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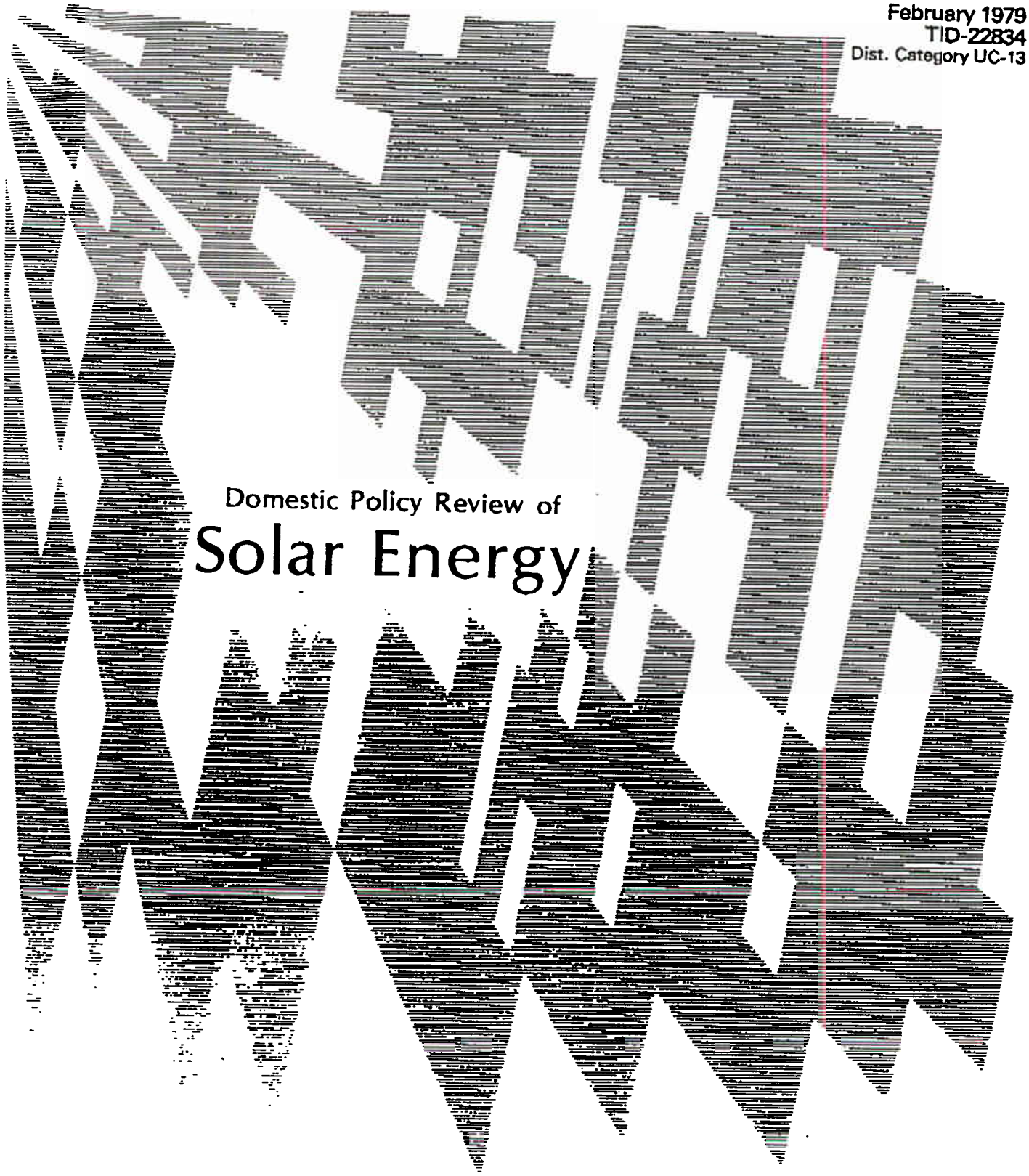
Domestic Policy Review of

Solar Energy



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A Response Memorandum to
The President of the United States

EXECUTIVE SUMMARY

I. INTRODUCTION

In your May 3, 1978, Sun Day speech, you called for a Domestic Policy Review (DPR) of solar energy.* Stuart Eizenstat followed on May 16 with a memorandum** defining its scope to include:

- a thorough review of the current Federal solar programs to determine whether they, taken as a whole, represent an optimal program for bringing solar technologies into widespread commercial use on an accelerated timetable;
- a sound analysis of the contribution which solar energy can make to U.S. and international energy demand, both in the short and the longer term;
- recommendations for an overall solar strategy to pull together Federal, State and private efforts to accelerate the use of solar technologies.

