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ARCHITECTURAL GUIDELINES TO PROMOTE EFFICIENT ENERGY USE

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HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY

OF THE

COMMITTEE ON PUBLIC WORKS

HOUSE OF REPRESENTATIVES

NINETY-THIRD CONGRESS

FIRST SESSION

ON

H.R. 11714

TO PROVIDE FOR THE DEVELOPMENT OF IMPROVED DESIGN,
LIGHTING, INSULATION, AND ARCHITECTURAL STANDARDS
TO PROMOTE EFFICIENT ENERGY USE IN RESIDENTIAL, COM-
MERCIAL, AND INDUSTRIAL BUILDINGS

DECEMBER 11, 1973

Printed for the use of the Committee on Public Works



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93^d CONGRESS
1st SESSION

H. R. 11714

IN THE HOUSE OF REPRESENTATIVES

NOVEMBER 30, 1973

Mr. HOWARD (for himself, Mr. SNYDER, and Mr. CLEVELAND) introduced the following bill; which was referred to the Committee on Public Works

A BILL

To provide for the development of improved design, lighting insulation, and architectural standards to promote efficient energy use in residential, commercial, and industrial buildings.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That section 7 of the Public Buildings Act of 1959 (40
4 U.S.C. 606) is amended by adding at the end thereof the
5 following new subsections:

6 “(e) The Administrator of the General Services Admin-
7 istration in cooperation with the Secretary of Defense, the
8 Secretary of Housing and Urban Development, and the
9 National Bureau of Standards is authorized and directed to

1 develop improved design, lighting insulation, and architec-
2 tural standards to promote efficient energy use in residential,
3 commercial, and industrial buildings.

4 “(f) The Administrator is authorized and directed to
5 prepare in cooperation with the Secretary of Defense, the
6 Secretary of Housing and Urban Development, and the
7 National Bureau of Standards model building codes for
8 different types of classes of buildings, incorporating the most
9 practicable standards possible for efficient energy use in
10 differing regional environments. Such codes shall, to the
11 extent possible, specify the energy conservation which may
12 be achieved by adopting the practices recommended
13 therein.”

ARCHITECTURAL GUIDELINES TO PROMOTE EFFICIENT ENERGY USE

TUESDAY, DECEMBER 11, 1973

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENERGY,
OF THE COMMITTEE ON PUBLIC WORKS,
Washington, D.C.

The subcommittee met, pursuant to notice, at 10:31 a.m., in room 2167, Rayburn House Office Building, Hon. James J. Howard (subcommittee chairman) presiding.

Mr. HOWARD. The Subcommittee on Energy of the House Public Works Committee will please come to order.

This morning in the continuing efforts of the Committee on Public Works to act concerning the energy situation in the country, and to see that the Congress takes a leadership role in needed activities toward resolving this problem, the subcommittee is holding hearings on H.R. 11714, introduced by various members of this subcommittee.

H.R. 11714 is a bill to provide for the development of improved design, lighting, insulation, and architectural standards to promote efficient energy use in residential, commercial, and industrial buildings.

The Chair would like to state that the House is in session with a very important trade bill. We do anticipate that there will be calls for either quorum or votes on amendments, and when the bells ring, the subcommittee will immediately recess so that the members may be able to meet that commitment. We hope that witnesses and others will bear with us, and we will certainly try to expedite matters as well as we can.

Before hearing the first witness, the Chair would like to recognize any members, should they have any comments to make.

Mr. CLEVELAND. Mr. Chairman.

Mr. HOWARD. The gentleman from New Hampshire.

Mr. CLEVELAND. Is it fair to assume that if we recess for a vote that we will come back into session not later than 20 minutes or 15 minutes?

Mr. HOWARD. I would feel that 15 to 20 minutes would be plenty of time.

Mr. CLEVELAND. Because it is a little unfair to those who come back promptly to have to sit and wait.

Mr. HOWARD. I think it will be immediate return.

Mr. CLEVELAND. Thank you, I have an opening statement, Mr. Chairman and I have a few copies available, but not many.

(3)

There really is not much need to take up our time here with a rationale for energy conservation in the construction and operation of buildings. This subcommittee has already taken positive action in reporting my bill to further energy conservation practices in buildings under the jurisdiction of the General Services Administration. And this promptly passed the House. The next logical step is this bill, H.R. 11741, to encourage similar action in the construction and operation of new residential, commercial, and industrial buildings.

I want to welcome today's witnesses. Mr. Roush cannot be here,

Mr. Meisen is taking his place. The GSA testimony, with which I believe you are familiar, on H.R. 11565, relating to conservation in public buildings, was most helpful and enabled us to make real improvements in that bill.

So again, I want to commend you and your Agency for your initiative in the energy conservation field, and look forward to your testimony today.

To Mr. Rice, our witness from Denver, representing the Energy Committee of the American Consulting Engineers Council, I also want to express my appreciation for your being here.

While I do not want to anticipate testimony of the witnesses here, I do want to note that I have received a statement submitted through my office concerning this bill from Mr. Fred S. Dubin, an energy consultant to GSA, on the Manchester, N.H., demonstration project, and chairman of the ACEC Energy Committee. He strongly supports the objectives of the bill and makes some worthwhile suggestions.

First, he makes some striking observations as to the potential for savings in energy at little or no additional cost, and other savings the costs of which can be offset in fuel economies. He speaks of an energy policy for buildings, setting up standards for maximum consumption by buildings of various size, according to the purpose served, and the part of the country it is located in.

He also says that within an energy consumption ceiling the designers and owners ought to have the greatest amount of choice possible in applying the mix of energy-consumption and energy-conservation materials, equipment, and techniques in terms of the economies involved. But to accomplish this realistically, he recommends that we sponsor the assembly of a wealth of knowledge on the subject, which I understand is pretty widely scattered around among individual architects, engineers, professional societies, government agencies, manufacturers, and possibly others. The information covers conservation, consumption, and costs.

He recommends broadening of the bill's coverage, a spending figure of about \$10 million, which strikes me as modest, and urges that we not get into the business of letting the model codes be translated somehow into rigid Federal specifications.

I wish him luck in that regard. To me this all makes sense, and I would like to explore these thoughts with the witnesses.

Now, with regard to the statement of Mr. Dubin, I would like unanimous consent, Mr. Chairman, to put that in the record at this time.

Mr. HOWARD. Without objection, so ordered.
[The statement referred to follows:]

STATEMENT OF FRED S. DUBIN, P.E., PRESIDENT, DUBIN-MINDELL-BLOOME ASSOCIATES, CONSULTING ENGINEERS, NEW YORK CITY: CHAIRMAN, ENERGY COMMITTEE, THE AMERICAN CONSULTING ENGINEERS COUNCIL, ON H.R. 11741

As a energy consultant and engineer engaged in the design of mechanical and electrical energy systems for buildings, I welcome this opportunity to comment on H.R. 11714, a bill to improve economies in energy consumption in residential, commercial and industrial buildings.

This subcommittee is to be commended for its initiatives in the energy conservation field, as exemplified by this bill and H.R. 11565 which was approved by the full House of Representatives last week. One measure of the potential for energy conservation is the fact that approximately 40 percent of the energy we use in this country is for heating, cooling, ventilation, lighting, and power systems in residential, commercial, and industrial buildings.

Energy conservation through design—using off-the-shelf hardware, systems, and methods—can reduce the yearly energy consumption of new buildings by 35 to 50 percent at least. Twenty percent of new building energy consumption can be achieved without an increase in first costs; another 20 to 30 percent can be achieved by measures which may increase first costs but which are offset by lower life-cycle costs.

Commercial and industrial buildings, with their high thermal requirements for ventilation and illumination over a large portion of the year, and heating and cooling over a large portion of the year, are particularly likely candidates for treatment under this bill. Moreover, they are often built and operated by one owner who is cognizant of the value of life-cycle costing.

So I hardly need say that I strongly support the objectives of H.R. 11714. My purpose today is to help identify some problems I have with the language as currently drafted and to suggest some changes whereby they may be overcome and the legislation strengthened.

Subsection (e) vests lead-agency responsibility in the General Services Administration for development of improved design of heating, air-conditioning and ventilation, lighting, insulation, building materials, fenestration, construction methods, architectural standards, and engineering to promote efficient energy use in residential, commercial, and industrial buildings. As you know, the GSA already owns and operates more than 10,000 commercial buildings and has been the most active agency in Government in building demonstration buildings. The Federal office building for Manchester, N.H., which you are familiar, is an example GSA's innovative approval in this field. I believe that GSA should, therefore, be assigned this major role.

As drafted, however, the bill makes no mention of funds to be allocated. Some provision for funding should be made in this section to assure the cooperation and involvement of the Defense, the Department of Housing and Urban Development, and the National Bureau of Standards.

The enumeration of categories of structures to be covered and the energy uses to be addressed in subsection (e) should be broadened. I suggest that you include institutional buildings, such as schools, colleges, and particularly hospitals whose laboratories and other facilities are extremely heavy users of energy. Uses to be covered should include heating, ventilation, air-conditioning, illumination, and power. I refer to power not as consumption by manufacturing equipment or other production processes but as motors of all kinds, powering pumps, fans, escalators, and elevators. I also would include two aspects of water consumption: heating and overall volume of use. A great deal of energy is wasted in heating service water in buildings. Thus provision for conservation of hot water in certain types of nonresidential structures should be considered. Water consumption also should be addressed also in terms of the energy-intensive processes required to produce it prior to its introduction into the structure and to treat it as waste upon discharge.

Subsection (f) deals with preparation of model building codes for different classes of buildings, incorporating the most practicable standards possible for efficient energy use in differing regional environments. The codes would specify to the maximum extent possible the energy conservation which may be achieved by adopting the practices recommended therein.

Model codes can make a worthwhile contribution to energy conservation, although I would emphasize that these must not become Federal standards. As the definition implies, they should provide guidance for State and local authorities with code-enforcement jurisdiction.

I would urge the subcommittee to be extremely wary of being prescriptive in haste, and to avoid unwarranted infringement on individual prerogatives. The approach should be one of establishing an energy policy for buildings, with development of a firm data base and reference service to underlie its application to various types of buildings under varying climatic circumstances.

As energy consultants to GSA, we systematically assembled energy-conserving equipment/systems/building techniques for possible application to the design, construction, and maintenance of Federal office buildings, with particular reference to the Manchester demonstration building. Needed data was often difficult to obtain and was in some cases not available at all.

This bill can perform great service by sponsoring the assembly, analysis, and refinement of hard information on energy consumption and economic trade-offs relating to all aspects of buildings' consumption of energy and means for achieving its reduction.

The model codes should be performance rather than specification-oriented, establishing outer limits of energy consumption for buildings depending on their function, size, and area of the country in which located. With economic and energy-consumption data at hand, the architect, engineer, and owner would have the flexibility to determine the mix of energy-consuming systems and energy savings techniques, materials, and other approaches under a Btu quota.

Development and dissemination of this data will be a substantial undertaking, which I would estimate to cost in the neighborhood of \$10 million.

