From Isabel Miller, Energy Chair

Attached is the commentary I submitted to DOE for the hearings on its proposed Building Energy Performance Standards, BEPS, together with a glossary of technical terms. It is in some parts abstruse (wherein it answers DOE questions which are not restated), in some parts technical; but it should be useful to you nevertheless because it deals with something you will hear more and more about. This is because the number of persons, mostly contractors, who will be affected is much greater than for most federal rules.

These builders are screaming (1) because it will add more cost to housing which is already priced out of much of its market. (I feel they are exaggerating how much this increase in first cost will be. For a given house size, monthly ownership costs should be less than now because of lower utility costs.) (2) because they think it will add more paperwork and delays. Some believe all plans will have to be sent to Austin and /or be computer ananyzed. This is <u>not</u> true. Standard building codes which local building officials now administer will be revised so that compliance with the local code is all that is required. If one has the know-how, he <u>may</u> use an approved computer program to check the DEC of his plan (see glossary).

It is unfortunate and inconvenient that energy efficiency in new buildings has to be coerced rather than encouraged, but the simple fact is builders and designers do not pay the utility bills for the buildings they build and sell or rent. When the monetary incentive is missing and the issue is urgent, regulations must be resorted to. If the buying and renting public were knowledgeable enough about energy-efficient buildings and if the buildings were in good supply, the competitive market could provide the incentive; but neither of these conditions exists.

Therefore go ye forth and stand up for BEPS, timid as the final regulations will probably be, for they are necessary, their "performance" principle is sound and desirable, and they are a start.

G L O S S A R Y

BEPS Building Energy Performance Standards.

Clerestory (clear-story) Upper part of a room above an adjoining roof.

Degree Day Unit of measurement of heating or cooling requirement.

Example: The heat requirement for a 4 month heating season would be figured by taking the difference between the desired building temperature (68°) and the average winter temperature (say 44°) and multiplying by 4 months of 30 days:

68 - 44 x 4 x 30 = 2880 degree days

Design Energy Budget (DEB) The main principle of BEPS is to give flexibility and encourage the use of solar energy by alloting each new building a DEB based on its size, local climate, and fuel. It can then be designed in any manner which will make the calculation of its Design Energy Consumption (DEC) no more than its DEB. Its DEC is roughly its heat requirement times an energy (fuel) factor. In assigning these factors, energy sources are weighted reflecting their "national" cost: gas 1, oil 1.2, electricity 3 (about) and solar is free.

Heat exchanger or recuperator A device with many thin parallel planular compartments, with outgoing stale warm air and incoming fresh air passing through in alternate compartments. Heat exchange through dividers warms incoming fresh air.

Mass Any material with marked capacity for absorbing heat: masonry walls or floors, containers of water, plant boxes.

Passive solar design Building design in which the building becomes the collector or rejector of heat based principally on window placement and shading, internal mass, insulation, and ventilation.

Process energy Energy used for commercial or industrial processes in a building; e.g., heat for drying paint.

SMSA Standard Metropolitan Statistical area.

Thermosiphon Panel with glass face exposed to the sun in which a dark metal is heated, causing air to rise and pass into the room through vents near the top and drawing in cooler room air through vents near the bottom.

Trombe wall A giant thermosiphon. A black-painted masonry south wall, glass-covered outside, with a few inches of air space between wall and glass. The masonry becomes hot and radiates warmth for hours into the room. May have top and bottom vents. Must be

Joanne Bakos
Office of Conservation and Solar Energy
Department of Energy
Docket Number CAS-RM-79-112
Mail Station 2221C
20 Massachusetts Avenue, N.W.
Washington, D.C. 20585

Energy Performance Standards for New Buildings
Docket Number CAS-RM-79-112

The League of Women Voters at national, state, and local levels has long been concerned with conservation of natural resources. In the area of energy, its present top priorities are conservation and transition to renewable sources. We therefore enthusiastically applaud the proposal of Building Energy Performance Standards, and support the "performance" form with its flexibility and potential for encouraging this transition.

We appreciate the extensive research required to arrive at the present form of the standards. We feel, however, that use of data based on structures built in 1970-76 has been made obsolete by the drastic rise in oil prices and change in public attitudes. Owners, designers, and builders were barely beginning to be concerned or knowledgeable about energy use in 1976. The worsening stresses in the U.S. economy and society traceable to the national energy crisis merit the choice of performance standards which will be of maximum economic benefit to the owner or occupant and to the nation. The new vocabulary of design and construction procedures is neither complex nor expensive. The major obstacle is psychological, the building community's fear of new rules. This fear has little relevance to strictness, but strictness has major relevance to effectiveness.

Hundreds of trade associations, solar energy societies, energy extension services, continuing education systems, and professionals are ready to augment the promised all-out DOE education program to erase this unfamiliarity and fear.

SETTING THE DESIGN ENERGY BUDGET

We feel that the DEB for each house should be no more lenient than the point "where the cost of saving the energy is equal to the cost of the energy to be saved" (Life Cycle Cost Minimum), using replacement costs of energy. In determining the LCCM the entire range of conservation and solar-energy options should be examined. These should not be sampled as add-ons but tried in

combination, in thoughtful designs. They should include:

Interior mass isolated from exterior
Trombe wall, with summer shade and night venting
Thermosiphons under south windows
East and west deciduous trees
Cross ventilation washing internal mass
Fans, especially night exhaust fans
Wood stoves
Earth tubes (adequate footage of PVC pipe, damper-controlled, connected into the return-air plenum so that earth-warmed air in the fall and earth-cooled air in the summer can be drawn in and circulated by the AC fan to all rooms to which it is ducted)

The LCCM analysis should be updated as often as movement of construction costs and energy-replacement costs shift more than, say ten percent with respect to each other. If the economic benefit to the nation is great for a capital outlay of one percent to two percent more than for the LCCM, consideration should be given to a stricter DEB.

As soon as the research can be completed, all other building types, including mobile homes, should be brought under this method of calculation for the DEB. The applicability of many of the procedures listed above to office and commercial buildings should be examined.

Since the regulations do not control building energy use after construction, if the DEB for similar structures is based on identical operating conditions it will result in an energy-conserving shell without affecting its subsequent use. In commercial buildings of mixed or unassigned occupancy or in buildings such as restaurants where process energy is complex, we suggest that a DEB for the building shell be assigned and advisory guidelines for operational energy conservation be provided on the supposition that maximizing profits will lead toward conservational operating procedures.

We feel strongly that all new buildings should comply with BEPS, preferably as functional types, but at least as regulated shells. This is subject to the exception, which we support, of omitting a building if its size and location would result in the use of more energy to administer the regulation than would be saved.

Operating Conditions.

Domestic hot water should be included in DEB.

Infiltration should be included, coupled with use of a heat exchanger when the air flow is diminished below .6 change per hour. Infiltration is usually a major cause of heat loss, and should

not be ignored. The possibility of indoor pollution also should not be ignored, because of low-level radiation, vapors from building materials, smoke and other human-produced pollutants. Heat recuperators are non-mechanical and inexpensive; and, if equipped with filters, provide better fresh air than "accidental" infiltration.

Owner intervention, such as the use of insulating shades, is admittedly not altogether dependable, though it is certainly to be encouraged. Some owner intervention, however, should be credited, such as:

Automatic night-set-back thermostat use
Cross ventilation
Use of whole-house exhaust fan

Climate.

The tables for the 78 SMSA climate areas would be easy to use and fairly dependable in the case of standard building types on flat terrain. A much more specific calculation could be made, however, if a formula were available into which a variety of constants for each location could be inserted, including:

(1) A constant related to the closest data on degree days heating (65° base) and cooling (78° base, not 65°)
(2) A constant for local wind conditions, which could be site-specific, dependent on exposure vs. shelter
(3) A constant for humidity
(4) Constants for solar accessibility and percentage of possible sunshine
(5) A constant for summer solar protection on south, east, and west
(6) A constant for degree of exposure, i.e. detached, attached, semi-earth-sheltered, fully earth-sheltered.

An owner could accept use of the nearest SMSA degree-day data or, with proof of validity, substitute more locally precise data.

Energy Weighting.

We believe the idea of an energy-weighting factor reflecting the cost to the nation of various forms and mixes of energy is appropriate. It should take into account replacement costs. With national deregulation of oil and gas prices proceeding, nationwide weighted constants for these fuels are appropriate.

With some electrical generation coming from renewable sources (hydro, wind, and eventually solar), such regional electricity might be weighted lower.

Cost.

The estimates of 1¼% to 2½% additional cost for basic passive solar construction--more insulation, and redistribution

of windows, using multiple glazing--is in range of accuracy. Adding insulation, shifting windows, and plugging air leaks are the most effective and inexpensive energy-saving procedures. Exceeding R38 insulation for ceilings in colder areas should be required. Use of fully insulated 2" x 6" walls is probably indicated everywhere except in the farthest south areas. The added cost is about $1.50 per lineal foot of wall. Triple-glazed windows in cold climates are important, though not nearly so effective as insulative night shutters or blinds. A new double-air-space window has a special ultra-violet-protected polyester high-transmission film as the internal-air-space divider which increases solar transmission while reducing conductive losses.

Two very effective passive-heating strategies are greenhouses and earth sheltering. At Goddard College, in Vermont, an earth-sheltered greenhouse flourished all winter without heat. In Minnesota 2400-square-foot south-facing fully earth-sheltered house without heat never dropped below 41° F in the winter of 1980*.

Additionally, earth-sheltering is quiet and provides safety. Of 125 identified earth-sheltered houses in Oklahoma, the most-often given reasons for "going underground" were tornadoes, heating, cooling, and maintenance, in that order. With 7/8 of these built without architectural assistance and with very little solar heat-gathering design, the average in conservation performance is twice as good as the proposed BEPS would require.**

APPLICATION

The computer-program evaluation precedure is alarming to thousands of small builders, professionals, and small-city code officials. That regulations seemingly so complex could be written into easily understood and applied equivalency codes is questioned. Great effort must be spent to do this well. Code officials must be well trained in applying the new codes. Acceptance of the program lies in the success of these two efforts rather than in leniency in the standards. Effectiveness of the standards lies in making them of maximum economic benefit to the owners and to the nation. They could do more than any other government action now proposed to save energy. As written, however, they are too lenien to substantially develop solar-energy use as intended by Congress.

IMPLEMENTATION

In case Congress does not pass sanctions to enforce compliance with the standards, a whole array of incentives and penalties must be provided. Training grants for national code groups and local code officials, grants to local and state organizations to educate owners and builders, partial withholding of federal benefits, and the requirement of a "performance sticker" on each building built with a loan through a federally insured money institution might be some possibilities. The sticker might be

*Raymond Sterling, University of Minnesota, Minneapolis.
**Walter T. Grondzik, Oklahoma State University, Stillwater.

Passive design cost must always be examined from the whole plan, not as add-on procedures. When clerestory lighting and ventilation, minimum north openings, internal mass, and direct-gain south windows with summer-effective overhangs are combined with modest arrays of active solar panels, energy cost is very low. For example: a six-unit low-rise office building in Austin operates with an annual average energy use of 34,000 BTU per square foot. Austin's Energy Budget Level is approximately 115, Kansas City's is 107. The "strict" budget allotted to a small office in Kansas City is 46,000 BTU per square foot per year. The tenants in Austin are instructed in effective passive operation techniques--use of cross ventilation, night-time cool-out, ceiling fans, and conventional air-conditioning--but each is responsible for his own suite operation to meet his own comfort levels. Suite to suite, BTU use varies widely, but the overal average of 34,000 BTU is 1/5 to 1/10 of that in new conventional local construction. Water and space heating are with modest active solar installation; backup is a gas-fired pool heater. Construction price was competitive with non-solar construction.*

Total cost.

Building according to BEPS will have a somewhat higher first cost, 2 percent to 5 percent, lower combined mortgage-and-utilities monthly cost. The increased first cost will probably not be a deterrent to most owners, but special government assistance may need to be arranged for the buyers of least-cost construction to make ownership possible for many families. Recognition needs to be taken in Life Cycle Cost analysis of the transient nature of a large proportion of owners, and of the higher resale value of BEPS houses.

Passive Cooling.

Little cognizance is taken of the costs of cooling or the passive procedures for lessening these, although the Energy Budget Level tables list 118 for Houston, compared to 117 for Minneapolis. Moreover, all cooling is now done with electricity. Much attention is needed here. In the mention of shifting 75 percent of the windows to the south wall, nothing is said of summer shade protection for them. Passive cooling strategies, except for desert coolers in arid areas, are not nearly so simple, inexpensive, or non-space-consuming as are heating strategies. Earth-sheltering, earth air tubes, dehumidifiers, fans, internal mass with night cooling are other possibilities for some sites in some regions.

*Office building designed and built by L. M. Holder III, 4202 Spicewood Springs Road, Austin, Texas 78759.

similar to the new appliance tags, stating how much under standard operating conditions the energy for operation of the building would cost in an average year. This could be an educational technique for the public and provide an important competitive tool for builders.

Enforcement would lie with local building inspectors, as does enforcement of all present code provisions. If these people are trained adequately, compliance should be satisfactory, though no one is more effective in watch-dogging than an attentive owner.

Other matters not addressed by the standards but pertinent to building-energy conservation are:

(1) Solar access. Guidelines for planning of subdivisions with maximum solar access need to be made available to cities.

(2) Renovation. Far more people live in energy-wasteful old houses than will live in new ones for decades. Cost-effective remodeling procedures need to be devised and disseminated along with weatherizing assistance.

(3) Non-energy-intensive building materials. Vastly different amounts of energy are required to produce different different building materials. Knowing and taking this into account can also contribute to national energy conservation.

During the past two and a half years, the building industry, utilities, and state and local governments have all played an active role in the development of BEPS, but until recently, virtually no effort had been made to involve consumer groups and the general public. Through DOE's recent award to the Consumer Energy Council, the much-needed public participation program is now beginning. While it is overdue, it is not too late to still make meaningful changes in BEPS. In fact, what little comment there has been from public interest groups has helped induce DOE to rewrite portions of BEPS significantly. Consumer participation in the development and implementation of BEPS can be very influential. Consumer participation at this stage is vital.

