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BY THE COMPTROLLER GENERAL
 Report To The Chairman, Subcommittee
 On Energy Conservation And Supply
 Committee On Energy And Natural Resources
 United States Senate
 OF THE UNITED STATES

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**20-Percent Solar Energy Goal--
 Is There A Plan To Attain It?**

The President's June 1979 Solar Message established a national goal of meeting 20 percent of the Nation's energy needs from solar resources by the year 2000.

This report reviews the administration's efforts, primarily those of the Department of Energy, to attain this goal.

GAO observed that although several legislative initiatives and the creation of a Solar Subcommittee were called for by the administration, final actions have not been taken. GAO's primary concern, however, relates to the lack of a comprehensive plan for attaining the goal, and is recommending that the Secretary of Energy develop such a plan.



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EMD-80-64
 MARCH 31, 1980





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

B-198213

The Honorable John A. Durkin
Chairman, Subcommittee on Energy
Conservation and Supply
Committee on Energy and Natural
Resources
United States Senate

SEN 06307

Dear Mr. Chairman:

In a February 18, 1980 letter, you requested the General Accounting Office to examine the efforts being taken by the administration, primarily the Department of Energy (DOE), to attain the President's goal of meeting 20 percent of the Nation's energy needs from solar resources by the year 2000. Also, you asked for our report so that it could be of use to your Subcommittee during its upcoming hearings on the administration's 1981 budget request.

AGC 000912

The solar energy goal established by the President in his Solar Message of June 20, 1979, assumed a strong, concerted effort by Federal, State and local governments, private industry, and energy consumers. The President stated that the Federal Government has a responsibility for providing incentives, information, and the impetus for meeting the solar goal.

In his Message, the President enumerated approximately 50 elements or actions relating to the attainment of the solar goal. Some of these were identified as "key elements" including the establishment of a permanent standing subcommittee (Solar Subcommittee) of the Energy Coordinating Committee^{1/} to monitor and direct all Federal solar programs and a number of proposed legislative and other initiatives. Because of the extremely tight reporting deadline established by your request, we limited the scope of our work to reviewing the status of these key elements.

DLG 04352

^{1/}The Energy Coordinating Committee was established by the President in Sept. 1978 to provide for the coordination of Federal energy policies. See the footnote on page 9 in app. I for further details.

We conducted our work primarily at DOE headquarters offices. DOE is the lead agency for carrying out Federal solar programs aimed at achieving the 20-percent goal. Our work included a review of various solar strategy and budget planning documents and discussions with officials of DOE, the White House Domestic Affairs and Policy Staff, Office of Management and Budget, and the Agency for International Development.

Our comments on the status of the administration's efforts and primarily those of DOE are discussed in appendix I of this letter. Our observations and recommendations are highlighted below.

We observed that while the President called for several legislative initiatives and the creation of a Solar Subcommittee, actions are underway, but none have yet been finalized. Both of these could be crucial to the successful attainment of the solar goal. Our primary concern, however, relates to a total lack of a comprehensive plan for attaining the goal. Such a plan, in our opinion, should (1) establish interim goals, (2) contain specific actions needed to attain the goals, and (3) identify the roles and responsibilities of other Federal agencies to meet the goals. Also, the plan should be periodically reviewed to determine its effectiveness and to identify areas needing modifications.

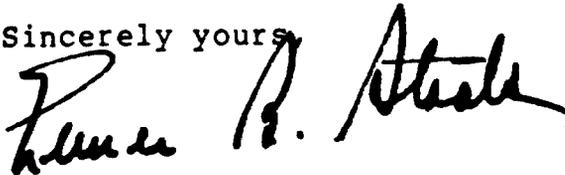
Accordingly, we are recommending that the Secretary of Energy, as Chairman of the Energy Coordinating Committee and as head of the Department with overall responsibility for Federal solar programs, develop a plan to attain the 20-percent solar goal and periodically review this plan to determine its effectiveness. We are further recommending that the Secretary furnish the plan to the congressional oversight and budget committees as soon as possible so that it can be of assistance to the committees in their deliberations on solar energy policy and budget matters.

As you requested, we did not obtain formal agency comments on this report; however, it was discussed with DOE officials within the offices of the Assistant Secretary for Conservation and Solar Energy, and the Assistant Secretary for Policy and Evaluation. They agreed with our conclusions and recommendations.