But considering the economy's direct dependence on energy sufficiency, the degree of potential for reducing consumption and the savings to be realized in costs, this modest investment would be repaid many times over.

We can expect spill-over benefits as well, in terms of incentives to conserve energy in existing buildings. In this category, use of off-the-shelf technology can reduce energy consumption by 15 to 20 percent. If we apply energy conservation measures to existing buildings and save only 15 percent of the energy consumed now, the amount saved could exceed 300 million barrels of oil a year, with commensurate reductions in release of pollutants into the atmosphere.

Another benefit would be the impetus to application of such alternatives to fossil fuels as solar energy, of which energy conservation in building design and construction is an essential part.

In conclusion, I welcome the invitation to submit this statement. I regret that previous commitments precluded my appearance in person. But on the basis of the subcommittee's action in refining H.R. 11565 in the markup prior to final passage on the basis of your hearings, I feel confident that the subcommittee is receptive to modifications along the lines I have suggested and will produce a most constructive piece of legislation.

Mr. HOWARD. Are there other statements from our members? Mr. Snyder?

Mr. SNYDER. Thank you, Mr. Chairman.

In the area of energy conservation there are certain things that can be done so quickly and so easily that we wonder why they have not been done before. Today we are holding hearings on the second bill designed to conserve energy by improving design of buildings. Those learned in the field have assured us that buildings currently in existence are wasting a great deal of the energy necessary to make them work. In short, they are inefficient, requiring a greater energy input for heating, lighting, ventilation, air-conditioning, and the mechanical movement of people and material, and so forth. We are further assured that we could increase the efficiency of new buildings by as much as 50 percent if proper design techniques were employed. Further, it is my understanding that the incorporation of these design techniques for new buildings in many instances could lead to a saving of up to 25 percent with no added initial costs.

Recently we passed out of the House legislation requiring the Administrator of the General Services Administration to incorporate into new building design criteria for the purpose of saving energy and to examine existing buildings to see what can be done to improve the efficiency of buildings already in use and under the control of the

Administrator of the General Services Administration. Today, we turn our attention to the needs of the private sector. The United States does not own all the buildings in the country—it only owns a tiny fraction. The bulk of the buildings in this country are owned by other than the United States and it is the builders, operators, and purchasers of these buildings that we wish to aid by having for them guidelines that they can use when they are contemplating construction of a new building or rehabilitation of an old one.

The purpose of this is to give reliable information to the citizen who wishes to take action not only to save himself money, but to assist his country in its efforts to develop a wise and effective energy policy. To this end we have before us today witnesses from the Government and witnesses from the private sector. I think it is particularly significant that we will have testimony from a member of the Consulting Engineers Council because indeed after the criteria are developed, it will be largely the consulting engineers who see to it that these guidelines are translated into energy-saving realities.

Mr. HOWARD. Thank you Mr. Snyder. Our first witness this morning is Mr. Walter Meisen, Assistant Commissioner, Public Buildings Service, General Services Administration.

Mr. Meisen, we welcome you to the subcommittee, and wish to thank you for appearing here concerning the views of GSA on H.R. 11714.

The prepared statement by Mr. Larry Roush will appear at this point in the record.

[Mr. Roush's statement follows:]

STATEMENT OF LARRY F. ROUSH, COMMISSIONER, PUBLIC BUILDINGS SERVICE,
GENERAL SERVICES ADMINISTRATION

Mr. Chairman, it is a pleasure for the General Services Administration to have the opportunity to comment on H.R. 11714, a bill "to provide for the development of improved design, lighting, insulation and architectural standards to promote efficient energy use in residential, commercial, and industrial buildings." I am Larry F. Roush, Commissioner of the Public Buildings Service and with me today are Walter Meisen, Assistant Commissioner for Construction Management, and Robert Rice, Assistant General Counsel, Public Buildings Division. I will be happy to address the bill as it relates to GSA's responsibilities for Federal buildings.

As you may know, the General Services Administration has moved forward, in rapid fashion, with a comprehensive energy conservation program for existing buildings and that we have under design a new facility in Manchester, N.H., which we call our energy demonstration project. Because of the committee's concern with the energy issue, you may be interested to know that on page E6997 of the Congressional Record dated November 2, 1973, is a detailed statement on our energy conservation program as it relates to Federal office buildings.

We are proud of our initial efforts, to achieve the President's energy conservation goals, which as of last week have resulted in a 9 percent reduction in GSA energy usage over the past 3 months when compared to last year.

H.R. 11714 would give the Administrator of General Services in cooperation with the Secretary of Defense, the Secretary of Housing and Urban Development and the National Bureau of Standards the authority to develop improved design, lighting, insulation, and architectural standards to promote efficient energy use in residential, commercial, and industrial buildings. We consider this authority as it affects our responsibilities unnecessary in view of the projects affecting design criteria for new Federal buildings which GSA is currently conducting under existing authority. As I mentioned to the subcommittee on November 27, 1973, these projects include:

1. The development of Federal design criteria for energy conservation which are being prepared in conjunction with the AIA Research Corp.

2. The instrumentation of the Manchester building to substantiate the National Bureau of Standards computer design model.
3. The development of an air change rate study.
4. A study on a centralized computer control of buildings on energy use.
5. A study of lighting levels and use of task oriented lighting.
6. The development and use of an integrated ceiling system.
7. A proposed demonstration project we are presently reviewing for possible construction in Saginaw, Mich.
8. The development and use of various energy conservation systems included in the Manchester project.
9. The design of solar collectors for the Manchester building. Fact sheet of this building is enclosed.

We are proceeding with these projects as they relate to buildings under the jurisdiction of the General Services Administration and feel that our efforts to date have been very rewarding and they could be expanded to encompass residential, commercial, and industrial buildings.

In particular reference to H.R. 11714, the General Services Administration is developing Energy Conservation Design Guidelines for Federal Buildings which will be completed in January 1974. The Guidelines are an out-growth of design criteria used for our Energy Conservation Demonstration Project in Manchester, N.H. They have been reviewed and analyzed by a national panel of 70 architects, engineers, and city planners, and will shortly be reviewed by 35 major building contractors, manufacturers, and fabricators. Once the review process is completed the guidelines will be used for all GSA administered projects and distributed to all other Federal agencies and the Federal Construction Council of the National Academy of Sciences.

The purpose of the guidelines is to place before the architects and engineers those energy conservation factors (heating, cooling, lighting, fenestration, insulation, etc.) which must be considered in the design of energy efficient Federal buildings. If adopted and used by the Federal agencies in the design of new buildings the guidelines will have a significant impact on future energy consumption in Federal guidelines.

As I previously mentioned, the National Bureau of Standards acted as a consultant to GSA for the design of the energy conservation features for the Manchester project and the development of the guidelines. We have shared our knowledge and experience with NBS in their work with the National Conference of States on Building Codes and Standards. NBS and NCSBCS are working together and anticipate having an Interim Standard for Energy Conservation in Building Design and a proposed draft of model State legislation by January 1974.

These two documents will permit State and local governments to implement energy conservation measures in their building regulatory systems. Performance oriented standards will encourage innovation and technological development whereas, codified prescriptive standards quickly become restrictive and outdated thus stifling innovation.

As I mentioned to the subcommittee on November 27, 1973, and in the interest of H.R. 11714 the General Services Administration, in conjunction with the National Bureau of Standards, is already in the process of systematically analyzing 230 existing major Federal buildings to determine:

1. The reasons for the variance in energy usage between apparently similar buildings,
2. What elements of energy usage are manageable, and
3. What improvements in design and operating practices will reduce energy usage.

We anticipate the analysis will be complete in late February 1974 and thereafter expect to have a basis to learn what modifications can be made both to the physical structure of a building and changing its operating procedure to further reduce energy consumption. On new structures we already do energy usage analysis during the design phase.

We would like to defer to the Department of Housing and Urban Development with respect to the effect of this bill on that agency's authorities and we understand HUD will be submitting a report to your committee. We do, however, have a general comment and it is that with regard to non-Federal buildings, we would expect the commercial sector and the architects and builders who serve it will react to the energy crisis in appropriate fashion.

Mr. Chairman, the General Services Administration appreciates the opportunity to comment on H.R. 11714 and we support the intent of the bill. We believe that the current efforts of executive branch agencies and the private sector along this line will be beneficial to the effort to avoid a more serious energy crisis than the one we presently face and that no new legislative authority is necessary to carry out the intent of H.R. 11714.

Thank you.

STATEMENT OF WALTER MEISEN, ASSISTANT COMMISSIONER FOR CONSTRUCTION MANAGEMENT OF THE PUBLIC BUILDINGS SERVICE, GENERAL SERVICES ADMINISTRATION; ACCOMPANIED BY JACK MULLIGAN, OFFICE OF GENERAL COUNSEL

Mr. MEISEN. I have a very brief summary of that statement.

My name is Walter Meisen. I am Assistant Commissioner for Construction Management of the Public Buildings Service, General Services Administration.

With me is Assistant Deputy General Counsel, Jack Mulligan, also of the Public Buildings Service.

We appreciate the opportunity, Mr. Chairman, to respond to your request for GSA's comments on H.R. 11714, a bill to provide for the development of improved design, lighting, insulation, and architectural standards to promote efficient energy use in residential, commercial, and industrial buildings.

We will be happy to address the bill as it relates to GSA's responsibilities for Federal buildings.

As you may know, the General Services Administration, in conjunction with the National Bureau of Standards, is developing and will complete in January 1974, energy conservation design guidelines for Federal buildings. The guidelines are an outgrowth of design criteria used for our energy conservation demonstration project in Manchester, N.H. They have been reviewed and analyzed by a national panel of 70 architects, engineers, and city planners, and will shortly be reviewed by 35 major building contractors, manufacturers, and fabricators. Once the review process is completed the guidelines will be used for all GSA administered projects, and distributed to all other Federal agencies and the Federal Construction Council of the National Academy of Sciences.

I might add we also anticipate wide dissemination through the private sector.

The purpose of the guidelines is to place before the architects and engineers those energy conservation factors—heating, cooling, lighting, fenestration, insulation, et cetera—which must be considered in the design of energy efficient Federal buildings.

If adopted and used by the Federal agencies in the design of new buildings the guidelines will have a significant impact on future energy consumption in Federal buildings.

As I previously mentioned, the National Bureau of Standards acted as a consultant to GSA for the design of the energy conservation features for the Manchester project and the development of the guidelines. We have shared our knowledge and experience with NBS in their work with the National Conference of States on building codes and standards. NBS and NCSBCS are working together and anticipate having a performance-oriented interim standard for energy conservation in building design and a proposed draft of model State legislation by January 1974.

These two documents will permit State and local governments to implement energy conservation measures in their building regulatory systems. Performance-oriented standards will encourage innovation and technological development, whereas codified prescriptive standards quickly become restrictive and outdated, thus stifling innovation.

We would like to defer to HUD with respect to the effect of this bill on that Agency's authorities—specifically building codes—and we understand HUD will be submitting a report to your committee.

We do, however, have a general comment, and it is that with regard to non-Federal buildings, we would expect that the commercial sector, and the architects and builders who serve it will react to the energy crisis in appropriate fashion.