At the hearings on BEPS consumers will be able to comment on a number of issues that directly affect them. Among the issues of primary concern are:

*Whether BEPS will produce buildings that are as energy efficient as possible within the boundaries of economic feasibility.

*Whether BEPS will encourage the maximum possible use of appropriate technologies and renewable energy resources, such as solar, in buildings.

*How BEPS will affect the first cost of housing.

*How BEPS will affect the cost of heating and cooling a home.

*What effect the tighter building envelopes constructed according to BEPS might have on indoor air quality and on occupants' health.

*And even if the standards ultimately adopted are very tough, what guarantees will consumers have that the new houses they buy in fact comply with the standards?

*Who will enforce the standards? And how? And what will be the penalties for non-compliance?

*What will be the impact of BEPS-built homes on low income renters? Owners? Will higher first costs preclude low-income people from living in more energy efficient BEPS houses?

These and other hard questions must be thoroughly considered and resolved before BEPS are set in concrete. Active consumer involvement at hearings is essential if the final standards are to be effective and equitable.

But while consumers and consumer groups have a crucial interest in BEPS, most consumer groups do not have the in-house technical resources -- the economists, lawyers, architects, and engineers -- that are needed to deal fully with the technical complexities of BEPS and energy use in buildings. Lack of such resources and expertise is a perennial barrier to effective public participation. For this reason, the consumer view generally goes unheard in major energy policy proceedings. But in this case, the Consumer Energy Council of America can help. To help ensure that consumers take an active part in the hearings, and to fulfill a

statutory mandate to consult with consumer groups during the development of the standards, the Department of Energy has given the Consumer Energy Council of America a grant to inform consumers about BEPS, provide the expertise needed by them to prepare testimony for the hearings, and to provide funds, where needed, for witnesses to attend out of town hearings.

We will first provide interested consumer groups with background information on BEPS and the major technical, legal, and economic issues surrounding BEPS to be used in understanding the issues inherent in DOE's proposed BEPS standards.

We will stay in regular contact with all groups who request our assistance, and we will keep such groups up to date on all BEPS developments. If time permits, we will hold a series of informational seminars in various cities across the country to discuss BEPS with you.

As the hearings draw near, we will send technical assistance teams to each of the cities where hearings will be held. These teams will be available several days prior to the hearings to assist consumer groups in preparing their written statements for the hearings and to work with these groups on the most effective oral presentation of their testimony.

The teams will also accompany the witnesses at the hearings -- if they so desire -- to help with any last minute details of fact or presentation. Finally, to help ensure that those who wish to testify are able to do so, we will pay transportation costs of selected witnesses that cannot afford to travel to the hearings -- to the extent our limited budget permits.

We hope that you will take advantage of this opportunity to learn more about BEPS, to participate in the development of BEPS, and to make your views on BEPS known to DOE.

We urge you to become involved. Please take a few minutes to complete the enclosed response sheet so that we may know the nature of your interest in BEPS and determine how we can best provide whatever help you need to participate effectively in the development of the standards. If you have special areas of interest or can provide us with information not mentioned in the questionnaire, please elaborate in a cover letter. Your prompt response is essential.

If you are interested in receiving the BEPS proposed regulations but do not want additional assistance or information from CECA or if you are not interested in testifying, you can call DOE's hotline directly and receive a copy of the proposed regulations. The toll-free number is 800-424-7094 or 252-2855 if you are calling from Washington, D.C.

We look forward to working closely with you.

Sincerely,

Ellen Berman
Executive Director

Fred Goldberg
Project Director

The Conservation Foundation
1717 Massachusetts Avenue, N.W., Washington, D.C. 20
Telephone (202)797-4300 Cable CONSERVIT

December 27, 1979

DEC 31 1979

Dear LWV Leader:

The federal Department of Energy has recently released a proposed regulation that could do more for energy conservation in the future than any other single action taken this year. This regulation announces the Building Energy Performance Standards (BEPS), a program established by Congress to regulate the amount of energy that any new building -- including homes and offices -- can use.

The Conservation Foundation has received a small grant from the Department of Energy to work with environmental and conservation groups to let them know about the proposed regulations, to help them prepare for the public hearings, and to serve as a technical resource for those who want to testify or prepare written comments on the rules.

I recently talked to several people at the national League office, including Dotty Powers (the National Energy Chair), Isabelle Weber (Director, Energy Department of the LWV Education Fund), and Lloyd Leonard (Action Department, LWV-US). They were enthusiastic about having key League leaders learn about the regulations. Your name was one of the ones the national office supplied to me for this purpose.

In this envelope, I am enclosing the materials that we have already mailed to others on our mailing list. You will find (1) a cover letter announcing the availability of the Notice of Proposed Rulemaking; (2) a copy of the Proposed Rule; and (3) a short history of energy conservation regulation of buildings for background reading.

We intend to send out short analytic materials every few days over the next few weeks. It would be helpful to know, in advance, if you are interested in receiving this material or whether there is someone else who should be added (or substituted) on our mailing list. For this purpose, we have enclosed a postcard in order to make sure you want to receive this material. Could you please fill out the postcard as soon as possible so we can have an accurate mailing list targeting those particularly interested in the topic.

Time is very short for public comment on this important regulation. If you want any information or assistance in participating in the public comment opportunity, please call me collect at 202/797-4370.

We look forward to working with you on this project.

Yours very truly,

Grant P. Thompson

Grant P. Thompson
Senior Associate

Island counts 1 level

1500 □' @ $40 = 60,000

750

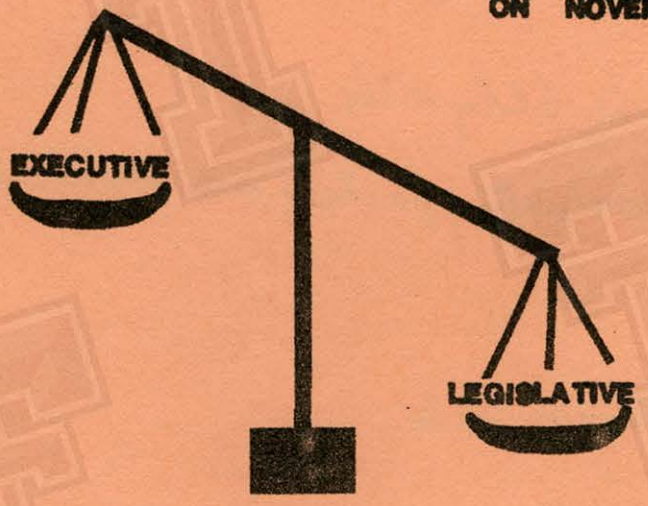
60,0

.5 / 40 = 1.25 %

VOTE NO

AMENDMENT 2

ON NOVEMBER 6, 1979



- ALLOWS SMALL LEGISLATIVE SUBCOMMITTEES TO EXERCISE EXCESSIVE POWER
- COULD DELAY OR PROHIBIT IMPLEMENTATION OF NEEDED LEGISLATION
- VIOLATES INTENT OF CONSTITUTION

League of Women Voters of Texas Political Action Committee
1212 Guadalupe, Suite 109, Austin, Texas 78701

In suggested implementation is it being suggested that equivalency codes could be devised to check compliance of Design Energy Consumption w D.E. Budget in place of computer or manual calculation.

34 Incentives for exceeding

35 Plans for staged improvement

6.2.4
3.2.3 Progressive strengthening as familiarity w/ techniques increases

Heat recuperator & infiltration control

36 Energy intensive bldg mtls

2.4.1 Need to base weighting factors on price figures more recent than 4/77

37 2.4.2 Comment re Passive Solar

38 2.3.3 Need for sun right

39 5.6 Needs for waiving applic in sparse areas

40 Should be a technology forcing device

41 Basing cost benefit analysis on present cost of energy doesn't reflect benefit to consumer nation of new energy eff bldgs

42 Need incentive for builder to provide more energy eff prod. Can't avoid a custom bld to be like an assembly line auto

26 April 1980

Joanne Bakos
Office of Conservation and Solar Energy
Department of Energy
Docket Number CAS-RM-79-112
Mail Station 2221 C
20 Massachusetts Avenue NW
Washington, DC 20585

COMMENTS ON PROPOSED BEPS

This office has been designing passive solar buildings for twenty-five years and getting them built locally without difficulty. We feel the proposed standards are too easy in what they require as a minimum if any transition to solar design is to be induced.

We fully support the performance-standard approach.

All buildings, as soon as the data are available, should have their Design Energy Budgets based on LCCM.

All new buildings should be required to have energy-efficient shells, whatever the problems may be with internal energy use (such as in restaurants).

In the operating conditions:

Domestic hot water should be included.

Infiltration, coupled with use of a heat recuperator if air change drops too low, should be included.

Night-set-back thermostat should be included.

We support the energy-weighting concept and the suggested weightings.

We feel that the attitudinal climate has changed so much since the major OPEC price rises that it is feasible to expect more from builders than the proposals estimate. In evaluating components of passive technology, we feel they must be considered only in integrated plans, not as elective add-ons, as the proposals seem to have done. The possibilities of passive cooling seem not have been considered adequately.

Sincerely yours,

Tom Polk Miller, AIA

THE NATIONAL HUMANITIES SERIES

PRESENTED BY THE WOODROW WILSON NATIONAL FELLOWSHIP FOUNDATION
FUNDED BY THE NATIONAL ENDOWMENT FOR THE HUMANITIES

May 26, 1980

David Strom
Conservation Foundation
1717 Massachusetts Avenue
Washington, D.C. 20036

Dear David:

Forgive my not getting these copies of my commentary on BEPS for LWVT and of our brief office commentary to you sooner.

The lively and incisive BEPS Grams were invaluable in coping with the regs and confirming my worst fears and best reactions in several instances. It was especially useful to have analysis by a group whose motives one did not fell were suspect.

The excuse for my delay is that I have been appointed t to the Texas Solar Energy Advisory Committee which is requiring a great deal of time and travel. It has only five months to inform itself, hold hearings (five regional and one statewide) and produce a report. I am chair of the Economics Subcommittee. If you have material in the area of financial incentives or the probable employment effects of increased solarization, I would welcome it. Among our information files are the PURPA regs, the RCS regs, copies of California and Arizona legislation, and a booklet from SERI on State Solar-Energy Incentives (Note: We have no state income tax nor expect one)

Thanks again. Yours for a solar future in spite of Secretary Duncan.

Isabel Miller
Energy Chair of LWVT

Denton County Fine Arts Festival

P. O. DRAWER P
DENTON, TEXAS 76201

Beps Gram

The Conservation Foundation

1717 Massachusetts Avenue, N.W., Washington, D.C. 20036

DEADLINE APPROACHING

The public hearings on the Building Energy Performance Standards (BEPS) are approaching. The deadline for requests to speak at any public hearing is Wednesday, March 12.

If you want to appear to speak at any of the public hearings, you must write immediately to:

Ms. Joanne Bakos
Department of Energy
Office of Conservation and Solar Energy
Mail Station 2221 C
20 Massachusetts Avenue N.W.
Washington, DC 20585
202/376-1651

The public hearing locations and dates are listed below:

City	Date	Location
Washington DC	March 24, 25 & 26	Georgetown University Hall of Nations 36th & Prospect NW Washington DC 20008
Atlanta GA	April 14, 15 & 16	Atlanta Civic Center 395 Piedmont Avenue NE Atlanta GA 30308
Kansas City MO	April 14, 15 & 16	Sheraton Downtown Sixth & Main Kansas City MO 64105
Los Angeles CA	April 21, 22 & 23	Holiday Inn Convention Center 1020 South Figueroa St. Los Angeles CA 90015
Boston MA	April 21, 22 & 23	McCormack Post Office and Courthouse Building Post Office Square Boston MA 02102
Seattle WA	April 24 & 25	Federal Building South Auditorium 915 Second Avenue Seattle WA 98174

If you write (or if necessary call) Ms. Bakos at DOE with your request to appear, you should hear from DOE with the day and time you will appear by March 19, 1980.

If you are submitting written comments (either in addition to or instead of oral comments) the deadline for submission is April 30, 1980.

Public testimony will assist DOE in improving BEPS. Comments from as many interested, concerned citizens as possible will help produce strong, energy-conserving standards.

March 7, 1980

The Conservation Foundation
1717 Massachusetts Avenue, N.W., Washington, D.C. 200
Telephone (202)797-4300 Cable CONSERVIT

December 27, 1979

Dear Friend:

We recently sent you the Notice of Proposed Rulemaking (NOPR) issued by the Department of Energy on the federal Building Energy Performance Standards (BEPS). If you have not received the NOPR, please let me know as soon as possible so that we can mail you another one.

With this mailing, The Conservation Foundation is beginning its program of distributing information to the environmental/conservation community concerning issues raised by BEPS. Our present plan is to mail frequent, short "BEPS Grams" to you, each one only a very few pages long, covering a single topic. We hope that by keeping them short and topic-oriented, we will not overwhelm you with too much information all at once.

This first mailing somewhat violates our desire to keep materials short. But in order to understand much of what appears in BEPS, it is helpful to know the history of the Standard and its precursors. Therefore, we are burdening you with a somewhat longer paper in this mailing. The paper describes the history of BEPS, outlines some of the important issues it raises, and provides a few initial reactions to the Standards from the conservation point of view.

As you know, there is an opportunity for public comment (both at public hearings and by written submissions). If you want to appear at a public hearing, you must follow the procedure set out in the NOPR in order to reserve time. We may be able to provide you with technical assistance for preparing your presentation. If you would like this assistance, please call us collect at 202/797-4370.

Thank you again for your assistance on this BEPS project. The issues that BEPS raises are important to the environment and to energy consumption patterns in this country. Only if enough citizens who care about these issues participate in the comment process will the Standards be as strong as they ought to be.

