

BY THE COMPTROLLER GENERAL

**Report To The Chairman,
Select Committee On Small Business,
United States Senate**

OF THE UNITED STATES

**Small Business Participation In
The Department Of Energy's
Solar Energy Programs**

The Department of Energy needs to take additional steps to encourage small business participation in its solar energy programs. Although the Department's goal is to have about 20 percent small business participation in its overall energy programs in fiscal year 1980, it estimates that small business will receive about 14.5 percent of the Department's solar budget.

Some program officials established their own informal goals for using small businesses, while others have not. GAO recommends that formal goals be established for the overall solar program areas as well as for each solar energy program. In addition, GAO recommends that (1) priority attention be given to correcting problems with the Department's Integrated Procurement Management Information System so that small business participation can be more closely monitored and that (2) emphasis be placed on providing special training for solar program officials to help them better understand small business problems.



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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-200310

The Honorable Gaylord Nelson
Chairman, Select Committee on
Small Business
United States Senate

Dear Mr. Chairman:

Your March 6, 1980, letter requested that we review a number of matters regarding small business participation in the Department of Energy's (DOE's) solar energy programs. Pursuant to your request, and as agreed with your office, this report discusses

- the extent small businesses participate in DOE's solar energy programs,
- DOE's efforts to encourage innovativeness by small businesses in the solar area,
- the background and experience key DOE officials have in dealing with small businesses, and
- DOE's funding for centralized versus decentralized solar power generation.

We conducted our review primarily at DOE's headquarters office in Washington, D.C. We also contacted officials of the Washington, D.C., headquarters offices of the Small Business Administration and the National Bureau of Standards, and representatives of 70 small business firms located throughout the country. Our objectives, scope, and methodology for this review are discussed in more detail in appendix I.

BACKGROUND

The Department of Energy Act of 1978, Civilian Applications (42 U.S.C. 7256 note) requires the Secretary of Energy to provide a realistic and adequate opportunity for small business concerns to participate in DOE programs to the extent feasible, consistent with the size and nature of the projects

and activities involved. 1/ Although DOE has taken some actions to encourage small business participation in carrying out its various energy programs, some Members of Congress and small businesses have criticized DOE for not doing enough to encourage the use of small businesses. Similarly, we have issued several reports in recent years which addressed, at least in part, the need for DOE to improve its efforts to encourage the use of small businesses in carrying out Federal energy programs. Our most recent of these reports, "Need to Increase DOE's Efforts to Encourage Small Business Contracting" (EMD-79-83, June 26, 1979), pointed out, among other things, that DOE needs to (1) improve procedures for setting small business goals and (2) ensure that there is adequate monitoring of small business participation in the procurement process. A listing of our prior reports which address DOE's efforts to use small businesses is presented in appendix II. This report expands on our previous work, while focusing specifically on small business participation within DOE's solar energy programs.

EXTENT OF SMALL BUSINESS
PARTICIPATION IN SOLAR
ENERGY PROGRAMS

Small businesses have received as much as 24.7 percent of solar program funding in past years, but DOE estimates the small businesses' share for fiscal year 1980 to be about 14.5 percent. Historically, the direct funding of small businesses for carrying out Federal solar energy programs has been relatively low (about 10 percent or less) compared with the amount directly funded to national laboratories, DOE field offices, large corporations, and other Federal agencies. However, the role of small businesses increases substantially when subcontracts are considered. According to DOE officials, this is primarily because management of DOE's solar energy programs has been, to a large extent, decentralized. Under DOE's decentralized approach to management, other Federal agencies, DOE field organizations, and laboratories have been given day-to-day management responsibilities of major segments of the solar energy programs. Therefore, they receive large amounts of funds directly from DOE headquarters to carry out their

1/DOE defines a small business concern as one, including its affiliates, which is independently owned and operated, is not dominant in the field of operation in which it is bidding on Government contracts, and which can further qualify under criteria set forth in regulations of the Small Business Administration.

responsibilities. With increased attention being given by DOE to expanding the responsibilities of the Solar Energy Research Institute and the Regional Solar Energy Centers in recent years, greater amounts are directly funded to such organizations. The records of DOE's Office of the Controller show that for fiscal year 1979, DOE directly funded over 60 percent of the solar budget with other Federal agencies, and DOE field offices and laboratories. A detailed breakout, for fiscal year 1979, of the extent various organizations received direct funding from DOE in the solar program area is shown in appendix III.