We support the intent of H.R. 11714, since we have been developing energy conservation design guidelines for Federal buildings for over a year. We believe that the current efforts of executive branch agencies and the private sector along this line will be the effort to avoid a more serious energy crisis than the one we presently face.

Thank you, gentlemen.

I would be very happy to answer any questions you may have.

Mr. HOWARD. Thank you for your testimony.

It is correct that the Department of Housing and Urban Development is submitting testimony before this subcommittee concerning this bill. Also the people who are active in the private sector of buildings, such as architects and engineers.

Mr. MEISEN. That is correct.

Mr. HOWARD. We agree with you for the necessity of that. The gentleman from South Carolina.

Mr. DORN. No questions, Mr. Chairman.

Mr. HOWARD. The gentleman from Kentucky.

Mr. SNYDER. Just a couple of questions.

In Mr. Roush's statement, he says that:

H.R. 11714 would give the Administrator of General Services, in cooperation with the Secretary of Defense, the Secretary of Housing and Urban Development and the National Bureau of Standards the authority to develop and improve design, lighting, insulation, and architectural standards to promote efficient energy use in residential, commercial, and industrial buildings. We consider this authority as it affects our responsibilities unnecessary in view of the projects affecting design criteria for new Federal buildings which GSA is currently conducting under existing authority.

Now, admittedly, it is unnecessary for you all to do anything with regard to Federal buildings, but of course, the scope of this means that whatever information and expertise you and other agencies develop, in conjunction with the study on the Federal buildings, would then be available under this bill, and you would be put into a position of cooperation for the development of these standards insofar as that information is applicable for non-Federal buildings.

Now, is it your position, or Mr. Roush's position that you do not want to do this?

Mr. MEISEN. I believe it is the position of the Agency that it is imperative that each Government agency, and every Government agency involved in energy cooperate to the fullest extent with any segment, both private and public, that is working toward energy conservation.

I do not think there is any doubt about that.

Mr. SNYDER. Without this legislation, what would be GSA's method of operation insofar as consultation and exchange of expertise and so forth with Defense and HUD and the National Bureau of Standards, for that development of some sort of criteria for non-Federal buildings? You would not do anything, would you?

Mr. MEISEN. Well, other than through technology transfer, sir, through working in cooperation with HUD, which does have an impact on private residences, and the National Bureau of Standards, which does have some influence on national building codes, we would propose to continue to cooperate with those two agencies, and as I say, any of the other agencies, to the greatest extent possible.

Mr. SNYDER. HUD has more than just residential impact, they make a few loans on commercial buildings, do they not?

Mr. MEISEN. That is right.

Mr. SNYDER. Through FHA?

Mr. MEISEN. Yes.

Mr. SNYDER. Mr. Roush would say, and you are saying, that you do not need this legislation. You would just send all of that information that you develop on over to them any way?

Mr. MEISEN. I think what Mr. Roush is saying here is that we certainly do not need this legislation for application to Federal buildings. I believe he was deferring to HUD and to the Bureau of Standards as concerns the application through other commercial sectors.

Mr. SNYDER. Can I conclude from that statement that you have no objection to this legislation?

Mr. MEISEN. I would conclude that we would like to defer to HUD.

Mr. SNYDER. HUD cannot answer for GSA. You are here to answer for GSA. Do you want to delegate GSA's authority to HUD?

Mr. MEISEN. No, sir.

Mr. SNYDER. I mean all of it?

Mr. MEISEN. No, sir.

Mr. SNYDER. Why defer to HUD your part of this bill? Tell us what your position is on this bill. I do not know what HUD thinks your position is.

Mr. MEISEN. GSA would be very happy to cooperate and to coordinate with any other Federal agencies working to improve this in the private sector.

Mr. SNYDER. You are suggesting that HUD be the lead agency?

Mr. MEISEN. No. GSA would be happy to coordinate with any of the agencies involved. I think that is what this bill suggests.

Mr. SNYDER. I think this is what the bill suggests, too. I am glad you would be happy to do that.

Do you have any information for the committee's guidance since this bill does not provide for an authorization, as to whether or not you can do this under existing funds, or whether an authorization ought to be put into this bill, and if so, how much?

Mr. MEISEN. I would like to furnish that for the record, sir. I believe that it could go over quite a wide range. It might be done for as little as a million dollars. It might require something between \$10 and \$15 million.

I do believe for it to be valid or to be based on proper data that some central depository of data should be developed, both from the

private sector and from Government experience, and somehow located, either through a computer, or a remote access computer of some sort, making that data available to all segments.

I think we know enough to initiate some preliminary guidelines. I think we need the necessary data to insure that those guidelines are correct. So I would be happy to furnish that, Mr. Snyder.

Mr. SNYDER. Thank you very much.

I ask that he be permitted to furnish the figures for the record.

Mr. DORN [presiding]. Without objection.

[The information received follows.]

[Following information received from Mr. Meisen]

1. The development of design guidelines to promote the efficient use of energy in residential, commercial, and industrial buildings will be required. Due to the variety of industrial applications and differing climatological regions, this effort will cost approximately \$2,500,000.

2. The model code to be developed must be performance oriented to promote, rather than restrict, development and application of new technology. A comprehensive model code applicable to residential, commercial, and industrial buildings that can be used nationwide will cost nearly \$3 million.

3. A necessary part of the development of the design guidelines and model code for energy conservation will be the accumulation of all related technical data. This information must then be collated, analyzed, and made available in a usable form. The magnitude of such a data bank will require computerized processing for access, analysis, and distribution. It is anticipated that this will cost about \$10 million.

Mr. DORN. Mr. Cleveland.

Mr. CLEVELAND. Thank you, Mr. Chairman.

Your testimony has been very helpful to me, Mr. Meisen.

A quote from your testimony states:

Performance-oriented standards will encourage innovation and technological development whereas codified prescriptive standards quickly become restrictive and outdated thus stifling innovation.

H.R. 11714 seems to be laying the groundwork for the preparation of model building codes, incorporating the most practicable standards, and this might defeat our very purpose, according to your testimony, is that correct?

Mr. MEISEN. Well, Mr. Cleveland, I believe that if the building code was structured and done on performance basis, as opposed to prescriptive basis, it could easily be done.

I do not think that language is necessarily restrictive. I think it is important since most building codes today tend to be prescriptive.

For example, they might say 4 inches of insulation on *x* building. I think what they should be oriented to is a total energy budget of some sort, and through whatever means that can be reached, allowed open for innovation and not spell out how you achieve energy efficiency, but require a certain level of energy efficiency, and let the whole sector respond to that.

Mr. CLEVELAND. Let us be more specific.

Turn to page 2 of the bill, section (f).

Does that do it?

Mr. MEISEN. Yes, sir.

I would be happy to see model building performance codes, and I think the language precisely as it is now would be satisfactory.

Mr. CLEVELAND. Well, I have had longstanding experience with government and bureaucratic rigidity, and I do not want to be in the position of proposing a bill that might create rigidity, while you people from the Bureau are calling for less rigidity.

Under the circumstances, I would want to be very sure that that section says what we mean it to say.

Mr. MEISEN. I think the insertion of the words "performance" before "code" in both lines 7 and 10 would be sufficient for that.

Mr. CLEVELAND. Is the staff making a note of that?

I want to be sure the staff is noting this.

Would you mind slowly repeating your suggestion?

Mr. MEISEN. I would suggest that on lines 7 and 10, before the word "codes," the word "performance" be inserted. It is on page 2 of the bill, Mr. Chairman.

Mr. CLEVELAND. As currently used in the profession does the word "performance" serve beyond a doubt to free this language from any threat that it might have to impose rigid codes that might defeat our purpose?

Mr. MEISEN. I think the terminology is sufficiently understood; yes, sir.

Mr. CLEVELAND. Sometimes these terminology situations can get out of hand, and I am sure you are aware of that.

Mr. MEISEN. Yes, sir.

I believe your next witness is speaking to more specific language that would also help clarify this language, and you might prefer to hear that language.

I have read their testimony, and I concur in that aspect of it, desiring redefinition of criteria and guidelines.

Mr. CLEVELAND. The thrust of your testimony is, than, that because this is a rather large country and we have southern sections and northern sections and eastern and western sections, it would be almost disastrous if we attempted to have strict codes on a national basis to achieve our objectives?

Mr. MEISEN. I think it is imperative that some guidelines, some performance requirements be established for energy consumption.

I think it would be disastrous for the Federal Government to specify how that level of consumption is to be met. That would stifle the ingenuity of the American free enterprise system which, I think, would happily respond to any reasonable standards of performance required of it in order to conserve energy. And it would be our hope that this is what would be developed, sir.

Mr. CLEVELAND. Well, I want to thank you for your testimony. It is music to my ears to hear you say that.

Perhaps out of this energy crisis some good may evolve after all.

Mr. Chairman, I have no further questions.

Mr. DORN. Thank you, Mr. Cleveland.

Mr. Baker.

Mr. BAKER. Thank you, Mr. Chairman.

I am wondering, from a little bit more practical basis, what might be included in the codes as they are developed.

Would you retain the conventional approaches in your judgment of providing utilities, which are energy consuming, or would you be innovative in supplementing energy sources, or anything else that might be usable from a technical standpoint?

Mr. MEISEN. I would say any performance-oriented standard or code would give total energy budget and, hopefully, permit the trade-off of solar energy for other energy.

We at GSA feel very strongly that solar energy has to be one of our prime resources in the future. It is one of the few things that is both energy conserving and clean to the environment.

We feel, as we are trying to demonstrate in both Manchester, as well as Saginaw, Mich., that energy collectors of various types can be very helpful in conserving overall energy output in an environmentally clean way. That is the type of thing we would like to impose with any type of model performance code—that you have a total energy budget.

You would not start out that you must use this or this or this. It gives us the target we must shoot for.

You must keep your energy consumption at a certain level or below, and perhaps even grant bonuses for falling well below, through the use of solar energy.

I think if we do that, we will find many, many very imaginative ways of conserving much more energy than we can with today's technology.

Mr. BAKER. Would you go so far as to recommend the manner in which a tenant might use energy most efficiently?

I operate a building maintenance company in Chattanooga. In fact, I am the only janitor in Congress.

We recommend to our larger customers with many fluorescent lights to leave them on all the time because it is cheaper. Energy in the past has been cheaper than replacement of the fluorescent tubes.

Now, would you have incorporated in your codes recommendations which are the best approach to a conservation of energy in the use of conventional forms of lighting, and so forth?

Mr. MEISEN. Mr. Baker, it is my personal opinion that unless we directly attack the energy consumption in existing buildings we will not make a major impact on this problem.

This is one of the reasons that GSA's first task was to initiate surveys and guidelines for its some 10,000 buildings of which we have some operating control.

While we may build 40 buildings a year, we have 10,000 here and now, and they are using energy every day. We have up to now removed some 1 million fluorescent lamps from our buildings across the country. We believe that the potential for saving energy, certainly in the very near future, in the immediate future, is vast in existing buildings. And we would say that it is absolutely essential that much information be disseminated on how more efficiently from an energy standpoint to operate existing buildings.