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We are sending copies of this report to the Chairman, Senate Committee on Energy and Natural Resources, the Secretary of Energy, and other interested parties. We will also make copies available to others upon request.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Florence B. Atchell". The signature is written in a cursive style with a large initial "F".

Comptroller General
of the United States



COMMENTS ON THE STATUS OF FEDERAL
EFFORTS TO ATTAIN THE 20-PERCENT
SOLAR ENERGY GOAL

By letter dated February 18, 1980, the Chairman, Subcommittee on Energy Conservation and Supply, Senate Committee on Energy and Natural Resources, requested the General Accounting Office to examine the efforts being taken by the administration, primarily the Department of Energy (DOE), to achieve the President's goal of meeting 20 percent of the Nation's energy needs from solar resources by the year 2000. The following sections provide background on the solar goal, our observations, and recommendations to the Secretary of Energy.

BACKGROUND

The President, in his June 20, 1979, Solar Message 1/, outlined a national strategy for accelerating the use of solar energy resources. As part of this national strategy, the President established a goal of meeting 20 percent of the Nation's energy needs from solar resources by the year 2000. The goal calls for a strong, concerted effort by Federal, State and local governments, private industry, and energy consumers. The President stated in his Message that the Federal Government has a responsibility for providing incentives, information, and the impetus for meeting the solar goal.

The Solar Message was based upon the results of the Domestic Policy Review (DPR) 2/ of solar energy, which was completed in February 1979. The DPR, which was requested by the President in his May 3, 1978, Sun Day speech, was conducted by over 100 officials representing more than 30 executive departments and agencies under the direction of the Secretary of Energy. The major findings of the DPR included (1) significant potential exists for expanding the Nation's use of solar resources; (2) solar resources offer numerous important advantages over

1/The term "Solar Message" as used in this report refers to the President's Message on Solar Energy, and the accompanying Fact Sheet which was presented to the Congress on June 20, 1979.

2/For the DPR, solar resources were defined to include direct sunlight and indirect resources such as biomass, hydro, wind, and ocean energy. The definition does not include geothermal.

competing technologies, such as fewer detrimental environmental effects and improving the Nation's balance of payments, and (3) many solar technologies are already economical and can be used in a wide range of applications.

The DPR used three broad scenarios to examine the potential for solar energy. These scenarios, which assumed different levels of government support, were a base case that represented current energy policies at the present level of commitment, and assumed that oil prices would rise gradually to the equivalent of \$32 per barrel 1/ by the year 2000; a maximum practical case where government policies are within the framework of traditional Federal intervention; and a technical limits case that represented the limit to which solar resources could be developed given limits of manufacturing, production, and turnover in stocks. The maximum practical case scenario corresponds with the 20-percent solar goal. The goal assumed a future oil price of \$32 per barrel in the year 2000, an energy consumption of 95 quads 2/ in 2000, and a maximum practical effort by Federal, State, and local governments. 3/

The DPR's estimates for the individual solar contributions are shown in table A. The numbers in this table represent the amount of conventional energy that can be displaced by solar energy, rather than the amount of energy actually delivered by solar systems. Also, because predictions about future solar use cannot be precise, the DPR estimated ranges for solar penetration in the year 2000. The DPR stated that the figures in this table usually represent the midpoints of these ranges. The total quads figure of 18.5, shown under the maximum practical case, approximately equals the 20-percent solar goal.

1/Today's world oil prices are already approaching this level.

2/A quad is one quadrillion British thermal units (Btus) of energy. The United States now consumes about 76 quads of energy a year.

3/As defined by the DPR, a maximum practical effort would include comprehensive and aggressive initiatives at the Federal, State, and local levels, to improve and introduce solar technologies within the framework of traditional Federal intervention, i.e., increased funding, tax incentives, loan guarantees, etc.

Table A
Energy Displaced by Solar
Technologies in 1977 and 2000

<u>Solar technology</u>	<u>1977</u>	<u>2000</u>		
		<u>Base case \$32/bbl</u>	<u>Maximum practical</u>	<u>Technical limit</u>
Residential/ commercial heating hot water, cooling	Small	1.3	2.0	3.8
Passive design	Small	0.3	1.0	1.7
Industrial and agricultural	-	1.4	2.6	3.5
Hydro	2.4	4.0	4.3	4.5
(High head)	(2.4)	(3.5)	(3.5)	(3.5)
(Low head)	(Small)	(0.5)	(0.8)	(1.0)
Biomass	1.8	4.4	5.4	7.0
Solar thermal electric	-	0.2	0.4	1.5
Wind	-	0.9	1.7	3.0
Photovoltaics	-	0.2	1.0	2.5
Ocean thermal energy conversion	-	-	0.1	1.0
Solar power satellite	-	-	-	-
Total quads	<u>4.2</u>	<u>12.7</u>	<u>18.5</u>	<u>28.5</u>

Source: Domestic Policy Review.