Although the records indicated that small businesses received only about 4.7 percent of DOE's direct funding in fiscal year 1979, small businesses got much more involved in the solar energy programs by becoming subcontractors to those organizations directly funded by DOE. For example, Techmatics Corporation, in a study conducted for the former Energy Research and Development Administration (ERDA), ^{1/} reported that 7.1 percent of the fiscal year 1976 (including the transition quarter) solar budget of \$94.3 million was funded directly to small businesses. In total, however, small businesses reportedly received about 24.7 percent of the solar budget after subcontracts were considered. A similar DOE study of the fiscal year 1977 solar budget showed that small business participation in the solar energy programs is substantially higher when subcontracts are considered.

Although DOE has conducted studies which show small business participation in DOE's overall programs, no such studies have been made which specifically examine small business participation in the overall solar energy programs for fiscal years 1978 or 1979. However, based on an internal survey, DOE has estimated small business participation in the solar energy programs for fiscal year 1980. The survey indicated that about \$77 million of the nearly \$530 million available for funding in fiscal year 1980, or 14.5 percent, will be funded to small businesses.

DOE's survey was conducted in April 1980, about half way through the fiscal year. Thus, we could only identify about 35 percent of the \$77 million as actually going to small businesses from the backup data to this survey. The remainder was either planned or estimated. Moreover, we noted that about

^{1/}ERDA's programs were absorbed by DOE, effective Oct. 1, 1977.

\$127 million of construction funds was excluded from the survey. These funds may or may not go to small businesses.

To see if better information was available, we also examined small business procurement data in DOE's Integrated Procurement Management Information System (IPMIS). In our June 26, 1979, report we noted that IPMIS was not delivering adequate information on small businesses. In commenting on that report, DOE indicated that it expected the system to be fully operational by September 1979. At the time of our review in June 1980, however, the system did not include all organizations directly funded by DOE, and some data which it did include were erroneous. Furthermore, the system did not contain subcontracting information on small businesses. Thus, although IPMIS could provide a tool for monitoring small business participation in DOE's programs, it does not yet have that capability. DOE officials told us they now expect to correct, by October 1980, the erroneous data on organizations receiving direct funding. They also told us they expect the system to provide summary information showing small business subcontracts early in calendar year 1981.

Assuming that the 14.5-percent funding level for fiscal year 1980 is indicative of the extent small businesses are participating in DOE's solar energy programs, DOE lacks a yardstick to determine whether that degree of participation is appropriate. In accordance with the Small Business Act, as amended (15 U.S.C. 644), DOE's Office of Small and Disadvantaged Business Utilization has set DOE-wide goals for using small businesses. In fiscal year 1979, the goal was 15 percent of DOE's total procurement (contract award dollars), and for fiscal year 1980, the goal was increased to 20.1 percent. To help reach these goals, subgoals have been assigned to DOE buying offices, such as those located at DOE's field offices, laboratories, and major contractors. For example, the Solar Energy Research Institute was assigned a 23-percent small business utilization goal for fiscal year 1980. However, no goals were established for the various program offices, including those for solar energy. According to officials of DOE's Office of Small and Disadvantaged Business Utilization, upper level program managers were made aware of DOE-wide goals but were not given specific goals for their respective programs. These officials also told us they thought that the DOE-wide goals could be met through DOE's buying offices.

In the June 26, 1979, report, we recommended that the Secretary of Energy improve the goal-setting procedures by obtaining input from various DOE entities, including the program offices. As indicated by that recommendation, we believe

the program offices' active participation is necessary to establish realistic goals. For example, program managers often set forth the work that is to be contracted out and make recommendations, primarily from a technical or scientific standpoint, on the entities to be awarded contracts. Furthermore, the extent that small business participation may be appropriate would vary among the programs, depending largely on each program's phase of development.

With no specific mandates to do so, the extent small business goals were developed and applied in the various solar energy programs was at the discretion of individual solar program managers. Many of these managers apparently recognized the merit of having their own goals for small business participation and established informal goals, which ranged from 10 to 20 percent. These managers generally felt that these goals were an important measure for determining the successfulness of their efforts to encourage small business participation. Other managers, however, established no goals.

