The original documents are located in Box 6, folder "9/3/74 HR11864 Solar Heating and Cooling Demonstration Act (3)" of the White House Records Office: Legislation Case Files at the Gerald R. Ford Presidential Library.

93D CONGRESS
2d Session

SENATE

REPORT
No. 93-734

SOLAR HEATING AND COOLING DEMONSTRATION ACT OF 1974

REPORT

OF THE

COMMITTEE ON AERONAUTICAL AND SPACE SCIENCES UNITED STATES SENATE

ON

H.R. 11864

MARCH 13, 1974.—Ordered to be printed

U.S. GOVERNMENT PRINTING OFFICE
99-010 WASHINGTON : 1974

COMMITTEE ON AERONAUTICAL AND SPACE SCIENCES

FRANK E. MOSS, Utah, *Chairman*

WARREN G. MAGNUSON, Washington
STUART SYMINGTON, Missouri
JOHN C. STENNIS, Mississippi
HOWARD W. CANNON, Nevada
JAMES ABOUREZK, South Dakota
FLOYD K. HASKELL, Colorado
HOWARD M. METZENBAUM, Ohio

BARRY GOLDWATER, Arizona
CARL T. CURTIS, Nebraska
LOWELL P. WEICKER, JR., Connecticut
DEWEY F. BARTLETT, Oklahoma
JESSE A. HELMS, North Carolina
PETE V. DOMENICI, New Mexico

ROBERT F. ALLNUTT, *Staff Director*
JAMES J. GEHRIG, *Professional Staff Member*
GILBERT W. KEYES, *Professional Staff Member*
H. GERALD STAUB, *Professional Staff Member*
CRAIG VOORHEES, *Professional Staff Member*
DR. GLEN P. WILSON, *Professional Staff Member*
RALPH E. VANDERVORT, JR., *Assistant Chief Clerk*
CHARLES F. LOMBARD, *Minority Counsel*

CONTENTS

	Page
Amendment	1
I. Need for the legislation	10
II. Summary of the act	10
III. Cost estimates for the act	13
IV. Legislative history	13
Senate hearing	13
V. Committee actions	16
Markup	16
Discussion of key issues	16
VI. Section-by-section analysis	20
Section 1. Short Title	20
2. Findings and Policy	20
3. Definitions	21
4. Nasa Amendment	21
5. Solar Heating Program	21
6. Combined Solar Heating and Cooling Program	22
7. Commercial Buildings	23
8. Mass Demonstration	23
9. Dissemination of Information	23
10. Encouragement of Small Business	24
11. Priorities	24
12. Regulations	24
13. Transfer of Functions	25
14. Authorization of Appropriations	25
VII. Changes in existing law	25

93D CONGRESS
2d Session
SENATE
REPORT
No. 93-734

SOLAR HEATING AND COOLING DEMONSTRATION ACT OF 1974

MARCH 13, 1974.—Ordered to be printed

Mr. Moss, from the Committee on Aeronautical and Space Sciences, submitted the following

REPORT

[To accompany H.R. 11864]

The Committee on Aeronautical and Space Sciences, to which was referred the Act (H.R. 11864) having considered the same, reports favorably thereon with amendments and recommends that the Act as amended do pass.

The Committee on Aeronautical and Space Sciences, to which was referred the Act (H.R. 11864), to provide for the early commercial demonstration of solar heating and cooling technologies, having considered the same, reports favorably thereon with an amendment in the nature of a substitute and recommends that the Act as amended do pass.

The amendment is in the nature of a substitute, as follows:

AMENDMENT

That this Act may be cited as the "Solar Heating and Cooling Demonstration Act of 1974".

FINDINGS AND POLICY

SEC. 2. (a) The Congress hereby finds that—

(1) the current imbalance between supply and demand for fuels and energy is likely to persist for sometime;

(2) the early demonstration of the feasibility of using solar energy for the heating and cooling of buildings could help to relieve the demand upon present fuel and energy supplies;

(3) the technologies for solar heating are close to the point of commercial application in the United States;

(4) the technologies for combined solar heating and cooling still require research, development, testing, and demonstration, but no insoluble technical problem is now foreseen in achieving commercial use of such technologies;

(5) the early development and export of viable solar heating equipment and combined solar heating and cooling equipment, consistent with the established preeminence of the United States in the field of high technology products, can make a valuable contribution to our balance of trade;

(6) the widespread use of solar energy in place of conventional methods for the heating and cooling of buildings would have a significantly beneficial effect upon the environment;

(7) the mass production and use of solar heating and cooling equipment will help to eliminate the dependence of the United States upon foreign energy sources and promote the national defense; and

(8) commercial application of solar heating and combined solar heating and cooling technologies can be expedited by early commercial demonstration under practical conditions.

(b) It is therefore declared to be the policy of the United States and the purpose of this Act to provide for the demonstration within a three-year period of the practical use of solar heating technology, and to provide for the development and demonstration within a five-year period of the practical use of combined heating and cooling technology.

DEFINITIONS

SEC. 3. For purposes of this Act—

(a) the term "solar heating", with respect to any building, means the use of solar energy to meet such portion of the total heating needs of such building (including hot water), or such portion of the needs of such building for hot water (where its remaining heating needs are met by other methods), as may be required under performance criteria prescribed by the Secretary of the Department of Housing and Urban Development acting in consultation with the National Bureau of Standards and the Administrator of the National Aeronautics and Space Administration;

(b) the terms "solar heating and cooling" and "combined solar heating and cooling", with respect to any building, mean the use of solar energy to provide both such portion of the total heating needs of such building (including hot water) and such portion of the total cooling needs of such building, or such portion of the needs of such building for hot water (where its remaining heating needs are met by other methods) and such portion of the total cooling needs of such building, as may be required under performance criteria so prescribed, and include cooling by means of nocturnal heat radiation, by evaporation, or by other methods of meeting peakload energy requirements at nonpeakload times; and

(c) the term "residential dwellings" includes mobile homes, apartments, existing homes and new construction, and publicly assisted housing owned by a private sponsor or a State or local housing authority.

(7)

(d) the term "Administrator" means the Administrator of the National Aeronautics and Space Administration; and

(e) the term "Secretary" means the Secretary of the Department of Housing and Urban Development.

CONDUCT OF ACTIVITIES IN SOLAR HEATING AND COOLING TECHNOLOGIES BY NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SEC. 4 Section 203 of the National Aeronautcis and Space Act of 1958 (42 U.S.C. 2473) is amended by redesignating subsection (b) as subsection (c), and by inserting immediately after subsection (a) the following new subsection:

"(b) The Administration shall initiate, support, and carry out basic and applied research, development, demonstrations, and other related activities in solar heating and cooling technologies, including (to the extent that funds are appropriated therefor) activities as provided for in sections 5, 6, and 7 of the Solar Heating and Cooling Demonstration Act of 1974.".

DEVELOPMENT OF SOLAR HEATING SYSTEMS TO BE USED IN RESIDENTIAL DWELLINGS

SEC. 5. (a) The Administrator and the Secretary shall promptly initiate and carry out a program as provided in this section, for the development and demonstration of solar heating systems, including collectors, controls and thermal storage, for use in residential dwellings.

(b)(1) Within six months after the date of the enactment of this Act, the Secretary, in consultation with the National Bureau of Standards and the Administrator, shall determine, prescribe, and publish—

(A) performance criteria for solar heating equipment and systems to be used in residential dwellings, and

(B) performance criteria (relating to suitability for solar heating) for such dwellings themselves,

taking into account in each instance climatic variations existing between different geographic areas.

(2) As soon as possible after the publication of the performance criteria prescribed under paragraph (1), the Secretary will select on the basis of open design competition a number of designs for various types of residential dwellings suitable for and adapted to the installation of solar heating systems meeting the performance criteria prescribed under paragraph (1)(A).

(c) The Administrator, in accordance with the applicable provisions of title II of the National Aeronautics and Space Act of 1958, and in consultation with the Secretary shall—

(1) enter into such contracts and grants as may be necessary or appropriate for the development (for commercial production and residential use) of solar heating systems meeting the performance criteria prescribed under subsection (b)(1)(A) (including any further planning and design which may be required to conform with the specifications set forth in such criteria); and

(2) enter into contracts with a number of persons or firms for the procurement of solar heating systems including prototypes meeting the performance criteria of subsection (b)(1)(A) of this

section (including adequate numbers of spare and replacement parts for such systems).

(d) The Secretary shall, as soon as feasible, award contracts for the construction of prototype demonstration dwellings and shall make arrangements to install in such dwellings and, if appropriate, in existing dwellings, solar heating systems procured by the Administrator under subsection (c)(2) of this section. Title to and ownership of such dwellings, including ownership of the solar heating systems installed therein, shall be conveyed to purchasers of such dwellings under terms and conditions prescribed by the Secretary, including an express agreement that such purchaser shall, in such manner and form and on such terms and conditions as the Secretary may prescribe, observe and monitor (or permit the Secretary or his agents to observe and monitor) the performance and operation of such system for a period of five years, and that such purchaser (including any subsequent owner and occupant of the property who also makes such an agreement) shall regularly furnish the Secretary with such reports thereon as the agreement may require.

(e) The Secretary of Defense shall, as soon as feasible, award contracts for the construction of prototype demonstration dwellings on Federal or federally administered property and shall make arrangements to install in such dwellings and, if appropriate, in existing dwellings, solar heating systems procured by the Administrator under subsection (c)(2) of this section.

(f) The Secretary and the Secretary of Defense shall coordinate their activities under this section to assure that solar heating systems are installed in substantial numbers of residential dwellings and in a sufficient number of geographic areas under varying climatic conditions to constitute a realistic and effective demonstration in support of the objectives of this Act.

(g) The Secretary, in coordination with the National Bureau of Standards, and the Administrator, and the Secretary of Defense, shall have the general function of monitoring the performance and operation of all solar heating systems installed in residential dwellings under this section, and of collecting and evaluating data and information on such performance and operation; and he shall from time to time make such findings and recommendations and take such other actions (including the submission of special reports to the Congress when appropriate) as may be necessary to assure that the program under this section effectively carries out the objectives of this Act. The Secretary shall in addition maintain continuing liaison with the building industry and related industries and interests, during and after the period of the program under this section, with the objective of assuring that the projected benefits of such program are and will continue to be effectively realized.

DEVELOPMENT OF COMBINED SOLAR HEATING AND COOLING SYSTEMS TO BE USED IN RESIDENTAL DWELLINGS

SEC. 6. (a) The Administrator and the Secretary shall promptly initiate and carry out a program as provided in this section for the development and demonstration of combined solar heating and cooling systems for use in residential dwellings.

(b) (1) As soon as possible after the date of the enactment of this Act, the Secretary, in consultation with the National Bureau of

Standards and the Administrator, shall determine, prescribe, and publish—

(A) performance criteria for combined solar heating and cooling equipment and systems to be used in residential dwellings, and

(B) performance criteria (relating to suitability for solar heating and cooling) for such dwellings themselves,

taking into account in each instance climatic variations existing between different geographic areas.

(2) As soon as possible after the publication of the performance criteria prescribed under paragraph (1) (and if possible before the completion of the research and development provided for in subsection (c)), the Secretary will select on the basis of open design competition a number of designs for various types of residential dwellings suitable for and adapted to the installation of combined solar heating and cooling systems meeting the performance criteria prescribed under paragraph (1)(A).

(c) During the period immediately following the publication of performance criteria under subsection (b)(1), the Administrator shall undertake and conduct with respect to solar heating and cooling a program of research, development, and testing, designed to provide the additional technological resources necessary for the development and commerical application of combined solar heating and cooling systems as contemplated by the program under this section.

(d) The Administrator, in accordance with the applicable provisions of title II of the National Aeronautics and Space Act of 1958 and in consultation with the Secretary, and at the earliest possible time during or immediately after the period specified in subsection (c), shall—

(1) enter into such contracts and grants as may be necessary or appropriate for the development (for commercial production and residential use) of combined solar heating and cooling systems meeting the performance criteria prescribed under subsection (b)(1)(A) (including any further planning and design which may be required to conform with the specifications set forth in such criteria or to reflect the results of the activities conducted under subsection (c)); and

(2) enter into contracts with a number of persons or firms for the procurement of combined solar heating and cooling systems including prototypes meeting the performance criteria of subsection (b)(1)(A) of this section (including adequate numbers of spare and replacement parts for such systems).

(e) The Secretary shall, as soon as feasible, award contracts for the construction of prototype demonstration dwellings and shall make arrangements to install in such dwellings and, if appropriate, in existing dwellings, combined solar heating and cooling systems procured by the Administrator under subsection (d)(2) of this section. Title to and ownership of such dwellings, including ownership of the combined solar heating and cooling systems installed therein shall be conveyed to purchasers of such dwellings under terms and conditions prescribed by the Secretary, including an express agreement that such purchaser shall, in such manner and form and on such terms and conditions as the Secretary may prescribe, observe and monitor (or permit the Secretary or his agents to observe and monitor) the performance and operation of such system for a period of five years, and

that such purchaser (including any subsequent owner and occupant of the property who also makes such an agreement) shall regularly furnish the Secretary with such reports thereon as the agreement may require.

(f) The Secretary of Defense shall, as soon as feasible, award contracts for the construction of prototype demonstration dwellings on Federal or federally administered property and shall make arrangements to install in such dwellings and, if appropriate, in existing dwellings, combined solar heating and cooling systems procured by the Administrator under subsection (d)(2) of this section.

(g) The Secretary and the Secretary of Defense shall coordinate their activities under this section to assure that solar heating systems are installed in substantial numbers of residential dwellings and in a sufficient number of geographic areas under varying climatic conditions to constitute a realistic and effective demonstration in support of the objectives of this Act.

(h) The Secretary, in coordination with the National Bureau of Standards, the Administrator, and the Secretary of Defense, shall have the general function of monitoring the performance and operation of all solar heating and cooling systems installed in residential dwellings under this section, and of collecting and evaluating data and information on such performance and operation; and he shall from time to time make such findings and recommendations and take such other actions (including the submission of special reports to the Congress when appropriate) as may be necessary to assure that the program under this section effectively carries out the objectives of this Act. The Secretary shall in addition maintain continuing liaison with the building industry and related industries and interests, during and after the period of the program under this section, with the objective of assuring that the projected benefits of such program are and will continue to be effectively realized.

DEVELOPMENT OF SOLAR HEATING AND COOLING SYSTEMS FOR COMMERCIAL BUILDINGS

SEC. 7. The Administrator, in consultation with the General Services Administration and the National Bureau of Standards and concurrently with the conduct of the programs under sections 5 and 6, shall enter into arrangements with appropriate Federal agencies to carry out such projects and activities (including demonstration projects) with respect to office buildings, factories, agricultural structures (including crop-drying facilities), public buildings (including schools and colleges), and other commercial or industrial buildings, taking into account the special needs of and individual differences in such buildings based upon size, function, and other relevant factors, as may be appropriate for the early development and demonstration of combined solar heating and cooling systems suitable and effective for use in such buildings.

LARGE-SCALE DEMONSTRATION OF SOLAR HEATING AND COOLING SYSTEMS

SEC. 8. In addition to the prototype demonstration under sections 5, 6, and 7, the Secretary is authorized to undertake and carry out

large-scale demonstrations of the utilization of solar heating systems and of combined solar heating and cooling systems if, after consultation with the Administrator, he determines that such large-scale demonstrations are necessary to expedite widespread acceptance of utilization of such systems.

DISSEMINATION OF INFORMATION AND OTHER ACTIONS TO PROMOTE PRACTICAL USE OF SOLAR HEATING AND COOLING TECHNOLOGIES

SEC. 9. (a) The Secretary shall take all possible steps to assure that full and complete information with respect to the demonstrations and other activities conducted under this Act is made available to Federal, State, and local authorities, the building industry and related segments of the economy, and the public at large, both during and after the close of the programs under this Act, with the objective of promoting and facilitating to the maximum extent feasible the early and widespread practical use of solar energy for the heating and cooling of buildings throughout the United States. In accordance with regulations prescribed under section 12, such information shall be disseminated on a coordinated basis by the Secretary, the Administrator, the National Bureau of Standards, the National Science Foundation, the Patent Office, and other appropriate Federal offices and agencies.

(b) In addition the Secretary shall—

(1) study and investigate the effect of existing building codes, zoning ordinances, and other laws, codes, ordinances, and practices upon the practical use of solar energy for the heating and cooling of buildings; and

(2) determine the extent to which such laws, codes, ordinances, and practices should be changed to permit or facilitate such use, and the methods by which any such changes may best be brought about.

(c)(1) In carrying out his functions under subsections (a) and (b) the Secretary, utilizing the capabilities of the National Aeronautics and Space Administration, Department of Commerce, and the National Science Foundation to the maximum extent possible, shall establish and operate a Solar Heating and Cooling Information Data Bank (hereinafter in this subsection referred to as the "bank") for the purpose of collecting, reviewing, processing, and disseminating solar heating and cooling information and data in a timely and accurate manner in support of the objectives of this Act.

(2) Information and data compiled in the bank shall include—

(A) technical information (reports, journal articles, dissertations, monographs, project descriptions, etc.) on solar energy research, development, and applications;

(B) similar technical information on the design, construction, and maintenance of buildings compatible with solar heating and cooling concepts;

(C) physical and chemical properties of the materials required for solar heating and cooling;

(D) climatic conditions in appropriate areas of the United States, including those areas where the demonstrations are to be located; and

(E) engineering performance of devices utilized in solar heating and cooling or to be employed in the demonstration.

(3) In accordance with regulations prescribed under section 12(a), the Secretary shall provide retrieval and dissemination services to cover the solar heating and cooling information described under paragraph (2) for—

(A) Federal, State, and local government organizations that are active in the area of energy resources (and their contractors);

(B) universities and colleges in their related research and consulting activities; and

(C) the private sector upon request in appropriate cases.

(4) In carrying out his functions under this subsection, the Secretary shall utilize, when feasible, the existing data base of scientific and technical information in Federal agencies, adding to such data base any information described in paragraph (2) which does not already reside in such base.

(d) Each Federal officer and agency having functions under this Act shall include in his or its annual report to the President and the Congress a full and complete description of his or its activities (current and projected) under this Act, along with his or its recommendations for legislative, administrative, or other action to improve the programs under this Act or to achieve the objectives of this Act more promptly and effectively. In addition, the Secretary shall submit annually to the President and the Congress a special report summarizing in appropriate detail all of the activities (current and projected) of the various Federal officers and agencies having functions under this Act, with the objective of presenting a comprehensive overall view of such programs.

ENCOURAGEMENT AND PROTECTION OF SMALL BUSINESS

SEC. 10. In carrying out their functions under this Act, all Federal officers and agencies shall take steps to assure that small business concerns will have a realistic and adequate opportunity to participate in the programs under this Act to the maximum extent possible.

PRIORITIES

SEC. 11. The Secretary will set priorities as far as possible consistent with the intent and operation of this Act, to consider the following criteria:

(a) The residential dwellings referred to in subsections (d) and (e) of section 5 and subsections (e) and (f) of section 6 shall be located in sufficient number of different geographic areas in the United States to assure a realistic and effective demonstration of the solar heating systems and combined solar heating and cooling systems involved, and of the dwellings themselves, under climatic conditions which vary as much as possible. A reasonable number not less than 30% of such residential dwellings shall be constructed in rural areas, or in towns and cities the population of which does not exceed 25,000.

(b) The particular need for assistance under this Act in areas with high density of population and prospects for future growth where early development of solar demonstration projects may more quickly reduce reliance on regular fuel supplies now in short supply.

(c) The desirability of encouraging those projects in which funds appropriated by any State or political subdivision thereof for the purpose of sharing costs with the Federal Government, for the procurement of solar heating and combined solar heating and cooling equipment, are committed before or after the date of the enactment of this Act.

REGULATIONS

SEC. 12. The Administrator and the Secretary, in consultation with the Administrator of the General Services Administration, the Secretary of Defense, the National Bureau of Standards, and other appropriate officers and agencies, shall prescribe such regulations as may be necessary or appropriate to carry out this Act promptly and efficiently. Each such officer or agency, in consultation with the Secretary, may prescribe such regulations as may be necessary or appropriate to carry out his or its particular functions under this Act promptly and efficiently.

TRANSFER OF FUNCTIONS

SEC. 13. Within sixty days after the effective date of the law creating the Energy Research and Development Administration or any other law creating a permanent Federal organization or agency having jurisidiction over the energy research and development functions of the United States (or within sixty days after the enactment of this Act if the effective date of such law occurs prior to the enactment of this Act), all of the research and development functions vested in the National Aeronautics and Space Administration under this Act and any funds which may have been appropriated pursuant to section 14 of this Act, to the extent necessary or appropriate, may, in accordance with regulations prescribed by the Office of Management and Budget, be transferred to and vested in the Energy Research and Development Administration or such other organization or agency.

AUTHORIZATION OF APPROPRIATIONS

SEC. 14. (a) There is hereby authorized to be appropriated to the National Aeronautics and Space Administration for fiscal year 1975 $5,000,000 to carry out the functions vested in the Administrator by this Act.

(b) There is hereby authorized to be appropriated to the Department of Housing and Urban Development for fiscal year 1975 $5,000,000, and for fiscal years 1976, 1977, 1978, and 1979 such additional funds as may be required to carry out the functions assigned to the Secretary by this Act.

Amend the title so as to read:

> An Act to provide for the early commercial demonstration of the technology of solar heating by the National Aeronautics and Space Administration and the Department of Housing and Urban Development, in cooperation with other Federal agencies, and for the early development and commercial demonstration of technology for combined solar heating and cooling.

I. Need for the Legislation

The recent fuel shortage in America has affected the life of virtually every American. For almost all, it has been a great inconvenience; for many, a near disaster. The effect upon the economy has been profound. The price of gasoline has skyrocketed, many businesses and industries have been forced to cut back their operations, and unemployment has risen. This situation has revealed the dangers of relying on foreign States to supply us with fuel and has indicated the limitation of our own resources at present. Investigations into possible solution to the crisis have been focused on the need for a secure, accessible, and unlimited source of energy. One resource which meets all of these needs is solar energy. First, it is secure from the threat of foreign interference. Second, recent technological advances promise to make it readily accessible. Finally, the source of energy is as vast as the power which maintains life itself on this planet. Although much research is still required before all the uses of this energy source are fully appreciated and utilized, there does exist one use that should be available for commercial use on a large scale in the relatively near term—solar heating and cooling of buildings.

This concept is not new. It has been attractive ever since researchers determined that the sun is pouring energy into the earth at the incredible rate of a thousand watts per square meter. Over the past thirty years, several enterprising individuals and organizations have developed solar homes of varying designs and performance characteristics. Cheap and plentiful alternative fuels have been the major factor contributing to the slow growth and low level of interest in this field. Now that the fuel shortage has altered the economics of energy, the concept of developing solar heated homes has merited renewed interest. However, the inhibiting factor remains that the operating experience necessary for large scale commercial implementation of this technology does not exist. Such a myriad of technical, social and aesthetic problems are associated with development of solar heating and cooling systems that government must play a vital role in achieving this operating experience. Thus, the next logical step is legislation to coordinate Federal agencies, designate responsibility, and outline policy to achieve this goal—development and demonstration of solar heating and solar heating and cooling systems for buildings.

II. Summary of the Act

H.R. 11864, as amended, would accomplish the important and timely "next logical step" required to implement the wide-spread public acceptance and practical use of solar energy for heating and cooling of various classes of buildings in the next few years.

Statement of Policy

The bill declares that it is the policy of the United States to accomplish the demonstration of the practical use of solar heating technology within three years, and to accomplish the research, development, and demonstration of the practical use of combined solar heating and cooling technology within a five-year period.

Agency Responsibility and Coordination

The National Aeronautics and Space Administration (NASA) will be in charge of the research, development, and manufacture of solar

heating and combined solar heating and cooling equipment, meeting performance criteria prescribed by the Department of Housing and Urban Development (HUD).

HUD will install in residential dwellings the equipment procured by NASA; the Department of Defense (DOD) will install the equipment in Federal dwellings. HUD will monitor performance and disseminate information on these projects.

Similar arrangements will be made for demonstration projects in cooling other classes of buildings.

The solar heating program is programmed for three years; the combined heating and cooling program for five years.

Development of Residential Solar Heating Systems

NASA shall carry out the development of solar heating systems for residential dwellings. This includes the responsibility for contracting for the development, prototypes and manufacturing of the systems in substantial numbers. Substantial numbers will be administratively defined, since preset figures would be too speculative and confining for an experimental program of the type envisioned. The program will proceed in increments or stages so that evolving technology in solar collectors, storage and control systems may be sufficiently evaluated and ultimately improved upon.

The solar heating systems developed and contracted for by NASA are to meet the performance criteria prescribed by HUD. These performance criteria are to be published six months after the enactment of the bill. HUD will also prescribe performance criteria for the residential dwellings in which the equipment is to be installed, in order to assure satisfactory performance of the solar heating systems under varied climatic conditions. A design competition for homes meeting these performance criteria will be conducted by HUD so that an adequate number of "off the shelf" designs will be available to individuals and small builders to install solar heating systems.

The solar heating systems manufactured under contract to NASA are to be installed in both private and publicly-owned dwellings. The Secretary of Defense shall make arrangements for the installation of the systems in Federal and federally administered dwellings. Construction of and installation in privately owned and occupied residences shall be carried out by arrangements made by the Secretary of HUD. The installation phase would proceed in increments or stages so that various promising technologies can be demonstrated and evaluated.

Ownership of the dwellings and heating systems shall be conveyed to the purchaser with an express five-year agreement. Under the terms of this agreement, the purchaser shall monitor and report on the operation of the system to the Secretary of HUD. During this period, the expense of maintenance and repair of the heating system and its related effects will be borne by the Government under current law.

HUD in coordination with other agencies, has general responsibility for the monitoring and evaluation functions. HUD must also report on the progress of the demonstration, and maintain a continuing liaison with the building industry and related industries during and after the demonstration program. The liaison will be directed toward assuring that the benefits of this demonstration program will be realized by the nation on a continuing basis.

Development of Residential Combined Solar Heating and Cooling Systems

The conduct of this program is virtually identical to that of the heating program. The major exception is that NASA is authorized to undertake a separate research and development program for combined solar heating and cooling systems that would meet the performance criteria established by HUD. As it is anticipated that this research and development phase will require about two years, the total time planned for the combined heating and cooling program is five years.

Commercial Buildings

NASA is directed to enter into arrangements with appropriate Federal agencies to carry out solar heating and cooling demonstration projects with respect to a wide range of commercial buildings, such as school, industrial, office, and agricultural structures. It is anticipated that arrangements patterned after those applied to residential dwellings would be followed.

NBS is to participate in the commercial demonstration in ways similar to its participation in the residential dwelling program. Because of its unique responsibility for public buildings, the General Services Administration is expected to play an important role in this aspect of the overall program.

Large Scale Demonstration of Solar Heating and Cooling Systems

After completion of the prototype demonstrations, the Secretary of HUD may carry out large scale demonstrations if, in consultation with the Administrator of NASA, he determines that such demonstrations are necessary to enhance the widespread acceptance of the solar systems.

