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94-35 INDUSTRIAL ENERGY CONSERVATION ACT OF 1975

GOVERNMENT

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KANSAS STATE UNIVERSITY

HEARINGS

BEFORE THE

SPECIAL SUBCOMMITTEE ON SCIENCE,
TECHNOLOGY, AND COMMERCE

OF THE

COMMITTEE ON COMMERCE

UNITED STATES SENATE

NINETY-FOURTH CONGRESS

FIRST SESSION

ON

S. 594, Title X

TO INCREASE DOMESTIC ENERGY SUPPLIES AND AVAILABILITY; TO RESTRAIN ENERGY DEMAND; AND TO PREPARE FOR ENERGY EMERGENCIES, AND FOR OTHER PURPOSES.

S. 1392

TO ESTABLISH A DEMONSTRATION PROGRAM IN ENERGY CONSERVATION, USING PROMISING INNOVATIVE TECHNOLOGY TO THE MAXIMUM EXTENT POSSIBLE, THROUGH RETROFITTING EXISTING BUILDINGS WITH ENERGY CONSERVATION EQUIPMENT AND SYSTEMS, AND FOR OTHER PURPOSES.

S. 1908

TO REGULATE COMMERCE BY DIRECTING THE SECRETARY OF COMMERCE TO ESTABLISH AND MAINTAIN AN INDUSTRIAL ENERGY CONSERVATION PROGRAM, AND FOR OTHER PURPOSES

JUNE 17 AND 19, 1975

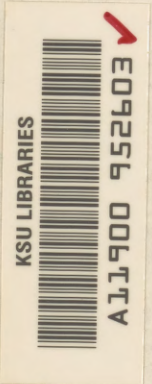
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INDUSTRIAL ENERGY CONSERVATION ACT OF 1975

TUESDAY, JUNE 17, 1975

U.S. SENATE,
COMMITTEE ON COMMERCE,
SPECIAL SUBCOMMITTEE ON SCIENCE,
TECHNOLOGY, AND COMMERCE,
Washington, D.C.

The subcommittee met at 9:40 a.m. in room 5110, Dirksen Senate Office Building, Hon. John V. Tunney (chairman of the subcommittee) presiding.

OPENING STATEMENT BY SENATOR TUNNEY

Senator TUNNEY. The subcommittee will come to order.

This morning we're going to hold hearings on an aspect of the energy crisis.

Our Nation has been experiencing an ever-deepening dependence on foreign oil; and just last week, the Federal Energy Administration (FEA) released figures that revealed that in the first quarter of 1975, 22 percent of our oil imports came from the Arab States—up from 17 percent last year. Also, it has been estimated that our foreign imports of oil from the Arab Bloc might rise to as high as 30 percent by the end of the year, and that our oil imports could double in the next 10 years.

Clearly, we are becoming increasingly vulnerable to another oil embargo. In an attempt to lessen our dependence on foreign fuels and protect our stock of energy resources, the Senate Commerce Committee has given top legislative priority to energy conservation programs.

I'd like to ask that my statement be included in the record as if read simply because we are running short of time this morning. We have an Executive committee session that was scheduled to be held at 11 a.m. this morning.

In order to carry out this energy conservation program, the committee recently reported legislation to require mandatory fuel economy improvements in automobiles. These standards would mandate fuel economy improvements of 50 percent above 1974 levels by 1980 and 100 percent by 1985.

It also provided an intensive research and development program to assist the automobile industry in reaching these goals. The committee also reported legislation to require operating cost labeling of new homes, major appliances, and automobiles in order to provide the consumer sufficient information to make wise energy conserving decisions.

Staff member assigned to these hearings: Dan Jaffe.

Today, the Subcommittee on Science, Technology, and Commerce continues this intensive investigation of energy conservation opportunities by focusing on three important pieces of legislation.

The first is S. 1908, the Industrial Energy Conservation Act of 1975. This legislation, which I have introduced with the cosponsorship of Chairman Magnuson and Senators Hollings, Stevenson, and Moss, is an outgrowth of extensive hearings held by the Commerce Committee last year. These hearings demonstrated that there were enormous opportunities for energy conservation in the industrial sector. Industry utilizes up to 40 percent of the United States' annual energy output—more than any other sector of our economy. Yet, the record of industry in maximizing energy conservation techniques has been far from uniform. In a number of cases significant energy conservation improvements have been carried out, yet administration sources have estimated that in the aggregate, 1974 industrial energy use was only 1 percent lower than 1973 levels.

In order to create greater incentives for industry to utilize and develop energy-saving procedures, the Industrial Energy Conservation Act comprises a five-part strategy. First, the legislation sets energy conservation goals of 15 percent overall improvement by 1980 and 30 percent by 1985 in comparison to 1974 levels. Second, the legislation requires a survey to be conducted regarding the maximum potential for energy conservation in various industries. Third, energy conservation targets will be developed by industry in conjunction with the Commerce Department. Reports will then be required as to the activities of industry in meeting these targets. Fourth, in those areas where high conversion costs may create a serious disincentive for significant energy conservation programs, grants and loans may be provided to aid industrial conservation programs. Fifth, this legislation will rapidly expand Federal research and development programs to assure that the United States takes a leadership role in the development and demonstration of energy conservation techniques for industry.

The potential for energy savings in this sector are enormous. It has been estimated, for example, that utilizing proven technologies, as much as one-third of all fuel presently expended by industry could be saved.

The other two pieces of legislation to be examined by the Subcommittee today relate to energy conservation in buildings and housing. S. 1392, the Energy Conservation in Buildings Demonstration Act, which I introduced, sets up a program to demonstrate techniques for renovating buildings to maximize their energy efficiency.

The Federal Government is the world's largest landlord, having jurisdiction over hundreds of thousands of buildings throughout the country. Many of these buildings were built at a time when little attention was paid to energy consumption characteristics of buildings.

This program will not only lead to major energy savings, but will help to show that the Federal Government is taking energy conservation seriously. The Federal Government should not expect the rest of society to treat energy conservation as an urgent matter if the Federal Government fails to do so.

This legislation also will set up a similar program to carry out projects to renovate State and local government buildings in order

to demonstrate energy conservation methods throughout the country. This program could be a major boost to our sagging construction industries if we made an effort, throughout the country, to renovate hospitals, schools, police and fire stations, and other State and municipal buildings for energy conservation purposes. Furthermore, the potential energy savings that are readily obtainable could make this program pay for itself.

Finally, we will be examining section 10 of S. 594. This legislation, the Building Energy Conservation Standards Act of 1975, would require establishing performance standards for commercial and residential buildings. The Project Independence report estimated that as much as 32 percent of the energy consumed in commercial buildings could be saved through alteration in construction techniques.

[The bills and agency comments follow:]

IN THE SENATE OF THE UNITED STATES

FEBRUARY 5, 1975

Mr. HUGH SCOTT introduced the following bill; which was read twice and, by unanimous consent, referred to the Committees on Armed Services, Banking, Housing and Urban Affairs, Commerce, Finance, Government Operations, Interior and Insular Affairs, the Judiciary, Labor and Public Welfare, and Public Works

A BILL

To increase domestic energy supplies and availability; to restrain energy demand; and to prepare for energy emergencies, and for other purposes.

9 PART B—DEMAND RESTRAINT**10 TITLE X****11 SHORT TITLE**

12 SEC. 1001. This title may be cited as the "Building
13 Energy Conservation Standards Act of 1975".

14 FINDINGS AND PURPOSE

15 SEC. 1002. (a) The Congress finds that—

16 (1) large amounts of fuels and energy are con-
17 sumed unnecessarily each year in heating, cooling, ven-
18 tilating, and providing domestic hot water for newly
19 constructed residential and commercial buildings because
20 such buildings lack adequate energy conservation
21 features;

22 (2) Federal policies and practices contribute to
23 this condition, which the Nation can no longer afford in
24 view of its current and anticipated energy shortage, by
25 providing, without regard to energy considerations, Fed-

1 eral construction aids directly such as through loans or
2 grants and indirectly through financing from federally
3 approved, regulated, or insured financial institutions;

4 (3) failure to provide adequate energy conservation
5 measures in newly constructed buildings increases long-
6 term operating costs that may affect adversely the
7 repayment of and security for loans made, insured or
8 guaranteed by Federal agencies or made by federally
9 insured or regulated instrumentalities; and

10 (4) State and local building codes or similar con-
11 trols can provide an existing means by which to assure,
12 in coordination with other building requirements and
13 with a minimum of Federal interference in State and
14 local transactions, that newly constructed buildings con-
15 tain adequate energy conservation features.

16 (b) The purposes of this title, therefore, are to—

17 (1) redirect Federal policies and practices so that
18 Federal financial assistance for construction purposes is
19 provided only under conditions which assure that reason-
20 able energy conservation features will be incorporated
21 into new buildings receiving such assistance;

22 (2) provide for the development and implementa-
23 tion as soon as feasible of prescriptive and performance
24 standards for new residential and commercial buildings
25 which are designed to achieve the maximum practicable

1 economies in fuels and energy consumption within rea-
2 sonable cost levels; and

3 (3) encourage States and local governments to
4 adopt and enforce such standards through their existing
5 building code and other construction control mechanisms.

6 DEFINITIONS

7 SEC. 1003. As used in this title, the term—

8 (1) “Secretary” means the Secretary of Housing
9 and Urban Development;

10 (2) “Administrator” means the Administrator of
11 the Federal Energy Administration;

12 (3) “building” means any structure to be con-
13 structed which includes provision for a heating or cooling
14 system, or both, or a hot water system;

15 (4) “residential building” means any building de-
16 veloped for residential occupancy, substantially on a
17 year-round basis, for one or more persons or families;

18 (5) “commercial building” means any building de-
19 veloped for use other than residential occupancy, includ-
20 ing buildings developed for industrial or public use;

21 (6) “Federal building” means any building to be
22 constructed by or for the use of any Federal agency
23 which is not legally subject to State or local codes or
24 similar requirements;

25 (7) “unit of general local government” means a

1 city, county, town, municipality, or other political sub-
2 division of a State or any combination thereof, which
3 has a building code or similar jurisdiction over a particu-
4 lar area;

5 (8) "Federal agency" means any department,
6 agency, corporation, or other entity or instrumentality
7 of the executive branch of the Federal Government, and
8 includes the United States Postal Service, the Federal
9 National Mortgage Association, and the Federal Home
10 Loan Mortgage Corporation;

11 (9) "financial assistance" means any form of loan,
12 grant, guaranty, insurance, payment, rebate, subsidy, or
13 any other form of direct or indirect Federal assistance,
14 other than general or special revenue sharing or formula
15 grants made to States;

16 (10) "Federal instrumentality responsible for the
17 supervision, approval, regulation, or insuring of banks,
18 savings and loan associations, or similar institutions"
19 means the Board of Governors of the Federal Reserve
20 System, the Federal Deposit Insurance Corporation, the
21 Comptroller of the Currency, the Federal Home Loan
22 Bank Board, the Federal Savings and Loan Insurance
23 Corporation, and the National Credit Union Adminis-
24 tration;

25 (11) "State" includes each of the several States, the

1 District of Columbia, the Commonwealth of Puerto Rico,
2 and the United States territories and possessions;

3 (12) "prescriptive standard" means a minimum
4 standard describing the means, such as structural com-
5 ponents, systems and subsystems, to be employed to
6 meet prescribed thermal or energy consumption require-
7 ments for a building and/or component thereof;

8 (13) "performance standard" means a minimum
9 energy conservation standard for various classifications
10 of buildings which may be satisfied through any method
11 or system which consumes or involves use or loss of less
12 than specified amounts of energy in connection with
13 heating, cooling, ventilating, lighting, or providing do-
14 mestic hot water for a building, and which includes or
15 is accompanied by one or more illustrative prescriptive
16 solutions which meet the performance requirements
17 specified; and

18 (14) "building code" means a legal instrument
19 which is in effect in a State or unit of general local gov-
20 ernment, the provisions of which must be adhered to
21 if a building is to be considered to be in conformance
22 with law and suitable for occupancy and use.

23 PROMULGATION OF MINIMUM ENERGY CONSERVATION

24 STANDARDS

25 SEC. 1004. (a) (1) Within six months after the enact-
26 ment of this title, the Secretary, only after consultation with

1 the Administrator and the Secretary of Commerce utilizing
2 the services of the Director of the National Bureau of Stand-
3 ards shall develop and publish in the Federal Register for
4 public comment proposed prescriptive energy conservation
5 standards for new residential buildings. Final prescriptive
6 standards shall be developed and promulgated within six
7 months after publication of the proposed standards, shall be-
8 come effective one year after such promulgation, and shall
9 remain effective until superseded by the standards described
10 in subsection (a) (3) of this section.

11 (2) As soon as practicable, but in no event later than
12 eighteen months after enactment of this title, the Secretary,
13 only after consultation with the Administrator, the Secretary
14 of Commerce utilizing the services of the Director of the Na-
15 tional Bureau of Standards, and the Administrator of the
16 General Services Administration, shall develop and publish
17 in the Federal Register for public comment proposed per-
18 formance energy conservation standards for new commercial
19 buildings. Performance standards shall be developed and
20 promulgated within six months after publication of the pro-
21 posed standards, and shall become effective within a reason-
22 able time, not to exceed one year after promulgation, as
23 specified by the Secretary.

24 (3) As soon as practicable, but in no event later than
25 three years after enactment of this title, the Secretary, only

1 after consultation with the Administrator and the Secretary
2 of Commerce utilizing the services of the Director of the
3 National Bureau of Standards, shall develop and publish in
4 the Federal Register for public comment proposed per-
5 formance energy conservation standards for new residential
6 buildings. Performance standards for such buildings shall
7 be promulgated within six months after publication of the
8 proposed standards, and shall become effective within a
9 reasonable time, not to exceed one year after promulgation,
10 as specified by the Secretary.

11 (b) All standards promulgated pursuant to this sec-
12 tion shall take account of, and make such allowance as the
13 Secretary determines appropriate for, climatic variations
14 among the different regions of the country.

15 (c) The Secretary, in consultation with the Administra-
16 tor, the Secretary of Commerce, the Administrator of the
17 General Services Administration, and other Federal officials,
18 as appropriate, shall periodically review and provide for the
19 updating of standards promulgated pursuant to this section.

20 (d) The Secretary, if he finds that the dates otherwise
21 specified in this section for publication of proposed or pro-
22 mulgation of final performance standards under subsection
23 (a) (2) or (a) (3) cannot practically be met, may extend
24 the time for such publication or promulgation, but no such
25 extension shall result in a delay of more than six months

1 in promulgation. The Secretary may also extend for not to
2 exceed six months the date for promulgation of prescriptive
3 standards under subsection (a) (1) if he finds that such
4 extension is necessary in order to allow an adequate oppor-
5 tunity for analysis and action on public comments.

6 INCORPORATION OF STANDARDS IN STATE AND LOCAL CODES

7 SEC. 1005. (a) No Federal officer or agency shall ap-
8 prove any financial assistance for the construction of any
9 building in any area of a State unless the State has certified
10 that the unit of general local government having jurisdiction
11 over such area has adopted and is implementing a building
12 code or similar requirement which provides for the enforce-
13 ment of any effective energy conservation standard or stand-
14 ards promulgated pursuant to section 1004 of this title, or
15 unless the State certifies that a State code or requirement
16 providing for the enforcement of such standard or standards
17 has been adopted and is being implemented on a statewide
18 basis or within the area in which such building is to be
19 located.

20 (b) In any case where, on the effective date of the
21 prescriptive standards referred to in section 1004 (a) (1), a
22 State has not yet developed and implemented a procedure
23 for certifying local codes or similar requirements, or adopted
24 and proceeded to implement a State code or requirement for
25 carrying out the provisions of subsection (a) of this section,

1 but where the Secretary finds that the State is actively
2 developing such procedure or code, the Secretary may receive
3 and approve a code or other requirement proposed by a unit
4 of general local government as complying with the provisions
5 of subsection (a) of this section, but no such approval shall
6 extend for more than one year.

7 (c) Each Federal instrumentality responsible for the
8 supervision, regulation, or insuring of banks, savings and
9 loan associations or similar institutions shall adopt regulations
10 prohibiting such institutions from—

11 (1) making loans for the construction or financing
12 of buildings, or

13 (2) purchasing loans made after the effective date
14 of any energy conservation standard for the construc-
15 tion or financing of buildings, unless such buildings
16 are to be located in areas where Federal assistance for
17 construction is permitted under subsection (a) of this
18 section.

19 (d) The Secretary shall, by regulation, provide for the
20 periodic updating of State certifications under this section,
21 and shall make such reviews and investigations as he deems
22 necessary to determine the accuracy of such certifications.
23 The Secretary may reject, disapprove or require the with-
24 drawal of any certification but he shall not take such action
25 without affording the State a reasonable opportunity for
26 hearing.

1 FEDERAL BUILDINGS

2 SEC. 1006. The head of each Federal agency responsible
3 for the construction of Federal buildings shall adopt such
4 procedures as may be necessary to assure that such con-
5 struction meets or exceeds the applicable energy conserva-
6 tion standards promulgated pursuant to this title.

7 GRANTS TO STATES

8 SEC. 1007. (a) The Secretary is authorized to make
9 grants to States to assist them in meeting the costs of devel-
10 oping State building codes or State certification procedures
11 to carry out the provisions of section 1005 of this title.

12 (b) There is hereby authorized to be appropriated for
13 the purpose of grants under this section not to exceed a
14 total of \$5,000,000 for fiscal year 1976.

15 TECHNICAL ASSISTANCE

16 SEC. 1008. The Secretary, directly, by contract or other-
17 wise, may provide technical assistance to States and units of
18 general local government to assist them in meeting the re-
19 quirements of this title.

20 CONSULTATION WITH INTERESTED AND AFFECTED GROUPS

21 SEC. 1009. In promulgating standards and carrying out
22 his other functions under this title, the Secretary shall con-
23 sult with appropriate representatives of the building com-
24 munity, including labor, the construction industry, engineers,
25 and architects, and with appropriate public officials and

1 organizations of public officials, and representatives of con-
2 sumer groups. For purposes of such consultation, the Secre-
3 tary shall, to the extent feasible, make use of the National
4 Institute of Building Sciences as established by section 809
5 of the Housing and Community Development Act of 1974.
6 The Secretary may also establish one or more advisory com-
7 mittees as may be appropriate. Any advisory committee or
8 committees established pursuant to this section shall be
9 subject to the provisions of the Federal Advisory Committee
10 Act.

11 RESEARCH

12 SEC. 1010. The Secretary, in cooperation with the
13 Administrator, the Administrator of the Energy Research
14 and Development Administration, and the Director of the
15 National Bureau of Standards shall carry out such research
16 and demonstration activities as he determines may be neces-
17 sary to assist in the development of standards under this
18 title and to facilitate the implementation of such standards
19 by State and local governments. Such activities shall be
20 designed to assure that standards are adequately analyzed
21 in terms of energy use, institutional resources, habitability,
22 economic cost and benefit, and impact upon affected groups.

94TH CONGRESS
1ST SESSION

S. 1392

IN THE SENATE OF THE UNITED STATES

APRIL 9, 1975

Mr. TUNNEY introduced the following bill; which was read twice and referred to the Committees on Commerce, Public Works, and Government Operations jointly by unanimous consent

A BILL

To establish a demonstration program in energy conservation, using promising innovative technology to the maximum extent possible, through retrofitting existing buildings with energy conservation equipment and systems, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That this Act may be cited as the "Energy Conservation in
4 Buildings Demonstration Act of 1975".

5 FINDINGS AND PURPOSE

6 SEC. 2. (a) The Congress finds and declares that—
7 (1) large amounts of fuel and energy are consumed
8 unnecessarily each year in heating, cooling, ventilating,

II

1 providing hot water, lighting, and for other major energy
2 uses in residential and commercial buildings because such
3 buildings lack adequate energy-conservation features;

4 (2) substantial savings in fuel and energy could be
5 accomplished by retrofitting such buildings with ade-
6 quate energy-conservation features that would more than
7 pay for themselves in reduced energy costs on a life-cycle
8 basis; and

9 (3) the national interest will be best served by en-
10 couraging innovative technology and approaches so that
11 a wide diversity of geographic and technological circum-
12 stances may be treated with a maximum of cost effec-
13 tiveness.

14 (b) It is the intent of Congress to institute a demon-
15 stration program for retrofitting selected existing Federal,
16 State, and municipal buildings for energy conservation, using
17 promising innovative technology to the maximum extent
18 possible, and to disseminate the results of that experience
19 in order to promote this type of conservation nationwide.

20 DEFINITIONS

21 SEC. 3. DEFINITIONS.—As used in this Act—

22 (a) "Administrator" means the Administrator of the
23 Federal Energy Administration.

24 (b) "Director" means the Director of the National
25 Bureau of Standards.

1 (c) "Panel" means the Awards Panel as defined in sec-
2 tion 4.

3 (d) "Governor" means a Governor of one of the fifty
4 States.

5 (e) "Municipality" means a town, city, or other district
6 in the United States which is not a State, which has powers
7 of local self-government, and which owns at least ten
8 buildings.

9 (f) "Executive" means mayor of a city or town, execu-
10 tive officer of a county or other municipality who has author-
11 ity to contract for retrofitting of buildings which belong to
12 that municipality.

13 DUTIES OF ADMINISTRATOR

14 SEC. 4. (a) Within ninety days after the enactment of
15 this Act, the Administrator, in consultation with the Director
16 of the National Bureau of Standards shall establish procedures
17 for identifying existing buildings as candidates for retrofitting
18 with energy conservation equipment and systems for the pur-
19 pose of decreasing the cost of supplying such buildings with
20 energy for climate-conditioning, water-heating, lighting, and
21 other major uses of energy. In developing such procedures
22 the Administrator and the Director shall consult with other
23 Federal agencies and appropriate professional architectural
24 and engineering societies as required to insure a broad per-
25 spective and maximum utilization of professional expertise.

1 (b) The Administrator shall establish and convene on a
2 timely basis, as required, an Awards Panel for the purpose
3 of awarding grants to States and municipalities under section
4 6 of this Act. The Panel shall consist of the Administrator or
5 his designate, the Director or his designate, and one other
6 person to be chosen by the Administrator. The Administrator
7 shall designate one member of the Panel as Chairman.

8 (c) The Administrator shall publish in the Federal
9 Register procedures established under (a) of this section,
10 along with the provisions of this Act and necessary proce-
11 dures for applicants, and shall also transmit a copy of same
12 to the Administrator of the General Services Administration.

13 FEDERAL PROGRAM

14 SEC. 5. (a) On the basis of procedures established in
15 section 4 the Administrator of the General Services Adminis-
16 tration shall, within six months after the date of enactment of
17 this Act, select no fewer than forty federally owned buildings
18 as candidates for retrofitting with energy conservation equip-
19 ment and systems. The buildings shall be selected so as to
20 offer a wide range of geographic and technological circum-
21 stances and opportunities for implementation of energy con-
22 servation measures which can be justified on a life-cycle cost
23 basis.

24 (b) The Administrator of the General Services Ad-
25 ministration shall, within six months after the date of enact-

1 ment of this Act, solicit proposals for retrofitting each build-
2 ing identified in subsection (a) of this section with energy
3 conservation equipment and systems. On the basis of the
4 proposals received in response to his solicitations, the Ad-
5 ministrator of the General Services Administration, in con-
6 sultation with the Administrator and the Director, is author-
7 ized to award contracts for the design and installation of
8 energy conservation equipment and systems in any or all of
9 the federally owned buildings identified in subsection (a) of
10 this section. In addition to the cost and estimated effectiveness
11 of the proposal in achieving energy conservation, the poten-
12 tial for a novel and innovative approach to be of particular
13 value in wide application shall be a factor in awarding
14 contracts.

15 (c) Grants for Federal buildings shall be for the full
16 cost of the contract, within the limit of funds available, but
17 not to exceed \$1,000,000 for any one building.

18 STATE AND MUNICIPAL PROGRAM

19 SEC. 6. (a) Governors of the fifty States and executives
20 of municipalities may submit requests for grants for retrofit-
21 ting of buildings owned by their respective States or munici-
22 palities. Requests for grants shall be submitted to the Panel,
23 through the Administrator, and shall include, in accordance
24 with procedures published by the Administrator in the Fed-
25 eral Register, a description of their State or municipal awards

1 panel, the criteria and procedures by which it will select pro-
2 posals for awards, and an identification of the State or municipi-
3 pal buildings for which grants are to be sought.

4 (b) The Panel is authorized to allocate grants to States
5 and municipalities from funds appropriated for those pur-
6 poses, in accordance with criteria established by the Panel
7 for State and municipal programs.

8 (c) Grants to States and municipalities shall be on a
9 3-to-1 Federal to State or municipality matching basis and
10 may not be used for any other purpose. Grants may not ex-
11 ceed \$10,000,000 Federal share for any one State nor
12 \$6,000,000 Federal share for any one municipality out of
13 one year's appropriation under this Act.

14 ADMINISTRATIVE PROVISIONS

15 SEC. 7. (a) The Administrator of the General Services
16 Administration, Governor or executive responsible for the
17 administration of a grant under this Act shall file with the
18 Administrator in such form as he may prescribe, reports or
19 answers in writing to such specific questions, surveys, or
20 questionnaires as may be necessary to enable the Adminis-
21 trator to carry out his function under this Act and to evalu-
22 ate the effectiveness of the program in promoting energy
23 conservation.

24 (b) The Administrator of the General Services Admin-

1 istration and the Governors and executives administering
2 grants under this Act shall keep such records as the Admin-
3 istrator may prescribe in order to assure an effective audit
4 of the disposition of the funds provided under this Act.

5 (c) The Administrator and the Comptroller General of
6 the United States, or any of their duly authorized repre-
7 sentatives, shall have access, for the purpose of audit and
8 examination to any books, documents, papers, and records
9 of any State or municipality which receives a grant under
10 this Act that are pertinent to the grant received.

11 REPORT TO CONGRESS AND DISSEMINATION OF
12 INFORMATION

13 SEC. 8. (a) The Administrator shall, not later than one
14 year after the enactment of this Act, submit a report to the
15 President and to the Congress presenting the results of this
16 program. A second report shall be submitted not later than
17 two years after enactment of this Act.

18 (b) The Administrator shall disseminate to the public,
19 in such form and in such manner as he deems most effective,
20 results of this program which promise to further promote
21 conservation of energy on a wide scale. Each grantee shall
22 be required, as a condition of the grant, to make available to
23 any interested person the complete breakdown of cost infor-
24 mation incurred in his project.

1 AUTHORIZATION OF APPROPRIATIONS

2 SEC. 9. There are authorized to be appropriated such
3 sums as may be necessary to carry out the provisions of this
4 Act, not to exceed \$30,000,000 for the Federal program,
5 \$60,000,000 for the State program, and \$60,000,000 for the
6 municipal program for each of the fiscal years ending
7 June 30, 1976 and June 30, 1977, to remain available until
8 expended.

94TH CONGRESS
1ST SESSION

S. 1908

IN THE SENATE OF THE UNITED STATES

JUNE 10 (legislative day, JUNE 6), 1975

Mr. TUNNEY (for himself, Mr. HOLLINGS, Mr. MAGNUSON, Mr. MOSS, and Mr. STEVENSON) introduced the following bill; which was read twice and referred to the Committee on Commerce

A BILL

To regulate commerce by directing the Secretary of Commerce to establish and maintain an industrial energy conservation program, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That this Act may be cited as the "Industrial Energy Con-
4 servation Act of 1975".

5 DECLARATION OF POLICY

6 SEC. 2. (a) FINDINGS.—The Congress finds and de-
7 clares that—

8 (1) The energy producing facilities and resources
9 available to American industry are and will remain
10 essentially limited.

1 (2) Intensive exploration for, and development of,
2 new and alternative energy-producing facilities and re-
3 sources are essential, but they will not meet the Nation's
4 demand for energy if that demand continues to increase
5 at the same rate as it has.

6 (3) As a consequence, the conservation of energy
7 is absolutely necessary.

8 (4) Industry consumes more energy than any
9 other sector of American society. Industry accounts for
10 an estimated 40 percent of present energy use.

11 (5) Substantial energy savings can be achieved by
12 industry by implementing more efficient operating prac-
13 tices with respect to existing and currently used equip-
14 ment and technologies, and by adopting known new
15 energy efficient technologies. Fuel consumption by major
16 sectors of industry could thus be reduced by as much as
17 one-third.

18 (6) Other important energy conserving industrial
19 technologies could be readily made available with further
20 research and development, and, these new technologies
21 could result in even greater energy savings by industry.

22 (7) Rapid development and cost-effectiveness dem-
23 onstrations, and widespread application by industry, of
24 energy efficient technologies can be facilitated by Fed-
25 eral financial assistance in the form of research, develop-

1 ment, and demonstration projects and through incentives
2 to companies that invest in such technologies.

3 (b) PURPOSES.—It is the purpose of the Congress in
4 this Act to provide for such reports, targets, monitoring, re-
5 search and development, and financial assistance as may be
6 necessary—

7 (1) to increase the energy efficiency of industrial
8 activities in the United States by at least 15 percent
9 by January 1, 1980, and by 30 percent by January 1,
10 1985, by comparison with the energy efficiency of com-
11 parable activities during 1974;

12 (2) to reduce the amount of energy utilized in the
13 United States by the maximum amount technologically
14 and economically feasible within each major industry
15 in the manufacturing sector, consistent with economic
16 recovery; and

17 (3) to foster and promote, through Federal finan-
18 cial assistance, innovation and experimentation in the
19 development of energy-efficient industrial technologies,
20 and joint and cooperative efforts between government
21 technicians, engineers, and researchers and their counter-
22 parts in private industries and institutions, for the pur-
23 pose of (A) determining and analyzing industrial energy
24 usage patterns; (B) promoting research into, and gen-
25 eral adoption of, viable energy-conserving industrial

1 technologies; and (C) exploring new ways for reducing
2 industrial consumption of scarce energy resources with-
3 out diminishing output or productivity and without
4 further impairing currently depressed sectors of the
5 economy;

6 DEFINITIONS

7 SEC. 3. As used in this title, the term—

8 (1) "Administrator" means the Administrator of
9 the Energy Research and Development Administration;

10 (2) "chief executive officer" means the person with
11 top operational responsibility within a major company;

12 (3) "depressed industrial area" means an area, as
13 designated by the Secretary of Labor, with a population
14 of not less than 5,000 persons, in which—

15 (A) the rate of employment, as determined by
16 such Secretary of Labor,

17 (i) is greater than 6.5 percent; or

18 (ii) has been at least 50 percent above the
19 national average for 2 of the preceding 3 calen-
20 dar years; or 60 percent above the national
21 average for 3 of the preceding 4 calendar years;
22 and

23 (B) there exist industrial sources of employ-
24 ment which have reduced the number of persons
25 employed due to adverse economic or commercial

1 circumstances, and which sources may be expected
2 to increase labor employment upon receipt of such
3 assistance as may be available under this Act.

4 The Secretary shall compile a list of such areas and shall
5 periodically add to such list, but no area, once listed, shall
6 be removed therefrom unless and until the rate of unemploy-
7 ment in such area has fallen below 5 percent.

8 (4) "energy efficiency" means the amount of in-
9 dustrial output, as defined by the Secretary, divided by
10 the amount of energy or fuel required to produce such
11 output;

12 (5) "industry" means that classification of an eco-
13 nomic unit set forth in the Standard Industrial Classi-
14 fication (SIC) Manual by an SIC industry code number
15 on the basis of its primary activity which the Secretary
16 determines is the classification best suited to carry out
17 the purposes of this Act;

18 (6) "major company" means a company which
19 spends at least \$500,000 a year for fuel and electricity;

20 (7) "paragraph" means a paragraph of the sub-
21 section in which the term is used;

22 (8) "Secretary" means the Secretary of Com-
23 merce or his delegate; and

24 (9) "subsection" means a subsection of the section
25 in which the term is used.

1 INDUSTRIAL ENERGY EFFICIENCY PROGRAM

2 SEC. 4. (a) IDENTIFICATION OF INDUSTRIES.—The
3 Secretary shall, within 30 days after the date of enactment
4 of this Act, identify those industries for which energy effi-
5 ciency surveys shall be conducted in accordance with subsec-
6 tion (b). The Secretary shall also establish a priority rank-
7 ing of such industries for the purpose of determining the order
8 in which such surveys shall be conducted.

9 (b) ENERGY EFFICIENCY SURVEYS.—The Secretary
10 shall conduct energy efficiency surveys in accordance with
11 this subsection, for the purpose of compiling information
12 with respect to—

13 (1) the major energy consuming industrial proc-
14 esses utilized within each industry identified by the Sec-
15 retary under subsection (a). Relevant data, informa-
16 tion, and comments thereon shall be requested from each
17 such industry and from each major company within each
18 such industry;

19 (2) the levels of energy efficiency currently
20 achieved with respect to each such process within each
21 such industry and company;

22 (3) the maximum levels of energy efficiency which
23 it would be technically and economically feasible for
24 each such industry and company to achieve with each

1 such process, or with an alternative and equivalent such
2 process, by January 1, 1980; and

3 (4) the prerequisites to achieving such improve-
4 ments in energy efficiency by such date, including the
5 technologies that would be used, any capital require-
6 ments or conversion expenses necessary to begin using
7 such technologies, and any obstacles to be overcome and
8 problems to be solved before such technologies could be
9 used and such improvements in energy efficiency
10 achieved.

11 Such surveys shall be conducted (A) within 90 days after
12 the date of enactment of this Act, for at least six of the in-
13 dustries identified by the Secretary under subsection (a);
14 and (B) within one year after the date of enactment of this
15 Act, for all industries so identified. Other Federal agencies,
16 industrial firms, and trade associations shall cooperate with
17 the Secretary by providing needed information. The Secre-
18 tary shall seek the cooperation and assistance of, and request
19 comments from, appropriate professional and technical socie-
20 ties, members of the academic community, and other inter-
21 ested persons. Each such survey shall be continuously re-
22 viewed, evaluated, and updated upon the basis of new re-
23 search, data, and other information.

24 (c) INDUSTRIAL ENERGY EFFICIENCY TARGETS.—

1 Within 60 days after the energy efficiency survey for an in-
2 dustry is completed, and upon the basis of the information
3 developed, collected, and compiled under subsection (b),
4 and comments thereon, the Secretary shall set and publish
5 an Industrial Energy Efficiency Target for such industry,
6 and, where appropriate, for some or all of the major energy
7 consuming industrial processes utilized within such industry.
8 Each such target shall represent the maximum energy ef-
9 ficiency which is technologically and economically achiev-
10 able by the applicable industry or process by January 1,
11 1980, and by January 1, 1985. In setting any such target,
12 the Secretary shall give due regard, to cost and benefit as-
13 sessments as to alternative approaches, designs, methods, ap-
14 plications, and consequences. The Secretary may, for cause
15 shown, modify any such target from time to time.

16 (d) ENERGY CONSERVATION REPORT.—The chief ex-
17 ecutive officer of each major company shall, on January 1,
18 1976, and annually thereafter, report to the Secretary on
19 the progress made and expected to be made, by the company
20 of which he or she is the highest officer, toward meeting the
21 purposes of this Act and such company's proportionate
22 share of any applicable Industrial Energy Efficiency Target.
23 Each such report shall be made on a simplified form to be
24 provided by the Secretary. Each such officer shall personally
25 attest, as part of each such report, that the company involved

1 has instituted, and is conducting, specified energy savings
2 programs that are designed and expected, at a minimum,
3 to achieve such purposes and proportionate share.

4 (e) ANNUAL REPORT.—The Secretary shall prepare
5 and submit to the Congress and the President an annual
6 report on industrial energy efficiency developments and pro-
7 jections. Such report shall be submitted by June 1 of each
8 year, starting in 1976, and shall include, but not be
9 limited to—

10 (1) a summary of the progress made since any
11 previous such report toward achievement of the national
12 goal set forth in section 2 (b) (2) of this Act;

13 (2) a summary of the progress made since any
14 previous such report, toward meeting each applicable
15 Industrial Energy Efficiency Target established in ac-
16 cordance with subsection (c) ; and

17 (3) recommendations for any additional legislation
18 or other action.

19 (f) ASSISTANCE.—The Secretary shall establish and
20 maintain a clearinghouse for information, technologies, tech-
21 niques, data, and ideas for improving industrial energy ef-
22 ficiency. The Secretary shall provide such assistance as may
23 be necessary to State and local government entities, trade
24 associations, and companies requesting assistance in improv-

1 ing industrial energy efficiency and in meeting any Indus-
2 trial Energy Efficiency Target. The Secretary shall co-
3 ordinate the activities of the Department of Commerce with
4 the relevant energy conservation and developmental activi-
5 ties of the Federal Energy Administration. The Energy Re-
6 search and Development Administration, and other Federal
7 State, and local government agencies, and of private industry,
8 in order to avoid duplication of effort and misuse of resources.