Yours very truly,

Grant P. Thompson

Grant P. Thompson
Senior Associate

THE BACKGROUND TO BEPS

This paper has two parts. First, there is a short description of the pre-BEPS standards and codes that regulated energy consumption. Second, the BEPS are described and criticized.

Energy Standards for New Construction: Pre-BEPS

Regulation of energy use within buildings does not have a long history in this country. To be sure, a few examples of requirements for relatively minimal amounts of insulation can be found, but before 1970 there was little general interest in energy-efficient construction. The most wide-spread program was not mandatory, but was a set of voluntary guidelines adopted by electric utility companies interested in making the cost of operating electric heating competitive. Homes that complied with the guidelines were awarded a Gold Medallion. The first systematic, nationwide interest in energy conservation for buildings came as a reaction to the oil embargo of 1973-74. At that time, a voluntary group representing the heating, cooling, and ventilating professions began the process of drawing up an energy efficiency code for new buildings. The group, the American Society of Heating, Refrigeration, and Air-conditioning Engineers, Inc. (ASHRAE), intended to add to their growing list of standards covering subjects ranging from ventilation rates to humidity control. Because the standard was to be the nintieth in the list of ones they had developed, it was called Standard 90P, the "P" standing for proposed.

ASHRAE and other similar voluntary professional societies were experienced in developing standards and had developed a process for making certain that all economically affected parties had an opportunity to comment on and offer revisions to a standard before it was issued in final form. This so-called consensus process demands Herculean devotion from its participants who voluntarily attend meeting after meeting without pay or travel expenses, arguing over comments ranging from word changes to the most fundamental revisions. The consensus process, by its very nature, guarantees that any standard surviving the process will have two characteristics: it will not be unacceptably controversial and it will have had little input from any person who did not have some strong (usually economic) reason to donate a very large amount of time and effort to the process. ASHRAE standards are extremely influential. Their influence comes from the fact that they are technically sound, generally accepted by most directly affected interest groups, and usually cover highly technical subjects that no non-federal level of government would have the resources to regulate thoroughly and accurately. For this reason, many local or state laws and ordinances simply refer to a particular standard, thus giving it the force of law.

ASHRAE issued its standard in final form in 1975, and it was given a suffix indicating its vintage: Standard 90-75. In the meantime, Congress had reacted for the first time to the energy crisis by passing the Energy Policy and Conservation Act (P.L. 94-163, effective December 22, 1975). Section 362 of that Act required each state to develop energy conservation plans that included five mandatory provisions. One of those provisions was "mandatory thermal efficiency standards and insulation requirements for new and renovated buildings." The federal government seized upon ASHRAE Standard 90-75, declaring that any state that adopted the Standard or its equivalent would be deemed to have complied with the Energy Policy and Conservation Act, and thus be eligible for federal assistance. In order to assist states in using ASHRAE Standard 90-75 even more rapidly, the federal government funded another voluntary group, the National Conference of States on Building Codes and Standards, to

In the early stages of standard development, HUD chose the American Institute of Architects Research Corporation as the lead contractor for the standards. In broad outline, HUD and AIA/RC decided to look at what American builders were actually designing shortly after the oil embargo, then use the best of those actual designs as the new standard for all builders. This method of setting a standard demonstrated that HUD and AIA/RC had two strong views of energy conservation in buildings. First, it showed they believed it should be based on present technology in actual use. This view is contrary, in our opinion, to the intent of the legislation, which sought to use BEPS as a technology-forcing device, bringing new designs and new technics into common use. Second, it showed that HUD and AIA/RC did not share the economists' view of energy conservation (that it is simply cost-minimization), but rather took the engineers' view (that it is plugging leaks as their existence becomes known to you).

Let us now turn to a somewhat more detailed description of the process AIA/RC followed in developing the standards. Although some of this story is now simply history, the data collected in the effort continues to exert a strong influence on the Department of Energy's views concerning what builders can actually do. AIA/RC began by surveying a large number of buildings designed during 1974-75. This period was picked both because designs were available, and because it was assumed that designers and engineers had by then taken new, higher prices into account. Enough buildings were selected so that a statistically significant sample was available for various building use categories and climate zones (defined on the basis of heating degree days only). AIA/RC used a sample size of 1,661 non-residential buildings. Data drawn from the plans of each of these 1,661 buildings were entered into a computer that estimated the amount of energy the building would consume, using a proprietary program (AXCESS) developed by the Edison Electric Institute. The computer output consisted of a figure showing how many British Thermal Units (BTUs) of energy each building would use per square foot per year.

The data generated by AXCESS permitted AIA/RC to prepare an matrix of American non-residential buildings, organized by climate zone, by building type, and by predicted energy consumption. (For example, by looking at the data books, it was possible to show a range of energy use per square foot for hotels located in climate zone 7.) This large data collection effort formed the basis for standard setting.

In order to test how much further an average designer could improve on a design, the AIA/RC then selected a sample of about 10 percent of those buildings and asked the architect teams who designed 161 buildings to attend a three-day training session on energy conservation in building design. Following this intensive session, each design team was asked to redesign their original building, but to do it within the original budget guidelines established by the client, with no additional use of active solar energy, and complying with any particular requests of the client no matter what their energy consequences might be. The result of this Phase II redesign effort should give all of us renewed hope for the future of American education! Fully 80 percent of the redesigns were so good that if they had been categorized with the original 1,661 buildings, they would have fallen at or above the top fifth of that group as measured by energy efficiency.

In the case of residential buildings, the Department took a different approach, although it was likewise one based on technical improvements in the building stock. Using data collected for a different purpose by the National Association of Home Builders, the Department analyzed the energy consumption of these residences using a computerized version of the ASHRAE Modified Degree Day Method. Experienced designers were asked to develop prototype residences that were based on the median

change the Standard (a format that is unsuitable for enactment) into a code format, which local building code departments could apply. NCSBCS also developed, under contract to the federal government, a set of training courses for building code officials to familiarize them with the code based on ASHRAE Standard 90-75.

The ASHRAE standard is what is called a "component-performance" standard. This means that the builder is instructed to look at each element of a building (that is, the walls, the floor, the ceiling, the heating plant, and so on) and make certain that each one of those components had a certain minimum thermal integrity or performance. Any builder assembling a building made up of various elements, each of which had passed the Standard, would be guaranteed that the final building would be in compliance with the Standard.

This component-performance standard is relatively easy to administer, but various groups, spearheaded by the American Institute of Architects, argued that such a standard stifled innovation in building design and, in many cases, mandated construction practices that were actually wasteful of energy. After considerable efforts at persuasion, proponents of this viewpoint prevailed on Congress to mandate that states follow a quite different approach, one that looked at the total energy performance of a building. In the Energy Conservation and Production Act (P.L. 94-385, effective August 14, 1976) Congress required the Department of Energy to develop performance standards for new buildings. Section 303(9) of ECPA defined a performance standard as "an energy consumption goal or goals to be met without specification of the methods, materials, and processes to be employed in achieving that goal or goals, but including statements of the requirements, criteria and evaluation methods to be used, and any necessary commentary." The critics of the component performance standards had won a victory in the legislative arena. They had also set the Department of Energy on a long, technical, controversial, and demanding course, whose end is not yet in sight.

Development of BEPS and Critique of Their Current Form

The original legislation mandating development of BEPS gave the government three years -- that is, until August 14, 1979 -- to develop the standards in their final form. The fact that BEPS were just issued in proposed form on November 28, 1979 gives some clue of the actual schedule that has been followed. It goes without saying that criticisms of BEPS at this point can only be based on the Proposed Notice of Rulemaking (to be found in 44 Federal Register 68120). Changes are both desirable and likely in the final form of the rule. The present schedule calls for promulgation of the regulations in May, 1980. However, the Department is seeking to find more time to revise and rework parts of the rule. It may well be toward the end of 1980 before final rules are available.

Under the original legislation, both the technical standard for BEPS and the implementation plan were to have been developed by the Department of Housing and Urban Development. Congress transferred the authority to develop the technical basis for the standard to the Department of Energy; however, it left the implementation development with HUD. It soon became clear that this arrangement was unworkable, since the standard development and the implementation plans are so closely allied to one another. Therefore, the two Departments entered into a Memorandum of Understanding, delegating implementation to DOE. In a confusing recent development, HUD suddenly refused to renew the Memorandum, then just as suddenly agreed to renew it. The early development of both the BEPS standard and the implementation plan were carried out at HUD. This transfer and retransfer of authority has added enormously to the difficulty of developing a workable standard.

characteristics of the houses surveyed. These prototypes were then re-analyzed for energy consumption. Again, a technically-based methodology was used in order to set the energy performance standards.

Based on the analysis of the AIA/RC and the NAHB data, the Department selected energy budget figures that would have forced designers of all non-residential buildings subject to the BEPS to be as conscious of energy as were the better third to fifth of their colleagues. In the case of homes, builders would have been required to comply with the Thermal Performance Guidelines issued by the National Association of Home Builders. This form of the BEPS was released in an Advance Notice of Proposed Rulemaking at the end of 1978.

The criticism of these preliminary BEPS was immediate and harsh. Although there were many detailed criticisms of particular provisions, three important drawbacks were noted:

First, the standards were based simply on existing technology and based on buildings in which energy was not particularly singled out for special attention. Even in the case of the Phase II redesigns, the design teams were constrained by considerations that showed little sensitivity to use of new techniques, new machinery, and new ways of persuading clients and designers to save energy.

Second, the standards were based on buildings that were designed almost immediately after the original oil embargo. The market had not had time to readjust to the higher prices, and many clients and architects believed that the crisis would soon be over with a return to lower prices. The standards that the Department was proposing to issue stated, in effect, that in the 1980s, American designers were required to design buildings only as well as many of their colleagues were already doing in 1974.

Third, and most fundamentally, the technically-based standards ignored the most basic question of energy consumption and conservation: what is the economic balance between the discounted present cost of using energy in the future and the capital cost of taking steps to avoid using that future energy. As the recent Ford Foundation sponsored energy study, Energy: The Next Twenty Years, states the case:

> We mean by conservation those energy-saving investments, operating decisions, and changes in the goods and services that we buy and use that save money over the life of energy-consuming products. Money can be saved by substituting intelligence, prudence, maintenance, better equipment, or different equipment for purchased energy; the substitution should be made up to the point where the cost of not using the energy is equal to the cost of the energy saved.

By ignoring the life cycle costs of buildings, the Department's strategy established standards that had no sound analytic basis. The House Report on H.R. 8650, an earlier version of the bill that was eventually passed establishing BEPS, made it clear that this economic basis was what Congress had in mind. The Report noted that the bill was designed to:

> introduce discipline in the construction process which will result in lower costs to the consumer and in higher quality buildings. The Committee recognizes that the construction of more energy efficient buildings will result in higher development or initial

> costs under CURRENT DESIGN PRACTICES. However, the Committee received abundant evidence that the potential reductions in annual utility bills can offset the annual amortization costs of fairly substantial increases in front end construction costs. ... The Committee does not regard the higher capital costs involved in energy efficient buildings to have any serious consequences with respect to the marketability of homes. ..." H.R. Report No. 94-377, 94th Congress, 1st Session, 3 (1975).

A technically-based standard is virtually impossible to revise intelligently as fuel prices rise, since the cost/benefit calculations that form the basis of such analysis are completely missing.

For whatever combination of reasons, the Department abandoned its original goal of promulgating final regulations in February, 1979. Instead, a major new research program was undertaken in order to put the BEPS on a sounder intellectual footing. The fruits of this further labor are now available within the last few days. Let us now turn to an analysis of the new format of the BEPS.

Standard for Residential Buildings:

For the revision of BEPS, the Department undertook a number of economic studies in order to determine the life cycle costs of residential buildings. The preamble to the Notice of Proposed Rulemaking states that such a life-cycle analysis "permitted the use of well-defined economic criteria that have the potential of maximizing the net economic benefits to homeowners and to the Nation, as well as achieving maximum practicable energy conservation." In carrying out the life-cycle analysis, however, the Department constrained itself in a number of ways. It considered the use of energy conservation measures and techniques only if they are currently in common practice in the United States. Included were such conventional and timid measures as increased levels of insulation in the walls, ceilings, and floors, and use of double and triple glazing. Similarly, no conservation measure that required any significant changes in behavior or level of amenity of the occupants was permitted. For calculation of costs and benefits, the Department used the Energy Information Administration's Series B Midterm Price Forecast (44 Federal Register 25369, April 30, 1979). The discount rate was set at 3 percent, corresponding to an interest rate 3 percent higher than the inflation rate. No doubt there will be wide and merited discussion concerning whether these parameters are correct, in view of the trend of price rises and the discount rates actually used by individuals in their own economic calculations.

What effects are the BEPS likely to have on real houses? Of course, in one sense, it is impossible to answer this question. By legislative design and purpose, the federal government is not to use these standards to dictate any particular architectural solution to meeting the standard. But in actual practice, the Department from the first recognized that small builders and designers would need assistance in understanding what kinds of buildings would be likely to pass an inspection based on BEPS. Therefore, the government intends to provide a number of "cookbook" solutions for use by designers. The HUD Minimum Property Standards will be revised so that builders complying with them will also automatically comply with BEPS. Instructions will be given concerning modifications that are necessary in ASHRAE Standard 90-75 in order to make buildings designed to meet it also meet BEPS.

Most helpfully for persons trying to understand the effect of BEPS in the real world, the Notice of Proposed Rulemaking contains a sample list of measures that could

be taken in order in the design of a single-family residence in order to comply with the Standards. Let us look at two examples:

- For a gas heated home located in Chicago, Illinois, a designer could follow any of these three paths: (1) windows 15 percent of floor area distributed equally on the four walls, triple glazing, R-38 ceiling and R-19 wall insulation; or (2) windows redistributed so that south facing window area is increased by 75 percent, and east, west, and north facing window area is decreased by 25 percent, double glazing, and R-38 ceiling and R-19 wall insulation; or (3) an active solar domestic hot water heating system supplying 60 percent of the hot water needs of the home, double glazing, an R-38 ceiling and R-11 wall insulation.