Dissemination of Information—Information Data Bank

As part of its responsibilities to assure continuing public benefit from this program, HUD is required to undertake comprehensive programs that would assure dissemination of all relevant information produced under this demonstration program. HUD shall submit to the President and Congress a summary annual report detailing all activities relating to programs under this bill. HUD is also charged with establishing and operating a Solar Heating and Cooling Information Bank. This bank shall collect, review, process, and disseminate information on solar heating and cooling in order to support the objectives of the bill, and encourage the widespread utilization of information related to solar heating and cooling of buildings and water.

Studies and Investigations

HUD is charged with studying, investigating, and reporting on ways that building codes, zoning ordinances, and other laws and practices can be modified in order to facilitate widespread use of solar energy for heating and cooling buildings.

Small Business

All Federal agencies participating in this demonstration program are charged with taking steps to assure adequate opportunities for participation by small business firms.

Priorities

The Secretary will establish priorities in selecting areas to be demonstration sites. It is recommended that geography, climate, population, growth rate, and local initiative of candidate communities be con-

sidered. However, the over-riding priority is to pursue as closely as possible the general operation and intent of this Act, including installation of systems in varying climatic regions where conditions permit realistic demonstration and evaluation.

Transfer of Functions

Research and development functions vested in NASA by this Act, and funds appropriated pursuant to the Act, may be transferred to any new permanent organization having jurisdiction over energy research and development, such as the proposed Energy Research and Development Administration, should such an agency be established by law.

Authorization of Appropriation

$5 million is authorized to be appropriated to NASA, and $5 million is authorized to be appropriated to HUD to initiate this program in Fiscal 1975. Additional funds are authorized to be appropriated to HUD for Fiscal Years 1976, 1977, 1978, and 1979 as may be required to carry out the functions assigned to HUD by this Act.

III. Cost Estimates for the Act

In accordance with section 252(a) of the Legislative Reorganization Act of 1970 (Public Law 91–150, 91st Congress) the Committee provides the following estimate of cost:

For administration of the Act, the cost shall not exceed $10 million for the first year of operation. Funding required in succeeding years cannot be accurately forecast until decisions are made on numbers and types of units and locations, and the results of initial efforts are known. The Administrator of NASA has estimated that approximately $50 million is presently anticipated to be needed for the 5-year NASA effort. But that estimate may vary as the program proceeds. Appropriations will be subject to congressional review for each year of the program.

IV. Legislative History

The original version of this legislation was introduced in the House of Representatives on October 16, 1973, as H.R. 10952. A companion bill, S. 2658, was introduced by Senators Moss and Weicker on November 5, 1973.

Hearings were held by the House Committee on Science and Astronautics on November 13, 14, and 15. An amended bill, H.R. 11864, was reported by the Committee and passed by the House on February 13, 1974, and referred to the Senate Committee on Aeronautical and Space Sciences.

Senate Hearings

The Senate Committee conducted hearings on S. 2658 and H.R. 11864 on February 25.

A total of 12 witnesses, including representatives of Federal agencies, university research organizations, and industry, offered prepared testimony.

The witnesses and the emphasis of their testimony, in the order of their appearance before the Committee, were:

1. The Honorable Mike McCormack, Chairman, Subcommittee on Energy, Committee on Science and Astronautics, U.S. House of

Representatives. He outlined the principal differences between S. 2658 and H.R. 11864, and advocated adoption of the language in the House bill. The key elements which he wished incorporated in the Senate bill included:

Delegation of responsibility to HUD in the demonstration phase, and the correlated redefinition of NASA's responsibilities.

Establishment of a Data Bank to process and disseminate solar heating and cooling information.

Extension of limitations of federally assisted mortgage loans to cover the increased costs of dwellings equipped with solar systems.

Establishment of priorities to be considered in the selection of demonstration sites.

Transfer of all the functions vested in NASA and the National Science Foundation (NSF), along with related records and personnel, to the Energy Research and Development Administration (ERDA) or any other permanent Federal organization having jurisdiction over energy research and development.

2. Dr. H. Guyford Stever, Director, National Science Foundation. He supported the demonstration concept but felt that it was premature. He indicated that NSF, designated by the Administration as the lead agency in solar energy research, did not feel that the time was appropriate for such a demonstration. In addition, he stated that coordinated management by the Energy, Research and Development Administration (ERDA), when and if it comes into existence, would be essential. He said that the provisions of the bill relating to NSF were unnecessary.

3. Dr. James C. Fletcher, Administrator, National Aeronautics and Space Administration. He supported the objectives of the bill but agreed with Dr. Stever that, until ERDA comes into existence, the NSF should continue as the lead agency in solar energy research. However, he also stated that an early prototype demonstration program involving varied concepts could have a major impact on the energy problem. He foresaw no major problems in coordinating such a program with ERDA. Finally he proposed a two-phase program as the optimum manner in which to accelerate the solar heating and cooling demonstration. The first phase would be the development phase conducted by NASA and the second phase would be the actual housebuilding and installation phase conducted by HUD and DOD.

4, 5. Drs. Marjorie P. and Aden B. Meinel, Optical Sciences Center, University of Arizona, Tucson. They indicated that the concept of the bill was very important, but that the main thrust should be directed toward commercial buildings. They firmly believed in a demonstration project as a starting point from which solar technology and industry could eventually mature.

6. Mr. Michael H. Moskow, Assistant Secretary, Policy Development and Research, Department of Housing and Urban Development. He supported the Administration position that NSF at present, and ERDA in the future, should have the lead responsibility in this area. Also, he favored a two phase approach similar to Dr. Fletcher's in which NASA would conduct a program of systems development in one phase, and HUD would conduct a program of systems installation in another. He claimed that a mere increase in mortgage limitations would not provide a sufficient incentive to the individual, however. He felt that the answer was *not* to increase FHA mortgage limitations but

to have the Federal government bear all, or a very large portion, of the increased costs, which he estimated would double the cost of a similar conventional dwelling. He also felt that production of prototype systems will provide a basis from which to assess the validity and economic feasibility of the previously determined performance criteria. "It is at this point—and only at this point—that we believe the size and scope, and indeed, the very necessity of a large-scale demonstration can be determined."

7, 8. Mr. Lewis Cenker, President, National Association of Home Builders, and Mr. Ralph J. Johnson, Director of the NAHB Research Foundation. They supported the concept of the bill and also proposed a smaller scale prototype-production method of conducting the program, similar to Mr. Moskow's suggestion. They also favored utilizing HUD to conduct the demonstration phase of the program.

9. Mr. John Eberhard, President, American Institute of Architects Research Corporation. He recommended using the language in H.R. 11864 describing open design competition for dwellings incorporating solar systems. He doubted if demonstrations were needed, and agreed with earlier witnesses that prototypes should precede any large scale demonstration.

10. Rear Admiral Nathan Sonenshein, Defense Energy Task Group, Department of Defense. He supported the objectives of H.R. 11864, but stated that limitations on the size of Federal housing would have to be extended.

11. Mr. Walter A. Meisen, Assistant Commissioner, Office of Construction and Management, General Services Administration. He agreed with the general objectives of the bill and the role that GSA could play, but said that ERDA should be considered. He felt that one encouraging feature of the bill is that it recognizes the need for early development of solar collectors. He warned against the dangers of developing standards that are too complex and specific at this stage. Finally, he noted that industrial and manufacturing firms have much to contribute to the design effort.

12. Dr. John I. Yellot, Visiting Professor in Architecture, College of Architects, Arizona State University, Tempe, Arizona. Dr. Yellot supported the concept of development of solar heating and cooling systems and suggested including development of thermal storage and evaporative devices as objectives of the bill.

The oral testimony was supplemented by written statements from:

1. Honorable George McGovern, a Senator in the U.S. Congress, from the State of South Dakota.

2. Honorable Hubert H. Humphrey, a Senator in the U.S. Congress, from the State of Minnesota.

3. Honorable William Lehman, a Representative in the U.S. Congress, from the thirteenth District of the State of Florida.

4. Dr. K. W. Boer, Director, Institute of Energy Conversion, University of Delaware, Newark, Delaware.

5. Dr. Peter C. Goldmark, President and Director of Research, Goldmark Communications Corporation, Stamford, Connecticut.

6. Mr. Fred Dubin, Dubin-Mindell-Bloome Associates, West Hartford, Connecticut.

7. Mr. Howard C. Slack, H. C. Slack and Associates, Baltimore, Maryland.

8. Dr. Peter E. Glaser, Vice President, Arthur D. Little, Inc., Cambridge, Massachusetts.

9. Honorable Thomas J. Meskill, Governor of the State of Connecticut.

V. Committee Actions

Markup in Committee on H.R. 11864

On March 11, 1974, the Committee on Aeronautical and Space Sciences met to consider S. 2658 and H.R. 11864. It was determined that several amendments were required.

The Committee agreed to report H.R. 11864 with an amendment striking all after the enacting clause and inserting the Committee amendments.

Discussion of Key Issues

The principal issues which surfaced during the Committee hearings and deliberations are outlined in the following table. The positions of the witnesses with respect to these issues are summarized in an earlier section, and the Committee view is expressed below.

MAJOR DIFFERENCES—HOUSE BILL/SENATE AMENDMENTS

	House bill	Amendments
Residential housing:		
Heafing demonstration	"Current technology"	NASA develops technology or uses currently availabile if it meets performance criteria.
Type of unit	Implies new construction	New, existing.
Housing construction/installation	Responsibility not clear	HUD, DOD to construct, install units furnished by NASA.
Number of units	Must be "manufactured on a mass productoin basis"; 4,000 units indicated as one adequate measure.	No numerical definition; HUD and NASA expected to conduct series of demonstrations using latest technology from NASA (and NSF) R. & D. Mass demonstrations authorized if necessary.
Prototypes before mass demonstration.	Permitted if found necessary	Preferred.
Funding	Assumes private homeowner bears cost, increases mortgage ceilings, etc.	HUD bears increased cost.
Other buildings:		
Responsibility	NASA and HUD	NASA to work out arrangements similar to those in housing.
General provisions:		
Transfer to ERDA	Automatic in 60 days	Authorized, not mandatory.
Funding	$50,000,000 to NASA over 5 years. Other agencies (?)	$5,000,000 to NASA, $5,000,000 to HUD for 1st year. HUD authorization for next 4 years.
NSF role	Authorizes basic and applied research.	Provision deleted as unnecessary. Report assumes program would continue, with results provided NASA and HUD, etc.

This bill is designed to apply the technical competence of the National Aeronautics and Space Administration in research and development, systems engineering, and the procurement and delivery of hardware systems to the development of systems for utilizing solar energy to heat and cool residential, commercial, institutional and industrial buildings. Further, the bill is designed to utilize the experience and capabilities of the Department of Housing and Urban Development and the Department of Defense in the provision of residential housing, as well as the capabilities of other Federal agencies in order to demonstrate the effectiveness of solar powered systems to reduce the demands on other types of energy for the heating and cooling needs of our society. Underlying the basic approach to this legislation, however, is the concept that in order to assure success in the eventual adoption of such solar energy systems, it is vital to

emphasize the development of technology to produce reliable, durable, economical and efficient systems. This point is emphasized because it appears that any approach other than that of sound development will not convince the ultimate users to adopt this technology. Therefore, it seems clear that one of the objectives of the bill should be to stress systems performance comparable to that an owner today would expect from a conventional heating and/or heating and cooling system.

Since this bill assigns responsibilities to NASA, HUD and other Federal agencies, it is essential to delineate clearly the responsibilities of the respective organizations. NASA is assigned the responsibility to accomplish the necessary system research and development and hardware procurement and delivery while HUD is charged with the responsibility to develop dwelling and system performance criteria and to make the necessary arrangements for the construction of dwellings and the installation of the solar heating and/or solar heating and cooling systems furnished by NASA. While the Committee recognizes that the House intended the same assignment of responsibilities, the Committee believes that language in the bill should be more specific and has modified it accordingly. The Committee intends also that in developing and demonstrating units for structures other than residential dwellings, the same division of responsibilities for development and procurement and for construction and installation would prevail with respect to other agencies engaged with NASA in such activities.

The Committee received testimony indicating that H.R. 11864 implied the construction of new dwellings or other structures in order to demonstrate the feasibility of solar heating and cooling systems. While the Committee believed that there was nothing in the bill precluding the development of systems for application to and integration with existing systems and existing dwellings, it would be beneficial to clarify that application to existing units was contemplated by the bill, particularly since a very large portion of our residential housing in existence today will continue to house most of our population for many years. Therefore, if solar powered systems are going to make a substantial contribution to reducing demands on other energy sources, then it follows that attention must be given to the application of these units to existing homes. The Committee accomplished this by expanding the definition of residential dwellings in Sec. 3(c), and also by references in Sections 5 and 6.

Although the House, in its report on H.R. 11864, indicated that it expected new technology to be phased into the demonstration construction and installation program, the Committee was concerned that the definition of "substantial" as 4,000 units might be misconstrued and imply that NASA, HUD, and DOD were committed to undertake a housing development of 4,000 residential units equipped with solar heating and solar heating and cooling systems. As stated above, the Committee believes that the principal objective should be the development of reliable, durable and efficient systems and that this does not necessarily require mass demonstrations of such magnitude. In fact, concern has been expressed that without proper attention such a program could be a disappointment and could reflect unfavorably on solar powered systems, thereby negating, in the long run, the energy savings that the bill was intended to achieve. Therefore, the Com-

mittee has modified the bill to provide for a series of demonstrations incorporating the technology available at the beginning of each demonstration. This approach would provide for continuing periodic inputs of new technology in modest-sized demonstrations rather than imply an immediate commitment to a large-scale building program. The bill would further provide that a larger demonstration can be undertaken if necessary.

Some views were expressed that the industrial community may well see an opportunity in this area and move to offer reliable, durable and efficient systems without further NASA or HUD support. The bill as presented would encourage this approach, particularly since the Committee would expect NASA to work closely with the industrial community in its technology development activities. While there may be differing points of view, it seems increasingly clear that the key to successful and large scale adaptation and acceptance of solar power systems by the average individual is going to rest upon confidence in the equipment which is being offered. Therefore, at the risk of redundancy, the Committee restates that it believes that this should be the key emphasis of this legislation. Consistent with this objective it does not necessarily follow that mass demonstrations or specification of a large number of units is essential to the success of the program. Installations should be made in such quantities as will accomplish the objectives of demonstrating performance in sufficient numbers of geographic areas under varying climatic conditions to constitute a realistic and effective demonstration. Finally, it seems clear that until such time as the state-of-the-art is identified and analyzed and a program laid out, it is not appropriate to mold a program too concretely but to permit responsible executive agencies the freedom to adjust as developments dictate. Accordingly, the Committee has introduced the phrase "prototype demonstration dwellings" which is considered to be consistent with this approach.

In Section 8 of H.R. 11864, as passed by the House, certain responsibilities of the National Science Foundation with respect to solar energy development would have been restated through an amendment to Section 3 of the National Science Foundation Act of 1950. The Committee understood that this change was proposed to delineate more clearly the respective responsibilities of NSF and NASA in view of the assignment of certain responsibilities for solar energy functions to NASA by virtue of H.R. 11864. Based upon testimony received, including that of the Director of the National Science Foundation, it is not necessary to so modify the basic legislation affecting the National Science Foundation. In the absence of conflict in responsibilities or functional assignments, which would not appear to be the case, it was believed that existing NSF legislation should remain unchanged. The Committee anticipates that NASA and HUD will make full use of the results on ongoing NSF basic and applied solar heating and cooling research and proof of concept work, and feed the demonstration results back into NSF planning. It is not necessary to spell this out in legislation.

The Committee has modified the provisions of H.R. 11864 with respect to the development of solar powered systems for heating and cooling of commercial buildings to relieve HUD of responsibility in this area because this is foreign to its on-going responsibility and expertise. HUD would remain responsible for applications to apartment units. NASA would have the same technology and system

development and procurement responsibility as in the residential area; however, NASA would be expected to work with the General Services Administration, and other agencies involved in commercial/industrial type building construction and/or management to conduct demonstration activities utilizing the same approaches established with respect to HUD in residential applications.

H.R. 11864, as passed by the House, included language that would remove Federal legislative or regulatory restrictions on mortgage loans or unit costs to the extent an increase was due to solar heating and cooling systems provided under the bill. The owner eventually would pay any increased costs, however. The Committee received testimony that it would be necessary for HUD or other sponsoring agencies to underwrite most or all of the cost of not only the solar system equipment, but also the cost of installation of such equipment, in order to get owner acceptance of the solar power demonstration system. While granting mortgage exceptions might provide a stimulus in certain circumstances, the Committee was persuaded that underwriting of the additional cost was necessary for a successful demonstration program whatever the size. The bill, as modified, so provides, and deletes the mortgage provisions of the House bill. In addition, the Secretary shall report to Congress on the desirability or necessity of proposing tax and/or mortgage incentives to encourage production by the private sector within two years upon enactment of this bill. The Committee understands that legislation is being drafted to provide overall incentives for private adoption of solar heating and cooling technology.

The Committee retained the House provision to transfer the research and development functions vested in NASA under this bill to the Energy Research and Development Administration when and if such an agency with jurisdiction over government-wide energy research and development functions is created. However, the language in the bill was modified to make this a permissive rather than mandatory transfer as would be required by the House version of H.R. 11864. While the Committee is in agreement with the concept of unifying energy research and development functions, it believed that there ought to be some latitude because of the inability at this time to foresee or anticipate all the circumstances which might exist at the time an ERDA or its equivalent is created.

The Committee has substantially changed the authorization of appropriations as proposed by the House in H.R. 11864. The House bill specified a sum of $50 million to carry out the functions assigned to NASA and to reimburse HUD and several other agencies participating in the program. It was clear from testimony that $50 million was insufficient to carry out the total program including the construction of 4,000 demonstration units. The Committee was of the view that in the absence of precise knowledge of the state-of-the-art and the details of the program to be carried out, it was not possible to project the total fiscal requirements of the various agencies at this time. The Committee recommends a $5 million authorization for FY 1975 for NASA and a $5 million authorization for FY 1975 for HUD as adequate to initiate the program anticipated by this legislation. An integral part of the first year's activities would be the development of a firm program plan so that funding requirements could be more precisely determined in subsequent years. The Committee would expect to review subsequent NASA requirements on an annual basis

concurrent with the annual authorization required for all of NASA's other research and development programs. With respect to HUD, the bill would authorize such appropriations as may be necessary for fiscal years 1976, 1977, 1978, and 1979, with the exact amounts to be determined on an annual basis during the appropriation process. The Committee understands that this approach would be consistent with that used by the agency in carrying out housing development programs which require a program commitment over a period of years.

While the Committee has provided funding authorization in this bill for NASA for fiscal year 1975 and for HUD for fiscal years 1975 through 1979, similar provision was not made for funding demonstration activities of the Department of Defense. Inasmuch as the Committee understands that all residential housing for the Department of Defense is authorized as an integral part of the military construction authorization process, it believes that it is more appropriate that funding for demonstration activities be included as a part of the residential housing authorization process.

In amending H.R. 11864, conforming changes have been made to implement the major revisions discussed in this section of the report. This includes such changes as incorporation of existing dwellings and apartments in the definition of the term "residential dwellings", as well as changes to assure the legal sufficiency of the legislation as presented.

VI. Section-by-Section Analysis of the Bill

The first section contains the short title of the bill—the "Solar Heating and Cooling Demonstration Act of 1974."

SECTION 2. FINDINGS AND POLICY

This section sets forth the policy and purpose of the bill and the findings on which they are based.

Subsection (a) expresses the findings of the Congress—that the current fuel and energy shortage is likely to persist; that the early demonstration of the use of solar energy for heating and cooling buildings could expedite its commercial application and help relieve the demand on present fuel and energy supplies; that solar heating technology is relatively close to commercial application, while the commercial development of technologies for combined heating and cooling apparently presents no insoluble technical problems; and that the development and use of solar heating and cooling equipment will benefit the environment, eliminate our dependence upon foreign energy sources, improve our balance of trade, and promote the national defense.

Subsection (b) declares it to be the policy of the United States and the purpose of the bill to provide for a 3-year program to demonstrate the practical use of solar heating technology, and for a 5-year program to develop and demonstrate the practical use of combined solar heating and cooling technology. Rather than defining the exact meaning of the concept of demonstration, it is the general intent that the project shall, within this time frame, illustrate the feasibility of early widescale utilization of this technology.

SECTION 3. DEFINITIONS

This section contains definitions of terms used in the bill. "Solar heating" means the use of solar energy to meet such portion of a building's total heating (or hot water) needs as may be required under performance criteria to be prescribed by the Secretary of HUD. "Combined solar heating and cooling" means the use of solar energy to meet such portion of a building's total heating (or hot water) needs, and total cooling needs, as may be required under such criteria (and includes cooling by means of other methods of meeting peakload energy requirements at non-peakload times). "Residential dwellings" includes mobile homes, apartments, and publicly assisted housing It also allows for the retrofitting of the systems into existing dwellings, as well as integration of the systems in new construction. "Administrator" means the Administrator of the National Aeronautics and Space Administration and "Secretary" means the Secretary of the Department of Housing and Urban Development.

SECTION 4. CONDUCT OF ACTIVITIES IN SOLAR HEATING AND COOLING TECHNOLOGIES BY NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

This section amends section 203 of the National Aeronautics and Space Act of 1958 to direct the National Aeronautics and Space Administration to initiate, support, and carry out basic and applied research, development, demonstrations, and other activities in solar heating and cooling technologies (including activities funded under sections 5, 6, and 7 of the bill). The intent is to allow the Administration to utilize its facilities and procedures to manufacture, test, and evaluate these systems.

SECTION 5. DEVELOPMENT OF SOLAR HEATING SYSTEMS TO BE USED IN RESIDENTIAL DWELLINGS

This section establishes a Federal program for the early development and demonstration of solar hearing systems to be used in residential dwellings. The National Aeronautics and Space Administration (NASA) in cooperation with other Federal agencies, will be responsible for the development phase of the program. The Department of Housing and Urban Development (HUD), in cooperation with other Federal agencies, will be responsible for the demonstration phase of the program.

The program described in this section shall be conducted in phases or series of prototype demonstrations. The intent is to maximize performance while minimizing investment risks.

Subsection (a) directs the Administrator of NASA and the Secretary of HUD to initiate and carry out the development and demonstration program in accordance with the succeeding provisions of the section.

Subsection (b) provides for the initial stage of the program. It directs the Secretary, in consultation with the Administrator and the National Bureau of Standards (NBS), to (1) determine, prescribe, and publish, within six months after enactment, performance criteria for solar heating systems to be used in residential dwellings and similar

criteria (relating to suitability for solar heating) for the dwellings themselves, taking into account climatic variations, and (2) to select, as soon as possible thereafter, on the basis of open design competition, a number of designs for various types of residential dwellings which are suitable for the installation of solar heating systems meeting the applicable criteria so prescribed. The participation of qualified professionals (including advanced students in architecture, engineering, and related fields) is greatly encouraged, but the competition will be open to all qualified individuals and organizations. The Secretary shall specify regulations for the competition as soon as possible after the publication of the performance criteria.

Subsection (c) describes the development portion of the program. The Administrator, in consultation with the Secretary, is directed to enter into contracts and extend grants for the development (for commercial production and residential use) of solar heating systems meeting the applicable performance criteria prescribed under subsection (b). The Administrator would then enter into contracts with various persons and firms for the procurement of solar heating systems, including prototypes, spare and replacement parts.

Subsection (d) directs the Secretary to award contracts for the construction of prototype demonstration dwellings and to make arrangements to install solar heating systems in these dwellings, and existing dwellings. Ownership of such dwellings shall be conveyed to the purchaser according to conditions prescribed by the Secretary. Under this agreement, the purchaser shall have the responsibility of reporting on the performance of the system to the Secretary for a period of 5 years. During this period, the expense of maintenance and repair of the heating system and its related effects shall be borne by the government.

Subsection (e) directs the Secretary of Defense to award contracts for the construction of prototype dwellings on Federal property, and to make arrangements to install solar heating systems in such dwellings and, if appropriate, in existing dwellings.

Subsection (f) directs the Secretary and Secretary of Defense to assure that the systems are installed in substantial numbers and under a sufficient number of varying climatic conditions to constitute an effective demonstration. "Substantial numbers" shall be administratively defined, since preset figures would be too speculative and confining for such an experimental program.

Subsection (g) vests in the Secretary (in coordination with NBS, the Administrator, and the Secretary of Defense) the general function of monitoring the performance and operation of all solar heating systems installed under the program, collecting and evaluating information thereon, taking such actions as are necessary to assure that the program effectively carries out the objectives of the bill, and maintaining continuing liaison with the building industry and related industries and interests to assure that the projected benefits of the program are and will continue to be effectively realized.

SECTION 6. DEVELOPMENT OF COMBINED SOLAR HEATING AND COOLING SYSTEMS TO BE USED IN RESIDENTIAL DWELLINGS

This section establishes a Federal program for the development and demonstration of combined solar heating and cooling systems to be used in residential dwellings which includes the same steps as

the program established by section 5 for the development and demonstration of solar heating systems alone, and which is otherwise the same as that program in all procedural respects with a single exception:

Reflecting the fact that the technologies for combined solar heating and cooling are not as close to the point of commercial application as the technologies for solar heating alone, the program under this section of the bill includes as an additional step (immediately following the initial stage of the program and before the stage of contracting for development and manufacture) a period of research, development, and testing designed to provide the additional technological resources necessary for the development and commercial application of combined solar heating and cooling systems under the program as contemplated by the bill.

SECTION 7. DEVELOPMENT OF SOLAR HEATING AND COOLING SYSTEMS FOR COMMERCIAL BUILDINGS

This section directs the Administrator, in consultation with NBS and the General Services Administration (and concurrently with the demonstration programs involving residential dwellings under sections 5 and 6 of the bill), to carry out appropriate projects and activities for the early development and demonstration of combined solar heating and cooling for use in office buildings, factories, agricultural structures, public buildings, schools, and other commercial and industrial buildings. These projects and activities would take into account the special needs of and individual differences in such buildings based on size, function, and other relevant factors.

SECTION 8. LARGE-SCALE DEMONSTRATION OF SOLAR HEATING AND COOLING SYSTEMS

This section authorizes the Secretary to carry out large-scale demonstrations following the prototype demonstrations. The Secretary will first consult with the Administrator to determine if such an approach is necessary to expedite widespread acceptance of the utilization of such systems.

SECTION 9. DISSEMINATION OF INFORMATION AND OTHER ACTIONS TO PROMOTE PRACTICAL USE OF SOLAR HEATING AND COOLING TECHNOLOGIES

Subsection (a) of this section directs the Secretary of HUD, in coordination with the Administrator of NASA, NBS, NSF, the Patent Office, and other Federal agencies, to assure that full information with respect to the demonstration programs and other activities under the bill is made available to public authorities, the building industry and related segments of the economy, and the public at large, with the objective of promoting and facilitating the early and widespread practical use of solar energy for heating and cooling buildings.