9 (g) ENFORCEMENT.—The chief executive officer of each
10 major company who fails to complete and submit to the
11 Secretary an annual progress report in accordance with sub-
12 section (d) shall be subject to a \$10,000 civil penalty upon
13 a determination by the Secretary of such failure. Such a civil
14 penalty may not be paid by the company of which such
15 violator is the chief executive officer.

16 PUBLIC DISCLOSURE OF INFORMATION

17 SEC. 5. The Secretary shall disclose to the public the
18 information obtained under this Act except that any informa-
19 tion which contains or relates to a trade secret or other matter
20 referred to in section 1905 of title 18, United States Code,
21 which, if disclosed, would result in significant competitive
22 damage, shall not be disclosed to the public (other than to
23 officers or employees concerned with carrying out this title).
24 Nothing in this subsection shall authorize any information to
25 be withheld by the Secretary, or any person subject to the

1 Secretary's direction or control, from any duly authorized
2 committee of the Congress.

3 RESEARCH AND DEVELOPMENT

4 SEC. 6. (a) GENERAL.—The Administrator shall es-
5 tablish and maintain a comprehensive program for research,
6 development into, and demonstration of, energy conserving
7 industrial technologies. This program shall include—

8 (1) basic and applied research into such technolo-
9 gies to be conducted by, or sponsored by the Adminis-
10 trator;

11 (2) the construction, fabrication, or other develop-
12 ment by the Administrator, or by private persons or
13 organizations under contract with the Administrator,
14 of prototypes or demonstration models of such technolo-
15 gies and associated facilities;

16 (3) the making of grants to private organizations
17 and businesses to facilitate the incorporation of such
18 energy conserving technologies into ongoing commer-
19 cially conducted industrial enterprises and processes,
20 on the express condition that—

21 (A) grant recipients allow such incorporation
22 to serve as a model or demonstration facility for
23 other persons in the same or other industrial fields;
24 and

1 (B) grant recipients will be responsible for
2 that part of such facility or process or any part
3 thereof which may be deemed conventional, the
4 Administrator funding only those parts of such
5 facility which may be designated to be for the
6 purpose of research, development, or implementa-
7 tion of innovative, experimental, or non-conven-
8 tional energy conserving industrial technologies.
9 However, nothing in this section shall be deemed
10 to prohibit total funding by the Administrator
11 should the Administrator certify that special circum-
12 stances warrant such funding.

13 (b) PRIORITIES.—In reaching decisions regarding the
14 directions, priorities, activities, and operation of the indus-
15 trial energy conservation program, and in selecting contract
16 and grant recipients thereunder, the Administrator shall give
17 due regard, wherever possible, to the following factors and
18 criteria:

19 (1) the extent to which a given project, contract,
20 or grant shows potential for contributing toward a reali-
21 zation of any industrial energy efficiency target estab-
22 lished pursuant to this Act for those industries which are
23 the most energy intensive, including but not limited to—

24 (A) the extraction and production of iron,
25 steel, and aluminum;

1 (B) petroleum and petrochemical refining;

2 (C) the manufacture of paper, paperboard, ce-
3 ment, plastics, glass, styrene butadiene rubber, fer-
4 tilizer production; and

5 (D) food processing;

6 (2) the extent to which a given demonstration
7 project is directed at encouraging the widespread adop-
8 tion of applicable technologies and processes which are
9 temporally close to commercialization with special em-
10 phasis on the following areas:

11 (A) heat transfer technology and waste heat
12 recovery;

13 (B) low temperature heat applications;

14 (C) industrial steam and combined steam elec-
15 tricity production technology;

16 (D) new manufacturing processes;

17 (E) increased operational and procedural effi-
18 ciency; and

19 (F) decentralization of electrical generation;

20 (3) the extent to which a given project, contract
21 or grant will result in benefits to health, safety, or the
22 environment.

23 (c) REGULATIONS.—In furtherance of the above cited
24 objectives and goal, the Administrator shall promulgate such
25 rules and regulations as, in the Administrator's discretion,

1 may be deemed necessary to implement the purposes of this
2 Act.

3 (d) COORDINATION.—In the promotion and develop-
4 ment of the program required by this section, the Adminis-
5 trator shall cooperate and coordinate his activities with those
6 of appropriate Federal, State, and local agencies and institu-
7 tions, and with other public and private organizations and
8 institutions.

9 LOANS AND LOAN GUARANTEES

10 SEC. 7. GENERAL.—The Secretary is authorized, in ac-
11 cordance with the provisions of the Act, to make loans, and
12 to guarantee the payment of loans and other obligations, for
13 the purchase, construction, operation, or maintenance of en-
14 ergy efficient equipment or facilities.

15 PRIORITIES FOR LOANS AND GUARANTEES

16 SEC. 8. In selecting recipients for loans and loan guar-
17 antees under this Act, the Secretary shall give due regard,
18 wherever possible, to the following factors and priorities:

19 (1) the extent to which a given loan recipient
20 is located within a depressed industrial area, as de-
21 fined in section 3.(3), and the extent to which the
22 making or guaranteeing of a loan will contribute to
23 the achievement of a target established pursuant to
24 section 4.(c). of this Act, and will alleviate unem-

1 ployment and contribute to general or local economic
2 development recovery;

3 (2) the extent to which a given loan or loan guar-
4 antee is directed at encouraging the widespread adop-
5 tion of applicable technologies and processes which are
6 temporally close to commercialization with special em-
7 phasis on those areas specified in section 6 (b) (2) of
8 this Act;

9 (3) the extent to which increased energy efficiency
10 may be attained by the modernization of existing plants
11 and equipment, rather than by replacement, with a focus
12 on fuel management and the introduction of fuel-conser-
13 vation-oriented equipment;

14 (4) the extent to which a given loan will be
15 recoverable by the Federal Government, either di-
16 rectly, by the repayment of loans, and indirectly, by an
17 increase in Federal revenues resulting from the eco-
18 nomic or industrial growth induced by such loan;

19 (5) the extent to which a given loan will afford
20 small businesses every reasonable and adequate oppor-
21 tunity to participate in the economic and technological
22 benefits of the overall program; and

23 (6) the extent to which a given loan will result
24 in benefits to health, safety, or the environment.

1 LOAN AND LOAN GUARANTEE REGULATIONS

2 SEC. 9. (a) In furtherance of the above cited factors
3 and criteria, the Secretary shall—

4 (1) to the extent reasonable and practicable, allo-
5 cate at least 60 percent of the funds available for loans
6 and loan guarantees pursuant to this Act to recipients
7 located within depressed industrial areas;

8 (2) promulgate and enforce such rules and regula-
9 tions as may be necessary to avoid unjust enrichment,
10 fiscal irresponsibility, and economically irrational alloca-
11 tions of resources, and necessary rules and regulations
12 governing the allocation of, qualifications for, obligations
13 to be incurred, and conditions to be imposed with respect
14 to loans, including, but not limited to, rules and regula-
15 tions specifying—

16 (A) conditions governing the eligibility and
17 selection of, and performance standards for, each
18 type or category of loan recipient;

19 (B) requirements for partial or complete
20 matching contributions of funds, facilities, or re-
21 sources for receipt of such forms or types of loans
22 as the Secretary may specify;

23 (C) rates of interest, time and method of re-
24 payment, and other terms and conditions of loan
25 obligations;

1 (D) methods and criteria for the cancellation
2 or compromising of such loan obligations, such can-
3 cellation or compromising to be limited to those
4 situations where and to the extent that, in the
5 judgment of the Secretary, a loan recipient requires
6 such cancellation or compromise because of in-
7 solveny resulting from the failure of the energy
8 conserving technology implemented by such recip-
9 ient to be or to prove economically viable, or to
10 produce a reasonable return on the recipient's in-
11 vestment in such technology;

12 (E) reporting, demonstration, and monitoring
13 requirements for loan recipients;

14 (F) conditions for visits to the plants or facili-
15 ties of loan or loan guarantee recipients by the
16 Administrator and others; and

17 (G) penalties for violation of any rule or regu-
18 lation, or of any loan condition, which penalties
19 may include—

20 (i) immediate cancellation of such loan,
21 with recovery of part of all of any funds ad-
22 vanced to a recipient thereof; and

23 (ii) a civil penalty not to exceed \$5,000
24 per violation.

1 (b) LOAN GUARANTEES.—The Secretary is author-
2 ized, in accordance with the provisions of this section and
3 such rules and regulations as he shall prescribe, to guarantee
4 and to make commitments to guarantee the payment of
5 interest on, and the principal balance of, a loan or other
6 obligation incurred by any institution, organization, corpora-
7 tion, partnership, or individual for the purpose of financing
8 installation or construction of full-scale operational energy
9 efficient equipment or facilities: *Provided*, That (1) the
10 outstanding indebtedness guaranteed under this Act shall at
11 no time exceed \$500,000,000; and (2) no guarantee or
12 commitment to guarantee shall be undertaken under this Act
13 after September 30, 1977. Each application for such a guar-
14 antee shall be made in writing to the Secretary in such
15 form and with such content and other submissions as the
16 Secretary shall prescribe to reasonably protect the interests
17 of the United States. Each guarantee and commitment to
18 guarantee shall be extended in such form, under such terms
19 and conditions, and pursuant to such regulations as the Sec-
20 retary deems appropriate. Each guarantee and commitment
21 to guarantee shall inure to the benefit of the holder of the
22 obligation to which such guarantee or commitment applies.
23 The Secretary is authorized to approve any modification of
24 any provision of a guarantee or of a commitment to guaran-
25 tee such an obligation, including the rate of interest, time

1 of payment of interest or principal, security, or any other
2 terms or conditions, upon a finding by the Secretary that
3 such modification is equitable, not prejudicial to the interests
4 of the United States, and has been consented to by the
5 holder of such obligation.

6 (c) CRITERIA.—The Secretary shall make a guarantee,
7 or a commitment to guarantee, under subsection (a),
8 with respect to a facility, only if such facility will
9 be constructed, operated, and maintained in accordance
10 with any applicable standards or regulations duly issued by
11 the Secretary, and upon a finding by the Secretary that no
12 other means of financing or refinancing such facility is rea-
13 sonably available to the applicant.

14 (d) CHARGES.—(1) The Secretary shall charge and
15 collect such amounts as he may deem reasonable for the
16 investigation of applications for a guarantee, for the appraisal
17 of properties offered as security for a guarantee, and for the
18 issuance of commitments to guarantee.

19 (2) The Secretary shall collect such reasonable fees
20 and charges as he shall determine for a loan or other obliga-
21 tion guaranteed under this section.

22 (e) VALIDITY.—No guarantee or commitment to
23 guarantee an obligation entered into by the Secretary
24 shall be terminated, canceled, or otherwise revoked, except
25 in accordance with reasonable terms and conditions pre-

1 scribed by the Secretary. Such a guarantee or commit-
2 ment to guarantee shall be conclusive evidence that the
3 underlying obligation is in compliance with the provisions of
4 this section and that such obligation has been approved and
5 is legal as to principal, interest, and other terms. Such a
6 guarantee or commitment shall be valid and incontestable in
7 the hands of a holder as of the date when the Secretary
8 entered into the contract of guarantee or commitment to
9 guarantee, except as to fraud, duress, mutual mistake of fact,
10 or material misrepresentation by or involving such holder.

11 (f) DEFAULT.—(1) If there is a default by the obli-
12 gor in any payment of interest or principal due under an
13 obligation guaranteed by the Secretary under this sec-
14 tion, and such default has continued for 60 days, the holder
15 of such obligation or his agents have the right to demand
16 payment of such unpaid amount from the Secretary.
17 Within such period as may be specified in the guarantee or
18 related agreements, but not later than 45 days from the
19 date of such demand, the Secretary shall promptly pay
20 to the obligee or his agent the unpaid interest on, and
21 the unpaid principal of, the obligation guaranteed by the
22 Secretary as to which the obligor has defaulted, unless the
23 Secretary finds that there was no default by the obligor in
24 the payment of interest or principal or that such default has
25 been remedied.

1 (2) If the Secretary makes a payment under para-
2 graph (1), he shall have all rights specified in the guarantee
3 or related agreements with respect to any security which he
4 held with respect to the guarantee of such obligation, includ-
5 ing, but not limited to, the authority to complete, maintain,
6 operate, lease, sell, or otherwise dispose of any property
7 acquired pursuant to such guarantee or related agreements.

8 (3) If there is a default under any guarantee or com-
9 mitment to guarantee an obligation, the Secretary shall
10 notify the Attorney General. Upon such notification, the At-
11 torney General shall take such action against the obligor or
12 any other parties liable thereunder as is, in his discretion, nec-
13 essary to protect the interests of the United States. The holder
14 of such obligation shall make available to the United States
15 all records and evidence necessary to prosecute any such suit.

16 AUTHORIZATION FOR APPROPRIATIONS

17 SEC. 11. (a) There are authorized to be appropriated to
18 the Secretary for carrying out the provisions of sections 3,
19 4, and 5 of this Act such sums as are necessary, not to
20 exceed \$2,000,000 for the fiscal year ending June 30, 1976,
21 not to exceed \$500,000 for the transitional fiscal quarter
22 ending September 30, 1976, not to exceed \$2,000,000 for
23 the fiscal year ending September 30, 1977, and not to exceed
24 \$2,000,000 for the fiscal year ending September 30, 1978.

25 (b) There are authorized to be appropriated to carry

1 out the purposes of section 6 of this Act, funds not to
2 exceed \$55,000,000 for the fiscal year ending June 30,
3 1976, not to exceed \$20,000,000 for the transitional fiscal
4 quarter ending September 30, 1976, and not to exceed
5 \$100,000,000 for the fiscal year ending September 30,
6 1977.

7 (c) There are authorized to be appropriated to the
8 Secretary for the purpose of making loans under this Act,
9 such sums as are necessary not to exceed \$22,500,000 for
10 the fiscal year ending on June 30, 1975; \$45,000,000 for
11 the fiscal year ending on June 30, 1976; \$22,500,000 for
12 the transitional fiscal quarter ending on September 30, 1976;
13 and \$45,000,000 for the fiscal year ending on September 30,
14 1977.

15 (d) There are authorized to be appropriated to the
16 Secretary such sums as are necessary, not to exceed \$500,-
17 000,000, to pay any amount required to be paid by reason
18 of a default on any loan or other obligation guaranteed
19 under section 10 of this Act.

FEDERAL ENERGY ADMINISTRATION,
Washington, D.C., February 26, 1975.

HON. WARREN G. MAGNUSON,
Chairman, Committee on Commerce, U.S. Senate,
Washington, D.C.

DEAR MR. CHAIRMAN: The Administrator has received your request of February 24, 1975, for a report on S. 594, a bill "To increase domestic energy supplies and availability; to restrain energy demand; and to prepare for energy emergencies, and for other purposes". Senator Hugh Scott introduced the bill at the request of the Administration on February 5, 1975.

The Federal Energy Administration supports the proposals in the Administration's Energy bill, S. 594. These proposals, if enacted, should allow the United States to achieve energy independence by 1985.

Sincerely,

PAUL CYR,
Director for Congressional Affairs.

DEPARTMENT OF STATE,
Washington, D.C., April 7, 1975.

HON. WARREN G. MAGNUSON,
Chairman, Committee on Commerce, U.S. Senate
Washington, D.C.

DEAR MR. CHAIRMAN: Secretary Kissinger has asked me to reply to your letter of February 24 requesting the State Department's comments concerning the merits of S. 594 and the propriety of its passage.

Title XIII of S. 594 (the Standby Energy Authorities Act of 1975) is designed to enable the United States to fulfill the commitments it has undertaken in adhering to the Agreement on an International Energy Program (IEP). That Agreement constitutes a significant step toward consumer cooperation by the major industrialized oil consuming countries following the disruptive experience of the oil embargo last winter. The IEP consists of the following complementary short-term and long-term programs:

—A comprehensive emergency oil sharing program to protect the consuming countries against another oil embargo. It assures that we will have the capability to deal with future oil supply interruptions in a cooperative framework, thus avoiding a scramble for oil which serves only to bid up prices.

—A commitment to a long-term cooperative program among consuming countries to reduce their dependence on imported oil through joint programs in the fields of conservation, the development of alternative energy supplies and research and development on energy. This program is essential if we are to restore equilibrium between the oil consuming and producing nations and ultimately in the world oil market to exert downward pressure on current oil price levels.

At present our government is bound only provisionally by the Agreement on an International Energy Program. We are obligated to apply it only to the extent that it is not inconsistent with existing legislation until we give notice that the United States, having complied with its constitutional procedures, consents to be fully bound. In negotiating the Agreement it was our view that implementing legislation would be both necessary and appropriate before the United States could agree to be bound by the full range of commitments embodied in the IEP. Title XIII would provide us with the necessary authority to fully implement our commitments.

The Agreement provided that the participating countries will bring it fully into force in accordance with their respective constitutional and legal procedures by May 1, 1975. It is imperative that the United States meet this deadline in order to maintain the momentum toward international energy cooperation already achieved in the IEA. This will clearly demonstrate to OPEC that we are determined to deal with the energy crisis. Accordingly, the State Department urges Congress to act expeditiously and decisively to grant the authority that will permit us to move ahead in this critical international endeavor.

The Office of Management and Budget advises that from the standpoint of the Administration's program there is no objection to the submission of this report.

Sincerely,

ROBERT J. MCCLOSKEY,
Assistant Secretary for Congressional Relations.

FEDERAL MARITIME COMMISSION,
Washington, D.C., April 25, 1975.

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce, U.S. Senate,
Washington, D.C.

DEAR MR. CHAIRMAN: This is in response to your request for the views of the Federal Maritime Commission with respect to S. 594, a bill

To increase domestic energy supplies and availability; to restrain energy demand; and to prepare for energy emergencies, and for other purposes.

The bill seeks a solution to one of our most pressing national problems—energy insecurity. It looks toward the development of a dependable domestic supply of energy at stable prices.

In the main, S. 594 would authorize the President and the Federal Energy Administrator to institute and carry out various programs designed to increase the supply and availability of fuels, to reduce energy consumption where feasible, and to provide a plan of action in event of serious disruption in our national supply of energy.

The Federal Maritime Commission gives unqualified support to the objectives of this legislation.

As to the various specific programs and provisions we will confine our comments to those which directly involve the Federal Maritime Commission.

Title XIII provides that if the President after making certain findings exercises any one of the enumerated authorities in Section 1302(c), the Federal Maritime Commission (also the Interstate Commerce Commission and the Civil Aeronautics Board) shall report within 20 days to the President and appropriate Committees of Congress on the need to remove authority or to grant additional authority to the Agency in order to conserve fuel while continuing to provide for the public convenience and necessity. The named agencies would also report as to any change in existing fuel allocation programs deemed appropriate to provide for the public convenience and necessity during the existence of fuel allocation programs.

The Federal Maritime Commission considers such provisions to be consistent with our responsibilities, and an essential part of the comprehensive governmental action required in time of national emergency.

We strongly support S. 594 and the provisions which relate to the Federal Maritime Commission.

The Office of Management and Budget has advised that there would be no objection to the submission of this letter from the standpoint of the Administration's program.

Sincerely,

HELEN DELICH BENTLEY,
Chairman.

Senator TUNNEY. I would like to welcome as our first witness, Congressman Robert Drinan of Massachusetts who has been a leader in the energy conservation area.

STATEMENT OF HON. ROBERT F. DRINAN, U.S. REPRESENTATIVE FROM THE FOURTH DISTRICT OF MASSACHUSETTS

Mr. DRINAN. Thank you, Senator Tunney.

Senator TUNNEY. It is a pleasure having you here, Congressman. I know the very deep concern that you have evidenced in regard to these matters. I have read the Congressional Record, and you have many good statements in the Record demonstrating your very deep concern for the energy problem. Please proceed.

Mr. DRINAN. Thank you, Senator. I commend you also for your leadership in this very important area, and I will speak very briefly about a bill that I think is very important.

I welcome this opportunity to testify about the Industrial Energy Conservation Act of 1975. I believe that this legislation is capable of bringing about significant savings of energy in the industrial sector with a relatively small outlay of Federal funds.

The legislation which your Subcommittee is presently considering, S. 1908, is very similar to the Industrial Energy Conservation Act

which I have introduced on the House side as H.R. 6936. H.R. 6936 has now been revised, and as such, our two bills are substantially the same. Both bills direct the Energy Research and Development Administration (ERDA) to establish a system of research and development in energy conserving industrial technologies.

ERDA will contract with individuals or firms to develop prototype or demonstration facilities, as well as make low interest loans and loan guarantees in order to accelerate the implementation of the existing or new technologies. So as to stimulate the economy in depressed regions, both bills target 60 percent of the grants and loans to high unemployment areas, as defined by the Economic Development Agency.

The major difference between our two bills, Mr. Chairman, is that the revised version of H.R. 6936 does not include the section on surveys, goals, and targets for industrial energy savings. Because of a jurisdictional conflict, this latter Section is included in the House Interstate and Foreign Commerce Committee bill, H.R. 7014, the Energy Conservation and Oil Policy Act of 1975.

Mr. Chairman, there can be little question that this country must cut down on its foreign energy dependence. Yet in developing energy programs for this purpose, the Federal Government has up until this time almost totally emphasized increasing energy supplies as opposed to conserving its use. Legislation now pending before the Congress as well as Federal energy expenditures reflect our Government's overwhelming bias towards the supply rather than the consumption side of the energy question.

I think this is particularly true in the industrial sector where 40 percent of all our energy is consumed. The energy savings in the industrial sector are truly impressive, especially in view of the fact that six major U.S. industries are responsible for over three-quarters of this 40 percent figure. This means that by substantially improving the fuel efficiency of the most energy intensive industries, savings of millions of barrels of oil are realizable on a monthly basis.

The mechanism for achieving these energy savings in our two bills involve a research and development program, demonstration facilities, and low interest loans and loan guarantees.

I feel, Mr. Chairman, that the research and development program in conjunction with the demonstration facilities is particularly well suited to achieving major progress in the industrial sector. Estimates have been made to the effect that fuel consumption of a major segment of industry could be reduced by as much as one-third with existing technology. However, much of this existing technology is unproven yet in large industry and regarded as experimental or risky by industry as a whole. If we are to take major steps forward, the Federal Government, acting through ERDA, must show that energy efficiency is feasible for large-scale commercial operations. Without such a demonstration of the known technology, the widespread utilization of these energy efficient processes will be significantly delayed.

Mr. Chairman, I am particularly aware of the potential in the paper and plastics industry, both of which are prominent in my area in Massachusetts. I have discussed this problem with industrial leaders in my district as well as with very sophisticated people in greater Boston who have developed potential savings devices for both of

these industries, all of which could save up to one-third or even more than one-third of the energy that is being consumed.

In both the Senate and House bills, a provision has been incorporated so as to insure that the demonstration facilities do not amount to industrial giveaways, protecting the taxpayer's dollar. It is specified that where the demonstration grants are funded by the Government, ERDA will only provide support for those portions of the facility which are designated "for the purpose of research, development, or implementation of innovative, experimental, or nonconventional energy conserving industrial technologies." This provision should make it certain that the selected prototype plants are much less costly for the Government while proving the feasibility of a maximum number of energy efficient technologies.

The one aspect of both the House and Senate bills that does concern me somewhat, Mr. Chairman, is the low-interest loan provision. Small or big business benefit by this particular grant and have a subsidy for that which they should be doing by themselves in the private sector.

Low interest loans are relatively low-cost incentives to the Federal Government. Both bills do specify that the Administrator of ERDA should promulgate regulations so as "to avoid unjust enrichment, fiscal irresponsibility, and economically irrational allocations of resources." But even given these provisions, I do feel that every effort should be made to insure that the aims which we seek to bring about through this legislation should be implemented by private industry acting on their own behalf as much as possible.

Mr. Chairman, America cannot wait any longer to solve its energy problems. Conservation, beginning with industrial energy conservation, is a solution that is practicable now and it is a solution that will not further contribute to the depletion of the world's energy resources. From that standpoint, the Industrial Energy Conservation Act represents an important step towards the goal of widespread energy efficiency.

Senator TUNNEY. I want to thank you, Congressman. I am impressed, as I know you are, by the statements that we are constantly receiving from various sectors of the country—the public utility industry as well as other elements of industry and government—that there are going to have to be substantial increases in electric generating capacity. There are going to have to be new sources of oil, natural gas, and coal found and developed if we are to be able to maintain our standard of living in this country.

However, the thing that impresses me is that in a country like Sweden, which has a higher per capita standard of living than we do in this country, at least as far as GNP is concerned, they use 50 percent less energy per capita than the United States. If you take a look at Germany, it's approximately 50 percent less per capita there also. We are the most energy profligate country in the world. And as such, we have foreign policy interests which are probably unrivaled in the global sense, with the exception of possibly the Soviet Union. Our vulnerability to a boycott of oil in the future is perhaps as great as that of any country in the world, and there is absolutely no reason why we should not be prepared to cutback significantly on the amount of energy that we use and this is not going to effect our standard of living at all.

As a matter of fact, it will probably improve it, because it means we're going to have to use less money to build the pollution control system.

Mr. DRINAN. And Senator, it could be good for the consumer, as these industries that rely heavily on energy will be cut down on their costs and excessive use of fuel.

If I may, Senator, I have here 9 examples of energy conservation processes that are available at this particular time and at the end of my testimony, I would like permission to have them inserted into the record.

Senator TUNNEY. They will be included in the record.

Do you have any commitment? What is the status of your bill?

Mr. DRINAN. We have a commitment from the Science and Technology Committee that we will have hearings in July or shortly thereafter. The legislation is pending in Congressman Mike McCormack's subcommittee, and I have spoken to him personally.

He and other members of the subcommittee are deeply interested. We have roughly 50 or 60 cosponsors.

I think it's fair to say that many people in the House have not appreciated the fact that the Federal Government has done very little in the area of conserving energy in the industrial sector. As a result, I would say that of all of the energy measures pending in the subcommittees of the House of Representatives, I would feel that progress in this area is most likely, and I'm quite optimistic.

Senator TUNNEY. Well, you know, I can't help feeling that energy conservation measures like this are going to be far less disruptive to the economy than slapping a huge tax on energy, such as has been suggested in certain quarters, and I can't think of anything that is more likely to increase social instability and divisiveness than a big new tax on these forms of energy, which are considered absolutely essential to the public welfare, and I'm thinking on heating oil and gasoline and things of that nature. And if you can have the savings from greater efficiency in industrial processes, better insulation in our homes, greater efficiency in our appliances, it would seem that we would save an equal amount of energy and that we would not impact any one segment of the society, namely the middle and lower income groups to a greater extent than we do the upper income groups.

Mr. DRINAN. I agree totally; and I think the bill provides specifically that in economically depressed areas particular help will be given.

Sixty percent of the money must be allocated to these areas.

I think it's significant to note that in Japan the steel industry is already operating on less energy than the steel industry here in America. When one compares the Btu's, it's astonishing that a nation such as Japan can out-distance us in this area without any diminution in the quality or quantity of production of steel. This is one of the nine examples that I will attach to my testimony.

Senator TUNNEY. Thank you very much. We know how busy you are and we appreciate your being here with us and I appreciate your testimony.

Mr. DRINAN. Thank you very much.

[The information referred to earlier follows:]

EXAMPLES OF INDUSTRIAL ENERGY CONSERVATION PROCESSES

1. Reusing Waste Steam: By using waste steam heat to produce electricity, great savings are possible. In a power plant in Lake Charles, La., a new combined cycle turbine generator produces 150 megawatts of electricity and then reuses all of its waste steam. This system provides an energy efficiency better than 85 percent, or more than twice that of a normal electrical utility.

If this process were used on a 1600 megawatt power station, the savings would amount to 54,000 gallons of fuel per hour. Such installations would not have to be used only in industrial settings. If integrated into new communities, this byproduct steam could supply the energy to heat and cool 50,000 houses or apartments.

2. Cement Plant: In one cement plant alone in Texas, the installation of a preheater system using waste heat reduced the fuel consumption at the plant by 27 percent, or the equivalent of 5 million gallons of fuel oil per year.

3. Power Generation: In Michigan, Dow Chemical's Midland Division labored under an energy disadvantage for many years in that 96 percent of its energy was imported from outside of the area. So as to compensate for this disadvantage, energy efficient processes were adapted. For the year 1973, Midland generated power at any energy efficiency rate of 54 percent, as opposed to the average U.S. utility operating at a 33 percent efficiency figure. A power generating facility run by a public utility traditionally takes the steam exhaust from the turbines and rejects the heat in this exhaust to cooling water. But in the Midlands plant, there are more than 10,000 steam traps to regain waste heat which can be reprocessed.

4. Size of Possible Savings: At the Lake Charles, La. power station mentioned above, the 85 percent energy efficiency rate results in tremendous savings. Indeed, if the plant operated at normal efficiency ratings, 4.7 trillion additional Btu's would have to be purchased each year. This is equal to the total amount of energy used by 14,000 Americans in one year.

5. Recycling Waste Heat: In industrial furnaces known as "radiant tube" models, exhaust gases are the primary source of inefficiency. Because uniform temperatures of 1700 degrees are required throughout the furnace, temperature variance accounts for a large amount of waste heat. This waste energy can be recovered and recycled by means of recuperators or heat exchangers, which utilize the heat in the exhaust gases. With these processes, fuel requirements can be reduced by 1.65 million Btu's for each ton of unit output produced, or a total of 28 percent.

6. Paper Manufacturing: Paper manufacturing uses a very high amount of energy per unit of output. But by incorporating processes which can reduce the water in the pulp mixture, the fuel demand of the paper-making phase of production can be reduced by up to 55 percent. Most of the saving is due to reduced drying requirements as a result of the lessened water content in the pulp.

If the above process was implemented in addition to integrating pulping and paper-making operations, increasing the amount of waste heat recovery, and using special pulp digesters, these processes could cut the average fuel consumption of paper manufacturers by almost 40 percent, from 39 million Btu per ton to 24 million Btu per ton of paper.

7. Steel Production: A great number of improvements can be utilized in the average steel plant. They include steps such as preheating combustion air, increasing air blast temperature, replacing open hearth furnaces with basic oxygen furnaces, and using byproduct steam. Industry-wide implementation of these types of practices could reduce average fuel requirements for steel production by 36 percent, from 26.5 million Btu per ton to 17.2 million Btu per ton of steel. A new Japanese steel plant is already operating at 22 million Btu, much better than almost all American plants.

8. Aluminum Production: Over the past three decades, the electric power to smelt aluminum has been cut almost in half. Since World War II, the electric power needed to produce a pound of aluminum has been reduced from 12 kilowatt hours to 8. Today's most efficient smelters only use 6.5 kilowatt hours. In a new smelting process developed recently by Alcoa, however, the power requirement will be reduced by an additional 30 percent, to 4.5 kilowatt hours.

9. Byproduct Electricity: In 1968, industry consumed about 10 quadrillion Btu's of energy, the equivalent of 1.5 billion barrels of fuel oil, for process steam raising. Most of this steam was used at low pressures and temperatures. If this steam were raised to higher temperatures and pressures so as to turn engine generator sets, 700 billion kilowatt hours of electrical energy could be produced. Although added fuel is consumed in the process, this is more than offset by the by-product electricity generated—equal to about 53 percent of the total U.S. electrical production for the year 1968. This amounts to 30 percent of all the fuel used by electric utilities.

Senator TUNNEY. Our next witness is the Honorable Roger W. Sant, Assistant Administrator for Energy Conservation and Environment, Federal Energy Administration.

It's a pleasure having you here, Roger.

STATEMENT OF HON. ROGER W. SANT, ASSISTANT ADMINISTRATOR FOR CONSERVATION AND ENVIRONMENT, FEDERAL ENERGY ADMINISTRATION.

Mr. SANT. Thank you, Senator. Nice to be here again.

We appreciate very much the work of this committee in energy conservation. You have been one of the stalwarts in trying to develop new approaches to achieving conservation. We appreciate it. There's so much to be done that we've got to look at every alternative that we can find.

I only have one comment on your conversation with Father Drinan. I guess my own view is that increased prices and the other approaches you were talking about are not alternatives. We need both. There is no disagreement on the need for the latter at all, but we must also increase the overall potential as well.

Senator TUNNEY. I suppose I'm opposed to the artificial increase in prices. In the natural order of things there is going to be an increase in price. It looks like the OPEC countries are once again calling for a substantial round of price increases.

I just can't think of a better way to maintain the recession in this country than to have another round of price increases, but please go ahead with your testimony.

I just glanced at your statement and it's a very interesting one.

Mr. SANT. I would like with your permission to summarize it.

Senator TUNNEY. It will go into the record.

Mr. SANT. I am in firm and fervent agreement with the objectives of the two bills. However, I do have some comments on the problems we see in those proposals. Initially, let me focus on the two proposals which would directly impact the building sector S. 1392 and our Building Energy Conservation Standards Act.

Space heating and cooling of buildings accounts for about 18 percent of total U.S. energy consumption. It is in this area where the greatest potential for building energy conservation exists.

The greatest long-term potential for energy conservation in buildings clearly lies in improving the design and construction of new buildings.

However, over one-half of the existing U.S. housing stock was built before 1949, before the existence of any thermal standards for buildings. For the short term, we must, therefore, focus on opportunities for conserving energy in existing residential, commercial and public buildings.

My personal view, Senator, is that at this point in time we already know enough about the opportunities for saving. Our major barrier is not the absence of technologies, which would require more demonstrations or development, but rather it is finding ways to implement what we already know.

We are now reaching only a small percentage of the existing market. We must increase that percentage if we are to achieve the kinds of savings we ought to achieve.

A major emphasis has been on tax credits. Both the Administration and the Ways and Means Committee have proposed tax credits for energy conservation in residential buildings. The Ways and Means Committee has proposed investment tax credits for commercial buildings as well. Further, we must significantly increase the marketing programs to get the information to the public, the building owner—the people who have a chance to make good economic decisions for energy conservation under current prices and current economic conditions.

Federal agencies have instituted many programs in this area. For the most part these initial efforts have concentrated on changing the traditional operating practices of building managers by encouraging adjustments in thermostat, ventilation, and lighting levels.

These have resulted in savings of between 11 and 25 percent in Federal buildings alone.

We are convinced that far greater savings can be achieved in many buildings through the institution of a well defined and executed retrofit program.

Last fall the President called for all Federal agencies to examine their facilities and operations for energy conservation potential. Additionally, he asked the Administrators of GSA and FEA to recommend to the Energy Resources Council a multiyear program to increase energy efficiency in all Federal facilities and operations.

In response to this second request, FEA and GSA are currently in the process of preparing their report to the Energy Resources Council. This report, expected to be completed by the end of next month, will identify specific long-range opportunities to conserve energy in Federal facilities and operations.

A great deal of effort has been expended by 11 working committees to investigate major energy intensive Federal activities and operations. Their assignments range from telecommunications to motor vehicle operations, and they are now drafting reports that identify various strategies to achieve energy efficiency and determine the funding, legislative and other actions needed for implementation.

This committee effort, drawing on the collective expertise of numerous Federal agencies under the leadership of FEA and GSA, is being overseen by a steering group composed of 22 agency members at the assistant secretarial level.

Several of the working committees are looking at various aspects of buildings and facilities and are developing analyses and methods to improve operations and maintenance, implement modifications or retrofiting, develop new design, siting and utilization criteria, and identify research and development opportunities.

By way of an example of the information being developed, preliminary indications are that implementation of the conservation possibilities dealing with Federal office and warehouse facilities alone could save a significant amount of oil equivalent per year by 1985 and if the same actions being investigated were adopted by the private sector commensurate savings could be realized.

We feel that this program, coupled with the existing contract authority of FEA and ERDA and the State/Federal Energy Conservation program announced last week, will be sufficient to accomplish the objectives of S. 1392. Therefore, we oppose the enactment of S. 1392 at this time.

With regard to new buildings, I would like to briefly review the President's proposal for mandatory standards, the "Building Energy Conservation Standards Act." This proposal is particularly important because by 1990 about 50 percent of all residential and commercial space will have been constructed after 1974.

One estimate has indicated that adoption now of energy conserving design practices could reduce the heating and cooling energy consumption of single family dwellings by 35 percent, of high rise multi-family structures by 24 percent, and of commercial buildings by 32 percent. A Federal building being constructed by GSA in New Hampshire will save 69 percent compared to the current average for commercial buildings.

The building standards would be developed and promulgated in three phases:

Phase 1 would develop component performance standards for residential dwellings.

Phase 2 calls for minimum performance standards for energy conservation in commercial buildings.

Phase 3 requires minimum performance standards for energy conservation in residential buildings to supersede the component performance standards promulgated in Phase 1.

Standards for Phases 1, 2, and 3 would be developed by the Department of Housing and Urban Development in conjunction with the FEA, the ERDA, NBS, and GSA. The bill provides for consultation with Federal, State, and local government agencies, industry, labor and consumer groups. These efforts would be coordinated with what is being done in the private sector and at State and local levels, such as the efforts of the American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE) and the National Conference of States on Building Codes and Standards (NCSBCS).