Recently, DOE's Assistant Secretary for Conservation and Solar Energy has recognized the need for small business goals. In a letter dated July 10, 1980, to the Chief Counsel for Advocacy, Small Business Administration, the Assistant Secretary stated he has required all programs to submit planned small business goals for fiscal year 1981. However, whether such goals will be determined solely at the discretion of individual program managers or if they will be formulated as part of DOE's overall small business goal is not clear.

DOE'S EFFORTS TO ENCOURAGE
INNOVATIVENESS BY SMALL BUSI-
NESSES IN THE SOLAR AREA

To develop and commercialize solar technologies as quickly as possible will, to a large extent, require innovative techniques for developing and/or applying new technologies. DOE has two programs which are intended to encourage innovations by small businesses. Neither of the programs was designed especially for encouraging solar-related ideas, and both are relatively small, compared to the overall solar budget. Within the solar energy programs, we did not identify any specific program designed to encourage innovative ideas by small businesses. However, individual solar program managers have used various funding approaches to encourage innovativeness by small businesses within their respective programs.]

The two DOE-wide programs designed to encourage ideas--the Energy Related Inventions Program and the Appropriate Energy Technology Small Grants Program--are carried out and managed by DOE's Office of Small Scale Technology. ^{1/} The Energy Related Inventions Program, begun in fiscal year 1975, provides an opportunity for individuals and small businesses to obtain Federal assistance in developing their nonnuclear, energy-related inventions. Similarly, the Appropriate Energy Technology Small Grants Program, begun in fiscal year 1979, provides financial assistance to individuals and small businesses, among others, for projects which are small in scale; are energy efficient; use local materials, labor, and ingenuity; and maximize the use of renewable energy resources.

The combined funding for these programs in fiscal year 1979 was about \$12 million, which was used to support 600 projects. About \$847,000 of this amount was funded for 47 solar-related projects proposed by small businesses as shown below.

<u>Program</u>	<u>Small business solar-related projects</u>	<u>Amount funded to small businesses</u>
Energy Related Inventions	1	\$110,000
Appropriate Energy Technology Small Grants	<u>46</u>	<u>736,840</u>
Total	<u>47</u>	<u>\$846,840</u>

In view of the size of the overall funding of the DOE solar energy programs--about \$515 million in fiscal year 1979--the funding of these two programs for solar-related small business projects appears rather small.

Within the various solar energy areas, no specific program exists to encourage innovative ideas by small businesses. However, DOE solar program officials have funded such ideas

^{1/}This office is the responsibility of the Deputy Assistant Secretary for State and Local Assistance Programs, who reports directly to the Assistant Secretary for Conservation and Solar Energy.

through unsolicited proposals, Program Research and Development Announcements (PRDAs), and/or Program Opportunity Notices (PONs). 1/

One of the most common ways DOE and solar program officials support innovative ideas is by funding unsolicited proposals. These proposals are generally submitted solely on the proposer's initiative to carry out research and/or demonstration activities which do not duplicate work already underway or contemplated by DOE.

In fiscal year 1979, at the request of DOE's procurement office, several DOE Assistant Secretaries collectively established a \$2.05-million reserve to support unsolicited proposals by meritorious small/disadvantaged businesses. Although \$400,000 was reserved for solar-related proposals, DOE officials could only document that about \$251,000 was spent for solar-related proposals. They told us additional proposals may have been funded, but a formal tracking system was not set up to ensure that all funded solar-related projects were identified. In fiscal year 1980, DOE's procurement office requested that another reserve be established, but the Assistant Secretary for Conservation and Solar Energy did not participate. In August 1980, solar program officials told us they plan to set aside \$300,000 in the fiscal year 1981 reserve for unsolicited small business proposals.

Although PRDAs and PONs have been used to encourage innovative ideas, small businesses must compete with large businesses and universities for the projects. In fiscal year 1979, \$10.9 million of the solar energy programs' funding was through PRDAs and PONs. Of this amount, about \$1.2 million (11 percent) went to small businesses.