Subsection (b) further directs the Secretary of HUD to study and investigate existing building codes, zoning ordinances, and related laws and practices to determine their effect upon the practical use of solar energy for heating and cooling buildings and the extent to which they should be changed to permit or facilitate such use.

Subsection (c) directs the Secretary of HUD (utilizing the capabilities of NASA, NBS, and NSF and the existing data base of scientific and technical information in Federal agencies) to establish and operate a Solar Heating and Cooling Information Data Bank to collect, review, process and disseminate solar heating and cooling information and data, including relevant types of technical information and information on the physical and chemical properties of solar heating and cooling materials, climatic conditions, and the engineering performance of solar heating and cooling devices. Retrieval and dissemination of this information would be provided for Federal, State, and local government organizations active in the energy field (and their contractors), to colleges and universities in related research and consulting activities, and to the private sector upon request in appropriate cases.

Subsection (d) directs each Federal officer and agency engaged in activities under the bill to include a full description of such activities current and projected (with related recommendations) in his or its annual report to the President and the Congress. In addition, the Secretary of HUD is directed to submit annually a special report summarizing all of the current and projected activities of the various Federal officers and agencies having functions under the bill in order to provide a comprehensive overall view of the various programs under the bill.

SECTION 10. ENCOURAGEMENT AND PROTECTION OF SMALL BUSINESS

This section directs all Federal officers and agencies performing functions under the bill to assure that small business concerns are given a realistic and adequate opportunity to participate in the new solar heating and solar heating and cooling demonstration programs.

SECTION 11. PRIORITIES

This section directs the Secretary to establish priorities in selecting areas to be demonstration sites. Among the criteria recommened to be considered are:

Subsection (a) differing geographic areas and varying climatic conditions.

Subsection (b) population and growth rate.

Subsection (c) local initiative.

The Secretary must balance these recommendations with the overriding priority of pursuing as closely as possible the general operation and intent of this Act.

SECTION 12. REGULATIONS

This section directs the Administrator of NASA and the Secretary of HUD, in consultation with NBS, the Administrator of GSA, the Secretary of Defense, and other appropriate Federal officers and agencies, to prescribe the regulations necessary to carry out the programs under the bill promptly and efficiently. Each such officer or agency, in consultation with the Administrator, could prescribe any additional regulations necessary for the performance of his or its particular function under the bill.

SECTION 13. TRANSFER OF FUNCTIONS

This section authorizes the transfer of all the research and development functions vested in NASA, along with funds appropriated under section 14, to any permanent Federal organization having jurisdiction over the energy research and development functions of the U.S. Such a transfer, if it takes place, will be effected within 60 days after the Federal agency is created by law.

SECTION 14. AUTHORIZATION OF APPROPRIATIONS

For fiscal year 1975, $5,000,000 each are authorized to be appropriated to NASA and HUD to carry out their functions under this Act.

Additional funds as necessary for the following four years are authorized to be appropriated to HUD in order that they might effectively project future endeavors within the scope of this Act.

Since NASA is customarily authorized appropriations on a yearly basis, no additional authorization is contained in this section.

VII. Changes in Existing Law

In compliance with subsection 4 of rule XXIX of the Standing Rules of the Senate changes in existing law made by the bill are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

NATIONAL AERONAUTICS AND SPACE ACT OF 1958

Public Law 85-568 (72 Stat. 426)

* * * * * * *

TITLE II—COORDINATION OF AERONAUTICAL AND SPACE ACTIVITIES

* * * * * * *

FUNCTIONS OF THE ADMINISTRATION

SEC. 203. (a) * * *

(b) The Administration shall initiate, support, and carry out basic and applied research, development, demonstrations, and other related activities in solar heating and cooling technologies, including (to the extent that funds are appropriated therefor) activities as provided for in sections 5, 6, and 7 of the Solar Heating and Cooling Demonstration Act of 1974.

[(b)] *(c)* In the performance of its functions the Administration is authorized * * *

○

93D CONGRESS } HOUSE OF REPRESENTATIVES { REPORT
2d Session } { No. 93-769

SOLAR HEATING AND COOLING DEMONSTRATION ACT OF 1973

JANUARY 28, 1974.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. TEAGUE, from the Committee on Science and Astronautics, submitted the following

REPORT

[To accompany H.R. 11864]

The Committee on Science and Astronautics, to whom was referred the bill (H.R. 11864) to provide for the early commercial demonstration of the technology of solar heating by the National Aeronautics and Space Administration and the Department of Housing and Urban Development, in cooperation with the National Bureau of Standards, the National Science Foundation, the General Services Administration, and other Federal agencies, and for the early development and commercial demonstration of technology for combined solar heating and cooling, having considered the same, report favorably thereon without amendment and recommends that the bill do pass.

Page
Purpose of the bill ---- 2
Explanation of the bill ---- 2
Statement of policy ---- 3
Amendment of the NASA Act ---- 3
Development of residential solar heating systems ---- 3
Development of residential combined solar heating and cooling systems ---- 4
Commercial buildings ---- 4
Amendment of NSF Act ----
Dissemination of information—Information Data Bank ----
Studies and investigation ----
Increased ceilings on federally assisted mortgages or federal dwelling structured housing ----
Small business ----
Transfer of functions ----
Authorization of appropriations ----
Background ----
Funding history for solar energy R. ... remain with the United
Energy task force report ... installation. During this period,
Committee staff report—D... and evaluate the performance and
. At the end of this five-year period, in ex-

	Page
Background—Continued	
NSF/NASA solar energy panel report	8
Solar energy field trips	8
Solar energy legislation in the 93d and earlier Congresses	8
Legislative history of H.R. 11864	15
June 1973 investigative hearings	15
Introduction of H.R. 10952	18
Legislation identical to H.R. 10952	18
November 1973 hearings on H.R. 10952	20
Committee actions	26
Markup in Subcommittee of H.R. 10952	26
Full Committee action on H.R. 11864	27
Committee views	28
Departmental responsibilities	28
Adequacy of authorized funds	28
Technological contributions from private citizens	29
Design competitions	29
Solar heating and cooling information data bank	29
Ceilings on loans and unit construction costs	30
Mass production of units in substantial numbers	30
Section-by-section summary of the bill	31
Cost and budget data	37
Committee recommendations	37
Department recommendations	37
Changes in existing law made by the bill, as reported	38

PURPOSE OF THE BILL

The purpose of the bill is to demonstrate within three years, using current technology, the practical use on a large scale of solar heating technology; and to develop and demonstrate on a large scale within five years the practical application of combined solar heating and cooling technology.

EXPLANATION OF THE BILL

This bill provides $50 million over a five-year period for the commercial demonstration of solar energy for heating and cooling residential and commercial buildings. It should be emphasized that H.R. 11864 does not set forth a comprehensive national solar energy R. & D. program. Rather, it accomplishes the very important and timely "next step" required to implement the large-scale, practical use of solar energy in the immediate future.

Solar energy has received greatly increased attention from Congress, the scientific community, and the public, a fact well documented by the Committee. Proposals were presented to the Committee for utilizing solar energy to heat and cool buildings, as well as for large scale terrestrial solar energy conversion and huge satellite electric power stations in space. Other proposals included bioconversion, wind conversion and ocean thermal gradient utilization.

[illegible] ony before the Committee indicates that only the area of solar [illegible] ing and cooling of buildings is now ready for commercial [illegible] n a large scale. However, only about 30 solar heated [illegible] en constructed in the entire world, and the operating [illegible] arge scale commercial implementation of this [illegible] ommercial demonstration of the economic [illegible] ling is a necessary step in attaining [illegible] duction and marketing of solar [illegible] American homes.

H.R. 11864 provides a two-stage demonstration program. The National Aeronautics and Space Administration (NASA) will be in charge of the initial phase which will consist of contracting for the research, development and manufacture of solar heating and combined solar heating and cooling equipment.

The second phase, including responsibility for installation of the equipment, monitoring and dissemination of information will be managed by the Department of Housing and Urban Development.

The residential solar heating program is programmed for three years; the residential combined heating and cooling program for five years; and the heating and cooling program for commercial buildings for five years.

Statement of Policy

The bill declares that it shall be the policy of the United States to accomplish the demonstration of the practical use of solar heating technology within three years (using current technology for this purpose), and to accomplish the research, development, and demonstration of the practical use of combined solar heating and cooling technology within a five-year period.

Amendment of the NASA Act

The bill amends Section 203 of the National Aeronautics and Space Act of 1958 to make explicit NASA's authority to carry out activities prescribed by H.R. 11864.

Development of Residential Solar Heating Systems

The development of solar heating systems for residential dwellings shall be carried out by NASA. This includes the responsibility for contracting for the development, prototypes (if needed), and manufacturing of the systems in substantial numbers. "Substantial numbers" will be administratively defined, but in any case 1,000 units is deemed to meet the requirement for each category of the demonstration program, a total of 4,000 units under all sections of the bill.

The solar heating systems developed and contracted for by NASA must meet performance criteria prescribed by the National Bureau of Standards (NBS). These performance criteria are to be published 120 days after enactment of the bill. NBS will also prescribe performance criteria for the residential dwellings in which the equipment is to be installed, in order to assure satisfactory performance of the solar heating systems under varied climatic conditions. A design competition for homes meeting these performance criteria will be conducted by NBS so that an adequate number of "off the shelf" designs will be available to individuals and small builders to install solar heating systems.

The solar heating systems manufactured under contract to NASA are to be installed, half in Federal and half in private residential dwellings. Installation in Federal dwellings shall be carried out under arrangements made by the Secretary of Defense. The Secretary of Housing and Urban Development shall arrange for installation in privately owned and occupied residences.

Ownership of the heating systems shall remain with the United States Government for five years after installation. During this period, HUD utilizing NBS, will monitor and evaluate the performance and operation of the systems. At the end of this five-year period, in ex-

change for cooperation in the monitoring and evaluation program, title shall be transferred at no charge to the owner of the residences in which the equipment is installed. During the period of Government ownership, the expense of maintenance and repair of the heating system shall be borne by the Government.

Since HUD has general responsibility for administering this demonstration program after the heating systems have been manufactured, it also has responsibility for the monitoring and evaluation functions. It is expected that NBS will be delegated as much responsibility as possible in this regard. HUD must also report on the progress of the demonstration, and maintain a continuing liaison with the building industry and related industries during and after the demonstration program. The liaison will be directed toward assuring that the benefits of this demonstration program will be realized by the Nation on a continuing basis.

Development of Residential Combined Solar Heating and Cooling Systems

The assignment of administrative responsibilities for the combined heating and cooling demonstration program for residential dwellings is similar to that for the heating program. The major exception is that NASA is authorized to undertake a research and development program for combined solar heating and cooling systems that would meet the performance criteria. It is anticipated that this research and development phase will require about two years, hence the total time planned for the combined heating and cooling program is five years.

Commercial Buildings

NASA and HUD, in a phased program similar to that for residential buildings, are directed to concurrently carry out solar heating and cooling demonstration projects with respect to a wide range of commercial buildings, such as school, industrial, office, agricultural, and apartment structures.

NBS is to participate in the commercial demonstration in ways similar to its participation in the residential dwelling program. Because of its unique responsibility for public buildings, the General Services Administration is expected to play an important role in this aspect of the overall program.

Amendment of NSF Act

The NSF Act of 1950 is amended to require the Foundation to initiate and support basic and applied research in solar heating and cooling in support of H.R. 11864. NSF is authorized to use funds appropriated directly to the Foundation or transferred to it from NASA or other agencies.

Dissemination of Information—Information Data Bank

As part of its responsibilities to assure continuing public benefit from this program, HUD is required to undertake comprehensive programs that would assure dissemination of all relevant information produced under this demonstration program. In addition to coverage in the annual reports of the various agencies participating in this demonstration program, HUD shall submit to the President and Congress a summary annual report detailing all activities relating to programs under this bill.

HUD is also charged with establishing and operating a Solar Heating and Cooling Information Bank. This bank shall collect, review, process and disseminate information on solar heating and cooling in order to support the objectives of the bill, and encourage the widespread utilization of information related to solar heating and cooling of buildings and water.

Studies and Investigation

HUD is charged with studying, investigating and reporting on ways that building codes, zoning ordinances, and other laws and practices can be modified in order to facilitate widespread use of solar energy for heating and cooling buildings.

Increased Ceilings on Federally Assisted Mortgages or Federally Constructed Housing

The bill provides for an increase in the ceilings on federally assisted mortgage loans, to the extent of the increased cost resulting from installation of solar heating and/or cooling systems. Unit cost ceilings of federally constructed housing are also increased to this extent.

The increases apply only to buildings specifically incorporated into this demonstration program. The amount of the increases may include but are not limited to the solar heating and/or cooling equipment, and special construction materials.

Small Business

All Federal agencies participating in this demonstration program are charged with taking steps to assure adequate participation by small business firms.

Transfer of Functions

Research and development functions vested in NASA and NSF by this bill would be transferred to any new permanent organization having jurisdiction over energy R. & D., such as the proposed Energy Research and Development Administration, should such an agency be established by law.

Authorization of Appropriations

$50 million is authorized to be appropriated to NASA to carry out the demonstration bill for the five fiscal years beginning after the enactment of the bill.

BACKGROUND

For some decades, private inventors and other interested individuals have taken the lead in developing the technology for heating and cooling buildings with solar energy. Various government agencies have supported small solar R. & D. programs, but only in this decade has government support exceeded one million dollars annually. In a real sense these pioneering private and agency activities have been responsible for developing the technological base needed for a demonstration program such as that provided under this bill.

Legislative interest in solar energy has recently become widespread. Numerous bills related to solar research, development and demonstration programs have been introduced, and have received careful attention from this Committee. These earlier bills, including legislation introduced in both the present and the previous Congresses, provided much information and many valuable ideas that were incorporated in this bill as reported by the Committee. These previously-introduced bills also demonstrated the widespread congressional support for solar energy, and encouraged the Committee to take the initiative in reporting out this landmark legislation.

Funding History for Solar Energy R. & D.

Prior to the fiscal year 1971 Federal budget, obligations for solar energy R. & D. were not well documented and amounted to at most a few hundred thousand dollars annually for all forms of solar energy conversion. In fiscal year 1971, the NSF budget included $1.2 million for all forms of solar research, with $540,000 devoted specifically to research on heating and cooling of buildings.

Table 1 shows how NSF funding for solar energy R. & D. has varied over the last several years. The recent emphasis on solar energy for heating and cooling of buildings is indicative of a realization of the near-term importance of this application, with obligations for the current fiscal year of $5.6 million, out of a total solar research budget of $13.2 million. This support is expected to rise a great deal more over the next several years.

Other agencies have also been involved in solar R. & D. over the last several years, but at much more modest levels than NSF. For fiscal 1974, budgets for all forms of solar energy conversion (not just heating and cooling) are: NASA ($900,000), AEC ($600,000), and DOD ($200,000).

TABLE 1.—NSF SOLAR ENERGY R. & D.

[In millions of dollars]

	Fiscal year—			
	1971 (actual)	1972 (actual)	1973 (actual)	1974 (estimate)
Solar energy for buildings	0.54	0.19	0.50	5.9
Solar thermal conversion	.06	.55	1.43	2.2
Photovoltaic conversion		.43	.89	2.4
Bioconversion for fuels	.60	.35	.65	1.0
Wind conversion			.26	1.0
Ocean thermal difference conversion		.14	.23	.7
Total	1.20	1.66	3.96	13.2

Energy Task Force Report

The legislative beginnings of H.R. 11864 are contained in the report of the Task Force on Energy of the Committee on Science and Astronautics. This Task Force was constituted specifically for reviewing energy matters during the 92nd Congress. At the conclusion of the 92nd Congress, following thorough investigation and study during 1971 and 1972, the Task Force submitted its final report. A major conclusion of that report was that, because of the continuous and virtually inexhaustible nature of solar energy, solar energy R. & D. should receive increased emphasis and funding.

The Task Force report noted that the fossil fuels upon which we depend today were formed by solar energy in the past. Food, wind, wood, and hydropower are all derived from solar energy. Solar energy is available everywhere and is almost limitless. If man can learn to develop solar power economically, it is a nearly ideal source of energy.

The body of the Task Force report emphasized three distinct uses of solar energy, each with its own problems and time scale, as being worthy of increased attention: dispersed, small-scale use for heating and cooling buildings and water; large-scale terrestrial solar energy collection and conversion into electricity; and large-scale satellite electric power plants.

Based upon briefings from experts and its own study, the Task Force concluded that with minor engineering development and relatively simple architectural modifications, solar energy could now be used for space heating of residential and industrial buildings, and the heating of water. The report also noted that in a few years solar energy might be practical for cooling as well.

Committee Staff Report—December, 1972

The conclusions of the Energy Task Force were further supported by a Committee Staff Report "Solar Energy Research" dated December, 1972. This report presented views of the National Aeronautics and Space Administration, the National Science Foundation, the National Bureau of Standards, and the Congressional Research Service of the Library of Congress on how to better assure utilization of solar energy, and supported the need for increased funding. It endorsed the conclusion that solar heating and cooling is practical using current technology.

NSF-NASA Solar Energy Panel Report—December, 1972

About the same time as the Committee Staff Report described above, a report was published by the Solar Energy Panel led by the National Science Foundation and the National Aeronautics and Space Administration. This panel was one of several technical panels commissioned by the now defunct Office of Science and Technology to review all energy technologies. Many of the facts contained in this study are also contained in the previously described Committee Staff Study, but the Panel report is much more detailed.

The portion of the report devoted to solar heating and cooling of buildings noted the present state of near readiness for commercial exploitation. It proposed a staged program for Federal R. & D., and called for a demonstration phase similar to that authorized by this bill. Several of the principal authors of this section of the Panel report were witnesses in the November hearings described below, including Mr. Richard Schoen, of UCLA (also speaking for the Space-Conditioning Panel Chairman, Dr. Jerry Weingart, from the California Institute of Technology) and Mr. Richard Rittleman, an architect with Burt, Hill and Associates of Butler, Pennsylvania.

Solar Energy Field Trips—1973

The Committee's Subcommittee on Energy in 1973 made three field trips to evaluate solar heating and cooling technology. The Subcommittee visited the solar heated home of Mr. Harry Thomason in the Washington, D.C. area; the solar heated and wind powered home and laboratories of Mr. Robert Reines near Albuquerque, New Mexico; and the Los Alamos Scientific Laboratory, Los Alamos, New Mexico, which is building a solar heated library building.

Solar Energy Legislation in the 93rd and Earlier Congresses

Legislation in the 93rd Congress.—By the close of the 1st session of the 93rd Congress, 11 different solar energy bills had been introduced in the House and Senate. Some of these were broad in scope, covering the research and development of all aspects of solar technology. Most, however, are aimed at just the development of solar heating and cooling technology for buildings—the solar application reputed to be closest to commercial use. In addition to the 11 bills dealing specifically with solar energy, several general energy bills have been introduced, such as S. 70, H.R. 9090, S. 2135, and others, which include provisions for the development of the unconventional or little-used energy sources such as solar. The following is a brief summary of the 11 specific solar energy bills introduced in the 1st session of the 93rd Congress:

H.R. 9696 (Mr. Runnels). Introduced July 30, 1973 to establish an Office of Solar Energy Research in the Department of the Interior with authority to coordinate, conduct, encourage, and promote, by means of research grants and contracts, basic research to develop economical processes for using solar energy. The bill authorizes the development of solar conversion technologies to the point where they can be demonstrated, certified, produced, and operated in a practical manner. Funding not to exceed $125 million is authorized to carry out the provisions of the Act during the fiscal years 1974 to 1978, inclusive. (Referred to the Committee on Science and Astronautics.)

H.R. 10479 (Mr. Vanik). Introduced September 24, 1973 to promote the development of solar technology by authorizing the Secretary of Commerce (1) to establish a system of grants for solar energy research and (2) to establish a Solar Energy Data Bank. The Data Bank would serve as a technical and scientific library and evaluation center with respect to the development and use of solar energy. Grants authorized by the bill are to be made for research leading to the design, manufacture, and marketing of solar energy heating and cooling equipment for homes and office buildings. NBS is directed to establish testing procedures and performance standards for such equipment, as well as to perform cost analyses and collect weather data. Funding as might be needed for research grants is authorized for fiscal years 1975 through 1984, inclusive. (Referred to the Committee on Science and Astronautics.)

H.R. 10952 (Mr. McCormack). Introduced October 16, 1973 to provide for the early commercial demonstration of the technology of solar heating and cooling by the National Aeronautics and Space Administration, the National Bureau of Standards, the National Science Foundation, the Department of Housing and Urban Development, the Department of Defense, and other agencies. It provides for the demonstration of solar heating technology on a large scale in three years, and the demonstration of the technology for combined solar heating and cooling of buildings in five years. It further provides for a five-year demonstration program of solar heating and cooling of commercial buildings, factories, and industrial buildings. The total cost of these programs over the five year period, including installation of approximately 2,000 mass produced solar heating units and 2,000 mass produced solar heating and cooling units in residential dwellings will be $50 million.

The bill was referred to the Committee on Science and Astronautics, and, after detailed study and hearings in November, was ordered reported out of committee favorably on December 20, 1973. The clean bill, H.R. 11864, has a provision for a Solar Heating and Cooling Information Data Bank to be established within HUD, and a provision which will allow the functions contained in the bill to be transferred to the Energy Research and Development Administration or any other permanent Federal organization that is created having jurisdiction over the energy research and development functions of the United States.

H.R. 11542 (Mr. Vanik). Introduced November 15, 1973 to amend the Public Buildings Act of 1959 so as to encourage the use of solar energy in the heating and cooling systems of public buildings. The bill specifies that no appropriation shall be made to construct or acquire any building to be used as a public building and no appropriation shall be made to alter any public building involving an expenditure in excess of $10,000 unless the Administrator of G.S.A. transmits to the Congress an energy use statement with respect to any such proposed construction, acquisition, or alteration. It also provides that the Committee on Public Works of the Senate and House shall not approve any project for construction of any public building under subsection (a) unless such project provides for the use of solar energy to meet the heating and cooling requirements of such building, to any

extent to which the use of solar energy is economical and efficient. (Referred to the Committee on Public Works.)

H.R. 11566 (Mr. Lehman). Introduced November 26, 1973 to (1) direct the Secretary of Commerce to research and develop new building designs and construction methods which utilize solar energy and (2) authorize the Secretary of Housing and Urban Development to increase the maximum amount of mortgages insured under title II of the National Housing Act for certain facilities utilizing solar energy. The Secretary of Commerce is further authorized to prescribe standards and specifications for solar buildings within one year after enactment of the bill and specify the climatic regions of the United States where the use of solar buildings is practicable. The Secretary of HUD may increase the maximum amount of a mortgage insured under the National Housing Act by the amount by which the cost of using solar systems exceeds the cost of using conventional building systems. (Referred to the Committee on Banking and Currency.)

H.R. 11933 (Mr. Vanik). Introduced December 12, 1973 to amend the Internal Revenue Code of 1954 to provide for the amortization of facilities used for the manufacture of solar heating and cooling equipment. The five-year amortization period provided for by the bill is in lieu of the depreciation deduction with respect to such facilities. The taxpayer may elect to take the amortization deduction beginning either with the month following the month in which the certified solar heating and cooling equipment manufacturing facility is completed, or with the taxable year succeeding the taxable year in which the facility is completed. (Referred to the Committee on Ways and Means.)

Amendment No. 624 (Mr. Cranston). Introduced October 10, 1973 to amend the Housing Act of 1973 (S. 2182) to provide for the establishment of major demonstration projects to test the economic and technical feasibility of solar energy as an energy source for the heating and cooling of both single family and multi-family housing. The Secretary of Housing and Urban Development in collaboration with the National Science Foundation is authorized to undertake demonstration projects throughout the country. The Secretary is authorized to enter into contracts with individuals and entities with special competence and knowledge to contribute to the planning, design, development, and operation of such housing. Finally, the Secretary is directed to report to the Congress annually on his effort. Funds, not to exceed $5 million which shall remain available until expended are authorized to be appropriated for demonstrations. (S. 2182 is being considered by the Banking, Housing and Urban Affairs Committee.)

S. 2636 (Mr. McGovern). Introduced October 30, 1973 to authorize supplemental appropriations for the National Science Foundation's solar, hydrogen, and geothermal research and development programs. Specifically, the bill authorizes an additional $80 million for NSF's RANN solar energy program for FY 1974 and $400 million for the program for each of the four fiscal years beginning July 1, 1974. In addition, the bill authorizes $50,000 for a feasibility study regarding the establishment of a National Data Bank for Solar, Hy-

drogen, and Geothermal Energy for FY 1974. (Referred to the Committee on Interior and Insular Affairs.)

S. 2650 (Mr. Cranston). Introduced November 2, 1973 to direct the Secretary of Housing and Urban Development to undertake a major demonstration program to determine the practical feasibility of solar heating and cooling in residential and commercial buildings. This would involve the development of appropriate standards and building codes, the awarding of an adequate number of designs to test existing technology and innovations, and the actual construction of solar-powered buildings. The Secretary of HUD will have overall responsibility for this program, for implementing, monitoring, and evaluating it, after he has consulted with the National Solar Energy Coordinating Council. This Council will be composed of the following, or their designees: The Administrator of NASA, the Director of NSF, the Administrator of General Services, the Director of NBS, the Administrator of EPA, the President of NAS, three members representing the public, and any additional Federal department or agency heads whom the President may name. The bill provides for an immediate three-year demonstration program for solar heating, and a five-year development and demonstration program for combined solar heating and cooling systems. A maximum of $50 million is authorized to carry out the purposes of the act. (Read twice and, by unanimous consent, referred to the Committees on Banking, Housing and Urban Affairs and Commerce jointly, and if and when one of the above reports, then to the Committee on Labor and Public Welfare.)

S. 2658 (Mr. Moss). Introduced November 5, 1973 as a companion bill to H.R. 10952. (Read twice and referred to the Committee on Aeronautical and Space Sciences.)

S. 2819 (Mr. Humphrey). Introduced December 17, 1973 to establish an Office of Solar Energy Research within the Atomic Energy Commission to carry on a vigorous program of research and development of all solar energy applications. The Chairman of AEC, acting through the Office of Solar Energy Research and in conjunction with NSF and NASA would (1) conduct by means of grants and contracts basic research to develop economical processes for using solar energy; (2) conduct appropriate research and technical development work (a) to determine the usable results of the basic research and all existing research and (b) to develop and fabricate solar energy transformation processes and equipment to the point where they can be commercialized; (3) recommend to the Congress authorizations for the construction and operation of solar energy conversion facilities; and (4) undertake, through research grants and contracts, studies of possible environmental effects which will result from the use of solar energy. The bill also establishes a Solar Energy Research Council to be headed by the Chairman of the AEC to coordinate policy and programs in solar energy research. There are authorized to be appropriated $56 million for FY 1975, $94 million for FY 1976, and $150 million for each of the succeeding three fiscal years. (Read twice and referred to the Committee on Atomic Energy.)