- For an electrically heated home in Atlanta, Georgia, a designer could meet the standards in a number of ways, including by following any of these three packages: (1) windows 15 percent of the floor area distributed equally on the four walls, triple glazing, R-38 ceiling, R-19 wall, and R-11 floor insulation, heating supplied by a heat pump; or (2) windows redistributed so that south facing window area is increased by 80 percent, and east, west, and north facing window area is decreased by 27 percent, double glazing, R-38 ceiling, R-19 wall, and R-11 floor insulation, heating supplied by a heat pump; or (3) an active solar domestic hot water heating system supplying 60 percent of the hot water needs of the home, double glazing, R-30 ceiling, R-19 wall, and R-11 floor insulation, heating supplied by electric resistance.

The careful reader will have noticed that although the heating loads vary enormously between Chicago and Atlanta (on base 65 F^{o}, Chicago accumulates 6639 degree days, while Atlanta accumulates only 2961), the strategies that must be used to meet the BEPS are essentially identical. How can this be when the heating needs are so different? The explanation lies in the fuels the designer chose for heating: the Chicago home uses natural gas, while the Atlanta home uses electricity. The Department is thus taking into account more than just the energy use that registers on the customer's meter; it is subjecting this consumed energy to different weighting factors for each fuel type. What are these weighting factors? In effect, they are numbers assigned to each fuel type; the designer is required to multiply the amount of electricity, natural gas, or oil by the appropriate weighting factor before he adds up the number of BTUs per square foot per year the building uses.

How are these weighting factors derived? The weighting factor in the current version of the BEPS starts with the average price of fuel consumed. (Average prices of energy are based on the existing mix of old and new energy sources; replacement costs are the costs of new energy sources such as a new powerplant.) Naturally, if the BEPS propose to use economic criteria for evaluating life cycle costs, only the replacement or marginal cost of energy consumed is the proper measure of the value of energy consumed. Since the homeowner must make the choice between avoiding energy consumption (i.e., buying conservation) at marginal costs, only by considering the marginal costs of energy not consumed can the equation work fairly. As the Ford Foundation study notes, average prices

> are typically below the cost to the nation of replacing the energy consumed -- that is, they are below the marginal cost of the energy. Analysis of the regulations based solely on prices paid by the consumer will therefore understate the value to the nation of more energy-efficient buildings.

> This failure to use the regulatory process for correcting deficiencies in the residential energy market is unfortunate because the housing market is almost a classic case in which intelligently conceived regulation has a place. Homebuyers do not generally think in terms of life cycle costing. ... A standard that ... took into account the benefits of energy conservation to both the consumer and to the nation, and that permited exceptions in cases where direct regulation was inappropriate would have a great deal to commend it.

The weighting factors used by DOE also include a premium for oil and natural gas, in order to press building designers away from using these fuels. Finally, the weighting factors were based on national averages, not on regional differences in fuel costs or availability. The weighting factors chosen by DOE are as follows:

Building Type	Natural Gas	Oil	Electricity
Single-Family Residential	1.0	1.22	2.79
Commercial and Multi-family Residential	1.0	1.20	3.08

The effect of these weighting factors is to make it more "expensive" in any given energy budget to use electricity, somewhat less "expensive" to use oil, and least "expensive" to use natural gas. Solar energy and other renewable energy resources are "free" according to this scheme, so the use of such sources is highly encouraged. The other effect of the weighting factors, of course, is to announce in effect a fuels policy for the American building industry.

How Strict are the BEPS?

Any detailed analysis of the BEPS for residences is certainly premature at this time. The Department based many of its decisions on Technical Support Documents (TSDs) that were not publicly released at the time the proposed rule was published in the Federal Register. These TSDs cover such crucial analytic topics as "Energy Budget Levels Selection," "Weighting Factors," "Economic Analysis," and "Passive and Active Solar Heating Analyis." Neither is it necessary to offer a detailed criticism of rules that may well be improved by the comment process. Nonetheless, one can legitimately look to the cast of mind of the Department as it selected these budget figures. In the selection of the energy budget figures for homes, the department considered four levels: the level they chose, 10 percent tighter, 20 percent tighter, and 25 to 30 percent looser. Energy savings were 11 quads (summed over the 40 years from 1980 to 2020) for the alternative selected, but 16.5 quads for the tightest standard. Both the standard selected and the tightest standard were found to have approximately equal and favorable economic impacts on the nation and on the homeowner. The first costs of the alternative selected would be between $750 and $1,500 added to the base cost; for the tightest alternative, the additional first cost ranges from $1,500 to $3,000 (although the Department's analysis shows this first cost will tend to be smaller as new energy conservation technology is introduced to meet the tighter standard). Yet in spite of the additional energy saved, the benefits to homeowner and nation, and the relatively small additional first cost, DOE selected the less favorable alternative on the basis of "the difficulty of achieving those levels at the present time." This reasoning is hard to understand if BEPS are to be a technology forcing regulation.

Standards for Non-Residential Buildings:

For non-residential buildings, the Department was unable to conduct the kind of life cycle analysis that they did on the single family dwellings. Therefore, the proposed rules are based on the older, technically-based data base collected by AIA/RC. Using the Phase II buildings redesigned by their original architects following the three day energy conservation course, the Department looked at three budget levels for such buildings. R_{30} means that 30 percent of all building redesigns for that building type achieved that level of design energy requirement or lower. DOE calls this "strict." R_{50} indicates that 50 percent met the figure; this is called "nominal." R_{70} means that 70 percent met that level of performance; this is called "lenient" (DOE's calculations reveal that for a large office building in Kansas City, these levels of performance translate into the following number of BTUs per square foot per year: R_{30} = 46 MBtu/sq. ft./yr; R_{50} = 49 MBtu/sq. ft./year; and R_{70} = 51 MBtu/sq. ft./year.) Again, in each case, DOE found that "the net present value to the Nation of the proposed Energy Budget Levels was greatest for the strict case and lowest for the lenient case. Thus, national economic benefits are greatest for the more strict levels." Likewise, DOE reveals that in a preliminary life cycle study of a large office building, "there are designs that are economically beneficial at design energy requirement levels more stringent than those achieved by most of the redesigns in Phase II."

Nonetheless, DOE feared that designers would have difficult in reaching strict levels not because of costs or technical constraints, but merely because of "unfamiliarity of design professionals with energy efficient design strategies and available technology." For this reason, DOE has selected the following levels:

- Large and small office buildings: R_{30} ("strict").
- Hospitals and multifamily low rise residential buildings: R_{70} ("lenient").
- All other commercial and multifamily residential buildings: R_{50} ("nominal").

Again, as a preliminary matter, it appears unwise to select standards on the basis that design professionals are unfamiliar with existing technology; a better strategy would be to set stricter standards and let the manufacturers, trade associations, continuing education course instructors, and the federal Energy Extension Service educate the professionals to meet the new, higher standard.

Sanctions:

Finally, in this description of BEPS, it is worth discussing how they will actually come to have the force of law at the state and local level. The building code professionals are conservative and clannish; from the beginning, there has been considerable distrust of the federal effort, and an active movement on the part of some states to have alternative energy conservation building codes in place in order to head off the federal BEPS when it finally emerged.

Unfortunately, Congress in the original legislation devised a Draconian remedy, one that is so excessive that it certainly would never be used. According to Section 305(c) of the Energy Conservation and Production Act, the President is to transmit the final BEPS regulations to Congress with a recommendation concerning their adoption. Congress then has ninety days in which to consider them. If both Houses pass a resolution approving the regulations, they become effective. Following that, any state that does not adopt BEPS or its equivalent, can lose all federal financial assistance for building. This includes "any form of loan, grant, guarantee, insurance, payment, rebate, subsidy, or any other form of direct or indirect Federal assistance"

and "any loan made or purchased by any bank, savings and loan association, or similar institute subject to regulation" by the federal government or insurance by a government agency. This sanction is equivalent to sending policemen out in patrol cars, equipped only with fragmentation bombs: cutting off all federal aid to the building industry is too extreme a penalty ever to be imposed by Congress on any state.

We may hope that in its consideration of the standards themselves, Congress will try to develop a more graduated set of incentives and penalties for states that refuse to adopt BEPS or its equivalent. Training grants for state and local officials, incentive payments to state building agencies, educational efforts for the national code groups and voluntary organizations, and partial withholding of federal benefits are a better array of carrots and sticks with which to equip DOE.

Beps Gram

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BEPS and the Art of Life Cycle Costing

Understanding the concept of "life cycle costs" is the key to understanding energy conservation. Life cycle cost (LCC) analysis lets us decide how much money it is worth investing now in order to avoid incurring higher operating or maintenance costs later. Instead of focussing narrowly on the initial price you pay, LCC analysis is an orderly way of deciding whether you should spend more at first to avoid a higher overall expense over the life of the item. Let us suppose you are thinking of buying a car. Two models appeal to you. The Hupmobile costs $4,000 and gets 7 miles per gallon. The Svelte costs $5,000 but gets 42 miles per gallon. Both cars will sell for the same price after you have owned them for one year. If you know that you always sell your car after one year and that gas costs $1 per gallon, it doesn't take much mathematics to figure out that the Svelte is a better buy if you are planning to drive more than 8,400 miles that year. Thus, the extra $1,000 spent at first pays for itself later.

In exactly the same way, a person trying to decide whether to spend a little more on a house, an office building, or a factory should calculate how much extra to invest at first (in better insulation or better design work for example) in order to save money later on fuel. Ideally, the Building Energy Performance Standards should be set in order to minimize the life cycle cost of owning a building. This BEPS Gram deals with how the Department of Energy (DOE) has used life cycle cost analysis for setting the single family family residential standard. We strongly support the concept of using life cycle costing for setting energy conservation standards. In fact, a major shortcoming of the BEPS as proposed is the limitation of LCC analysis to the single family residence: we believe the analysis should be extended to all buildings. But even for the single family residence, there are flaws in the LCC analysis that should be corrected.

How Do You Do An LCC Analysis? To perform an adequate LCC analysis, six steps must be taken. These steps are widely recognized and are used, among other places, by the National Bureau of Standards. The steps are:

1. Choose those things in your analysis that you don't want to change ("the constants").
2. Choose those things you are willing to let change ("the parameters") and decide how much you will let them change ("the range of each parameter").
3. Decide how long a period is appropriate to analyze ("common time basis").
4. Determine how you will measure costs and benefits of the changes you are analyzing.
5. Quantify those measures to arrive at life cycle costs.
6. Compare the various design options for both costs and benefits to determine which action or set of actions you should take.

Let's look at how this six-step process was used by DOE and where it went wrong.

Choose Constants

DOE has assumed that some things must remain constant among all the different design changes they analyzed. For example:

- Every house is designed so that there is exactly 15 percent as much window area as there is floor space.
- Every house has an equal amount of window area on each wall.
- Every homeowner sets the thermostat at 70^{o} and never changes it.
- No one uses more than triple glazing in windows.
- Every homeowner uses natural ventilation to keep the indoor temperature below 78^{o}. If this is not possible, everyone uses air conditioning.
- No one uses wood stoves, room air conditioners, dehumidifiers, or fans (or other "user-operated devices").
- No one every changes the heating, ventilating, or air conditioning system in a house, no matter how relative fuel prices vary or effiencies of those devices improves.
- No one makes any changes in the lighting, air infiltration or other building comfort levels from certain levels assumed by DOE.

All of these limitations make it harder to save energy. For example, common sense and scientific studies both emphasize the importance of clustering windows on the south side of homes to take advantage of the warmth from the winter sun. Yet by artificially assuming facts that don't exist, DOE's LCC analysis isn't really looking at a complete set of reasonable alternatives for energy conservation.

The Department should have examined a much wider variation in conditions. What if people used four-ply windows? What if all furnaces came equipped with automatic night-setback thermostats? What if BEPS were set in order to force builders to shift more windows to the south side of the building? In each case, the Department would have found many reasonable alternatives for energy conservation that would substantially lower the life cycle cost of owning a home -- and would have saved considerable energy while doing it.

Choose Parameters and Their Range

The next step in an LCC analysis is to choose the paramenters you are interested in changing and to choose the range within which each will vary. A selection of the values of each parameter will specify each design alternative used in the later analysis. DOE uses four parameters. The first is the cost of the labor involved in designing and building a house. The second is the quantity of materials used to build and maintain the house. The third is the number and size of the heating, cooling, refrigerating, cooking, and lighting fixtures used. The fourth is how much energy the house will use for performing the "services" people require: keeping warm and cool, preserving and preparing food, and lighting.

To be sure, these parameters are the appropriate ones to consider. But in order to analyze DOE's figures, they should make available the range they have chosen for every one of the parameters and the different designs resulting from the choice of the value of each parameter. Unfortunately, the Proposed Rule does not give this information. The Technical Support Document where you would expect to find the information

(TSD #8, Economic Analysis) provides incomplete or contradictory information. Thus, it is impossible for an outsider to follow the trail of DOE's analysis from the information it has made publicly available.

Choose a Common Time Basis

One must look at two specific time periods in order to do an LCC analysis. The first time period is the life (in years) of the capital assets (in this case, the house and all of its appliances and fixtures), so that all present, past, and future contributions to those assets can be compared with one another without ambiguity. The second time span is the study period or the amount time the homeowner is going to live in the house and enjoy directly the benefits of the investment. If this study period is less than the life of the assets, you need to calculate a "salvage value" for the purposes of the assets. Recall that both the Hupmobile and the Svelte sold for the same price after one year. Therefore, in our analysis it was unnecessary to take the salvage value of each car into account even though our study period (one year) was less than the life of most automobiles. For houses, there is considerable evidence that conservation investments actually add to the salvage value of the house; put differently, energy efficient houses sell for a higher price than leaky, drafty houses.