And I do not know that this is a correct way of handling it, through the building code itself. But I know much of our literature on this subject has been disseminated widely to the private sector.

Whether that kind of guideline would be appropriately incorporated in a national code or not, I do not know.

I think the bill here speaks to new buildings, but I think much can be done in the area of existing buildings.

Mr. BAKER. I visited a couple of weeks ago with a physicist who relocated from California, just outside of my district in north Georgia, and he had been associated with developing the wind tunnel in Tennessee for testing the aerodynamics of the aircraft engine, rocket, and so forth.

He had a pilot model, a working model, of a solar energy collector, a rough sort of model development.

How would that sort of activity feed its way in through our resources here?

Mr. MEISEN. Well, undoubtedly, some central repository of energy data and energy knowledge would be very helpful in this area.

We are familiar with a number of people that are working very diligently at developing efficient solar collectors. It is interesting when we were designing one for Saginaw, Mich., that we had considerable difficulty in locating where the technology existed.

There was obviously some which NASA had developed, which were very weight oriented, as you can imagine, and not directly applicable to building construction.

We have found a number of areas, and we will make this information available to anyone upon request.

It is a serious problem to try and locate where all the necessary technology lies.

For example, one of the problems with solar energy in the past has been a lack of ability to get high temperature heat from them.

General Dynamics is working on development by putting a vacuum, for example, in this collector, and they can get up to 280- and 300-degree heat. This is a major breakthrough.

If something like that could, for example, be gotten into mass production, it might be as economical as a new air-conditioner.

The technology is not serious, and certainly manufacturing difficulties are not serious.

We feel very strongly that the work of the individuals, such as you mentioned, and many others across the country, if it can be once converted to mass production, to where we start getting, instead of handmade sort of collector in the laboratory, a factory mass produced sort of collector, it will have achieved a major breakthrough, and much of the potential energy savings in this country.

Mr. BAKER. As I understood his approach, he is building it in the eaves of a home, and he is storing the heat in a bed of rocks.

Mr. MEISEN. Yes.

Mr. BAKER. Thank you, Mr. Chairman.

Mr. DORN. Thank you, Mr. Baker.

Mr. Cochran.

Mr. COCHRAN. I have no questions.

Mr. DORN. Mr. Meisen, there is nothing in this bill that would give these departments of the Federal Government and your agency the green light to get off on a binge and have some crazy things going on and neglect the beauty of the building and the landscape, and get the good ladies on our neck all over this country.

I had that problem. They wanted to cut down the magnolia trees at one of the buildings. I had to step in personally to stop it myself, and that would have been a tragedy.

Mr. MEISEN. Two magnolia trees. Very beautiful ones at that. You are right.

Mr. DORN. I just wanted to make sure that they do not get off on one of these binges here.

There is nothing in this bill that would give some of these wild people a green light to come up with something where people would just roll in the streets laughing at us?

Mr. MEISEN. I do not believe so.

I have always been surprised how people can read different things into something.

Mr. DORN. I happen to know right here in this building there are some funny things going on.

I have been threatening to wear my overcoat down here to the committee in the summertime and take all my clothes off virtually in the wintertime, where it is so hot down here.

This is the kind of thing you are going to try to correct, right?

Mr. MEISEN. If this were our building, sir, it would have about half the fluorescent lights in the ceiling at the moment.

But let me assure you that we are very much environment conscious. That is why we initiated the two projects simultaneously, one to preserve the environment and one to test energy.

Mr. DORN. Thank you.

You know, in some design we have found out that some things will make you sick just to look at them.

Mr. MEISEN. Yes, sir.

Mr. DORN. We doctored up my office over here in the Cannon Building, and we all felt better. This has to be considered, too, not just for energy alone.

I know that interior decorating, design, it affects the personality, the way you feel. I am sure you folks consider all of that.

I have the utmost confidence in you and in those that will be carrying out this legislation but I just want to make sure there is nothing in here that would encourage people to forget everything else and take off on this, as is so often the case, in a one-track deal, and you have some of the most awful sights in this country that you can possibly imagine.

I know some of the great housing projects in my district, you know, the architect will have all kinds of funny designs, and I love architecture. But you look at his house and he will have good, most of the time, good standard traditional, beautiful type architecture for himself.

Mr. SNYDER. With magnolia trees.

Mr. DORN. I am for that. It takes over 100 years for it to get ripe and to smell those blossoms.

The same thing holds true with the fir trees and all those things up north in Alaska. I like that, too.

Mr. SNYDER. What about dogwoods?

Mr. DORN. I am for dogwoods.

No. 1, I am for the good ladies around here from the garden clubs.

Mr. BAKER. You could not possibly be running for the governorship of South Carolina without having appreciation of magnolias.

Mr. DORN. I do not have my palm tree necktie on, but I am for palm trees, too.

Did you have a question, Mr. Snyder?

Mr. SNYDER. I did, Mr. Chairman. I have a couple of questions that come across here.

I was just glancing over the next witness' testimony.

I do not know whether you have a copy of that.

Mr. MEISEN. I do.

Mr. SNYDER. There are recommendations which you might read to yourself that apparently the next witness is going to testify on, that he would save from being incorporated into this legislation.

Mr. MEISEN. It is my personal feeling that we would not object to either one of these paragraphs. In fact, we believe they would be helpful.

Mr. SNYDER. You would favor it then?

Mr. MEISEN. Yes, sir.

Mr. SNYDER. Thank you very much.

Mr. DORN. Any further questions?

Counsel.

Mr. D'AMICO. Mr. Meisen, would the model code not take into consideration the various construction costs of various type of houses?

For example, if a building contractor is in the business of building \$20,000 homes, and another contractor is in the business of building \$30,000 homes, and another \$50,000 homes, et cetera, would the energy recommendations of the models be related to these costs, or would they all be aimed at the top level or the bottom level?

Mr. MEISEN. Well, there are many ways that such codes could be structured, and I believe that that is where much of the effort should go, to make sure that there is a code that is workable in all instances, from the most economical aspect to the largest commercial building.

I think a methodology for doing that is to require a certain energy usage per something, either square footage or something, and not say for this house you have to have 2 inches but for the more expensive house you have to have 3 inches, but have a level of energy efficiency, either equated to a square foot or some other practical means of measuring, so that any and all methods can be considered.

The other alternative is to require that certainly very obviously energy conserving facilities must be considered, and if they are not considered, they should be justified as to why they are not used.

Until we gather more data, this might be the most efficient way to go, to say that you must make at least this kind of energy analysis. And if you come up in excess of a certain figure, you should demonstrate why that is necessary and why that is most practical, until we learn much more about what the right level to establish is.

Mr. D'AMICO. Would it be your opinion that energy conservation in buildings can be incorporated in the lowest cost as well as the highest cost type of house?

Mr. MEISEN. Very definitely, sir.

I would believe that except for houses that obviously are not well constructed and should not be allowed to be constructed perhaps that we can save much of our energy without any additional first cost or minimum additional first cost, if we become more energy conscious and think about some of the things that we are doing.

Mr. D'AMICO. Thank you, sir.

Mr. DORN. Any further questions?

Thank you. You have been a good witness.

We appreciate it.

Mr. MEISEN. Thank you.

Mr. DORN. Our next witness is Mr. Robert J. Rice, vice chairman, Energy Committee, American Consulting Engineers Council.

Mr. Rice, would you please identify the gentleman with you, and then you may proceed in any way you care to.

STATEMENT OF ROBERT J. RICE, VICE CHAIRMAN, ENERGY COMMITTEE, AMERICAN CONSULTING ENGINEERS COUNCIL; ACCOMPANIED BY BRUCE E. VOGELSINGER, AMERICAN CONSULTING ENGINEERS COUNCIL STAFF

Mr. RICE. Mr. Chairman and members of the subcommittee, my name is Robert J. Rice. I am a consulting mechanical-electrical engineer, and president of the design firm of Rice, Marek, Marral, and Holtz, Inc., from Denver, Colo. I am vice chairman of the American Consulting Engineers Council's Energy Committee.

Mr. Fred Dubin, a consulting engineer from New York City, is chairman of our committee, but he is, unfortunately, unable to attend the hearing today, and has asked me to express his regrets to the subcommittee.

With me today is Bruce E. Vogelsinger, of the American Consulting Engineers Council staff.

The American Consulting Engineers Council is an organization of 2,600 private practice engineering companies.

I emphasize companies.

Mr. Chairman, we appreciate the opportunity to express our views on this important legislation designed to foster this country's energy conservation efforts, and of vital interest to the members of our council.

In addition to the design of energy-producing, generating and consuming facilities—ranging from hydroelectric projects to power and industrial plants—our member firms design the mechanical-electrical systems for both new and existing residential, commercial, industrial, and institutional buildings.

Consulting engineers are right now providing services to reduce energy consumption in public and private facilities.

For example, a consulting engineer recently completed a study of the energy requirements of an aircraft manufacturing plant and made a number of recommendations which required a total capital investment of \$11,000. This investment has resulted in a \$60,000 per year reduction in the cost of utilities—a 6-to-1 return—and a significant contribution to energy conservation.

In another example, the space conditioning equipment for major buildings on a Texas University campus is separately controlled at each building. A feasibility study prepared by a consulting engineer indicates that a centralized automatic control system will result in a net savings of 10 percent of the gas and electricity consumption by all the buildings.

In still another case, an elementary school in Minnesota is in the process of reducing energy usage by a predicted 50 percent based upon recommendations of a consulting engineer. A number of the recommendations were simply changes in operating procedures, while others will require some capital investment that is economically justified. Some were regarded as unfeasible, but they may become so when the present energy shortage gets worse.

Consulting engineers have long recognized and advocated ideas and techniques which can be incorporated in the design of facilities to reduce energy expenditures.

However, these recommendations were frequently ignored because of a major concern by investors and financial institutions with initial

cost of construction plus an apparent unlimited availability of low-cost heat and power.

The energy crisis has turned this situation around.

The expertise of the consulting engineer is finally being heeded. Interestingly, consulting engineers could do an even better job if more up-to-date data on field tests, new systems applications, research results, pilot studies, available equipment, and so forth, were more immediately available to us.

In this connection, we view H.R. 11714 as potentially an important first step toward expansion of the engineers' and architects' abilities to better incorporate energy conservation measures in the design of various types of buildings.

Before anyone can promulgate guidelines for energy conservation in buildings or develop model energy conservation building guidelines, it is essential to first accumulate, analyze and make available, in a usable form, all existing technology and data.

Substantial research and development in areas dealing with energy consumption for space heating, air-conditioning, ventilating, lighting, water heating, and refrigeration have been carried out since the 1920's.

Numerous techniques for realizing energy savings have been developed. This and other worthwhile work has been carried on by various professional societies, trade associations, government agencies, manufacturers, universities, utility companies, engineers, architects, and others.

Likewise, a number of significant projects are currently underway, including the Manchester project sponsored by the General Services Administration, and the Ohio University project being performed by the American Society of Heating, Refrigerating and Air-Conditioning Engineers, ASHRAE.