Legislation in Earlier Congresses.—A small number of bills dealing specifically with the development of solar technology were introduced in earlier Congresses. None of them passed. One, S. 2318, was a basic

research and development bill first introduced by Mr. Bible in 1959 and later in 1961 by Mr. Hosmer. It authorized the Secretary of the Interior to make grants to private institutions and to use the facilities of existing Federal scientific laboratories to conduct research and technical development of techniques for the practical utilization of solar energy. The bill authorized $10 million to be spent over a ten-year period. A similar bill was introduced jointly by Mr. Humphrey in the Senate and Mr. Anfuso in the House in 1962. This bill differed from Mr. Bible's bill in that it provided for the establishment of a Solar Energy Advisory Board, composed of five scientists, to work with the Secretary of the Interior on a consulting basis. The bill was reintroduced in 1964 by Mr. Humphrey and again in 1965 by Mr. Schmidhauser. A new bill, H.R. 12438, was introduced in 1967 by Mr. Miller to authorize the Secretary of the Interior to grant contracts to public or private institutions for the research and development of techniques for the practical utilization of solar energy. Other bills which would have accelerated the development of solar technology had they passed were S. 2510, introduced in 1971 by Mr. Moss, and an amendment to S. 3103 (the AEC authorization bill), introduced in 1972 by Mr. Gravel. Mr. Moss's bill would have established a corporation for the development of new energy sources, including solar, and Mr. Gravel's amendment would have provided $15 million for solar research and development. There follows a summary of these and other solar energy bills introduced in earlier Congresses.

H.R. 4286 (Mr. Murdock). Introduced May 28, 1951 to authorize the Secretary of the Interior to perform the necessary research and development to construct and operate a demonstration windpower plant. The plant is to demonstrate the economic and commercial feasibility of producing electric power and energy by means of a wind-driven generator operated in conjunction with an electric power system. During the demonstration period, generated power shall be delivered into the power system of the Federal project with which the demonstration plant is integrated. At such time as the Secretary determines that the feasibility of the plant has been established, the experimental period shall end and the demonstration plant shall be transferred to the power system of the Federal project with which it is then integrated. Congress will from time to time appropriate the funds deemed necessary to carry out the provisions of the act. Bill did not pass.

S. 2318 (Mr. Bible). Introduced July 1, 1959 to authorize the Secretary of the Interior to make grants to private and educational institutions and to use the facilities of existing Federal scientific laboratories to conduct research and technical development of techniques for the practical utilization of solar energy. Research undertaken by the Secretary of the Interior shall be coordinated or conducted jointly with the Department of Defense. Sums not to exceed $10 million are appropriated to carry out the provisions of the Act during the fiscal years 1959 to 1968, inclusive. Bill did not pass.

H.R. 6558 (Mr. Hosmer). Senator Bible's bill (S. 2318) reintroduced April 20, 1961 with the authorization period changed to the fiscal years 1961 to 1968, inclusive. Bill did not pass.

S. 2849 (Mr. Humphrey). Introduced February 15, 1962, S. 2849 is similar to S. 2318 and H.R. 6558 except that it also provides for the establishment of a Solar Energy Advisory Board, composed of five scientists, to work with the Secretary of the Interior on a consulting basis. Sums not to exceed $10 million are authorized to carry out the provisions of the Act during the fiscal years 1962 to 1968, inclusive. Bill did not pass.

H.R. 10203 (Mr. Anfuso). Companion bill introduced on the same day in the House. Bill did not pass.

S. 2853 (Mr. Humphrey). Introduced May 18, 1964. Identical to S. 2849. Bill did not pass.

H.R. 3434 (Mr. Schmidhauser). Introduced January 25, 1965. Identical to S. 2849. Bill did not pass.

H.R. 12438 (Mr. Miller). A short bill introduced August 17, 1967 to authorize the Secretary of the Interior, in consultation with other interested agencies, to engage by contract or otherwise, public or private institutions in a program of research and development in techniques for the practical utilization of solar energy. The Secretary is also authorized to encourage activities outside the Federal Government which will contribute to such a program. There are authorized to be appropriated such sums as may be required to carry out the purposes of this Act. Bill did not pass.

S.J. Res. 184 (Mr. Tower). Introduced March 24, 1970 to authorize the Secretary of the Interior to conduct a study of the solar rays with a view to determining the potential of such rays as an alternative source of electrical energy. A sum not to exceed $500,000 is authorized for a two year period following the date of approval of the resolution. Bill did not pass.

S. 2510 (Mr. Moss). Introduced September 14, 1971 to establish a corporation for the development of new energy sources. The Corporation (New Energy Sources Corporation) is authorized to enter into contracts or other arrangements with public or private institutions to conduct research and development related to its mission. The bill authorizes $5 million for the fiscal year beginning July 1, 1972 to permit the initial organization of the Corporation, and for each of the next five succeeding fiscal years, such sums as may be necessary. Section 3 (c) deals with solar energy and directs the Corporation to select among the most feasible methods for the utilization of solar energy when such processes have reached the stage of development that they are ready to be demonstrated. The Corporation is then authorized to design, construct, operate, and maintain demonstration facilities that are required to prove the technical and economic feasibility of the processes selected. If, on the basis of the demonstration, the Corporation determines that methods so demonstrated are technically and economically feasible for producing energy on a commercial scale, the Corporation is authorized to produce energy by such method. Bill did not pass.

Amendment to S. 3103, the AEC authorization bill for fiscal 1973 (Mr. Gravel). Introduced February 14, 1972 to provide $15 million for solar energy research and development. The amendment authorizes the Commission to conduct solar energy research and development in

order to accelerate the demonstration of large-scale solar power systems. Of the $15 million authorized to be appropriated for the fiscal year ending June 30, 1973, $150,000 shall be expended to fund adversary experts to independently investigate and publicly reveal alleged hazards and adverse ecological and economic implications of solar power projects under development. Mr. Gravel introduced a similar amendment in July 1971 to authorize the AEC to spend $3 million on solar research. Amendments did not pass.

June 1973 Investigative Hearings

Witnesses provided expert advice during hearings on June 7 and 12, 1973 on the current state of the art for solar space conditioning systems, and defined as carefully as possible the economics of such systems in terms of today's market. Testimony and Member questions focused on the economic, technological, and institutional obstacles to widespread commercial utilization of solar heating and cooling technology and on the steps that should be taken to accelerate the commercialization of solar heating and cooling for homes and commercial buildings. The witnesses who advised the subcommittee were, in the order of their appearance:

1. Professor George Löf of Colorado State University.
2. Dr. James Comly, Manager, Thermal Branch, Corporate Research and Development, General Electric Company.
3. Walter A. Meisen, Assistant Commissioner for Construction Management, Public Building Service, GSA.
4. Fred S. Dubin, P.E. of Dubin-Mindell-Bloom Associates.
5. Ralph J. Johnson, Staff Vice President, National Association of Home Builders Research Foundation.

In addition to the oral testimony received, written statements were received from the following:

1. Dr. James C. Fletcher, Administrator, National Aeronautics and Space Administration.
2. John K. Tabor, Acting Secretary of Commerce, Department of Commerce.
3. Arthur I. Mendolia, Assistant Secretary of Defense (Installations and Logistics), Department of Defense.
4. Karl W. Böer, director, Institute of Energy Conversion, University of Delaware.
5. J. A. Duffie, director, Solar Energy Laboratory, Engineering Experiment Station, College of Engineering, the University of Wisconsin.
6. Sheffield Nelson, president, Arkansas Louisiana Gas Co.
7. William J. Bailey, president, Carrier Corp.
8. William C. Dackis, vice president and assistant to the president, Crane Co.
9. Herman Barkmann, P. E., president, Sun Mountain Design, Ltd.
10. D. C. Burnham, chairman, Westinghouse Electric Corp.
11. J. W. Kennedy, president, York Division, Borg-Warner Corp.
12. Harold R. Hay, member, board of directors, the International Solar Energy Society, Sky Therm Processes and Engineering.

13. Robert G. Reines, director, ILS Laboratory, Integrated Life-Support Systems Laboratories for Spaceship Earth.

14. P. Richard Rittleman, Burt, Hill & Associates, architects.

15. L. N. Hunter, managing director, Air-Conditioning and Refrigeration Institute.

16. H. E. Thomason, J. D., president, Thomason Solar Homes, Inc.

The witnesses agreed that the use of solar energy for space heating, air conditioning, and water heating in buildings is the most promising near-term application of solar energy. Professor Löf saw the application as being technically feasible and closely approaching economic viability. He advised that with a vigorous program of research and development it would be possible to have commercial solar heating and cooling equipment within three to five years that would compete in cost with conventional systems. Dr. Comly had no doubt that "it will be technically feasible to heat water and to heat and cool interior building space using the sun as the major energy source." Mr. Meisen was equally optimistic about the potential of this application. He stated, "We, in the General Services Administration, believe the time is ripe for a major expansion in the use of solar energy in this country to heat and cool buildings. We believe the technology and hardware is available to begin making large solar energy installations."

Witnesses identified three classes of obstacles to the commercial use of solar hardware—economic, technological, and institutional. It is clear that the three classes are not strictly separable, for example, very strong relationships exist between the technological effort to manufacture solar equipment at low cost and the resolution of the economic barrier of high initial cost.

The substantially higher first cost of solar heating and cooling systems compared to conventional systems was generally considered the greatest single barrier to the widespread commercial use of solar hardware. The substantial increase in initial cost of a building, represented by solar hardware, is unacceptable to most building purchasers even though the economic justification of the additional first cost can be demonstrated when the savings in the cost of fuel over the lifetime of the building are considered. Professor Löf stated that a "solar heating system for an average house is going to add perhaps $2,000 to the price of that house, and I'm told by people who know the building industry pretty well that this is a horrible thought to the usual builder-developer."

Mr. Dubin, whose firm is working with GSA in the design of two solar-conditioned Federal office buildings, stated that solar energy "is economically competitive with electric resistance heating and cooling now. It will be economically competitive with conventional oil or gas-fired systems in the very near future anywhere in the country." He substantiated his economic assessment of solar energy with the results of a cost analysis performed on GSA's Manchester, New Hampshire solar building: "Without a very sophisticated collector, and without thorough integration of the system, the solar heating and cooling system would operate on a life cycle cost basis about 25 percent less than straight electric resistance heating at today's cost and would cost about 20 to 25 percent more than gas or oil at today's cost." Mr. Dubin and other witnesses anticipated that the cost ad-

vantage now enjoyed by conventional heating and cooling systems would soon be offset by rising costs for gas and oil, and that rise has, of course, recently occurred. Dr. Löf predicted (in June) that if solar collectors, the most expensive component in a solar space conditioning system, can be mass manufactured at a cost of $2 to $4 per square foot, then "solar heat can be supplied to buildings for space heating, water heating, and cooling at costs seldom more than double current oil and gas costs; in some localities solar energy is fully competitive, and in virtually all situations solar costs are substantially below those associated with electric heating."

The availability of lower cost solar hardware through mass manufacture would certainly enhance the economic position of solar heating and cooling systems. But until life cycle or total lifetime costs are considered in cost estimating, the initial capital investment required for solar space conditioning will continue to be a serious marketing problem. Mr. Johnson urged "special information programs for mortgage bankers, appraisers and government personnel concerned with mortgage loan insuring and guaranteeing programs to assure full credit for reduced heating and cooling operating costs when using solar energy. This is needed to offset the increased mortgage payments due to higher first costs of solar equipment, if we are to prevent the disqualification of a large number of potential buyers because of the higher first cost of the solar energy installations."

The principal technological obstacle to the application of solar energy for building services is the fact that no solar-equipment industry exists today. Dr. Comly knew of no major manufacturer of appliances or of heating and cooling equipment which includes solar-fired equipment in its product line. To be useful in providing the energy requirements for buildings services, solar hardware will probably have to be introduced into the market in a manner similar to the way furnaces, air conditioners, major appliances, and other durable consumer goods are introduced. The technological requirement for success in this market includes the existence of an industry which pursued the design of devices for low cost mass manufacture, for durability, and for reliable performance with simple maintenance procedures.

Dr. Comly defined the requirements for a commercial system in very precise terms: Once an optimum design is selected, "a detailed design of the products must be made using experience, intuition, and innovation to minimize first cost, the critical problem for solar energy today, while maintaining reliability, automatic operation, ease of installation, serviceability, and environmental compatibility." Until solar devices can be produced in such a way as to meet these requirements, there will probably be no wide-spread application. Even though solar heating systems have been demonstrated in numerous experimental homes, the systems that have been tested lack the design sophistication and economic position to be competitive with the well established conventional heating and cooling systems. As Dr. Löf stated, "we are not quite at the point in the development of solar energy, or solar heating and cooling, and in the price of fuels to provide a high assurance to an industrial firm that if they were to commit heavy investment to tooling up for manufacture that they would have a substantial market."

The principal institutional barrier to successful use of solar energy in buildings is the present lack of a coordinated effort among the diverse institutions which interact to affect construction. In order for solar devices to be introduced into wide-spread application in buildings, designers, builders, codes and standards agencies, financial institutions, and equipment suppliers must cooperate. Mr. Johnson provided good insight into the attitude of the home building industry which, if solar space conditioning is to become a reality, is the industry that will be first involved. He pointed out trends in current construction, such as emphasis upon townhouses and apartments, that may discourage the use of solar hardware. He also noted that the mere demonstration of solar space conditioning will not be enough to bring it into the housing market. A major change in outlook will be required of home buyers, home builders, and financiers.

On the whole, the collective advice of the witnesses indicated that solar space conditioning and water heating is at the stage where research and development needs to be supplemented by demonstration projects and incentives to cause home builders and buyers to start to use this technology. From the standpoint of public policy, the question developed was whether to rely upon present funding of solar energy research and evolving economic forces to bring solar space conditioning to the commercial market, or whether to expedite its earlier application through expanded federally supported programs. The latter choice was that of the Committee, based on the testimony and the urgency of the energy problem.

Introduction of H.R. 10952

Following the June hearings described above, committee staff with the assistance of the Congressional Research Service of the Library of Congress, the House Legislative Counsel's Office, and outside experts in the solar energy field, prepared a bill to provide for demonstration of solar heating and cooling in accordance with the testimony received, and the wishes of the Committee. The purpose of the bill has already been described—to provide for an effective demonstration of solar heating and cooling technology. The intent was two-fold: to help generate a new industry, and to help generate a new market.

The first bill, H.R. 10952, was cosponsored by the Chairmen and ranking minority members of the Subcommittee and Committee. It was introduced on October 16, 1973, and an introductory statement by Subcommittee Chairman Mike McCormack appeared in the Congressional Record of October 30, 1973.

Legislation Identical to H.R. 10952

The widespread support in Congress for accomplishing the goals of this legislation was demonstrated by 185 Members sponsoring legislation identical to H.R. 10952. A list of these Members and the bills which each introduced is given below. Mr. Flowers and Mr. Benitez, although not sponsors of bills identical to H.R. 10952, are cosponsors of H.R. 12079 and H.R. 12248 identical to the clean bill, H.R. 11864.

Alexander	H.R. 11430	Badillo	H.R. 11058
Anderson of Ill	H.R. 11180	Bafalis	H.R. 11431
Annunzio	H.R. 11058	Baker	H.R. 11057
Archer	H.R. 11056	Bell	H.R. 11028
Aspin	H.R. 11057	Bergland	H.R. 11027

Bevill ---------- H.R. 11179
Biester ---------- H.R. 11795
Bingham ---------- H.R. 11058
Blatnik ---------- H.R. 11056
Boggs ---------- H.R. 11432
Boland ---------- H.R. 11431
Breaux ---------- H.R. 11058
Brotzman ---------- H.R. 11077
Brown of Calif ---------- H.R. 11027
Broyhill of N.C ---------- H.R. 11179
Burgener ---------- H.R. 11056
Burke of Calif ---------- H.R. 11432
Byron ---------- H.R. 11431

Camp ---------- H.R. 11027
Carney ---------- H.R. 11056
Casey ---------- H.R. 11432
Chappell ---------- H.R. 11839
Clausen ---------- H.R. 11554
Cleveland ---------- H.R. 11058
Cohen ---------- H.R. 11430
Collier ---------- H.R. 11179
Collins of Ill ---------- H.R. 11430
Collins of Tex ---------- H.R. 11179
Conlan ---------- H.R. 11027
Conte ---------- H.R. 11179
Corman ---------- H.R. 11056
Cotter ---------- H.R. 11027
Coughlin ---------- H.R. 11180
Cronin ---------- H.R. 11027
Culver ---------- H.R. 11430

Danielson ---------- H.R. 11056
Davis of Georgia ---------- H.R. 11028
Dellums ---------- H.R. 11058
Downing ---------- H.R. 11028
Drinan ---------- H.R. 11179
du Pont ---------- H.R. 11432

Edwards of Ala ---------- H.R. 11056
Edwards of Calif ---------- H.R. 11179
Esch ---------- H.R. 11028
Eshleman ---------- H.R. 11058

Fish ---------- H.R. 11056
Foley ---------- H.R. 11430
Forsythe ---------- H.R. 11430
Fraser ---------- H.R. 11056
Frenzel ---------- H.R. 11180
Frey ---------- H.R. 11028
Froehlich ---------- H.R. 11057
Fulton ---------- H.R. 11431
Fuqua ---------- H.R. 11028

Gilman ---------- H.R. 11180
Ginn ---------- H.R. 11795
Goldwater ---------- H.R. 10952
Grasso ---------- H.R. 11432
Green of Oregon ---------- H.R. 11430
Gunter ---------- H.R. 11027

Hamilton ---------- H.R. 11431
Hanna ---------- H.R. 11028
Harrington ---------- H.R. 11179
Harvey ---------- H.R. 11058
Hastings ---------- H.R. 11058
Hechler of W. Va ---------- H.R. 11028
Helstoski ---------- H.R. 11058
Hicks ---------- H.R. 11058
Hinshaw ---------- H.R. 11431
Hogan ---------- H.R. 11179
Holt ---------- H.R. 11431
Horton ---------- H.R. 11795
Huber ---------- H.R. 11432
Hunt ---------- H.R. 11821

Johnson of Calif ---------- H.R. 11431
Johnson of Colo ---------- H.R. 11056
Johnson of Penna ---------- H.R. 11821
Jones of Okla ---------- H.R. 11431
Jordan ---------- H.R. 11179

Keating ---------- H.R. 11057
Kemp ---------- H.R. 11056
Ketchum ---------- H.R. 11180

Lehman ---------- H.R. 11430
Lent ---------- H.R. 11057
Long of Md ---------- H.R. 11057
Lujan ---------- H.R. 11430

McClory ---------- H.R. 11431
McCloskey ---------- H.R. 11430
McCormack ---------- H.R. 10952
McDade ---------- H.R. 11058
McEwen ---------- H.R. 11431
McKay ---------- H.R. 11431
McKinney ---------- H.R. 11058

Maraziti ---------- H.R. 11181
Martin of N.C ---------- H.R. 11027
Mayne ---------- H.R. 11056
Mazzoli ---------- H.R. 11430
Meeds ---------- H.R. 11056
Melcher ---------- H.R. 11179
Metcalfe ---------- H.R. 11058
Michel ---------- H.R. 11431
Milford ---------- H.R. 11027
Mitchell of N.Y ---------- H.R. 11058
Moorhead of Calif ---------- H.R. 11058
Mosher ---------- H.R. 10952

Nedzi ---------- H.R. 11431

Obey ---------- H.R. 11430
Owens ---------- H.R. 11430

Parris ---------- H.R. 11027
Patten ---------- H.R. 11431
Pepper ---------- H.R. 11056
Pettis ---------- H.R. 11821
Pickle ---------- H.R. 11027
Poage ---------- H.R. 11179
Podell ---------- H.R. 11179
Pritchard ---------- H.R. 11057

Quie ---------- H.R. 11056

Rarick ---------- H.R. 11431

Rees	H.R. 11180	Taylor of Missouri	H.R. 11821
Reuss	H.R. 11058	Teague	H.R. 10925
Rhodes	H.R. 11432	Thomson	H.R. 11057
Rinaldo	H.R. 11432	Thone	H.R. 11430
Robinson of Va	H.R. 11056	Thornton	H.R. 11027
Robison	H.R. 11179	Tiernan	H.R. 11795
Rodino	H.R. 11431	Treen	H.R. 11430
Roe	H.R. 11028		
Roncalio	H.R. 11057	Udall	H.R. 11057
Roncallo	H.R. 11057	Ullman	H.R. 11430
Rosenthal	H.R. 11057		
Roush	H.R. 11057	Vander Jagt	H.R. 11839
Rousselot	H.R. 11821	Vanik	H.R. 11056
Roy	H.R. 11057		
Runnels	H.R. 11432	Walsh	H.R. 11057
Ryan of Calif	H.R. 11432	Ware	H.R. 11179
St Germain	H.R. 11721	White	H.R. 11057
Sarasin	H.R. 11431	Wilson of Calif	H.R. 11179
Sarbanes	H.R. 11430	Wilson of Texas	H.R. 11057
Scherle	H.R. 11057	Winn	H.R. 11028
Schroeder	H.R. 11179	Won Pat	H.R. 11430
Seiberling	H.R. 11432	Wright	H.R. 11057
Shoup	H.R. 11430	Wyatt	H.R. 11058
Shriver	H.R. 11056	Wydler	H.R. 11028
Sisk	H.R. 11056	Wylie	H.R. 11821
Skubitz	H.R. 11432	Wyman	H.R. 11431
Snyder	H.R. 11430		
Stanton of Ohio (J. William)	H.R. 11056	Yatron	H.R. 11431
Stark	H.R. 11430	Young of Ga	H.R. 11056
Steiger of Ariz	H.R. 11179	Young of S.C	H.R. 11058
Studds	H.R. 11058	Young of Ill	H.R. 11057
Sullivan	H.R. 11057	Young of Fla	H.R. 11431
Symington	H.R. 11028		
		Zwach	H.R. 11179

November 1973 Hearings on H.R. 10952

Following the introduction of H.R. 10952 and identical bills, hearings were promptly scheduled. These took place on November 13, 14, and 15, 1973, with both morning and afternoon sessions on the latter two days. The 23 witnesses, representing Federal agencies, industry, university research organizations, and environmental groups generally endorsed the concept of the demonstration project, its timeliness, and general administrative features.

The witnesses and the emphases of their testimony, in the order of their appearance before the Subcommittee were:

1. Dr. James C. Fletcher, Administrator, National Aeronautics and Space Administration. He supported the bill, and also called for creation of the Energy Research and Development Administration (ERDA).

2. Dr. H. Guyford Stever, Director, National Science Foundation. He supported the demonstration concept, but felt ERDA management was important and the large scale demonstration called for in H.R. 10952 was premature.

3. Dr. Betsy Ancker-Johnson, Assistant Secretary for Science and Technology, Department of Commerce. She supported the demonstration concept with ERDA management. She also advocated a strong role for the National Bureau of Standards.

4. Mr. Peter Michel, Acting Deputy Assistant Secretary for Policy Development and Research, Department of Housing and Urban Development. His statement was little more than a strong plea for the creation of ERDA. In response to committee questions he indicated his general support of the demonstration concept, with strong participation by HUD in all phases.

5. Dr. Peter Glaser, Vice President for A. D. Little Co. He felt the bill was too timid, and did not go far or fast enough. He heads an industrial solar study, and felt industry is now ready to produce on a large scale solar heating and cooling equipment, but needs government incentives.

6. Mr. P. Richard Rittleman, Burt, Hill and Associates, Butler, Pennsylvania. A leading solar-oriented Architect and Mechanical Engineer, he called for more emphasis on the commercial building portion of the demonstration program.

7. Dr. Erich Farber, Solar Energy Laboratory, University of Florida. He indicated that solar technology is ready for such a large-scale demonstration, but urged even greater speed than envisioned in the bill.

8. Prof. Raymond Reed, Dean, College of Architecture and Environmental Design, Texas A & M University. He provided strong support and advocated expanded national coverage and greater participation by architectural schools and students.

9. Mr. William Rush, Manager, Systems Applications Research, Institute of Gas Technology. His testimony showed near solar readiness of their new heat exchanger. His answers to Committee questions showed his support of the bill.

10. Mr. Sheldon Kinsel, Conservation Liaison, National Wildlife Federation. He gave enthusiastic support and wanted to expand bill to other energy conservation areas.

11. Mr. Wilson Clark, Energy Consultant, Environmental Policy Center. He supported the concept of the bill enthusiastically, while urging a number of extensions into other energy-related areas.

12. Mr. Warren Christian, President, Solec Company. He gave testimony on solar heating products produced by his company. His answers to Committee questions indicated support for the bill.

13. Rear Admiral Nathan Sonenshein, Defense Energy Task Group. He supported the bill without mentioning ERDA. He gave an understanding of how DOD would participate, citing specific financial and legislative needs.

14. Mr. Walter Meisen, Assistant Commissioner for Construction Management, Public Buildings Service, General Services Administration. He supported the bill and called for creation of ERDA. He demonstrated GSA interest and competence, and expressed interest in having GSA included in the bill.

15. Mr. Ralph Johnson, Staff Vice President, National Association of Home Builders Research Foundation, Inc. His strong support for the bill was qualified by a call for time and funding increases.

16. Mr. Frederick D. Hunt, Jr., Director of Program Development, Mobile Home Manufacturers Association. He generally supported the bill and pointed out special needs of mobile home manufacturers and owners in utilizing solar energy.

17. The Hon. Charles Vanik, Member of Congress from Ohio. Mr. Vanik offered numerous amendments, some following from legislation he had introduced independently. He was generally enthusiastic about the bill.

18. Prof. Richard Schoen, School of Architecture/Urban Planning, UCLA. He concentrated on institutional barriers to the introduction of solar heating and cooling, and offered numerous modifications. He generally supported the bill.

19. Mr. J. Frederick Weinhold, Senior Engineer, Energy Policy Project. He concentrated on the future role of solar energy and identified some of the hurdles to be overcome. He generally supported the legislation.

20. Mr. Jack Bologna, Director, New Products Development, PPG, Inc. He concentrated on the virtues of proper glass selection for solar collectors, and the need for Federal financial support of industrial supplies for a new solar industry. He supported the bill in response to Committee questions.

21. Dr. Ian R. Jones, Manager, Thermal Energy Systems Department, TRW Systems. He described TRW work on a current $550,000 NSF grant, and earlier work on HUD Project Breakthrough. He supported the intent of the bill, but pointed out that work is under way on major problem areas identified by the bill.

22. Dr. Jesse C. Denton, Director, National Center for Energy Management and Power, University of Pennsylvania. He supported the concept of the bill with a delay in the cooling portion, increased funds, and possible joint office management.

23. Mr. Donald A. Urquhart, Manager of Special Projects, Lighting Products Division, Corning Glass Works. He described his company's efforts in developing concentric cylindrical tubular solar collectors. He urged increased speed and funding.