The Solar Message enumerated approximately 50 elements or actions relating to the attainment of the solar goal. The following were identified in the Message as "key elements."

- Proposed legislation including (1) tax credits for passive solar designs and applications, new investments which provide process heat for use in industry and agriculture, and the installation of woodburning stoves; (2) establishment of a solar bank to provide interest subsidies; and (3) an extension of the exemption from the Federal gasoline excise tax for gasoline/alcohol mixture.
- Establishment of a permanent standing subcommittee (Solar Subcommittee) of the Energy Coordinating Committee 1/ to monitor and direct all Federal solar programs.
- Increased budget and tax expenditures for fiscal year 1980 to over \$1 billion.
- Encouraging international use of solar resources particularly through the Agency for International Development.

We reviewed the "Weekly Compilation of Presidential Documents" since the Solar Message was announced to determine whether any additional actions or initiatives were taken by the President concerning the solar goal. We could not identify any, and the White House domestic policy staff stated that there were not any beyond those announced by the President in the June 20, 1979, Message.

Because of the extremely tight reporting deadline established by the Senate Subcommittee on Energy Conservation and Supply, we limited the scope of our work to reviewing the status of these key elements. Our review disclosed a number of general observations and concerns.

Our observations relate to the fact that the President called for several legislative initiatives and the creation of a Solar Subcommittee, both of which could be crucial to the successful attainment of the solar goal. Although actions are underway relative to these areas, none have yet been finalized.

1/The Energy Coordinating Committee was established by the President in Sept. 1978 to provide for the coordination of Federal energy policies. See the footnote on page 9 for further details.

Our primary concern relates to a lack of a comprehensive plan for attaining the goal. We are recommending that the Secretary of Energy develop such a plan.

The following sections discuss our observations, concerns, and recommendations.

LEGISLATIVE INITIATIVES
NOT YET ENACTED

Generally, the key elements involving legislative action are concerned with two congressional bills. One bill--the Crude Oil Windfall Profits Tax Act of 1979 (H.R. 3919)--contains the following provisions identified by the President in his Message:

- A 20-percent tax credit, up to a total of \$2,000 per home, for new homes built using passive solar designs and applications.
- A new investment tax credit to encourage the use of solar technologies to provide process heat for use in industry and agriculture.
- A new 15-percent tax credit for the purchase and installation of air tight woodburning stoves in principal residences.
- An extension of the exemption for gasoline/alcohol mixtures from the current 4 cents Federal gasoline excise tax to encourage the use of gasohol.

This legislation passed the House in June 1979 and the Senate in December 1979; however, the bill went to conference because the Senate amended it. Staff members from the Committee on Science and Technology and the Joint Committee on Taxation have informed us that generally the items noted above have remained the same except that the credits for the purchase and installation of woodburning stoves, and the use of passive solar designs and applications have been eliminated. A conference report was filed March 7, 1980. At the time of our review this bill was still pending. 1/

1/During the final processing of this report, the Congress passed this bill.

The other bill--the Energy Security Act (S. 932)-- includes the establishment of a national solar bank. According to the President's Solar Message, the bank would be funded at an initial annual level of \$100 million. The bank would provide interest subsidies for owners and builders of residences and commercial structures who install solar equipment. The bank would be funded out of the proposed Energy Security Trust Fund. This legislation passed the Senate and House in June 1979 and then went to conference. At the time of our review the legislation was still in conference.

THE SOLAR SUBCOMMITTEE
NOT YET ESTABLISHED

In his Solar Message the President directed the Secretary of Energy to establish a permanent standing subcommittee (Solar Subcommittee) of the Energy Coordinating Committee (ECC) 1/ to monitor and direct the implementation of all Federal solar programs. The President stated that he is expecting the Solar Subcommittee " * * * to provide the leadership and day-to-day coordinating function which will be essential as we strive to meet our national solar goal * * *."