In response to this memorandum, an interagency Solar Energy Policy Committee under the chairmanship of the Secretary of Energy was formed to conduct the review. Over 100 officials representing more than 30 executive departments and agencies have participated since early June.

This review was conducted with significant public participation. Twelve regional public forums were convened throughout the Nation during June and July to receive public comments and recommendations on the development of national solar energy policy. The response of the public was impressive, and reflected the growing support for solar energy identified by several recent opinion polls. Several thousand people attended the meetings and over 2000 individuals and organizations submitted oral or written comments.

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*For the purpose of this review, solar energy was broadly defined to be energy received from the sun directly in the form of radiant energy, and indirectly in the form of stored radiant energy in biomass (i.e., wood, vegetation and organic solid wastes), heated surface waters, the potential and kinetic energy of water elevated via the hydrological cycle, and the kinetic energy of the wind.

**See Appendix A.

In addition, briefings were given to members of the Domestic Policy Review by representatives of solar advocacy groups, small businesses, state and local government, public interest and consumer groups, utilities, the energy industry and solar equipment manufacturers. This public input was an important part of the Review.*

In large part, themes reflected in the public comments are consistent with the findings of the DPR and the premises of the National Energy Plan. These premises include an emphasis on conservation as a cornerstone of national energy policy, awareness that energy prices should generally reflect the true replacement cost of energy, and recognition of the need to prepare for an orderly transition to an economy based on renewable energy resources. The public forum comments also reflected a deep concern that the poor and the elderly have access to affordable energy.

II. SUMMARY OF MAJOR FINDINGS

The results of the Domestic Policy Review can be summarized in nine major findings.

1. Significant Potential Exists for Expanding the Nation's Use of Solar Energy. With appropriate private and government support, solar energy could make a significant contribution to U.S. energy supply by the end of this century. Renewable energy sources, principally biomass and hydropower, now contribute about 4.8 quads** or six percent to the U.S. energy supply. Since estimates of future energy supply and demand are imprecise, three generic forecasts of possible solar use were developed. They can be distinguished most readily by the level of effort that would be required to reach them. In the Base Case, where present policies and programs continue, solar energy could displace 10-12 of a total of 95-114 quads in the year 2000 if energy prices rise to the equivalent of $25-32 per barrel of oil in 1977

*Summaries of the public forum comments and the public responses to the DPR status report issued in early September are included in Appendices C and D.

**A quad is one quadrillion British Thermal Units (Btu) of energy.

dollars. A Maximum Practical effort* by Federal, state and local governments could result in solar energy displacing 18 quads of conventional energy by the end of the century. Thus, if one assumes the higher future oil price scenario** and this Maximum Practical effort, solar could provide about 20 percent of the nation's energy by the year 2000. The Technical Limit to solar penetration by the year 2000, imposed primarily by the rates at which changes can be made to existing stocks of buildings and equipment, and rates at which solar techniques can be manufactured and deployed, appears to be 25-30 quads.

2. Solar energy offers numerous important advantages over competing technologies. It provides the Nation with a renewable energy source which can have far fewer detrimental environmental effects than conventional sources. To the extent that increased use of solar energy can eventually reduce U.S. dependence on expensive oil imports, it can also improve our balance of payments, alleviate associated economic problems, and contribute to national security.

Widespread use of solar energy can also add diversity and flexibility to the nation's energy supply, providing insurance against the effects of substantial energy price increases or breakdowns in other major energy systems. If oil supplies are sharply curtailed or environmental problems associated with fossil and nuclear fuels cannot be surmounted, solar systems could help reduce the possibility of a major economic disruption.

In addition, because solar systems can be matched to many end-uses more effectively than centralized systems, their use can help reduce a large amount of energy waste. Although the U.S. now consumes about 76 quads of energy a year, less than 43 quads actually are used to provide energy directly in useable form. The rest is consumed in conversion, transmission and end-use losses.

3. Even with today's subsidized energy prices, many solar technologies are already economic and can be used in a

*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.

**Corresponding to 95 quads of total demand in 2000.

wide range of applications. Direct burning of wood has been economic in the private sector for some time, accounting for 1.3 to 1.8 quads of energy use. Combustion of solid wastes or fuels derived from solid wastes is planned for several U.S. cities. Passive solar design can significantly reduce energy use in many structures with little or no increase in building cost. Low head hydroelectric generation is currently economic at favorable sites. Solar hot water systems can compete successfully in many regions against electric resistance heating, and will compete against systems using natural gas in the future. A number of solar systems installed by individual users are cost-effective at today's market prices. In addition, other solar technologies will become economic with further research, demonstration, and market development, and if subsidies to competing fuels are reduced or removed.