The legislation would require States to certify that the new standards have been incorporated into local building codes and that they will be enforced. If within a specified period of time a State has not certified that the Federal energy conservation standard is being adopted and implemented by the appropriate local or State code jurisdiction, Federal financial assistance for construction of new buildings would not be approved for that area. Grants will be available to states to assist in planning and implementing the program. The standards development process will be augmented with a demonstration program.

This is where we think the demonstration program ought to exist—in conjunction with the development of new energy conservation standards.

If enacted promptly, this proposal would result in a reduction in imports of more than 300,000 barrels per day by 1985, and these savings would continue to grow into the future. Clearly, this proposal is not only of major importance to the achievement of energy savings within the next 10 years, but it will also help us better meet the Nation's energy needs beyond 1985.

In summarizing my remarks about building energy conservation, I would like to reiterate that we agree with the basic objectives of S. 1392. The efforts to formulate a multi-year program within the Administration are nearing completion and should provide the basis

for a substantive comment on the bill later this year. What should not be delayed, however, is action on Title X of the President's Energy Independence Act of 1975, the "Building Energy Conservation Standards Act."

I would now like to turn to S. 1908, to present our views on that bill.

S. 1908, the "Industrial Energy Conservation Act of 1975," addresses three of the most important elements of industrial energy conservation:

1. Management of available resources to achieve improved energy efficiency;
2. The development of more energy efficient processes and equipment; and
3. The problems associated with capital formation and investment in energy efficient processes and equipment.

Section 4 of S. 1908 would establish under the Secretary of Commerce a mandatory energy efficiency reporting system, including the establishment of industrial energy efficiency targets. We believe the purposes of this section are being carried out through existing programs established by FEA and the Department of Commerce. I will address this point in more detail in a few moments.

Section 6 would establish a comprehensive program of research, development and demonstration within ERDA devoted to energy conserving industrial technologies. Recognizing the great need for such R. & D., and the legitimate leadership role to be played by the Federal Government, we would support such initiatives, generally. However, I would like to defer to the ERDA for any detailed discussion of the intimately related issues of developing new and more energy-efficient technology.

Sections 7, 8, and 9 would establish within the Department of Commerce a program of Government loans and loan guarantees, directed largely at small firms located within depressed areas. The modest scope and short life of this program, however, would probably not have substantial impact outside of that universe. On the other hand, a massive program of industrial loans and guarantees could have adverse effects due to the consequent distortion of normal market forces. Until industry achieves a greater share of the energy savings already justified by higher energy costs, we would oppose such incentives as unnecessary windfalls.

Returning to Section 4, I wish to note that under the FEA Act of 1974, this agency is required to "develop and oversee the implementation of equitable voluntary and mandatory energy conservation programs and promote efficiencies in the use of energy resources" (section 5(b)(7)).

In the balance of my remarks I would like to review the FEA's activities and programs pursuant to this mandate.

It is the Administration's position that mandatory regulations are not yet necessary, but that we will invoke the information gathering authority available under Section 13(b) of the FEA Act, or seek additional legislation if progress under our current voluntary program is not satisfactory.

The basic voluntary program to which I refer is a joint venture of the FEA, Department of Commerce, and industry. It is focused

on 10 of the most energy-intensive industries which together account for about 55 percent of industrial energy consumption. These industries are: aluminum, baking, cement, chemicals, copper, glass, meatpacking, paper, petroleum refining, and steel.

FEA and Commerce have organized and held meetings and workshops with over 200 industrial firms and 20 trade associations representing the bulk of the production capacity within these 10 industries.

The purpose was to assess the energy conservation potentials within each industry and establish industry energy conservation programs, including energy efficiency goals.

Followup meetings at the cabinet and chief executive officer level were then held and top-level management commitments obtained to implement industrywide and company specific energy conservation programs.

Preliminary industry-wide conservation goals for 1980 (relative to baseline year 1972) were determined and agreements reached with industry for the monitoring and reporting of energy conservation progress in cooperation with appropriate trade associations.

The year 1972 was selected as the baseline because energy consumption data for 1972 is not distorted by the effects of the 1973-1974 embargo or the subsequent fuel cost escalation.

Had 1974 been selected as the baseline year, as this bill proposes, the basis for setting goals and for measuring progress would have been measurably different. Companies which responded to fuel shortages and increased prices quickly and resolutely achieved a degree of energy efficiency improvement prior to 1974. Hence, the apparent progress of these companies is diminished when measured against a 1974 baseline. On the other hand, companies which did not effect substantial improvements early, will appear to achieve greater relative increases in energy efficiency when measured against a 1974 base.

Thus, with 1972 as a baseline all industries and companies start from a common set of initial conditions. Inequities arising from the use of a later baseline period, due to the embargo and subsequent events, consequently are virtually eliminated.

The sequence of meetings between FEA, Commerce and industry to which I have referred were held in two distinct groupings.

The first series included aluminum, cement, chemicals, paper, petroleum refining, and steel, and was held in the latter half of 1974.

The second series included baking, copper, glass, and meatpacking and was concluded in the first half of 1975.

Preliminary reports on progress toward 1980 energy efficiency goals have been received from trade associations representing the first six industries. Reports from the remaining four are scheduled for later this year.

The industry-wide goals, based on 1972 performance, range from 10 percent for aluminum, cement, paper and steel, to 15 percent for chemicals and petroleum refining. Actual improvements reported thus far range up to 7.8 percent for the petroleum refining industry and 7.5 percent for chemicals.

Apart from the 10 industries currently participating in the joint FEA-Commerce program the Department of Commerce is also work-

ing with 13 other trade associations and has preliminary plans to expand this effort to 40 industrial and 10 commercial trade associations.

In summary, may I reiterate that we support the basic objectives of section 4, namely to increase the efficiency of energy use in the industrial section. However, we feel that the provisions of this section are duplicative of existing programs established under the Federal Energy Administration Act of 1974 and that mandatory programs are not required at this time.

Further, we believe that the ongoing joint programs of FEA and Commerce in this field meet the basic objectives of S. 1908, section 4. We would, of course, appreciate your support of these existing initiatives.

That concludes my prepared remarks. I very much appreciate the opportunity to present our views, and thank you for your interest. I would be pleased to answer any questions.

Senator TUNNEY. Thank you Mr. Sant. I know that this is an area where people who have exactly identical goals can differ as to design, and I applaud much of the Administration's program. I think that, in particular, the FEA has been very conscious of the need to develop a variety of alternatives to attack the problems of energy conservation; and I think that the FEA certainly has exercised leadership in awakening the country to the long-term problems that we face in the energy area.

It's hard to believe, but I think it's demonstrably true from polls that have been taken, that the majority of Americans feel that there is no serious energy crisis. They feel that when prices were low, there were shortages of gasoline after the boycott. When prices went up, then there was enough fuel. It's very difficult to explain that the energy crisis, if you will, is a crisis of the next 10, 15, 20 years.

Now, I have just a couple of questions with respect to the comments that you have made. I am just trying to get an understanding of the philosophy that you have espoused here today. You indicate, turning to section 4 of S. 1908, that it is the Administration's position that mandatory regulations are not yet necessary. Now this, of course, deals with the reporting concerning energy efficiency programs by private industry.

Now, I don't quite follow your point of view inasmuch as the Administration has sent down to the Congress requests for mandatory standards for housing and mandatory labeling of major household appliances.

The facts are clear that at the time of the boycott the Federal Government didn't have any idea of the extent of petroleum reserves or where the petroleum products were in the distribution system. As a matter of fact, they still don't have independent data on worldwide petroleum reserves, the amount of refining capacity that's available, or the amount of petroleum in the distribution system. It's getting better, but it's not adequate yet. So, I can't understand why—if that is your approach, on the one hand to get better information and to establish mandatory standards—you're not interested in getting additional data on energy efficiencies that relate to a wide variety of industrial processes.

Mr. SANT. The reason for this different approach is that we feel we're getting sufficient information and cooperation now in a voluntary mode. As I described in the testimony, we have now met with at least 200 firms. We're expanding that all the time. What we're trying to do is develop our relationship on an almost one to one basis.

Senator, we find frankly, that all you need to do is bring it to someone's attention and you have a sale. That's why I made the comment that I sometimes wish I had a national sales force rather than any more demonstrations. We just need to get the word out. When we bring these people in and tell them about the opportunities for savings, and as soon as they've done an audit of their energy use, they recognize that there are a lot of opportunities for saving. So, our program is really not one of setting any standards, but rather it is bringing to the attention of businessmen the kind of energy they're now wasting.

The reasons for requiring reporting on the one side and setting national standards are, I think, very different. The reason we approached building standards the way we did is that we felt it was possible to develop a performance standard for all construction in a given region, whereas, for industrial energy use, it is very difficult to say for a specific process that you ought to use no more than this many Btu's per unit of output.

We're working with a much more diverse set of circumstances. The only question is do we need to mandate information reporting when we can get it in a voluntary mode? Our feeling is that we do not have the authority to mandate it any time we want to. If we don't get the cooperation or the reports in, that's what we will do.

Senator TUNNEY. Do you feel that you have the authority under existing law to do everything for which section 4 of S. 1908 provides?

Mr. SANT. Well, let me be clear about that. I think that authority is there. However, it's not anywhere near as explicit as section 4 would be. Therefore, your point is well taken. Section 4 makes very clear what would be mandated, whereas, our existing authority just gives us the ability to ask for reports and get them. It doesn't go into the goals and all of the other survey requirements that are indicated in section 4.

Senator TUNNEY. How many individual companies have you written to?

Mr. SANT. We have worked directly with about 200 companies. We have expanded that recently by writing to about another 150, and our ultimate goal is to have contacted, before the end of the calendar year, a thousand companies. We think by the middle of next year, we will be up to 2,000. Our goal is to hit about 2,000 companies, because that kind of skims the cream of the large companies, the ones who are really large energy users.

Senator TUNNEY. How many responses have you gotten from these firms?

Mr. SANT. So far, no one has refused to respond.

Senator TUNNEY. You received 200 responses?

Mr. SANT. That's right. The only problem is we haven't expanded that far enough yet.

Senator TUNNEY. What are the responses that you get?

Mr. SANT. As I indicated—

Senator TUNNEY. Do you have a copy of the letter, by the way, that you sent to the firms? is it a standard form?

Mr. SANT. No; it's not. In fact, we didn't send a letter. We really asked for their participation verbally. The information that is coming in has never been requested formally. However, I did follow up the initial contacts with a letter in April to all of those firms asking for direct reproting from the companies to FEA. Since that time, we have had considerable discussion with the industry and they have requested that they continue to be allowed to work through their associations in some cases. We're still working it out. I would be happy to provide you with copies of the letters that we have sent.

[The letters follow:]

FEDERAL ENERGY ADMINISTRATION,
Washington, D.C., August 2, 1974.

Mr. W. F. MARTIN,
President, Phillips Petroleum Co., Phillips Bldg.,
Bartlesville, Okla.

DEAR MR. MARTIN: The purpose of this letter is to formally invite you or your designee to a conference on "Energy Conservation in the Petroleum Refining Industry." The conference will be held by the Federal Energy Administration and the Department of Commerce on August 13, 1974, in Conference Room 4203, New Executive Office Building, beginning at 9:30 a.m. This meeting will be one of several we are organizing with key energy consuming industries to develop ways to improve energy efficiency. This effort will play an important role in helping achieve energy independence by meeting national energy requirements with domestic energy resources.

We seek to gain your support and cooperation in establishing a voluntary industrial energy conservation program within the petroleum refining industry. This first meeting is intended to explain the purpose of the voluntary energy conservation program from a Federal perspective and to ask for your participation in evaluating the potential for conserving energy within your industry. The purpose of the meeting is not to reach definitive conclusions. Rather, it is to insure your support in this effort and to establish lines of communication between the petroleum refining industry and the Government.

Following this first meeting we plan to convene one or more workshop sessions in which appropriate industry personnel will be asked to comment on technical papers prepared for the FEA on "Energy Conservation Within the Petroleum Refining Industry." These workshop sessions are to be a forum for technological exchanges and for the identification of major constraints to the rapid realization of energy savings. Dates for these sessions will be established at the meeting on August 13. We also would like to begin discussions leading toward establishment of a voluntary industry-wide energy conservation program which would serve as a focal point for energy conservation activities in your industry.

We also plan to hold another meeting, following the workshop exchanges, with you, other chief executives of your industry and ourselves on September 19. At this meeting, we will draw from the workshop effort appropriate general conclusions as to the conservation potential in your industry, identify specific actions which will lead to achieving that potential, and discuss setting specific energy conservation planning targets within the Project Independence framework.

Attached is an agenda for the initial meeting to be held on August 13. The participation of your corporation is extremely important to the success of this program. We hope that you or your representative can attend. Mr. Roger Sant, Assistant Administrator for Energy Conservation and Environment, Federal Energy Administration, together with Seth M. Bodner, Deputy Assistant Secretary for Resources and Trade Assistance, Department of Commerce, will be representing us at the meeting.

We would appreciate your contacting Mr. John B. Roose, Director of FEA's Industrial Monitoring Program (202/961-8576) to inform us who will be attending the meeting on August 13.

Sincerely,

JOHN C. SAWHILL,
Administrator, Federal Energy Administration.

FREDERICK B. DENT,
Secretary of Commerce.

FEDERAL ENERGY ADMINISTRATION,
Washington, D.C., April 8, 1975.

Mr. H. WILLIAM STRONG, Jr.,
President, Basic Chemicals, A Division of Basic Incorporated,
845 Hanna Building, Cleveland, Ohio.

DEAR MR. STRONG: Voluntary energy conservation by industry is a major component of the President's comprehensive energy plan. The Federal Energy Administration and the Department of Commerce have been working with a number of industries to establish voluntary industry-wide energy conservation programs, goals, and reporting systems. Industry's cooperation in this effort has been appreciated, for, as the President has indicated, if voluntary programs are not successful, mandatory energy conservation measures would need to be implemented.

We believe it is now appropriate and feasible to initiate the company-specific phase of our overall voluntary industrial energy conservation program. This program will involve two basic elements: (1) a company-specific plan including jointly established (government-company) long- and short-range goals and, (2) an FEA developed monitoring system to provide appropriate information on industrial and company energy consumption and efficiency as well as progress in meeting the established goals.

Regarding the company-specific plans/goals, we would appreciate a commitment from your company containing an energy conservation goal for 1980 expressed as a percent reduction in Btu's per unit of output, based upon 1972 base year. Interim goals for 1975 and 1977, with a longer term projection for 1985 should also be included. It is assumed that your 1980 goal would equal or exceed the industry-wide goal which has been generally agreed to by your industry. We plan to review your progress with you and to revise the goal, if circumstances warrant, at least annually.

In order for your company to maximize its energy efficiency, your energy conservation plan must be tailored to your management philosophy and operation. Therefore we are not prescribing means by which you should strive to meet the jointly established goals. A brief individual summary, broken down into whatever categories you believe to be most useful, of your plans, programs, and anticipated results is needed. This should include housekeeping/operation and maintenance measures as well as energy conservation capital projects. For our information, a copy of your energy conservation manual would be useful.

The FEA energy-use monitoring system being developed will provide us with quarterly company-specific data which will, among other things, allow us to monitor company progress against their specific goals. This data will be audited, as appropriate, and used as a vehicle for FEA-company dialogue, and to assist in basic government policy and decision making processes.

We would appreciate your letter of commitment with the information on programs/goals described above and the name of your Energy Program Manager within thirty days. Please direct your response and inquiries to Mr. John B. Roose, Associate Assistant Administrator for Industrial Programs, Federal Energy Administration, Washington, D.C. 20461. Mr. A. A. Lahna, Program Manager, Petroleum and Chemicals, of his staff is available to answer immediate questions and provide assistance, and can be reached at 202/254-9635.

It is our belief that industry can, and will, lead the Nation in energy conservation. The success of this voluntary program would reflect that leadership.

Sincerely,

ROGER W. SANT,
Assistant Administrator, Energy Conservation and Environment.

Senator TUNNEY. I'm interested when you say they have asked if they can report through their associations. What do you mean by that?

Mr. SANT. When we originally set up the program, the objective was to pull together the major companies in industry, work out a reporting system, and have the associations collect the data for FEA; and then submit the data on a total-industry basis. Since the program was started that way, the companies are saying, "We would like to continue in this manner, rather than directly submitting the data to FEA." We have, frankly, some concerns about that. I've been trying to work that out. We want the capability to deal directly with the chief executive officer regarding a specific company's information reporting and energy efficiency goals.

Senator TUNNEY. I am informed that FEA's position is that the individual companies should report directly to FEA, whereas the Commerce Department's position is that reporting ought to be through the trade associations.

Mr. SANT. That's essentially correct.

Senator TUNNEY. But that has not yet been resolved?

Mr. SANT. Well, we did get the Department of Justice in the act to determine whether or not we in fact could encourage reporting through the associations without being in violation of antitrust law. The Justice Department responded that we could not encourage such reporting, we could just tolerate it. That is, we could allow it to happen, but we ought to encourage reporting directly from individual companies where we can. We certainly could allow it if we so desired.

Senator TUNNEY. I can easily understand a desire on the part of you or anyone else not to have the kind of reporting system that is suggested by section 4, simply because it represents an intervention in the free-enterprise system. However, it's a relatively minor intervention, particularly when you consider the level of dependence of the entire Nation on imported oil, and the vulnerability that our Nation is subject to through the foreign policy initiatives of the OPEC countries. It seems to me, that if through a reporting system, a mandated reporting system, you can effect in the short-term greater energy efficiencies which reduce that vulnerability to foreign coercion, we would be serving the best interests of the free-enterprise system; because, I am absolutely convinced that that system in this country can't maintain itself if we are going to have a permanent system of allocation of energy, and we're moving rapidly towards that situation.

Right now, you have a permanent allocation of natural gas by the FPC, and it's going to be curtailed with some cutbacks.

We have a problem now with allocation of fuel oil. It's never been removed. I think that any way that we are able, through a relatively minor intervention to improve energy efficiencies and bring supply in line with the demand as it relates to domestic production of the supply; we're going to be, in effect, saving the free-enterprise system, rather than intervening in a way that would destroy it.

I recognize that it's a question of judgment, but as much as I respect you, I don't think that your answer is terribly convincing to me. I'm not convinced that we have a voluntary system now. You have contacted 200 companies, and to contact another 200 by the end of the year; and maybe a thousand next year, and the end of next year, maybe a couple of thousand. I think that's a fair restatement of what you said. I think we need something much more rapid than that. If the President is asking for a substantial increase in the price of energy, there are some that say if his energy program goes through, it's going to cost \$23 billion. If you can ask consumers to pay \$23 billion additional for energy, I don't know why you can't ask industry to report on the energy efficiencies that they're effectuating.

Mr. SANT. Let me agree with you for the most part. Again, the experience we have had is that there exists substantial cost effective energy saving potential right now. The reason that energy savings aren't being achieved is because people aren't aware of the opportuni-

ties. To the degree you say that companies should conduct an audit of their energy use, and then look at the potentials for saving, I would agree that that is the best way of bringing to their attention the opportunities for energy savings.

We recently looked at a study that examined the major opportunities for conservation on a cost-per-barrel basis—to try and compare them with supply options. We found that with the exception of fixed-rail rapid transit, every one of those conservation opportunities costs something less than \$5 a barrel. To the degree your point is, “Let’s develop those resources that are justified by their costs, on the basis that a barrel saved is the same as a barrel produced, and that therefore conservation is the cheapest source of energy we have, and we have to get every bit of it,” then I completely agree.

I do not think that the reason that we haven’t contacted more firms is that we don’t have mandatory authority to do so. We have gotten cooperation from everybody we have contacted. First, we have been limited by the reporting system. We have been working the bugs out of it and trying to get it to operate more effectively. As soon as we have a good reporting system that gives us the right kind of information, I think we can expand the program greatly. Second, we certainly have budget operating limitations that prevent us from contacting a hundred thousand companies instead of 2,000. I don’t see the lack of mandatory authority as a significant constraint, at the moment.

Senator TUNNEY. Well, I’d just point out that a Library of Congress research fellow did a study for Congressman Moss, which you may be familiar with on the cost of the Administration’s new oil policy. Quoting from the report;

Old oil will immediately rise to an uncontrolled \$12 level, a price determined by the interaction of the tariff surcharge and OPEC cartel tactics. This will cost an estimated \$13.7 billion. If 100,000 barrels per day of extra production will be produced during the first year of decontrol, \$438 million will be added to this \$13.7 billion figure. The complete decontrol costs should also include \$3.3 billion in induced natural gas price hikes as well as \$4.2 billion for coal and bring the total decontrolled bill to \$21.2 billion.

For this we will get an extra 100,000 barrels per day in one year at a marginal cost of \$600 per barrel.

Clearly, when cost is on the basis of decontrols, full economic impact, the evoked incremental crude production appears extremely expensive.

Now, whether you agree with that data or not, there is an incremental increase in the cost of the new oil which is going to be produced as a result of this incentive. Profit incentive which is coming from the decontrolled mode of oil is going to be mighty expensive, whether it’s \$300 a barrel or \$600 or \$250. And I think that it’s a very small price to pay to set up a mandatory reporting system which also gets FEA off the dime, and requires them to send these letters out and requires them to get this report data in and analyze it.

It’s a very small price to pay and it’s going to effect a lot of savings.

MR. SANT. I have to take this opportunity to make at least one comment about that. As I said in the beginning, those are not alternatives. Viewing existing economic conditions, with the price of energy at current levels, let’s assume for the moment that the potential for energy conservation is 30 percent by 1980. I don’t know that that’s

exactly right, but let's say that that's the potential. The reason that you would increase the price of energy would be to recognize, one, that long-term sources of energy are going to cost more anyway—every supply alternative that we look at to replace the now running-out resources of natural gas and oil would cost more than current energy supplies, synthetics will cost more, certainly any of the exotics will cost more and, therefore, we have to expect that energy is going to cost more—and, two, raising the price would immediately increase that 30 percent to something higher. Increasing the potential and achieving the existing potential are two different things.

The first order of business is to try and get as much of that 30 percent as we possibly can. That's what we're talking about today. We must get a higher percentage of that potential.

The second is to create a greater potential. That's the reason you would consider increasing the prices. As you know from previous conversations, our whole approach has been that if we increase the price that we should take all of that increase and turn it back into the economy, to the consumer, business, and so forth. That's why the windfall profits tax was proposed—which we can't seem to get through Congress. If we decontrol we have to have a windfall profits tax to prevent the companies from making windfall profits.

We have to understand the true cost of energy not only now, but to coming generations.

Senator TUNNEY. I certainly agree with the last part of your statement; I have just a few additional questions. You have indicated your preference for tax credits, for stimulating renovation of existing buildings. However, S. 1392 addresses itself to public buildings, libraries, schools, police stations, courthouses, et cetera, so tax credits obviously aren't going to have any effect on them. Many municipalities are having a great difficulty raising revenues just to pay for essential services, and they're not going to spend in the near future substantial amounts of money for capital improvements to create greater energy efficiency in their buildings despite the fact that if you amortize the expenditure you can save the municipality a great deal of money.

They are cutting back on fire and police services. Don't you think that this kind of an incentive will be a stimulus to the municipalities to embark on retrofit programs?

Mr. SANT. I didn't read your bill quite that way. It seems your bill and ours has a defect in that instance. Clearly a tax credit was designed for the homeowner. That's the way we chose to principally achieve savings in this area. The Ways and Means Committee would provide an investment tax credit for commercial buildings as well. That leaves out the building owners that you're talking about.

I think that is a defect. I don't think that can be remedied through additional demonstrations. Demonstrations are to improve technology.

The low interest loans proposed in S. 1908 would also not apply to that particular segment of energy consumers. So, I think you're correct. I don't know how to handle that, but I think it's a good point that neither of our proposals has correctly addressed the need to encourage the retrofit of public buildings.

Senator TUNNEY. Well, I think we can perhaps develop some language which would take care of that problem, because I think this has to be addressed.

Mr. SANT. Someone on the Ways and Means Committee proposed that their 12 percent investment tax credit could be, in effect, a tax refund even though the person or organization was a nontaxpayer. That is, it would not be a credit, but a subsidy available through the tax system.

The bill at this present time doesn't include that provision.

Senator TUNNEY. Is it your feeling with regard to S. 1392 that you don't need any more demonstration projects? In other words that the technology is sufficiently developed, that you just don't need to show what the technology can do to encourage—

Mr. SANT. Not quite that strongly. I'm saying that our priority ought to be to get implemented the measures we already know. But, secondly, to the degree that we do conduct further demonstrations, those demonstrations should be a part of developing national performance standards for all buildings.

That is, if we're going to do demonstrations, let's do them as a part of developing a national standard.

Senator TUNNEY. I agree with that. I'm very sympathetic to that. But, then I think that can be changed. The language of the legislation can be adjusted to direct our attention towards a coupling of the technology with the national-standards program.

Mr. SANT. That's true. However, it might be better to embody it all in the one bill, but that's only a matter of legislative preference. We wouldn't disagree with that approach at all.

In our standards act we do call for significant demonstrations to achieve the performance standards. I really believe that one of the finest energy conservation steps we could take would be to get an effort going in that direction, particularly if we use demonstrations for that purpose.

Senator TUNNEY. You see, Section 6 of S. 1392 says that Governors of the 50 States and executives of municipalities may submit requests for grants for retrofitting buildings owned by the respective States and municipalities. Requests for grants shall be submitted to a panel. It makes money available for that retrofit.

And you oppose that?

Mr. SANT. As I read it, it was more for the purpose of demonstration than the purpose we just discussed.

I think I agreed we have a whole sector of energy consumers out there we haven't provided for; and to that degree, I would share that objective personally.

Senator TUNNEY. Well, what if we put the emphasis on the demonstration of the energy savings rather than a demonstration of the new technology? Do you think that FEA could support that proposal? I mean, for instance, let's say you have in my State, two cities, one adjacent to the other. They have municipal courthouses. And you gave a demonstration grant to one which showed that you could have substantial energy efficiencies through a retrofit program. And let's say that they saved \$25 to \$30,000 a year in heating fuels.

Mr. SANT. Oh, sure.

Senator TUNNEY. Maybe \$50,000. But that certainly would encourage, I would think, the neighboring city to effect the same kind of savings in their municipal courthouse.

Mr. SANT. I would like to do some further work on proposals directed at that sector of consumers, if you choose to move toward that approach.

I just recognize the need; I don't have it all together. A program which defined the particular amount of subsidy or the particular amount of grant provided for any project may be a better approach than the demonstration approach.

I don't have any idea of the magnitude of the numbers. I don't know how much that sector accounts for in my head. I would like to put that together.

Senator TUNNEY. OK, we'd like to have your report later on that. I would just like to tell you about my experience with other representatives of the Administration in regard to proposals that I had to have some demonstration-grant money for the construction of rather large, 200-ton-per-day solid waste conversion plants and the Administration's statement was, "Well, we have model plants now operating. Two-and-a-half-tons a day. We don't need it. The technology has been demonstrated. We don't need it."

The fact was that it was never demonstrated in scale; and as a result, you have many cities which refuse to spend their money or contract with a private entrepreneur to agree, for instance, to sell their solid waste for 10 to 15 years when they did not know what the cost was going to be or what the potential profits or savings would be in the sale of the solid wastes as a result of land-fill disposal or incineration or something of that nature.

Mr. SANT. I understand what you're saying. It's a valid point.

I'm saying, in the Federal Government we're just turning down thermostats and delamping and saving 20- or 30-percent of the energy used in buildings. Until we get that, which is at no cost to anyone—just getting the word out—I'm not very comfortable with proposals for massive programs which would put money into it.

Senator TUNNEY. Not massive programs. \$10 million.

Mr. SANT. That's not going to do very much either. I have a personal view that because we are so far from achieving what is there, I would really like to see more priority put there than I would on a continuation of our present demos and technology approaches.

That's a simple point, not a complex point.

Senator TUNNEY. Could you supply for us what demonstrations you have ongoing?

Mr. SANT. Yes.¹

Senator TUNNEY. I'd like to see what demos you have both for new technology and to demonstrate energy efficiencies.

Mr. SANT. Would you like me to include the rest of the executive branch as well, GSA and ERDA?

Senator TUNNEY. Would you?

We don't want to be duplicative.

Mr. SANT. I'll coordinate it.

Senator TUNNEY. Why would it take 3 years to develop performance standards for a residential building and only 18 months for such standards for commercial buildings?

Mr. SANT. That is under some discussion now. One reason why we chose 3 years was because in the first phase we are going to

¹ See p. 70.

develop component performance standards which means that instead of looking at the total building and establishing a Btu per square foot, we would be setting performance standards for each component in the house, such as a wall, a ceiling, and so forth.

Because we would develop standards for that first phase, which would take some time, we put off completion of the performance standard for residential buildings.

If we eliminated that first phase and didn't go through the component performance standard phase, we could develop residential performance standards approximately on the same time scale as for commercial buildings. That alternative is under consideration now.

Senator TUNNEY. Why can't you eliminate the prescriptive standards entirely which are in the intermediate stage, and accelerate the development of performance standards?

Mr. SANT. That is a good question. That is what I was just addressing. We changed prescriptive to component performance and now we are considering the possibility of eliminating that first phase altogether.

Our friends from the American Institute of Architects have made a strong case along that line and we are considering that. We have had some discussions on the House-side about this possibility. It is not determined yet, because HUD, at the moment, holds a different view. They believe that we ought to go with the first phase.

Senator TUNNEY. As you probably know, last week the Commerce Committee approved a bill requiring the disclosure of estimated annual operating costs for new residential construction. That bill will now be referred to the Senate Banking, Housing, and Urban Affairs Committee, which also is considering the energy conservation building standards legislation.

In a June 6 letter to the Commerce Committee, you indicated your support of residential energy labeling in conjunction with the establishment of standards.

Do you have any plans to actively encourage incorporation of the Home Energy Disclosure Act into the standards bill by the Banking Committee?

Mr. SANT. It was our assumption that the standards bill did that, that we didn't need to enact separate labeling provisions because there would already be a standard in existence. We are convinced, however, that even though there is a standard, people could exceed that standard. Therefore, we ought to be able to differentiate. That is a good point. I don't think we would have any objection to putting a performance label on a building, once the builder has certified that it has been built to the minimum standard. The purchaser could then compare that against an alternative building.

We have no problem with that at all.

Senator TUNNEY. I want you to know that I feel that you have shown great leadership in trying to promote energy conservation programs in the Federal establishment, as well as in the private sector. I think this is a very important thing. I would like your proposal that relates to the efficiency standards for housing.

I think it is extremely important that you suggest the incredible savings that can be realized.

I want to thank you very much for being here. We will try perhaps to come to some agreement on the thrust of these bills and if we can't agree, we will have to see what a majority of the Committee feels about them. Thank you very much.

Mr. SANT. Thank you.

[The statement follows:]

STATEMENT OF ROGER W. SANT, ASSISTANT ADMINISTRATOR FOR ENERGY
CONSERVATION AND ENVIRONMENT, FEDERAL ENERGY ADMINISTRATION

Mr. Chairman, and Members of the Committee: I appreciate this opportunity to appear before you today to present the Federal Energy Administration's views on S. 1392, the "Energy Conservation in Buildings Demonstration Act of 1975" and S. 1908, the "Industrial Energy Conservation Act of 1975," as well as to discuss the Administration's proposed "Building Energy Conservation Standards Act of 1975." I would also like to express appreciation for the Committee's continuing interest in energy conservation. There is still much to be done and every proposal should be explored thoroughly.

Each of these three bills deals with distinct opportunities for energy conservation. I will state at the outset that FEA is in firm agreement with the objectives of the two bills introduced by Senator Tunney—that is, to increase the energy efficiency of existing public buildings and industry. However, we foresee some specific problems with the programs and policies proposed by S. 1392 and S. 1908 which prevent us from supporting their enactment at this time.

In my statement, I will discuss each of these proposals separately and will specify the objections we have to their enactment.

Let me begin by focusing on those two proposals which would directly impact the buildings sector—S. 1392 and the Administration's Building Energy Conservation Standards Act.

Space heating and cooling of buildings accounts for about 18 percent of total U.S. energy consumption.¹ It is in this area where the greatest potential for building energy conservation exists.

The greatest long-term potential for energy conservation in buildings clearly lies in improving the design and construction of new buildings.

However, over one half of the existing U.S. housing stock was built before 1949, before the existence of any thermal standards for buildings. For the short term, we must, therefore, focus on opportunities for conserving energy in existing residential, commercial and public buildings.

Studies have shown that as much as 40 percent² of the heating and cooling energy consumed in buildings is unnecessarily used due to inefficient design, operating practices, and equipment, and excessive lighting, heating and cooling levels.

Although it is sometimes difficult, there are numerous opportunities for significantly reducing the energy used in most existing buildings.

These savings can be achieved not only by improving operating procedures, but also, in many cases, by retrofitting existing structures with insulation, double glazed windows and new, more energy efficient, heating, ventilating and air conditioning systems. For large public buildings a major retrofitting effort can be both extremely complex and expensive, but the cost savings achieved through reduced energy consumption should more than compensate for the initial expense when the project is viewed over the useful life of the building.

We believe the Federal sector can and should play a leadership role in demonstrating the value of conservation in buildings.

For these reasons, Federal agencies have instituted many programs both to achieve major energy savings and to encourage the adoption of energy conserving practices in the public buildings controlled by State and local governments. For the most part, these initial efforts have concentrated on changing the traditional operating practices of building managers by encouraging adjustments in thermostat, ventilation and lighting levels. These simple measures have resulted in savings averaging between 11 percent and 25 percent.³ We are convinced, however, that far greater savings can be achieved

¹ Buildings account for 32 percent of U.S. consumption. Fifty-seven percent of building energy use is for space heating and cooling. $.32 \times .57 = 18.24\%$ of U.S. consumption. FEA, *Project Independence Report*, November 1974, Appendix A III, p. 123.

² Department of Housing and Urban Development, *Residential Energy Conservation* (A Summary Report), HUD-HAI-8, July 1974, p. 22.

³ Federal Energy Administration, *Federal Energy Management Program*, Annual and Quarterly Reports.

in many buildings through the institution of a well-defined and executed retrofit program. S. 1392, the "Energy Conservation in Buildings Demonstration Act of 1975," would promote energy conservation in existing buildings by instituting a demonstration program for retrofitting selected Federal, State and municipal buildings with energy conserving materials and systems, using promising innovative technology to the maximum extent possible. We agree with the basic objective of this legislation.

A large percentage of public office buildings, hospitals, and other structures, which are in use in 1975, will still be standing and in use up to 40 years from now. These structures should be the focus of Federal efforts to reduce consumption because they not only can economically be made more thermally efficient but also because they are highly visible to the general public. We are convinced that through the adoption of energy conserving practices and, in many cases, the retrofitting of existing structures, public institutions can realize both substantial energy and dollar savings. Such savings would not only contribute to national energy independence but would also lessen the burden of higher energy costs on those public institutions that are already pressed by other financial difficulties. The actions necessary to conserve energy are well known, and yet they have not been adopted by most institutions. We see, as a part of our mission, the provision of information to such institutions to ensure that the costs and benefits of energy conservation are well understood and, in doing so, to motivate energy conservation actions. Federal agencies have taken the lead by adopting numerous energy conserving practices.

Last fall the President, as a part of this effort, called for all Federal agencies to examine their facilities and operations for energy conservation potential. Additionally he asked the Administrators of GSA and FEA to recommend to the Energy Resources Council a multi-year program to increase energy efficiency in all Federal facilities and operations.

In response to this second request, FEA and GSA are currently in the process of preparing their report to the Energy Resources Council. This report, expected to be completed by the end of next month, will identify specific long-range opportunities to conserve energy in Federal facilities and operations.

A great deal of effort has been expended by eleven working committees to investigate major energy intensive Federal activities and operations. Their assignments range from telecommunications to motor vehicle operations, and they are now drafting reports that identify various strategies to achieve energy efficiency and determine the funding, legislative and other actions needed for implementation.

This committee effort, drawing on the collective expertise of numerous Federal agencies under the leadership of FEA and GSA, is being overseen by a steering group composed of 22 agency members at the Assistant Secretarial level.

Several of the working committees are looking at various aspects of buildings and facilities and are developing analyses and methods to improve operations and maintenance, implement modifications or retrofitting, develop new design, siting and utilization criteria and identify research and development opportunities.

By way of an example of the information being developed, preliminary indications are that implementation of the conservation possibilities dealing with Federal office and warehouse facilities alone could save a significant amount of oil equivalent per year by 1985 and if the same actions being investigated were adopted by the private sector commensurate savings could be realized. We feel that this program, coupled with the existing contract authority of FEA and ERDA and the state/Federal energy conservation program announced last week, will be sufficient to accomplish the objectives of S. 1392. Therefore, we oppose the enactment of S. 1392 at this time.

