transfer programs, ongoing and planned.