DOE assumes that both the asset lifetime and the study period are the same: 30 years. This assumption can only be based on a belief that all of the fixtures that contribute significantly to the cost of a house will not be replaced for 30 years. Most homeowners do not have such a happy experience: instead, they replace, upgrade, improve, and redo. Moreover, for many of the important energy conserving features (insulation, caulking, furnace improvements and so on), common experience shows that 30 years is too long. Finally, because most people move several times during a 30 year period, the increase in market value that an energy conserving house enjoys is an important consideration for life cycle cost analysis.

DOE should have taken all of these important factors into account in its LCC analysis.

Determine Measures for Costs and Benefits

In order to decide whether a particular investment in conservation is worth it, you need to change the costs of that action and the benefits you receive from that investment into a common measure. The customary measure is dollars spent and dollars of comfort received. Both sides of this equation present difficulties.

The estimations that DOE makes for the costs of energy conservation systematically tend to overinflate the price. For the initial investment, the Department started with its "prototype house" and then calculated the additional costs needed to include various conservation features. This "add-on" approach makes conservation options appear more expensive than they really are. In fact, many of the most cost-effective energy conservation features -- such as design changes or items built in rather than added on -- are very cheap to do at first. DOE should have used a variety of prototype houses, designed from the first with energy conservation in mind.

DOE assumes that no matter what design of a house you use, you obtain the same benefits (that is, the same level of comfort). DOE should have made some attempt to deal with changing levels of benefits to account for different tastes explicitly. The inclusion of more of these benefits would have made energy conservation appear to be a greater bargain than DOE is willing to admit.

Quantify Measures

In order to bring all the costs down to their present value for the LCC analysis, we need to predict the levels of future fuel not used and we need to decide how much money saved or spent in the future is worth now ("discount rate"). Both of these issues will be treated in a future BEPS Gram.

Compare Options and Decide

The final step in performing an LCC analysis is to compare the present costs and benefits of different designs. The design that has the most benefit for the least present cost is called the "LCC minimum" design. DOE presents designs that are lower than their minimum. This point needs to be clarified by the Department. 49 P

We recommend that BEPS should be set at the LCC minimum that also provides benefits within acceptable comfort tolerance levels. As energy conserving technology for buildings improves, and as energy prices rise in the future, BEPS will also become stricter as the LCC minimums decrease. Thus, the Standards will provide a cost-effective means of saving energy for any building owner.

Summary

Life cycle costing is absolutely essential for an intelligent program of energy conservation for American buildings. But the process of performing such an analysis is complex. The complexity arises out of the complexity of life itself: no computer model or study can capture all of the variations that are possible in buildings. Nonetheless, the simplifying assumptions that run through DOE's work appear to bias BEPS away from energy conservation. A program as important for the future of the country deserves a more careful look to make certain that every reasonable step is taken to encourage more energy efficiency, not less. Judged against this standard, DOE needs to make further revisions in its LCC work for single family residences and to apply the same philosophy to all other buildings.

OOOPS! In the BEPS Gram entitled "A Readers Guide to the NOPR," the unit of measurement for Design Energy Budgets was mistakenly stated to be millions of BTUs per square foot per year. The correct unit is thousands of BTUs per square foot per year. Please make this correction in your copy.

Beps Gram

The Conservation Foundation
1717 Massachusetts Avenue, N.W., Washington, D.C. 20036

CEC WORKSHOPS ON BEPS

The Consumer Energy Council of America, a public interest group repre-senting energy consumers, is giving a series of eleven informational workshops throughout the country in January on the proposed Building Energy Performance Standards. The workshops are being given in partnership with Rural America and the National Low-Income Housing Coalition. CEC will conduct its workshops from 1 until 5 p.m.; RA/NLIHC will follow with a workshop focussing on low-income issues from 6 to 8 p.m.

These workshops will be helpful to those members of the environmental and conservation community who want to participate in the public comment process on BEPS. On the back of this form, we have reproduced a copy of the application form for attendance. CEC has asked that you return this form to them if you plan to attend. Because this mailing is going out so close to the date of the workshops, you do not have to hear back from CEC to attend. You should call CEC in Washington, D.C. (202/659-0404) a day or so before the workshop to confirm that the meeting place has not been changed.

Seminar Dates	Seminar Locations
January 10, 1980	Room 3000A - 12 & Pennsylvania NW Washington, D.C.
January 14, 1980	American Institute of Architects/Conf.Rm. 20 West 40th Street, New York City, NY
January 14, 1980	Franklin Avenue Library 5000 Franklin Ave./Des Moines, Iowa
January 15, 1980	Gardner Auditorium-Statehouse Beacon & Park Sts./Boston, MA
January 15, 1980	Coffman Union, Rm.320 Univ. of Minnesota/Minneapolis, MN
January 16, 1980	Wayne County Community College Downtown Center/1001 Fort Street Detroit, Mich.
January 16, 1980	Labor Building/2215 S.E. Division Portland, Oregon
January 17, 1980	St. Marks Community Center 1130 N. Rampart St/New Orleans, LA
January 17, 1980	Lawrence Berkeley Laboratories Bldg. 50-Auditorium 415/Berkeley Campus Berkeley, Calif.
January 18, 1980	Georgia Conservancy 3110 Maple Drive #407/Atlanta, Georgia
January 18, 1980	Science Building/Auraria Higher Education Center/12th & Lawrence Sts./Denver, CO

Attendance Form

1. I plan to attend a workshop on BEPS Yes ( ) No ( )
2. Name of organization:
3. Address:
4. Which of the workshops will you or your group be attending? (please check)

   Washington, D.C. (January 10) ( )
   New York City (January 14) ( )
   Des Moines (January 14) ( )
   Boston (January 15) ( )
   Minneapolis (January 15) ( )
   Detroit (January 16) ( )
   Portland (January 16) ( )
   New Orleans (January 17) ( )
   Berkeley (January 17) ( )
   Atlanta (January 18) ( )
   Denver (January 18) ( )

5. How many individuals from your organization plan to attend?

   Names:

6. What is your primary interest in attending the workshop?

   Background information on BEPS ( )
   Help in preparing oral testimony for the DOE public hearings ( )
   Help in preparing a written statement for the hearing record ( )
   Other (please specify)

7. Which of the sessions will you be attending?

   Consumer Energy Council of America ( )
   Rural America/National Low-Income Housing Coalition ( )
   Both ( )

8. Whom should we contact from your organization if any of the arrangements are changed?

   Name Telephone # (area code) (number)

9. Will you or anyone in your organization need special access arrangements for the handicapped? Yes ( ) No ( )

Please return attendance form to:

Mr. Teddy Sullivan
Consumer Energy Council of America
1990 M Street N.W. Suite 620
Washington, D.C. 20036
202/659-0404

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A READER'S GUIDE TO THE NOPR

On November 28, 1979, the U.S. Department of Energy issued a Notice Of Proposed Rulemaking (NOPR) setting out the Building Energy Performance Standards regulations. As it appears in the Federal Register, the NOPR runs for 61 pages, 3 columns per page, in small type. Even though it is clearly written (at least by the standards of Washington), it is a document designed to daunt all but the most fearless reader -- or the reader with an economic interest in reading it. In this BEPS Gram, we will try to "walk through" the document, showing its organization and pointing out some of the most important sections for study.

The NOPR is divided into 8 major sections plus a summary at the beginning, a description of the Technical Support Documents (also at the beginning), and the Proposed Rule itself at the end. Each section is numbered; subsections within a major division are indicated by numbers following a decimal. Thus, section 4.3.7 is the seventh subdivision of the third part of the fourth major section of the NOPR.

THE SUMMARY

The summary briefly, though cryptically, tells the casual reader the subject matter of the material that follows. This summary responds to a requirement by the management of the Federal Register to give those scanning it a brief idea of what a rule is about. For the purposes of analysis, it is not important. In one important respect, the information contained in the summary is incorrect: the dates for the public hearings and the deadline for submission of written comments have both been changed. Please refer to our earlier BEPS Gram for the new dates. If you are going to participate in the public comment process -- either in person or by submission of written comments -- it is imperative that you follow the rules set out in the summary and the dates set out in the revision.

The section following the summary titled "Technical Support Documents" names the TSDs and gives the addresses of DOE offices where they may be viewed. It also promises that they will be available on December 19, 1979. According to a mailing from DOE received on December 31, the TSDs are still not widely available. Until DOE makes them more widely available, for all practical purposes they may only be viewed at the places listed in the summary. Future BEPS Grams will consider the material in the TSDs, analyzing it for persons who have neither the time nor the resources to devote to that task.

SECTION ONE -- THE STANDARDS PROGRAM

This section describes briefly the Standards and the elements of the proposed rule. Section 1.1.1 ("Summary Description of the Proposed Standards") is a good overview in a few paragraphs of the concept behind BEPS. It contains a description in a general way some of the important terms that recur in the Standards, including the Energy Budget Levels, the Design Energy Budget, and the Design Energy Consumption. Section One's overview is a good road map to the Standards; as you read through the document later and get lost in details, keeping the description of the big picture in mind will help. Conversely, do not let the apparent simplicity of the description fool you: BEPS contains many complications, and it is in the details that the most interesting questions may be found.

SECTION THREE -- SELECTION OF THE PROPOSED ENERGY BUDGET LEVELS

This relatively short (4 Register pages) section is at the heart of the BEPS: it is in this section that the Department of Energy announces what the budgets will be for various types of buildings and sets out its justifications for choosing one budget level rather than another. (A higher budget number is one that will be easy to meet but will save little energy; a lower figure is more challenging and more conserving.) The section treats commercial and multi-family residential dwellings separately from single family homes.

Sections 3.2 and following explain the figures picked for all buildings except single family homes. These sections explain that the selection is based on the early data-gathering work conducted by the AIA Research Corporation on buildings being designed in 1974-75. (Readers are referred to the history of BEPS that was distributed earlier for a more complete description of the shortcomings of that AIA/RC effort.) Briefly, the Department has set the proposed BEPS budget levels at what some of the better designers were capable of doing in the mid-1970s. Note that in Section 3.2.2, the Department admits that the savings for the nation and the net present value would both be greater at a stricter budget level. Also note the study referenced in footnote 47 of Section 3.2.3 indicates that the life cycle cost for office buildings would be lower if the standard were more strict. Yet, in spite of this material, DOE has selected relatively lenient standards. Their reason -- that "designers would experience difficulty in reaching the strict range of design energy requirements" -- deserves careful examination.

Note in reading these sections that certain commercial building types are not to be regulated because of technical difficulties in dealing with so-called "process energy," that is, energy produced by a major heat producing activity within the building. Examples of process energy are the heat produced by the grill in a fast-food restaurant or by the forge in a steel mill.

Note also the comparisons between existing standards and the proposed BEPS contained in Section 3.2.9. This indicates that even with the relatively constrained budget levels picked by DOE, the new BEPS would be better than either the HUD Minimum Property Standards or the ASHRAE Standard 90-75 (adopted by many states). Readers may hear that BEPS is not needed because their state "already has an energy code based on ASHRAE Standard 90-75." The preliminary comparisons in Section 3.2.9 indicates why even a flawed BEPS is a great improvement on existing standards.

Section 3.3 and following explains the energy budget figures picked for single family homes. Briefly, DOE decided to set the standard for single-family homes at the minimum life cycle cost. (A future BEPS Gram will analyze the requirements of a satisfactory life cycle cost analysis and describes in what respects DOE has deviated from such an analysis.) Again in the course of this part of the NOPR, note that DOE admits that a tighter standard would save more energy and save money, yet they have chosen a more lenient standard. Important issues for readers to consider are whether the additional first costs (see section 3.3.4) are substantial in view of the energy savings (section 3.3.1); whether the Department's arguments about practicality (section 3.3.3) are convincing; and whether the possible degredations in of indoor air quality (section 3.3.5) can be avoided by some technical fix. Table 3-1 is the only place in the NOPR where the average reader can get any idea about what effects implementation of BEPS would have in actual construction. Readers may be surprised at what comparatively modest changes are required in housing design or construction to achieve enormous savings. But the table leaves one with the gnawing suspicion that if it is so easy to save some energy, surely it ought not be so terribly hard to save even more!

SECTION FOUR -- BUILDING DESIGN EVALUATION TECHNIQUES

This section of the NOPR will be the delight of those interested in the strengths and limitations of computer simulation techniques. As the introduction (section 4.1) points out, there will be two ways for BEPS to be applied in practice. The first way is to apply computer models to a given design to predict whether the building design will use less energy than permitted for such a building type in such a climate. The second way is to construct a building that complies with a model code that has been pre-certified to comply with BEPS. Thus, this section of the NOPR deals with two issues that are crucial to the success of BEPS: (1) creation of a computer model that can take the blueprints of a building and predict how much energy per square foot per year that building will use, and (2) figuring out ways to change existing energy conservation codes and standards (or to create new ones that will be simple to follow) so that buildings constructed according to the code will also comply with BEPS.

Computer analysis: For the purposes of BEPS, DOE is proposing to create a Standard Evaluation Technique, which is simply a computer model with a set of fixed parameters for climate, building operating conditions, and other conditions. The Standard Evaluation Technique will be in the form of a computer program designed to take blueprints of a proposed building in a given location and calculate the design energy consumption. In section 4.3, DOE proposes that the Standard Evaluation Technique be three computer programs called DOE-2, TRNSYS, and DEROB.

For those readers who are interested and experienced with computer modeling or energy consumption predictions, we recommend that you obtain a copy of Technical Support Document No. 1, The Standard Evaluation Technique. Future BEPS Grams will touch on various issues raised in TSD #1, although a complete analysis of that document will not be part of the BEPS Gram series. A brief description of the use of the Technique may be found in section 4.3.3.

Section 4.4 discusses alternative techniques for evaluating buildings. DOE notes that although it is going to suggest computer programs, it is also willing to let others develop their own computer techniques (or even techniques suitable for use on a hand held calculator or with paper and pencil) that can take a building at the design stage and estimate its energy use. DOE announces that it will establish a test to make sure that these other techniques give the same results as its own computer program; if they do, these alternate techniques will be certified for use.