The oral testimony was supplemented by written statements from:

1. Hon. J. J. (Jake) Pickle of Texas.
2. Hon. Goodloe E. Byron of Maryland.
3. Mr. William Bailey, president, Carrier Corp.
4. Mr. D. C. Burnham, Chairman, Westinghouse Corp.
5. Consulting Engineers Council of the United States.
6. Dr. James Comly, manager, Thermal Branch, General Electric Corporate Research and Development.
7. Mr. William C. Dackis, vice-president and assistant to the president, Crane Co.
8. Mr. Fred Dubin, P.E., Dubin-Mindell-Bloome Associates.
9. Mr. J. W. Kennedy, president, York Division, Borg-Warner Corp.
10. Mr. L. T. Papay, director, Research and Development, Southern California Edison Co.
11. Mr. Jerry Plunkett, president, Materials Consultants, Inc.
12. Hon. Dixy Lee Ray, Chairman, Atomic Energy Commission.

13. Mr. William A. Shurcliff, senior research associate, Harvard University.

14. Mr. Edson W. Spencer, executive vice president, Honeywell.

15. Ms. Rosalyn L. Switzen, National Education Ombudswoman.

16. Mr. H. E. Thomason, J.D., president, Thomason Solar Homes, Inc.

A primary concern of the Committee was whether the bill provided adequate time for the successful demonstration of heating and cooling technology. Five witnesses felt that three years were about right for the heating demonstration, five felt it too short, and three felt it too long. For the combined heating and cooling demonstration, two witnesses expressed concern that it was too short and one specifically stated that it was adequate. Generally the Committee felt that the expert testimony found the three and five year goals to be reasonable ones.

A second major concern of the Committee concerned the adequacy of the $50 million authorization. Although eight of the witnesses felt the amount was too little, four witnesses specifically stated that the amount was sufficient and the others made no specific comment. Closely related to the dollar limitation question is that of the number of units. Very few of the witnesses specifically commented on this question, but three felt the number was too high, while two specifically stated it was too low.

A third concern of the Committee was the adequacy of the proposed administrative structure. Witnesses representing executive agencies called for using the proposed Energy Research and Development Agency (ERDA) as the administrative agency. Two other witnesses suggested further strengthening the role of the Department of Housing and Urban Development, and several other witnesses urged that the areas of responsibility be more carefully delineated. None of the witnesses specifically argued against utilizing NASA for contracting for the solar equipment or HUD for installing and monitoring the heating and/or cooling systems.

A fourth major concern of the Committee was whether or not solar technology had evolved to the point that it is now reasonable to begin a demonstration program. Ten witnesses specifically indicated their agreement with the view that now is the time to begin such a demonstration. Only Dr. Stever voiced concern that the undertaking was premature. Several witnesses indicated that the bill, rather than being premature, moved too slowly.

A wide range of possible amendments were proposed by witnesses. Among those adopted by the Committee and described in a later section were suggestions for a solar data bank; removal of Federal mortgage and construction ceilings for housing involved in the demonstration projects; modifications in the design competition; emphasis on a need for increasing the number of regions and the number of manufacturers involved; a greater emphasis on commercial buildings; inclusion of GSA among the participating agencies; inclusion of solar hot water demonstrations if desirable; and providing more time to NBS for the preparation of equipment and building performance criteria.

There were many other valuable suggestions which were not included as amendments to the bill itself. Some were already permitted but not required by the language of the bill; others were really administrative in nature, involving decisions that should be made by the administrators after the program has been initiated. Further discussion of some of these will be found under "Committee Views."

Several witnesses were concerned that the demonstration units be insured under existing HUD insurance programs for experimental projects.

Questions were raised about patent policy, with emphasis on the need to encourage manufacturers to enter this demonstration project.

A number of witnesses discussed the need for legislation concerning sun rights or three dimensional zoning. Others addressed building codes, labor jurisdictional questions, needs of industrial suppliers for solar equipment manufacturers, and any other impediments to builder and consumer acceptance.

There were requests by three witnesses to expand the scope of the bill to declare a Federal long-range commitment to support solar heating and cooling, perhaps going so far as to mandate solar heating for all Federal buildings. Witnesses Glaser, Kinsel, Johnson, and Weinhold called for allowing greater flexibility for the administrator, including the possibilities for subsidies and authority for ad-hoc negotiations. Witnesses Reed and Rittleman called for the mandating of metric units in the bill; Mr. Rittleman also noted the need for subsystem compatibility.

Witnesses who were architects as well as representatives of the building industry made suggestions concerning the design competition called for in the bill. They emphasized its importance and urged the inclusion of all qualified participants, including manufacturers, builders, and students.

Witnesses Ancker-Johnson, Sonenshein, Schoen, and Weinhold urged the use of control houses, and careful test procedures. Other witnesses urged careful consideration of the siting of the houses. Witness Schoen went further and urged the taking of a complete history on the project, stating that this would be a unique and valuable contribution to allow improvements in future demonstration projects.

Witnesses Vanik and Hunt urged that community units be allowed. Witnesses argued on both sides of the question as to whether retrofitting units on existing structures should be stressed. Witnesses Vanik, Reed, and Denton urged the widest possible geographical spread of the solar units.

Several witnesses called for the inclusion of the public and various interest groups in the administration of this demonstration project.

Mention was made of the Experimental Research and Development Program (ERDIP) at NSF and the Experimental Technology incentives Program (ETIP) at NBS, and their potential relationships to the demonstration program.

Mr. Schoen urged a complete Technology Assessment of the solar heating and cooling area. Mr. Rittleman noted that previous technological innovations have followed a "Filter down" process, beginning with the commercial market and expensive, architect-designed residential units.

In summary, the hearings were a most valuable source of excellent ideas, many of which appeared in the final version of the bill, H.R. 11864. The witnesses almost without exception supported increased Federal funding to encourage rapid initiation of this new form of space conditioning. They broadly endorsed the time scale, funding level, and administrative mechanisms proposed by the legislation.

COMMITTEE ACTIONS

Markup in Subcommittee of H.R. 10952

On December 11, 1973, a quorum being present, the Subcommittee on Energy marked up the original bill (H.R. 10952 and identical measures), approving a number of amendments. Suggestions for many of these amendments arose in the course of the November hearings described above. Some of the amendments were substantive, others were minor, technical, and conforming changes. All such amendments were incorporated into a clean bill (H.R. 11864).

Throughout the bill, changes in language were made to show more explicitly the delineation of agency responsibilities, and to more clearly define the two distinct phases of the demonstration program and the associated management functions. In addition, language changes were made to clarify responsibilities of the agencies to consult with each other as appropriate during the demonstration. In the first phase, NASA would have major responsibility for developing the solar heating and cooling equipment; in the second phase HUD would have major responsibility for installation, testing, and evaluation of the equipment and housing, as well as the dissemination of information and data. Major functional duties were not reassigned, but a clearer delineation of agency responsibility was set forth.

Two new findings were added (Section 2) which point up the beneficial effect of solar energy heating and cooling upon the environment and the assistance it can render toward the elimination of U.S. dependence upon foreign energy imports.

The General Services Administration was specifically written into the bill in Section 7 in recognition of the lead role that it can play in promoting the objectives of this program's commercial building program. Acknowledgement of this major role is also seen in the inclusion of GSA in the Act at several places.

A major amendment was adopted as Section 9(c) that would require the Secretary of Housing and Urban Development to establish and operate a Solar Heating and Cooling Information Data Bank. This data bank is described in the Explanation and Sectional Analysis Sections.

A new section was added (becoming Section 10) that raised the maximum dollar amounts for federally-assisted mortgage loans and maximum allowable unit costs of federally-constructed housing involved in this demonstration. Generally, this provision authorizes existing statutory and/or regulatory maxima on loans and unit costs to be increased in the amount by which the cost of providing solar heating and/or cooling exceeds the cost of providing conventional heating and/or cooling systems.

Many witnesses called the attention of the Subcommittee to the fact that many bills before the Congress would establish a single depart-

ment or agency within the Executive Branch to centralize direction and control over energy research and development. One such bill to create an Energy Research and Development Administration has been passed by the House. To avoid any conflict with such organizational changes, the Subcommittee approved an amendment (becoming Section 13) to provide that within sixty days after enactment of any law creating an Energy Research and Development Administration or other permanent Federal organization responsible for energy research and development functions, responsibilities assigned to NASA and NSF under the provisions of this bill will be transferred to and vested in the newly established agency or department.

In addition to the above changes and various technical changes, minor amendments approved by the Subcommittee included:

Section 3.—Definitions 1 and 2 were modified to allow for demonstration projects involving solar water heating alone. This is a major form of home energy consumption, and is the most widespread application of solar energy; it is perhaps the only feasible way to currently use solar energy in certain types of buildings.

Section 5(b)(1).—The time allowed for NBS to develop performance criteria was lengthened from 80 to 120 days at the request of NBS and the suggestion of several other witnesses.

Sections 5(b)(2) and 6(b)(2).—The language setting up an architectural design competition was slightly modified in accordance with suggestions from the American Institute of Architects.

Sections 5(c)(2) and 6(d)(2).—Replaced "at least two different" by "a number of", to emphasize the desire for competition between manufacturers.

Sections 5(c)(3) and 6(d)(3).—Deleted the words "Not less than three" with respect to number of geographic regions for demonstration projects to emphasize the need for utilizing as many different geographical areas as feasible.

Section 7.—The phrase "public buildings (including schools and colleges)" was added to the list of commercial buildings in accordance with suggestions made to the Subcommittee.

Full Committee Action on H.R. 11864

Following the subcommittee actions described above, a clean bill was introduced, cosponsored by all members of the Subcommittee (including the full Committee Chairman and the Ranking Minority Member) on December 10. The clean bill, H.R. 11864, was considered by the full committee on December 14 and approved unanimously without change. On December 19, a quorum then being present, the Committee again unanimously approved the bill with no changes and recommended passage by the full House.

COMMITTEE VIEWS

Departmental Responsibilities

It is the intent of the Committee that this bill define a working arrangement between those Federal agencies best able to handle the various facets of this demonstration program, while at all times specifying a lead agency to ensure adequate management for each phase. The principal agencies are NASA and HUD, with NASA having responsibility during the first phase (development and procurement of the heating and/or cooling systems) and HUD having responsibility during the second (installation, monitoring and evaluation of the equipment and buildings).

A unique role is assigned to NBS in support of both phases. It is assigned the task of determining performance criteria, with which NASA will then work with industry in developing suitable hardware. NBS will also work with HUD in monitoring and evaluating the performance of the units.

NSF has been and will continue to be the major supporter of research in solar energy. NSF research projects have laid much of the technological foundation for this demonstration. It is expected that NSF will closely coordinate its solar program with this program, and will support activities that will further the objectives of this bill where feasible.

Organizational charts could be drawn for the two separate phases of this project. This is more properly an administrative prerogative, within the guidelines set forth in the bill.

The dissemination of information will be carried out by HUD, utilizing the existing capabilities of NASA, NSF, NBS, the Patent Office, and other organizations.

Interagency cooperation is very important in this program. Previous joint efforts have been pointed to with pride between NASA and AEC and between AEC and DOD. There is every reason to believe that the administrative approach specified in the bill will be suitable, despite obvious potential dangers in assigning specific responsibilities. The Committee believes that the agencies can avoid these dangers and successfully administer this important program.

Adequacy of Authorized Funds

During the course of the hearings on H.R. 10952, there was considerable disagreement among the witnesses concerning the adequacy of the $50 million budget. This amount was based on advice from Federal agencies and outside experts, although a more detailed cost analysis and further research data might reveal these funds to be insufficient to meet the total program as envisioned in this bill.

Although some witnesses indicated the budget was too low, others stated it was adequate. There was, however, considerable support for

increased emphasis on the commercial demonstration programs, with possible further cost increases.

The Committee feels the $50 million authorization will provide an adequate demonstration of the technical and economic feasibility of applying solar energy to heat and cool buildings. It should be emphasized that the bill does not require a specific number of residential or commercial units. It does establish 4,000 residential units as a number that will in any case meet the requirement that substantial numbers of units be produced and installed.

There may be upward or downward adjustments in the number of residential and commercial demonstration units consistent with the needs of the demonstration program and the availability of funds. Reduction in the number of residential units will not reduce costs in a linear manner, however, since a large portion of the costs will be in the R. & D. and set-up expenses.

Technological Contributions from Private Citizens

During the course of the hearings and various field visits, the Committee became aware of many demonstration projects already in existence or being built by private citizens at their own expense. A great portion of present solar heating and cooling technology has come from these sources. This bill does not directly provide funds to assist these individuals, but neither does it prohibit their participation in this demonstration. These kinds of projects may also be eligible for related research programs supported by NSF and NASA under Sections 4 and 8 of this bill, or other research activities.

Design Competitions

During the hearings on H.R. 10952 there was considerable discussion with the witnesses on the design competitions for residences compatible with solar heating and/or cooling equipment, as specified in sections 5 and 6. The language of the bill was slightly modified to reflect the Committee's wish that all potential qualified individuals be allowed to participate. Students were specifically added with the provision that they be engaged in studies at recognized schools in architecture, engineering, or related fields.

Thus the broad classification for participants includes all recognized professionals who are qualified to design houses to demonstrate solar heating and combined solar heating and cooling. This will help fulfill the dual purposes of the competition—developing a useful library of designs, and making known to the housing design market that immediate exploitation of solar energy is possible. The bill language is believed to be acceptable to the American Institute of Architects' design competition committee.

The duplication of competitions for housing designs for heating (section 5) and combined heating and cooling (section 6) is intentional. The second competition would probably be delayed to allow for the development of the more advanced combined heating and cooling equipment which could have some impact on building designs.

Solar Heating and Cooling Information Data Bank

The Solar Heating and Cooling Data Bank was added in markup and is in accordance with testimony from a number of witnesses. The

choice of HUD as the responsible agency is an obvious one, since it has close ties to the housing industry and is the Federal agency most likely to be sought out by individuals or organizations interested in solar heating or cooling. Other agencies would be utilized, and the Committee hopes that an appropriate existing information system could be utilized so that a bureaucracy need not be created.

It is not intended that this data bank carry out original research in any area, and the budget for a carefully managed data bank should not be large.

Ceilings on Loans and Unit Construction Costs

Section 10 was added in markup in response to concerns that the demonstration might be hindered by existing legislative limitations.

It is the belief of the Committee that this language removes Federal legislative or regulatory restrictions on mortgage loans or units costs to the extent of the increase due to solar heating and cooling systems.

The additional costs may include, but not be limited to, equipment, special insulation and construction materials, special construction techniques, and the auxiliary heating and/or cooling systems.

Mass Production of Units in Substantial Numbers

The Committee feels that mass production of units will help meet two goals of this demonstration act: (1) developing an industrial solar equipment capability and (2) developing a wide market for solar heating and/or cooling systems. Sufficient numbers of identical units should be produced to ensure that they not be hand-built, one-of-a-kind systems; at the same time, a large number of potential manufacturers should be involved.

It is the intent of the committee that the program test and evaluate many different concepts, without freezing designs prematurely. Appropriate changes and improvements should be possible at any time consistent with goals meeting the schedules of the demonstration program. 4,000 units is adequate to meet the requirement that "substantial numbers" of units be mass produced; this number may be reduced if lower totals can adequately meet the objectives of the demonstration program.

SECTION-BY-SECTION SUMMARY OF THE BILL

The first section contains the short title of the bill—the "Solar Heating and Cooling Demonstration Act of 1973.".

Section 2. Findings and Policy

This section sets forth the policy and purpose of the bill and the findings on which they are based.

Subsection (a) expresses the findings of the Congress—that the current fuel and energy shortage is likely to persist; that the early demonstration of the use of solar energy for heating and cooling buildings could expedite its commercial application and help relieve the demand on present fuel and energy supplies; that solar heating technology is already close to commercial application, while the commercial development of technologies for combined heating and cooling apparently presents no insoluble technical problems; and that the development and use of solar heating and cooling equipment will benefit the environment, improve our balance of trade, eliminate our dependence upon foreign energy sources, and promote the national defense.

Subsection (b) declares it to be the policy of the United States and the purpose of the bill to provide for a 3-year program to demonstrate the practical use of presently available solar heating technology, and for a 5-year program to develop and demonstrate the practical use of combined solar heating and cooling technology.

Section 3. Definitions

This section contains definitions of terms used in the bill. "Solar heating" means the use of solar energy to meet such portion of a building's total heating (or hot water) needs as may be required under performance criteria prescribed by the National Bureau of Standards. "Combined solar heating and cooling" means the use of solar energy to meet such portion of a building's total heating (or hot water) needs, and total cooling needs, as may be required under such criteria (and includes cooling by means of other methods of meeting peakload energy requirements at non-peakload times). "Residential dwellings" includes mobile homes.

Section 4. Conduct of Activities in Solar Heating and Cooling Technologies by National Aeronautics and Space Administration

This section amends section 203 of the National Aeronautics and Space Act of 1958 to direct the National Aeronautics and Space Administration to initiate, support, and carry out basic and applied re-

search, development, demonstrations, and other activities in solar heating and cooling technologies (including activities funded under sections 5, 6, and 7 of the bill).

Section 5. Development of Solar Heating Systems To Be in Residential Dwellings

This section establishes a Federal program for the early development and demonstration, by the National Aeronautics and Space Administration (NASA) and the Department of Housing and Urban Development (HUD) in cooperation with other Federal agencies, of solar heating systems to be used in residential dwellings.

Section (a) directs the Administrator of NASA, in consultation with the Secretary of HUD, to initiate and carry out the demonstration program in accordance with the succeeding provisions of the section.

Subsection (b) provides for the initial stage of the program. It directs the National Bureau of Standards (NBS), in consultation with the Administrator and the Secretary of HUD, (1) to determine, prescribe, and publish, within 120 days after enactment, performance criteria for solar heating systems to be used in residential dwellings and similar criteria (relating to suitability for solar heating) for the dwellings themselves, taking into account climatic variations, and (2) to select, as soon as possible thereafter, on the basis of design competitions open to all qualified professionals (including advanced students in architecture, engineering, and related fields), a number of designs for various types of residential dwellings which are suitable for the installation of solar heating systems meeting the applicable criteria so prescribed.

Subsection (c) provides for the actual carrying out of the program.

The Administrator, in consultation with the Secretary of HUD, would first enter into contracts for the development (for commercial production and residential use) of solar heating systems meeting the applicable performance criteria prescribed under subsection (b) (and for the manufacture, production, and installation of prototype solar heating systems in dwellings meeting the applicable criteria if he determines that it would expedite the program).

The Administrator would then enter into contracts with various persons and firms for the actual manufacture on a mass production basis of the solar heating systems so developed (including spare and replacement parts).

Finally the solar heating systems so manufactured, in sufficient numbers to assure a realistic and effective demonstration (approximately 1,000 such systems), would be installed in residential dwellings located on Federal or federally-administered property (for observation and monitoring by Federal personnel) in conjunction with and under arrangements to be made by the Secretary of Defense; and an equal number of such systems would be installed in privately-owned and occupied residential dwellings in conjunction with and under arrangements to be made by the Secretary of HUD. Title to and ownership of any solar heating system installed in a private dwelling would remain in the United States after the installation unless and until the owner-occupant of the dwelling involved (pursuant to an agreement

made at the time of the installation), including any subsequent owner-occupant who makes such an agreement, has observed and monitored (or permitted the Secretary's agents to observe and monitor) the performance and operation of the system for 5 years and has regularly furnished the Secretary with such reports thereon as the Secretary may require. The dwellings used in the program are to be located in different geographical areas to assure a realistic and effective demonstration of both the systems and the dwellings involved under varying climatic conditions.

Subsection (d) vests in the Secretary of HUD (utilizing NBS and in consultation with the Administrator and the Secretary of Defense) the general function of monitoring the performance and operation of all solar heating systems installed under the program, collecting and evaluating information thereon, taking such actions as are necessary to assure that the program effectively carries out the objectives of the bill, and maintaining continuing liaison with the building industry and related industries and interests to assure that the projected benefits of the program are and will continue to be effectively realized.

Section 6. Development of Combined Solar Heating and Cooling Systems To Be Used in Residential Dwellings

This section establishes a Federal program for the development and demonstration of combined solar heating and cooling systems to be used in residential dwellings which includes the same steps (the initial stage involving the determination of performance criteria by NBS and the selection of approved dwelling designs, the actual carrying out of the program by the Administrator of NASA through contracts for the development and manufacture of approved solar heating and cooling systems and the installation of such systems in at least 2,000 approved dwellings, and the monitoring of such systems by the Secretary of HUD) as the program established by section 5 for the development and demonstration of solar heating systems alone, and which is otherwise the same as that program in all procedural respects with a single exception:

Reflecting the fact that the technologies for combined solar heating and cooling are not as close to the point of commercial application as the technologies for solar heating alone, the program under this section of the bill includes as an additional step (immediately following the initial stage of the program and before the stage of contracting for development and manufacture) a period of research, development, testing, and demonstration design to provide the additional technological resources necessary for the development and commercial application of combined solar heating and cooling systems under the program as contemplated by the bill.

Section 7. Development of Solar Heating and Cooling Systems for Commercial Buildings

This section directs the Administrator of NASA and the Secretary of HUD, in consultation with NBS and the General Services Administration (and concurrently with the demonstration programs involving residential dwellings under sections 5 and 6 of the bill), to carry out appropriate projects and activities for the early development and

demonstration of combined solar heating and cooling for use in apartment buildings, office buildings, factories, agricultural structures, public buildings, schools, and other commercial and industrial buildings. These projects and activities would take into account the special needs of and individual differences in such buildings based on size, function, and other relevant factors.

Section 8. Funding of Solar Energy Research by National Science Foundation

Subsection (a) of this section amends section 3 of the National Science Foundation Act of 1950 to direct the National Science Foundation (NSF) to initiate and support basic and applied research relating to solar energy development.

Subsection (b) emphasizes that NSF's research activities under the amendment made by subsection (a) are to be in support of the objectives of the bill and of the new solar heating and cooling technologies demonstrated by NASA under sections 4, 5, 6, and 7. The Director of NSF would be authorized to fund these activities and to utilize for this purpose any funds appropriated or transferred to him.

Section 9. Dissemination of Information and Other Actions To Promote Practical Use of Solar Heating and Cooling Technologies

Subsection (a) of this section directs the Secretary of HUD, in coordination with the Administrator of NASA, NBS, NSF, the Patent Office, and other Federal agencies, to assure that full information with respect to the demonstration programs and other activities under the bill is made available to public authorities, the building industry and related segments of the economy, and the public at large, with the objective of promoting and facilitating the early and widespread practical use of solar energy for heating and cooling buildings.

Subsection (b) further directs the Secretary of HUD to study and investigate existing building codes, zoning ordinances, and related laws and practices to determine their effect upon the practical use of solar energy for heating and cooling buildings and the extent to which they should be changed to permit or facilitate such use.

Subsection (c) directs the Secretary of HUD (utilizing the capabilities of NASA, NBS, and NSF and the existing data base of scientific and technical information in Federal agencies) to establish and operate a Solar Heating and Cooling Information Data Bank to collect, review, process, and disseminate solar heating and cooling information and data, including relevant types of technical information and information on the physical and chemical properties of solar heating and cooling materials, climatic conditions, and the engineering performance of solar heating and cooling devices. Retrieval and dissemination of this information would be provided for Federal, State, and local government organizations active in the energy field (and their contractors), to colleges and universities in related research and consulting activities, and to the private sector upon request in appropriate cases.

Subsection (d) directs each Federal officer and agency engaged in activities under the bill to include a full description of such activities current and projected (with related recommendations) in his or its annual report to the President and the Congress. In addition, the Secretary of HUD is directed to submit annually a special report summarizing all of the current and projected activities of the various Federal officers and agencies having functions under the bill in order to provide a comprehensive overall view of the various programs under the bill.

Section 10. Dollar Limitations on Federally-Assisted or Federally-Constructed Housing

This section is designed to expedite the demonstration programs under the bill, and assure that assistance under the various Federal housing laws will be available for dwellings equipped with solar heating or solar heating and cooling systems under those programs, by providing in effect that the additional cost of such systems is to be disregarded in the application of those laws.

Subsection (a) provides that in determining the maximum dollar amount of any federally-insured mortgage loan or the maximum cost of any federally-constructed housing, where the law providing for the loan or construction specifies such maximum amount or cost and the structure involved is furnished with solar heating or solar heating and cooling equipment under the bill, the maximum amount or cost so specified will be deemed to be increased by the difference between the price or cost of the structure including such equipment and the price or cost of the structure with such equipment replaced by conventional heating or heating and cooling equipment. In the case of a mortgage loan, this difference would also be taken into account for purposes of applying any statutory maximum loan-to-value or -cost ratio (and, where downpayment rates vary for successive increments of value or cost, would be subject to the lowest such rate).

Subsection (b) defines the terms "mortgage loan" and "federally-assisted mortgage loan" for purposes of subsection (a). The latter term is defined as broadly as possible, so as to include any mortgage loan made by a lender who is subject to Federal regulation or whose deposits or accounts are federally insured, any loan which is made, insured, guaranteed, supplemented, or otherwise assisted in any way by a Federal agency or under a Federal program, any loan which is eligible for purchase by FNMA, GNMA, or FHLMC, and certain other loans made by lenders subject to the Consumer Credit Protection Act of 1968.

Subsection (c) defines the term "federally-constructed housing" to include any residential or multifamily housing which is constructed by a Federal agency and is designed for one or more particular types or classes of persons under a Federal program (including Defense Department housing for servicemen and their families), and any housing which is constructed by a State or local agency with Federal assistance for one or more particular types or classes of persons under a State or local program.

Section 11. Encouragement and Protection of Small Business

This section directs all Federal officers and agencies performing functions under the bill to assure that small business concerns are given a realistic and adequate opportunity to participate in the new solar heating and solar heating and cooling demonstration programs.

Section 12. Regulations

This section directs the Administrator of NASA, in consultation with NBS, NSF, the Secretary of HUD, the Administrator of GSA, the Secretary of Defense, and other appropriate Federal officers and agencies, to prescribe the regulations necessary to carry out the programs under the bill promptly and efficiently. Each such officer or agency, in consultation with the Administrator, could prescribe any additional regulations necessary for the performance of his or its particular functions under the bill.

Section 13. Transfer of Functions

This section, recognizing the possibility that a new Energy Research and Development Administration or similar Federal agency will be created with overall jurisdiction over the energy research and development functions of the United States and the desirability of assuring that such functions do not remain fragmented after the creation of that agency, provides for the transfer to such new agency under OMB regulations, within 60 days after its creation (or after the enactment of the bill if later), of all of the functions vested by the bill in NASA and NSF along with related records, documents, personnel, obligations, and other items.

Section 14. Authorization of Appropriations

This section authorizes the appropriation of $50,000,000 to the Administrator of NASA to enable him, over a 5-fiscal-year period, to carry out his functions under the bill and to reimburse NBS, NSF, the Secretary of HUD, the Secretary of Defense, and GSA for expenses incurred by them in carrying out their functions under the bill.