With regard to new buildings, I would like to briefly review the President's proposal for mandatory standards, the "Building Energy Conservation Standards Act." This proposal is particularly important because by 1990 about 50 percent of all residential and commercial space will have been constructed after 1974.⁴ One estimate⁵ has indicated that adoption now of energy conserving design practice could reduce the heating and cooling energy consumption of single family dwellings by 35 percent, of high rise multi-family structures by 24 percent and of commercial buildings by 32 percent. A Federal building being constructed by GSA in New Hampshire will save 69 percent compared to the current average for commercial buildings.⁶

⁴Project Independence Report, Energy Conservation Task Force Report, Volume 1, *Residential and Commercial Energy Use Patterns, 1970-1990*, November 1974, pp. 47, 62.

⁵HUD, *Residential Energy Conservation*, *ibid.*

⁶GSA energy goal for new Federal Building, Manchester, New Hampshire (55 million Btu's per square foot per year) compared to commercial building average (180 million Btu's per square foot per year), FEA, *Residential and Commercial Energy Use Patterns, 1970-1990*, *ibid.*

The building standards would be developed and promulgated in three phases:

Phase 1 would develop component performance standards for residential dwellings.

Phase 2 calls for minimum performance standards for energy conservation in commercial buildings.⁶

Phase 3 requires minimum performance standards for energy conservation in residential buildings to supercede the *component* performance standards promulgated in Phase 1.

Standards for Phases 1, 2 and 3 would be developed by the Department of Housing and Urban Development in conjunction with the Federal Energy Administration, the Energy Research and Development Administration, National Bureau of Standards and the General Services Administration. The bill provides for consultation with Federal, State and local government agencies, industry, labor and consumer groups. These efforts would be coordinated with what is being done in the private sector and at State and local levels, such as the efforts of the American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE) and the National Conference of States on Building Codes and Standards (NCSBCS).

The legislation would require States to certify that the new standards have been incorporated into local building codes and that they will be enforced. If within a specified period of time a State has not certified that the Federal energy conservation standard is being adopted and implemented by the appropriate local or State code jurisdiction, Federal financial assistance for construction of new buildings would not be approved for that area. Grants will be available to States to assist in planning and implementing the program. The standards development process will be augmented with a demonstration program.

If enacted promptly, this proposal would result in a reduction in imports of more than 300,000 barrels per day by 1985,⁷ and these savings would continue to grow into the future. Clearly, this proposal is not only of major importance to the achievement of energy savings within the next 10 years, but it will also help us better meet the Nation's energy needs beyond 1985. In summarizing my remarks about building energy conservation, I would like to reiterate that we agree with the basic objectives of S. 1392. The efforts to formulate a multi-year program within the Administration are nearing completion and should provide the basis for a substantive comment on the bill later this year. What should not be delayed, however, is action on Title X of the President's Energy Independence Act of 1975, the "Building Energy Conservation Standards Act."

I would now like to turn to S. 1908, to present our views on that bill.

S. 1908, the "Industrial Energy Conservation Act of 1975," addresses three of the most important elements of industrial energy conservation:

1. Management of available resources to achieve improved energy efficiency;
2. The development of more energy efficient processes and equipment; and
3. The problems associated with capital formation and investment in energy efficient processes and equipment.

Section 4 of S. 1908 would establish under the Secretary of Commerce a mandatory energy efficiency reporting system, including the establishment of industrial energy efficiency targets. We believe the purposes of this section are being carried out through existing programs established by FEA and the Department of Commerce. I will address this point in more detail in a few moments.

Section 6 would establish a comprehensive program of research, development and demonstration within ERDA devoted to energy conserving industrial technologies. Recognizing the great need for such R & D, and the legitimate leadership role to be played by the Federal Government, we would support such initiatives, generally. However, I would like to defer to the Energy Research and Development Administration any detailed discussion of the intimately related issues of developing new and more energy-efficient technology.

Sections 7, 8 and 9 would establish within the Department of Commerce a program of Government loans and loan guarantees, directed largely at small firms located within depressed areas. The modest scope and short life of this program, however, would probably not have substantial impact outside of that universe. On the other hand, a massive program of industrial loans and guarantees could have adverse effects due to the consequent distortion of normal market forces. Until industry achieves a greater share of the energy savings already justified by higher energy costs, we would oppose such incentives as unnecessary.

⁷ The President's State of the Union Message and Fact Sheets.

Returning to *Section 4*, I wish to note that under the FEA Act of 1974, this agency is required to "develop and oversee the implementation of equitable voluntary and mandatory energy conservation programs and promote efficiencies in the use of energy resources" (Section 5(b)(7)). In the balance of my remarks I would like to review the FEA's activities and programs pursuant to this mandate.

It is the Administration's position that mandatory regulations are not yet necessary, but that we will invoke the information gathering authority available under Section 13(b) of the FEA Act, or seek additional legislation if progress under our voluntary program is not satisfactory.

The basic voluntary program to which I refer is a joint venture of the FEA, Department of Commerce, and industry. It is focused on ten of the most energy-intensive industries which together account for about 55 percent^{*} of industrial energy consumption. These industries are: aluminum, baking, cement, chemicals, copper, glass, meat packing, paper, petroleum refining, and steel.

FEA and Commerce have organized and held meetings and workshops with over 200 industrial firms and 20 trade associations representing the bulk of the production capacity within these 10 industries. The purpose was to assess the energy conservation potentials within each industry and establish industry energy conservation programs, including energy efficiency goals.

Follow-up meetings at the Cabinet and Chief Executive Officer level were then held and top-level management commitments obtained to implement industry-wide and company-specific energy conservation programs. Preliminary industry-wide conservation goals for 1980 (relative to baseline year 1972) were determined and agreements reached with industry for the monitoring and reporting of energy conservation progress in cooperation with appropriate trade associations.

The year 1972 was selected as the baseline because energy consumption data for 1972 is not distorted by the effects of the 1973-1974 embargo or the subsequent fuel cost escalation.

Had 1974 been selected as the baseline year, as this bill proposes, the basis for setting goals and for measuring progress would have been measurably different. Companies which responded to fuel shortages and increased prices quickly and resolutely achieved a degree of energy efficiency improvement *prior to 1974*. Hence, the apparent progress of these companies is diminished when measured against a 1974 baseline. On the other hand, companies which did not effect substantial improvements early, will appear to achieve greater relative increases in energy efficiency when measured against a 1974 base.

Thus, with 1972 as a baseline all industries and companies start from a common set of initial conditions. Inequities arising from the use of a later baseline period, due to the embargo and subsequent events, consequently are virtually eliminated.

The sequence of meetings between FEA, Commerce and industry to which I have referred were held in two distinct groupings. The first series included aluminum, cement, chemicals, paper, petroleum refining, and steel, and was held in the latter half of 1974. The second series included baking, copper, glass, and meat packing and was concluded in the first half of 1975. Preliminary reports on progress toward 1980 energy efficiency goals have been received from trade associations representing the first six industries. Reports from the remaining four are scheduled for later this year. The industry-wide goals, based on 1972 performance, range from 10 percent for aluminum, cement, paper and steel, to 15 percent for chemicals and petroleum refining. Actual improvements reported thus far range up to 7.8 percent for the petroleum refining industry and 7.5 percent for chemicals. (The industry reports are summarized in Table I, below.)

^{*}Project Independence Report, Energy Conservation Task Force Report, Volume III, *Energy Conservation in the Manufacturing Sector, 1954-1990*, November, 1974, pp. 1-3.

TABLE I

Industry (trade association)	1980 goal (%)	Energy efficiency improvement (%)
Aluminum (The Aluminum Association, Inc.) -----	10	¹ 3.4
Cement (Portland Cement Association) -----	10	1.6
Chemicals (Manufacturing Chemists Association) ----	15	7.5
Paper (American Paper Institute) -----	10	2.5
Petroleum refining (American Petroleum Institute) ----	15	² 7.8
Steel (American Iron & Steel Institute) -----	10	2.7

¹ Denotes 1973 vs. 1972 baseline; all others are 1974 vs. 1972.

² Denotes BTU/unit input; all others are BTU/unit output.

[NOTE: All figures based on information supplied by the trade associations.]

Apart from the ten industries currently participating in the joint FEA-Commerce program, the Department of Commerce is also working with 13 other trade associations and has preliminary plans to expand this effort to 40 industrial and 10 commercial trade associations.

In summary, may I reiterate that we support the basic objectives of Section 4, namely to increase the efficiency of energy use in the industrial sector. However, we feel that the provisions of this section are duplicative of existing programs established under the Federal Energy Administration Act of 1974 and that mandatory programs are not required at this time. Further, we believe that on-going joint programs of the FEA and Commerce in this field meet the basic objectives of S. 1908, Section 4. We would, of course, appreciate your support of these existing initiatives.

That concludes my prepared remarks. I very much appreciate the opportunity to present our views, and thank you for your interest. I would be pleased to answer any questions.

[The following information was referred to on p. 64:]

The attached is a list of some of the Federally sponsored demonstration projects underway related to energy conservation in the building sector.

Each project is actually a physical illustration of a technique designed to conserve energy. There are many other programs in FEA and elsewhere which are based on the simulation or mathematical modeling of energy conservation measures in buildings. For all the energy conservation measures studied in this manner, the actual savings in energy can also be determined by physical measurement. The projects listed are presently underway and do not reflect the broad range of future projects now being planned within ERDA, FEA and other Federal agencies.

The guiding principle in selecting projects for demonstration is that the Federal Government should provide overall leadership in this field, but undertake only those efforts that industry would not initiate independently. As a given technology approaches commercialization, the role of the private sector will be paramount.

FEDERAL ENERGY ADMINISTRATION

1. INSTRUMENTATION SYSTEM FOR THE MANCHESTER OFFICE BUILDING

During the latter part of 1972, Commissioner Arthur Sampson of the General Services Administration (GSA) designated a Federal Office Building to be built in Manchester, New Hampshire, as an energy conservation demonstration project. The purpose of this project is to (a) dramatize the firm commitment of the Federal Government to the conservation of energy in the design, construction and operation of government buildings; (b) provide a "laboratory" for the installation of both recognized and innovative energy conservation technologies (with a goal toward obtaining at least 20 percent energy saving relative to other comparable buildings); and (c) inspire others in the building industry to pursue energy conservation as a goal. FEA funded the instrumentation.

HOUSING AND URBAN DEVELOPMENT/FEDERAL ENERGY ADMINISTRATION

2. MOBILE HOME RETROFIT (OAK RIDGE NATIONAL LAB)

The investigation of the mobile home from an energy consumption standpoint is intended to determine the thermal characteristics of a typical mobile home, to demonstrate analytical tools for predicting the thermal performance of mobile homes in different climate regions, and to evaluate various manufacturing and retrofitting modifications that might be made to reduce their heating and cooling energy requirements. Experimental data are being collected under both heating and air conditioning operation. The results are being used to confirm or provide a basis for modifying a computer program that is under development. The computer program will then be used to estimate heating and cooling energy requirements for mobile homes, constructed to different thermal standards, and located in any climate region.

FEDERAL ENERGY ADMINISTRATION

3. ENERGY CONSERVATION MANUAL DEMONSTRATION

The Federal Energy Administration has been directed by Congress to analyze total national energy usage and formulate policy and stimulate action which will increase domestic energy supplies and decrease energy demand. To assist in the overall effort to reduce national energy demand the FEA retained Dubin-Mindell-Bloome Associates, P.C. Consulting Engineers and Planners on July 1, 1974 to study national energy usage in buildings and identify viable energy conservation measures, together with the resulting costs and benefits. The conclusions of these studies are compiled in two energy conservation manuals, ECM-1 and ECM-2, for public use.

An Architectural and Engineers Services Contract has been awarded for the application, testing and demonstration of an Energy Conservation Manual for Commercial Buildings.

The general intent of this project is to provide the professional services required to test the manual, through application, to demonstrate its strengths and effectiveness as a device for guiding the professional consultant and the building owner/manager through the decision making stage regarding implementation of energy conservation measures.

HOUSING AND URBAN DEVELOPMENT AT NATIONAL BUREAU OF STANDARDS (NBS)

4. MODULAR INTEGRATED UTILITY SYSTEMS (MIUS) FEASIBILITY DEMONSTRATION

The overall purpose of the contract is: (a) to provide key assistance to HUD for the site selection of a feasibility demonstration and to manage certain aspects of the initial demonstration activities as requested by HUD; (b) to develop an overall demonstration evaluation plan and to prepare bid packages for the design and installation of a monitoring/information system; (c) to review and evaluate contractor designs of Modular Integrated Utility System, and conduct tests of MIUS equipment and to collect, analyze, evaluate and disseminate data collected from the MIUS plant.

5. ENERGY DEMONSTRATION OFFICE BUILDING

The objective of this project is to perform energy consumption analyses during the design stage and to show energy savings by comparing alternative construction, and mechanical and electrical systems.

It was estimated that 20-40 percent less energy would be needed in an office building that was designed to conserve energy while providing needed services, as compared with conventional buildings.

Computer runs (more than 40) simulating hourly energy consumption patterns covering a one year period were completed. Results were transmitted to GSA and the architectural/engineering firms and they were incorporated into final plans and specifications.

6. NEW BUILDING ENERGY DESIGN

The purpose is to work with architects and engineers employed by the respective agencies in such a manner that the various design alternatives with respect to buildings shells and heating, ventilating and air-conditioning (HVAC) systems can be evaluated

by the comprehensive computer program called NBS Load Determination (NBSLD) to obtain the optimum configuration from the standpoint of the life cycle cost.

7. RETROFIT HOUSING TO SAVE ENERGY—MOBILE HOMES

The plans for fiscal year 75 call for completion of the single-width mobile home tests in the environmental test chamber and completion of the double-width type mobile home tests in the environmental test chamber. This project is being conducted in cooperation with FEA.

8. BOWMAN HOUSE

The objective of this overall study is to demonstrate the performance of selected retrofit actions to act as a verification of the different conservation models being used for policy decisions.

The Bowman House's performance was measured as is. Selected modifications, such as additional insulation, solar shading, storm windows, and exchanging the oil furnace with a heat pump, will be carried out with intermediate measurement periods to evaluate individual actions.

Energy saving modifications will be performed in stages, each followed by a winter heating energy measurement. This will permit the separate energy savings for each stage of retrofitting to be quantified. A summer cooling energy measurement will be performed after retrofitting a heat pump for heating and cooling to replace the oil-fired warm air furnace now present in the house.

9. EXISTING BUILDINGS' ENERGY ANALYSIS

Energy use in NBS buildings has been simulated by a computer model and the actual measurement of the buildings' energy use has verified the computer estimation. Specific subsystem alterations are presently being evaluated both by model and experiment.

This study is determining how to reduce energy use by permanently incorporated alterations to the building systems and plant operations.

10. INTEGRATED SOLAR ENERGY SYSTEMS

During fiscal year 74 the five-bedroom townhouse was moved from the laboratory to a field site on the NBS grounds. Instrumentation was reinstalled and measurements under winter weather conditions were made, including air infiltration tests and infrared photography. An addition was built to house instrumentation and to serve as a simulation of a next-door neighbor's house. A solar energy measurement system, and test plans, were devised.

DEPARTMENT OF AGRICULTURE

11. FOREST SERVICE, USDA

The purpose is to develop, test and evaluate wood-frame house construction that minimizes heating and cooling energy requirements by optimizing the interaction of all components of a wood-frame house.

12. USDA ENERGY CONSERVATION

Purpose is to develop improved solid fuel heating systems such as stoves and fireplaces that will allow greater utilization of wood and other solid fuels.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

13. SOLAR HEATING/COOLING DEMONSTRATION

The development of a Solar-Powered Residential Heating and Cooling System.

This effort demonstrates the engineering feasibility of utilizing solar power for residential heating and cooling.

Senator TUNNEY. It is my understanding from the staff that Mr. John Eberhard, President of the American Institute of Architects' Research Corporation, can't be here after lunch.

The Commerce Committee is going to have an executive session at 11 o'clock.

I wonder if Mr. Matzke would be able to come back at, say, 1 o'clock?

Mr. MATZKE. Fine.

Senator TUNNEY. We will reconvene here at 1 o'clock.

Mr. Eberhard, we have got about 12 minutes or so and your statement will be incorporated into the record, and you can read it or you can summarize.

**STATEMENT OF JOHN EBERHARD, PRESIDENT, AMERICAN
INSTITUTE OF ARCHITECTS' RESEARCH CORPORATION**

Mr. EBERHARD. I prefer to summarize.

I think after the previous testimony it might be appropriate to simply give you the basic philosophy of the American Institute of Architects on both of these actions. I would like to begin by clarifying what we believe to be a misconception regarding the nature of the energy problem in buildings.

The misconception is that buildings use energy because they have mechanical and electrical systems in them. That is a misconception because the prior question has not been asked very often; namely: Why do buildings have mechanical and electrical systems?

The answer to that question is fairly obvious. It is because buildings provide for human comfort even when the climatic conditions would tend to make it uncomfortable for people to work or live or worship or play. That is the reason we use energy to heat and cool buildings.

That has not always been true, as you can well imagine, Senator. For thousands of years, it was necessary for architects to design buildings to provide for human comfort conditions without the benefit of mechanical and electrical systems.

It has only been since 1880, about the time that petroleum was discovered as a source of energy, that it was possible to utilize heating, air-conditioning and lighting systems to provide for human comfort.

It has been only the last 30 years or so that we as architects have made some unwise decisions. We have designed buildings without paying much attention to what we have known for a long time about human comfort conditions and adaptation to climate. We have produced, for example, glass boxes for office buildings, which were difficult to heat and to cool. It was impossible to overcome these decisions with mechanical and electrical systems even when energy was at a low price. We now realize that it is time to rectify those mistakes, but we do not believe that it would be sensible to initiate standards that would freeze the state of technology at a level of use, which is not sensible. That is our specific concern with Title 10.

Since this testimony was prepared, we have had some good conversation with Roger Sant and Charles Ince of the Federal Energy Administration and we understand, as Mr. Sant indicated this morning, that there is a definite move within the Administration to move directly to performance requirements for energy conservation, rather than to specifications or prescriptive standards.

Although we favor this approach we would be more satisfied if there were no mandatory Federal standard. We don't quite understand, Mr. Chairman, why the Administration feels it is inappropriate to have mandatory requirements for industry to produce data; certainly

not a very big burden to the industry, and yet they feel it is appropriate to have mandatory standards issued by the Federal Government (the first time in the history of building regulatory procedures) and enforced by the States in a way which we believe would become, a burden potentially, to ourselves and our clients.

We therefore are much happier with the basic concept of your bill S. 1392, which says, "let's do some more demonstration." We would also be in favor of more demonstration of ways to approach energy conservation in buildings, and to use Federal, State, and local office buildings for those demonstrations. This would be appropriate after we have developed better models and we have a better understanding, than any of us have right now, about what would be sensible to do about energy conservation. Then we could feel that we were moving in the right direction.

In summary, we believe that the position of the American Institute of Architects, as expressed in some of our previous testimony of offering tax incentives rather than the approach of relying on those industries and clients who pay taxes as a stimulus to energy conservation programs, would be more appropriate than using the stick of Federal regulatory processes for requiring that energy conservation be met in buildings.

We also support S. 1392 as a concept of utilizing demonstration for the purposes of serving as models for both the private sector and the public sector, to use in the future for energy conservation purposes.

Senator TUNNEY. What do you feel can be saved by the housing industry in space heating and cooling with new designs, with better installation?

Mr. EBERHARD. You said housing. I assume you are distinguishing between the opportunity for saving energy in housing as distinguished from other buildings?

Senator TUNNEY. Yes; residential housing.

Mr. EBERHARD. We are only estimating. I think more demonstrations and experiments are needed. We estimate in new housing it would be possible to save as much as 60 percent of the energy that is now being utilized if you use as a model for that most of the housing that has been built in the last few years, and you consider housing across the country, in northern climates as well as in warm climates.

Senator TUNNEY. Why is it that the Government cannot establish a foundation by the standard setting process, to assure that the builders are going to conform to at least a minimum level of energy conservation?

You see, I am not worried about the conscientious builder. What I am worried about is the one who wants to save a little bit of money by putting that much less insulation in the home, and unfortunately, the person who is trying to cut corners is also the one who causes the greatest energy problem.

Why can't we just make sure that everybody at least meets a minimum standard?

Mr. EBERHARD. It is important to distinguish here, Mr. Chairman, between residential areas and nonresidential areas. You again are addressing housing in residential areas.

Senator TUNNEY. You distinguish between the two?

Mr. EBERHARD. I think for the purposes of housing, we would accept the notion that there should be a national performance level or some index of energy utilization. We also would be inclined to accept the notion of a performance requirement for nonresidential buildings that would be promulgated by the Federal Government, but not legislated as mandatory as under the provisions of our Constitution, as you are well aware.

It is the State's police power that is used to enforce local building codes and regulations. We would prefer that that is where the power remains and that the power not be replaced by Congress in a Federal agency with the stick of withholding Federal funds, if local, State or organizations don't comply.

We would accept, however, a performance standard which would be of service to the Nation, developed by FEA and HUD and promulgated as a model for the national standards we would accept.

We do not like the idea that it would become law.

Senator TUNNEY. The only problem is that energy is a national problem. It is not a local problem. We get 40 percent of our oil from overseas now, and we are about to start our strip mining to a far greater extent than we have done it in the past in the Midwestern States and other places.

That coal doesn't stay there. It goes all over the country. And when they use a State like California as a conduit for Alaska oil, it is going to be shipped to the Midwest with all the attendant spills and other environmental effects.

That is the national problem, not a California problem, or a Los Angeles problem, or a San Francisco problem.

So I think your analysis falls short in the sense that if you have a national energy problem than it seems to me that you can't leave it up to local prescriptions to develop the standards of energy efficiency. It has to be a national program.

Mr. EBERHARD. If Congress feels that there should be a national program, then our feeling is that that program address performance requirements rather than prescriptive requirements.

Senator TUNNEY. Right. We appreciate that.

The Commerce Committee executive session begins now.

Thank you for coming. We may want to send you some more questions if we could. Would you respond to them in writing?

Mr. EBERHARD. Yes; of course.

Senator TUNNEY. The hearing will recess until 1 p.m.

[The statement follows:]

STATEMENT OF JOHN P. EBERHARD, PRESIDENT, AIA RESEARCH CORPORATION, ON
BEHALF OF THE AMERICAN INSTITUTE OF ARCHITECTS

Mr. Chairman, my name is John P. Eberhard. I am President of the AIA Research Corporation, a not-for-profit public benefit corporation established by the American Institute of Architects. I speak today for the members of the American Institute of Architects, the professionals who will be responsible for much of the program implementation in energy conservation now being designed by Congress, and for the AIA Research Corporation.

The American Institute of Architects shares with the Administration and the Congress a concern that this nation recognize the need for a major effort in the conservation of energy. We have for some time now advocated an emphasis on conservation as contrasted with attempts to stimulate an increase in the production of oil and natural gas or an increase in the capacity of electric power generation. We have issued two major reports outlining just how valuable it would be to the nation to have energy

efficient buildings and how economically, politically, and administratively feasible such a strategy would be. These two reports are entitled:

(1) Energy Conservation in the Built Environment: A Gap in Current Strategies;
and

(2) A Nation of Energy Efficient Buildings by 1990.

I have several copies of these reports with me and I will leave them for the Committee's use. We suggest in these reports that it is potentially possible to reduce energy consumption in buildings by the equivalent of 12.5 million barrels of oil per day. We have pointed out that if the nation were to achieve these savings, or any substantial portion of them, that they would be permanent savings which would continue indefinitely. This contrasts sharply with making an equivalent investment in increasing the supply of energy only to have it wasted unnecessarily in buildings which are not well adapted to energy use and subsequently are over-heated, over-cooled, and over-lighted.

The AIA has recently asked the policy research consulting firm which worked on our reports (Charles W. Williams, Inc. of Alexandria, Virginia) to evaluate for us the costs and benefits to the nation of an immediate incentive program for launching us toward the goal of a nation of energy efficient buildings by 1990. The basic concepts of this immediate initiative were presented to Congress on March 20, 1975, by William Marshall, Jr., the President of the American Institute of Architects, in testimony before the Senate Banking, Housing and Urban Affairs Committee.

Our program advocates a tax incentive approach to encouraging energy conserving design decisions in both new and existing buildings—as distinct from the regulatory standards approach for new buildings advocated in Title X of S. 594.

(a) The AIA program would stimulate two million to three million jobs in the construction industry and the industries which supply materials, and sustain them over a fifteen year period.

(b) If seven percent of our existing inventory of buildings (which is estimated to be about 70 million buildings in total) were redesigned and retrofitted with energy conservation features each year, and all new buildings were designed and built with energy conservation in mind, we would save 4.65 billion barrels of petroleum within the first five years. These savings would then continue year after year without additional cost or reduced standards of living.

(c) To the American public, these savings represent a total savings in just the first five years of \$75 billion dollars, assuming energy costs increase at the rate of 15 percent per year.

(d) The program of tax relief we recommend for energy investment would have a negative impact on the Treasury, but the increase in corporate and individual taxes as a result of the stimulus to the economy would produce positive contributions. Accordingly, Williams estimates that the most probable impact upon the Treasury will be a net increase to Treasury revenues of between \$19.5 billion and \$94.9 billion dollars in the first five years.

These brief summary points dramatically highlight the relative differences of the two basic approaches to conserving energy in buildings: incentives versus regulatory standards. The incentives approach results in substantially greater savings (even if not used by everyone) because it encourages saving as much energy as is feasible, not the lower common denominator which any regulatory standards approach must employ. It applies to both new and old buildings, thus providing a much faster conversion of the nation and a much more immediate impact upon energy conservation. It results in significant savings to consumers of energy. This is superior to the negative psychology of enforcing higher costs for construction. It results in incentivizing innovation and technological development rather than tending to "freeze" it at a lower-than-maximum denominator. It encourages aesthetic and design creativity rather than stultifying it. These are just a few of the comparative points which make us wonder why anyone would seriously consider such a less desirable alternative as regulatory standards, enforced by the police powers of the state, when there is a better alternative available.

There is a common misconception that the reason buildings use energy is because they have mechanical and electrical systems. This is the result of not asking the prior question, "Why do buildings contain mechanical and electrical systems in the first place?" The answer to that question is obvious: buildings are intended to provide a functionally satisfactory and comfortable place for people to live, work, learn, and play. Buildings are usually located in parts of the country that experience wide fluctuations in climatic conditions. Everything possible, within the limits of cost and technology, should be done, therefore, to design buildings to provide functionally satisfactory and comfortable places.

For thousands of years architects have been designing buildings with this in mind. It has been only the last 70 or 80 years that mechanical and electrical systems have been available to assist the architect in producing solutions that provided indoor comfort with little or no fluctuation in temperature during cold weather. It has been only a few decades now that it has been possible also to produce solutions that remained comfortable during hot weather. Buildings, therefore, use energy as a means of providing for human comfort under adverse climatic conditions.

During the past two decades, architects have often designed buildings, especially office buildings, that no longer provided solutions to human comfort by means of natural ventilation, or natural daylight, or natural protection from hot summer sun. Because energy saving was not a visible concern, and because mechanical and electrical systems were relatively inexpensive to operate, we provided solutions for our clients that in hindsight were not very energy efficient. We admit that our enthusiasm to provide comfort conditions with only very minor fluctuations in temperature or humidity, and to provide an abundance of light, has often resulted in buildings with large energy budgets. We now believe, however, that we all need to rethink the basic principles of designing and engineering buildings for human comfort and use. We will likely want to go back to some of the natural architectural solutions that used to be common practice, and we also fully expect that new technologies (such as solar energy) will emerge to provide us with new ways to meet human comfort and use needs. We are absolutely convinced that it would be unwise to freeze the present state-of-the-art of building design and engineering.

That is our primary concern with Title X, from a technical standpoint. Prescriptive, or component performance standards, especially if they are modeled after the ASHRAE 90-P document now in preparation, tend to freeze current technology and discourage innovation. Architects have been burdened for decades with narrowly written and narrowly interpreted building codes. We recognize the need for codes, backed by the police power of the state, to provide for public health, safety, and the common good. In fact, architects are rigorously tested by the various states to make certain they are professionally qualified to deal with these issues before they are given a license to practice. We have been advocating for years, however, that building codes should be more performance based than prescriptive, in order to allow for the introduction of new innovations. We supported the establishment of a National Institute of Building Sciences as a move by this Administration to bring about improvements in the building codes of the United States.

Title X proposes a regressive step in advocating a "quick fix" based on prescriptive standards and in asking the building industry to wait for a few years for performance standards. We've been waiting almost 50 years for performance based building codes—Congress directed the National Bureau of Standards in 1926 to do this—so that we have no basis for trusting the situation to improve in two or three years if we accept prescriptive standards now.

Those who support the basic strategy of Title X, to use federal standards as a forced solution to energy efficient building design, are also operating under a misconception that performance standards will take longer to develop than prescriptive standards. The implication is that prescriptive standards, or component performance standards, are technically easy and that six months is sufficient time to get such standards written and published for comment. The associated notion is that "pure" performance standards are more difficult and will require a few years to develop. The difference between prescriptive standards and performance standards is not one of technical difficulty, but of attitude. Prescriptive standards are the result of an attitude that says we cannot trust professionals and their clients to produce satisfactory solutions, so we will have to tell them how to design buildings that use energy efficiently. Performance standards result from an attitude which accepts the idea of establishing energy efficiency goals and leaves to professionals and their clients the responsibility for achieving those goals. Performance standards are thus much more likely to produce greater flexibility and innovation—and to challenge professionals to produce always better solutions. We, therefore, would urge Congress to insist that, if we are to be forced to comply with national standards, they should be nationally promulgated performance standards from the start.

We would now like to turn our attention to S. 1392, the "Energy Conservation in Buildings Demonstration Act." We see the purpose and direction of this bill as much more positive. By encouraging government at all levels to set examples for the nation in conserving energy in existing buildings by redesigning and modifying them, we believe much more can be achieved in a short time than will likely be achieved by legislation such as Title X of S. 594. This bill, S. 1392, would provide a means for using government buildings as demonstrations to be emulated by the

private sector. As the cost of energy increases and supplies diminish, we believe that the private sector will respond out of necessity to energy conservation examples provided by demonstrations such as these.

While we support the intention, the concept, and the program plan described in S. 1392, we have some suggestions for modification which we present for your consideration.

We believe Section 3, DEFINITIONS, should include a description of energy conservation. We would suggest the following definition:

(a) "Energy conservation technology" means any concept, technique, equipment, or system that can be utilized in reprogramming, replanning, or retrofitting existing buildings.

We urge this because there are a number of references in the bill to energy conservation "equipment and systems" which implies that energy use in buildings can be reduced only by buying equipment and systems which are added to the building or which replace existing, less efficient equipment. We would like to make it clear that there are also a number of things that can be done to reduce energy consumption that require no investment (primarily adjustments to building use patterns and/or operation of equipment) and many more things which can be done by replanning the use of the building and redesigning those architectural features which, as a result, would reduce energy requirements. As an example of replanning, we would suggest relocating those activities which require light near windows and light-wells in order to reduce the requirement for electric lighting. An architectural redesign might then call for modifying existing office arrangements; changing or adding windows or light-wells; providing protection from sun glare by exterior sunshades or windows facing south; modifying windows that are fixed in order to make it possible to open them for natural ventilation on mild days, etc.

We would hope that under Section 4, DUTIES OF ADMINISTRATOR, a thorough analysis will be made of the range of building types and the different climatic conditions which should be included in the demonstrations. We would be pleased to be asked to assist in developing the procedures to assure that an architectural point of view is represented in these deliberations.

We would also welcome an opportunity to participate in the evaluation phase as proposed in Section 7, ADMINISTRATIVE PROVISIONS. The work which the AIA Research Corporation has done with the General Services Administration in helping them to produce the first working guidelines for energy conservation in building design can help to provide a base for the evaluation surveys proposed in Section 7.

Finally, and most importantly, the results of the demonstrations will have to be widely disseminated to professionals as well as to the public if the results are to be effectively emulated across the nation. The American Institute of Architects is well organized to disseminate results to design professionals. Energy conservation has been voted the Institute's highest priority by our most recent annual convention. We have established a special coordinating committee of our Board of Directors to implement a program of professional education and information dissemination on energy conservation. We would look forward to cooperating with the Administration in carrying out the provisions of Section 8 (b), REPORT TO CONGRESS AND DISSEMINATION OF INFORMATION.

The American Institute of Architects believes that we should be doing everything possible to reduce the dependence of buildings on energy derived from fossil fuels. We want to work with the Administration and Congress on programs that address this goal. We *do not* believe that either we or our clients need to be forced to comply with prescriptive standards to achieve this goal. We *do* believe that demonstrations of effective ways to accomplish energy conservation will be invaluable in helping to meet this national need.

AFTERNOON SESSION

Senator TUNNEY. The hearing will come to order.

Our next witness is Mr. Frank Matzke, the Assistant Commissioner for Construction Management of the General Services Administration. Thank you for coming back, Mr. Matzke, and for making way for Mr. Eberhard. I know that he appreciated it and so do I because we had the benefit of having his testimony on the record which we wouldn't have received otherwise.

STATEMENT OF FRANK J. MATZKE, ACTING ASSISTANT COMMISSIONER, OFFICE OF CONSTRUCTION MANAGEMENT, GENERAL SERVICES ADMINISTRATION; ACCOMPANIED BY RICHARD J. PRONK, CHIEF, ENERGY UTILIZATION BRANCH; AND PATRICK CONNELLY, SPECIAL ASSISTANT AND COORDINATOR, ENERGY CONSERVATION

Mr. MATZKE. Thank you, Mr. Chairman. I'd like to introduce two other people I brought along with me: Mr. Richard Pronk, who is the Chief of the Energy Utilization Branch of our Offices of Building Management; and Mr. Patrick Connelly, who's my special assistant and coordinator of our energy conservation efforts.

I have a short prepared statement, if you'd like I can read that, or I can summarize.

Senator TUNNEY. Why don't you summarize it and it will go into the record.

Mr. MATZKE. I think the statement indicates that we feel there's ample opportunity to conserve energy in Government office space. In fiscal year 1974 the 16 most energy intensive Federal agencies which account for 99.7 percent of the energy consumed by the Federal Government reduced their energy consumption in buildings by 13.6 percent over fiscal year 1974's consumption.

I recognize that GSA has a responsibility for the operation of over 10,000 buildings throughout the United States and our commitment to energy conservation is not new. In 1972 at the direction of Administrator Sampson, we convened the GSA Roundtable on Energy Conservation and invited representatives from the private as well as public sector to participate and make recommendations.

In addition, we have designated a Federal building in Manchester, New Hampshire, as GSA's Energy Demonstration Project.

We have also published two documents: our Energy Conservation Design Guidelines for Office Buildings and Energy Conservation Guidelines for Existing Buildings; and I do have copies of those two documents here if you'd like them.

Senator TUNNEY. Yes. Why don't we have them for the file. Thank you.

Mr. MATZKE. The Energy Conservation Guidelines for Office Buildings is presently being updated. In fact, it's ready for the printer now, which adds additional sections on the use of solar energy as well as computer software to make energy use determinations in the design of Federal buildings.

The major program areas involving energy conservation in Federal office space are: maintenance and operation, modification or retrofit, new facilities, and development and demonstration. Existing facilities will account for the greatest proportion of general purpose office space available for energy conservation programs between now and 1985. One of the greatest potentials for conserving this energy is through the modification of these existing facilities.

In 1974 GSA reduced its energy consumption in existing buildings by 21.9 percent of the amount consumed in 1973 by modifying the operation and maintenance of our facilities. In fiscal year 1975 we are approaching a 30 percent reduction in the energy consumed in fiscal year 1973.

In regard to S. 1392, we feel that the largest area in buildings for conserving energy is through a facility modification or retrofit program. This is the primary reason that last year the President asked GSA and the Federal Energy Administration to recommend to the Energy Resources Council a multi-year program to increase energy efficiency in public buildings.

We feel that there are several items which would lead to a reduction in energy utilization in terms of modifying existing facilities and we have listed these as: increased insulation; new and efficient lighting; additional zone controls for lighting, air-conditioning and heating; solar screens or solar film on windows; better and tighter dampers for outside air control; heat recovery and storage; utilization of solar collectors on certain facilities; and burning unrecyclable paper and trash as boiler fuel.

Implementation of any program based on a multi-year plan referred to earlier will require both engineering and economic considerations. Our buildings will require architectural and engineering inspection to identify potential projects. Inspection and evaluation will include use of our published energy conservation for existing office buildings.

I might add that we have conducted a comprehensive engineering study of a building in Washington, D.C. and have identified about \$250,000 of retrofit modification which could be accomplished with a ten-year or less payback period.

GSA anticipates an 18 percent increase in space required by the Federal Government by 1985. In order to reduce energy consumption in buildings now being designed, realistic energy goals must be established setting limits on the amount of energy consumed. While there's no accurate base data from which to compare design experience, the results of the instrumentation of the Manchester, New Hampshire Energy Demonstration Project will verify a 50-percent energy reduction anticipated in those facilities which have been designed to energy conservation design standards.