Modifying existing energy codes: In this section of the proposed rule, DOE fails to mention what many believe is the most significant issue in deciding whether BEPS will succeed: simple, easily understood methods for changing existing codes (such as the ones based on ASHRAE Standard 90-75) so they will conform with BEPS. Figures demonstrate that the majority of buildings in this country are built not with the help of professional designers, but rather use standard plans drawn by a professional "plan service" and sold or from plans developed by a contractor with little or no formal design training. This means that the bulk of new buildings will not be subjected to the computer analysis, but rather will follow a "cookbook" approach. Thus, if BEPS are to be a success in practice, it is imperative that existing model codes be modified, that services providing standard plans to builders receive assistance in changing their standard designs to meet BEPS, and that manuals of acceptable practice and other standbys used by the construction trade are brought into line with BEPS. Failing this effort, BEPS will be a failure in practice even if they are a triumph in theory.

The remaining parts of section 4 deal with relatively specific issues concerning the Standard Evaluation Technique. Again, because of the importance of this issue to the reliability of the Standards, we urge those readers who are able to do so to comment on this section.

SECTION FIVE -- IMPLEMENTATION

Under the statute, regulations affecting implementation of BEPS are to be produced after the Standards themselves are complete. This is unfortunate. The Standards and their implementation are intimately bound together, so that bad Standards might be easy to implement, while good Standards might be impossible to enforce. In either case, a great deal depends on the relationship between the two. Unfortunately, in law at least, development of the implementation regulations is still divided between the Department of Energy and the Department of Housing and Urban Development. Although the two federal agencies have agreed that DOE will develop the implementation regulations, the legal division continues as an irritant that only legislation can correct.

Section 5.2 sets out the statutory requirements for the implementation plan and describes the sanctions for any unit of government that fails to comply with BEPS -- but if and only if Congress approves the need for sanctions. In a later BEPS Gram, we will discuss the issue of sanctions, presenting our view that the sanctions are too inflexible.

Section 5.5, State Certification, describes DOE's preliminary thinking concerning what constitutes an acceptable state code that would be in compliance with BEPS. Basically, DOE finds that states themselves should certify to the federal government that their energy codes comply with BEPS, although the federal government can monitor whether or not the certifications are correct. This section also discusses briefly one of the most complex issues raised by BEPS: that is, how can to tell whether a given code is "equivalent" to BEPS. "Equivalent" means that any building that complies with the code under consideration would also comply with or exceed the requirements of BEPS. DOE describes how it will assist states in determining whether codes are "equivalent." First, DOE proposes to pre-qualify various codes that are widely used. (These would probably include a version of ASHRAE Standard 90-75 and several other widely-used codes.) Second, DOE proposes an alternate approval process (described in Section 5.4.2). This would permit states that did not wish to use a pre-qualified code to continue issuing building permits with confidence that they were complying with the Standards.

The information given in Section 5 of the NOPR is insufficient to evaluate whether DOE has intelligently designed an implementation strategy. Moreover, at a later date, the Department must produce actual proposed regulations on the subject. We plan to provide assistance to environmental and conservation groups in commenting on those later regulations. Therefore, we suggest that comments on the implementation materials at this stage be limited to observations of the importance to the BEPS program of good implementation, without too much detailed commentary on the materials contained in Section 5.

SECTION SIX -- OTHER MATTERS

This section of the NOPR is a grab bag of items. Section 6.1 describes the availability of the draft environmental impact statement; Section 6.2 describes the regulatory analysis, and so on. The materials contained in this section do not require comment; the underlying documents (the Technical Support Documents) will be analyzed in future BEPS Grams.

SECTION SEVEN -- OPPORTUNITIES FOR PUBLIC COMMENT

You should follow the exact procedure set out in this section if you wish to comment in writing or at a public hearing. Note, however, that the dates of the hearings and the closing date for written comments has been extended, as noted in an earlier BEPS Gram.

Weighting Factors: (Section 2.4.1) There has been a substantial disagreement concerning whether the BEPS should reflect only the energy actually used in a building (that is, the energy that would show up on the customer's meter) or whether it should also reflect both the energy used to make and distribute the energy and the social costs of a particular energy form. DOE originally used Resource Utilization Factors and Resource Impact Factors (RUFs and RIFs) to take these factors into account, but has now abandoned them in favor of weighting factors. This issue is of considerable economic interest to the electric industry, which fears that a high weighting factor for electricity will shift buildings toward using other fuels. The issue is also of considerable interest to conservationists, who see the need for some methodology -- like a weighting factor or a RUF and RIF -- as a means to gauge the total impact of energy decisions on the environment. A future issue of BEPS Gram will discuss weighting factors.

Renewable Sources of Energy: (Section 2.4.2) The statute setting up the BEPS program states that one of the purposes of BEPS is to increase the use of nondepletable sources of energy. However, the act also states that the Standards are not to set out any particular means for a designer to meet the budget levels: the BEPS are to be expressed solely as a performance standard for buildings. Thus, DOE cannot legally mandate the use of solar systems under BEPS; instead, various more subtle incentives must be put within the Standard. This section sets out the places where DOE has added renewable energy incentives in BEPS. Advocates of renewable energy will want to study this section carefully, asking whether the incentives are sufficient and whether further incentives (within the permissible confines of a performance standard) should be added.

Building Design Classifications: (Section 2.4.3) This section describes how buildings that fall between clear building types will be treated. Many new multi-use buildings (e.g., commercial buildings with apartments in them) are of this type.

Standard Building Operating Conditions: (Section 2.4.4) For the purposes of using computer analysis, DOE has established certain "standard conditions" which they assume for each type of building. Put differently, DOE's analysis assumes ordinary working hours, night thermostat setbacks, and so on. This requirement of a standard set of conditions is obviously wise; otherwise a building designer could "meet" the BEPS simply by stating that he was going to ask the building owner to keep the thermostats set to 47^{o} in the winter and 92^{o} in the summer! Because of the enormous variation in the way buildings are used, you will want to read this section to see if DOE's thinking conforms to your common experience.

Climate: (Section 2.4.5) A performance standard must take into account the climate where the building is located: a building in Duluth will use more energy for heating than one in Phoenix. This section describes the system of climate zones based on standard metropolitan statistical areas (SMSAs) and asks for information concerning whether these are either sufficiently detailed or over detailed for the final rule. Readers with technical training in the interrelationship between building energy consumption and climate may wish to comment on this subject. Readers may also find this section -- ignoring as it does the influence of solar radiation -- an appropriate place to consider adding more solar incentives. A future issue of BEPS Gram will consider the climate issue more fully.

Unit of Measure for Design Energy Budgets: (Section 2.4.6) This section asks whether the unit selected by DOE for BEPS (million British Thermal Units per square foot per year) is appropriate. We believe that it is appropriate and relatively easy to use in practice.

SECTION EIGHT -- A GUIDE TO THE PROPOSED RULE

This final section of the NOPR (just prior to the actual rule itself) describes how the BEPS process would actually work when applied to a building. It is a good exercise to read carefully though all of Section 8 to make certain that you understand what a designer would do to comply with BEPS. The illustration used in Section 8 is the performance path; in fact, we predict that almost all buildings will use an equivalent code so that complying with BEPS will be no more complicated than complying with a plumbing, electrical, or ventilation code. But Section 8, using the more complicated performance path approach, gives an idea of the worst case for the builder.

If you followed your way through Section 8, you have a good working knowledge of the Standards and how they will be applied!

THE PROPOSED RULES

The NOPR ends with the legal text of the rules themselves. The heart of the rules themselves are the Energy Budget Levels that appear near the end of the proposed rule. The figures are expressed in terms of millions of BTUs per square foot per year; Table I-1 is for single family homes (both detached and attached); Table I-2 is for domestic hot water for single family homes; and Table I-3 is for commercial and multi-family residences. In case of both Table I-1 and I-2, note how the figures vary by climate region.

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Readers may wish to save this issue of BEPS Gram as a reference to be used as later, more detailed issues are raised.

SECTION TWO -- THE RESEARCH EFFORT

This lengthy section describes how DOE framed the questions necessary for setting the Standards, the work it did in support of answering those questions, and the decisions that were made concerning that research. Although this section is somewhat technical, a careful reader needs to work through it in order to understand many of the limiting assumptions that DOE made in its research, assumptions that often result in weaker standards. The section begins with a description of the history of the research effort (sections 2.1.1 and 2.1.2). These sections acknowledge that the transfer of authority from HUD to DOE slowed down the Standards development process. In this section, note how the data base was developed by the AIA Research Corporation; the age of these data, in our opinion, severely limits the usefulness of that early work as a basis for setting standards for the 1980s.

Section 2.2 describes the research conducted to develop the Energy Budget Levels. These Energy Budget Levels are the targets, expressed in BTUs per square foot per year that every building of a certain type in a certain climate zone must meet. Clearly, setting the Energy Budget Levels is the very centerpiece of establishing an adequate BEPS. If the research base is weak or wrongly conceived, DOE will not have the materials necessary for sustaining a strong BEPS against challenges. Section 2.2.1 deals with the underlying research for setting commercial and multifamily residential Budget Levels; Section 2.2.2 deals with the research for setting Budget Levels for single family residences. In reading these two sections, compare how they differ in approach. For commercial and multifamily buildings, the Budgets were drawn from existing practice in the mid-1970s, based on the AIA/RC work described earlier; for single family dwellings, the Budget was drawn from an analysis of the lowest life cycle cost of building and operating the home.

Section 2.2.3 explains why DOE is not proposing standards for mobile homes at this time.

Section 2.3 indicates areas where DOE itself believes that its research base is weak. One of these areas, the issue of indoor air quality, is discussed in somewhat more detail in section 2.3.1. Basically, DOE concluded that they feared degredation in indoor quality if they tightened up buildings too much. A later BEPS Gram will discuss this issue.

Section 2.3.2 points out one of the most interesting gaps in the research program: that DOE has not looked at whether the standards they propose for commercial and multi-family buildings are effective in saving the maximum amount of money for the building owner. As this section notes, "the results of the preliminary life-cycle cost analysis of commercial office buildings indicated a potential for significant reductions in Design Energy Budgets below those derived from the" earlier research work. We believe that this is a major shortcoming of the proposed standards and deserves study and comment.

Section 2.3.3 sets out some unsettled questions about Energy Budget Levels for single family residences. This section discusses domestic hot water use (an area where solar energy can make an important contribution); new and innovative energy conservation options (where a technical breakthrough might increase conservation at little increase in cost); use of renewable energy sources; the effect of the Standards on masonry construction; and possible fine-tuning of the life cycle cost analysis techniques. In each of these areas, DOE specifically asks for the public's comments.

Section 2.4 looks at a variety of issues affecting the way the Standards are presented and used by those who must follow them. Several of the important issues are:

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WHY ARE BEPS IMPORTANT?

JAN 7 1980

Buildings are one of America's big energy users. The consume over one-third of all the energy this nation uses -- and they are profligate wasters of much of it! One recent study from Princeton University's Center for Energy and Environmental Studies found that leaking of warm air into attics from one and two story wood frame houses alone wasted over 600,000 barrels of oil per day, 2 percent of all the energy used in the United States. When one adds up the poorly insulated ceilings, the leaking window sills, the glass-box offices hot on one side and freezing on the other, it is little wonder that American buildings are the silent gas-guzzlers of the world.

They do not have to be this way. There are real houses, lived in by real families today that use 50, 60, or 70 percent less energy than their look-alike neighbors. In Denmark, there is a home that relies on the heat of the sun, the lights, and the occupants for winter warmth. Even in the long Danish winter, the house uses no energy at all specifically for heating. Life Magazine, in a year-end issue, devoted pages to modern, attractive homes that use clever designs to heat and cool themselves.

Offices present even greater opportunities for savings. A comparatively mild energy conservation regulation, ASHRAE 90-75, promises to cut office building energy consumption by almost 60 percent. Stricter standards would permit designers to build offices that function gracefully, comfortably, and economically with even less energy than the mild ASHRAE standard.

What is keeping us from building these energy efficient buildings, and how can BEPS help? Of course, there are a variety of factors that go into the design of a building, and many of those factors are practically impossible to regulate by any governmental action. Shoddy workmanship, careless siting on a lot that exposes a building to unnecessary heat or cold, and unreasonable desire to hold the initial cost of a building artificially low are influences that must be attacked by education, persuasion, and the effect of higher prices, not by direct regulation. But many of the excuses for avoiding a strong BEPS are just not true, or they are misleading. Let's look at some of the common misconceptions about BEPS:

- "It's impossible to build buildings more energy-efficient" - As we have seen, this just isn't so. What is true is that it is hard to change the way you have been doing things for years. A strong BEPS will give designers, sellers of stock house plans, architects, home magazine editors, and the rest of the building industry a strong incentive to discover (or, in many cases, re-discover) the ways to make buildings energy efficient.

- "Won't higher energy prices make buildings better without regulation?" - Of course buyers and renters are looking at energy prices more closely now than they used to. But for a new building -- the kind that BEPS regulates -- it is hard for even the most sophisticated buyer to know how energy-efficient the building will be. BEPS will provide a baseline so that every buyer will know that every building conforms to at least a good efficiency rating. (It is unlikely that BEPS will ever be so strong that conforming buildings will be as good as they could be.) BEPS will have the same healthy effect on the building industry that the EPA fuel efficiency standards have had on the automobile industry. The market and higher energy prices will work, but regulation can help

- "Isn't this just another layer of government regulation?" - Regulating energy use in buildings is new, but regulating buildings and how they perform isn't new. Plumbing codes, electrical codes, fire safety codes, to name just a few, have been in existence for years. BEPS is likely to be administered by the same people who administer these codes, so no new government bureaucracy will be created.

- "The Regulation looks so confusing! How will it work?" - The intellectual underpinnings of BEPS are highly technical. These are what you see (partially) explained in the Notice of Proposed Rulemaking. But -- if the Department of Energy does its job correctly -- the rules that local and state building code officials will have to follow need be no more complicated than ordinary building code standards. The Conservation Foundation plans to monitor DOE's development of implementation regulations to make sure they can be administered in the real world.