COST AND BUDGET DATA

Discussion with qualified experts before, during, and after the extensive hearings on H.R. 10952 verified $50 million as a reasonable sum for this demonstration program. This includes agency staff, prototype development, and equipment purchase costs for both the residential and commercial portions of the demonstration program.

No five year budget estimates have been received from Federal agencies. In accordance with the requirements of sec. 252(b) of the Legislative Reorganization Act of 1970, the Committee estimates the costs of the program provided for in the bill are:

	Millions
Fiscal year 1975	$4.5
Fiscal year 1976	8.0
Fiscal year 1977	11.5
Fiscal year 1978	12.5
Fiscal year 1979	13.5

COMMITTEE RECOMMENDATIONS

A quorum being present, the Committee, by voice vote, unanimously approved the bill.

DEPARTMENT RECOMMENDATIONS

Formal written reports requested from the National Aeronautics and Space Administration, the Departments of Commerce, Defense, and Housing and Urban Development, General Accounting Office, the National Science Foundation and the General Services Administration have not been received. However, testimony from all of these organizations except the General Accounting Office was received and is part of the Hearing Record.

CHANGES IN EXISTING LAW MADE BY THE BILL, AS REPORTED

In compliance with clause 3 of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

SECTION 203 OF THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958

FUNCTIONS OF THE ADMINISTRATION

SEC. 203. (a) The Administration, in order to carry out the purpose of this Act, shall—

(1) plan, direct, and conduct aeronautical and space activities;

(2) arrange for participation by the scientific community in planning scientific measurements and observations to be made through use of aeronautical and space vehicles, and conduct or arrange for the conduct of such measurements and observations; and

(3) provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof.

(*b*) *The Administration shall initiate, support, and carry out basic and applied research, development, demonstrations, and other related activities in solar heating and cooling technologies, including (to the extent that funds are appropriated therefor) activities as provided for in sections 5, 6, and 7 of the Solar Heating and Cooling Demonstration Act of 1973.*

[(b)] (*c*) In the performance of its functions the Administration is authorized—

(1) to make, promulgate, issue, rescind, and amend rules and regulations governing the manner of its operations and the exercise of the powers vested in it by law;

(2) to appoint and fix the compensation of such officers and employees as may be necessary to carry out such functions. Such officers and employees shall be appointed in accordance with the civil-service laws and their compensation fixed in accordance with the Classification Act of 1949, except that (A) to the extent the Administrator deems such action necessary to the discharge of his responsibilities, he may appoint not more than four hundred and twenty-five of the scientific, engineering, and administrative personnel of the Administration without regard to such laws, and

may fix the compensation of such personnel not in excess of the highest rate of grade 18 of the General Schedule of the Classification Act of 1949, as amended, and (B) to the extent the Administrator deems such action necessary to recruit specially qualified scientific and engineering talent, he may establish the entrance grade for scientific and engineering personnel without previous service in the Federal Government at a level up to two grades higher than the grade provided for such personnel under the General Schedule established by the Classification Act of 1949, and fix their compensation accordingly;

(3) to acquire (by purchase, lease, condemnation, or otherwise), construct, improve, repair, operate, and maintain laboratories, research and testing sites and facilities, aeronautical and space vehicles, quarters and related accommodations for employees and dependents of employees of the Administration, and such other real and personal property (including patents), or any interest therein, as the Administration deems necessary within and outside the continental United States; to acquire by lease or otherwise, through the Administrator of General Services, buildings or parts of buildings in the District of Columbia for the use of the Administration for a period not to exceed ten years without regard to the Act of March 3, 1877 (40 U.S.C. 34); to lease to others such real and personal property; to sell and otherwise dispose of real and personal property (including patents and rights thereunder) in accordance with the provisions of the Federal Property and Administrative Services Act of 1949, as amended (40 U.S.C. 471 et seq.); and to provide by contract or otherwise for cafeterias and other necessary facilities for the welfare of employees of the Administration at its installations and purchase and maintain equipment therefor;

(4) to accept unconditional gifts or donations of services, money, or property, real, personal, or mixed, tangible or intangible;

(5) without regard to section 3648 of the Revised Statutes, as amended (31 U.S.C. 529), to enter into and perform such contracts, leases, cooperative agreements, or other transactions as may be necessary in the conduct of its work and on such terms as it may deem appropriate, with any agency or instrumentality of the United States, or with any State, Territory, or possession, or with any political subdivision thereof, or with any person, firm, association, corporation, or educational institution. To the maximum extent practicable and consistent with the accomplishment of the purpose of this Act, such contracts, leases, agreements, and other transactions shall be allocated by the Administrator in a manner which will enable small-business concerns to participate equitably and proportionately in the conduct of the work of the Administration;

(6) To use, with their consent, the services, equipment, personnel, and facilities of Federal and other agencies with or without reimbursement, and on a similar basis to cooperate with other public and private agencies and instrumentalities in the use of services, equipment, and facilities. Each department and agency of the

Federal Government shall cooperate fully with the Administration in making its services, equipment, personnel, and facilities available to the Administration, and any such department or agency is authorized, notwithstanding any other provision of law, to transfer to or to receive from the Administration without reimbursement, aeronautical and space vehicles, and supplies and equipment other than administrative supplies or equipment;

(7) to appoint such advisory committees as may be appropriate for purposes of consultation and advice to the Administration in the performance of its functions;

(8) to establish within the Administration such offices and procedures as may be appropriate to provide for the greatest possible coordination of its activities under this Act with related scientific and other activities being carried on by other public and private agencies and organizations;

(9) to obtain services as authorized by section 15 of the Act of August 2, 1946 (5 U.S.C. 55a), at rates not to exceed $100 per diem for individuals;

(10) when determined by the Administrator to be necessary, and subject to such security investigations as he may determine to be appropriate, to employ aliens without regard to statutory provisions prohibiting payment of compensation to aliens;

(11) to provide by concession, without regard to section 321 of the Act of June 30, 1932 (47 Stat. 412; 40 U.S.C. 303b), on such terms as the Administrator may deem to be appropriate and to be necessary to protect the concessioner against loss of his investment in property (but not anticipated profits) resulting from the Administration's discretionary acts and decisions, for the construction, maintenance, and operation of all manner of facilities and equipment for visitors to the several installations of the Administration and, in connection therewith, to provide services incident to the dissemination of information concerning its activities to such visitors, without charge or with a reasonable charge therefor (with this authority being in addition to any other authority which the Administration may have to provide facilities, equipment, and services for visitors to its installations). A concession agreement under this paragraph may be negotiated with any qualified proposer following due consideration of all proposals received after reasonable public notice of the intention to contract. The concessioner shall be afforded a reasonable opportunity to make a profit commensurate with the capital invested and the obligations assumed, and the consideration paid by him for the concession shall be based on the probable value of such opportunity and not on maximizing revenue to the United States. Each concession agreement shall specify the manner in which the concessioner's records are to be maintained, and shall provide for access to any such records by the Administration and the Comptroller General of the United States for a period of five years after the close of the business year to which such records relate. A concessioner may be accorded a possessory interest, consisting of all incidents of ownership except legal title (which shall vest in the

United States), in any structure, fixture, or improvement he constructs or locates upon land owned by the United States; and, with the approval of the Administration, such possessory interest may be assigned, transferred, encumbered, or relinquished by him, and, unless otherwise provided by contract, shall not be extinguished by the expiration or other termination of the concession and may not be taken for public use without just compensation;

(12) with the approval of the President, to enter into cooperative agreements under which members of the Army, Navy, Air Force, and Marine Corps may be detailed by the appropriate Secretary for services in the performance of functions under this Act to the same extent as that to which they might be lawfully assigned in the Department of Defense;

(13) (A) to consider, ascertain, adjust, determine, settle, and pay, on behalf of the United States, in full satisfaction thereof, any claim for $5,000 or less against the United States for bodily injury, death, or damage to or loss of real or personal property resulting from the conduct of the Administration's functions as specified in subsection (a) of this section, where such claim is presented to the Administration in writing within two years after the accident or incident out of which the claim arises; and

(B) if the Administration considers that a claim in excess of $5,000 is meritorious and would otherwise be covered by this paragraph, to report the facts and circumstances thereof to the Congress for its consideration; and

---

SECTION 3 OF THE NATIONAL SCIENCE FOUNDATION ACT OF 1950

FUNCTIONS OF THE FOUNDATION

SEC. 3. (a) The Foundation is authorized and directed—

(1) to initiate and support basic scientific research and programs to strengthen scientific research potential and science education programs at all levels in the mathematical, physical, medical, biological, engineering, social, and other sciences, by making contracts or other arrangements (including grants, loans, and other forms of assistance) to support such scientific and educational activities and to appraise the impact of research upon industrial development and upon the general welfare;

(2) to award, as provided in section 10, scholarships and graduate fellowships in the mathematical, physical, medical, biological, engineering, social, and other sciences;

(3) to foster the interchange of scientific information among scientists in the United States and foreign countries;

(4) to foster and support the development and use of computer and other scientific methods and technologies, primarily for research and education in the sciences;

(5) to evaluate the status and needs of the various sciences as evidenced by programs, projects, and studies undertaken by agencies of the Federal Government, by individuals, and by public and private research groups, employing by grant or contract such

consulting services as it may deem necessary for the purpose of such evaluations; and to take into consideration the results of such evaluations in correlating the research and educational programs undertaken or supported by the Foundation with programs, projects, and studies undertaken by agencies of the Federal Government, by individuals, and by public and private research groups;

(6) to maintain a current register of scientific and technical personnel, and in other ways to provide a central clearinghouse for the collection, interpretation, and analysis of data on the availability of, and the current and projected need for, scientific and technical resources in the United States, and to provide a source of information for policy formulation by other agencies of the Federal Government; and

(7) to initiate and maintain a program for the determination of the total amount of money for scientific research, including money allocated for the construction of the facilities wherein such research is conducted, received by each educational institution and appropriate nonprofit organization in the United States, by grant, contract, or other arrangement from agencies of the Federal Government, and to report annually thereon to the President and the Congress.

(b) The Foundation is authorized to initiate and support specific scientific activities in connection with matters relating to international cooperation, national security, and the effects of scientific applications upon society by making contracts or other arrangements (including grants, loans, and other forms of assistance) for the conduct of such activities. When initiated or supported pursuant to requests made by any other Federal department or agency, including the Office of Technology Assessment, such activities shall be financed whenever feasible from funds transferred to the Foundation by the requesting official as provided in section 14(g), and any such activities shall be unclassified and shall be identified by the Foundation as being undertaken at the request of the appropriate official.

(c) In addition to the authority contained in subsections (a) and (b), the Foundation is authorized to initiate and support scientific research, including applied research, at academic and other nonprofit institutions. When so directed by the President, the Foundation is further authorized to support, through other appropriate organizations, applied scientific research relevant to national problems involving the public interest. In exercising the authority contained in this subsection, the Foundation may employ by grant or contract such consulting services as it deems necessary, and shall coordinate and correlate its activities with respect to any such problem with other agencies of the Federal Government undertaking similar programs in that field.

(d) The Board and the Director shall recommend and encourage the pursuit of national policies for the promotion of basic research and education in the sciences.

(e) The Director shall initiate and support basic and applied research relating to solar energy development, as provided in section 8 (b) of the Solar Heating and Cooling Demonstration Act of 1974.

[(e)] (*f*) In exercising the authority and discharging the functions referred to in the foregoing subsections, it shall be one of the objectives of the Foundation to strengthen research and education in the sciences, including independent research by individuals, throughout the United States, and to avoid undue concentration of such research and education.

[(f)] (*g*) The Foundation shall render an annual report to the President for submission on or before the 15th day of January of each year to the Congress, summarizing the activities of the Foundation and making such recommendations as it may deem appropriate. Such report shall include information as to the acquisition and disposition by the Foundation of any patents and patent rights.

○

93D CONGRESS
2d Session

SENATE

REPORT
No. 93-1083

SOLAR HEATING AND COOLING DEMONSTRATION ACT OF 1974

AUGUST 12, 1974.—Ordered to be printed

Mr. Moss, from the committee of conference, submitted the following

CONFERENCE REPORT

[To accompany H.R. 11864]

The committee of conference on the disagreeing votes of the two Houses on the amendments of the Senate to the bill (H.R. 11864) to provide for the early development and commercial demonstration of the technology of solar heating and combined solar heating and cooling systems, having met, after full and free conference, have agreed to recommend and do recommend to their respective Houses as follows:

That the House recede from its disagreement to the amendment of the Senate to the text of the bill, and agree to the same with an amendment as follows:

In lieu of the matter proposed to be inserted by the Senate amendment insert the following:

That this Act may be cited as the "Solar Heating and Cooling Demonstration Act of 1974".

FINDINGS AND POLICY

SEC. 2. (a) The Congress hereby finds that—

(1) the current imbalance between supply and demand for fuels and energy is likely to persist for some time;

(2) the early demonstration of the feasibility of using solar energy for the heating and cooling of buildings could help to relieve the demand upon present fuel and energy supplies;

(3) the technologies for solar heating are close to the point of commercial application in the United States;

(4) the technologies for combined solar heating and cooling still require research, development, testing and demonstration, but no insoluble technical problem is now foreseen in achieving commercial use of such technologies;

(5) the early development and export of viable solar heating equipment and combined solar heating and cooling equipment, consistent with the established preeminence of the United States in the field of high technolyogy products, can make a valuable contribution to our balance of trade;

(6) the widespread use of solar energy in place of conventional methods for the heating and cooling of buildings would have a significantly beneficial effect upon the environment;

(7) the mass production and use of solar heating and cooling equipment will help to eliminate the dependence of the United States upon foreign energy sources and promote the national defense;

(8) the widespread introduction of low-cost solar energy will be beneficial to consumers in a period of rapidly rising fuel cost;

(9) innovation and creativity in the development of solar heating and combined solar heating and cooling components and systems can be fostered through encouraging direct contact between the manufacturers of such systems and the architects, engineers, developers, contractors, and other persons interested in installing such systems in buildings;

(10) evaluation of the performance and reliability of solar heating and combined solar heating and cooling technologies can be expedited by testing under carefully controlled conditions; and

(11) commercial application of solar heating and combined solar heating and cooling technologies can be expedited by early commercial demonstration under practical conditions.

(b) It is therefore declared to be the policy of the United States and the purpose of this Act to provide for the demonstration within a three-year period of the practical use of solar heating technology, and to provide for the development and demonstration within a five-year period of the practical use of combined heating and cooling technology.

DEFINITIONS

SEC. 3. For purposes of this Act—

(1) the term "solar heating", with respect to any building, means the use of solar energy to meet such portion of the total heating needs of such building (including hot water), or such portion of the needs of such building for hot water (where its remaining heating needs are met by other methods), as may be required under performance criteria prescribed by the Secretary of Housing and Urban Development utilizing the services of the Director of the National Bureau of Standards, and in consultation with the Director of the National Science Foundation, and the Administrator of the National Aeronautics and Space Administration;

(2) the terms "solar heating and cooling" and "combined solar heating and cooling", with respect to any building, mean the use of solar energy to provide both such portion of the total heating needs of such building (including hot water) and such portion of the total cooling needs of such building, or such portion of the needs of such building for hot water (where its remaining heating needs are met by other methods) and such portion of the total

cooling needs of a building, as may be required under performance criteria prescribed by the Secretary of Housing and Urban Development utilizing the services of the Director of the National Bureau of Standards, and in consultation with the Director of the National Science Foundation, and the Administrator of the National Aeronautics and Space Administration, and such term includes cooling by means of nocturnal heat radiation, by evaporation, or by other methods of meeting peakload energy requirements at nonpeakload times;

(3) the term "residential dwellings" includes previously occupied and new single family and multifamily dwellings, mobile homes, and publicly assisted housing owned by a private sponsor or a State or local housing authority not covered by section 17;

(4) the term "Administrator" means the Administrator of the National Aeronautics and Space Administration;

(5) the term "Secretary" means the Secretary of Housing and Urban Development; and

(6) the term "Director" means the Director of the National Science Foundation.

CONDUCT OF ACTIVITIES IN SOLAR HEATING AND COOLING TECHNOLOGIES BY NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SEC. 4. Section 203 of the National Aeronautics and Space Act of 1958 (42 U.S.C. 2473) is amended by redesignating subsection (b) as subsection (c), and by inserting immediately after subsection (a) the following new subsection:

"(b) The Administration shall initiate, support, and carry out such research, development, demonstrations, and other related activities in solar heating and cooling technologies (to the extent that funds are appropriated therefor) as are provided for in sections 5, 6, and 9 of the Solar Heating and Cooling Demonstration Act of 1974.".

DEVELOPMENT AND DEMONSTRATION OF SOLAR HEATING SYSTEMS TO BE USED IN RESIDENTIAL DWELLINGS

SEC. 5. (a) The Administrator and the Secretary shall promptly initiate and carry out a program, as provided in this section, for the development and demonstration of solar heating systems (including collectors, controls, and thermal storage) for use in residential dwellings.

(b)(1) Within 120 days after the date of the enactment of this Act, the Secretary, utilizing the services of the Director of the National Bureau of Standards and in consultation with the Administrator and the Director, shall determine, prescribe, and publish—

(A) interim performance criteria for solar heating components and systems to be used in residential dwellings, and

(B) interim performance criteria (relating to suitability for solar heating) for such dwellings themselves,

taking into account in each instance climatic variations existing between different geographic areas.

(2) As soon as possible after the publication of the performance criteria prescribed under paragraph (1), the Secretary, in consultation with the Director of the National Bureau of Standards and the

Administrator, will select on the basis of open competition a number of designs for various types of residential dwellings suitable for and adapted to the installation of solar heating systems meeting the performance criteria prescribed under paragraph (1)(A).

(c) The Administrator, in accordance with the applicable provisions of title II of the National Aeronautics and Space Act of 1958 and under program guidelines established jointly by the Administrator and the Secretary, shall, after consultation with the Secretary—

(1) enter into such contracts and grants as may be necessary or appropriate for the development (for commercial production and residential use) of solar heating systems meeting the performance criteria prescribed under subsection (b)(1)(A) (including any further planning and design which may be required to conform with the specifications set forth in such criteria); and

(2) enter into contracts with a number of persons or firms for the procurement of solar heating components and systems meeting such performance criteria (including adequate numbers of spare and replacement parts for such systems).

(d) The Secretary shall (1) arrange for the installation of solar heating systems procured by the Administrator under subsection (c)(2) in a substantial number of residential dwellings and (2) provide for the satisfactory operation of such installations during the demonstration period. Title to and ownership of any dwellings constructed hereunder and of solar heating systems installed hereunder may be conveyed to purchasers or owners of such dwellings under terms and conditions prescribed by the Secretary, including an express agreement that any such purchaser or owner shall, in such manner and form and on such terms and conditions as the Secretary may prescribe, observe and monitor (or permit the Secretary to observe and monitor) the performance and operation of such system for a period of five years, and that such purchaser or owner (including any subsequent owner and occupant of the property who also makes such an agreement) shall regularly furnish the Secretary with such reports thereon as the agreement may require.

(e) The Secretary of Defense shall arrange for the installation of solar heating systems procured by the Administrator under subsection (c)(2) in a substantial number of residential dwellings which are located on Federal or federally administered property where the performance and operation of such systems can be regularly and effectively observed and monitored by designated Federal personnel.

(f) The Secretary and the Secretary of Defense, and officials responsible for administering Federal or federally administered property, shall coordinate their activities under this section to assure that solar heating systems are installed in a substantial number of residential dwellings and in a sufficient number of different geographic areas under varying climatic conditions to constitute a realistic and effective demonstration in support of the objectives of this Act.

DEVELOPMENT AND DEMONSTRATION OF COMBINED SOLAR HEATING AND COOLING SYSTEMS TO BE USED IN RESIDENTIAL DWELLINGS

SEC. 6. (a) The Administrator and the Secretary shall promptly initiate and carry out a program, as provided in this section, for the

development and demonstration of combined solar heating and cooling systems (including collectors, controls, and thermal storage) for use in residential dwellings.

(b) (1) As soon as possible after the date of the enactment of this Act, the Secretary, utilizing the services of the Director of the National Bureau of Standards and in consultation with the Administrator and the Director, shall determine, prescribe, and publish—

(A) interim performance criteria for combined solar heating and cooling components and systems to be used in residential dwellings, and

(B) interim performance criteria (relating to suitability for solar heating and cooling) for such dwellings themselves,

taking into account in each instance climatic variations existing between different geographic areas.

(2) As soon as possible after the publication of the performance criteria prescribed under paragraph (1) (and if possible before the completion of the research and development provided for in subsection (c)), the Secretary, in consultation with the Director of the National Bureau of Standards and the Administrator, will select on the basis of open competition a number of designs for various types of residential dwellings suitable for and adapted to the installation of combined solar heating and cooling systems meeting the performance criteria prescribed under paragraph (1) (A).

(c) During the period immediately following the publication of performance criteria under subsection (b) (1), the Administrator, in coordination with the Director, shall undertake and conduct with respect to solar heating and cooling a program of research, development, and testing designed to provide the additional technological resources necessary for the development and commercial application of combined solar heating and cooling systems as contemplated by the program under this section.

(d) The Administrator, in accordance with the applicable provisions of title II of the National Aeronautics and Space Act of 1958 and under program guidelines established jointly by the Administrator and the Secretary, and at the earliest possible time during or immediately after the period specified in subsection (c), shall, after consultation with the Secretary—

(1) enter into such contracts and grants as may be necessary or appropriate for the development (for commercial production and residential use) of combined solar heating and cooling systems meeting the performance criteria prescribed under subsection (b) (1) (A) (including any further planning and design which may be required to conform with the specifications set forth in such criteria or to reflect the results of the activities conducted under subsection (c)); and

(2) enter into contracts with a number of persons or firms for the procurement of combined solar heating and cooling systems meeting such performance criteria (including adequate numbers of spare and replacement parts for such systems).

(e) The Secretary shall (1) arrange for the installation of combined solar heating and cooling systems procured by the Administrator under subsection (d) (2) in a substantial number of residential

dwellings and (2) provide for the satisfactory operation of such installations during the demonstration period. Title to and ownership of any dwellings constructed hereunder and of combined solar heating and cooling systems installed hereunder may be conveyed to purchasers or owners of such dwellings under terms and conditions prescribed by the Secretary, including an express agreement that any such purchaser or owner shall, in such manner and form and on such terms and conditions as the Secretary may prescribe, observe and monitor (or permit the Secretary to observe and monitor) the performance and operation of such system for a period of five years, and that such purchaser or owner (including any subsequent owner and occupant of the property who also makes such an agreement) shall regularly furnish the Secretary with such reports thereon as the agreement may require.

(f) The Secretary of Defense shall arrange for the installation of combined solar heating and cooling systems procured by the Administrator under subsection (d)(2) in a substantial number of residential dwellings which are located on Federal or federally administered property where the performance and operation of such systems can be regularly and effectively observed and monitored by designated Federal personnel.

(g) The Secretary and the Secretary of Defense, and officials responsible for administering Federal or federally administered property, shall coordinate their activities under this section to assure that combined solar heating and cooling systems are installed in a substantial number of residential dwellings and in a sufficient number of geographic areas under varying climatic conditions to constitute a realistic and effective demonstration in support of the objectives of this Act.

COMPREHENSIVE PROGRAM DEFINITION

SEC. 7. (a) The Administrator and the Secretary are authorized and directed to prepare a comprehensive plan for the conduct of the development and demonstration activities under sections 5 and 6. In the preparation of such plan, the Administrator and Secretary shall consult with the Director of the National Bureau of Standards, the Director, the Secretary of Defense, and other Federal agencies and private organizations as appropriate.

(b) The Administrator and the Secretary shall transmit such comprehensive program plan to the President and to each House of the Congress. The plan shall be transmitted within 120 days after the date of the enactment of this Act.

TEST PROCEDURES AND DEFINITIVE PERFORMANCE CRITERIA

SEC. 8. As soon as feasible, and utilizing data available from the demonstration programs under sections 5 and 6, the Secretary, utilizing the services of the Director of the National Bureau of Standards and in consultation with the Administrator and the Director shall determine, prescribe, and publish in the Federal Register in accordance with the applicable provisions regarding rulemaking prescribed by section 553 of title 5, United States Code—

(1) definitive performance criteria for solar heating and combined solar heating and cooling components and systems to be

used in residential dwellings, taking into account climatic variations existing between different geographic areas;

(2) definitive performance criteria (relating to suitability for solar heating and for combined solar heating and cooling) for such dwellings, taking into account climatic variations existing between different geographic areas; and

(3) procedures whereby manufacturers of solar heating and combined solar heating and cooling components and systems shall have their products tested in order to provide certification that such products conform to the performance criteria established under paragraph (1).

DEVELOPMENT AND DEMONSTRATION OF SOLAR HEATING AND COMBINED SOLAR HEATING AND COOLING SYSTEMS FOR COMMERCIAL BUILDINGS

SEC. 9. The Administrator, in consultation with the Secretary, the Director, the Administrator of General Services, and the Director of the National Bureau of Standards and concurrently with the conduct of the programs under sections 5 and 6, shall enter into arrangements with appropriate Federal agencies to carry out such projects and activities (including demonstration projects) with respect to apartment buildings. office buildings, factories, crop-drying facilities and other agricultural structures, public buildings (including schools and colleges), and other non-residential, commercial, or industrial buildings, taking into account the special needs of and individual differences in such buildings based upon size, function, and other relevant factors, as may be appropriate for the early development and demonstration of solar heating and combined solar heating and cooling systems suitable and effective for use in such buildings.

SOLAR HEATING AND COOLING RESEARCH BY NATIONAL SCIENCE FOUNDATION

SEC. 10. (a) The Director shall conduct a program of applied research relevant to (1) the improvement of solar heating components and systems and (2) the development and commercial application of combined solar heating and cooling components and systems as contemplated by the programs under this Act.

(b) The Director shall apprise the Secretary and the Administrator on a continuing basis of the results of the programs being conducted in accordance with subsection (a), and the Secretary and the Administrator shall insure that such results, where appropriate, are incorporated into the development and demonstration programs established by this Act.

COORDINATION, MONITORING, AND LIAISON

SEC. 11. (a) The Secretary, utilizing the services of the Director of the National Bureau of Standards and in coordination with such other Government agencies as may be appropriate, shall—

(1) monitor the performance and operation of solar heating and combined solar heating and cooling systems installed in residential dwellings under this Act;

(2) collect and evaluate data and information on the performance and operation of solar heating and combined solar heating

and cooling systems installed in residential dwellings under this Act; and

(3) from time to time, carry out such studies and investigations and take such other actions, including the submission of special reports to the Congress when appropriate, as may be necessary to assure that the programs for which the Secretary is responsible under this Act effectively carry out the policy of this Act.

(b) In the development of the performance criteria and test procedures required under sections 5, 6, and 8, the Secretary shall work closely with the appropriate scientific, technical, and professional societies and industry representatives to insure the best possible use of available expertise in this area.