There is a widespread belief that small businesses could be particularly useful in generating innovative solutions to the Nation's energy problems. For example, over the past several years a number of studies have shown small businesses can

1/DOE uses PRDAs and PONs to announce broadly defined areas of interest to encourage proposals from individuals; private entities; or public entities, excluding Federal agencies. PRDAs solicit ideas, which will serve as a basis for research, development, and related activities in the energy field. PONs solicit ideas for nonnuclear energy demonstrations.

be an important source of innovative ideas. ^{1/} However, many small businesses are wary of competing for Government funds even if they are aimed at supporting innovative ideas because of problems they have faced in obtaining such funds. Some small companies told us they never received replies to their unsolicited proposals. Other small firms told us they do not have the money or time to invest, as opposed to large firms, in trying to get Government energy work. As a result, representatives of some small firms told us they have given up trying to compete for DOE's solar energy funds.

BACKGROUND AND EXPERIENCE
OF DOE SOLAR OFFICIALS

The prior work experience of 14 key DOE officials associated with the solar energy programs indicates that these officials have had only limited small business experience. The following table shows the prior work experience of these DOE officials.

<u>Type of employment</u>	<u>Officials having such experience (note a)</u>	
	<u>Number</u>	<u>Percent</u>
Government (note b)	13	93
University	4	29
Large private industry	5	36
Small private industry	2	14

a/Amounts do not add to 14 or 100 percent because many officials had a variety of prior work experience.

b/For purposes of this review, we included the work experience at DOE laboratories as Government experience. Although contractor operated, these laboratories essentially function as in-house entities.

^{1/}These studies include: "Small Firms and Federal Research and Development," Report of the Office of Procurement Policy, Office of Management and Budget, Executive Office of the President, March 10, 1977; "Indications of International Trends in Technological Innovation," Gellman Research Associates, for the National Science Foundation, April 1976; "Technological Innovation, Its Environment and Management," U.S. Department of Commerce, January 1967.

Half of the officials had previous work experience in private industry. Of these, two had experience with small firms, one worked for an oil company, another previously worked for a public utility, and three had experience with manufacturing firms.

To a certain extent, the lack of experience working in a small business environment can be overcome through education and special training programs. Accordingly, we obtained information on the education and training of these key officials. Most of the officials hold advanced degrees in disciplines such as engineering, the physical sciences, and mathematics. Overall, it appears that these officials are well qualified for managing the technical aspects of their respective programs. However, we found no evidence that these officials have taken formal or informal courses which would be helpful in encouraging them to use small businesses. Only a few completed some general business or financial courses.

Special training aimed at understanding the needs and problems faced by small businesses has been available to these officials. In December 1979, DOE held a 1-day seminar on contracting with small and disadvantaged firms. The purpose of the seminar was to increase the awareness, understanding, and sensitivity toward small businesses in carrying out program plans. Although the seminar was designed for 60 DOE contracting and program officials, only 27 from throughout DOE attended. None from the solar energy programs attended.

In view of the limited experience DOE officials have in working in a small business environment and their apparent lack of small business training, we believe participation in special training, such as the seminar mentioned previously, could help provide a greater sensitivity and awareness of small business problems. This, in turn, might lead to a greater use of small businesses in carrying out the solar energy programs.

Several DOE solar program officials told us that while they recognize some of the problems small businesses face, they are concerned about getting the job done. Some noted that relying on small businesses to accomplish program objectives is generally more risky. Others said they have had difficulty in finding a small firm that has the unique technical capabilities they need. A few said that their primary concern is finding the best contractor for the job, not whether the company is big or small.

CENTRALIZED VERSUS DECENTRALIZED
SOLAR POWER GENERATION

In fiscal year 1979, about 38.6 percent (or \$199 million) of the DOE solar budget was for work primarily directed toward decentralized solar energy systems, while 22.9 percent (\$118 million) was primarily aimed at developing centralized solar energy systems. The balance was applicable to both solar energy systems. A breakout of the solar energy budget by program is contained in appendix IV.

It should be noted, however, that our categorization of the solar budget includes a number of subjective judgments as to whether such work is primarily for centralized or decentralized systems. We made the categorizations based on DOE budget documents and discussions with knowledgeable program officials. Some officials cautioned, however, that some experts may view their work to be more appropriately classified in some other manner.