- "Won't this add a lot to the cost of a house?" - It depends on whether you are talking about the initial cost of the house or the entire cost of owning it. It is true that BEPS will add a comparatively small amount to the purchase price of a house. But the savings on utility and oil bills will pay for that extra investment. Thus, the true, life-cycle cost of owning a home or any other building will be less.

In short, the idea of BEPS is a good one. But this does not mean that the regulations proposed by the Department of Energy are perfect. Far from it. Over the next few weeks, further BEPS Grams will explore strengths and weaknesses of BEPS, particularly as they affect environmental and conservation concerns. The criticisms should not be allowed to obscure this basic point:

A STRONG BUILDING ENERGY PERFORMANCE STANDARD CAN DO MORE THAN ANY OTHER GOVERNMENT ACTION PROPOSED IN THE COMING YEAR TO SAVE ENERGY. IT IS WORTH DOING. IT IS WORTH DOING RIGHT.

December 31, 1979

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JUST WHAT DO WE MEAN BY ENERGY CONSERVATION, ANYWAY?

In the environmental community, the values of "energy conservation" are assumed with as little question as we assume the value of an unspoiled wilderness, a species preserved, or a clear blue sky. Yet we are notoriously imprecise in describing either to ourselves or to others what we mean by the term. As a result, we have let energy conservation take on an unpleasant, puritanical cast. When the President speaks on the subject, voters' minds turn to chilly rooms and endlessly slow drives through the desert in cramped little cars, rather than increased efficiency. In order to be successful in promoting energy conservation, we need ourselves to understand what we mean by the term, and what motivates people to conserve.

Prior BEPS Grams have dealt with the history of building energy regulation and the importance of the building sector in the overall energy picture of this country. Later BEPS Grams will turn to a much more detailed examination of the proposed regulations for the Building Energy Performance Standards program. But in this issue, we try to set out more carefully the goals we have for adequate conservation and how we think success can be measured.

There are at least three directions from which one can view motivations for energy conservation:

- The moral approach. Many people feel that it is their duty to save energy. Noting that America, with 6 percent of the world's population consumes 33 percent of the world's energy, they feel uncomfortable with this imbalance. Obligations are owed to future generations: will our appetites deprive our grandchildren of choices? Do we need this much energy to be happy? Wouldn't less be just as good?

- The engineering approach: Many people are displeased with wasteful practices and get pleasure from improving obvious inefficiencies. Leaks should be plugged because they shouldn't happen, powerplants should be bigger if larger ones are more efficient. This is the viewpoint that has motivated much of the work of DOE in conservation generally. Large "targets of opportunity" are selected, then engineers, designers, and inventors are turned loose to find technical fixes to the problem at hand.

- The economic approach: Many people observe that when the price of a good rises, consumers use less of it. In fact, prices serve as an accurate way of letting people decide how much of an item they really want when compared with other things they could spend their money for. Even better, prices let people figure out how to have the same things they want but at an overall cheaper cost to them! This view of energy conservation suggests that individuals' self-interests should be tapped for motivating conservation. The proper measure of how much conservation is sufficient for each individual is when costs equal benefits.

There is a great deal to be said for each of the three approaches, and any approach that promotes energy conservation in this society should be applauded. But for the purposes of setting government regulations, there are very good reasons for favoring the economic approach over the moral or the engineering approach.

Unfortunately, moral choices over how much energy others should use tend to be a poor basis for making government regulations. Consider your own feelings about some favorite energy-consuming object that is, for you, a necessity (e.g., a frost-free freezer, a dishwasher, or a station wagon). No doubt others have kidded you about one or another of your choices or you have ribbed a friend about some energy use they hold dear. This is just a microcosm of the problem that government would face if it tried to set conservation goals or standards based on guesses of what most Americans believed was right. Morals provide a powerful incentive for private actions, but regulations based on "you should" or "you must" can easily make poor public policy.

In the same way, the engineering approach is valuable, but gives no insight into when you have done enough conservation. There are always leaks to be plugged; an engineer set loose could spend more money than it is really worth in order to save energy. Another limitation of the engineering approach to energy conservation is that it assumes that the given way of doing things is relatively fixed or that people really want to pay for a given service when confronted with higher prices.

Thus, in our analysis, we will adopt the third outlook: the economic approach. Energy conservation, as we will use it, means taking those actions that result in a saving of money over the life of the building by permitting the substitution of one way of providing heating and cooling (e.g., a furnace/air conditioner) for another (e.g., better design, insulation, or heat exchangers). As the Ford Foundation-funded study, Energy: The Next Twenty Years says, "Money can be saved by substituting intelligence, prudence, maintenance, better equipment, or different equipment for purchased energy; the substitution should be made up to the point where the cost of not using the energy is equal to the cost of the energy saved."

There is considerable evidence that the economic viewpoint mimics the way people actually respond to changing conditions and the way they make decisions about their own purchases. People only infrequently make sweeping decisions that affect the use of large amounts of energy. Instead, they make decisions bit by bit, taking into account a wide variety of differing circumstances and competing desires. Price is easy to understand and exerts pressure on each of us every day as we make those thousands of energy-related decisions. Easier than understanding government prohibitions or another alphabet agency in Washington, price talks in a language we all know and respond to.

The economic approach has another strength: it is well studied and its limits are understood. This means that conservation arguments based on economics can be criticized from within the confines of a body of knowledge and an academic discipline. When the arguments stand up against such scrutiny, they are more likely to be accepted in a way that regulations based on someone's guess or best hunch would not be. Of course, in using an economic approach, one must acknowledge that energy is not traded in the classic free market setting. Far from it! Different energy forms are treated under different regulatory schemes. The cost of energy does not include the effect on the environment. Renewable resources are relatively unsubsidized by the government. Nevertheless, these shortcomings can be approximated and can be understood by policymakers.

Throughout the coming BEPS Grams, readers will see economics, cost/benefit analysis, life cycle cost analysis, pay back periods, and many other tools of economic analysis used as a measure of the effectiveness and stringency of the proposed BEPS rules. We adhere to this viewpoint not because we love economics, but rather because we believe that economic analysis provides a particularly searching tool for criticizing DOE's work. Use of this economic viewpoint is not meant to diminish the importance of looking at energy as a moral issue or as an area where technical fixes can help. But we believe that an economics-based analysis will demonstrate how much further the Department of Energy has to go in producing a satisfactory energy standard for new buildings.

BEPS Gram

The Conservation Foundation
1717 Massachusetts Avenue, N.W., Washington, D.C. 20036

WHAT WILL ENERGY COST IN 1990?

The Department of Energy's Energy Information Administration (EIA) has tried for many year to calculate what energy costs present day consumers and what it will cost consumers in the future. This simple-sounding task turns out to be quite difficult in practice, and in practice the EIA has almost universally underestimated these costs.

For BEPS, this underestimation of the price of fuels affects two crucial calculations -- the determination of the weighting factors and the calculation of life cycle costs -- and in both places it has the effect of making the standards weaker than they should be. "Weighting factors," which are the subject of a future BEPS Gram, basically are used to let designers know that a BTU of oil consumed in a building is not the same as a BTU of electricity or a BTU of natural gas used at the building. For example, because it takes three units of coal or uranium or oil to produce one unit of electricity delivered to a house, counting the BTUs of electricity the same as oil would seriously understate the resource impact of electricity. Weighting factors are based, in part, on the price of different fuels as calculated by the EIA. If the price is too low, the weighting factor will be too small. In a different fashion, incorrectly low energy costs discriminate against conservation in a life cycle cost analaysis. Life cycle costs (which were discussed in an earlier BEPS Gram) depend on good estimations of future fuel costs; without good predictions it is impossible to decide how much it is worth now to invest in energy conservation to avoid higher fuel bills later.

Calculating the Present Cost of Energy

It seems hard to believe that the EIA does not know the present price of fuels. Couldn't they just go around the country and ask what people are paying? And of course they do. Yet asking what today's customers are paying for their energy is the wrong question when we are looking at energy conservation. Almost all fuels consumed today are a mixture of inexpensive energy already located and expensive energy yet to be discovered or produced. For example, electricity in the Pacific Northwest is produced mainly from hydroelectric sources that are quite cheap. Yet if many new buildings hook up to the grid there, the region will have to add coal or nuclear powered plants, costing more than old dams and producing much more expensive electricity. Therefore, from the nation's point of view, the relevant question is not what the cost of energy is to today's consumer, but rather what the cost of the new energy is: it is those costs that can be incurred or avoided by conservation actions. That is the price that will have to be paid, so it is the one to focus on. Economists call this the difference between looking at the average costs and the marginal costs of energy.

Often the marginal cost of energy is much higher than the average cost. The Ford Foundation sponsored study, Energy: The Next Twenty Years, used $75 per barrel for present day marginal costs and $25 per barrel for the average costs. The difference in costs reflects the fact that oil is getting more difficult (that is more expensive) to dig up, drill out, convert to electricity, or to send over the wires to the end user. Most conservation investments must be made at marginal costs instead of average costs; comparing the average price of energy with the marginal cost of conservation puts conservation at a severe disadvantage which the country can ill afford.

Why does DOE use the average cost in BEPS? The Notice of Proposed Rulemaking notes "that replacement costs are the most appropriate indicator of the cost to the nation of producing new sources of energy for new buildings . . ." Henry Kelly of the Solar Energy Research Institute states that "the national objective must look at the marginal cost, not the average cost." The Harvard Business School study, a recently completed Stanford University study, and many other sources are uniform on the need to use marginal costs in analysis, if not in the market itself. DOE, in its own defense, states that marginal costs "were not available in time" from the EIA to use in the proposed rule. Rather than estimate any marginal costs, DOE used available information, a process somewhat similar to waiting a long time for a bus on Sunday morning, then taking the first one, even though it is going the wrong direction, just because it's available.

Even in calculating the present-day prices, DOE took the process of price averaging one step too far by producing a national average of fuel prices. This average masks important regional and local differences in prices. The national average in effect pretends that all parts of the country pay the same price, something that is manifestly not so. DOE must be encouraged to move away from a national average and toward a regional or even a local marginal cost estimate.

Predicting future energy prices

It is hard to forgive EIA its inability to develop present marginal costs of energy. However, we can be more charitable about its consistent underestimation of the future costs of oil. No one could have guessed the timing or the magnitude of the changes that have taken place over the past decade. But what we have learned ought to lead us and EIA to believe that the prices will continue to rise, probably faster than we like or expect.

After the Arab oil embargo, EIA's predecessor agency (the Federal Energy Administration) created a mathematical model of the nation's energy system to help it make energy price predictions. The model, still in use in modified form, uses 10 regions of the country and establishes an interrelated network of supply and demand equations to determine what price a fuel must command in the market place in order to bring supplies into balance with demands. A major input to the model is the so-called "supply curve" for each fuel. A supply curve tries to describe mathematically how much of a given fuel will be available at a given price. Some of these curves are extremely complex; all of them depend on predictions for which past available data gives little guidance. Yet even so, the model must approximate all but the most simple relationships in these supply curves to permit even a very large, very fast computer to solve the many equations within a reasonable amount of time.

Predictions are incorporated into the model by changing the supply curves (as well as certain other inputs). These changes are often based on human judgment, as indeed they must be, since none of us can know the future. Yet it is important to lay out the basis for those judgments so that others can know whether they agree or disagree with them. Unfortunately, these crucial judgments are not referenced for the BEPS reader.

Naturally the future -- particularly the energy future -- is hard to predict. But the Department has a sorry record indeed. In 1975, it predicted world oil prices at $11 per barrel in 1985. The current prediction for 1985 is $30 per barrel (roughly today's price, not 1985's price). These numbers are typical of the too-low forecasts. DOE must attempt to improve its forecasting abilities, because so much crucial planning depends on it. It should also make the underlying assumptions more transparent.

The changes discussed here are not radical, they are simply the basic stuff of good analysis. Marginal cost predictions will give us regulations that truly save the nation as much energy as it is worth it to all of us to save, not a bit more nor a bit less. Better, more realistic predictions of future energy costs might throw the cold light of reality onto those who believe we can go back to an era of cheap fuels and leaky houses.

March 17, 1980

send to Isabel Mills
Denton

The Conservation Foundation
1717 Massachusetts Avenue, N.W., Washington, D.C. 20
Telephone (202)797-4300 Cable CONSERVIT

December 27, 1979

Dear LWV Leader:

The federal Department of Energy has recently released a proposed regulation that could do more for energy conservation in the future than any other single action taken this year. This regulation announces the Building Energy Performance Standards (BEPS), a program established by Congress to regulate the amount of energy that any new building -- including homes and offices -- can use.

The Conservation Foundation has received a small grant from the Department of Energy to work with environmental and conservation groups to let them know about the proposed regulations, to help them prepare for the public hearings, and to serve as a technical resource for those who want to testify or prepare written comments on the rules.

I recently talked to several people at the national League office, including Dotty Powers (the National Energy Chair), Isabelle Weber (Director, Energy Department of the LWV Education Fund), and Lloyd Leonard (Action Department, LWV-US). They were enthusiastic about having key League leaders learn about the regulations. Your name was one of the ones the national office supplied to me for this purpose.

In this envelope, I am enclosing the materials that we have already mailed to others on our mailing list. You will find (1) a cover letter announcing the availability of the Notice of Proposed Rulemaking; (2) a copy of the Proposed Rule; and (3) a short history of energy conservation regulation of buildings for background reading.

We intend to send out short analytic materials every few days over the next few weeks. It would be helpful to know, in advance, if you are interested in receiving this material or whether there is someone else who should be added (or substituted) on our mailing list. For this purpose, we have enclosed a postcard in order to make sure you want to receive this material. Could you please fill out the postcard as soon as possible so we can have an accurate mailing list targeting those particularly interested in the topic.

Isabel

Time is very short for public comment on this important regulation. If you want any information or assistance in participating in the public comment opportunity, please call me collect at 202/797-4370.

We look forward to working with you on this project.