I think, Mr. Chairman, I can say that we are currently working on all of these areas within GSA and in conjunction with FEA. As I have pointed out, there's much that can be done in the area of energy conservation but there is much more to be accomplished. We anticipate that the joint GSA/FEA review of multi-year energy conservation program will identify those promising areas and will recommend an implementation program.

Thank you.

Senator TUNNEY. Thank you very much. I'm glad, Mr. Matzke, that the GSA is demonstrating such an active interest in trying to conserve energy and although I haven't had a chance to do anything other than just briefly glance through your publications on the energy conservation guidelines for office buildings, I think that it does demonstrate that you're well on your way to coming to grips with this problem as it relates to Federal office space.

I just wonder what your view is with regard to S. 1392. Do you feel that passage of this legislation would be helpful in furthering GSA's energy conservation program?

Mr. MATZKE. Well, I think any legislation that's aimed in the direction of funding the retrofitting of existing facilities would certainly help us in our program to conserve energy. I think that we feel

at this point in time we have ongoing studies being made to identify buildings that can be retrofitted. We are looking at assembling an implementation program.

I would say, in essence, this parallels the efforts that we currently have underway to identify buildings to perform studies and to develop a 10-year program for retrofitting of existing facilities.

Senator TUNNEY. Can you tell me what is the interface that GSA would have, with the DOD and their buildings? As an example, I recall the time that I served at March Air Force Base in California. I recall the fact that I was in an office building that really had no insulation whatsoever. It was a World War II barracks made out of wood. In the wintertime the wind just blew through the office space. I'm sure it required the use of four or five times the amount of fuel that otherwise would have been necessary if it had been better designed and constructed.

I wonder what your ability is to move into this area in conjunction with other agencies of the Federal Government.

Mr. MATZKE. Well, I think there are two essential areas. (1) GSA has the responsibility given to it a couple of years ago to develop Federal management policy which we have done and in conjunction with the use of existing Federal facilities have developed operational guidelines which were put into effect a little over a year ago that mandated that other Federal agencies controlling buildings would reduce temperatures in buildings; would reduce operational hours; would cut back on amount of air-conditioning required in the summer; would reduce lighting requirements and so forth; and these standards were developed and implemented.

Now also, GSA, because of the amount of buildings and design it does, has been looked at as an authority in many aspects of this area. We have produced guidelines that the other Federal agencies that have expressed a great deal of interest in, and the private sector as well. I think there are probably over 5,000 copies of that guideline that have been picked up and are being used by other people, both in the Federal sector, State and municipal areas, and in the private sector as a reference to work with architects and engineers in the design of new facilities and in the retrofitting of existing facilities.

Senator TUNNEY. But, as I understand your answer, you are unable to mandate an energy conservation standard for the DOD in their construction program.

Mr. MATZKE. Not at this time; no, sir. There is a possibility if someone were to take our guidelines or any of the performance criteria that we have developed that they could adopt that criteria and follow through on that, but our responsibility is primarily to federally owned buildings that are controlled and operated by GSA.

Now that does include some buildings that are used by the DOD, the Pentagon, for instance.

Senator TUNNEY. What Federal buildings are not under GSA's control? What category of buildings are we talking about?

Mr. MATZKE. There are some special purpose buildings that were constructed, say, for special purposes of maybe the AEC or specialized facilities that are administered directly by the agencies involved. Military bases are an example. Another example are VA hospitals which would not be controlled by the GSA. There are other large buildings

owners and operators involved in the Federal program which do not come under GSA requirements.

Senator TUNNEY. Besides the distribution of this Energy Conservation Guideline, how are you able to disseminate the information that you receive from the various programs that you have undertaken for energy conservation?

Mr. MATZKE. Well, we do it two ways. We have produced some of our own brochures and booklets which indicate information that we have obtained from a demonstration project which we intend to do with the Manchester project. That building will be fully instrumented in order that we may ascertain the actual energy savings that can be brought about by alternative systems within the building and we intend to publish this information and make it available to the general public. At the same time, we have established good relations with the design and construction press in the construction industry and many of the things that we are doing are being reported on in the newspapers and particularly in the magazines that go to the architects and engineers and others involved in the construction industry.

Senator TUNNEY. What about State and local governments and their buildings? As you know, my legislation, S. 1392, addresses that problem specifically. Have you had an opportunity to evaluate the coordination that presently exists between the Federal Government and the State and local governments and do you think that the design for greater cooperation envisioned in S. 1392 makes sense?

Mr. MATZKE. Well, of course, at the moment, I don't think there's any direct connections between, say, GSA, and State and local governments. However, we maintain liaison with many of the States and municipalities in programs and in some programs we are jointly participating in research studies and things of that nature which could be beneficial to all segments of the Government.

An example is the Construction Research Council which we joined along with representatives of the City of Boston and private industry, and we see this as being the type of activity that can expand our joint relationships between the Federal Government and local and municipal governments in pursuing a research program, in this case aimed at identifying common user needs so that performance specifications can be developed and industry can respond to that performance. Not just through GSA's requirements but in recognition that these requirements go beyond GSA and might include other segments of government as well as private industry.

Senator TUNNEY. Well, as an example, in S. 1392 the Governors of the 50 States and executives of municipalities may submit requests for grants for retrofitting buildings owned by their respective States or municipalities. Requests for grants shall be submitted to the so-called awards panel, through the Administrator, and shall include, in accordance with procedures published by the Administrator in the Federal Register, a description of their State or municipal awards panel, the criteria and procedures by which it will select proposals for awards, and an identification of the State or municipal buildings for which grants are to be sought, and then there's a grant authorization.

Does that make sense to you?

Mr. MATZKE. Well, it does, but we would have no direct tie with that type of thing unless we were serving in some capacity on one of these panels.

Senator TUNNEY. I understand that GSA is going to be represented on the awards panel and I understand that the FEA Administrator is going to be the one that's responsible for the program, but does that make sense to you as the person who's very much involved in developing design criteria and working very closely with others who are attempting to bring about a degree of energy conservation in the GSA building program?

Mr. MATZKE. Well, I would say that it does make sense to me. Also, I would say that any program that provides some type of incentive to get people to move in the direction of energy conservation can benefit all of us.

Senator TUNNEY. Well, now, in section 5 of S. 1392 we state: "On the basis of procedures established in section 4 the Administrator of the General Services Administration shall, within 6 months after the date of enactment of this Act, select no fewer than 40 federally owned buildings as candidates for retrofitting with energy conservation equipment and systems. The buildings shall be selected so as to offer a wide range of geographic and technological circumstances and opportunities for implementation of energy conservation measures which can be justified on a life-cycle cost basis."

Does that section appear reasonable to you?

Mr. MATZKE. Well, I might say that we are already in the process of identifying buildings and I think that would be no difficulty from our standpoint.

Senator TUNNEY. Is it redundant?

Mr. MATZKE. In fact, we have at the present time reviewed the energy utilization figures for over 400 buildings in the GSA inventory and feel that there are at least 200 buildings of the 400 that we could make some definite improvements in energy conservation and these are the most energy intensive buildings or use the greatest amount of energy per square foot.

Senator TUNNEY. Mr. Matzke, is the section just cited to you redundant in relation to what you're already doing? Now we do provide that grants for Federal buildings shall be for the full cost of the contract within the limits of funds available but not to exceed \$1 million for any one building.

Do you think that's of any assistance or do you think this section is redundant?

Mr. MATZKE. I feel we are already moving in that direction so I don't think we need legislation to ask us to do that sort of thing.

Senator TUNNEY. How about the grant authority?

Mr. MATZKE. We are already programing within our upcoming budgets funds to do the necessary retrofitting and we are also, in any case where we are doing repair and alteration work, seeing that that's done in accordance with our energy conservation guidelines as a normal operation within our activities.

Senator TUNNEY. Let me ask you this. Inasmuch as you are already doing this and you made funds available for it, your feeling is then that you really don't need any legislation at all as it relates to the Federal building program?

Mr. MATZKE. Well, I'm just thinking now in terms of—we certainly need assurances that funding will be available to do what we'd like to do in terms of retrofitting buildings for energy conservation. If we receive funding as requested to meet our program, well, then, I see there's no need for additional funding. Of course, that's dependent on what we're doing each year.

Senator TUNNEY. Well, of course, we're discussing authorizations. You don't feel that you need any additional authority to do this?

Mr. MATZKE. I don't believe so.

Senator TUNNEY. Is there any way in which you feel that the expertise that you have developed could be better utilized by State and municipal governments?

Mr. MATZKE. Well, I think, of course, most of this is a matter of communication and getting the information that we have developed to the people in the other areas that could utilize this. We have as a matter of course participated in seminars and conferences throughout the country on energy conservation whenever asked and provided whatever information we could for this purpose and we are also involved in technology exchange programs that are being set up to make that information available to other municipalities. I feel that we would be as cooperative as required in this effort to help others reach the same understanding of energy conservation capabilities that we think we presently have.

Senator TUNNEY. Good. Well, I want to thank you very much for your testimony today and for the fact that you became familiar with the bill before you testified, which is appreciated. There's a quorum call now, a live quorum, which means I have to get down to the Senate floor. We may have a couple of additional questions we'd like to submit to you if you could respond in writing.

Mr. MATZKE. We would be very glad to.

Senator TUNNEY. Thank you very much.

[The statement follows:]

STATEMENT OF FRANK J. MATZKE, ACTING ASSISTANT COMMISSIONER, OFFICE OF
CONSTRUCTION MANAGEMENT, PUBLIC BUILDINGS SERVICE, U.S. GENERAL SERVICES
ADMINISTRATION

Mr. Chairman and Members of the Committee: I am Frank J. Matzke, Acting Assistant Commissioner, Office of Construction Management of the General Services Administration. It is a pleasure to appear before you in behalf of Arthur F. Sampson, GSA Administrator, to discuss a bill, S. 1392, which proposes to "establish a demonstration program in energy conservation, using promising innovative technology to the maximum extent possible, through retrofitting existing buildings with energy conservation equipment and systems, and for other purposes."

As you know, there is ample opportunity to conserve energy in Government office space. In fiscal year 1974, the 16 most energy intensive Federal agencies, which account for 99.7 percent of the energy consumed by the Federal Government, reduced their energy consumption in buildings by 13.6 percent over fiscal year 1973's consumption.

In this regard, the Public Buildings Service is one of these energy intensive agencies. We are responsible for 10,000 federally owned or leased buildings; 1700 construction projects are currently underway; a billion dollar annual budget; 22,000 employees; and an inventory of a quarter of a billion square feet of building space across the country.

Since placing energy reduction programs in GSA's list of priority projects, many methods for improving energy efficiency in our office space have been implemented and proven successful.

Mr. Chairman, our commitment to energy conservation is not new:

1.) In 1972 at the direction of Administrator Sampson we convened the GSA Roundtable on Energy Conservation and invited representatives from the private as well as public sector to participate and make recommendations.

2.) We have designated a Federal Building in Manchester, New Hampshire, as GSA's Energy Demonstration Project.

3.) We have published two documents: our *Energy Conservation Design Guidelines for Office Buildings* and *Energy Conservation Guidelines for Existing Buildings*.

The major program areas involving energy conservation in Federal office space are: maintenance and operation; modification (retrofit); new facilities; and development and demonstration. Existing facilities will account for the greatest proportion of general purpose office space available for energy conservation programs between now and 1985. And the greatest potential for conserving this energy is through the modification of the facilities.

In FY 1974 GSA reduced its energy consumption in existing buildings by 21.9 percent of the amount consumed in FY 1973 by modifying the operation and maintenance of our facilities. Thus far in FY 1975, we are approaching a 30 percent reduction in the energy consumed in fiscal year 1973.

The Federal Energy Administration and GSA have initiated several maintenance and operation practices that have been instrumental in the progress made toward energy conservation:

- 1.) daytime cleaning
- 2.) non-uniform and reduced lighting
- 3.) summer and winter space temperature adjustments
- 4.) off-hour shutdown
- 5.) reduced ventilation air and,
- 6.) elimination of simultaneous heating and cooling

Mr. Chairman, with regard to bill S. 1392, the second largest area in buildings for conserving energy is through a facility modification or retrofit program. This is the primary reason that last year the President asked GSA & FEA to recommend to the Energy Resources Council a multi-year program to increase energy efficiency in Public Buildings.

An energy orientation modification project is one that has been programmed to replace obsolete equipment or systems. When an existing system has outlived its useful life or is inadequate to accommodate current functional needs, it is then recognized that a new system which has energy conservation potential should be installed. For example, a roof replacement may include additional insulation to improve its energy efficiency. In this case most of the programmed cost is not energy related but an upgrading or replacement cost. Through efforts such as this we have completed over \$10 million in energy oriented projects in fiscal year 1974 and fiscal year 1975.

As mentioned earlier in my statement, a comprehensive program is being developed by GSA and FEA which will recommend a comprehensive engineering inspection and evaluation of all major energy intensive buildings and the subsequent installation of retrofit items.

Several items which would lead to a reduction in energy utilization are:

- 1.) increased insulation
- 2.) new and efficient lighting
- 3.) additional zone controls for lighting, airconditioning and heating
- 4.) solar screens or solar film on windows
- 5.) better and tighter dampers for outside air control
- 6.) heat recovery and storage
- 7.) solar collectors will be installed in selected buildings as demonstration projects and will be included as development progresses and first costs are reduced and,
- 8.) burning unyclable paper and trash as boiler fuel.

Implementation of any program based on a multi-year plan referred to earlier will require both engineering and economic considerations. Complex buildings will require architectural and engineering inspection to identify potential projects. Inspection and evaluation will include use of our published *Energy Conservation for Existing Office Buildings*. And, life cycle cost and computer simulation analysis will assist in identifying energy savings, cost and a payback period to justify the retrofit project.

You will be interested to know that GSA has already completed several retrofit contracts and we are currently in the process of evaluating their energy saving potential. A comprehensive engineering study of a building in Washington, D.C., for example, was awarded for the specific purpose of identifying retrofit projects for energy conservation.

Approximately \$250,000 in retrofit modifications were identified in this building with a 10-year or less payback period. Although projects will vary from building to

building and from one geographic area to another, similar costs and savings are possible in other buildings identified as energy intensive.

With your permission, I would like to discuss briefly the area of new construction and research and development in the area of energy conservation in buildings.

GSA anticipates an 18 percent increase in space required by the Federal Government by 1985. In order to reduce energy consumption in buildings now being designed, realistic energy goals must be established setting limits on the amount of energy consumed. While there is no accurate data base from which to compare design experience, the results of the instrumentation of the Manchester, New Hampshire, Energy Demonstration Project will verify 50 percent energy reduction anticipated in those facilities which have been designed to energy conservation design standards.

Studies have shown that the estimated energy savings for new facilities can range anywhere from 30 percent to 70 percent by incorporating energy conservation systems and techniques in the design. The estimated energy savings are based on a comparison between energy usage in existing structures which are similar and the calculated savings based on energy efficient designs.

These programs should apply to all new office facilities which can be defined as those which have received congressional approval but have not reached the final design phase. In addition, leased facilities in the proposed program will include the new and existing office space over 10,000 square feet where the Government has a formal agreement of three years or more to rent the space.

Mr. Chairman, we are currently working on all of these areas within GSA and in conjunction with the Federal Energy Administration. As I have pointed out this morning that much has been done in the area of energy conservation but there is much more to be accomplished. We anticipate that joint GSA/FEA review of multi-year energy conservation program will identify those promising areas and will recommend an implementation program.

Mr. Chairman. This concludes my statement, I will be pleased to answer any questions.

Senator TUNNEY. The hearing is adjourned.

[Whereupon, at 1:25 p.m., the hearing was adjourned.]

INDUSTRIAL ENERGY CONSERVATION ACT OF 1975

THURSDAY, JUNE 19, 1975

U.S. SENATE,
COMMITTEE ON COMMERCE,
SPECIAL SUBCOMMITTEE ON SCIENCE,
TECHNOLOGY, AND COMMERCE,
Washington, D.C.

The subcommittee was reconvened, pursuant to adjournment, at 9:45 a.m. in room 1318 of the Dirksen Senate Office Building; Hon. John V. Tunney (chairman of the subcommittee) presiding.

Senator TUNNEY. The hearing will come to order.

Our first witness is Hon. John K. Tabor, Under Secretary of Commerce, who will present the testimony of Secretary Rogers Morton.

I am sorry about the room change. It caught me by surprise too.

STATEMENT OF HON. JOHN K. TABOR, UNDER SECRETARY OF COMMERCE, DEPARTMENT OF COMMERCE; ACCOMPANIED BY ROBERT SHEPHERD, ACTING DEPUTY DIRECTOR, BUREAU OF RESOURCES AND TRADE ASSISTANCE

Mr. TABOR. I would like to introduce Robert Shepherd, the man with the mud on his feet.

It is a pleasure to be before you again today. I shall be testifying on S. 1908 and then of course the Department of Commerce through the able Assistant Secretary for Science and Technology, Betsey Ancker-Johnson, will give views on the other two bills.

Secretary Morton regards this hearing as important. He is out of the city on official business. He asked me as the Under Secretary to present his statement to you and it is presented on his behalf to you and your subcommittee. It is most appropriate, Secretary Morton would have me say that I testify here today on the subject of energy conservation for it is a goal to which I am deeply committed.

Speaking again for him as Secretary of Commerce, I have been assigned the leadership role in conducting the Administration's industry energy conservation program, and I shall pursue vigorously our ongoing programs in this area. While we believe the thrust of your bill, which attempts to stimulate further progress in attaining voluntary energy conservation goals, is very close to the thrust of the Administration's current programs, we are convinced legislation is not necessary to assure a comprehensive industrial energy conservation program.

Before I make specific comments on Sections 4 and 5 of the bill before us, which deal with industrial energy efficiency programs, I should like to describe the need as we see it, the possibilities for

industrial energy conservation, the methods employed to achieve greater energy efficiency, the scope of our current programs, and the results of our programs to date in exploiting those possibilities. Later, I shall provide written comments on the research and development and loan sections of the bill.

We certainly agree that there is an urgent need for industry to make energy efficiency a very high priority. The President has made it clear that energy independence is an essential goal for the United States and that the development of a national energy conservation ethic is a vital element in achieving energy independence. Since industry consumes some 43 percent of our Nation's energy, it will play an indispensable role in the Nation's overall effort to increase energy efficiency. And, as you pointed out in the introduction of this bill, the potential for energy conservation in industrial processes is very large.

The increased price of energy, as well as energy supply bottlenecks, will push industry towards greater energy efficiency.

I would like to underscore that point. The increased price of energy as well as bottlenecks will push industry of their own accord toward greater energy efficiency. It is a necessity for them.

At the same time, from a national point of view, industry must do its share in meeting the Nation's energy conservation goals.

However, unlike the case with regard to establishing energy efficiency targets for the products of industry, for example, air-conditioners and automobiles, it is unfeasible to decree industrial energy efficiency—contrasting the products and the processes.

Energy efficiency varies from industry to industry, as between companies within a given industry, and as between plants and facilities within a given company. To a great extent, industrial energy efficiency is dependent upon the age of the company's plant and equipment and level of production in relation to capacity; it is also dependent upon the particular technologies employed, the raw materials used and environmental regulations. There is no way to standardize an industrial energy conservation approach; nor will masses of information particularly assist government policymakers in this respect. What is possible is to work with industries in identifying increased energy conservation opportunities and based on these opportunities agree on revised goals over time.

Therefore, what we have tried to do is to work with industries, with the assistance of their trade associations, to design programs in which there can be mutual confidence. In this respect, a fine balance must be sought between creating such a high priority for energy conservation in industry that other economic goals are lost and allowing industries to continue their previous energy consumption patterns, passing on the additional costs to the consumers of their goods and services. We must also look closely with individual industries at the type of fuel consumed, and encourage conversion from scarce to more plentiful energy sources, even if that means greater energy Btu consumption per unit of output.

We believe the programs being conducted by the Commerce Department and the FEA, which are just now getting well underway, and which have the support of industry, can succeed if permitted the chance to get off the ground. These programs, as I have noted, are

similar in many important respects to the thrust of the bill which is before us.

The Commerce Department's program in industrial energy conservation began in early 1973. Many of the specifics of our voluntary industrial energy conservation programs were presented to you in testimony by former Secretary Frederick Dent in May of last year, with further elaboration by Under Secretary Tabor last December. But I shall review this effort briefly for you today.

Using a variety of media and enlisting the help of a wide range of business-related organizations, our programs have been aimed at:

1. Obtaining a commitment from business and industry to a specific percentage of energy savings per unit of output, on a sector basis.
2. Obtaining a commitment from business and industry to periodic—most often quarterly—reporting, also on a sector basis.
3. Following up to insure that the business community contributes its fair share toward the national energy conservation goals.
4. Making American business leaders and their employees aware of the nature of our energy situation.
5. Outlining the kind of energy conservation programs and practices that can be undertaken to help deal with it.

Illustrative materials have been prepared and distributed in this awareness campaign are those in these kits which I would like to give to yourself and the other members of your subcommittee.

Some 47 trade associations representing 30 distinct industry groups are now participating in the Administration's industrial energy conservation and reporting program. The firms involved in these industry groups account for about 70 percent of the total energy consumed in the industrial sector of the economy.

The groups involved in this program can be divided into two broad categories: A group of 10 of the most energy intensive industries, with whom the Department of Commerce and the Federal Energy Administration have a program well underway; and a group of 40–50 industries which comprise the bulk of the rest of American industry. The Department of Commerce now has programs in progress with 20 of these industries, and we hope to be working with the rest before the end of the year.

With respect to this first group, 10 of the Nation's most energy intensive industries, and I speak of aluminum, steel, paper, petroleum refining, chemicals, cement, copper, glass, baking, and meat packing, these have voluntarily agreed to 1980 goals of improved energy efficiency per unit of output of 10–15 percent. To insure that these industry commitments represented the best possible energy efficiency improvement, an outside consultant was hired to analyze each industry's potential for energy conservation. The actual goals resulted from a detailed process of discussions and negotiations between Government and the industries involved. The base year against which progress is to be measured is 1972—a reasonably normal year of production and pre-embargo. In order to assure that we accounted properly for increased productivity, we agreed that the energy savings would be measured on a unit of output basis. We will be pushing these industries to exceed their goals as we identify additional energy conservation opportunities.

In the case of the second group, the Department of Commerce has already completed preliminary meetings with 20 industry groups. A commitment to the implementation of an industry-wide conservation and reporting program has been obtained, and positive results already have been reported for three of the industries.

While the industries in this group are not as energy intensive as the first 10 industries, they nevertheless represent some 40 percent of the energy used by industry. This program stresses the development of an industry-wide conservation program to meet the Administration's energy savings goals. Cooperation on conservation matters and sharing of technical advances which improve efficiency of energy use among association members are also emphasized.

The first 6 of the 10 energy intensive industries with which we began working last fall have now submitted initial reports.

Good morning Senator.

Senator BEALL. Good morning.

Mr. TABOR. These reports show that substantial energy savings are being achieved. Petroleum refining and chemicals have between 1972 and 1974 reported savings of 7.8 percent and 7.5 percent, respectively. All 10 of these industries have also established—or are in the process of establishing—detailed reporting systems at considerable expense and effort so that we will be in a position to keep the Congress informed of their progress in meeting the specific goals.

To amplify, the initial reports from the first six of the energy intensive industries show the following results:

	Energy efficiency improvement (%)	1980 goal (%)
Aluminum ¹	3.4	10
Iron and Steel	2.76	10
Paper ¹	2.5	10
Petroleum Refining	7.8	15
Chemicals	7.5	15
Cement	1.6	10

¹ 1973 vs. 1972 baseline—all others are 1974 vs. 1972 baseline.

Reports from the next four energy intensive industries—meat packing, baking, copper, and glass—will be forthcoming soon.

Positive results have also been received from three of the industries in our second group.

	Energy efficiency improvement (%)	1980 goal (%)
Feed manufacturing	19	15
Can manufacturing	19	15
Canning	6.8	15

All of these are over 2 years.

While two industry groups have reported savings in excess of the Administration's goal for 1980, the factors affecting energy efficiency are extremely complex and these good initial results should not encourage the general setting of significantly higher goals until we accumulate further information. We hope to achieve similar results with other industries which are in the process of designing their survey forms and collecting data.

Our overall tracking system for the industrial sector indicates that energy savings per unit of output are in fact taking place, but more savings will be needed to meet both short and long-term goals set by the Administration. In addition, more and better information is required. We must, however, ensure that our system is meaningful and not unduly burdensome.

Under the Commerce Committee bill, the Secretary of Commerce would conduct surveys of major energy consuming industries and, on the basis of these surveys, would identify possibilities for energy savings within each industry. On the basis of information collected in this survey, energy efficiency goals or targets would be established for each industry. Every major company, as defined in the bill, would be required to report to the Secretary on progress made and expected to be made by the company. Progress would be measured against energy consumption in 1974, base year.

These features of the bill are so similar to the approach we are in fact taking that we believe legislation is not needed. Among other problems we anticipate, we are particularly concerned over the base year, and the definition of "major company."

The bill uses 1974 as a base year against which energy savings will be measured. Many companies have already achieved significant energy savings in recent years. Using 1974 as a base year would unduly penalize those companies. As the FEA witness testified before this subcommittee on June 17:

The year 1972 was selected as the baseline for our energy intensive industry program because energy consumption data for 1972 is not distorted by the effects of the 1973-1974 embargo or the subsequent fuel cost escalation.

Had 1974 been selected as the baseline year, as this bill proposes, the basis for setting goals and for measuring progress would have been measurably different in the program underway. Companies which responded to fuel shortages and increased prices quickly and resolutely achieved a degree of energy efficiency improvement prior to 1974. Hence, the apparent progress of these companies is diminished when measured against a 1974 baseline. On the other hand, companies which did not effect substantial improvements early, will appear to achieve greater relative increases in energy efficiency when measured against a 1974 base.

Thus, with 1972 as a baseline all industries and companies start with a common set of initial conditions.

The bill defines "major company" as a company which spends at least \$500,000 a year for fuel and electricity. If energy prices continue to rise in the ensuing years, the group of companies covered under the definition in the bill would become progressively larger, resulting in an unmanageable program.

As noted above, we do not believe new legislation is required for an effective voluntary program and would be unnecessary at this time. However, if we do not obtain sufficient results through our ongoing voluntary program, we think that this bill provides a conceptual basis for legislation. A particularly appealing feature is the bill's practical approach—industry and government working together to establish

realistic goals, and the best way to do that is not through legislation, but through a continuation of voluntary programs.

Senator TUNNEY: Thank you, Mr. Secretary. I appreciate your being here. We know that Secretary Morton gave his personal approval not only to the statement that you read in his behalf but to your being here. We appreciate that.

I would, first of all, like to say that I think the voluntary program that you have undertaken is a lot better than nothing. The question is whether it is as good as it should be. That is why we have these hearings and why legislation like mine has been introduced.

I would like to just start off with a basic philosophical point. I am absolutely convinced myself that the only way that you are going to save the free enterprise system in this country, which I think is threatened, is to arrive at the point as quickly as possible where we do not have to allocate energy.

As I look at the future, the prospect is for ever increasing programs of energy allocation. We are clearly running out of energy on a worldwide basis although it will take some time for this fact to be manifested in the area of oil and natural gas. It has been estimated that there is presently only a 35 year reserve of oil and natural gas and that represents 81 percent of the energy consumed in this country.

In fact in the case of natural gas we have maybe 15 to 20 years. We have an allocation of shortages that the FPC is engaged in. We had a 10 percent shortage in the past year and we will have a 25 to 30 percent shortage by 1980 in the natural gas area. We will allocate shortages and that means some commercial enterprises will receive it and some will not particularly if we maintain households as the No. 1 priority use.

The shift from natural gas to other forms of energy will be extremely expensive, due to the need for the enormous amount of capital for the plants which will be required to burn oil, and the fact that the Btu's will cost more. The same thing is true in the case of oil. We still have an FEA allocation program. I can't help but note that 40 percent of the energy that is used in this country is used by industry. And if you can achieve substantially greater efficiencies with industry, it is going to mean that we are going to prolong the life of our oil and natural gas resources. Hopefully we will be able, along with other conservation measures that are being taken, to increase supply—hopefully we will obtain a position where we won't need to have an allocation of shortages.

I think that is what we are all interested in, to avoid allocation of shortages. If I am right in my basic premises that a curtailment of energy and allocation of energy is a serious threat to the free enterprise system and a much greater threat than most people in the country perceive then I think it follows that we must do what we can to ensure that we have a curtailment of energy consumption.

I suppose it is a question of which intervention is worse. Is it worse to have a mandatory program of energy efficiency for the free enterprise system or is it worse to have an allocation of shortages? You are going to have intervention one way or the other, it seems to me.

The question for the free enterprise system is which is worse?

I come down on the side of the issue this way; I think it is worse to have an allocation of shortages because then the great allocators, whether they be the FPC or FEA, have a right to determine which industries get the energy and frequently in the case where you have a discrepancy between the Btu price of natural gas and oil, at what price?

That to me is a serious threat which will probably result within a short period of time in a loss of our traditional way of doing business in this country. You don't have a demand market if you have the Government allocating energy. Therefore I would like to have a comment from you on my basic philosophic point about whether you agree or disagree, and, if you disagree, in what particulars.

Mr. TABOR. I think it is a most thoughtful analysis of a terribly important point that goes right to economic freedom, and I happen to believe there are links between our economic freedom and our personal freedom. This was terribly riveted in my consciousness by a recent trip to Russia. I wish every citizen of this country could go there for a week as I did and just sense the difference when one comes home to the freedom and the ease and the vitality we have to a large degree because of the job opportunities, the price opportunities, the freedom of our market.

I agree with your concern very, very much.

I also, Mr. Chairman, agree that an allocation program—what I would call in very big words “quantitative intervention”—would be brought about not only in industry but elsewhere, and it would take on three parts: Quotas at the import level, allocation at the industrial level, and probably rationing at the individual level. These are all part of a fabric and all of those three elements would enormously constrict our personal freedoms and way of living in this country. We must do everything possible to avoid those.

You raised the question and I would agree with you that once you start having very well intended bureaucrats making the allocations in Washington as to what industries are going to get the natural gas or the oil to run their trucks or plants—we have seriously altered our style of living. You come to the conclusion that in order to stave that off as I hear you and read you, it is necessary to have a mandatory conservation program and at that point I think we do part ways.

It seems to me that we have in the industrial situation—

Senator TUNNEY. Could you hold there? Of course you see that the Administration has a mandatory conservation program as far as housing, establishing energy efficiency standards for housing. My bill does not say that industry or individual companies must save X percentage of energy. We do say that you establish targets and that there are reports and monitoring in order to meet the industrial energy efficiency goals of S. 1908 of 15 percent by January 1980 and 30 percent by January 1985. We don't say that the Government comes in and says to Company X by 1980 you must be 15 percent more energy efficient or we will close you down if you don't meet it. It is a prod. We try to convince industry to do it by the reporting, target setting and monitoring.

Mr. TABOR. We respect those limitations in your bill. We also have put our prods in and one of them is public exposure which is an important one. When the six major industries adopted their targets of 10 percent and 15 percent savings by 1980 they reaffirmed that with Secretary Morton in the Roosevelt Room of the White House and this was stated to the media immediately afterwards.

That wasn't by statute. It was voluntary. It was using all of the persuasive powers that Government has without enacting another law, without developing another set of regulations. I think this is where I come back to your initial point.

Senator BEALL. Isn't the increase in price itself a substantial prod to industry to conserve or seek an alternative?

Mr. TABOR. It is the ultimate one and most powerful one that operates. It operates on industry. That executive officer of a corporation is answerable to his stockholders daily and weekly to save every nickel and dime he can, particularly in the high fuel cost area. I couldn't agree with you more, that is the force that is at work.

Senator TUNNEY. Did you have anything else to say on this point? I think it is later than most people think. I have analyzed the situation as best I can. I have no better powers of analysis than you do. I have analyzed it and I can see a lemming approach. We are heading for the cliff. People will say the problem will take care of itself, the voluntary programs are going to work and yet they probably won't work.

The price we are going to pay is the loss of the freedom that you and I both treasure. Say if, for instance, that we should have by 1980, 15 percent greater energy efficiency in industry, and assuming that industry used no more oil and other forms of energy than they do today, the energy savings would be approximately the equivalent of 2 billion barrels of oil or \$24 billion. By 1985 if we have 30 percent greater efficiency, it would be \$48 billion. We know there will be a substantial increase in the amount of energy used. Those dollar amounts could go up dramatically.

We are talking about substantial quantities of oil, coal, and natural gas being saved by those efficiencies in industry being achieved by 1980 and 1985. That prolongs the life of our resources. It also in my view would create hopefully a condition where the normal laws of supply and demand would operate and we would have a matching—we would come close to have a matching of our domestic supplies with domestic demand. It is clear that by 1985 we will not have any kind of independence.

Mr. TABOR. As Senator Beall noted, when you are talking about industry processes and adopting processes that will be efficient, you have the cost, the profit motive driving these companies to the same goal that you and I both want. It is not the same as assigning a standard for an air-conditioner or piece of automotive equipment. You have to go through the whole consumer aspect of it before you can achieve the energy efficiency you want.

Here every day those people in the companies are looking at the rising cost of whatever the fuel may be—oil, natural gas, which at the moment is still constrained in interstate, but not intrastate use, coal: All of them are rising in price.

There is a tremendous force on business firms to survive and be competitive and institute energy conservation programs. As we sit with those people, there is no resistance whatsoever to the concept and desire. One of the problems they have is to make judgments within the company as to whether the steps on energy conservation, which might involve new processing equipment, take priority over ecological concerns, sales considerations, other aspects. They have complicated judgments to make. They are tremendously spurred, by the high cost of this fuel, to get moving. Frankly I think the results are quite creditable.

Those I have mentioned to you are underway; there are others developing their conservation programs and reporting systems. I submit that fundamentally we ought to let this price and profit incentive which is so prevalent in this particular area operate. We ought to use the reporting systems which are in place, which are working and this is particularly so where we are concerned with eliminating regulation, eliminating intervention by Government. If we have a system which is working and I submit respectfully it is working, it can be improved and will be improved as we work longer with it.

Then I suggest we should not issue additional laws and regulations since it is the temptation of those who are part of such programs to build them into bigger and bigger programs with more and more information, more and more regulations. Things that start with small regulatory programs often end up like the ICC, strangling and crippling—

Senator TUNNEY. But what must be realized is that we have such colossal Government interventions anyway. Look at the way the Government has subsidized the automobile for the last 25 or 30 years. Most people aren't aware of that. It has cost tens of billions of dollars. We have subsidized the automobile and have thereby subsidized the use of more oil and gasoline. We have a \$60 billion highway program. We had the foreign tax credits. In 1974 we subsidized the oil industry by \$5.2 billion. Inasmuch as 40 percent of the oil is used by the automobile that is an indirect subsidy to the automobile. That subsidy resulted in more driving and thereby more use of fuel. We have had incredible Government subsidies to encourage the use of energy in this country. That is governmental intervention.

We are saying let's have governmental intervention now to stop people from wasting energy. We are talking about reporting and setting targets and monitoring.

Mr. TABOR. We certainly recognize that, as set forth in the bill, it is one of the more modest interventions that appear in the statutes. I would however question why we would need to have any intervention or any statute when we have strong incentives at work and producing good results.

Senator TUNNEY. Okay, but what about the poor economic times we are now in? I can easily see where a company could legitimately justify not making the capital expenditures to provide greater energy efficiencies now because they just feel that it is not the time to do it. I just can't help but feel that with these external economic pressures, you are going to need additional encouragement to bring about these energy efficiencies.

We have to face the facts that these are poor economic times, that it is going to be difficult to justify large capital investments for energy efficiency, particularly when the payout would be over 10 or 15 or 20 years. It may be an important national policy to have energy efficiencies which individual companies may not according to their investment plan feel that it can accommodate at the moment.

Mr. TABOR. Mr. Chairman, I am somewhat unclear about your statement. I perceive there is some suggestion that if these are bad economic times and therefore, if a company is for its own internal reasons reluctant to make an investment in a process, then somehow—and I hope I am misreading this—the mandatory legislation would bring pressures to bear on a particular company to adopt a particular process. This is the kind of thing that the recent emission controls experience has indicated we are not good at in Government. However well intended we may be and however bright, we are not good at determining the particular process, the particular timing of an investment. These are exactly the reasons we think that a mandatory program ought not be issued when there are powerful incentives in price and profit working as to processes in companies and when we are already getting results.

Senator TUNNEY. In section 7 of the legislation we talk about loans and loan guarantees. The Secretary has authorized in accordance with the provision of the Act to make loans and guarantee payments of loans and other obligation for the purchase, construction, operation and maintenance of energy efficient facilities.

What we are talking about is to not only give additional encouragement by reporting of energy efficiency and monitoring by the Government of the steps that are being taken to achieve the energy efficiencies but we are talking about a loan guarantee program to do that same thing.