Considerable development and research has been, and is being, performed, but the data resulting from such efforts exists in an uncoordinate, fractured, and scattered form. Because of the monumental work involved, no one has ever gathered it together, summarized it, sorted it, analyzed it, categorized it, indexed it, and made it available in a readily usable form.

Nevertheless, the accumulation of such information is long overdue. It is prerequisite to the proper development of design guidelines and model codes and, frankly, it is urgently needed as a basis for establishing sound energy policy relating to the building industry.

Further, the availability of this type of data from one central source would eliminate duplication and overlap of effort—more appropriately termed "reinventing-the-wheel."

Building managers, public works officials, architects and engineers, and numerous others could effectively utilize information on current technology to immediately institute reductions in energy consumption with very little capital expenditure.

The paybacks to be gained from the proper application of such technology to residential, commercial, and industrial buildings could be astounding.

Adding institutional buildings, these structures utilize at least 33 percent of all energy consumed in the United States. Assuming that 20 percent of that energy is wasted, and I believe this to be a conservative assumption—there are some assumptions that bring us up to higher than 30 percent—this would represent more than 6 percent of

all energy consumed in the United States—energy that can be saved. That amounts to some \$5.6 million worth of energy a day.

All the design professionals, government and industry, need is information which can be applied to accomplish elimination of this waste.

A singularly important tool is a central compendium—a date bank if you will—of all existing technology in a central and accessible location permitting rapid dissemination in a usable form.

Turning to the specific language of H.R. 11714, our council respectfully recommends that “institutional” buildings be added to residential, commercial, and industrial now specifically cited in paragraph (e).

In this connection, the Department of Health, Education, and Welfare and the Veterans’ Administration should also be added to the cooperating agencies. Both the VA and HEW have hospital construction programs, and HEW is involved in the design and construction of educational facilities.

Furthermore, we would suggest that the word “standards” be eliminated in subparagraph (e) and replaced with the word “guidelines,” and suggest that the language be changed to broaden the scope to insure that guidelines are developed for all component parts or systems of buildings.

By specifying lighting and insulation on line 1 of page 2, it could be interpreted to exclude other components such as HVAC systems, water heating, and the like.

The following language is recommended:

Develop engineering and architectural design guidelines to promote efficient energy use in residential, commercial, industrial, and institutional buildings applicable to both existing and new construction.

Our reason for suggesting the substitution of “guidelines” for “standards” is that the term “standards,” in the building industry, is frequently interpreted to be a mandatory requirement. We are concerned that any mandatory compliance with standards will restrict or limit the designer’s judgment and ability to achieve optimum energy utilization through design.

The design professionals, engineers and architects, along with manufacturers and building owners, are the ones who will ultimately implement and use the energy conservation techniques derived from guidelines to be developed under this legislation.

Consequently, we believe that it is imperative to include these groups in the development of the energy conservation guidelines. Not only are the design professionals, manufacturers, and building owners the ultimate users of the guidelines, but they possess unlimited expertise and experience in their practical application, and this is vitally needed in the development of reasonable and workable techniques.

In order to guarantee that these groups are included, and that the guidelines do not in any way discourage creative or innovative approaches to energy conservation, it is suggested that H.R. 11714 be amended to include a new subsection reading as follows:

(g) In carrying out subsections (e) and (f) above, the Administrator is authorized and directed to utilize, to the maximum extent feasible, the services of private organizations, professional engineering and architectural societies, trade associations, and to coordinate the development of the guidelines and model codes with these organizations.

We believe that the inclusion of this subsection will insure that the expertise and talent of the non-Federal sector is fully utilized. Additionally, it will provide for greater acceptance of the guidelines developed under this bill, and will contribute to immediate and broad dissemination to the ultimate users.

Now, I would like to turn briefly to subsection (f), which directs the development of model building codes.

We are pleased to note that there is no reference to the adoption of a mandatory Federal code. We believe that any consideration of a Federal code should be strongly discouraged.

The authority of State and local governments to adopt and enforce building codes and regulations has long been recognized as the most workable and appropriate system, and any Federal intrusion on the rights of States and local governments would be unwise.

Any model code developed under this legislation should be performance-oriented and set forth performance criteria as opposed to restrictive specifications such as x amount of insulation for a certain type building in a particular geographical area.

Consideration should be given to developing guidelines to establish an energy budget. By energy budget, I mean an allowable amount of energy for a certain type of occupancy and building use. Additionally, we would suggest that the term "standards" be replaced with the word "guidelines" in this subsection for reasons stated earlier.

Next, I will address the funding we believe would be required to carry out the provisions of H.R. 11714.

As I have previously stated, we are firmly convinced that the initial work should be directed to accumulating and analyzing the existing technology, and making this readily available to all parties involved in the building industry. This phase alone, I would estimate to cost between \$10 and \$15 million, and \$1 or \$2 million would be required annually to keep the data current and to provide for appropriate dissemination.

While this bill does not address the operational aspects of energy consuming systems, it is a subject which we believe the subcommittee should give consideration to at a future time.

A building can be designed and built in such a manner to reflect the optimum level of energy consumption, but the systems must be properly operated to obtain the full benefits of the design.

Operating manuals, such as those required by EPA for federally funded waste-water treatment facilities, would contribute to solving the operational problems, but operator training and other factors should be considered.

An energy budget, for example, would automatically provide the incentive for maintaining efficient operating procedures.

In conclusion, we are firmly convinced that H.R. 11714 when enacted, with the changes we have recommended, will make a significant contribution to attacking and eliminating much of the energy wasted in a major energy consuming segment of our economy.

We appreciate the opportunity to present our views, and wish to congratulate your subcommittee on taking a positive and practical approach to the current crisis.

Thank you, Mr. Chairman.

Are there any questions?

Mr. DORN. Thank you very much, Mr. Rice. Mr. Snyder.

Mr. SNYDER. Mr. Rice, I think you have a terrifically good statement in that it is full of a lot of meat and content and a lot of information.

I am not sure I agree with you in what I believe to be all the implications, but you really lay in there and give us an awful lot of things to get our teeth into.

So you, of course, support the bill with some amendments, and I believe the amendment you indicated would be substantial improvement to the bill.

You indicate that it is an important first step toward expansion of the engineers' and architects' abilities to better incorporate energy conservation measures in the design of various types of buildings.

In another place, you say that because of the monumental work involved, no one has ever gathered all the technical data together, summarized it, sorted it, analyzed it, categorized it, indexed it, and made it available in a readily usable form.

You talk about the accumulation of this information being long overdue and needing a data bank type operation for this kind of information.

I am concerned about what the American Consulting Engineers Council does and what their contribution to the architectural expertise in this country is, if any.

Also I would like for you to talk about—well, this legislation you had before Congress, wherein architects were opposed to the bidding process on their work—the great presentations made by the architects about the schooling, expertise, experience, knowledge, et cetera, that is necessary and the engineering degree required as arguments against requiring bids for architectural work for the Government.

We have a great scientific school in Louisville very near my congressional district. I am sure you are familiar with it.

Do not these colleges and schools of engineering and architecture teach you anything?

Why does the Government have to put this together for you now?

Mr. RICE. A few of these questions I have anticipated.

Mr. SNYDER. Very good.

I am cosponsor of the bill, and obviously I think we have got to do it, but I am concerned. I am a free enterprise man myself, and my friend who was in the chair is, too, as a matter of fact. And I am going to help try to get this legislation through.

But it concerns me if we are going to preserve the free enterprise system, by golly, that the Government has got to do this. We ought not to be doing your architecturing for you, and I am saying this friendly like, because I am your friend. I am a friend of free enterprise.

The reason why we have Government moving in so many areas where they should not be moving is because free enterprise does not always hold up its side of the bargain.

I would like for you to develop that in line with your testimony.

If the chair wants to make this vote before you answer, it would be all right.

This concerns me, not just you, because you have got a darn good statement. It has got a lot of stuff in it. The whole thrust of what I am supporting and what you are supporting is what an organization like you or a Congressman like me ought not to be doing. But there is a vacuum and we have got to do it.

I would like for you to develop it with me a little bit and tell me why we are where we are in your business and all the rest of the fields, too.

Mr. RICE. Mr. Chairman, would you want to wait?

Mr. DORN. We can wait until we return.

I agree with my distinguished colleague from Kentucky, though. Also, I want to commend you for realizing the danger of any kind of Federal standard.

That reminds me of old Albert Speer—I read this in his book—about how Hitler would want to sit there and direct all the architecture. I am glad you realize that a bill like this could be the instrumentality through which you could promote the Federal standards, and this would be a terrible thing. So I commend you for realizing the importance of this bill and also about your maintaining creative, what you call it, renovations. I agree with you about that, too.

You just do not want to have a piece of legislation that would be the instrumentality through which you could have standardized, federalized architectural and engineering in this country. I think you realize that. I appreciate that.

The committee will stand adjourned until 12 o'clock, and then, if necessary, we will adjourn until 2 o'clock.

[Recess.]

Mr. DORN. The subcommittee will come to order.

Mr. Rice, would you resume the stand, please?

Mr. SNYDER. Do you want to answer the question of an hour ago?

Mr. RICE. Yes, Mr. Snyder.

In answer to why this central information bank has not been gathered before, the principal reason is that there has been insufficient interest, because energy has been plentiful and cheap. This has left the individual consulting engineer to develop his own files and depend upon the technical societies. These technical societies represent specific fields of interest, such as mechanical, electrical, civil, and illuminating engineering, whereas the information to be accumulated for application to energy conservation covers all these disciplines. The technical societies would be an excellent source from which to accumulate the necessary data. Regarding our council, we do not get into technical fields, but rather are concerned with management and business practices relating to the private practice of consulting engineering.

Mr. SNYDER. Would you like to supply the answer for the record?

Mr. RICE. Yes.

On second thought, I do not think so, because there might be some questions that you want me to answer now. Getting back to the question on the role of universities, they do an excellent job on teaching basic theory and the sciences, but what is needed, is information on practical applications.

Mr. DORN. What university?

Mr. RICE. I say the universities, the research and the efforts the universities have taken to compile this information, are more theoretically oriented than the practical engineering application.

Mr. SNYDER. Is that what we need right now, some folks who are kind of technically oriented as far as the energy business is concerned?

Mr. RICE. No.

We need the practical side is what I am leading up to.

Mr. DORN. What I think you are trying to say, Mr. Rice, is that we do not need a data bank for Government agencies within the Government, right?

You are not suggesting that this type of data bank move out into the private field?

I am asking.

Mr. SNYDER. Let him answer it, but his statement would indicate generally that he wants the same people who have allowed this energy waste in construction to have taken place over these years as he indicated perhaps because of cheap energy to have the input or a portion of it.

Mr. RICE. The decision on whether to conserve energy or not has been left with the owner and financial institutions. In many cases the banker is the one that sets our design.

The priority given energy conservation by the owner has been very low—keeping the price of the initial construction down has been the foremost concern.

The operating cost, including utility bills, have always been 100 percent writeoff.

Mr. SNYDER. Not in residential construction.

Mr. RICE. Not residential, no. I am talking about commercial.

The most important thing that has not existed is an incentive for our client to have us conserve energy.