CONCLUSIONS

According to DOE, small businesses are to receive about 14.5 percent of the solar budget in fiscal year 1980. DOE, however, lacks a yardstick to determine whether such a percentage is appropriate and has not related this percentage to DOE's overall small business goal of 20.1 percent for fiscal year 1980. Although DOE-wide goals have been established, solar-wide goals have not. Some individual solar energy program managers, however, have established goals for their respective programs. Since goals can be an important measure of DOE's successfulness in encouraging small business participation, we believe goals for using small businesses should be established for each of the solar programs. Recently, the Assistant Secretary for Conservation and Solar Energy initiated steps in this direction by requiring all programs under his direction to develop small business goals for fiscal year 1981. We agree that such goals are needed for the solar energy programs. At the time of our review, it was not clear whether such goals would be formulated in the context of DOE's overall procurement goal for small businesses.

To evaluate each program against its respective goals, small business participation in the solar energy programs needs to be more closely monitored. DOE's IPMIS system has not yet provided reliable information. In view of past delays in correcting this system, we are concerned that further delays may be encountered in providing accurate data on small business participation, particularly with respect to including subcontracting information in the system in early 1981.

(Only two of the key DOE solar program officials included in our review have had any experience in working in a small business environment. In addition, none had any apparent training aimed at understanding the difficulties that small businesses face. We believe that special training could help solar program officials better understand small business problems and thereby lead to greater use of small businesses in carrying out their respective programs).

RECOMMENDATIONS

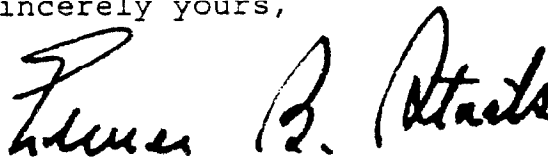
To better ensure that small businesses have a meaningful role in carrying out DOE's solar energy programs, we recommend that the Secretary of Energy:

- Direct that goals be established for using small businesses in the solar energy programs as a whole, and for individual solar energy programs. Such goals should be considered in formulating DOE's overall procurement goals for small businesses.
- Give priority attention to correcting existing problems surrounding the use of DOE's Integrated Procurement Management Information System and to monitoring the continuing development of the system to ensure adherence to the present schedule for incorporating summary data on subcontracts.
- Emphasize the need for solar program officials to obtain training to become more sensitive and aware of small business problems.

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As requested by your office, we did not obtain official DOE comments on this report. Also, as arranged with your office, copies of this report are being sent to DOE, the Office of Management and Budget, and interested congressional committees. Copies will also be available to other interested parties upon their request.

Sincerely yours,



Comptroller General
of the United States



OBJECTIVES, SCOPE, ANDMETHODOLOGY

By letter dated March 6, 1980, the Chairman, Senate Select Committee on Small Business, requested us to examine a number of matters related to small business participation in the Department of Energy's (DOE's) solar energy programs. Pursuant to the Chairman's request, and as agreed with his office, we examined

- the extent small businesses participate in DOE's solar energy programs,
- DOE's efforts to encourage innovativeness by small businesses in the solar area,
- the background and experience key DOE officials have in dealing with small businesses, and
- DOE's funding for centralized versus decentralized solar power generation.

We considered our prior reports addressing DOE's efforts to encourage small business participation in its contracts. We focused our work primarily on the solar energy programs under the purview of DOE's Deputy Assistant Secretary for Solar Energy. 1/

We conducted our work primarily at DOE's headquarters in Washington, D.C. We also contacted officials at the Washington, D.C., headquarters offices of the Small Business Administration, and the National Bureau of Standards.

We interviewed responsible DOE officials and examined DOE's budgetary and planning documents, reports generated by various DOE information systems, personnel files of 14 key DOE solar program officials, DOE correspondence and internal reports, and other available records. In addition, we contacted over 70 small business firms involved in solar energy located throughout the country to obtain their views and perceptions regarding DOE's efforts to use small businesses.

1/The major programs include (1) fuels from biomass, (2) photovoltaic energy systems, (3) wind energy systems, (4) solar thermal energy systems, (5) ocean thermal energy systems, (6) research and development of active and passive solar heating and cooling systems, and (7) test and commercial application.

In examining the extent small businesses participate in DOE's solar energy programs, we focused on

- the validity of DOE's estimates of small business participation in the solar energy programs,
- DOE's capabilities to track small business involvement in the solar energy programs, and
- the extent goals are used to ensure that small businesses have a meaningful role in carrying out solar energy programs.