As I say we don't want to put industry in the position where we force them to go out of business. But on the other hand, it does seem to me that in light of the poor economic conditions that you could well justify not doing anything assuming you had no program for loans and loan guarantees in addition to the reporting that we have provided for.

Mr. TABOR. On those two sections, including the loan guarantee aspect we intend to submit additional comments. Secretary Morton's testimony did not deal with that. That obviously gets into the priorities of an overall Administration program on spending in the energy field. But we have got to weigh that additional kind of commitment, even if it is a loan guarantee, it is an obligation of the United States. It involves competition for funds and it is a tough call that we would like to give more thought to as to whether or not it merits that kind of priority—I think I will leave my comment there.

Senator TUNNEY. The thing I don't understand, is if we can have as a national priority the depletion allowance and the tax credit for royalties paid to foreign governments to help the oil industry, why can't we have a simple governmental intervention to stimulate conservation.

I don't understand that bifurcation that takes place in some Government bureaus and agencies and departments. You can use tax incen-

tives and it is taxpayers dollars that are being utilized. You can subsidize an industry for production but somehow you can't encourage industry to conserve. You can't give the same kind of subsidy for conservation.

The kind of world we are moving into, the subsidy for conservation would be more important than the subsidy for production.

Mr. TABOR. We tend, in Washington, to ignore the fact that there is an awful lot that is happening out there without subsidy or without Government programs being the answer. In other words the private sector operating in exactly the way you want to preserve can meet an awful lot of these problems.

There are reports we had yesterday—the National Industrial Energy Conservation Council, a group of 23 chief executive officers met. Within that group of about 23 companies, they have been hitting a 7 percent level over the last 2 years of energy conservation. They are sharply focused on it because they have been called on to advise Secretary Morton.

We have not heard any emphasis on calls for capital assistance, subsidization.

We have heard, to be candid, a number of complaints and requests that they be relieved of some of the varied energy-consuming, costly elements of the EPA program. To go a few additional percentage points in cleaning up the air on a smokestack takes enormous additional amounts of energy.

They say "let's rationalize that, reduce it about .2 or .3 of a percent. We can save more energy by putting in a new generator."

Senator TUNNEY. We are not dealing with that specific problem today. I will have to see that overview.

Mr. TABOR. We have that under review in the Department. We are doing a study on the steel industry to get the marginal tradeoffs, how much energy are you using at the margin to accomplish some additional environmental assistance that is desirable if you have limitless energy and limitless money.

Senator TUNNEY. I'm glad you're doing that. We have to recognize that the price of electricity in Maryland or Washington, D.C. can have a dramatic adverse impact on the environment in Montana where they will strip the coal and bring it to the generating plants in Maryland.

I don't want to hold you too long. We have other important witnesses. I know Senator Beall has some questions.

I would like to say, sir, that I think your 1980 goals as you have outlined them in your statement, aluminum 10 percent, iron and steel 10 percent, petroleum refinement 15, as compared to the 1972 base line is much, much, much too low.

Sweden, which has a higher per capita income level than we do in this country uses about 50 percent less energy on a per capita basis.

Mr. TABOR. One must remember the size of the countries. When we send goods to Washington, D.C. across the United States from California and Washington markets, it takes more energy than it does sending goods from the Swedish farms to Stockholm or from the Danish peninsula. We have an enormous geographical element.

We are in the process of looking at the figures. The Germans use approximately 50 percent of the per capita amount of energy that we use. That is our standard of living. We like our car. We will have to find a way to harmonize.

Senator TUNNEY. Let's take Germany. Germany uses 50 percent less energy per capita than we do. They don't have as high a per capita income. But they are not starving, however, and they are doing better economically at the moment and they are still able to use 50 percent less energy per capita, too.

Let's face the fact that it is primarily because of Government regulation that our transportation system is so energy inefficient. There are these incredible interrelationships. The point I'm making is that today we have a colossal amount of Government intervention.

When people say we shouldn't have a reporting system to get industry to report on their industrial efficiency because of the additional Government intervention, I have to say "nonsense" because we have so much Government intervention now that this minimal additional intervention to increase energy efficiency is essential in order to help save the best free enterprise system in the world.

We have to maintain as much free enterprise consistent with social harmony as possible. In my view one of the better ways of doing it in 1980 is to put more pressure on industrial energy conservation than your voluntary program is doing. I know it is a difference in emphasis.

I think 15 percent with a base of 1974 makes more sense than 10 percent with a base of 1972. You have studied the matter and I don't deny your right to a very sound opinion. You may be right and I may be wrong. I just happen to think we need a greater effort and I will try to convince my colleagues in the Congress that we do.

Mr. TABOR. We don't intend to be satisfied with these figures. These were made quite responsible when the gentleman stood up in the presence of the American people and said, "We will meet these goals." We will be pressing in this working relationship which is part of your concept as well, to get them to do this well and better.

At the end of 1975-1976 we may see these adjusted upward. But it will be on the basis of realistic understanding of the complexities, competition, new factors entering in. Changes in the price of oil will be operating as a further incentive; substitution of fuels, new technologies, many things operating.

I will say that I certainly find myself quite close to you in the concern. I have some difficulty following the step in the logic leading you to conclude that we need more regulations. It is an attempt to preserve a private, minimally regulated and minimally controlled economy that we both seek. Then to say "but a little bit more regulation may not hurt in this particular place," does not follow. I would like to say we have some strong forces working that Senator Beall mentioned. We have a program. We have sharing of responsibility in profit incentive.

I think we ought to let that operate for a while and come back.

Senator TUNNEY. If you take away some of the other regulations, then I would say all right, you don't need a regulation in this area

because the price mechanism will probably create the kind of efficiencies you are talking about.

But as long as you have a governmental intervention which stimulates energy consumption, as we do—we still have substantial benefits to the oil industry. We have the depletion allowance in coal. Take aluminum as an example. We give a tariff preference to virgin ores. It requires 95 percent more energy to make aluminum initially than to recycle aluminum from aluminum cans. Yet recycled materials are penalized under the tariff rates in this country because virgin ores get a greater preference. Virgin ores get a preference from the depletion allowance and tariff rate when you know it would be more energy efficient to recycle aluminum or any other basic metal.

It is cheaper and better energy-wise, to recycle.

We have Government intervention to make it more profitable to use the technologies that are energy consumptive. You have one governmental intervention working against another. If you eliminate the depletion allowance completely, and the tariff preference on virgin ores and the other governmental interventions that lead to greater energy use then I would say you don't need another countervailing governmental intervention.

But as long as you keep governmental interventions that give a preference to the most energy consumptive means of using your basic raw materials, then you need legislation such as S. 1908.

Senator BEALL. Back on the bill—if I understand the thrust of your testimony, you are opposed to the enactment of this legislation?

Mr. TABOR. Right.

Senator BEALL. If we should proceed in this, you have two principal objections. You think in order to be fair to everybody concerned you must use 1972 as the base year or you would severely penalize the people who have accomplished a great deal of conservation.

Mr. TABOR. Yes.

Senator BEALL. Secondly, you are concerned about the definition of—

Mr. TABOR. Major companies.

Senator BEALL. Do you have any suggestions as to how the definition should be clarified?

Mr. TABOR. Within the context of preference not to have a bill at all, we are concerned that it is a low figure, \$500,000 of sales. We can visualize with continued inflation that that is going to produce a massive number of companies to be reviewed.

I think our suggestion there would be to vest more discretion in the Secretary of Commerce or whoever is named the Administrator of the program, to select a workable number of companies rather than to build in a massive inflow of material for which you would begin to hire new people. Invariably once you get all of that information they will want to do things with it which are not necessarily appropriate.

We are back to the fundamental point that the Chairman is concerned about.

Senator BEALL. I think it is extremely important to have the maximum amount of conservation possible throughout our society. I suspect, for reasons which they can't all take credit, that we have more conservation in industry than in any other sector of our society.

We have a great deal of conservation because of the downturn in the economy—which is undesirable. The pricing mechanism is causing a considerable amount of conservation.

However, I have been concerned, from personal experience with major manufacturers in my own State, that we have restricted them from making substitutions for the utilization of their present energy which would allow greater conservation.

I had an example a couple of weeks ago of a major manufacturer in western Maryland who has four plants around the country. This one happened to employ 4,500 people. They use oil to heat the plant in their production facility. But they are sitting on a lot of coal.

The western plant turns out to be the highest per unit cost plant they have operating. They have only enough business for three, rather than four, plants. Therefore, the only way to keep this plant going is to be able to switch from oil to coal, which they want to do. But the regulatory process to make this switch is so cumbersome that it is almost a question of moving mountains.

We have to cut through the red tape in order to keep 4,500 people working. I'm concerned about these kinds of obstacles that are thrown up in front of people who want to make logical choices in the utilization of energy and that lead to a less than efficient use of the energy that is available.

Mr. TABOR. On that point this is the kind of concern we have heard repeatedly expressed in the hundred meetings we have been involved with in dealing with the industries. There are choices such as you suggest. They could be energy saving or save particularly short fuels like oil.

But there are many prohibitions which were enacted at a time when we didn't face this problem at all. We were flying high and very prosperously. We could afford it and oil was cheap.

We have a different situation and we haven't reviewed those regulations.

I would like to say if I might that the energy conservation percentage figures here relate to energy consumption per unit of output so when there is a downturn in the economy, it is apt—on an energy consumption per unit of output—to increase.

It will be hard to reflect good savings in 1974 as a result of downturn. The tons of coal or barrels of oil will go down. Per unit of output it will be a larger input base you're producing for your goods. It will be harder to meet these figures with the recession.

Senator BEALL. Thank you.

Senator TUNNEY. One last question I meant to ask and forgot to, Mr. Secretary.

On May 1, 1975, Senator Magnuson sent a letter to Rogers Morton. One of the paragraphs of that letter says:

It is our understanding that plans are under consideration to secure such information, namely industrial energy conservation information, through trade associations. In our view such information-gathering and monitoring would be inadequate for obtaining comprehensible, reliable and compatible statistics.

Do you have a copy of that?

Mr. TABOR. I'm aware of that letter. It has been a source of a very considerable amount of discussion and review, not only in

deference to the Chairman but in deference to the issue which is an important one. We are working with FEA and others.

Basically we have found that working through the trade associations has given us a forum and it is not to the exclusion of sitting down with the corporate executives. We brought them into a room. We listened to them. We bargained with them in setting up these targets.

The reporting mechanism is the use of the trade association. It has an advantage of saving us the collation problem in an industry such as the cement industry where there are probably a hundred or two hundred major producers scattered all over the country.

The figures can go in. We don't have to do the analysis and collating of all that data. Other industries are well set up to handle that data. We have found it a workable system so far. We intend to give the Senator a careful report.

Senator TUNNEY. I gather from what you're saying that you still have decided to go ahead using the trade associations rather than getting the information from the individual companies.

Mr. TABOR. We prefer that supplemented by this kind of thing, Mr. Chairman. We were interested in a plan to get specific comments from a number of corporate executives who had taken leadership roles in the whole energy conservation program. We asked for them to send us a personal telegram as to how they were doing and what sort of results they were getting.

That kind of personal contact at the chief executive officer level and the kind of meeting we had yesterday with the industrial energy conservation group where the chief executive officers conferred with Secretary Morton, so he is able to meet eyeball to eyeball with them and find out whether they are onto this program and whether the profit mechanism is driving them as it ought to is highly important.

We think the supplement of those meetings adds an excellent dimension to the practical usefulness of the trade association for correlating the data instead of hiring additional staff.

Senator TUNNEY. Isn't it true that the trade associations are influenced by the few companies that dominate the industry? Can you really obtain a fair reflection of what the attitude is of the individual companies by just going through the trade associations?

I use trade associations, too, for information. We all do. Now we are talking about a program that can either move in and target on the individual companies or one which will for convenience purposes use the trade associations.

Mr. TABOR. I think the personal contact and the personal commitment of these chief executive officers in the development of these targets has been absolutely vital. I think in terms of a reporting mechanism, where the results on a sector basis come in, that has been a suitable supplement to the personal commitment and discussions which have gone on.

Senator TUNNEY. You see what concerns us is let's say I, as a chief executive officer of Company X, decide to do my darndest to achieve the greatest possible energy efficiencies. I achieve it by a factor of 10 percent.

Company Y, on the other hand, is loafing along at 2 or 3 percent and perhaps in the short term saving some money because they don't want to put a lot of money into capital improvements.

The Commerce Department, relying on the trade association, has no way of knowing whether Company X is doing better than Company Y and cannot put the kind of pressure on Company Y that it should to have Company Y do a better job.

Mr. TABOR. I know Mr. Shepherd is dying to comment on that.

I would like to state first that it is quite difficult to compare company to company. As I understand it, they have different processes. Their equipment is of different age. They may even be using different raw materials. One may be using coal or one may be using natural gas.

It makes for comparisons which are not necessarily accurate or desirable.

Mr. Shepherd.

Mr. SHEPHERD. Mr. Chairman——

Senator TUNNEY. Could you identify your position with the Department?

Mr. SHEPHERD. I am Robert Shepherd, Acting Deputy Director of the Bureau of Resources and Trade Assistance. The bureau is responsible for the Office of Energy Programs which carries out the kind of programs we have been discussing today.

I would like to correct what I think is a misconception about the way we use trade associations in the program. In all of the industry groups we have met with, we have had direct participation by company chief executives. The number has ranged from 11 or 12 in the case of aluminum, which is a highly concentrated industry, to as many as 30 or 40 in organized meetings.

As the program got underway, in the case of each industry we asked them to do the following sorts of things:

First of all to appoint a point of contact for that industry that we could work with.

Second, to form an energy committee—an energy conservation committee—to develop a reporting form which would do two or three things: one, it would provide valid data to the government; second, it would be a forum which in itself would encourage greater energy efficiency by individual firms.

The energy committees formed in the industries are made up of representatives of companies, not made up of trade associations. The reason we have wanted to use this method is that different companies have quite different views about to whom they would like to submit fairly detailed data.

What we have asked them to do in essence is find a bona fide neutral point to which the data could be submitted, assembled and put into useable form and passed on to us in the Government. In most instances that has been a trade association. In some instances it has been a law firm or a public accounting firm.

We have made it clear—and we have been assured by all participants in both elements of our program—that we will have access to the individual company data if we feel we need it. The different industries have made different arrangements for us to get that data. We can have the data from the company. We can and do find out when we feel it germane, how the companies were ranking.

The program has another powerful plus for it. What is happening is a somewhat synergistic effect, in that people are taking pride in

their accomplishments. In one of the first industries we used, the American Textile Manufacturers Institute, the textile industry developed a reporting system which every month ranks companies by the efficiency with which they are using their energy. Anyone getting that report knows what his figure was and knows where he stands in that list.

As another example, the Manufacturing Chemists Association last week held a one-day energy conservation reporting seminar in which 99 companies attended. Those company representatives spent a day going through the reporting form which had been developed by the chemical industry, working on and understanding that form. It's complicated business that you get into.

What was required, how could it be gathered from a firm, why it was useful to get that data if you in an individual company were attempting to use energy more efficiently, why data once provided would be meaningful and useful to the Government?

It is not a case where you are turning to a trade association saying, "Gather the data and report it to us." We are trying to use an established mechanism to multiply our efforts throughout a given industry.

We will get data, aggregate it in a form meaningful and useful to us with a clear understanding we can go back to the source of the data, to the extent of going and auditing the records of an individual firm.

It takes time to explain that. Once you get people together and they get working on it we find a high degree of endorsement and in some cases terrific enthusiasm.

Senator TUNNEY. Thank you very much.

Mr. Secretary, I wonder if you can state for us how much you feel we can receive in the way of energy efficiency if we have a program such as outlined in this legislation before you. You're a voluntary program. You hope to get 10 percent greater efficiency by 1980.

If you would have a program of R. & D. and guaranteed loans, couldn't you achieve 20- to 25-percent greater energy efficiency?

Mr. TABOR. The present program is 10 percent by 1980 in certain industries, other industries 15 and indeed some, as you have noted, have exceeded that goal. I want that clear.

I would like to say also there is a tremendous amount of R. & D. going on out there in the private sector. It's essential that it go on and it is going on without request for Government funds or Government loans or Government subsidies. This is once again the area—the savings are so obvious. The cost is so high.

I might cite an illustration.

The aluminum industry is now well ahead and one of the companies probably is going to break through with a new process which has come through their R. & D. over a long time. Electricity is a major factor in the cost of producing the aluminum from bauxite, and this new process will reduce the amount of electricity needed from a range of 8–6.5 kilowatt hours per pound to about 4.5 kilowatt hours per pound.

The existing process using 8 to 6.5 had come down from 12 and the 12 from 20 in constant effort through R. & D.

It would be beyond my capability at this time to put a figure on the question that you ask. I don't know. I am not convinced by the meetings I have participated in that there would be more R. & D. with a Government R. & D. law on the books than there is R. & D. going on in the private sector compelled by its own cost concerns. Nor am I sure—and I'm sure there are particular cases, but generally speaking I don't think that a Government loan program or a Government guarantee program is something that they are calling for to aid them in their energy conservation efforts.

These are high priority financing items. They are self-justifying to the bankers. They are not having difficulty getting these kinds of financial assistance.

Senator TUNNEY. How much is the voluntary program costing?

Mr. TABOR. Costing the Government to operate?

Senator TUNNEY. Yes.

Mr. TABOR. We just got another 14 slots. Could I give you that for the record quite accurately from the accounting people?

Senator TUNNEY. Secretary Tabor, I appreciate your being here and giving us your time. It has been helpful to me. I know it will be to the other members of the committee.

I want to underline what I said in the beginning. I'm pleased you have a program, very pleased with it. I question whether it is sufficient. Hopefully by the end of these hearings we will have a better idea of how we should proceed with this legislation.

Thank you and Secretary Morton.

Mr. TABOR. It has been a personal pleasure to exchange views with you, Mr. Chairman. It couldn't be on a more serious subject. We are not satisfied and won't be until we are saving every erg and Btu we're able to save.

Senator TUNNEY. Dr. Ancker-Johnson, I have to go up and make a quorum. I will be back shortly. If you come up to the witness table we will start with you.

[The following information was subsequently received for the record:]

VOLUNTARY INDUSTRIAL ENERGY CONSERVATION EXPENDITURES

	Fiscal year 1975				Fiscal year 1976			
	Number of positions	Salary & admin. support	Program money	Total funds	Number of positions	Salary & admin. support	Program money	Total funds
Department of Commerce:								
Office of Energy Programs	43	\$951,000	\$472,000	\$1,423,000	57	\$1,326,000	\$592,000	\$1,918,000
Maritime Administration	6	146,000	135,000	281,000	6	146,000	135,000	281,000
National Bureau of Standards	0	0	289,000	289,000	0	0	289,000	289,000
DOC total	49	—	—	1,993,000	63	—	—	2,488,000
Federal Energy Administration	28	390,000	2,810,000	3,300,000	38	608,000	2,585,000	3,193,000
Totals	77	1,487,000	3,706,000	5,293,000	101	2,080,000	3,601,000	5,681,000

Senator TUNNEY. Dr. Ancker-Johnson, I'm pleased to have you before our Committee again. I'm going to ask you if you care to, to put your statement in the record and summarize it, or read it, if you prefer.

STATEMENT OF DR. BETSY ANCKER-JOHNSON, ASSISTANT SECRETARY OF COMMERCE FOR SCIENCE AND TECHNOLOGY; ACCOMPANIED BY RICHARD N. WRIGHT, DIRECTOR OF THE NATIONAL BUREAU OF STANDARDS' CENTER FOR BUILDING TECHNOLOGY; AND JACK E. SNELL, ENERGY CONSERVATION PROGRAM MANAGER

Dr. ANCKER-JOHNSON. I would be happy to submit my statement and go to questioning if you wish.

Senator TUNNEY. I was informed when I was upstairs that the Wyman-Durkin matter will be coming up again at 12:30 this afternoon and no committee of the Senate can be sitting while we are considering this matter. It means I have to wind this hearing up at 12:30. We also have three additional witnesses.

If you care to, you can summarize the main points you wanted to make in your statement and then I will ask you questions.

Dr. ANCKER-JOHNSON. I would like to summarize by pointing out we are much in agreement with the concept and goals of these bills, the Administration bill and your own bill on the conservation of energy in both new and existing buildings, respectively.

In my statement I explain why we support the Administration bill for the conservation of energy in new buildings. In the case of conservation of energy in existing buildings, we would like to recommend, in concert with FEA, that there be a delay in legislative action until FEA and GSA have accomplished their programs.

We have gone into detail in my statement. I feel no need to summarize it further if you would like to save time.

Senator TUNNEY. Well, I would like to ask you questions then if you don't mind.

On Tuesday I asked the FEA whether we can accelerate the development of performance standards under Title 10 of S. 594 and skip the intermediate stages of prescriptive standards and component performance standards.

Mr. Sant indicated they were rethinking the issue and leaning in the direction of going to performance standards directly.

Do you feel that this would be a good idea? Could you give me some sense of your views on it?

Dr. ANCKER-JOHNSON. First, I would like to introduce the two gentlemen with me, Dr. Richard N. Wright, Director of the National Bureau of Standards' Center for Building Technology, and Dr. Jack Snell, the NBS Energy Conservation Program Manager.

Dr. WRIGHT. There has been a great deal of activity in the energy standards area in the past two years. At the request of the National Conference of States on Building Codes and Standards, the NBS began in September 1973 to develop a component performance type energy performance standard.

This was completed in a draft form in February 1974. At the request of the National Conference of States on Building Codes and Standards, it was turned over to the American Society of Heating/Air

Conditioning Engineers as a basis for their development, through consensus standardization procedures, of an energy conservation standard for new buildings. Hopefully that will be issued in the form of a component performance standard.

This does lead to a whole building performance standard. It leads to this by a process of accounting for reasonable and cost-effective goals for the various components of the building, envelope, lighting and mechanical system. Considering the use of the building and climate of the building, these can be summed into a total energy budget for the building.

This then becomes an energy budget, a target which an architect and engineer can use with any changes they prefer as long as they stay within the budget established in this fashion.

The important point to note is that it has taken a period of 2 years to develop the component performance standard into a form which is nationally accepted. This does provide a very important and immediate basis for achieving the first stage of standards.

As Mr. Sant pointed out, we can have component performance standards in place of the prescriptive standards called for in the original Administration bill. We would like to point out that taking the next step is an extremely hard task. It is difficult to go from the consideration of climate and occupancy to an energy budget or a direct performance standard.

Trying to accelerate this much beyond the terms listed in the Administration bill could be a regressive step; in other words, a hastily formulated performance standard might be poorer than the component performance standard that does allow consideration of whole building performance and freedom on the part of designers to meet the needs of the client in a cost-effective manner.

Senator TUNNEY. Do you agree?

Dr. ANCKER-JOHNSON. Yes.

I would just add by way of summary, Mr. Chairman, that we were much in sympathy with the performance standard as an ultimate goal since it gives those who are trying to comply as much flexibility as is possible.

Dr. Wright suggested it is not something we feel can be accelerated beyond the terms that are in the Administration's bill.

Senator TUNNEY. Regarding the component performance standards, do I understand that performance standards would be established for each of the building parts and equipment mentioned, and if the analysis of the system as a whole demonstrates performance at least as good as if every component met its own performance standard then the system also would meet the performance standard even though certain of the components would not?

Dr. WRIGHT. Yes; for example, skylights are not included but the architect could include the skylights and make up the energy saving in some other part of the building. He would still be meeting the component standard.

Senator TUNNEY. How does the cost factor enter into the building performance standards?

Dr. ANCKER-JOHNSON. I'm not sure I understand the question.

Senator TUNNEY. How do you relate cost to the building performance standard, the cost of operation?

Dr. ANCKER-JOHNSON. Are you interested in determining whether the ultimate result is a saving of money after compliance with the standard. Is that the thrust of your question?

Senator TUNNEY. Yes.

Dr. ANCKER-JOHNSON. We have introduced in the testimony the concept of life-cycle cost effectiveness which could provide a mechanism for guiding actions so as to minimize, over the lifetime of the structure, the cost to the consumer.

This can partly be achieved by having a less expensive heating and cooling and ventilating system than might otherwise be the case were the structure itself not made energy conserving. Of course, the ultimate saving over the years in energy consumption would contribute to a lower cost for the overall use of this building.

Senator TUNNEY. Obviously the Administration feels that in establishing standards for performance, that it is possible to do a cost-benefit analysis of the individual components that make up the heating and cooling system and the insulation that is available to the building, et cetera.

What about the next step, the labeling of the annual operating cost of that building and making that information available to the consumer? My point is this:

If you can do in effect cost-benefit analysis for the setting of standards there is no reason why you can't take the cost and let the consumer know what that cost will be so they can in the free market decide which house they want to buy.

I understand some of these all-electric homes have become for many people first-generation dinosaurs. They are incredible. Some of them cost \$200 a month to operate, more in some instances than the mortgage.

Dr. ANCKER-JOHNSON. Your point is well taken. We know this to be true in some instances. We discussed this to some extent in the previous hearing, you recall. We think the objective is a laudable one and we are interested in seeing it come in to being.

Senator TUNNEY. You can't keep me from trying to get help for my bill. Any chance I have.

Dr. ANCKER-JOHNSON. Our position is simply that on the basis of technology, we are not in a position yet to know how to label a building. However, we are working toward that goal. I'm sure when we feel comfortable with that concept, we will definitely move toward labeling buildings.

Dr. SNELL. The concept of labeling a building requires the same kind of capabilities that the performance standard would ultimately; so as we indicated previously, the ability to do one should give us the ability to do the other.

As indicated in the testimony, we have taken some initial steps in this direction by developing methodologies for analyzing cost-benefit retrofit actions and are carrying that forward for evaluation of new building designs.

Senator TUNNEY. My bill provides 2 years to conform with the provisions: Don't you think that 2 years would be sufficient to handle that problem?

Dr. ANCKER-JOHNSON. As you can well appreciate, it is very difficult to anticipate how long it is going to take to complete the R. &

D. program. I would prefer that we not be under a legislative mandate to complete something by a certain date and therefore possibly risking doing a very second-rate job in order to meet a mandatory, statutory time limit.

It would be wisest to proceed on the basis we are, moving as fast as the technology and expertise will allow us but not on the basis of an artificial time frame that might lead us to less than a top job.

Senator TUNNEY. You have set a time limit to develop standards of performance. Why not set a time limit here?

Dr. ANCKER-JOHNSON. We have given ourselves leeway. We are hopeful we can do it faster than that. But a 2-year limit is undesirable. It would be 6 months—

Senator TUNNEY. For prescriptive standards?

Dr. ANCKER-JOHNSON. From the time the performance standard would be instituted and that seems to be a frighteningly short time.

Senator TUNNEY. What about giving you an extension of time? Instead of 2 years, making it 2½ years.

Dr. ANCKER-JOHNSON. It would seem that since that is such a distant date that there really is no need for legislation at this time. It may be better to wait a while.

Senator TUNNEY. That is exactly what some people said when we decided in the decade of the 1960's to go to the Moon. You don't need a timetable or target. It will take care of itself. It doesn't.

You're a fine scientist, Dr. Ancker-Johnson. I remember during your confirmation hearing I had a chance to go over your record. I remember how impressed I was by it.

It seems to me from everything that I hear from the scientific community in my State, and it is a large one, unless you establish goals, unless you set targets, you just don't accomplish what you desire.

You have to establish those goals and those timetables so that you can allocate resources, money, and personnel.

Dr. ANCKER-JOHNSON. Please don't misunderstand me. I'm not saying we are not setting goals. On the contrary. But when some end goal you have in mind depends upon a number of previous steps, each of which may be achieved either more or less rapidly than anticipated, it is very difficult to estimate how long attainment of the final objective might take.

We are in the process of seeing to its conclusion the effort to develop a national program for energy savings which is to be followed by the performance standards. Once that is in hand, we will have a good idea of how long it would take to go from there to the possibility of labeling a building for energy consumption.

Senator TUNNEY. I respectfully disagree that we don't need a timetable for the labeling. I think we do. If you can establish a timetable internally for performance standards you can set a timetable for labeling.

Now the issue is joined. I think it is a perfect time to do it. Two years from now it may be much more difficult. I just think that we have a real possibility to do something worthwhile now and we might as well try and achieve it.

I'm willing to accept an argument that the 2 years is too soon. Maybe 2½ or 3 years. But, not to establish the timetable at all I think is unacceptable.

Dr. ANCKER-JOHNSON. You know, Mr. Chairman, if you set a timetable long enough to insure that the objective can be achieved in accordance with the statute, you may also retard progress because these things have a way of being self-fulfilling.

We are moving under the present arrangement as rapidly as we know how and might be able to move faster than the timetable you establish in law. If you establish it in law, that guarantees we would not move faster than that, I fear.

Senator TUNNEY. How many people do you have assigned to this problem?

Dr. ANCKER-JOHNSON. To the building programs?

Dr. WRIGHT. We didn't come prepared to discuss budget provisions.

Senator TUNNEY. But now we are talking about the number of people working on the problem.

Dr. ANCKER-JOHNSON. I have 7,500 people working for me, so it is hard for me to know how many are working on one particular topic.

Senator TUNNEY. You can supply it for the record.

Dr. SNELL. The numbers relating to the people working on our program in energy conservation in the areas of buildings, communities, and industry may in a sense be misleading. The effort that is not getting underway on developing energy conservation standards is one we are coordinating with HUD, FEA, and ERDA.

Senator TUNNEY. I accept the editorial comment. Now give me the figures.

Dr. SNELL. The current staffing within the Bureau on energy conservation programs is on the order of about 72 professionals. This includes a number of activities beyond those relating directly to this.

Senator TUNNEY. How many of the 72 are working on standard setting?

Dr. SNELL. I would like to ask to submit the answer for the record.

[The following information was subsequently received for the record:]

In a very important way, the entire 250 person staff of the Center for Building Technology is involved directly or indirectly in the development of measurement technology, performance criteria, and standards for buildings. Specifically, we have had a group of some six professionals working on program planning for the energy conservation standards development activity. Our current expectation is that we will have some 52 professionals working on this standards program in fiscal year 1976.

Senator TUNNEY. It is my impression it is a handful, from what I have heard.

Dr. ANCKER-JOHNSON. Mr. Chairman, are you suggesting that sheer brute force is the best way to proceed? I am not sure I follow the thrust of your questioning.

Senator TUNNEY. I'm not suggesting that. On the other hand, if you had three or four people working to get to the Moon you would never have gotten there. You know brute force is not what we're talking about. We're talking about a programmatic effort to achieve the required result.

You have 7,500 people working for you. They are working on something. It may be that you need more of them working on this if in fact as you say you can save so much energy. As I recall from your statement you say you can save 40 to 50 percent. This is not inconsiderable. We are talking about millions and millions of barrels of oil a year.

Dr. ANCKER-JOHNSON. We are in complete consonance, Mr. Chairman.

Senator TUNNEY. I feel energy labeling is a very good way to stimulate the free market system to operate and we are only saying that we ought to give somebody an opportunity to see what it will cost them to operate a house.

I tell you there are a lot of people who just can't believe what has happened to them in the past few years because of the increase in the price of energy to operate their homes. Many people find now their energy budget is larger than their mortgage.

If you have such a clear area for action and such a great opportunity to use the free market mechanisms as well as achieve tremendous energy efficiencies which will help in our national security, I don't see any reason at all why we can't move ahead aggressively in this program.

You're constrained by the OMB. You're constrained by budgetary considerations. The testimony that you have given here necessarily has to fit in with the overall Administration approach. I see gaps in logic. If you can have a timetable for setting performance standards, why can't you have a timetable for establishing a labeling program?

Dr. ANCKER-JOHNSON. I would like to reiterate that we are 100 percent in agreement with what you said about the desirability of labeling. We have demonstrated that to you in other areas, not just buildings.

But a better appreciation for what is involved in arriving at the amount of information and data required before being able to honestly—I would like to stress that—honestly label a building is a complicated process.

Let's ask Dr. Wright to describe something about what goes into arriving at that point where we can honestly label a building.

Dr. WRIGHT. I would like to say a few words in the context of developing a standard.

The NBS does not promulgate them but makes significant technical inputs and often provides a draft for a consensus process.

We began the development of the component performance standards in September 1973. We based this on research experience going back to 1910. We also based this on the work of approximately 50 professionals in mechanical engineering, architecture and other disciplines relative to the standards.

This group worked with the help of half a dozen outside advisors and in a period of 4 months we had a draft of the standard. ASHRAE received it and their 100 professionals worked with it over a period of a year and a half to improve it and become familiar and comfortable with it.

It is an activity to which we are applying substantial resources. The additional resources called for are implicit in S. 594 will be important to the activity. There are analogous activities important

to you in California to develop a new seismic code. We are working on this with the National Science Foundation.

We began the process over a year ago. There are 85 professionals across the country contributing to the Commission putting together a new seismic standard. The deadline for a draft and extensive discussion is a year away. It takes a lot of work and people and time for communication.

Senator TUNNEY. It takes a lot of work and a lot of people. That is why I'm suggesting that a greater allocation of resources to the question of establishing not only performance standards but also labeling would be advisable. That is why I have introduced this legislation.

That is the whole point, to prod the Administration to do what it will eventually do anyway. We want to see a faster timetable.

I would like to ask you more questions, Dr. Ancker-Johnson, and your colleagues, but I have to move on because of the tight time schedule today.

Thank you very much. I appreciate all of you being here.

[The statement follows:]

STATEMENT OF BETSY ANCKER-JOHNSON, ASSISTANT SECRETARY OF COMMERCE FOR
SCIENCE AND TECHNOLOGY, DEPARTMENT OF COMMERCE

Mr. Chairman and members of the Committee. Thank you for this opportunity to discuss Title X of S. 594, "The Building Energy Conservation Standards Act of 1975," and S. 1392, "The Energy Conservation in Buildings Demonstration Act of 1975."

With your permission, at this point I would like to introduce the gentlemen with me this morning. They are Dr. Richard N. Wright, Director of the National Bureau of Standards' Center for Building Technology, and Dr. Jack E. Snell, the NBS Energy Conservation Program Manager. I will speak to the Department's interests; together we will respond to whatever questions you may have.

President Ford in his State of the Union Address emphasized that it is not sufficient to increase our energy supplies, but that it is also necessary to take additional steps to cut long-term consumption. Since buildings account for over one-third of all the energy used in the United States, energy conservation in buildings can have a major effect on reducing consumption. Both Title X of S. 594 and S. 1392 recommend mechanisms for promoting the efficient use of energy in buildings. Title X of S. 594 provides for the development, promulgation and adoption of minimum energy conservation standards for new residential and commercial buildings. S. 1392 would establish a demonstration program in energy conservation using promising innovative technology, through retrofitting existing buildings with energy conservation equipment and systems. The Commerce Department's National Bureau of Standards can play an instrumental role in the development of both of these energy conservation programs.

The Department of Commerce strongly supports the aims of Title X of S. 594. In my testimony today, I would like to make comments on both bills, Title X and S. 1392. Before doing that, I wish to comment on the Department's expertise relative to these bills, the energy savings possible from the retrofit of existing buildings and from providing energy standards for new buildings, the need for Federal action, and the need for a consistent life-cycle cost-effectiveness approach to new and existing buildings.

BACKGROUND

DEPARTMENT OF COMMERCE EXPERTISE IN ENERGY CONSERVATION IN BUILDINGS

The Department of Commerce is deeply involved in energy conservation in buildings; a) it has the lead agency role in energy conservation in the American business community, b) its National Bureau of Standards is the recognized leader in measurement technology and building research, and c) NBS has participated in the development and implementation of the HUD, FEA and ERDA programs for energy conservation in buildings.

NBS has been actively involved in work related to energy conservation in buildings since 1910, when it began studies of the properties of insulating materials. In 1971,

it published, in cooperation with the Office of Consumer Affairs, the popular pamphlets "7 Ways to Reduce Fuel Consumption in Household Heating—through Energy Conservation" and "11 Ways to Reduce Energy Consumption and Increase Comfort in Household Cooling." More than one million copies have been distributed. NBS has developed the largest United States research program for energy conservation in buildings. This program has been of direct assistance to building owners, designers, contractors, and regulatory officials, as well as to HUD, FEA, ERDA, GSA, and other Federal agencies that construct buildings. With your permission, I would like to submit for the record a summary of the NBS Energy Conservation Program.

The NBS, in response to a request in July 1973 from the National Conference of States on Building Codes and Standards (NCSBCS), developed and published "Design and Evaluation Criteria for Energy Conservation in New Buildings." This NBS energy document is being used as the framework for the proposed standard, "Energy Conservation in New Building Design," now being developed by the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).

RETROFIT OF EXISTING BUILDINGS

Existing buildings represent one of the principal opportunities for enduring energy savings beginning within the next 10 years. We believe that energy savings of 10–30 percent are achievable in most types of existing buildings. It is extremely important that all levels of government evaluate life-cycle costs of modifying public buildings for energy conservation to set an example for the private sector and to provide experience applicable to all buildings.