On January 15, 1980, the Secretary of Energy sent a draft charter for the Solar Subcommittee to potential member agencies 2/ for comment. A Department official involved with establishing the Solar Subcommittee explained that the delay in its establishment was primarily due to the change in

1/The ECC was established by Executive Order No. 12083, signed September 27, 1978. It is chaired by the Secretary of Energy, and is composed of the heads of 24 Federal departments and agencies and advisers to the President. The purpose of the ECC is to ensure communication and coordination among executive agencies, and to develop and consider recommendations for improvements in energy policy and the management of energy resources.

2/Membership of the Solar Subcommittee is to include most of the ECC members plus other agencies and offices. However, all the specific agencies were not yet known at the time of our review. Therefore, a complete membership list was not available.

Energy Secretaries. This official also stated that a final charter, which considered the agencies' comments, is presently with the Secretary for approval and that the Secretary's approval is expected soon. During the final processing of this report DOE informed us that the Secretary had approved the Solar Subcommittee's charter, and that it is identical to the draft charter.

The draft charter states that to carry out its responsibilities, the Solar Subcommittee will attempt to identify and propose solutions to problems involving any of the major programs which contribute to the Federal Government's solar effort. The needs of individual agencies, existing and potential conflicts among agencies, and possible obstacles to solar program success will be considered. The draft charter further states that the Solar Subcommittee will monitor the progress of the Federal Government's solar and renewable energy efforts and identify gaps or deficiencies in the program. Regarding these deficiencies the Solar Subcommittee is responsible for considering appropriate programmatic, legislative, or institutional solutions along with new initiatives, and presenting options and recommendations to the ECC. Also, the Solar Subcommittee will submit regular status reports to the ECC which may be submitted by the ECC to the President. Through its regular and special reports, the Solar Subcommittee will bring matters affecting the success of the government-wide solar effort to the attention of the ECC.

The Solar Subcommittee is to be chaired by the Department's Assistant Secretary for Conservation and Solar Energy. A departmental official said because the Solar Subcommittee is to be chaired by the Assistant Secretary for Conservation and Solar Energy, the Department will supply most of the staff support for it.

STATUS OF OTHER KEY ELEMENTS

The President's Message called for encouragement of international use of solar resources particularly by the Agency for International Development (AID) and increased budget and tax expenditures for fiscal year 1980. With respect to the key element to encourage the use of solar energy internationally, AID officials informed us that no specific programs can be identified as resulting from the Solar Message, but for the last 2 years AID has been increasingly focusing its efforts on solar energy.

With respect to budget and tax expenditures, DOE reported 1/ a total Federal solar programs budget of \$924 million for fiscal year 1980 and solar-related tax expenditures of \$239 million. This corresponds with the key element in the Solar Message which called for increasing budget and tax expenditures to over \$1 billion for fiscal year 1980. DOE received most of the Federal solar budget (\$643 million).

NO OVERALL PLAN FOR ATTAINING
THE 20-PERCENT SOLAR GOAL

We asked DOE officials how the Department's solar programs are planned and managed toward meeting the goal. We were told by DOE policy and solar program officials that DOE's specific actions regarding the planning and implementation of its solar programs as they relate to meeting the solar goal is through its program planning activities under its budgetary system. These officials said that there was no overall plan aimed at achieving the solar goal. However, a DOE official involved with the establishment of the Solar Subcommittee informed us that DOE has three ongoing projects that may be of use to the Solar Subcommittee in developing an overall plan to attain the solar goal. This official could not provide us with a specific time frame or estimated completion date for producing this plan.

Regarding DOE's budgetary system, we noted that 5-year energy program plans are required to be prepared and maintained. These plans give detailed coverage to funding, manpower requirements, and consider new program initiatives. The first year of these plans serves as a basis for a detailed budget.

The solar program offices are presently engaged in preparing 5-year program plans for fiscal years 1982-86. Therefore, we reviewed the prior program plans which covered various periods for 8 of the 10 solar technologies identified in the DPR. Prior plans were not prepared even in draft form for the other two solar technologies. The prior plans for the eight solar technologies were unfinalized drafts which will be superseded by the program plans presently being prepared.

Our review of these prior plans showed that they were of little use in terms of serving as an overall plan for meeting the solar goal. Most of these plans were near-term and did not address what other Federal incentives (i.e., tax

1/As reported in DOE's "Budget in Brief" for fiscal year 1981.

incentives, low interest loans, regulation, etc.) are needed to attain the goal.