Mr. DORN. Well, I like your suggestion that we have guidelines instead of standards. I agree with you, when you see a standard, that could become a Federal standard, a Federal standard is usually thought of in unequivocal terms, that this is it.

You are recommending the term "guidelines."

Mr. SNYDER. You have indicated just now that the bankers more than anything else have set your standards, and you are talking about costs and financing and things of this nature.

Are you trying to tell this committee that the banks have dictated all of these buildings that have a lot of glass exposure, that you have more heat and light back and forth through the glass than you do if you have solid walls, that the banks have dictated the high ceilings in the buildings where you have a lot of heat lost, not necessarily lost, but it is up there and does not do anybody any good, because you do not walk around up there with the flies and the bugs, you know, and you are saying that the banks are responsible for this more than anybody is responsible for it other than the architect?

Mr. VOGELSINGER. I think we have to readily admit that there has been a certain amount of stylistic preference and ego gratification which has been exhibited in the design of buildings.

Mr. SNYDER. We are talking about the same thing, the chairman is talking about cutting magnolia trees. This is the same thing, really the other way around.

Mr. VOGELSINGER. I am not sure we can blame it on the architects or engineers or construction industry or financial institutions, but rather to the emphasis placed on low first-cost consideration.

Mr. SNYDER. Just a minute.

I know that is true in a lot of instances, particularly true to the businessman, the small businessman.

I guess this room is three stories high, and if you took what they could get by with, it is because the builders and the architects got together and figured how much they were going to bilk the taxpayers out of. You get right down to it that way.

The same thing is true with anything else where you have got a rich client. Let us face it. I have done a little country law practice, and I was always glad to see a rich client come in.

We do a little more work. Much of this responsibility—not all of it—much of this responsibility lies with the free enterprise sector of which the architects are part and parcel.

At least, that is my opinion.

I think I had better ask unanimous consent to revise my remarks.

Mr. DORN. Provided that the chairman has permission to do the same with his earlier comments.

Without objection, so ordered.

Mr. SNYDER. The chairman has made some comment, and I guess basically I am in agreement with it, about not having mandatory standards.

In your statement you indicate that you are opposed to this because it would restrict or limit the design, or judgment and ability.

You go ahead to say to achieve optimum energy utilization through design, but that such standards would also restrict or limit the design or judgment and ability. It could even achieve the direct opposite of that, too, could it not, if you had a fellow who was not energy oriented?

So, if you need the latitude there so that they would achieve optimum energy utilization, you also leave the latitude there for a fellow who does not give a darn about whether he is going to save energy or not and wants to go out and put up one of these things that you cannot tell is a building or not, one of these far-out things that perhaps I would refer to as a building and maybe you would not.

We do not want to tie everybody's hands. That is not what Government is for.

On the other hand, we are in this mess, and we are all here together, and a good portion of the responsibility lies at a lot of people's doorstep.

In many instances, it lays at the doorstep, as you indicated, of the bankers and the original cost of the owner, but a lot of it also lies at the doorstep with the builder, architect, and everybody else.

It seems to me that while maybe we do not want to have rigid standards, we do want to see that whatever regulations, or whatever comes out of this situation in the future, insofar as we are forced to legislate in this area because of the energy crisis, must look toward requiring the optimum in savings of energy, even as in our pollution bills we require certain types of industry to use the best available technology. We do not say exactly what that is, because that would improve from time to time.

Would you sort of agree that is the theory that we have got to get into this kind of legislation, and regulations—we ought to require as far as we can relative to buildings which are built with Government money and financed with Government money, that one of the criteria be the use of the best available technology in the area of conservation of energy?

Mr. RICE. Mr. Snyder, I believe I can speak for the consulting engineers as a whole on this.

The approach that we would like to see is the approach that NASA took. We have a certain goal out there. We want to get to the Moon at a certain time.

They wrote a performance type of specification. They left insulation thickness and how they built the bird and everything up to the innovative ideas of people, and we made our goal.

If we can do this, set a goal like this, and not curtail innovative ideas of free enterprise, but create an incentive for this to happen, we can, I believe, accomplish it with the greatest possible latitude.

Mr. SNYDER. Obviously, I think the amendments you propose are great, and I am really not trying to be antagonistic, but I want to put some things on the record.

You have indicated an estimate of cost of about \$10 to \$15 million, at the rate of two a year, to keep the data up to snuff.

I am assuming, by virtue of the fact that you are here for this legislation that you want the Government to do that?

Mr. RICE. You are speaking of an information bank?

Mr. SNYDER. Yes.

Mr. RICE. I anticipated that question. Let me give some examples, if I may, and this might take a little time, but I think it is worthwhile.

Last week I had an architect from Aspen, Colo., call, and he said, "Bob, can you send me the information on any windmill design for generating electricity that you have? We formed an architects group up here, and each person is going to contribute some time toward this energy thing."

Now, I have several sources of information: In my own files, I have our technical societies, I have our research papers, I have the library, and so forth, but the consulting engineer is put in the position of only having time to sell.

I have to estimate for this client what the charges are going to be.

Mr. SNYDER. A lawyer understands that.

Mr. RICE. This is liable to kill his incentive to do something because of the charges. He will say forget it.

Mr. SNYDER. Mr. Rice, if your expertise is not worth anything, I do not know what you are here testifying for today. You cannot very well use that argument. Like I say, I practiced a little country law, and still do, and I understand the concept of a man's time and talent being his own only stock in trade.

I think it ought to be paid for. If a fellow does not care enough about his project, or his lawsuit, as the case may be, to want to pay the fee, well, let it go to pot.

I have told many a person who came in, if you want to argue about the fee, well, if you do not care enough about that proposition or corporation or that lawsuit to want to pay me a fee, I do not care about it, either.

I suggest to you that if that man does not care enough about your expertise and your ability to put together this package of information he wants, then you ought not to care either.

The question was: It is your testimony that you want the Government to bear the \$10 million to \$15 million in cost of putting a data bank together, ought to keep it up to date?

I do not think the example is going to help me much.

Mr. RICE. Let me give you two more examples that will show you the importance of this.

About 6 weeks ago, the public works director of the State of Colorado called me and said, "Bob, do you have anything in your files to relate volumes in square footage to energy costs in our buildings?"

Again, if we came up with solid, sound basic information, it is a major project, this data bank will help public works officials on this sort of thing.

Another example is the variable volume system—a system which is being used now a great deal, and probably 500 are being designed this very moment in consulting engineering offices. The way this system is applied to a building can affect the energy consumption as much as 25 percent.

Now, if we could accumulate the practical knowledge on the application of this system—reasonable and realistic design guidelines could be developed for the variable volume system.

Mr. SNYDER. I think you want the data bank, and I think you want the practical knowledge. I am trying to find out who you think ought to pay for it.

Mr. RICE. Well, because we are on a crash program, I think it is beyond the private sector to pay for it.

Mr. SNYDER. You want the Government to pay for it?

Mr. RICE. Because we are on a crash program.

Mr. SNYDER. Now, I have got a lot of poor clients back home, and it would help an awful lot if I had all the law on the subject of rear end collisions in the data bank, so I could punch a button, and get all those cases cited to me from certain jurisdictions and certain circuits. That is mighty important to those folks.

Do you think that architects and engineering taxes ought to go to pay for it?

Mr. RICE. Normally, no, but we are in a crisis.

Mr. SNYDER. How would your association feel if we had a corporation put together on the theory of Comsat—in which maybe some folks in the architectural and engineering business would buy some shares, and the Government would maybe put up 40 or 50 percent of the money and let them go into business—that would put all of this into the data bank and charge a little fee for pulling this information out? And as this thing began to work and made a profit, and paid some dividends, maybe it could have an arrangement where it would even be provided for that in the ultimate, the Government would have to sell its stock back for whatever it cost. Then the architects and engineers, or your council, whatever the name of your organization is, and some of the other similar type organizations, could end up owning all of this, and charge your members a little fee for punching the button and coming out with data on that basis, rather than just saying let the Government do this. In other words, the users would pay, you would pass costs on to your fees and so forth, the people you built the system for. Would that not really make more sense for a fellow trying to operate in the concept of free enterprise system, than his saying let the Government put this and that together and keep it maintained for us so that we can go back here and use it? Wouldn't it, really?

Mr. VOGELSINGER. We had considered the establishment of a data bank that would economically support itself. The concern we had was that the individuals who have this information—architectural engi-

neering firms, utility companies, manufacturers, and others—would be hesitant to provide the data if they felt that someone would be making a profit on it.

This information exists in scattered places.

Mr. SNYDER. I can see that fear. I only have this practical disagreement, that had it been set up as a Government corporation, as Comsat was, something starting out as that did, and providing the shares initially would not sell for more than \$100 so it could be widely held among the membership, people who are going to use it would be buying stock.

Those people who are going to use it would be the same people who had the information, and they would want to see it succeed.

I think you would have an element of cooperation, if you had it widely owned and widely held.

As a practical matter, you may be wrong, and I may be wrong on that. I think we are going to have to go ahead and do this. There is not any question about it.

On the other hand, I want to lay on the record the fact that I think the Government ought to be encouraging this type of thing in this area as well as in other areas, but they ought to be trying to encourage it to be done in the private sector as best they can, with Government help in the original crash program, and get it set up, and let it walk on its own.

I will not pursue it any further.

I did want to give Mr. Rice the opportunity to expand on his concept of establishing an energy budget, which I read to mean allowing everybody so many Btu's, or something. Maybe I am reading that wrong.

Mr. RICE. What I am saying, essentially, is that before the consulting engineer has the freedom to maximize energy conservation measures his client has to be motivated to have him do it, and creating this incentive and motivation falls more in your hands, as policy-makers than it does in the engineer's hands. However, an idea that might be considered is the energy budget concept for inclusion in design guidelines and model codes.

In the first place, if an energy budget is created, there can be no cheating, because the ultimate use of the energy has to agree with the original since the facts are there, the utility bills come in—

Mr. DORN. Mr. Rice, you would not be in favor of putting every American on this computer list and be allocated so much energy, and all that kind of stuff, would you? You have got some people in this country, they have contacted Congress and want to put every American on a computer, and you push a button, and you get some half-gallon or quart of oil, or something, that is not what you are talking about, is it?

Mr. RICE. No. I am suggesting an energy budget as an incentive. How that is applied falls out of the engineers' hands.

If we are truly in a crisis, it is a form of rationing—and I am against rationing as much as anybody—but as I see it, the utility companies would administer this. There would not be any need to be a Government agency.

The utility company would say you have so much energy, and from there you pay a penalty of so much, and beyond this there is a shutoff entirely.

The ingenuity would come out, and building owners would devise ways to reduce consumption.

Mr. SNYDER. Mr. Rice, the chairman is not going to hold still for me to talk much longer, but I can take you on on that one until about 6 o'clock tonight.

If you think during this crisis that we ought to say to the Department of Defense, for instance, that we are going to allocate a little less fuel for your training program, and things like that, well, I am in the ball park with you, or to the airlines, as we have done, you have got to cut back 15 percent, I am with you.