4. Limited public awareness of and confidence in solar technologies is a major barrier to accelerated solar energy use. Public testimony continually emphasized the need for more and better solar information. New programs to educate designers, builders, and potential solar users in the residential, commercial and industrial sectors are needed.* Because consumers lack information, they often do not have confidence in solar products. Programs to provide reliable information to consumers, to protect them from defects in the manufacture and installation of solar equipment, and to assure competition in the solar industry can help build consumer confidence in the future.

5. Widespread use of solar energy is also hindered by Federal and state policies and market imperfections that effectively subsidize competing energy sources. These policies include Federal price controls on oil and gas, a wide variety of direct and indirect subsidies, and utility rate structures that are based on average, rather than marginal costs. Also, the market system fails to reflect the full social benefits and costs of competing energy sources, such as the costs of air and water pollution. If solar energy were given economic parity with conventional fuels through the removal of these subsidies, its market position would be enhanced.

* These concerns are consistent with the findings of a recent study entitled "Citizens Solar Program - State Reports on Barriers and Strategies to Renewable Energy Development", Solar Action Inc., September 1978 (funded by DOE).

6. Financial barriers faced by users and small producers are among the most serious obstacles to increased solar energy use. Most solar technologies cannot compete effectively with conventional fuels at current market prices, in part because of subsidies, price controls, and average-cost utility rate structures for these conventional fuels. The tax credit provisions in the National Energy Act (NEA)* will improve the economics of certain solar technologies, particularly in the residential sector.

Other barriers exist because the high initial costs of solar systems often cannot be spread over their useful lives. Industry and consumers have yet to develop experience in financing and marketing solar systems. Some of the provisions of the National Energy Act will help expand credit for residential/commercial solar systems. In addition, the new Small Business Energy Loan Act** will provide credit assistance to small solar industry firms. Other existing Federal financial programs, that were created for other purposes, could also help finance solar purchases if they were directed toward this end.

7. Although the current Federal solar research, development and demonstration (RD&D) program is substantial, government funding priorities should be linked more closely with national energy goals. Solar RD&D budgets, which have totaled about $1.5 billion in the FY 1974 to FY 1979 period, have not adequately concentrated on systems that have near-term applications and can help displace oil and gas. Electricity from large, centralized technologies has been over-emphasized while near-term technologies for the direct production of heat and fuels, community-scale applications and low-cost systems have not received adequate support. Basic research on advanced solar concepts has also

*The National Energy Act, as passed by Congress and signed into law by the President, is actually five Acts: The Energy Tax Act of 1978 (P.L. 95-618); The Public Utility Regulatory Policies Act of 1978 (P.L. 95-617); The Powerplant and Industrial Fuel Use Act of 1978 (P.L. 95-620); Natural Gas Policy Act of 1978 (P.L. 95-621); and The National Energy Conservation Policy Act (P.L. 95-619).

**Public Law 95-315.

been under-emphasized, limiting the long-term contribution of solar energy to the nation's energy supply.*

8. Solar energy presents the U.S. with an important opportunity to advance its foreign policy and international trade objectives. The United States can demonstrate international leadership by cooperating with other countries in the development of solar technologies, and by assisting developing nations with solar applications. Use of decentralized solar energy can be an important component of development planning in less developed countries which do not have extensive power grids, and cannot afford expensive energy supply systems. In many cases, solar may be the only energy source practically available to improve rural living conditions. Through such efforts, the U.S. could also help to develop new foreign markets for U.S. products and services, thereby increasing opportunities for employment in solar and related industries at home. And, as solar energy eventually begins to displace imported oil and natural gas, the U.S. will enjoy greater flexibility in the conduct of its foreign policy. Insofar as solar energy systems reduce the need for nuclear and petroleum fuels in the long-term, they can help reduce the risk of nuclear proliferation and international tensions arising from competition for increasingly scarce fossil fuels.

9. Although the Federal government can provide a leadership role, Federal actions alone cannot ensure widespread solar use. Many barriers to the use of solar energy, and opportunities to accelerate its use, occur at state and local levels. In order to overcome these barriers and take advantage of these opportunities, a concerted effort at all levels of government and by large segments of the public will be required. Nevertheless, the Federal government can set a pattern of leadership and create a climate conducive to private development and use of solar energy in a competitive market. These efforts must also recognize the wide variation among solar technologies and the resulting need to tailor initiatives to specific solar applications.

*This was also the conclusion of two recent government reports: "Solar Energy Research and Development Program Balance, A Review by the Solar Working Group, DOE" (February 1978); and "Report of the Office of Science and Technology Policy Working Group on Basic Research in the Department of Energy" (June 1978).