(c) The Secretary shall also maintain continuing liaison with the building industry and related industries and interests, and with the scientific and technical community during and after the period of the programs carried out under this Act, in order to assure that the projected benefits of such programs are and will continue to be realized.

DISSEMINATION OF INFORMATION AND OTHER ACTIONS TO PROMOTE PRACTICAL USE OF SOLAR HEATING AND COOLING TECHNOLOGIES

SEC. 12. (a) The Secretary shall take all possible steps to assure that full and complete information with respect to the demonstrations and other activities conducted under this Act is made available to Federal, State, and local authorities, the building industry and related segments of the economy, the scientific and technical community, and the public at large, both during and after the close of the programs under this Act, with the objective of promoting and facilitating to the maximum extent feasible the early and widespread practical use of solar energy for the heating and cooling of buildings throughout the United States. In accordance with regulations prescribed under section 16 such information shall be disseminated on a coordinated basis by the Secretary, the Administrator, the Director of the National Bureau of Standards, the Director, the Commissioner of the Patent Office, and other appropriate Federal offices and agencies.

(b) In addition, the Secretary shall—

(1) study and investigate the effect of building codes, zoning ordinances, tax regulations, and other laws, codes, ordinances, and practices upon the practical use of solar energy for the heating and cooling of buildings;

(2) determine the extent to which such laws, codes, ordinances, and practices should be changed to permit or facilitate such use, and the methods by which any such changes may best be brought about; and

(3) study the necessity of a program of incentives to accelerate the commercial application of solar heating and cooling technology.

(c)(1) In carrying out his functions under subsections (a) and (b) the Secretary, utilizing the capabilities of the National Aeronautics and Space Administration, the Department of Commerce, and the National Science Foundation to the maximum extent possible, shall establish and operate a Solar Heating and Cooling Information Data Bank (hereinafter in this subsection referred to as the "bank") for

the purpose of collecting, reviewing, processing, and disseminating solar heating and cooling information and data in a timely and accurate manner in support of the objectives of this Act.

(2) Information and data compiled in the bank shall include—

(A) technical information (including reports, journal articles, dissertations, monographs, and project descriptions) on solar energy research, development, and applications;

(B) technical information on the design, construction, and maintenance of buildings compatible with solar heating and cooling concepts;

(C) physical and chemical properties of the materials required for solar heating and cooling;

(D) climatic conditions in appropriate areas of the United States, including those areas where the demonstrations are to be located; and

(E) engineering performance of devices utilized in solar heating and cooling or to be employed in the demonstrations.

(3) In accordance with regulations prescribed under section 16, the Secretary shall provide retrieval and dissemination services to cover the solar heating and cooling information described under paragraph (2) for—

(A) Federal, State, and local government organizations that are active in the area of energy resources (and their contractors);

(B) universities, colleges, and other nonprofit organizations; and

(C) private persons, upon request, in appropriate cases.

(4) In carrying out his functions under this subsection, the Secretary shall utilize, when feasible, the existing data base of scientific and technical information in Federal agencies, adding to such data base any information described in paragraph (2) which does not already reside in such base.

(d) Each Federal officer and agency having functions under this Act shall include in his or its annual report to the President and the Congress a full and complete description of his or its activities (current and projected) under this Act, along with his or its recommendations for legislative, administrative, or other action to improve the programs under this Act or to achieve the objectives of this Act more promptly and effectively. In addition, the Secretary shall submit annually to the President and the Congress a special report summarizing in appropriate detail all of the activities (current and projected) of the various Federal officers and agencies having functions under this Act, with the objective of presenting a comprehensive overall view of such programs.

LIMITATIONS ON FEDERALLY ASSISTED OR FEDERALLY CONSTRUCTED HOUSING

SEC. 13. (a)(1) In determining the maximum dollar amount of any federally assisted mortgage loan (as defined in subsection (b)) or the maximum per unit or other cost or floor area limitation of any federally constructed housing (as defined in subsection (c)), where the law establishing the program under which the loan is made or the housing is constructed specifies such maximum per unit or other

cost on floor area limitation and the structure involved is furnished with solar heating or combined solar heating and cooling equipment under the demonstration program established by section 5, 6, or 9, the maximum amount or cost or floor area limitation so specified which is applicable to such structure shall be deemed to be increased by the amount by which (as determined by the Secretary or the Secretary of Defense, as appropriate) the price or cost or floor area limitation of the structure including such solar heating or combined solar heating and cooling equipment exceeds the price or cost or floor area limitation of the structure with such equipment replaced by conventional heating equipment or conventional heating and cooling equipment (as the case may be).

(2) In addition, in the case of a federally assisted mortgage loan, the cost excess specified in subsection (a) shall be fully taken into account in determining the value or cost of the structure involved for purposes of applying any statutory provision specifying the maximum loan-to-value or -cost ratio; except that, if the law specifies different rates of downpayment for successive increments of such value or cost, the lowest such rate shall apply to the additional cost attributable to the solar heating or combined solar heating and cooling equipment, and such equipment shall otherwise be excluded in determining the total value or cost of the structure.

(b) As used in subsection (a), the term "mortgage loan" means a loan which is made to finance the purchase or construction of a residence or any other building or structure; and the term "federally assisted mortgage loan" means a mortgage loan which—

(1) is made in whole or in part by any lender the deposits or accounts of which are insured by any agency of the Federal Government, or is made in whole or in part by any lender which is itself regulated by any agency of the Federal Government; or

(2) is made in whole or in part, or insured, guaranteed, supplemented, or assisted in any way, by the Secretary or any other officer or agency of the Federal Government or under or in connection with a housing, urban development, or related program administered by the Secretary or a housing or related program administered by any other such officer or agency; or

(3) is eligible for purchase by the Federal National Mortgage Association, the Government National Mortgage Association, or the Federal Home Loan Mortgage Corporation, or from any financial institution from which it could be purchased by the Federal Home Loan Mortgage Corporation; or

(4) is made in whole or in part by any "creditor," as defined in section 103(f) of the Consumer Credit Protection Act of 1968 (15 U.S.C. 1602(f)), who makes or invests in residential real estate loans aggregating more than $1,000,000 per year.

(c) As used in subsection (a), the term "federally constructed housing" means (1) residential or multifamily housing which is constructed by agencies of the Federal Government to provide dwelling accommodations for particular types or classes of persons under programs administered by such Federal agencies (including all housing constructed by the Department of Defense to provide dwelling accommodations for personnel of the armed services or for such personnel

and their families), and (2) residential or multifamily housing which is constructed by agencies of State or local government, with financial assistance in any form from the Federal Government, to provide dwelling accommodations for particular types or classes of persons under programs administered by such State or local agencies.

ENCOURAGEMENT AND PROTECTION OF SMALL BUSINESS

SEC. 14. In carrying out their functions under this Act, all Federal officers and agencies shall take steps to assure that small business concerns will have realistic and adequate opportunities to participate in the programs under this Act to the maximum extent possible.

PRIORITIES

SEC. 15. The Secretary shall set priorities as far as possible consistent with the intent and operation of this Act in accordance with the following criteria:

(a) The residential dwellings and other buildings which will be part of the demonstration programs referred to in sections 5, 6, and 9 shall be located in a sufficient number of different geographic areas in the United States to assure a realistic and effective demonstration of the solar heating systems and combined solar heating and cooling systems involved, and of the dwellings and other buildings themselves, in both rural and urban locations and under climatic conditions which vary as much as possible.

(b) Consideration shall be given to projected costs of commercial production and maintenance of the solar heating systems and combined solar heating and cooling systems utilized in the demonstration programs.

(c) Encouragement should be given in the conduct of programs under this Act to those projects in which funds, appropriated by any State or political subdivision thereof for the purpose of sharing costs with the Federal Government for the purchase and installation of solar heating or combined solar heating and cooling components and systems, are committed before or after the date of the enactment of this Act.

REGULATIONS

SEC. 16. The Administrator and the Secretary in consultation with the Director of the National Bureau of Standards, the Director, the Administrator of the General Services Administration, the Secretary of Defense, and other appropriate officers and agencies, shall prescribe such regulations as may be necessary or appropriate to carry out this Act promptly and efficiently. Each such officer or agency, in consultation with the Administrator and the Secretary, may prescribe such regulations as may be necessary or appropriate to carry out his or its particular functions under this Act promptly and efficiently.

USE OF PUBLICLY ASSISTED HOUSING

SEC. 17. The Secretary shall make appropriate use of publicly assisted housing and particularly low-rent housing assisted under the United States Housing Act of 1937 in demonstrating solar heating

systems and combined solar heating and cooling systems under this Act.

TRANSFER OF FUNCTIONS

SEC. 18. Within sixty days after the effective date of the law creating the Energy Research and Development Administration or any other law creating a permanent Federal organization or agency having jurisdiction over the energy research and development functions of the United States (or within sixty days after the enactment of this Act if the effective date of such law occurs prior to the enactment of this Act), the energy research and development functions vested in the National Aeronautics and Space Administration and the National Science Foundation under this Act and any funds which may have been appropriated pursuant to section 19 of this Act, to the extent necessary or appropriate, may, in accordance with regulations prescribed by the Office of Management and Budget, be transferred to and vested in the Energy Research and Development Administration or such other organization or agency.

AUTHORIZATION OF APPROPRIATIONS

SEC. 19. (a) There is hereby authorized to be appropriated to the National Aeronautics and Space Administration for the fiscal year ending June 30, 1975, $5,000,000, to remain available until expended, to carry out the functions vested in the Administrator by this Act.

(b) There is hereby authorized to be appropriated to the Department of Housing and Urban Development for the fiscal year ending June 30, 1975, $5,000,000, to remain available until expended. Any sums so appropriated shall be available (1) to carry out the functions vested in the Secretary of Housing and Urban Development by this Act, and (2) for transfer to the Department of Defense, the National Bureau of Standards, and the General Services Administration to enable them to carry out their respective functions under this Act.

(c) There is hereby authorized to be appropriated for the fiscal years ending June 30, 1976, 1977, 1978, and 1979, $50,000,000 in the aggregate to carry out the programs established by this Act.

And the Senate agree to the same.

That the House recede from its disagreement to the amendment of the Senate to the title of the bill and agree to the same with an amendment as follows:

In lieu of the matter proposed to be inserted by the amendment of the Senate to the title of the bill, insert the following: "An Act to provide for the early development and commercial demonstration of the technology of solar heating and combined solar heating and cooling systems."

And the Senate agree to the same.

FRANK E. MOSS,
EDWARD M. KENNEDY,
ALAN CRANSTON,
JOHNV. TUNNEY,
FLOYD K. HASKELL,
BARRY GOLDWATER,
PETER H. DOMINICK,
LOWELL P. WEICKER, Jr.,
PAUL J. FANNIN,
Managers on the Part of the Senate.

OLIN E. TEAGUE,
MIKE MCCORMACK,
DON FUQUA,
JAMES W. SYMINGTON,
CHARLES A. MOSHER,
BARRY GOLDWATER, Jr.,
JOHN WYDLER,
Managers on the Part of the House.

JOINT EXPLANATORY STATEMENT OF THE COMMITTEE OF CONFERENCE

The managers on the part of the House and the Senate at the conference on the disagreeing votes of the two Houses on the amendment of the Senate to the bill (H.R. 11864) to provide for the early development and demonstration of the technology of solar heating and cooling and combined solar heating and cooling systems submit the following joint statement to the House and the Senate in explanation of the effect of the action agreed upon by the managers and recommended in the accompanying conference report:

SECTION 1. SHORT TITLE

The House bill and the Senate amendment agree that this Act may be cited as the "Solar Heating and Cooling Demonstration Act of 1974".

SECTION 2. FINDING AND POLICY

Subsection (a) Findings.—The House bill contained eight findings. The Senate amendment included three additional findings: that widespread introduction of low-cost solar energy would be beneficial to consumers, that development of solar heating and cooling systems would be fostered by direct contact with manufacturers, architects, engineers, developers and other interested persons, and that evaluation of the performance and reliability of solar systems would be expedited by carefully controlled testing.

The conference substitute adopts the Senate amendment deleting reference to prototype consistent with other provisions of the bill.

Subsection (b) Policy.—The House bill declared it to be the policy of the United States to provide for a demonstration of solar heating technology using current technology and for the development and demonstration of combined heating and cooling technology. The Senate amendment provided for the earliest possible demonstration of solar heating and cooling technologies. Both bills specified identical time periods.

The conference substitute deletes the House reference to the use of "current technology" so as not to inhibit the application of technology advancements, and deletes the Senate reference to "earliest possible" as redundant in view of the time frames set forth.

SECTION 3. DEFINITIONS

The House bill provided definitions of "solar heating", "solar heating and cooling", and "residential dwellings". The Senate amendment added the definitions of "Administrator", "Secretary", and "Director" for the Administrator of the National Aeronautics and Space Administration (NASA), the Secretary of Housing and Urban Development

(HUD), and the Director of the National Science Foundation (NSF), respectively; expanded the definition of residential dwellings to include previously occupied and new single family and multifamily dwellings and publicly-assisted housing owned by a private sponsor or a state or local housing authority; and substituted the Secretary of HUD for the Secretary of Commerce as responsible for prescribing performance criteria and specified consultation with the Director and the Administrator in the development of such criteria consistent with responsibility assignments in the Senate amendment.

The conference substitute adopts the substance of the Senate amendment specifying, however, that the services of the National Bureau of Standards (NBS) are to be utilized in the development of performance criteria conforming with other sections of the bill.

The conferees agree that the phrase "not covered by Section 17" in the definition of residential dwellings in no way contravenes the intent of Section 17 regarding appropriate use of public housing.

SECTION 4. CONDUCT OF ACTIVITIES IN SOLAR HEATING AND COOLING TECHNOLOGIES BY NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

The House bill provided for amending the National Aeronautics and Space Act of 1958 specifically authorizing NASA to carry out basic and applied research, development, demonstrations and other activities in solar heating and cooling technologies. No similar provision was included in the Senate amendment.

The conference substitute adopts the House provision deleting the words "basic and applied" and substituting the word "such" in lieu thereof with respect to research activities, and deleting the words "including" and "activities" to define the work to be undertaken by NASA as provided for in Sections 5, 6, and 9 of this Act.

SECTION 5. DEVELOPMENT AND DEMONSTRATION OF SOLAR HEATING SYTEM TO BE USED IN RESIDENTIAL DWELLINGS

The House bill provided for the Administrator of NASA, in consultation with the Secretary of HUD, to carry out a program for the development and demonstration of solar heating systems for residential dwellings; for determination and publication by the Secretary of Commerce, in consultation with NASA and HUD, within 120 days, of performance criteria for such systems and for dwellings utilizing such systems, for selection by the Secretary of Commerce in consultation with the Administrator and the Secretary of HUD a number of designs of dwellings meeting the criteria and suitable for the installation of solar heating systems; for the Administrator to contract for the development, manufacture and production of solar heating systems and for the installation of such systems in conjunction with and under arrangements made by the Secretary of Defense on Federal properties and in conjunction with the Secretary of HUD in privately-owned and operated dwellings. The House bill proposed installations "in substantial numbers of residential dwellings" to be defined administratively, but specifying that one thousand or more installations would in any case meet the requirement for each of the two categories of the

residential dwelling demonstration. The House bill provided for monitoring and liaison activities. The Senate amendment provided for a joint program to be carried out by the Administrator of NASA and the Secretary of HUD with the Secretary, in consultation with the Director of NBS, the Director of the National Science Foundation and the Administrator, to determine and publish performance criteria for solar heating components and systems, for solar heated dwellings, and for test procedures for solar heating components and systems and to conduct a competition and select a number of solar systems and dwelling designs utilizing such systems. The Administrator was responsible for contracting for development, as necessary, and procurement of such systems, in accordance with guidelines established by the Secretary, and the Secretary would contract for design integration and construction of prototype dwellings and the installation of solar heating systems procured by NASA. The Secretary of Defense would contract for construction of and installation of such systems in military residential dwellings. The Senate amendment, in Section 7, provided for large scale demonstrations in addition to the prototype demonstrations, and as a part of such large scale demonstration provided that the Secretary was authorized to establish procedures whereby any person wishing to install solar heating components and systems could receive up to 75% of the purchase and installation costs of such components and systems. The Senate amendment required working closely with appropriate technical societies and industry representatives.

The conference substitute provides for a joint-fully-integrated program to be carried out by the Administrator of NASA and the Secretary of HUD. The Secretary is responsible for the determination and publication, utilizing the services of the Director of NBS, within 120 days, of interim performance criteria for solar heating components and systems and for dwellings utilizing such systems, and for the selection, in consultation with the Director of NBS, of a number of designs of residential dwellings meeting the performance criteria and suitable for the installation of solar heating systems. The substitute also provides that the Administrator, in accordance with guidelines established jointly with and after full consultation with the Secretary, will contract for the development and procurement of solar heating components and sytsems. Subsequent to such activity, the Secretary shall arrange for the installation of such systems in a substantial number of residential dwellings. The conference substitute similarly provides for installation of systems procured by the Administrator on Federal or federally-administered property. The installation activities of the Secretary and the Secretary of Defense are to be fully coordinated to provide a realistic and effective demonstration.

Section 6. Development and Demonstration of Combined Solar Heating and Cooling Systems To Be Used in Residential Dwellings

The House bill provided for a program for the development and demonstration of combined solar heating and cooling systems for use in residential dwellings identical to the program for solar heating except that no time was established for the determination and

publication of performance criteria and a subsection was included directing NASA to undertake to provide the additional technolgy necessary for combined heating and cooling systems. The Senate amendment also provided for a program identical to its solar heating program for the development and demonstration of combined solar heating and cooling, with the sale exceptions. The Senate amendment, however, with respect to additional technology, directed NASA to undertake "development and testing" while the House bill specified "research, development, testing and demonstration."

The conference substitute for this Section adopts the provisions of the conference substitute for Section 5 except that more time is permitted for the publication of performance criteria and subsection (c) is added providing for the conduct of a program of research, development and testing by the Administrator, in coordination with the Director of NSF, to provide the additional technology for combined solar heating and cooling systems.

Section 7. Comprehensive Program Definition

The House bill, in Sections 5 and 6, proposed installations "in substantial numbers of residential dwellings" to be defined administratively, but specifying that one thousand or more installations would in any case meet the requirement for each of the four categories of the residential dwelling demonstration. The Senate amendment, in Sections 4 and 5, authorized the construction of prototype dwellings and in Section 7, authorized the Secretary of HUD to undertake large-scale demonstrations including the establishment of procedures whereby persons could obtain up to 75% of the purchase and installation costs of solar heating and combined solar heating and cooling components and systems.

The conference substitute, in Sections 5 and 6, adopts programs for the demonstration of solar heating and combined solar heating and cooling technology, respectively. The Committee of Conference also adopts a new section requiring the joint submission by the Administrator and the Secretary of a comprehensive program plan for implementing and carrying out the programs anticipated by Sections 5 and 6.

The conferees agree that complete and continuous coordination must be effected by all agencies with responsibilities under this act, and that the solar heating and cooling equipment is developed in a manner which ensures appropriate consideration is given to factors such as cost, commercial marketability, aesthetics, design integration, and consumer preferences.

The conferees agree that it is the intent to have a wide variety of concepts and systems investigated and demonstrated under this program, and that nothing in this act should preclude the use of "package" systems for heating equipment which include a dwelling design that incorporates a specific solar system.

The conferees agree that in carrying out those functions NASA shall give small businesses engaged in solar heating and cooling developmental activities full opportunity to participate in the program authorized by this Act and that innovation and development work accomplished by such firms shall be utilized in the program to the maximum extent feasible.

The conferees agree that the requirement in Section 5(d) and Section 6(e) that the Secretary install only those units procured by NASA does not preclude HUD from procuring and installing and/or otherwise conducting solar heating and cooling demonstration activties under other legislative authority available to HUD.

The conferees agree that "in a substantial number" means that number of demonstations utilizing a variety of systems and approaches in a number of diverse geographic areas sufficient to provide realistic performance data to achieve the objectives of the act. Furthermore, the equipment is not to be "one of a kind", but is to be replicated in adequate numbers so that data can be generated on manufacturing methods and costs. This does not mean that the manufacturing methods used to produce equipment for this demonstration program have to be those which will necessarily be associated with large-scale production for the commercial market. The conferees further agree, however, that a massive program is not required. What is necessary is a program that is adequate to assure sufficient numbers of demonstration units, but at the same time to avoid the risk of mass failures which could cause a serious setback to the acceptance of solar energy systems.

Section 8. Test Procedures and Definitive Performance Criteria

The House bill, in Section 5, provided for the determination and publication, within 120 days, of performance criteria for solar heating equipment and systems and dwellings using such systems, and for similar action, in Section 6, with respect to combined solar heating and cooling activities as soon as possible. The Senate amendment, in Section 4, provided for the determination and publication of performance criteria, within nine months, for solar heating components and systems, dwellings utilizing such systems, and test procedures for such systems, and for similar action, in Section 5, with respect to combined solar heating and cooling activities as soon as possible.

The Conference substitute adopts, in Sections 5 and 6, the concept of interim criteria to serve the immediate need of the controlled NASA–HUD program. The Committee of Conference also adopts Section 8 providing for the establishment of test procedures and definitive performance criteria for general use utilizing the experience and data from the initial phases of the controlled program to assure the adequacy of such procedures and criteria.

Section 9. Development and Demonstration of Solar Heating and Combined Solar Heating and Cooling Systems for Commercial Buildings

The House bill provided for a joint program, by the Administrator of NASA and the Secretary of HUD, for the development of solar heating and cooling systems for commercial buildings including apartment buildings, office buildings, factories, agricultural structures, and other facilities. The Senate amendment provided for the conduct of such a program, excluding apartment buildings, by the Administrator of NASA in consultation with the heads of other federal agencies.

The conference substitute adopts the Senate amendment with an amendment including high-rise apartment buildings as a development

and demonstration activity that may be addressed under this section in lieu of inclusion solely in Sections 5 and 6 as multifamily dwellings.

The conferees agree that multifamily housing may involve high-rise apartment buildings, as well as low-rise garden apartments and similar structures, and further recognize that solar heating and cooling system requirements of high-rise buildings may have more commonality to commercial structures than to single family dwellings. Therefore, the Conferees agree that the Administrator and the Secretary, in developing the program plan, can organize the activities involving apartment buildings and assign responsibilities therefor in a manner best suited to expeditiously and efficiently achieving the objectives of the Act.

Section 10. Solar Heating and Cooling Research by National Science Foundation

The House bill provided for an amendment to the National Science Foundation Act of 1950 requiring the Director of the NSF to initiate and support basic and applied research relating to solar energy development as provided for in this act. The Senate amendment provided that the Director should conduct a program of research relevant to the improvement of solar heating components and systems and to the development and commercial application of such systems without amending the basic Act. The Senate amendment also required the Director to apprise the Secretary of HUD of the results of such research.

The conference substitute adopts the Senate provision with an amendment providing for the conduct of "applied" research and providing for apprising the Administrator as well as the Secretary of results.

Section 11. Coordination, Monitoring, and Liaison

The House bill provided for various coordination, monitoring, and liaison functions in several sections of the bill. The Senate amendment consolidated many of these same functions in its Section 9.

The conference substitute adopts the Senate provision with an amendment integrating the requirement for coordination with appropriate technical and professional societies and industry representatives in the development of performance criteria and test procedures, and specifying the role of the Director of NBS in the monitoring of and data collection and evaluation from installed systems.

Section 12. Dissemination of Information and Other Actions To Promote Practical Use of Solar Heating and Cooling Technologies

The House bill and the Senate amendment provided for the Secretary of HUD to assure the greatest possible dissemination of information on the activities under this Act and required the establishment of a Solar Heating and Cooling Information Data Bank.

The conference substitute incorporates the strengths of the very similar House and Senate bills making conforming changes as necessary.

Section 13. Limitations on Federally Assisted or Federally Constructed Housing

The House bill, in Section 10, provided a financing alternative to be available to the public, for buildings involved in the demonstration program, which would exempt from any mortgage limitations on any federally assisted mortgage loan or the maximum per unit or other cost of any federally constructed housing, the cost of solar heating or combined solar heating and cooling equipment. The Senate amendment had no comparable provision.

The conference substitute adopts the House provision with an amendment to except any floor area limitations which might inhibit the demonstration program.

Section 14. Encouragement and Protection of Small Business

The House bill and the Senate amendment included essentially similar provisions with respect to the encouragement and protection of small business.

The conference substitute adopts the Senate amendment, virtually identical with the House bill.

Section 15. Priorities

The House bill provided that the Administrator would set priorities as far as possible with consideration given to the following criteria: location of dwellings in a sufficient number of different geographic areas to realize an effective demonstration, the need for assistance in areas with high density of population and prospects for future growth which might impact regular fuel supplies now in short supply, and the desirability of encouraging projects in which funds appropriated by any state or political subdivision were provided on a cost-sharing basis with the federal government for the procurement of solar heating and cooling equipment. The Senate amendment provided that the Secretary of HUD should, as far as possible, set priorities in accordance with the following criteria: residential dwellings shall be located in a sufficient number of different geographic areas to assure a realistic and effective demonstration in both urban and rural locations, projected costs of commercial production and maintenance of solar heating and cooling systems, and encouragement of projects in which funds appropriated by any state or political subdivision were provided on a cost-sharing basis with the federal government for the procurement of solar heating and cooling equipment.

The conference substitute adopts the Senate provision with a nonsubstantive amendment amount to Subsection (b).

Section 16. Regulations

The House bill provided that the Administrator, in consultation with the heads of other appropriate government agencies, should prescribe regulations as necessary to carry out provisions of the Act and that each other such officer or agency might also prescribe such regula-

tions as necessary to carry out his or its functions under the Act. The Senate amendment contained no comparable provision.

The conference substitute adopts the House provision with minor changes to conform to definitions and assignments of responsibilities in the bill.

Section 17. Use of Publicly Assisted Housing

The Senate amendment provided for the Secretary of HUD to make appropriate use of publicly assisted housing in the demonstrations. The House bill did not contain a comparable provision.

The conference substitute adopts the Senate amendment.

Section 18. Transfer of Functions

The House bill, in anticipation of the creation of the Energy Research and Development Administration (ERDA), provided for the transfer, within 60 days, of all the research and development functions vested in NASA and NSF under this Act, to such agency in accordance with regulations prescribed by the Office of Management and Budget. The Senate amendment provided for a similar transfer; however, it excluded the National Science Foundation and made the transfer of functions permissive by use of the word "may" in lieu of "shall" as stated in the House bill.

The conference substitute provides for the transfer of the "energy research and development" functions vested in NASA and NSF under this Act to ERDA on a permissive basis in accordance with regulations prescribed by the Office of Management and Budget.

The conferees agree that, notwithstanding the 60-day time limit prescribed by Section 18, in the event it is determined that a transfer of functions should be made but that rigid adherence to the 60-day limitation would be inimical to orderly progress of the programs established by this Act, the period may be extended because of the permissive nature of the transfer authority.