But when you talk about every American being allocated so many kilowatts, and if he goes over that, he pays a terrific penalty by way of tax—

Mr. DORN. Or go to jail.

Mr. SNYDER [continuing]. Or go to jail, I just want to tell you that the Members of the House of Representatives stand for election every other year, and you better figure out another way to handle that because it "ain't" going to work, it "ain't" going to come to pass.

Now, most private power companies have had a system where the more current you use, the cheaper it got.

Now, maybe you would have some recommendation in that regard, that they would take a course that would have to go through the State public service commission, or whatever rating authority it might be, and I would hope that you would not want the Congress to legislate in that area, because you do not want us setting rigid standards for the architects, but if you were talking about something in that area, I would think maybe I would understand it a little bit more.

I am not going to pursue the energy budget. I know our chairman has been most gracious in allowing me to have much more time than I should have been allocated.

It strikes so against my basic philosophy to do this, but I suspect that we would be here for a while. I appreciate the fact though, and I stand on my original statement.

There is a heck of a lot of meat in your original statement. I think it is a good statement. There is a lot in there we've been chewing on. That does not mean it is not a good statement.

In some instances you may be right and I may be wrong. I appreciate your candor in discussing this with us.

I appreciate the time and the chairman's courtesy in allowing me to go this far.

Mr. DORN. Thank you, Mr. Snyder.

The Chair agrees with Mr. Snyder. You have made a good statement. That is why we kept you here so long.

I agree with you, too, Mr. Rice, about adding the VA and HEW to these coordinating agencies, because our very VA hospital system is the largest on this Earth. We have 168, I believe, VA hospitals, and are planning construction of a new one right now, one in Columbia, S.C., and one not too far away from Augusta, Ga., \$35 million and \$30 million.

We do need, and I think they should be a part of this—HEW, HUD, and these other agencies, General Services Administration, an overall study in coordinating the coordination of this program. I think they should be included.

You have made some good recommendations.

This is going a little bit far afield, but we do have people that want to put every American on a computer, and whether they play golf or not, whether they run around with women, and all this kind of business, and if we ever have to have anything like that, we have to have some safeguards to protect individual rights so somebody cannot punch a button across the continent and find out everything about me, whether I had a parking ticket or not.

Mr. SNYDER. Off the record.

[Discussion off the record.]

Mr. DORN. Mr. Rice, I want to say that without objection you will have the privilege of revising your remarks and commenting more fully on some of these questions for the record.

Counsel has a question.

Mr. D'AMICO. Mr. Howard has asked me, in his absence—he is before the Rules Committee—to offer for the record some letters that he has received, which he believes will shed some light on this subject. One of these letters is from Mr. Robert Eustace of Holmdel, N.J.

Mr. DORN. Without objection, the material will be inserted in the record at this point.

[The material referred to follow:]

HOLMDEL, N.J., Dec. 5, 1973.

MR. HOWARD: Regarding the oil shortage I submit this idea to you for conservation.

Oil burners require and pump thousands of cubic feet of air an hour. This air is pulled from the interior of the house and is exhausted up the chimney, resulting in cold outside air being pulled into the house in these same amounts around doors, windows, siding.

In new houses tightly built and well caulked there can be a lack of sufficient air for complete combustion.

The remedy is to duct fresh outside air directly to the burner head, this is done with stove pipe from the nearest outside wall or window.

Thanking you, I remain:

ROBERT EUSTACE.

SEPTEMBER 22, 1972.

MR. SALVATORE J. D'AMICO
*Counsel, Committee on Public Works, House of Representatives, Rayburn House
Office Building, Washington, D.C.*

DEAR MR. D'AMICO: I was pleased and excited by your invitation to submit to you information regarding fuel conservation by imaginative design.

I am including information on the "pyramid in the desert" which is the Tempe Municipal Building and I am also taking the liberty to include a school building which I designed utilizing rammed earth construction. I think this one has even more application for general building construction in the desert terrain. I am sorry the pictures are poor quality, but I hope the ideas expressed by them will be of some interest to you and the committee.

Thank you for the invitation to submit this material. By the way, as a Legislator for the State of Arizona, I have great appreciation for the work that is done in the halls of our Congress and I hope you will relay to Chairman John Blatnik a sincere appreciation of one U.S. citizen who appreciates the depth to which his committee is exploring this idea. I do get to Washington periodically, and if you like I would be willing to discuss either of these two projects with you in greater detail.

Yours sincerely,

MICHAEL GOODWIN,
President, Michael & Kemper Goodwin Ltd.

Shea School represents a contemporary example of southwestern architecture, making the best use of local materials, i.e., earth, concrete, plaster and wood.

The Architect on this project took advantage of the natural earth on the site to create a compacted earth berm, through which caissons were drilled, to support

the precast concrete spandrel beams, thus, eliminating the need for formed or constructed exterior walls. The interior of the earth berms were cut to a 60 percent slope and gunited. The exterior slopes of the berms were planted with grass. The earth provides excellent insulation around the building, thus, reducing the loads on the air-conditioning system.

Precast concrete "tees" installed throughout the project are furred between members at four locations across the school. These furred areas serve as plenums for return air and enclosures for supply air ducts, eliminating much of the sheet metal work.

Precast concrete wall panels around the perimeter of the building add the necessary scale to the school while concealing the mechanical equipment located on the roof.

STATEMENT

Subject: Use of glass and the solar load in a desert environment.

TEMPE MUNICIPAL COMPLEX

Tempe, Ariz.

The sloped glass walls reduce the solar load on this building as follows:

In lieu of a standard roof overhang over vertical glass surfaces, the glass is angled from the perimeter of the floor outward and upward to the perimeter of the normal roof overhang. In effect then, the glass shades itself.

The triangular interior space gained by this glass position, acts as a "cone of insulation" around the building perimeter. Heat, penetrating through the glass, and the resultant radiation and convection heat, is effectively isolated in this space, heating the air in the space which is then transported away by the air circulation system.

It is obvious that this interior cubage gained by the sloped glass is not useable as floor area, but its cost is small and its value as a "solar buffer zone" is very valuable. It also provides drama and visual freedom within the space.

Also, due to the reduction in angle of attack of the sun's rays on the glass, the solar load is decreased because reflection from the glass wall is greater.

All the above factors combine to produce a greatly reduced solar load making the use of a glass wall a very practical solution for this structure.

Design Statement:

"MUNICIPAL PROJECT FOR TEMPE, ARIZ."

The initial design consideration for the Tempe Municipal Project, following formulation of a basic program, was the spatial relationship of the building to the site. It became important that the structure should not overpower its surroundings and the site. This led to a plaza-garden environmental concept for the building setting.

Traditional Southwest design frequently places a building around a central plaza. This idea is apparent at the plaza level, but is reversed for the central element which rises from the center of the lowered plaza.

Two basic spatial divisions occur. Administrative office spaces are housed in the central building and citizen service-oriented spaces surround the lowered plaza area. The goal for these service-oriented areas was to create an open vista focusing on the central administration element and to provide "walk-in" spaces for the transaction of normal city-citizen affairs such as utility bills and other service matters.

It became evident that the central element should be a strong statement and reflect the image of the city. Tempe, Ariz., is involved in urban renewal and changing technology will continue to leave its mark on the face of the city. It was important that the design of the building have a "timeless quality", so it would retain its identity in a changing environment.

After experimentation with many design concepts and forms, other criteria emerged. The administration spaces should allow the people involved in the government of the city to be in visual contact with it. This obviously demanded a generous use of glass. The visual drama resulting from an unrestricted panorama of the city was a desirable goal, but becomes a difficult one in a desert locale while maintaining reasonable solar loading.

The incumbrance of solar screens, shading devices and sun controls seemed to negate large areas of glass, until after exhaustive research, and three-dimensional study, a solution was discovered. Experiments led to the sloping of the glass walls at an angle of 45° with the horizontal plane and the orientation of the building at an angle of 45° with the north quadrant. Studies indicated that this "dual 45° angulation" provided excellent solar orientation.

The concept solidified as an inverted glass pyramid which solved the solar loading problem and provided a simple architectural form with a timeless quality.

Finally, "pedestrian bridges" evolved, radiating from the central element, above the lowered plaza, and into the circulation of the city. The entire complex thus serves as the nucleus of Tempe, Ariz.

AMERICAN NATIONAL STANDARDS INSTITUTE, INC.,
New York, N.Y., December 13, 1973.

Hon. JOHN A. BLATNIK,
Chairman, House Public Works Committee, Rayburn House Office Building, Washington, D.C.

DEAR CONGRESSMAN BLATNIK: The American National Standards Institute, representing the major voluntary standards development organizations in the United States, notes H.R. 11714, which bill is under consideration in your Subcommittee on Energy.

If the House Public Works Committee finds that the proposed legislation merits a favorable report, we suggest the insertion of an amendment with respect to the section applicable to the development of standards. Specifically, we urge that those government agencies concerned with the energy conservation programs should be directed to work with and take advantage of the resources and experience provided by the nations voluntary standards organizations.

Respectfully yours,

DONALD L. PEYTON,
Managing Director.

Mr. D'AMICO. Mr. Rice, in your statement, with regard to certain statistics, you say 33 percent of all energy consumption in the United States is by certain structures you specify.

You further say that "assuming 20 percent of this energy is wasted," et cetera. Mr. Chairman, I respectfully request that the witness be asked to supply for the record the source of the first statistic and the basis for the assumption of the second statistic.

Mr. DORN. Without objection, so ordered, if you would, please, Mr. Rice, we would appreciate it.

[The information received follows:]

[THE FOLLOWING WAS RECEIVED FROM MR. ROBERT J. RICE, VICE CHAIRMAN, ENERGY COMMITTEE, AMERICAN CONSULTING ENGINEERS COUNCIL]

The most recent figures we have on energy consumption are those released by the Department of Commerce on October 25, 1973. Commerce estimates residential and commercial end-use energy consumption at 33 percent of the total U.S. consumption. Industrial use is estimated to be 46 percent and a portion of this would, of course, be used for space conditioning and other functions within industrial structures which are not directly related to the industrial or manufacturing processes.

Regarding the amount of energy wasted or the amount that could be saved with the proper controls and application of existing technology, the estimate of 20 percent is based largely on my own experience and that of other knowledgeable professionals in this field. In testimony before the Subcommittee on Energy of the House Science and Astronautics Committee on June 12, 1973, Mr. Fred Dubin stated "energy conservation through design * * * can reduce the yearly energy consumption of new buildings by 35-50 percent and of existing buildings by 15-20 percent. More than half the savings of energy can be accomplished with no appreciable increase in initial cost. About 40 percent of all energy consumed yearly in this country is for heating, cooling, ventilation, lighting, and power systems in buildings." Another knowledgeable professional, Mr. Roderick R. Kirkwood, President of the American Society of Heating, Refrigeration, and Air-Conditioning Engineers, addressed this subject in the November 1973

ASHRAE Journal and he estimates potential savings in the range of 50 percent could be achieved by 1980. For a more detailed explanation, Mr. Kirkwood's article follows:

[From the ASHRAE Journal, November 1973]

ENERGY CONSERVATION *SI*; ENERGY CRISIS *NO*!