NEED FOR ENERGY STANDARDS FOR NEW BUILDINGS

Our analyses of potentials for energy savings in new buildings show that we can if we will, save upwards of 40 to 50 percent by improving present practices, without sacrifice of comfort or essential performance. With skyrocketing fuel prices and uncertainties about future fuel supplies, the American public deserves every assurance that energy efficiency, as well as health and safety features, has been designed and built into all new buildings.

Nationally uniform energy conservation standards are needed for cost-effective design and construction practices for achieving these energy savings. NBS has worked closely with the principals referenced in Title X of S. 594, namely FEA, HUD, GSA, and ERDA in helping to develop an effective program for the formulation and implementation of energy conservation standards for buildings.

RATIONALE FOR FEDERAL ACTIONS

Because of our history of low-cost fuel in the United States, energy conservation has not been a primary concern in building design and construction. Therefore, few designers have experience in technical practices for energy-effective design, the energy-related properties of building materials and equipment have not been adequately characterized, and building regulatory officials in the cities and States have almost no experience in the enforcement of energy-related regulations.

All parts of the Nation have a common goal in energy conservation, and all share the need for the development and implementation of energy conserving practices for existing and new buildings. A major Federal program in research and development, and in dissemination of results, is the most efficient means of providing States, cities, and all elements of the private sector with the practices all need.

CONSISTENT APPROACHES TO NEW AND EXISTING BUILDINGS

"Life-cycle cost-effectiveness" should be a principal objective in the energy conserving design of new buildings and in the retrofit of existing buildings. "Life-cycle cost-effectiveness" means the actions taken are economically advantageous to the owner over the life of the building. As I will now explain, the mechanisms for achieving this objective may differ for new and existing buildings.

The NBS efforts in support of State needs show that the development and effective implementation of national design standards can bring about more efficient use of energy in new buildings. Incorporation of life-cycle cost considerations in the generation of such standards will result in economically justifiable energy conservation requirements. The development of standards based on the concept of an energy budget will allow trade-offs in design to reduce the cost of complying with the standard. Such standards would encourage innovation in the interests of energy conservation without sacrifice of other qualities.

Effective energy conservation in existing buildings requires the development of standard procedures for determining cost-effective modifications to be applied to specific

buildings. In contrast to the situation with new buildings, these procedures must account for the more limited alternatives and the different means for financing the improvements. Our recently completed study "Retrofitting Existing Housing for Energy Conservation: An Economic Analysis" has demonstrated the effectiveness of this approach. The approach used in this housing study is suitable for extension to decisions regarding the payoffs of retrofit of commercial and public buildings.

S. 594: BUILDING ENERGY CONSERVATION STANDARDS ACT OF 1975

THE NEED FOR NATIONAL ENERGY CONSERVATION STANDARDS

As noted earlier, DoC strongly endorses S. 594, the Building Energy Conservation Standards Act of 1975. This bill stipulates practicable standards workable both in the near and mid terms. The need for standards to achieve energy conservation in new building design has been widely accepted.

NCSBCS estimates that 75 percent of the U.S. population and 90 percent of the new construction occur in areas subject to local and State building codes. These codes provide a significant non-Federal delivery system for energy conserving measures.

A number of States already have authority to develop or implement energy conservation regulations. Thus, there is an urgent need for a workable standard now. Also, to encourage innovation, provide the maximum freedom to the architect and engineer in meeting user requirements in building design, encourage economy through reciprocity between States, a building performance standard is needed for the longer term. Title X of S. 594 provides for both the immediate and longer term needs.

For example, NCSBCS has recognized the immediate need and stimulated NBS and, subsequently ASHRAE, to develop what is now ASHRAE Standard 90P "Energy Conservation in New Building Design." This component performance standard, along with suitable manuals of accepted practice, could provide the basis for meeting the intent of Title X for a workable near-term interim standard.

Further development will be necessary to provide the rational cost-effective building performance standard needed to increase design flexibility and encourage greater innovation in meeting energy conservation goals.

IMPLEMENTATION OF ENERGY CONSERVATION STANDARDS

We believe that the requirements of Section 1005, for incorporation of standards in State and local codes, provide for the most rapid and uniform implementation of these standards in the United States. Many elements of the building community are concerned about energy use becoming a subject of building regulation, but impending fuel shortages indeed make this a matter of public health, safety, and welfare. The Federal inducements are likely to encourage more rapid and more uniform implementation of the standards.

However, even if the more traditional approach to incorporation of standards in State and local codes without Federal inducement is relied upon, standards promulgated in accordance with Section 1004 will make a substantial contribution to the energy conservation goals of the Nation. Many State and local governments are actively concerned with energy conservation and will promptly adopt and enforce regulatory standards. California, North Carolina, Ohio, Oregon, and Washington already have. In the absence of a recognized National standard, there is no consistency or uniformity among the codes adopted by these States.

TECHNICAL ASSISTANCE

With reference to Section 1008, Federal assistance will be greatly needed, and will be very effective: a) in the preparation and implementation of technical training programs for building designers and building regulatory personnel, b) in the development of specific guidelines to supplement the performance standards for builder-designed small residential and commercial buildings, and c) in providing for the support of accredited, independent engineering analysis agencies, testing laboratories, and quality assurance agencies to evaluate new or innovative solutions to performance requirements. All of these are important elements of technical assistance, which will be required for effective implementation of the energy conserving standards. NBS is prepared to provide assistance to HUD in carrying out the provisions of Section 1008 for technical assistance to the States and units of local governments.

RESEARCH AND DEMONSTRATION

NBS strongly supports the provisions for research and demonstration of energy conservation technology provided for in Section 1010. There are a large number of opportunities for energy conservation in the design of building envelopes and the mechanical,

electrical, and illumination systems used in buildings. But, because of our history of low-cost energy in the U.S., measures of the possible fuel savings have not been established adequately for improvements in standards and codes.

RECOMMENDED TECHNICAL CHANGES

Since S. 594 was introduced, we have worked with FEA, HUD, and ERDA to plan for implementation of the Act. These studies have indicated the types of standards best fitted to the intent of this legislation. These efforts have led to a sharpening of our understanding of the definitions of the types of standards needed.

In his testimony before this committee, Roger Sant, Assistant Administrator of FEA for Energy Conservation and Environment, used the terms "component performance standards" and "performance standards." We understand the term "component performance standards" to mean the following:

"Component performance standard" is "a set of design standards describing the minimum energy conservation performance required of individual building parts, and the equipment to provide heating, cooling, ventilating, hot water, and lighting for a building; a system analysis which demonstrates overall compliance without the necessity of meeting each of the design standards is a means of meeting the component performance standard."

Similarly, we understand the term "performance standard" to mean:

"Building performance standard" is "a design standard describing the minimum energy conservation performance required of an entire building and its energy-using systems, based on cost factors, as well as energy use factors."

We hope it will be noted in the legislative history that both component performance standards and building performance standards should be accompanied by manuals of accepted practice which illustrate one or more specific solutions that meet the prescribed performance requirements.

S. 1392: ENERGY CONSERVATION IN BUILDINGS DEMONSTRATION ACT OF 1975

The commendable objective of this bill is to bring about energy conservation in existing buildings by demonstrating the effectiveness of retrofit measures in Federal, State and municipal buildings. However, this objective is also being addressed currently by the FEA in the Federal Energy Management program and in the FEA-GSA multi-year program. Therefore, we support the Administration's position that no legislative action be taken at this time. FEA has commented in their testimony about their programs in relation to S. 1392. We offer the following two comments concerning deficiencies in the proposed legislation.

SELECTION OF DEMONSTRATION BUILDINGS

In an effective national demonstration, the selected buildings should be representative of many others and should lead to substantial and cost-effective energy savings. In order to predict the benefits and costs for the selection purposes, standard procedures are needed for determining the best combination of modifications for any specific building. These procedures should include means for 1) identifying energy wasteful buildings, 2) determining that a building can be retrofitted economically, and 3) selecting the optimum combination of modifications and evaluating their energy savings and costs. We estimate the time to accomplish this would be at least one year.

EVALUATION OF DEMONSTRATIONS

A retrofit demonstration program should involve quantitative evaluation of the energy savings and costs of the retrofit for each demonstration building. Without this, the benefits of the demonstration program itself would be unknown. In order to evaluate a retrofit demonstration, it would be necessary to measure the base-line performance prior to retrofit, then to establish the design and construction costs of the retrofitting, and finally to evaluate the performance of the retrofitted building. Some selected demonstration buildings should be instrumented and evaluated in substantial detail in order to provide new information for future improvements of retrofit technology.

SUMMARY

To summarize, I believe that 10-30 percent energy savings in existing buildings and 50 percent savings in new buildings would have a major effect on United States energy demand. Further, these savings can be achieved in a cost-effective manner. The Department strongly supports Title X of S. 594. The Department does not support S. 1392 at the present time pending completion of FEA program planning.

The standards called for by Title X are clearly needed to meet national goals for energy conservation in new buildings. We have said why we favor Federally developed standards. These standards should be implemented through State and local codes with Federally supported technical assistance as specified in Title X. A number of well-defined research studies are needed to assure timely and effective development of practical building performance standards.

Mr. Chairman, that completes my statement, and now we would be pleased to answer your questions.

Senator TUNNEY. Our next witness is Dr. Maxine Savitz, Director of the Division of Buildings and Industry, ERDA.

Welcome. I hope you don't mind if I ask you, Dr. Savitz, to put your statement in the record and maybe you can summarize it. Then we could ask you questions. Is that acceptable to you?

STATEMENT OF MAXINE L. SAVITZ, DIRECTOR, DIVISION OF BUILDINGS AND INDUSTRY CONSERVATION, ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION; ACCOMPANIED BY DR. LEONARD TOPPER

Dr. SAVITZ. I would be happy to summarize my statement.

First, I would like to introduce Dr. Leonard Topper of the National Science Foundation which has been sponsoring work related to industrial and energy conservation. He will assist me in answering questions.

ERDA is now formulating a program to develop and demonstrate technologies to reduce energy consumption in the industrial sector. The program will focus on: Industrial processes and products which consume significant energy and have the potential for significant energy savings; utilization of waste heat from industrial processes; substitution of alternate fuels and materials; energy savings in agricultural and food processing.

In order to strengthen the technological base of the energy-using industries, basic and applied research on materials (processing, substitution, characteristics) heat transfer, combustion and other related sciences will be investigated.

Criteria are being developed on which to select research projects. Among these would be: (1) The systems' potential saving for energy in terms of Btu's; specific fuels (oil, gas, or coal; particularly with regard to imported fuel); (2) the economies associated with technology-potential capital cost; operating cost; Btu saved per dollar invested; (3) relative technical maturity of process or equipment; (4) potential use of the process of equipment in other industrial sectors; (5) time period to perform the R.D. & D. and demonstration of commercial feasibility; (6) extent of participation of industry.

I will now address most of my comments to section 6 of S. 1908 which would establish a comprehensive program of research, development and demonstration within ERDA devoted to energy conserving industrial technologies.

The "Federal Non-Nuclear Energy Research and Development Act of 1974," Public Law 93-577, directs the Administrator of the Energy Research and Development Administration to perform research, development and demonstration to "advance energy conservation technologies, including but not limited to productive use of waste, including garbage, sewage, agricultural waste, and industrial waste heat, reuse and recycling of materials and consumer products . . ."

Thus, federally sponsored research, development and demonstration related to more efficient use of energy in the industrial sector is under the authority of ERDA.

The President's budget submitted in January 1975 proposed \$2 million for R. & D. related to the industrial sector. As part of ERDA's requirement to submit a R. & D. plan to Congress on June 30, a comprehensive R. & D. plan for industrial end-use conservation is currently being developed. This has been prepared with input from other government agencies.

Section 6 of S. 1908 directs the administrator of ERDA to establish and maintain a comprehensive research, development and demonstration program related to energy conserving industrial technologies. It would allow for contracts and grants to private organizations and businesses to conduct demonstrations.

It states that grant recipients will be responsible for that part of the facility or process which may be conventional, and ERDA would fund only that which would be related to innovative, experimental, or non-conventional energy conserving industrial technologies.

This does not preclude the Administrator from engaging in total funding. As mentioned, one of the criteria we plan to use in implementing our R. & D. program is the extent of participation of industry.

Industry input is being solicited in identifying promising opportunities for study. Industry participation will be sought at the earliest possible opportunity and intensify as projects move from development to demonstration.

The proposed criteria for grants in section 6(3)(b) might cause problems. It might be very difficult, for example, to separate the cost of an energy conserving step in a process or piece of equipment from a traditional one in order to determine who pays for what.

In addition, some industries may be in a better financial position to cost-share than others. Maximum flexibility is needed for cost-sharing. This is one of the areas to be examined which I referred to earlier.

The industries and general technologies and processes in the bill are consistent with the areas being identified in the ERDA R. & D. plan.

In summary, it can be said that we agree with the objectives of the bill, in particular section 6, but feel that sufficient authority currently exists for ERDA to conduct a comprehensive research, development, and demonstration program related to more energy-efficient technologies and processes in the industrial sector, and we are proceeding with such a program.

Senator TUNNEY. Thank you very much.

I have been reading your whole statement. I note that the President's budget submitted in January 1975 proposed \$2 million for R. & D. in the industrial sector.

Isn't that very little when you consider the industrial sector uses 40 percent of the energy that is consumed in this country.

Dr. SAVITZ. That number was submitted as part of the President's budget at the time that ERDA was being formulated. This was a minimum amount to get the program started. As part of the ERDA R. & D. plan to be submitted to Congress on June 30, we are identifying other possible budget numbers.

Senator TUNNEY. NASA, for example, has budgeted \$38 million in order to investigate energy conservation in aviation. Aviation utilizes only 4 percent of the energy consumed in the country, but \$2 million for R. & D. in the industrial sector which utilizes 40 percent of the energy consumed in this country does not seem to be at all an appropriate R. & D. effort.

Can you give us some indication as to what you feel will be required over the next couple of years in the way of money to be spent?

I'm not asking for your exact budget request, but what you think would be an optimum amount.

Dr. SAVITZ. Since June 30 is quickly approaching and we will submit the plan then, I would prefer to wait until then.

Senator TUNNEY. Can you give us a hint as to whether it will be more than \$2 million?

Dr. SAVITZ. I think I can safely say that it will be more than \$2 million.

Senator TUNNEY. In the Project Independence report, it is suggested that a major Federal R. & D. program is necessary and I'm quoting:

Research and development would be performed in the areas of boiler efficiency, heat management, improved insulation, reduced electricity usage, increased process efficiency and new materials processes. Direct Government costs for research and development are estimated to be \$250 million in 1977; \$100 million in 1980, and \$50 million in 1985.

This reduction occurs because by 1985, much of the front-end research and development effort necessary to bring about the savings will have been made, and by 1985, the program will consist largely of technology transfer. An estimated 1.50 quads would be saved in 1985 with imported oil prices at \$11 a barrel.

Eighty-five percent of the incremental savings resulting from the operations are the results of research, development, and demonstration programs.

I quote this in view of the fact you are going to be having a program announced soon, and it would be interesting to see how your program relates to the Project Independence estimates.

Dr. SAVITZ. Those areas are covered in our submission.

Senator TUNNEY. You may be getting a letter after we have learned about how much you are asking for.

You appear to imply that tax credits contained in the Tax Reduction Act provide adequate incentives for energy conservation investments, and therefore for the time being the loan guarantee provision of S. 1908 are superfluous.

As Dr. Hatsopoulos notes in his written testimony, "in some respects a loan program may be even more effective than tax credits. This is because many companies do not have sufficient earnings to take advantage of tax credits and have no remaining sources of funds."

Would you react to Dr. Hatsopoulos' statement?

Dr. SAVITZ. With the present economic situation, it would appear that companies would not be able to take advantage of tax investment. We want to look at that to see what is happening—

Senator TUNNEY. Could you speak up a bit?

Dr. SAVITZ. We want to see who is taking advantage of the Tax Reduction Act and for what means, for example, is the credit being used to invest in more energy efficient equipment. We would want to study the best mechanism—tax credit; tax writeoff; loan, et cetera.

Senator TUNNEY. Can't you have both?

Dr. SAVITZ. One needs to look at what the cost to the Treasury would be; to the private sector. It warrants some analysis to see what would be the most appropriate.

Senator TUNNEY. The purpose of a hearing like this is to get the kind of inputs that would provide for such analysis. If you agree, as I think you do, with Dr. Hatsopoulos' statement; you don't agree?

Dr. SAVITZ. In certain cases.

Senator TUNNEY. If you do agree, then a loan program is justified, but what is not known is the amounts of money that would be justified under the loan program. I don't see why you would testify you don't think that the loan program is needed, when in fact you have agreed that Dr. Hatsopoulos' statement——

Dr. SAVITZ. We don't know to what extent the loan program or tax incentive is being used now.

Senator TUNNEY. It is quantitative, not qualitative. We are talking about whether the loan program is needed.

You, in your statement, indicate that the loan program is not needed. I see an inherent inconsistency between that and your agreement with Dr. Hatsopoulos' statement.

Dr. SAVITZ. We need analysis to see how many companies would not be served by a tax credit as opposed to a loan. We have a law on the books now that will enable industry to invest in energy conserving equipment. Let's examine how that is being used. Part of our program will be that kind of analysis.

Senator TUNNEY. When we presently give several tax incentives, we are not focusing these incentives on energy conservation.

Dr. SAVITZ. The Tax Reduction Act does not specify equipment for energy conservation, however, it can be applied to such equipment. The law does not preclude it.

Senator TUNNEY. The loan program would be concentrated on energy conservation. I can't disagree that further analysis is needed. I do disagree with your statement that it is not necessary to go ahead with the loan program now.

Dr. SAVITZ. I feel it is premature to go ahead with the loan program until we see who is taking advantage or who isn't taking advantage of the Tax Reduction Act.

Senator TUNNEY. What Dr. Hatsopoulos says is that some companies don't have sufficient opportunity to take advantage of the tax credit. He says the loan program is most effective for those companies.

Dr. SAVITZ. I think the loan program would be one mechanism that could be used.

Senator TUNNEY. That is what we are doing in the legislation, providing one method.

As far as the amount of the program, that is a separate question. It is clearly separate. I think it is clear the program is needed.

You suggest that you already have the authority to carry out the industrial energy conservation research and development program. But in light of the fact that at the moment at least very little money has been requested from Congress for the program, don't you feel that it would be helpful in order to focus attention on the severity of the problem, that we establish some clear targets for energy conservation in industry, which would then also have the effect of encouraging OMB to make more money available for the R. & D. effort?

Dr. SAVITZ. The first step of our R. & D. effort will be doing appropriate systems analysis to identify where the technological opportunities exist and see what the payoffs are, and what the options may be. We are proceeding to document certain industries, processes, equipment, et cetera.

Senator TUNNEY. Do we have the figures on how much more energy-efficient industry is in Japan or Germany than industries in the United States?

Dr. SAVITZ. We are collecting data through the activities with the CCMS and IEA for several industries—iron and steel; cement; paper; petroleum refining.

Senator TUNNEY. Iron and steel, how much more efficient are the Germans than we are in that area?

Dr. SAVITZ. According to a Stanford Research Institute study, Germany is about 50 percent more efficient than the United States based on total energy used.

Senator TUNNEY. They are more energy efficient in Japan in these areas, are they not?

Dr. SAVITZ. They are in Japan, yes. I can submit it for the record.

Senator TUNNEY. I wish you would. We have heard testimony because S. 1908 calls for 15 percent overall industrial energy conservation improvements by 1980 and 30 percent by 1985 in comparison with 1974 that these goals are too high.

I think that comparative analysis would be interesting because I dare say that the Japanese in their steel industry are 15 percent more energy-efficient now. I don't know, but I would guess that. It would not seem to be a man-killing task to get 15 percent greater energy efficiency by 1980 for the steel industry.

I do have other questions, but the time is running short, Dr. Savitz. I appreciate your being here. We will look with interest at the amount of money that is requested for this area by ERDA.

Dr. SAVITZ. I appreciate the opportunity to testify on the proposed legislation.

Senator TUNNEY. Thank you.

[The statement follows:]

STATEMENT OF MAXINE L. SAVITZ, DIVISION DIRECTOR, BUILDINGS AND INDUSTRY
CONSERVATION, ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

Mr. Chairman and Members of the Committee: I appreciate the opportunity to appear before you to discuss S. 1908, the "Industrial Energy Conservation Act of 1975."

Industry represents the largest energy consuming sector of the United States economy. It accounts for 40 percent of the U.S. energy consumption and has experienced an average annual growth rate during recent years of 3.9 percent. If historical growth rates were to continue, by 1990 it has been projected that industry would consume 50 percent of the Nation's energy. The six largest users in industry—chemicals; primary metals; petroleum and coal; glass and cement; paper and allied products; agriculture and food processing account for over 70 percent of industrial energy consumption.

The principal end uses of fuels in industry can be classified into four major categories:

- Space heat and light—2 percent
- Electric drive—21 percent
- Process steam—47 percent
- Direct process heat—30 percent

The industrial energy demand is very complex in that not only is energy required but, in many cases, special types of fuel are required. For example, the iron and steel industries require special metallurgical coals and the glass industry requires natural gas for its processing fuel. Many factors affect energy use in industry—capital cost;

fuel cost; operation and maintenance; reliability and availability of fuel; reliability of equipment; regulations (e.g., OSHA, EPA).

While the total energy fraction consumed by industry has been increasing, the energy consumed per unit product has shown a downward trend. This has been largely as a result of the introduction of new plants and modified process designs in an effort by plant designers to remain competitive. Conservation for conservation sake has not been practical.

The objective of the program ERDA is now formulating is to develop and demonstrate technologies to economically reduce energy consumption required for industrial and agricultural products, taking into account the total life time cost and energy consumption of the products.

The program will focus on:

- Industrial processes and products which consume significant energy and have the potential for significant energy savings.
- Utilization of waste heat from industrial processes.
- Substitution of alternative fuels and materials.
- Energy savings in agriculture and food processing.

Much of the data collected to date has been related to energy-use rather than identifying specific technological opportunities. The initial effort, therefore, will involve system analysis related to all four areas. The research will include technical, economic and environmental and society impacts associated with new energy conserving technology. The success of any program will be measured by the degree to which the conservation opportunities developed are adopted. These may depend on many factors external to the technology itself. Studies such as cost/benefit analysis, impact analysis (resource availability, life cycle cost, labor dislocations, etc.), legal, institutional and financial constraints will be initiated. These rather basic pieces of information concerning the impact of various energy conservation choices are not now available. We expect our research program to provide a much firmer basis for future decision making on energy conservation opportunities by both the private and public sectors.

As an example of one of the program elements, consider the sub-program area—reoptimization of industrial heating process. The objective is to improve the energy efficiency of present industrial heating processes which have been optimized, but in an era when energy was low in cost and readily available.

Significant opportunities exist for analysis of the heat use systems to identify inefficient heating (and cooling) processes and to estimate the savings which could be effected by application of modern technology. Analyses of such systems in each of several selected industries (e.g. glass, paper, cement, food, heat treatment, etc.) will be initiated early in fiscal year 1976. In these studies the cooperation of the appropriate national industrial associations will be sought. Based upon the preliminary results of the systems analysis, goal oriented R&D projects will be undertaken to demonstrate energy conservation in a specific industrial situation via introduction of modern technology. The choice of techniques and devices to be investigated will depend upon the nature of the industry involved and upon the particular plant selected (all of which are peculiar to some degree). For example, general technologies available for waste heat utilization in the reoptimization of industrial heating process might be (via bottoming cycles, heat pumps, etc.) thermal transfer and storage techniques, improved insulation and refractory materials, multiple uses of energy, and combustion technology.

In order to strengthen the technological base of the energy using industries, basic and applied research on materials (processing, substitution, characterization), heat transfer, combustion and other related sciences relevant to more efficient use of energy and equipment will be investigated.

Criteria are being developed on which to select research projects. Among these would be: (1) the systems potential saving for energy in terms of Btu's; specific fuels (oil, gas or coal; particularly with regard to imported fuel); (2) the economies associated with technology—potential capital cost, operating cost; Btu saved per dollar invested; (3) relative technical maturity of process or equipment; (4) potential use of the process or equipment in other industrial sectors; (5) time period to perform the RD&D and demonstration of commercial feasibility; (6) extent of participation on industry.

The proposed bill S. 1908 would offer a comprehensive approach to more efficient use of energy in the industrial sector. It would allow for the establishment of goals and targets; a comprehensive research, development and demonstration program to develop energy efficient technologies in the industrial sector to meet the goals and targets; and then a guaranteed loan program to encourage purchase, construction, operation or maintenance of energy efficient equipment.

Section 4 would establish a mandatory energy efficiency reporting system and energy efficiency targets. A voluntary program is underway with the Federal Energy Administra-

tion, Department of Commerce and industry and I will defer to the representatives from FEA and DOC for a more detailed discussion of this section. Sections 7, 8, and 9 would allow the Secretary of Commerce to make loans and guarantee the payment on loans for the purchase, construction, operation or maintenance of energy efficient equipment or facilities. It should be noted that the Tax Reduction Act of 1975, which became law in March, provides incentives for industry to make new capital investments. Although it is too early to predict the Law's ultimate impact, we would expect that firms taking advantage of higher tax credits would be selecting equipment and processes which are more energy efficient than they have been in the past. As part of its Energy Conservation Program, the Administration would investigate and make recommendations as to what methods might be desirable to promote rapid implementation of energy conservation technologies upon expiration of the Tax Reduction Act.

I will now address most of my comments to Section 6 which would establish a comprehensive program of research, development and demonstration within ERDA devoted to energy conserving industrial technologies.

The "Federal Non-nuclear Energy Research and Development Act of 1974" PL 93-577 directs the Administrator of the Energy Research and Development Administration to perform research, development and demonstration to "advance energy conservation technologies, including but not limited to productive use of waste, including garbage, sewage, agricultural waste, and industrial waste heat, reuse and recycling of materials and consumer products . . ." Thus Federally sponsored research, development and demonstration related to more efficient use of energy in the industrial sector is under the authority of ERDA. The President's budget submitted in January 1975 proposed \$2M for R&D related to the industrial sector. As part of ERDA's requirement to submit a R&D plan to Congress on June 30, a comprehensive RD&D plan for industrial end-use conservation is currently being developed. This has been prepared with input from other government agencies, (FEA, NBS, EPA, USDA, NSF, FPC) and by industry through two workshops at which the plan was reviewed and analyzed by industry representatives. We have already begun coordinating end-use conservation R&D within the government through an interagency task force meeting held at ERDA on June 4 at which the above agencies discussed their fiscal year 1975 programs and their planned fiscal year 1976 programs.

A meaningful R&D program will allow realization of the widest spectrum of opportunities to utilize energy more efficiently than is now possible. Many of the industrial processes have been optimized in a time when energy was low in cost and readily available. Large capital investments have been made in equipment to support these processes. Federal R&D would allow the acceleration of those technologies that are promising forms of energy and projected cost but are not close to commercialization and for which industry does not have sufficient risk capital available. The three largest energy consuming industrial sectors (chemicals; primary metals; petroleum) are characterized by concentration in large industrial firms with substantial research organization and analytical capabilities. Such large companies are already actively engaged in "energy accounting" and in taking steps to improve their energy efficiency. The next three largest energy consuming industries (paper and allied products, stone, clay and glass products, and food and kindred products), however, are generally disaggregated into relatively small companies with limited research or analytical capabilities. The suppliers of industrial process equipment are even more diverse. Once technological alternatives have been identified, it is necessary to carry out full-scale demonstration to prove the practicality and economic benefit of the next technology in an actual industrial environment. Private industry may not finance long-term, high-risk expenditures. For example, the suppliers of industrial process equipment are small to medium sized companies whose financial resources are so limited that they cannot commit to any long-term R&D or large-scale demonstration programs.

Section 6 of S. 1908 directs the Administrator of ERDA to establish and maintain a comprehensive research, development and demonstration program related to energy conserving industrial technologies. It would allow for contracts and grants to private organizations and businesses to conduct demonstrations. It states that grant recipients will be responsible for that part of facility or process which may be conventional and ERDA would fund only that which would be related to innovative, experimental, or non-conventional energy conserving industrial technologies. This does not preclude the Administrator from engaging in total funding. As mentioned, one of the criteria we plan to use in implementing our R&D program is the extent of participation of industry. Industry input is being solicited in identifying promising opportunities for study. Industry participation will be sought at the earliest possible opportunity and intensify as projects move from development to demonstration. The proposed criteria

for grants in Section 6(3)(B) might cause problems. It might be very difficult, for example, to separate the cost of an energy conserving step in a process or piece of equipment from a traditional one in order to determine who pays for what. In addition, some industries may be in a better financial position to cost share than others. Maximum flexibility is needed for cost sharing. This is one of the areas to be examined which I referred to earlier.

The industries and general technologies and processes are consistent with the areas being identified in the ERDA R&D plan.

In summary, it can be said that we agree with the objectives of the Bill in particular Section 6, but feel that sufficient authority currently exists for ERDA to conduct a comprehensive research, development and demonstration program related to more energy efficient technologies and processes in the industrial sector and we are proceeding with such a program.

Senator TUNNEY. Our next witness is Dr. Hatsopoulos, president of the Thermo Electron Corp.

I apologize for mispronouncing your name, Dr. Hatsopoulos. I should know better, but the interesting thing is the way I had it written down was as two words.

STATEMENT OF GEORGE N. HATSOPOULOS, PRESIDENT, THERMO ELECTRON CORP., WALTHAM, MASS.; ACCOMPANIED BY THOMAS WIDMER

Mr. HATSOPOULOS. It is a difficult name.

Senator TUNNEY. I know you, and I should have recognized it. I'm sorry.

Mr. HATSOPOULOS. It is a pleasure for me to testify again before your committee, Mr. Chairman, on a subject I feel is of great national importance.

With your permission, I would like not to read my statement, which I am submitting for the record, but make a few points relating to it as well as some points that came to mind as I was listening to the testimony this morning.

First let me say that you have accurately described the magnitude of the problem. Industry consumes far more fuel than any other sector; far more than transportation which includes automobiles; far more than the electric utilities. So it is a very important sector to focus our attention on.

You also have accurately described what could be accomplished in terms of savings in the next few years in this sector which amounts to an enormous amount of energy, estimated at over 4.6 million barrels a day of equivalent energy in terms of oil.

I would like to add that this savings can, according to studies made by many people including ourselves, be made economically.

In others words, the return on whatever investment is required is positive. It is advantageous. So the question that arises is why is that not happening?

In fact, some of the critics of the kind of action you suggest in your legislation have pointed out that normal cost-pricing forces in the economy will take care of the matter automatically because industry is very sensitive to costing.

Therefore, they will move to more effective energy conservation. In that regard I would like to point out a number of things.

First of all, a lot of the saving practices in industry have been economical for many years in the past. You can prove that by working up the numbers. Yet the progress made was very little.

For example, the cement industry in this country is using a wet process which consumes twice as much energy as the dry process that is used in the cement industry in Japan. Changing to the dry process was economical not only now with high prices, but was economical before.

Yet for the last 10 years, no movement has taken place in this country to go in that direction. Whatever changes have occurred in other industries like the shifting to the basic oxygen process, in this country, have taken 20 years. Basic oxygen was practiced in Japan in the 1950's, yet it wasn't initiated in this country until the early 1960's, and only a percentage of the companies in this country use it now.

Senator TUNNEY. Why is this?

Mr. HATSOPOULOS. The economic forces are not working.

Senator TUNNEY. Why not?

Mr. HATSOPOULOS. It is an interesting question. Interaction with chief executives in the country and understanding of the ways that boards think will provide the answer. Incurring large capital investments is a big barrier to overcome. You can have technical staffs produce to the chief executive reasons why in the long run they can save money if they invest 10 or 15 million dollars in a new process. That investment, however, in the context of the economic climate is sometimes impossible to take place.

More specifically, I would like to point out that contrary to common belief, the cost of capital in industry is inhomogeneous. Companies—like oil companies that have a lot of cash flow, a lot of profits and very low debt, cost them for capital which is less than 8 percent. Now you go to the bulk of energy-consuming companies which consist of medium-sized companies that are right now beyond the debt-to-equity ratio permitted by the financial community where the price ratio of their stock is down to four, you find that the cost of capital to them is not 8 percent, but approaches 50 percent before taxes.

Senator TUNNEY. What?

Mr. HATSOPOULOS. Fifty percent, because—there are thousands of companies right now, many of them listed in the New York Stock Exchange, selling at four times earnings. You look at the balance sheet and the banks are after them to reduce the debt.

They can't borrow money. The only avenue they have for obtaining capital is by selling stock. They go to the major underwriters and they may offer them four times their earnings, that corresponds to 25 percent after taxes, which before taxes is about 48 percent of the additional capital used. For some companies, therefore, it cost them 48 percent to make an investment whereas others that are rich now because of the situation, like oil companies, it may cost them 8 percent.

This is an enormous discrepancy of almost an order of magnitude. It is one of the major reasons why it is not feasible for American industry to modernize with an efficient method. That is one of the reasons I highly endorse your loan program presented in this bill which in this present time could be far more effective than a small tax incentive or investment tax credit.

The second point I want to make concerns another barrier to change. The second barrier is the general conservatism that exists

in industry. I know this by experience, by interacting with companies in several industries. Even if a process is practiced overseas and has been for a long time, the guy that will introduce it to his own plant for the first time in a country is under tremendous pressure to say "let somebody else try it first before I do."

He can't take a chance to invest the last few million dollars he has in his budget to use a new practice that is not practiced in this country.

Therefore, the demonstration aspect of your bill where monies are allowed for demonstration, is the key to overcome this enormous barrier which accounts for the very slow introduction of energy-savings practices which sometimes after the thing is developed and proven overseas, may take as long as 20 years before it is practiced universally in this country. The third point I want to make is that in our opinion, the R. & D. that is being done in new processes in industry, with the exception of just a few special cases, including the Alcoa new process, is not only inadequate, but compared to the size of the opportunity is practically nonexistent.

I differ substantially with anybody that makes the statement that industry makes enormous investments in improved processes. This is just not so.

I would like to make one small point concerning something you stated. You said, how come NASA spends \$38 million for an industry that consumes 4 percent of our energy, whereas we have allocated \$2 million for 40 percent.

The matter is even worse than that, Senator. The potential for improving that 4 percent in aviation is very small. Improving the efficiency of aviation is a difficult, difficult process because already they are quite efficient.

The potential for improving the 40 percent on the other hand is far greater. Therefore the ratio is even worse than what you suggested.

My final point is that one of the greatest opportunities that exists for improved utilization in industry is to combine the production of steam that uses 50 percent of the electricity generation. To do so and to implement such a program that could have enormous benefits will require changes to regulations and changes of rules by which pricing of electricity is made by utilities.

Senator TUNNEY. I always enjoy your testimony, Dr. Hatsopoulos, because I think you have such a broad vision. You are a scientist. You are a successful businessman. But you have the capacity to reach beyond your own business endeavors and find the kind of interrelationships which I think are important if we are going to survive.

The thing that I don't understand, the way the Federal Government has established its programs with regard to energy conservation, is that on the one hand they are prepared to make certain interventions. They feel perhaps the pressure against these kinds of intervention, are not sufficiently great to dissuade them from doing it, like in housing performance standards.

Then in the case of industry, where there is tremendous opportunity for additional energy savings, the Federal Government so far has taken the position, no, we don't want any kind of intervention at all.

The point is to get a decent program underway to encourage industry to analyze their own processes, to develop a loan program where they can obtain money as you suggest, and not have to pay 48 percent—by the way, I wonder how many people who are establishing these programs down in the Administration and the Commerce Department are aware of the fact that it costs 48 percent for a company to go to the debt-equity markets.

I think a lot of people haven't thought about it, and a lot of people who are establishing program priorities haven't thought about it either.

That is why it is important, it seems to me, to move as quickly as we can with a loan program.

I have a couple of questions. I have a lot of questions but I can't ask them all today.

Isn't it true that most R. & D. in industry is to improve products rather than conserve energy?

Mr. HATSOPOULOS. There is an enormous amount of research done in industry. I wasn't referring to that before. There is sketchy and inadequate research done in improving processes, specifically aimed at improving fuel efficiency.

Most of the research dollars which are, of course, billions go into producing new products because this will give the quickest return, growth on their sales, glamour, and increase their P.E. ratios. This is where the research dollars go to.

Senator TUNNEY. Are there studies in progress that would furnish guidance for legislative action in the area of onsite generation of electricity?

Mr. HATSOPOULOS. Yes. There are studies that are being conducted right now. NSF is conducting some of these studies. I understand that one such study has interesting findings. The results of this study are about to be produced and published.

Senator TUNNEY. Is that a private study?

Mr. HATSOPOULOS. This is Mr. Widmer, vice president of engineering of the company.