Section 19. Authorization of Appropriations

The House bill authorized appropriations to the Administrator of NASA, for the first five fiscal years after the date of enactment of this Act, such sums not exceeding $50 million as necessary to carry out functions vested in NASA and to reimburse the National Bureau of Standards, the National Science Foundation, the Secretary of HUD, the Secretary of Defense, the General Services Administration, and other agencies for expenses incurred by them in carrying out programs in the Act. The Senate amendment authorized appropriations to the National Aeronautics and Space Administration for Fiscal Year 1975 of $5 million to carry out the NASA functions, and authorized to be appropriated to the Department of HUD for Fiscal Year 1975 $5 million and for each of the subsequent four fiscal years, $10 million each to carry out the functions vested in HUD and for transfer to the Department of Defense, the National Bureau of Standards, and the General Services Administration to carry out functions vested in them by the Act.

The conference substitute authorizes $5 million for NASA for FY 1975 to remain available until expended, authorizes $5 million to HUD for Fiscal Year 1975 to remain available to be expended to carry out the functions vested in HUD and for reimbursing the Department of Defense, the National Bureau of Standards and the General Services Administration for expenses incurred by them in carrying out responsibilities under the Act. The conference substitute also authorizes an additional $50 million for the fiscal years ending June 30, 1976, 1977, 1978 and 1979, to carry out programs established by this Act.

FRANK E. MOSS,
EDWARD M. KENNEDY,
ALAN CRANSTON,
JOHN V. TUNNEY,
FLOYD K. HASKELL,
BARRY GOLDWATER,
PETER H. DOMINICK,
LOWELL P. WEICKER, Jr.,
PAUL J. FANNIN,
Managers on the Part of the Senate.

OLIN E. TEAGUE,
MIKE MCCORMACK,
DON FUQUA,
JAMES W. SYMINGTON,
CHARLES A. MOSHER,
BARRY GOLDWATER, Jr.,
JOHN WYDLER,
Managers on the Part of the House.

○

H. R. 11864

Ninety-third Congress of the United States of America

AT THE SECOND SESSION

Begun and held at the City of Washington on Monday, the twenty-first day of January, one thousand nine hundred and seventy-four

An Act

To provide for the early development and commercial demonstration of the technology of solar heating and combined solar heating and cooling systems

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "Solar Heating and Cooling Demonstration Act of 1974".

FINDINGS AND POLICY

SEC. 2. (a) The Congress hereby finds that—

(1) the current imbalance between supply and demand for fuels and energy is likely to persist for some time;

(2) the early demonstration of the feasibility of using solar energy for the heating and cooling of buildings could help to relieve the demand upon present fuel and energy supplies;

(3) the technologies for solar heating are close to the point of commercial application in the United States;

(4) the technologies for combined solar heating and cooling still require research, development, testing and demonstration, but no insoluble technical problem is now foreseen in achieving commercial use of such technologies;

(5) the early development and export of viable solar heating equipment and combined solar heating and cooling equipment, consistent with the established preeminence of the United States in the field of high technology products, can make a valuable contribution to our balance of trade;

(6) the widespread use of solar energy in place of conventional methods for the heating and cooling of buildings would have a significantly beneficial effect upon the environment;

(7) the mass production and use of solar heating and cooling equipment will help to eliminate the dependence of the United States upon foreign energy sources and promote the national defense;

(8) the widespread introduction of low-cost solar energy will be beneficial to consumers in a period of rapidly rising fuel cost;

(9) innovation and creativity in the development of solar heating and combined solar heating and cooling components and systems can be fostered through encouraging direct contact between the manufacturers of such systems and the architects, engineers, developers, contractors, and other persons interested in installing such systems in buildings;

(10) evaluation of the performance and reliability of solar heating and combined solar heating and cooling technologies can be expedited by testing under carefully controlled conditions; and

(11) commercial application of solar heating and combined solar heating and cooling technologies can be expedited by early commercial demonstration under practical conditions.

(b) It is therefore declared to be the policy of the United States and the purpose of this Act to provide for the demonstration within a three-year period of the practical use of solar heating technology, and to provide for the development and demonstration within a five-year period of the practical use of combined heating and cooling technology.

DEFINITIONS

SEC. 3. For purposes of this Act—

(1) the term "solar heating", with respect to any building, means the use of solar energy to meet such portion of the total heating needs of such building (including hot water), or such portion of the needs of such building for hot water (where its remaining heating needs are met by other methods), as may be required under performance criteria prescribed by the Secretary of Housing and Urban Development utilizing the services of the Director of the National Bureau of Standards, and in consultation with the Director of the National Science Foundation, and the Administrator of the National Aeronautics and Space Administration;

(2) the terms "solar heating and cooling" and "combined solar heating and cooling", with respect to any building, mean the use of solar energy to provide both such portion of the total heating needs of such building (including hot water) and such portion of the total cooling needs of such building, or such portion of the needs of such building for hot water (where its remaining heating needs are met by other methods) and such portion of the total cooling needs of a building, as may be required under performance criteria prescribed by the Secretary of Housing and Urban Development utilizing the services of the Director of the National Bureau of Standards, and in consultation with the Director of the National Science Foundation, and the Administrator of the National Aeronautics and Space Administration, and such term includes cooling by means of nocturnal heat radiation, by evaporation, or by other methods of meeting peakload energy requirements at nonpeakload times;

(3) the term "residential dwellings" includes previously occupied and new single family and multifamily dwellings, mobile homes, and publicly assisted housing owned by a private sponsor or a State or local housing authority not covered by section 17;

(4) the term "Administrator" means the Administrator of the National Aeronautics and Space Administration;

(5) the term "Secretary" means the Secretary of Housing and Urban Development; and

(6) the term "Director" means the Director of the National Science Foundation.

CONDUCT OF ACTIVITIES IN SOLAR HEATING AND COOLING TECHNOLOGIES BY NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SEC. 4. Section 203 of the National Aeronautics and Space Act of 1958 (42 U.S.C. 2473) is amended by redesignating subsection (b) as subsection (c), and by inserting immediately after subsection (a) the following new subsection:

"(b) The Administration shall initiate, support, and carry out such research, development, demonstrations, and other related activities in solar heating and cooling technologies (to the extent that funds are appropriated therefor) as are provided for in sections 5, 6, and 9 of the Solar Heating and Cooling Demonstration Act of 1974.".

DEVELOPMENT AND DEMONSTRATION OF SOLAR HEATING SYSTEMS TO BE USED IN RESIDENTIAL DWELLINGS

SEC. 5. (a) The Administrator and the Secretary shall promptly initiate and carry out a program, as provided in this section, for the development and demonstration of solar heating systems (including

collectors, controls, and thermal storage) for use in residential dwellings.

(b) (1) Within 120 days after the date of the enactment of this Act, the Secretary, utilizing the services of the Director of the National Bureau of Standards and in consultation with the Administrator and the Director, shall determine, prescribe, and publish—

(A) interim performance criteria for solar heating components and systems to be used in residential dwellings, and

(B) interim performance criteria (relating to suitability for solar heating) for such dwellings themselves,

taking into account in each instance climatic variations existing between different geographic areas.

(2) As soon as possible after the publication of the performance criteria prescribed under paragraph (1), the Secretary, in consultation with the Director of the National Bureau of Standards and the Administrator, will select on the basis of open competition a number of designs for various types of residential dwellings suitable for and adapted to the installation of solar heating systems meeting the performance criteria prescribed under paragraph (1) (A).

(c) The Administrator, in accordance with the applicable provisions of title II of the National Aeronautics and Space Act of 1958 and under program guidelines established jointly by the Administrator and the Secretary, shall, after consultation with the Secretary—

(1) enter into such contracts and grants as may be necessary or appropriate for the development (for commercial production and residential use) of solar heating systems meeting the performance criteria prescribed under subsection (b) (1) (A) (including any further planning and design which may be required to conform with the specifications set forth in such criteria); and

(2) enter into contracts with a number of persons or firms for the procurement of solar heating components and systems meeting such performance criteria (including adequate numbers of spare and replacement parts for such systems).

(d) The Secretary shall (1) arrange for the installation of solar heating systems procured by the Administrator under subsection (c) (2) in a substantial number of residential dwellings and (2) provide for the satisfactory operation of such installations during the demonstration period. Title to and ownership of any dwellings constructed hereunder and of solar heating systems installed hereunder may be conveyed to purchasers or owners of such dwellings under terms and conditions prescribed by the Secretary, including an express agreement that any such purchaser or owner shall, in such manner and form and on such terms and conditions as the Secretary may prescribe, observe and monitor (or permit the Secretary to observe and monitor) the performance and operation of such system for a period of five years, and that such purchaser or owner (including any subsequent owner and occupant of the property who also makes such an agreement) shall regularly furnish the Secretary with such reports thereon as the agreement may require.

(e) The Secretary of Defense shall arrange for the installation of solar heating systems procured by the Administrator under subsection (c) (2) in a substantial number of residential dwellings which are located on Federal or federally administered property where the performance and operation of such systems can be regularly and effectively observed and monitored by designated Federal personnel.

(f) The Secretary and the Secretary of Defense, and officials responsible for administering Federal or federally administered property, shall coordinate their activities under this section to assure that solar heating systems are installed in a substantial number of resi-

dential dwellings and in a sufficient number of different geographic areas under varying climatic conditions to constitute a realistic and effective demonstration in support of the objectives of this Act.

DEVELOPMENT AND DEMONSTRATION OF COMBINED SOLAR HEATING AND COOLING SYSTEMS TO BE USED IN RESIDENTIAL DWELLINGS

SEC. 6. (a) The Administrator and the Secretary shall promptly initiate and carry out a program, as provided in this section, for the development and demonstration of combined solar heating and cooling systems (including collectors, controls, and thermal storage) for use in residential dwellings.

(b) (1) As soon as possible after the date of the enactment of this Act, the Secretary, utilizing the services of the Director of the National Bureau of Standards and in consultation with the Administrator and the Director, shall determine, prescribe, and publish—

(A) interim performance criteria for combined solar heating and cooling components and systems to be used in residential dwellings, and

(B) interim performance criteria (relating to suitability for solar heating and cooling) for such dwellings themselves,

taking into account in each instance climatic variations existing between different geographic areas.

(2) As soon as possible after the publication of the performance criteria prescribed under paragraph (1) (and if possible before the completion of the research and development provided for in subsection (c)), the Secretary, in consultation with the Director of the National Bureau of Standards and the Administrator, will select on the basis of open competition a number of designs for various types of residential dwellings suitable for and adapted to the installation of combined solar heating and cooling systems meeting the performance criteria prescribed under paragraph (1) (A).

(c) During the period immediately following the publication of performance criteria under subsection (b) (1), the Administrator, in coordination with the Director, shall undertake and conduct with respect to solar heating and cooling a program of research, development, and testing designed to provide the additional technological resources necessary for the development and commercial application of combined solar heating and cooling systems as contemplated by the program under this section.

(d) The Administrator, in accordance with the applicable provisions of title II of the National Aeronautics and Space Act of 1958 and under program guidelines established jointly by the Administrator and the Secretary, and at the earliest possible time during or immediately after the period specified in subsection (c), shall, after consultation with the Secretary—

(1) enter into such contracts and grants as may be necessary or appropriate for the development (for commercial production and residential use) of combined solar heating and cooling systems meeting the performance criteria prescribed under subsection (b) (1) (A) (including any further planning and design which may be required to conform with the specifications set forth in such criteria or to reflect the results of the activities conducted under subsection (c)); and

(2) enter into contracts with a number of persons or firms for the procurement of combined solar heating and cooling systems meeting such performance criteria (including adequate numbers of spare and replacement parts for such systems).

(e) The Secretary shall (1) arrange for the installation of combined solar heating and cooling systems procured by the Administrator

under subsection (d) (2) in a substantial number of residential dwellings and (2) provide for the satisfactory operation of such installations during the demonstration period. Title to and ownership of any dwellings constructed hereunder and of combined solar heating and cooling systems installed hereunder may be conveyed to purchasers or owners of such dwellings under terms and conditions prescribed by the Secretary, including an express agreement that any such purchaser or owner shall, in such manner and form and on such terms and conditions as the Secretary may prescribe, observe and monitor (or permit the Secretary to observe and monitor) the performance and operation of such system for a period of five years, and that such purchaser or owner (including any subsequent owner and occupant of the property who also makes such an agreement) shall regularly furnish the Secretary with such reports thereon as the agreement may require.

(f) The Secretary of Defense shall arrange for the installation of combined solar heating and cooling systems procured by the Administrator under subsection (d) (2) in a substantial number of residential dwellings which are located on Federal or federally administered property where the performance and operation of such systems can be regularly and effectively observed and monitored by designated Federal personnel.

(g) The Secretary and the Secretary of Defense, and officials responsible for administering Federal or federally administered property, shall coordinate their activities under this section to assure that combined solar heating and cooling systems are installed in a substantial number of residential dwellings and in a sufficient number of geographic areas under varying climatic conditions to constitute a realistic and effective demonstration in support of the objectives of this Act.

COMPREHENSIVE PROGRAM DEFINITION

SEC. 7. (a) The Administrator and the Secretary are authorized and directed to prepare a comprehensive plan for the conduct of the development and demonstration activities under sections 5 and 6. In the preparation of such plan, the Administrator and Secretary shall consult with the Director of the National Bureau of Standards, the Director, the Secretary of Defense, and other Federal agencies and private organizations as appropriate.

(b) The Administrator and the Secretary shall transmit such comprehensive program plan to the President and to each House of the Congress. The plan shall be transmitted within 120 days after the date of the enactment of this Act.

TEST PROCEDURES AND DEFINITIVE PERFORMANCE CRITERIA

SEC. 8. As soon as feasible, and utilizing data available from the demonstration programs under sections 5 and 6, the Secretary, utilizing the services of the Director of the National Bureau of Standards and in consultation with the Administrator and the Director shall determine, prescribe, and publish in the Federal Register in accordance with the applicable provisions regarding rulemaking prescribed by section 553 of title 5, United States Code—

(1) definitive performance criteria for solar heating and combined solar heating and cooling components and systems to be used in residential dwellings, taking into account climatic variations existing between different geographic areas;

(2) definitive performance criteria (relating to suitability for solar heating and for combined solar heating and cooling) for

such dwellings, taking into account climatic variations existing between different geographic areas; and

(3) procedures whereby manufacturers of solar heating and combined solar heating and cooling components and systems shall have their products tested in order to provide certification that such products conform to the performance criteria established under paragraph (1).

DEVELOPMENT AND DEMONSTRATION OF SOLAR HEATING AND COMBINED SOLAR HEATING AND COOLING SYSTEMS FOR COMMERCIAL BUILDINGS

SEC. 9. The Administrator, in consultation with the Secretary, the Director, the Administrator of General Services, and the Director of the National Bureau of Standards and concurrently with the conduct of the programs under sections 5 and 6, shall enter into arrangements with appropriate Federal agencies to carry out such projects and activities (including demonstration projects) with respect to apartment buildings, office buildings, factories, crop-drying facilities and other agricultural structures, public buildings (including schools and colleges), and other non-residential, commercial, or industrial buildings, taking into account the special needs of and individual differences in such buildings based upon size, function, and other relevant factors, as may be appropriate for the early development and demonstration of solar heating and combined solar heating and cooling systems suitable and effective for use in such buildings.

SOLAR HEATING AND COOLING RESEARCH BY NATIONAL SCIENCE FOUNDATION

SEC. 10. (a) The Director shall conduct a program of applied research relevant to (1) the improvement of solar heating components and systems and (2) the development and commercial application of combined solar heating and cooling components and systems as contemplated by the programs under this Act.

(b) The Director shall apprise the Secretary and the Administrator on a continuing basis of the results of the programs being conducted in accordance with subsection (a), and the Secretary and the Administrator shall insure that such results, where appropriate, are incorporated into the development and demonstration programs established by this Act.

COORDINATION, MONITORING, AND LIAISON

SEC. 11. (a) The Secretary, utilizing the services of the Director of the National Bureau of Standards and in coordination with such other Government agencies as may be appropriate, shall—

(1) monitor the performance and operation of solar heating and combined solar heating and cooling systems installed in residential dwellings under this Act;

(2) collect and evaluate data and information on the performance and operation of solar heating and combined solar heating and cooling systems installed in residential dwellings under this Act; and

(3) from time to time, carrying out such studies and investigations and take such other actions, including the submission of special reports to the Congress when appropriate, as may be necessary to assure that the programs for which the Secretary is responsible under this Act effectively carry out the policy of this Act.

(b) In the development of the performance criteria and test procedures required under sections 5, 6, and 8, the Secretary shall work

closely with the appropriate scientific, technical, and professional societies and industry representatives to insure the best possible use of available expertise in this area.

(c) The Secretary shall also maintain continuing liaison with the building industry and related industries and interests, and with the scientific and technical community during and after the period of the programs carried out under this Act, in order to assure that the projected benefits of such programs are and will continue to be realized.

DISSEMINATION OF INFORMATION AND OTHER ACTIONS TO PROMOTE PRACTICAL USE OF SOLAR HEATING AND COOLING TECHNOLOGIES

SEC. 12. (a) The Secretary shall take all possible steps to assure that full and complete information with respect to the demonstrations and other activities conducted under this Act is made available to Federal, State, and local authorities, the building industry and related segments of the economy, the scientific and technical community, and the public at large, both during and after the close of the programs under this Act, with the objective of promoting and facilitating to the maximum extent feasible the early and widespread practical use of solar energy for the heating and cooling of buildings throughout the United States. In accordance with regulations prescribed under section 16 such information shall be disseminated on a coordinated basis by the Secretary, the Administrator, the Director of the National Bureau of Standards, the Director, the Commissioner of the Patent Office, and other appropriate Federal offices and agencies.

(b) In addition, the Secretary shall—

(1) study and investigate the effect of building codes, zoning ordinances, tax regulations, and other laws, codes, ordinances, and practices upon the practical use of solar energy for the heating and cooling of buildings;

(2) determine the extent to which such laws, codes, ordinances, and practices should be changed to permit or facilitate such use, and the methods by which any such changes may best be brought about; and

(3) study the necessity of a program of incentives to accelerate the commercial application of solar heating and cooling technology.

(c) (1) In carrying out his functions under subsections (a) and (b) the Secretary, utilizing the capabilities of the National Aeronautics and Space Administration, the Department of Commerce, and the National Science Foundation to the maximum extent possible, shall establish and operate a Solar Heating and Cooling Information Data Bank (hereinafter in this subsection referred to as the "bank") for the purpose of collecting, reviewing, processing, and disseminating solar heating and cooling information and data in a timely and accurate manner in support of the objectives of this Act.

(2) Information and data compiled in the bank shall include—

(A) technical information (including reports, journal articles, dissertions, monographs, and project descriptions) on solar energy research, development, and applications;

(B) technical information on the design, construction, and maintenance of buildings compatible with solar heating and cooling concepts;

(C) physical and chemical properties of the materials required for solar heating and cooling;

(D) climatic conditions in appropriate areas of the United States, including those areas where the demonstrations are to be located; and

(E) engineering performance of devices utilized in solar heating and cooling or to be employed in the demonstrations.

(3) In accordance with regulations prescribed under section 16, the Secretary shall provide retrieval and dissemination services to cover the solar heating and cooling information described under paragraph (2) for—

(A) Federal, State, and local government organizations that are active in the area of energy resources (and their contractors);

(B) universities, colleges, and other nonprofit organizations; and

(C) private persons, upon request, in appropriate cases.

(4) In carrying out his functions under this subsection, the Secretary shall utilize, when feasible, the existing data base of scientific and technical information in Federal agencies, adding to such data base any information described in paragraph (2) which does not already reside in such base.

(d) Each Federal officer and agency having functions under this Act shall include in his or its annual report to the President and the Congress a full and complete description of his or its activities (current and projected) under this Act, along with his or its recommendations for legislative, administrative, or other action to improve the programs under this Act or to achieve the objectives of this Act more promptly and effectively. In addition, the Secretary shall submit annually to the President and the Congress a special report summarizing in appropriate detail all of the activities (current and projected) of the various Federal officers and agencies having functions under this Act, with the objective of presenting a comprehensive overall view of such programs.

LIMITATIONS ON FEDERALLY ASSISTED OR FEDERALLY CONSTRUCTED HOUSING

SEC. 13. (a)(1) In determining the maximum dollar amount of any federally assisted mortgage loan (as defined in subsection (b)) or the maximum per unit or other cost or floor area limitation of any federally constructed housing (as defined in subsection (c)), where the law establishing the program under which the loan is made or the housing is constructed specifies such maximum per unit or other cost on floor area limitation and the structure involved is furnished with solar heating or combined solar heating and cooling equipment under the demonstration program established by section 5, 6, or 9, the maximum amount or cost or floor area limitation so specified which is applicable to such structure shall be deemed to be increased by the amount by which (as determined by the Secretary or the Secretary of Defense, as appropriate) the price or cost or floor area limitation of the structure including such solar heating or combined solar heating and cooling equipment exceeds the price or cost or floor area limitation of the structure with such equipment replaced by conventional heating equipment or conventional heating and cooling equipment (as the case may be).

(2) In addition, in the case of a federally assisted mortgage loan, the cost excess specified in subsection (a) shall be fully taken into account in determining the value or cost of the structure involved for purposes of applying any statutory provision specifying the maximum loan-to-value or -cost ratio; except that, if the law specifies different rates of downpayment for successive increments of such value or cost, the lowest such rate shall apply to the additional cost attributable to the solar heating or combined solar heating and cooling equipment, and such equipment shall otherwise be excluded in determining the total value or cost of the structure.

(b) As used in subsection (a), the term "mortgage loan" means a loan which is made to finance the purchase or construction of a residence or any other building or structure; and the term "federally assisted mortgage loan" means a mortgage loan which—

(1) is made in whole or in part by any lender the deposits or accounts of which are insured by any agency of the Federal Government, or is made in whole or in part by any lender which is itself regulated by any agency of the Federal Government; or

(2) is made in whole or in part, or insured, guaranteed, supplemented, or assisted in any way, by the Secretary or any other officer or agency of the Federal Government or under or in connection with a housing, urban development, or related program administered by the Secretary or a housing or related program administered by any other such officer or agency; or

(3) is eligible for purchase by the Federal National Mortgage Association, the Government National Mortgage Association, or the Federal Home Loan Mortgage Corporation, or from any financial institution from which it could be purchased by the Federal Home Loan Mortgage Corporation; or

(4) is made in whole or in part by any "creditor," as defined in section 103(f) of the Consumer Credit Protection Act of 1968 (15 U.S.C. 1602(f)), who makes or invests in residential real estate loans aggregating more than $1,000,000 per year.

(c) As used in subsection (a), the term "federally constructed housing" means (1) residential or multifamily housing which is constructed by agencies of the Federal Government to provide dwelling accommodations for particular types or classes of persons under programs administered by such Federal agencies (including all housing constructed by the Department of Defense to provide dwelling accommodations for personnel of the armed services or for such personnel and their families), and (2) residential or multifamily housing which is constructed by agencies of State or local government, with financial assistance in any form from the Federal Government, to provide dwelling accommodations for particular types or classes of persons under programs administered by such State or local agencies.

ENCOURAGEMENT AND PROTECTION OF SMALL BUSINESS

SEC. 14. In carrying out their functions under this Act, all Federal officers and agencies shall take steps to assure that small business concerns will have realistic and adequate opportunities to participate in the programs under this Act to the maximum extent possible.

PRIORITIES

SEC. 15. The Secretary shall set priorities as far as possible consistent with the intent and operation of this Act in accordance with the following criteria:

(a) The residential dwellings and other buildings which will be part of the demonstration programs referred to in sections 5, 6, and 9 shall be located in a sufficient number of different geographic areas in the United States to assure a realistic and effective demonstration of the solar heating systems and combined solar heating and cooling systems involved, and of the dwellings and other buildings themselves, in both rural and urban locations and under climatic conditions which vary as much as possible.

(b) Consideration shall be given to projected costs of commercial production and maintenance of the solar heating systems and combined solar heating and cooling systems utilized in the demonstration programs.

(c) Encouragement should be given in the conduct of programs under this Act to those projects in which funds, appropriated by any State or political subdivision thereof for the purpose of sharing costs with the Federal Government for the purchase and installation of solar heating or combined solar heating and cooling components and systems, are committed before or after the date of the enactment of this Act.

REGULATIONS

SEC. 16. The Administrator and the Secretary in consultation with the Director of the National Bureau of Standards, the Director, the Administrator of the General Services Administration, the Secretary of Defense, and other appropriate officers and agencies, shall prescribe such regulations as may be necessary or appropriate to carry out this Act promptly and efficiently. Each such officer or agency, in consultation with the Administrator and the Secretary, may prescribe such regulations as may be necessary or appropriate to carry out his or its particular functions under this Act promptly and efficiently.

USE OF PUBLICLY ASSISTED HOUSING

SEC. 17. The Secretary shall make appropriate use of publicly assisted housing and particularly low-rent housing assisted under the United States Housing Act of 1937 in demonstrating solar heating systems and combined solar heating and cooling systems under this Act.

TRANSFER OF FUNCTIONS

SEC. 18. Within sixty days after the effective date of the law creating the Energy Research and Development Administration or any other law creating a permanent Federal organization or agency having jurisdiction over the energy research and development functions of the United States (or within sixty days after the enactment of this Act if the effective date of such law occurs prior to the enactment of this Act), the energy research and development functions vested in the National Aeronautics and Space Administration and the National Science Foundation under this Act and any funds which may have been appropriated pursuant to section 19 of this Act, to the extent necessary or appropriate, may, in accordance with regulations prescribed by the Office of Management and Budget, be transferred to and vested in the Energy Research and Development Administration or such other organization or agency.

AUTHORIZATION OF APPROPRIATIONS

SEC. 19. (a) There is hereby authorized to be appropriated to the National Aeronautics and Space Administration for the fiscal year ending June 30, 1975, $5,000,000, to remain available until expended, to carry out the functions vested in the Administrator by this Act.

(b) There is hereby authorized to be appropriated to the Department of Housing and Urban Development for the fiscal year ending June 30, 1975, $5,000,000, to remain available until expended. Any

sums so appropriated shall be available (1) to carry out the functions vested in the Secretary of Housing and Urban Development by this Act, and (2) for transfer to the Department of Defense, the National Bureau of Standards, and the General Services Administration to enable them to carry out their respective functions under this Act.

(c) There is hereby authorized to be appropriated for the fiscal years ending June 30, 1976, 1977, 1978, and 1979, $50,000,000 in the aggregate to carry out the programs established by this Act.

Speaker of the House of Representatives.

Vice President of the United States and
President of the Senate.

August 22, 1974

Dear Mr. Director:

The following bill were received at the White House on August 22nd:

S. 1871	H.R. 14402
S. 3703	H.R. 14920
H.R. 6485	H.R. 15205
H.R. 11864	H.R. 15842

Please let the President have reports and recommendations as to the approval of these bills as soon as possible.

Sincerely,

Robert D. Linder
Chief Executive Clerk

The Honorable Roy L. Ash
Director
Office of Management and Budget
Washington, D. C.