Concerning the three ongoing projects that may be of use to the Solar Subcommittee in developing an overall plan, for the most part they represent recent efforts. Two were started in January 1980 and the other prior to the DPR.

One of the recent efforts is within the Office of the Assistant Secretary for Conservation and Solar Energy. Officials in that office informed us that the plan they are working on will address the specific program, tasks, and legislation that would be needed to integrate solar and conservation objectives through the year 2000. The plan however, does not include the 20-percent goal as its objective and will not specifically identify the steps necessary for its attainment. This plan is expected to be completed in August 1980.

Another effort, which was recently started, is being performed by the Solar Energy Research Institute (SERI) ^{1/} at the request of the Deputy Secretary of Energy. SERI's project is to develop a coordinated set of policies designed to (1) ensure that consumption of nonrenewable energy resources does not increase during the next 20 years and (2) attain the 20-percent solar goal. SERI is planning an initial report in April and a final report on September 30, 1980. These reports are to include recommendations for improving the implementation and coordination of existing programs and suggestions for new legislation needed to correct gaps or defects in existing programs. Based on our discussions with a SERI official and our review of the objectives of SERI's efforts, it was not clear to us as to what extent this effort would result in identifying specific actions needed to attain the goal.

Regarding the third project, the Office of Solar Applications, which is under the Assistant Secretary for Conservation and Solar Energy, started work early in 1978 on a plan to accelerate solar energy commercialization. DOE contracted with the Mitre Corporation to assist in this project.

^{1/}SERI is the Department's lead institution for solar energy research, development, and demonstration. It is operated by a private contractor for the Department.

We were furnished with some documents which were prepared by the Mitre Corporation in connection with this effort. As of February 1980, these documents were being reviewed within DOE, and a draft accelerated commercialization plan had not yet been prepared. Our review of these documents showed that they do address the 20-percent solar goal and suggest programs and actions needed to meet the solar goal including budgetary assistance or Federal incentives. While the documents provide a framework for actions to accelerate commercialization, they do not formulate specific implementation plans nor identify the Federal agencies which individually and jointly share responsibility for their preparation and execution.

We are concerned with DOE's lack of progress on this effort. In a March 5, 1979, letter to us, commenting on one of our prior reports 1/ the Department stated that its plan for accelerating solar energy commercialization was going to be provided to the Congress in December 1979. A Solar Applications' official told us in February 1980, however, that there was no specific date that a plan was due to the Congress, that a plan had not been drafted, and that there was no date by which one was expected to be drafted.

At this time, therefore, it is not apparent whether any of the three previously mentioned efforts will produce a detailed plan for attaining the 20-percent solar goal. However, we agree with DOE officials that these efforts could serve as a basis for preparing such a plan.

CONCLUSIONS AND RECOMMENDATIONS

The President's Solar Message enumerated approximately 50 elements or actions relating to the attainment of the 20-percent solar goal. Some of these were identified as "key elements," including the establishment of a permanent standing subcommittee (Solar Subcommittee) of the Energy Coordinating Committee to monitor and direct all Federal solar programs and a number of proposed legislative and other initiatives.

Our review of the status of the legislative initiatives and the establishment of a Solar Subcommittee disclosed

1/"Commercializing Solar Heating: A National Strategy Needed," EMD-79-19, dated July 20, 1979.

that actions are currently underway relative to these areas, but none have yet been finalized. These key elements could be crucial to the successful attainment of the solar goal.

Our review also disclosed the lack of a comprehensive plan for attaining the 20-percent solar goal. The Department has some efforts underway which could serve as a basis for preparing such a plan, but for the most part these efforts are recent. It is not apparent at this time whether these efforts will produce a detailed plan.

Recommendations

In order to provide greater assurance that the 20-percent solar goal will be attained, we recommend that the Secretary of Energy as Chairman of the Energy Coordinating Committee and as head of the Department with overall responsibility for Federal solar programs:

- Develop a plan designed to attain the 20-percent solar goal. Such a plan should establish interim goals; contain specific actions needed to attain the goals; and identify the roles and responsibilities of the other Federal agencies in meeting the goals.
- Periodically review this plan to determine its effectiveness and to identify areas needing modifications.
- Furnish this plan to congressional oversight and budget committees as soon as possible so that it can be of assistance to the committees in their deliberations on solar energy policy and budget matters.

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