With respect to DOE's efforts to encourage innovativeness by small businesses in its solar energy programs, we explored DOE's programs and other mechanisms intended to help accomplish this objective. This involved examining the impact of DOE-wide efforts on the solar programs, as well as exploring whether any special efforts were taken within the solar programs themselves.

We obtained information on the experience and training of 14 key officials associated with DOE's solar energy programs primarily from DOE personnel records. These officials were branch chiefs or higher at DOE headquarters. Most of them were responsible for carrying out specific solar energy programs. We also interviewed DOE officials to obtain information on the availability of courses, seminars, or other training activities which might help heighten solar program managers' awareness and sensitivity to the merits of, and constraints on, small business participation in their respective programs.

Finally, we obtained information on DOE's funding of centralized versus decentralized solar power generation by analyzing the various budget elements of DOE's solar energy programs. Since some of the solar programs are in the relatively early phases of development, it is not yet known whether many of the solar technologies being developed will eventually be used in either centralized or decentralized systems. Hence, we obtained the assistance of knowledgeable DOE program officials to help us in making some of our analyses.

LIST OF PRIOR GAO REPORTS ADDRESSINGDOE'S EFFORTS TO USE SMALL BUSINESSES

1. "Comments on Certain Management and Funding Aspects of Selected Non-Nuclear Energy Subprograms" (EMD-77-24), Feb. 25, 1977.
2. "DOE Small Business Procurement Practices" (EMD-78-103), Aug. 10, 1978.
3. "The Mandatory Small Business Subcontracting Test: Considerations For Public Law 95-507's New Subcontracting Program" (PSAL-79-66), May 11, 1979.
4. "Need to Increase DOE's Efforts to Encourage Small Business Contracting" (EMD-79-83), June 26, 1979.

THE EXTENT VARIOUS ORGANIZATIONS
RECEIVED DIRECT FUNDING FROM DOE
IN THE SOLAR PROGRAM AREAS

<u>Type of organization</u>	<u>Fiscal year 1979</u>	
	<u>Amount obligated (note a)</u>	<u>Percent of total</u>
	(millions)	
DOE field offices and laboratories	\$ 90.9	19.3
Other Federal agencies	118.6	25.2
Large businesses	112.7	23.9
Small businesses	22.0	4.7
Universities	31.5	6.7
Non-profit institutions (note b)	86.7	18.4
Miscellaneous organizations (note c)	2.6	.6
Not identifiable (note d)	<u>5.8</u>	<u>1.2</u>
Total	<u>\$470.8</u>	<u>100.0</u>

a/These figures do not include amounts carried over into fiscal year 1980.

b/This category primarily includes funding to the Solar Energy Research Institute, which is a Government laboratory operated by a non-profit institution.

c/Includes State and local governments.

d/These funds could not be classified by type of organization from DOE's official records.

COMPARISON OF DOE'S FISCAL YEAR 1979 BUDGET
AUTHORITY FOR CENTRALIZED VERSUS DECENTRALIZED POWER
GENERATION IN THE SOLAR PROGRAM AREAS (note a)
 (in millions)

<u>Solar program areas</u>	<u>Primarily centralized</u>	<u>Primarily decentralized</u>	<u>Applicable to both</u>	<u>Total</u>
Fuels from Biomass	\$ -	\$ 16	\$26	\$ 42
Photovoltaic Energy Systems	-	24	80	104
Wind Energy Systems	20	8	32	60
Solar Thermal Energy Systems	53	-	45	98
Ocean Thermal Energy Systems	41	-	-	41
Market Analysis	-	3	3	6
System Development	-	c/41	-	41
Test and Commercial Application	-	d/107	-	107
Solar Energy Research Facility	-	-	3	3
Program Direction and Support	b/4	-	9	13
Total	<u>\$118</u>	<u>\$199</u>	<u>\$198</u>	<u>\$515</u>
Percent of Total	22.9	38.6	38.5	100.0

a/The precise emphasis DOE is placing on centralized power generation compared with decentralized power generation is subject to different opinions. Many of the solar technologies being developed eventually might be used in either a centralized or decentralized mode of operation. Until systems for such technologies are fully developed, categorizations on how they will eventually be used is, to a certain extent, debatable.

b/This amount is for research and development of active and passive solar heating and cooling systems.

c/Includes demonstrations of various solar technologies for private buildings, Federal buildings, farm uses and industrial applications.

d/Includes amounts for solar power satellite research.





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