This article is from the address made by President Kirkwood at the Conference on Energy Conservation held on August 23, 1973, at Henniker, New Hampshire

(By Roderick R. Kirkwood)

As president of ASHRAE, I have already expressed myself more than once on the great concern that we as an industry should have regarding the reaction of the public to the "scare talk" of an energy crisis. There is an energy shortage, and efforts are going to have to be applied to reduce energy consumption or to provide new sources of energy in order to offset this shortage. The public reaction to the term "crisis" is likely to be excessive and result in crash programs of only partially thought out legislation or regulations. These, in turn, can create many more problems than they will solve. In fact, this seems to be almost a way of life these days with things such as the problem of meat shortages, resulting in hoarding and price ceilings, which in turn cause even less beef to be available so that we get to a point of not knowing whether the proposed cure is going to cause more problems than if the government stayed out of the area entirely.

There have been and are proposed many consensus standards governing heating and air conditioning which are either being prepared or being proposed with good intentions, but with far less than a full understanding of the impact of these on our technology. There has also been much in the way of poorly thought out publicity in the press, including such proposals as shutting down all air conditioning systems whenever the ambient outside temperature is below 75°F. Such proposals show lack of understanding of the technology involved, since they ignore the efficiency and comfort of the building occupants.

HIGHER CONSTRUCTION COSTS

One of the serious fallouts that will come from the talk of crisis will be building code modifications and other legislation with specific requirements rather than performance requirements. These will have a negative impact on the industry and on growth within the industry. A typical example would be a requirement for a specific thickness of insulation rather than using an overall "U" factor for wall or roof. The specific thickness of insulation would eliminate the economic advantages of developing more effective insulating materials, which would tend to reduce the technological advances of the industry. Having specified only an insulation thickness, there would be little opportunity for designers to use their most innovative efforts to provide the "U" factor and keep the construction cost at a reasonable minimum.

Another would be the restriction in the percentage of glass in exterior walls rather than a performance specification which would take into account double glazing, reflective glass, shading and other new concepts which may come on the scene.

SCRATCHING THE SURFACE

The talk of crisis has also resulted in efforts to provide great quantities of money to be used in the development of new energy sources but with very little emphasis on funding research relating to energy conservation. Actually, the money necessary to proceed with research to optimize energy utilization would require very small outlays of funds compared to that necessary for the development of new energy sources. So far, the research in optimizing energy utilization has been carried on by manufacturers of products, ASHRAE's research programs, the GSA project at Manchester, N.H. and a few other relatively minor efforts. I believe that this is an extremely fertile area in which we have only scratched the surface.

With projects such as ASHRAE's Ohio State program, we will expand our understanding of how energy is used in buildings and be able to develop further technical information to improve the utilization of energy. This will add to the important part we have to play in easing both the energy shortage and the problems of the pollution of our environment.

IMPACT

In weighing the impact of what we can do at the present time with our technology, I have gathered information together from nearly 30 years of consulting engineering experience, from the ASHRAE Symposium on Energy Conservation, from the bulletin on "The Potential for Energy Conservation" as prepared in October, 1972 by the Executive Office of the President, Office of Emergency Preparedness, and from other miscellaneous sources.

The bulletin on "The Potential for Energy Conservation" indicates that heating, air conditioning and refrigeration for residential and commercial consumers in this country use about 26.6% of the total energy required by the nation. This includes approximately 18% for space heating, 4% for water heating, 2.2% for refrigeration and 2.5% for air conditioning. This is exclusive of the energy utilized in industrial heating, cooling and refrigeration requirements.

If we add the industrial heating, ventilating, air conditioning and refrigeration requirements, not including any processing, I am sure that the total energy utilized in the disciplines represented by ASHRAE is at least 30% of the national total. This same government report sets a goal of saving only 4.7% of the 26.6% used in residential and commercial buildings by 1980. Such a savings is far too small a goal for our industry. In residential space heating, installation of adequate insulation, double glazing, weather stripping, replacement of inefficient furnaces and burners and adequate maintenance of such heating equipment can reasonably reduce the energy requirements for this area by at least 40-50%. The savings of at least 30% can also be made in water heating, refrigeration and air conditioning in the residential market. For example, tests run on packaged air-conditioners indicate that for the same capacity the most efficient unit only used half as much energy as the least efficient unit.

Also, in the commercial area the kind of savings referred to in this report are minor compared to those that can be applied using present technology. For example, a series of tests run by one of the manufacturers on the use of variable air volume systems as compared to other more conventional systems indicated nearly a 40% reduction in energy requirements. Heat reclaiming for double circuited condensers to transfer heat from interior to perimeter ones can be accomplished with a coefficient of performance of four or better. The use of solid state space demand control systems according to another manufacturer's test on roof top units indicated a 37% saving. The savings resulting from proper maintenance and operation of systems can run as much as 50% or more. The savings possible with fully computerized operation can reach 25%.

This type of information, coupled with the experience of our office in the commercial area, indicates that savings of 30-50% are entirely possible rather than the 11% proposed by the government report. If such savings are possible in the commercial area, comparable savings are possible in industrial heating, cooling and refrigeration.

THE SAVINGS

In putting this all together, it appears that with total application of our present technology we should be able to save in the order of 50% of the energy utilized for the disciplines represented by ASHRAE in the residential, commercial and industrial fields. This would be a potential savings of 15% of the total energy requirements for the nation. I can see no reason why at least half of this saving could not be implemented easily by 1980, if not sooner, which would result in a reduction of 7½% of the national energy requirements. The full accomplishment of the 15% reduction could be possible by 1990, and with that much lead time it is also probable that our research will develop additional ways to improve energy utilization even further.

According to the government report, the projected oil imports for 1980 are somewhere between 9.2 and 11.6 million barrels of oil per day more than we are presently importing. If this were reduced by the 7½% of the national requirements, as I have explained, and the savings in the other areas described in the government's report for electrical, transportation, industrial processing and illumination are as forecasted by the report, the 1980 annual import requirements would be reduced to less than that required in 1971. In other words, our problems of a shortage can be solved by using our present technology without requiring extensive lead time to develop new procedures or equipment.

However, the implementation of this program will require a very real incentive. This incentive can be pressure of public opinion, supplemented by an income tax deduction such as a fast write-off of investment in energy conservation-related improvements in existing property, or some other real tax break which would be of direct interest to every business and every homeowner.

Mr. D'AMICO. Mr. Rice, in replying to a question asked by Mr. Snyder, I was wondering whether you would want to add that architecture is not only a functional thing, but it is also an art form, so that when you have buildings, these tremendous buildings, made of glass, they are reflecting the period in which they were created, so that the glass would reflect an era of plenty, and now that we have come to a time requiring austerity and sacrifice, the architectures of the future will reflect that austerity, and we probably would look forward to an elimination or a change in the design of all this glass which would lead to the loss of heat, et cetera?

Mr. RICE. Yes, very much so.

Mr. D'AMICO. Thank you.

Mr. DORN. Thank you, Mr. Rice.

The committee will stand adjourned until the call of the Chair.

(Whereupon, at 1:07 p.m., the subcommittee adjourned, subject to the call of the Chair.)

[The following was received for the record:]

CRS DESIGN ASSOCIATES,
Washington, D.C.

HON. JOHN A. BLATNIK,
*House of Representatives, Chairman, Public Works Committee,
Rayburn House Office Building, Washington, D.C.*

CHAIRMAN BLATNIK: We recently notified your committee of our interest in conserving energy through architectural design and engineering and have prepared this additional information for your use when legislation is again being considered regarding this subject.

We have supplied the committee with background information on William W. Caudill, Chairman of the Board of Caudill Rowlett Scott, Inc., a national architectural, engineering and planning firm. As an architect with more than 30 years of experience, Mr. Caudill believes buildings can be designed to not only save energy, but can fulfill human needs at the same time.

This "humanistic" philosophy will be presented in depth in a new book, "A Bucket of Oil: The Humanistic Approach to Building Design," written by Mr. Caudill, Frank D. Lawyer, and Thomas A. Bullock, to be released in April by Cahners Books.

The following is a summary of the major thoughts in the book.

Buildings use about one third of all energy. Forty percent of that goes down the drain—65 billion gallon buckets of oil that can be saved if we go about things in the right way. And we can still have buildings which fulfill human needs. Even better buildings—if we use a humanistic approach and not just a scientific approach.

Here are some ways to do this:

Use *space-age technology* in selecting the right orientation, the best fenestration, the most efficient heating/cooling systems, and proper materials.

Keep the *envelope* lean and clean. The more space there is, the more energy required. There is enough fat in some buildings to reduce the volume nearly one third without sacrificing activities and amenities.

Use air-conditioned outdoor space—courts, patios, colonnades, outdoor corridors, porches, breezeways, shelter and the like, protected from the hot summer suns, the cold winter wind.

Provide *daylighting*—it's free.

Use the *sun* to heat—even without hard-to-get solar energy hardware.

Use the *wind* to cool. It's hard to beat a five-mile-an-hour breeze on a hot humid day.

Design *windows* to do specific tasks.

Keep the *sun out* of buildings in the summer and let the *sun in* in the winter.

Insulate. Stopping heat flow cuts down energy use.

Bury part of the building. Earth is good insulation.

Design efficient, mechanical/electrical *systems*. What we want is a Cadillac with a Volkswagen engine to cut out that 40 percent waste factor.

Use *glass* judiciously. And use the right kind. When there's a view, make it available to the user. It might help keep him warm in the winter and cool in the summer. When there's no view and strong wintry winds, use a blank wall.

Provide *controls*, automatic and on/off, so energy can be saved when wall openings and spaces are not in use or when systems need modification.

Design on the edge of *comfort zones*. People can wear more or less clothing to suit individual comfort.

Shape the building for optimum energy consumption. It will save substantial energy.

Design *lighting* for specific tasks. If the task doesn't require high illumination, then don't waste the energy.

Respect the *region*. Buildings in Massachusetts should not be like buildings in Texas.

Always remember in making design trade-offs that buildings are for *people*.

The design profession has the technology to save energy—how best to use a bucket of oil. Competent architects and engineers know how to fulfill the needs of the human being at the same time. What we don't need are legalized restrictions such as prescription codes which will force our people to live in banal if not horrendous but efficient ice boxes. What we do need are design innovations to find the balance between saving energy on one hand and fulfilling emotional, intellectual, as well as physical needs on the other. That is what architecture is all about. Buildings are for people to live, to work, to play. The ice box approach to designing buildings won't do.

To sum:

1. Buildings today waste energy.
2. Through proper design, energy can be saved.
3. Energy shapes buildings.
4. Buildings shape people's lives.
5. Energy can be saved without sacrificing esthetic and human values.

There is a proven humanistic approach to building design for energy conservation. That's what is needed now more than more oil and more codes.

We agree there is much to be done in compiling information and fact finding on this subject and support any approach that pulls it all together. We believe the public must be educated about these potentials for conserving energy and are eager to aid in this education. Please notify us if we can be of any additional assistance.

ED GRISHAM,
Vice President, Governmental Affairs.