Mr. WIDMER. One program, which has been under NSF sponsorship, is with Dow Chemical. Dow is a leader in the field of combined cycles in generating onsite electricity. That will be published publicly.

There are other things in progress now as well. We are doing some of them ourselves.

Senator TUNNEY. If you can send them down to us—not the DOW study or NSF study, but your own study, it would be interesting. What do you consider reasonable conservation goals? Do you think the goals in the legislation are reasonable?

Mr. HATSOPOULOS. I think they are reasonable. I think they could be exceeded. In this connection, let me make another point:

As far as the potential for energy saving in the next decade is, for which you pointed out how much it would be, it consists of a number of elements.

One of those elements is better housekeeping. Now this has a potential of saving only a fraction of the total potential you mentioned. It is one that has not much barrier because it doesn't involve the barrier of capital expenditure or anything that is very hard for industry to swallow.

What is happening right now with the able help of the Department of Commerce and FEA, is that industry is responding and showing good results. I feel these results will level off very soon because these results were achieved primarily in the easy part of the conservation goals: Namely, those that have to do with housekeeping or improving practices that don't involve any controversial issues. I think the numbers stated to you this morning are very commendable. They are great. They were achieved.

Unless you have bills of the type you are introducing here, you will reach a saturation point in terms of these things.

I want to make the point that the incentive to the Nation for improved utilization in terms of dollars, never mind other intangibles, but in terms of dollars, is far greater than the incentive that our pricing system has given to a plant manager.

The reason is that if instead of going through the conservation route, we go through the increased supply route, it will cost the Nation twice as much. In particular to produce or supply as much energy as we could save in the next decade, we would need to spend over \$50 billion for increased supplies whereas the capital investments to accomplish these savings would be less than half.

The reason is basically that the incremental cost of supplies is very high. In fact, it is three times higher than in the past.

The fuel pricing policy, however, is costing the plant manager only the average price not the incremental. The incentive to the Nation is, therefore, greater than the incentive to the plant manager. Something like your bill helps put the two incentives closer to reality.

Senator TUNNEY. I want to thank you very much, Dr. Hatsopoulos. I appreciate your statement and support of the bill.

As I said earlier, I appreciate the fact that you take such an interest in these matters and have the vision you do.

Mr. HATSOPOULOS. Thank you very much.

Senator TUNNEY. Thank you.

[The statement follows:]

STATEMENT OF GEORGE N. HATSOPOULOS, PRESIDENT, THERMO ELECTRON CORPORATION, WALTHAM, MASS.

I am pleased to have this opportunity to testify before the Senate Commerce Committee concerning the proposed legislation for industrial energy conservation (S. 1908). This legislation can be an extremely important element in the Nation's program to resolve its urgent energy problems. My testimony includes a discussion of the technical and economic basis for potential fuel savings in industry, and some suggested provisions for an industrial energy conservation policy.

THE BASIS FOR INDUSTRIAL ENERGY CONSERVATION

It is important to recognize that U.S. industry, while consuming over 40 percent of the Nation's energy, now operates at an average thermodynamic efficiency of only about 13 percent. This fact is not widely appreciated, even by engineers themselves, because of the practice of applying incomplete thermodynamic criteria in the calculation of process effectiveness. A recent report for the Ford Foundation's Energy Policy Project and an article in the May 23 issue of SCIENCE called attention to the shortcomings of defining efficiency solely according to the simple principles of the First Law of Thermodynamics. As pointed out in this article, the true measure of efficiency can only be obtained by reference to the Second Law of Thermodynamics and to the properties known as "entropy" and "available useful work."

The present low level of industrial energy efficiency indicates that great opportunities exist for substantial fuel saving. In the short term, such savings can be achieved through wider use of existing technology. In the long run, development of entirely new industrial

processes will make it possible to more nearly approach the thermodynamic limits of energy end-use effectiveness.

It is estimated that about one third of the fuel used by industry can be saved by implementing only proven technology. Some of these methods are already in use in certain segments of domestic industry, others have been practiced extensively abroad, and still others require demonstration in pilot plant operation. At the level of industrial fuel consumption experienced in 1975, the known fuel-saving measures could result in a reduction equivalent to 4.6 million barrels of oil per day. Such a drastic cut-back would be achieved by an increase in the average efficiency of industrial processes from the present 13 percent to only 17 percent. In other words, each percentage-point improvement in industrial energy efficiency corresponds to a fuel saving that is equivalent to more than one million barrels of oil per day.

By far, the largest single opportunity for energy savings is afforded by on-site generation of by-product electricity in combination with industrial process steam. Almost half of all the fuel consumed by U.S. industry is employed to generate process steam. In 1975, this amounts to the energy equivalent of 6 million barrels per day of petroleum, a quantity approaching the total fuel consumption of all U.S. automobiles.

Most industrial steam is used at relatively low pressure and temperatures—less than 200 pounds per square inch and 300 to 400° F are typical conditions. The energy required to produce such steam need only be in the form of low-grade heat at a temperature of several hundred degrees Fahrenheit. In practice, however, most industrial steam is produced by the heat generated from combustion of fuels which are high-grade energy sources yielding temperatures over 3000° F. These fuels could be used much more effectively if the heat resulting from combustion were first used to generate electricity, a high grade form of energy and then used again at lower temperatures for the production of process steam.

One approach already followed to a limited extent in the paper and chemical industries is to produce superheated steam at over 900° F and 1400 pounds per square inch pressure as in the large boilers of electric utility plants. This steam is first expanded through a turbine which drives an electric generator and is then used for process needs.

An even more effective method of satisfying the process steam needs of industry would be to first generate electricity with conventional gas turbine-generator sets and then use the exhaust heat to raise steam in a waste heat boiler. By generating electricity in combination with process steam it is possible, in principle, to supply the Nation's entire electric power requirements as a by-product of normal industrial operations. This single class of applications for combined cycle systems could yield an energy saving equivalent to over 4 million barrels per day of petroleum—half the fuel now consumed by all central station generating plants.

Not all industrial boiler installations supply a large enough steam load to make by-product electrical generation economically feasible, but most of them could. Currently, however, only about 10 percent of the full potential is being realized, and in the five-year period from 1968 to 1973, the amount of in-plant electricity generation actually declined.

It is obvious that an aggressive program of industrial energy conservation can yield enormous fuel savings without impairing productivity or retarding economic growth. This is in direct contradiction to the recent advertisements by major electric utilities and oil producers whose public relations campaigns suggest that reduced energy consumption can be directly translated into a loss of jobs and further economic stagnation.

On the other hand, the prospect of limitless energy growth inspired vigorous opposition among environmental groups who envision irreversible damage to the earth's oceans, atmosphere, and still-virgin land areas resulting from the uncontrolled quest for new fossil and nuclear fuel supplies. Between these two extreme positions, all-out expansion of supplies versus zero growth, I believe that the alternative of energy conservation through improved efficiency affords a more reasonable basis for a National policy. Clearly, it is possible to have continued expansion of industrial output, while sharply reducing the rate of energy growth.

CAPITAL COST ADVANTAGES OF ENERGY CONSERVATION

Capital cost is an issue often raised as an objection to industrial energy conservation measures requiring new process equipment. Actually, most energy saving techniques provide a good return on invested capital. For example, waste heat recuperators for gas or oil fired furnaces have long been worthwhile investments, even at historically low fuel prices. Nevertheless, only the recent fuel shortages and threats of outright curtailment have stimulated industry to begin installing recuperators on a broad scale.

The present higher energy prices have caused some change in industry attitudes toward conservation, but the economic climate, i.e., high long-term interest rates and lack of opportunity for raising equity capital, has so conspired that many industrial concerns cannot afford to take advantage of existing energy conservation opportunities.

This is unfortunate, because the Nation's limited financial resources can often be invested more effectively in energy conservation measures, rather than expanded energy supply facilities.

Some idea of the cost benefits of industrial energy conservation to the Nation as a whole can be obtained by comparing the total capital investments required to increase energy supply, on the one hand, with the industrial investments required to implement fuel saving, on the other.

It has been estimated that to supply *one* additional barrel per day of refined petroleum fuel products, from new domestic sources inclusive of well-head production, transportation, refining and distribution, will require between \$11,000 and \$14,000 of capital investment—about a factor of 3 to 4 increase over the investment cost of the late 1960's for Middle East sources. Synthetic natural gas from coal will cost between \$10,000 and \$12,000 for the energy equivalent of one barrel of oil per day. Similarly, to supply one additional kilowatt of electricity requires a total capital investment for the fuel supply, the utility generating plant, and the transmission and distribution network, of between \$900 and \$1,100. These costs are equivalent to \$22,500 and \$30,000 per daily barrel of oil supply at an average utility heat rate equal to 10,000 Btu per kilowatt.

Table I shows estimates of the energy savings and the capital investment associated with a number of specific industrial energy conservation measures. These are contrasted with the capital costs required to incrementally increase energy supplies. The bottoming cycles referred to in the first three items are the advanced closed-cycle Rankine systems which use organic working fluids developed to take advantage of the relatively low temperatures of furnace stack gases and diesel engine and gas turbine exhausts. It can be seen that in most cases the capital investments for energy conservation are much less than the investments needed to increase energy supplies. Even for those cases where the investments for conservation are comparable with those required to increase supply, considerable reductions in energy costs still occur as a result of the yearly savings in fuel.

It is estimated that the capital investment needed to reduce industrial energy consumption by one third is about \$25 billion. However, the comparable cost of providing this amount of new energy supply would be over \$50 billion.

TABLE I.
POTENTIAL CAPITAL COST-BENEFITS FROM SELECTED
ENERGY CONSERVATION MEASURES

Item	Energy Savings at 1975 Consumption Level (bbl/day)	Capital Investment for Energy Saving (per bbl/day)	Comparable Capital Cost of New Supply (per bbl/day)
(1) BOTTOMING CYCLES FOR INDUSTRIAL WASTE HEAT STREAMS	275,000	\$ 8,300	\$22,500 to* \$30,000
(2) BOTTOMING CYCLES FOR STATIONARY DIESEL ENGINES	110,000	\$20,500	\$22,500 to* \$30,000
(3) BOTTOMING CYCLES FOR STATIONARY GAS TURBINES	589,000	\$11,500	\$22,500 to* \$30,000
(4) RECUPERATORS FOR DIRECT COMBUSTION FURNACES, BOILERS, ETC.	400,000	\$ 5,000	\$11,000 to \$14,000
(5) HIGH CONSISTENCY HEAD-BOX FORMERS FOR PAPER MAKING	80,000	\$ 2,300	\$11,000 to \$14,000
(6) TROUGH KILN FOR CEMENT MAKING	170,000	\$15,000	\$11,000 to \$14,000
(7) PROCESS STEAM-ELECTRICITY (Back-pressure steam turbines)	1,300,000	15,000	\$22,500 to* \$30,000
(8) PROCESS STEAM-ELECTRICITY (Gas turbines - Waste Heat Boilers)	4,600,000	\$13,700	\$22,500 to* \$30,000

* Supplied as electricity.

FEDERALLY SUPPORTED RESEARCH AND DEVELOPMENT

In view of the relatively low efficiency of well-known industrial processes, I believe that an aggressive R&D program is needed to explore various means for improving the situation. Although thermodynamic studies show that substantial gains are obtainable through fundamental process changes and new technology, any radical departures from existing practice will undoubtedly incur high technical risk. Consequently, several years of research are required before clear decisions and selections can be made. Moreover, once promising alternatives have been identified, it is necessary to carry out full-scale demonstrations to prove the practicability and economic benefit of any new technology in the actual industrial environment.

Private industry is unlikely to finance such long-term, high-risk expenditures. Indeed, in many instances the suppliers of industrial process equipment are small-to medium-sized companies whose financial resources are so limited that they cannot commit to any long-term R&D or large-scale demonstration programs.

It is my belief that only through Federally sponsored research and demonstration projects will it be possible to accelerate the development of the required energy conserving technology. New technology created under such a program would rapidly be made available to industrial customers through the equipment manufacturers who pioneer the developments. Moreover, by making provisions for royalty payments to return the Government's R&D investment, it should be possible for the developer to retain his proprietary rights.

In order to focus the National effort upon those opportunities affording maximum return on research dollars invested, there is also a need for comprehensive industrial efficiency surveys. These surveys might draw upon the resources of the Energy Research and Development Administration, so that technically qualified staff can be made available for planning and reviewing their progress. The same requirement for technical management expertise also applies to any Government sponsored R&D programs. These programs will often involve highly specialized new technology, and it is important that qualified staff be made available within the Government to direct the various projects funded under this proposed legislation.

STIMULATION OF INVESTMENT IN INDUSTRIAL CONSERVATION

From the total capital availability point of view, it is certainly in the National interest to induce industry to adopt fuel-saving measures. One approach, of course, would be to raise the price of all fuels and electricity so as to sharply alter the investment trade-offs. Although industry would then be subjected to overwhelming economic pressures to conserve energy, such a policy would likely have a severe retarding effect on most industrial operations, and the general economy would certainly worsen.

A more realistic approach would be one where industry is given low interest loans or investment tax credits for installing energy conservation equipment. I see no clear-cut choice between loans and tax incentives as a means of stimulating investment in energy saving industrial equipment. As you may know, I have previously proposed an investment tax credit plan. The same general approach could also be applied to a system of loans:

- (1) Establish a Government council of energy technologists to determine the degree to which specific energy saving equipment would qualify for low-interest loans or credits.

- (2) Develop guidelines for the council's decisions, including a relationship between the amount of loans or credits allowed and the degree of impact upon National energy objectives.

- (3) Require original-equipment manufacturers to take the initiative of filing an application before the council to qualify for loans or credits on a specific process or piece of equipment. A fee for each application might offset administrative costs.

- (4) List each qualified process and equipment with the agency designated to process industrial loan applications, or with the Internal Revenue Service for investment tax credits.

By adjusting the interest rates, amount of loans, or the tax credit allowances on a sliding scale geared to performance, it would be possible to give highest priority to equipment and process modifications which yield the greatest fuel savings. In some respects, a loan program may be even more effective than tax credits. This is because many companies do not have sufficient earnings to take advantage of tax credits, and have no remaining sources of either equity or debt capital as a result of depressed stock values and limited borrowing power. Thus, a loan program could provide capital for energy-saving measures in some of the weaker segments of industry where existing production methods are often the most antiquated.

REGULATORY AND UTILITY PRICING POLICIES

I would like to discuss one final point which I believe to be critically important to any industrial energy conservation program. This relates to the need for creating an economic and regulatory environment favorable to the practice of decentralized or on-site generation of electricity.

As previously noted, this constitutes the largest single source of potential fuel savings. However, present state and Federal regulations are not designed to accommodate any large-scale flow of electricity from industry into the utility grid for sale to non-industrial customers. Furthermore, the existing policies of electric power companies generally discourage the practice of self-generation by industry. This is accomplished not only by offering progressively lower rates for incremental energy, but also by charging high fees for stand-by or emergency power as backup to a customer's on-site generating system. Federal legislation should limit the rates charged by utilities for backup power to the absolute minimum, covering only incremental costs of equipment needed to guarantee such service. Determining this cost will necessitate careful study of the overall effect upon the Nation's interconnected power grid, considering the low probability that any large number of industrial generating systems will fail simultaneously.

An additional step might involve granting Government credits to utilities so as to reduce to the lowest possible level the cost of guaranteeing stand-by power. This would help eliminate a potential economic barrier against industry's fully exploiting the available opportunities for self-generation of electricity.

Senator TUNNEY. Our next witness is Dr. Edward Sunderland, Department of Mechanical and Aerospace Engineering, University of Massachusetts.

STATEMENT OF DR. J. EDWARD SUNDERLAND, DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING, UNIVERSITY OF MASSACHUSETTS.

Dr. SUNDERLAND. Thank you. It's a pleasure to be here.

I share a lot of Mr. Hatsopoulos's opinions as well. I feel that industry does not have the same priorities we do when it comes to energy conservation.

I think we can look at the history of industry in many other areas and see a type of pattern here.

I suggest you consider what they have done in automobile safety. They didn't move effectively in this area until the Government forced them to, environmental control problems and many other examples can be made where industry has I would say dragged their feet.

Right now there are a number of industries moving toward greater use of electricity rather than other forms of energy even though this is not in the best interest of energy conservation.

The efficiency of electrical generation may be 37 percent in central power station. By the time the electricity gets to the end user, due to losses in transmission, the efficiency is only about 33 percent. If industries generate their own steam, the efficiency is 70 to 80 percent.

Some industries are moving more toward electrical sources of energy because it is more likely to be available when oil and gas supplies become scarce.

I'm in favor of all three of these bills. I think they are extremely important.

On the Building Energy Conservation Act, S. 594, I would like to stress the importance of considering the different kinds of energy used. We need to be careful to watch the source of energy that we are using and minimize the use of electricity.

In the S. 1392, there are a couple of problems I see there.

One is that if we try too many innovative systems on one building, you may have an evaluation problem. It's important to do one at a time.

Another aspect of this which I feel is important is to evaluate more adequately some existing retrofit systems. There are a lot of retrofit systems that people use but data for the economic evaluation of them is limited.

Until we can tell people how much money will be saved by making a certain retrofit to a building, they will be slow to do it.

On the Industrial Energy Conservation Act, S. 1908, industry has been solving the easy problems. This started with the Arab oil embargo. They repaired broken windows, fixed leaky steampipes, things that you could walk through a building and see.

We need to get into the more thorough thermal analyses of the entire system, and when industry does this, they will be able to come up with much more effective improvements in their energy use. I don't think most companies will do it unless someone forces them to.

I will give a personal example of the type of study that is needed. Some years ago, I was studying the bacon process, smoking of bacon in smokehouses for Swift & Company. This is the largest producer of bacon in the world.

In the process of going through a thermodynamic analysis, I found out that it was taking twice as long to process bacon as it should have. At first I thought my calculations were bad.

Further analyses showed that the long processing time was caused by evaporative cooling; a lot of energy was used to evaporate the water and some of the things injected into the bacon.

By adding steam ejectors in the smokehouses, they increased the humidity and were able to double the capacity of the smokehouses. They also saved a great deal in energy.

This type of study needs to be done by all large energy using industries.

Senator TUNNEY. I have to leave in 7½ minutes. I will let you talk. I don't have any immediate questions. I may submit questions to you in writing.

Dr. SUNDERLAND. I will try to summarize quickly.

One study we had at the University of Massachusetts of a survey nature was to see the energy used by the various buildings we had, the dormitories. We surveyed 41 buildings and we found out that the energy use on a per-year basis for heating varied by more than a factor of 3.

Some of the buildings use 3 times as much energy for heating in a given season per square foot as others. Unfortunately, the newer buildings use more energy than the older buildings. I stress the importance of getting the kind of data from industry that would correspond to this.

Find out how much energy each industry is using for example per ton of steel or per ton of aluminum and publish this data, make it available so that the industries who are using too much have the embarrassment of seeing this published to consumers. The industries who are more cost effective, can use it in their advertising.

The industries who are using too much energy have the greater economic incentive to undergo conservation efforts.

The one thing that I would say in summary is this. The area that is most important to our national energy policy, right now is conservation. The alternative energy sources will not help us in an effective way in the next 5 to 10 years.

Conservation can have immediate dividends, even in the next 1, 2, 3, or 5 years.

My feeling is we need active, strong measures with short timetables. If I had an overall criticism of the three bills, it would be that the timetable is a little too slow. We need to push it more. Time is at a premium.

Senator TUNNEY. You heard Doctor Ancker-Johnson respond to my questions about energy labeling in the buildings and timetables.

Would you care to comment on her comments in response to my questions?

Dr. SUNDERLAND. In general, I would not agree with her. I feel that there is a matter of haste here. We can't sit waiting for industry by-and-by to come up with cost saving efforts.

Industry and government need to move rapidly and I think they can if they are pushed into it.

I don't think they will do it without pressure.

Senator TUNNEY. You think we need timetables?

Dr. SUNDERLAND. I think we need definite timetables and goals. I would say the ones in S. 1908 are too slow. To wait 10 years for 30 percent reduction is far too slow.

I think that these reductions in energy use could be accomplished much faster than that.

Senator TUNNEY. What would you use as a figure?

Dr. SUNDERLAND. I think I would be tempted to get that 30 percent down to 1980 or 1981 and really put the pressure on. There is room in the bill for negotiation.

If the company has overriding reasons why they can't meet the goals, negotiations can be made if necessary. Let them make a strong case why they can't do it; 1985 is a long time to wait for a 30 percent reduction.

Senator TUNNEY. Did you agree with Mr. Hatsopoulos that the loan program is a good one?

Dr. SUNDERLAND. Yes, particularly in New England. I'm not that familiar with other regions in the country but in New England the companies really need money.

The companies I talk to can sometimes get capital for energy conservation items that will have a 2-year payback.

If they get a payback in 10 years, they should be able to obtain funds for the retrofit. But they can't do it unless there are some additional loans and extra funds available.

Senator TUNNEY. Doctor Savitz thought we should have more analysis before going ahead with the loan program.

Dr. SUNDERLAND. You get a lot of data by starting the loan fund on a modest basis if necessary. That would give you rapid data, seeing how many people apply for it.

Senator TUNNEY. It's true is it not that the big companies are able to generate their own capital requirements to a far greater extent than the midsized and smaller companies. It's the larger companies as Mr. Hatsopoulos suggested who were able to get the 7 $\frac{3}{4}$ -percent

money whereas the smaller company has to go to the marketplace to get equity capital and thereby suffer the costs associated with that.

When the stockmarket is depressed many of the companies' stocks are affected.

Dr. SUNDERLAND. Yes.

Senator TUNNEY. I'm very appreciative of the analysis that you have carried out on each of the bills which you submitted for the record.

They will go into the record.

Senator TUNNEY. They are helpful.

I was interested in one of your comments regarding the definition of energy efficiency. We will look at that and try and make some appropriate changes so that we can incorporate your thinking. I thought your point was well taken.

Dr. SUNDERLAND. That is helpful academically. It didn't change anything substantive but it's helpful from an academic standpoint.

Senator TUNNEY. We may have a few more questions that I will have to send to you. I hope you don't mind responding in writing.

Dr. SUNDERLAND. I would be happy to.

Senator TUNNEY. Thank you very much, Doctor Sunderland.

[The statement follows:]

STATEMENT OF J. EDWARD SUNDERLAND, PROFESSOR AND HEAD, DEPARTMENT OF
MECHANICAL AND AEROSPACE ENGINEERING, UNIVERSITY OF MASSACHUSETTS,
AMHERST, MASS.

This bill provides the impetus to collect data on industrial energy use, provides pressure for industry to develop worthwhile conservation activities, provides funds for energy conservation research and development, and loans for industries to enable them to reduce their energy usage. The objectives of the bill are excellent and the benefits to the National energy program should be significant.

I would expect many industries to view this bill with skepticism and possibly some hostility. They want to be left alone and not engulfed in additional Federal interference. Many of them have already had "major" energy programs with great success. I strongly differ with these opinions and believe that much progress can be gained through the type of thoughtful pressure that this bill would produce. The energy reductions that some companies were able to accomplish in the last several years have often resulted from superficial studies which gave solutions to the easy problems: add storm windows, stop steam leaks, turn out lights that were not needed, etc. I am convinced that much greater reductions in energy use can be accomplished through careful studies of the type that would be required by this bill.

One of the major benefits will result from reporting the energy use by various industries. If this data is carefully collected, it will cause industries that use above average amounts of energy to produce a given output to reconsider their process from an energy viewpoint. Last year we made a study of the energy use per unit area per heating system of forty-one dormitories at the University of Massachusetts. To our surprise, we found that some dormitories used more than three times as much energy for heating than others. The older buildings tend to use less energy than the ones more recently constructed. This survey is invaluable in deciding which buildings to work on first to reduce energy losses.

I am concerned that the definition of "energy efficiency" (Page 5 line 9) is not adequate. The main problem is that it does not take into account the type of energy used. For example, suppose that a particular industrial process uses 100 units of energy in the form of steam that is generated in its main boiler. Suppose that the system is converted to an electrical system that uses 20 percent less energy or 80 units. The definition of efficiency used in the bill would rate this as a good achievement. However, the total energy use, considering the fact that the central power station is only about 33 percent efficient whereas the company's boiler should have an efficiency above 80 percent, would increase. Before changing the system, it would take about 120 units of energy in the form of fuel to generate the required steam. But to generate

80 units of electricity would take 240 units of fuel energy at the central power station. Thus, in this example, twice as much energy is actually used even though the "energy efficiency" was reduced by 20 percent. I would recommend defining the "energy efficiency" as the amount of industrial output divided by the energy required to produce the product if the energy is not electricity. If electricity is used, it should be multiplied by three! From an academic viewpoint, I object to the term energy efficiency and would recommend using instead *energy use factor*. In thermodynamics, efficiencies are always ratios of the same type of thing used and are dimensionless.¹

There are several other problems involved with implementing the program but these will need to be solved on a case by case basis. E.g., how are energies treated that are used by companies for travel, sales, heating offices and warehouses, etc.? Suppose a company starts making a product out of plastic (high energy cost) instead of wood (low energy cost). This case would be difficult to cover by the procedures suggested in this bill.

The plans required by companies to reduce energy use per unit output ("energy efficiency" or "energy use factor") should prove valuable but the implementation by the Secretary will not be at all easy. Companies that make conscientious efforts will find great opportunities to save energy. Often these opportunities will be quite unexpected and will occur through making a careful thermal study of all their processes. About fifteen years ago I made a study of the thermal processing (smoking) of bacon for the largest meat packer in the world. According to my calculations it was taking twice as long to process a slab of bacon as it should. Upon further study we found that evaporative cooling was taking place and this greatly reduced the rate of heat transfer into the product. By adding steam injectors to the smoke houses to increase the relative humidity, the processing time (and energy use) was reduced by 50 percent and the capacity of the smoke houses was doubled. I give this as an example for stressing the need for industries to perform thorough energy studies of their processes. Analyses of this type may take longer than the 90 days allotted in the bill for the six industries identified by the Secretary (Page 7, line 12). The review, evaluation, and updating mentioned at the end of the same paragraph is crucial to the implementation of the bill. In order to adequately perform the review and evaluation, site visits may be necessary and provision for this by panels of experts should be made in the bill.

I would like to add the following specific comments or questions:

On page 10, line 21 who will be the ultimate judge concerning public disclosure? Could a provision be made in these cases to enable disclosure of averages and minimums and maximums without revealing the specific company?

The section beginning on page 11 is well written and should be beneficial to university research groups of the type I direct.

On page 12, emphasis is placed on R&D support that is innovative. The bill should stress the importance of a thorough evaluation of the innovation including costs vs. savings and before and after energy uses.

On page 13, after line 19, I would suggest adding:

(G) energy sources (electricity, oil, gas, solar, etc.)

(H) thermal control systems

The whole subject of loans and guarantees is outside my field, but this section, starting on page 14 appears to be cumbersome.

In conclusion, I am enthusiastic about this bill. It will not be easy to implement and it will require very careful supervision. The benefits will be well worth the costs.

TITLE X OF S. 594. BUILDING ENERGY CONSERVATION STANDARDS ACT OF 1975

The purposes of this bill are to insure that reasonable and cost effective energy conservation features are incorporated into new residential and commercial buildings. A strong feature of this bill is the emphasis on both prescriptive and performance standards.

On page 106, line 13, I would suggest adding after *variations* "and energy source (electricity, oil or gas) for heating and hot water"—

On page 110, lines 1 and 2, university faculty and environmental groups could be added to the list.

The last section, on page 110, Research, almost appears to be added as an afterthought. This section is extremely important to the Federal Energy Program and should be much more specific.

¹The thermodynamic definition of the energy efficiency would be the ratio of the actual amount of energy to produce a product (as considered from the original source, i.e., the fuel used directly or indirectly through the generation of electricity, steam, hot air, etc.) divided by the energy necessary to produce the product by a reversible process (the most efficient possible process.)

This bill should be expanded to include considerations of the type of energy source used, especially for heating buildings and hot water. For at least ten years and probably much longer, oil and to a lesser extent, natural gas will be used by central power stations for the production of electricity. The efficiency of these power stations is about 33 percent. Small domestic oil furnaces operate at about 70 percent efficiency and gas furnaces are about 80 percent efficient. Thus considerable energy could be saved by restricting the use of electric heating in all new construction. If, in the future (20 years?) electricity becomes cheaper due to coal and nuclear power stations, electric heating could be added. I would suggest prohibiting the use of electric heating in most (or all) regions of the country unless it is used as a back up for a solar heating or a heat pump system.

In general, I think this bill is well written and will be extremely beneficial to the Nation. I would suggest that the Commerce Committee consider the development of a similar bill for existing buildings. This, admittedly will be a much more difficult piece of legislation to write, but the benefits would be greater.

S. 1392. ENERGY CONSERVATION IN BUILDINGS DEMONSTRATION ACT OF 1975

This bill would establish a demonstration program for using innovative technology for reducing the energy usage in Federal, state and municipal buildings. The objective of this bill is noteworthy but the evaluation of the results of the funded projects may be difficult. If innovative technology will be used to retrofit various buildings, it will be necessary to restrict the changes made to any building in order to develop an adequate evaluation. If more than one retrofit system were installed in a given building, then the relative effectiveness of each system would be difficult to measure. In implementing the provisions of this bill, it would be essential to obtain a record of the energy use in the building and appropriate weather data before and after retrofit.

I would suggest that grants could be made to organizations that would try several innovations, one per building, to avoid the difficulty involved with evaluating individual retrofit innovations where more than one change would be made simultaneously in a given building.

This bill could be altered to address one of the major problems confronting states and municipalities, i.e., the lack of funds to implement well established conservation techniques. I know of organizations (such as my own) that cannot obtain funds for conservation programs that would have very short pay back times (even less than two years). A provision might be added to this bill as follows:

A fund could be established to finance innovative and/or established retrofit schemes. All retrofit costs would be covered by this fund. A previous history of the energy usage of the buildings to be retrofitted and the corresponding weather data would be a prerequisite for obtaining support. Data would be obtained after retrofit is completed to determine the annual savings in energy costs. One-half of the annual savings would be returned by the organization to the Federal Government to be used to add money to this fund. The total amount of money to be returned to the Government would exceed the original grant perhaps by as much as 50% so more grants could be made in the future.

Another suggestion that I would like to make would help individual home owners obtain funds for insulation, solar collectors, or other energy conserving devices. This would involve the possibility of the Federal Government (perhaps through H.U.D.) providing the mechanism for owners to finance these alterations through low interest second mortgages or first mortgage expansions. Currently, most retrofits of this type can be financed only through home improvement loans with interest rates around 12%.

[Whereupon, at 12:40 p.m., the hearing was adjourned.]

[The following information was subsequently received for the record:]

STATEMENT OF RALPH L. HARDING, JR., PRESIDENT, THE SOCIETY OF THE PLASTICS INDUSTRY, INC.

Mr. Chairman and members of the committee, my name is Ralph L. Harding, Jr., president of The Society of the Plastics Industry, Inc., (SPI). SPI is the principal trade association and spokesman for the plastics industry, headquartered in New York City. Our membership includes more than 1,200 companies engaged in manufacturing and distributing plastics and plastics products. These companies account for more than 75 percent of the plastics sold in this country.

While SPI supports the establishment of an industrial energy conservation program, as indicated in our statement submitted to the committee on June 10, 1974, we do have specific doubts as to certain provisions of S. 1908, as drafted.

1. The Industrial Energy Efficiency Program, as described in Sec. 4 of the bill, would impose a complex and onerous burden on the plastics industry. The primary consumption of petroleum and gas energy resources by the plastics industry is for non-fuel, feedstock use. Even in those monomer processes which operate at high temperatures, only 20 percent of production cost is accounted for by fuel and steam costs. Obviously most of the energy used in plastics manufacture involves product raw material rather than process energy. While there may well be efficiencies in production which can be identified and pursued, we fear that Section 4 and its mandated survey and energy conservation reports would open the door to allowing the Commerce Department to dictate the restriction or even elimination of certain plastic production lines in the name of conservation and thus unlawfully restrict trade.

Moreover, SPI believes that (subsection g) Section 4 imposes an unduly harsh penalty for failure to submit a timely progress report in accordance with Subsection (d). Being entirely dependent on petroleum and natural gas for feedstock materials, the plastics industry bears the full brunt of price increases and materials shortages in these energy resources. In the face of such grim economic realities, management is thus already compelled by market forces to make the maximum efficient use of these materials in order to survive in a competitive business arena. We therefore believe the enforcement provision in subsection (g) to be draconian in effect. As SPI observed in the energy policy statement adopted at its annual meeting in Washington on April 30, 1975, if feedstock supplies are inadequate "the resultant shortages and cost increases will have major adverse effects on the ability of the plastics industry, not only to manufacture existing products but to replace conventional materials, many of which are in short supply, and which will become increasingly scarce in the decades to come."

It should be further noted that feedstocks for plastics currently represent only 1.3 percent of total oil and gas output and that plastics products have become so intertwined in the fabric of the U.S. society that the health of the industry is vital to the economy as a whole. The plastics industry is not, as was observed by a member of the House of Representatives recently, "all hula hoops, hockey pucks and plastic ducks," but the provider of many essential materials to the automotive, electrical, transportation, construction and housing industries, as well as many critically needed medical supplies including prosthetic devices.

2. We support the intent of the research and development program outlined in Section 6 of the bill, particularly where those efforts and demonstration grants lead to significant advances in research which assist in the reservation of our dwindling oil reserves for non-fuel use, or where alternative sources for petroleum may be developed for feedstock use throughout the petrochemical field. Inasmuch as plastics are "solidified petroleum," we believe these research efforts should also be used to make practical the reclamation of the high energy content of plastics so that the plastics products can demonstrate two lives, one as a product and a second as a fuel. As noted in our earlier statement, almost \$500 million worth of electricity can be generated annually from waste plastics. Plastics burned as fuel can be used to produce heat, steam, electrical energy or synthetic fuels. SPI is already participating here in Washington in a pilot project with the National Center for Resource Recovery which involves the recycling of plastics from municipal trash.

3. SPI further believes that in carrying out the purposes of Section 6, proper regard must be given to the fact that the low density of plastics is a critical factor. As pointed out in our 1974 statement, one pound of polyethylene can replace between two and five pounds of metal or eight and ten pounds of glass in typical end uses. Since less energy is needed to process plastics on a volumetric basis, less energy is also needed to distribute it. Therefore, it would seem to us that the method of ranking target industries among those categorized as energy intensive should use a formula which calculates both weight of product and the ultimate human need served.

The volume of PVC plastic needed to make a container is significantly less than the glass required for a similar container. Compared to steel or aluminum products, plastics are considerably lighter—thus leading to their increasing use in automobile construction as a means of reducing vehicle weight and thereby reducing petroleum consumption.

If computed on a basis of millions of BTU's per cubic foot, plastics can be seen to be less energy intensive than in customary tabulations which list products by millions of BTU's per ton:

Energy Consumption of Industrial Products

Product	M BTU per ton*	M BTU per cubic foot**
Primary aluminum -----	175.75	14.7
Raw steel -----	19.33	4.7
Glass containers -----	18.21	1.5
Low density polyethylene -----	93.57	2.5
High density polyethylene -----	88.73	2.5
Polystyrene -----	115.67	3.7
Polyvinyl chloride -----	83.01	3.7
Paper -----	22.46	0.6

*Gordian Associates report to Environmental Protection Agency.

**SPI calculations.

4. While SPI believes the intent of Sec. 9 of the bill is a worthy one, we fear that the net effect of a program of loans and loan guarantees would be inflationary and, coupled with the rising cost of petroleum and natural gas feedstock prices which the plastics industry now must cope with due to many reasons, not the least of which is federal regulation, would increase marketplace costs and contribute to a renewal of the national inflationary spiral.

The plastics industry, during the period of Cost of Living Council price controls, went through a period of severe feedstock shortages and price distortions as a result of federal controls which imposed artificially low price levels on certain raw materials and contributed directly to the establishment of "gray markets" and large scale export of materials to overseas markets. As a result of this experience, SPI strongly believes that both petroleum and gas deregulation are necessary to enable market forces to stabilize the cost of our raw materials. We further believe that additional regulations or federal programs which tend to influence these costs indirectly can also produce similar negative effects.

Therefore, while S. 1908 is intended to accomplish a most worthwhile purpose—the conservation of energy by industry—SPI believes the sections of the bill as described earlier would be counterproductive and rather than encouraging the various industries to conserve, would saddle them with additional regulatory constraints.

Certainly other valid national goals, such as reduction of high unemployment, can hardly be served when energy conservation legislation imposes regulations that would encourage business to curtail production—as this bill would seem to do. Further, while the Ways and Means and Finance Committees are considering tax legislation which contemplates encouragement to industry for plant expansion through investment credits and other programs, it would appear to us that it would be logical to write into such tax programs incentives to industry to use plant machinery which better conserves energy resources than existing plant facilities, rather than to attempt to impose conservation through added paper work, an even larger federal regulatory bureaucracy and the imposition of civil penalties.