Yours very truly,

Grant P. Thompson

Grant P. Thompson
Senior Associate

V has a nice guy

The Conservation Foundation
1717 Massachusetts Avenue, N.W., Washington, D.C. 20
Telephone (202)797-4300 Cable CONSERVIT

December 27, 1979

Dear Friend:

A lot of time has passed since you first asked us to keep you up to date on what the U.S. Department of Energy is doing on the Building Energy Performance Standards (BEPS). The delay has been the Department's slowness in getting proposed rules out for comment. But they finally have acted and I am delighted to enclose a copy of those proposed rules for you to review.

I am less delighted to let you know that the Department has decided to start the public hearings on January 28 and that the comment period for members of the public ends February 26. (You can find the schedule for public hearings and the comment procedure at the beginning of the proposed rule.) This short time is particularly shocking since many of the Technical Support Documents (TSDs) that underlie this proposed rule are still unavailable to the public.

This tight comment period is obviously very difficult for members of the public who must try to read and absorb a mass of technical data, presented in a not-very-lively fashion, over the Holidays, without the technical data necessary for understanding crucial decisions, all in a few short weeks. We understand that The White House is considering asking the Department of Energy to extend the comment period. We also understand that a number of Members of Congress are interested in this subject, although uncertain whether there is any interest among their constituents. At the Department of Energy here in Washington, D.C., the crucial decision-maker is Dr. Maxine Savitz, Acting Assistant Secretary for Conservation and Solar; the lead person at The White House is Mr. Harry K. Schwartz of the Domestic Policy Staff in the Old Executive Office Building.

In the meantime, the environmental community needs to react to this proposed rule. Over the next few weeks, The Conservation Foundation, working under a grant from the Department of Energy, will be mailing a series of "fact sheets" to you on the proposed rule. These fact sheets will assist you in reading and understanding the proposed rule and picking out for special analysis sections or decisions that are especially important from the environmental point of view. Those of you who are willing or able to attend a public hearing and testify should let me know (via a collect call to 202/797-4370) so we can provide you special assistance. In addition, if you are willing to prepare written comments, again let us know so we can provide technical support for your analysis.

Thank you for taking the time to work on BEPS. Although the details are technical, the basic concept -- that Americans can build homes and offices that are a credit to the nation, not a shame -- is too important to leave to the experts.

Yours very truly,

Grant P. Thompson

Grant P. Thompson
Senior Associate

Encl: Proposed Rule (BEPS)

The Conservation Foundation
1717 Massachusetts Avenue, N.W., Washington, D.C. 20
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Yours very truly,

Grant P. Thompson

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Senior Associate

Encl: Proposed Rule (BEPS)

BEPS Gram

The Conservation Foundation
1717 Massachusetts Avenue, N.W., Washington, D.C. 20036

AND NOW A WORD ABOUT COMMERCIAL BUILDINGS

When most of us think about energy use in buildings, we instinctively think of our own home, its insulation, furnace, and thermostat. This bias is natural, since we all live in some kind of home. Yet there is another important world of buildings that our residential bias obscures: this is the world of the large commercial building, including the large apartment house. Half of all the energy used in American buildings is consumed in just such buildings: if we ignore them, we will miss half or more of our opportunities to save energy.

The basic fact about energy consumption in these large buildings is that it varies enormously from type to type and even within buildings of the same general type. Schools, hospitals, factories, restaurants, apartment complexes: there are few generalities that hold true in many cases. The government was aware of this problem and decided to select the design drawings of a number of buildings, analyze them by computer to estimate their predicted energy use, and then use that computed data as the basis for setting commercial building standards. The story of this work by the AIA Research Corporation (AIA/RC) has already been told in a previous BEPS Gram; the important points to remember are that the standards are based on buildings designed in the mid-1970s, and that no real buildings were actually considered, only computer predictions of building designs. To understand this research, we must trace the assumptions used in the computer models. These assumptions must be examined to make certain they are both reasonable and consistently applied.

Unfortunately, following the thread of these assumptions through the documents provided is a difficult task. In the Notice of Proposed Rulemaking, the reader is referred to several Technical Support Documents (TSDs). TSD #2 covers the initial statistical work done by AIA/RC and others on the designer sample. TSD #5 ("Standard Building Operating Conditions") contains the assumptions made by DOE on how buildings use energy. TSD #1 describes the "Standard Evaluation Technique," that is, the instructions on how to take a building design and calculate predicted energy use. At the back of TSD #1 (Appendix V, part A) are instructions on how to run the appropriate computer programs to calculate the energy used in each design from the assumptions given in TSD #5. Finally, one can look to Appendix B of TSD #8 ("Economic Analysis") to find the "net cumulative energy savings to the Nation" and the "value models." These two quantities compare the effects of different standards and choose the best standards for the Notice of Proposed Rulemaking.

The analysis thus spread over these documents deals with important questions, but unfortunately, it fails to ask the questions that should be central in any discussion of energy conservation: "What will it cost and how much will it save?" (The importance of framing energy conservation questions in this context is the subject of an earlier BEPS Gram, "What Do We Mean By Conservation Anyway?") By failing to gather the data necessary to conduct a life-cycle cost analysis, the Department has been forced to set standards on the basis of estimations about work that some designers did in the mid-1970s, rather than what is good for the Nation in the 1980s. In the time since the designs were completed, energy prices have risen rapidly and further rises appear highly likely. These changes call for better data collection -- especially data collection on costs and benefits in various types of commercial buildings -- if this part of the BEPS is going to save as much energy as it should.

Many improvements could be made in the Department's analysis. In fact, DOE has already recognized some of the major shortcomings in its commercial building analysis. The Department is currently performing life cycle cost analysis for these buildings. Unfortunately, it is unlikely that this improvement will be available in time for the final rulemaking due in August, 1980. Nevertheless, BEPS as they stand now can save a significant amount of energy in commercial buildings. Because of this, DOE should consider issuing the standards with the best information available, and make a commitment to update them rapidly on the basis of its further research. In this BEPS Gram, we discuss the statistical analysis of commercial buildings that are found in the TSDs; later BEPS Grams will consider other issues affecting both commercial and residential buildings.

Statistics is a systematic mathematical method to help us understand relationships between events occuring in the real world. The method is particularly valuable when those relationships are presently unknown or not well thought out. Application of the statistical method requires us to make a series of assumptions (called "hypotheses") and to collect information on what is actually happening (called "data"). Then statistical tools let us work with the data to test whether those data support our hypotheses. If they do, we have not proved that the hypotheses are correct. With a sufficiently large amount of data and with very high correlations between what we observe and what we predict will happen, we can become increasingly confident that our hypotheses are correct. Statistical methods are perfectly suited to studying the energy use in a large building <u>if</u> there are enough data and <u>if</u> those data allow us to test all the important hypotheses.

The statistical analysis of BEPS is quite defective when measured against the complexity of the relationships being studied and the need for an adequate amount of data. The sample size is small, thus limiting any conclusions about the designs sampled. In order to make up for this, data are subjected to a variety of techniques that help the data "fit" various relationships assumed by the researchers. Such fitting amounts to doing your high school chemistry lab experiments backwards: you know the "answer," so you have to get back to the "data" needed. Unfortunately, commercial buildings are no two-chemical lab problems; they involve complicated relationships among heating, lighting, occupancy, ventilation, and climate. Therefore, this manipulation of data points, even by "powerful and sophisticated statistical methods" should make one uneasy.

A valid statistical methodology is to make simplifying assumptions either where you don't know the data or where data is expensive or difficult to obtain. But where many simplifying assumptions are made, those simplifications tend to make the relationships generated by later analysis less reliable. For example, in TSD #5, temperatures, occupancy levels, lighting, ventilation requirements, and exhaust fan use are all given fixed levels. No real explanation is given for these assumptions other than "the nature and intensity for energy use may vary widely over the useful life of the building." Likewise, in TSD #1, "Standard Evaluation Technique," there are no provisions for buildings using passive or active solar systems, commercial buildings with more than one furnace and air conditioning system, and other commercially available systems. It is one matter to make simplifying assumptions that can increase insight into a difficult problem; DOE's approach, unfortunately, goes well beyond this so that little insight is gained.

The final stop along the faintly marked TSD statistical trail is a slim appendix to the economic analysis. This appendix contains an evaluation of the economics of new commercial construction, as influenced by BEPS. Again, this appendix is flawed since it does not use life-cycle cost analysis. Totalling up the energy saved from buildings (whose performance was basically calculated from the beginning) is limiting to one's explorations of different conservation options. A more complete look at these options is needed and might have been provided by using an LCC calculation. In fact, in one footnote in the NOPR, DOE refers to a preliminary draft of an LCC study on an office building. That study confirmed that for that office building at least, an LCC study would result in much stricter standards. It is hard to avoid wondering if that one office building isn't trying to suggest a truth that applies to all commercial buildings.

Even as they stand, BEPS will improve energy use in commercial buildings. But it is a shame not to do the job right.

BEPS Gram

The Conservation Foundation
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LET THE SUN SHINE IN

> For heat, humidity, fresh air -- all the elements that make up interior comfort -- the problem is pretty simple: keep it in or keep it out, let it in or let it out. These aren't new problems; man has spent his history as a builder learning how to deal with them. But sometimes in our headlong progress we forget the old lessons.
>
> Progressive Architecture

The regulations proposed by the Department of Energy for BEPS seem at times to forget the wise old lessons. Everywhere one looks today, builders are using techniques of solar design: adobe walls for thermal mass, deciduous trees for summer shade, large south-facing windows, and overhangs calculated to shade out the summer sun and let winter warmth enter. Almost every issue of the leading home magazines includes an article on active or passive solar design. Yet DOE has failed to capture the richness and variety of solar energy use in designing its BEPS. Instead, throughout its analysis, DOE has defined solar techniques narrowly, ignoring many common strategies that are already widely used. In its life cycle cost analysis for single family homes this omission is particularly disturbing. Perhaps even more troubling, DOE has failed to live up to its statutory mandate to encourage the use of renewable resources. Finally, there is little indication within the confines of the Notice of Proposed Rule-making that the Department will give sufficient emphasis to educating commercial and residential builders about the many opportunities for saving energy that solar energy will permit. In this BEPS Gram, we discuss some of the corrections that should be made in BEPS to truly capture solar energy's potential.

Narrow Definition of Solar Energy:

To understand what the Department means by solar energy, one must look at the Technical Support Document Number 9, "Passive and Active Solar Heating Analysis." (This document concludes, it might be noted, that passive solar systems are not viable in Portland, Oregon, a place where there are a number of solar homes that are operating efficiently and economically!)

In TSD #9, heating with the sun, while using the same materials to provide "coolth," is completely ignored. A concrete wall, correctly placed, can absorb the winter sun, releasing it through the evening hours. In the same way, it can radiate heat off in the cool of the night during the summer, then be available all day as a cool block to absorb heat inside the shaded home. Acting like a giant thermal flywheel, such thermal mass, incorporated into the building structure from the very design stage, is cheap to build and free to operate. Yet the Department completely ignores thermal mass in its analysis.

Ignoring thermal mass may be a simple omission, but the narrow vision of solar energy's potential pervades the document. For example, the TSD assumes that:

- Every heat-exchange medium uses only liquids for space and water cooling, thus ignoring most cost-effective methods which use air or other gases.

- All windows used as part of a passive solar energy system are assumed to be double glazed, no matter what other glazing is appropriate for the remainder of the house in the climate zone.

- Only concrete foundations on-grade are used.

- The appearance of the house may not change, even if relatively modest changes in the appearance of the house would substantially reduce the overall cost.

This final point severely limits the options of designers. Almost quite ordinary tract-type homes are now being built throughout the country taking advantage of window overhangs, south-facing window, and other techniques to cooperate with nature. Indeed the Leger houses in Massachusetts are examples of suburban homes that appeal to ordinary families, can be afforded, and actually "make" money for their owners because they are so cheap to heat. The innovations are all in the care with which they were designed beforehand. Buyers in East Pepperell line up to purchase them.

In addition to ignoring many solar techniques that are already in common use, the TSDs make inaccurate assumptions on others. These inaccuracies prevent solar energy from being used efficiently and economically. In an appendix to the TSD #3 on "Energy Budget Levels," for example, the hot water inlet and outlet temperatures are assumed to be $50^{o}F$ and $140^{o}F$. Yet a lower outlet temperature and a higher inlet temperature can be effectively provided by solar hot water heating. The smaller range of temperatures is probably more typical in homes than DOE's own assumptions. Likewise, DOE simply assumes that every resident uses 63.4 gallons of hot water per day, an assumption surprising in its accuracy in view of the fact that no source is cited.

The Department should correct or verify these questionable assumptions and incorporate as many different solar techniques as possible into their analysis. Such a revised analysis might help DOE amend its the astonishing statement in the NOPR that solar designs "have not achieved widespread acceptance by the design community or the building industry."

Life Cycle Cost Analysis Must Be Improved:

The narrow range of solar techniques analyzed results in a defective life cycle cost analysis. As pointed out in an earlier BEPS Gram, life cycle cost analysis ought to consider the entire range of conservation and solar energy options in order to determine the minimum costs that could be incurred by the owner. Instead, the DOE analysis assumes that the buyer begins with an already designed and built building, then various conservation and solar afterthoughts are added to the building. These alterations are obviously more expensive than if the designer had started out with the solar techniques at the beginnning of the design process and included them from the start.

Sadly, DOE's life cycle cost analysis also fails to take advantage of the many profitable interactions between conservation and solar techniques. Instead, the approach taken is like walking through a cafeteria line, taking tasty items until you have spent your money. Planning certain conservation and solar items together might avoid assembling a meal of chocolate pudding, strawberry pie, and grilled zucchini! You should never think of using south facing windows without also insulating the attic: unless the analysis considers this as a package, the collection of random techniques fails to make sense in the real world.

BEPS Energy Budgets Should Be Designed to Encourage Solar Energy Use:

One of the most hopeful promises of the BEPS program when Congress enacted it was that it would serve as a means to encourage a move to a Solar America in our new buildings. Many observers believed that if the DOE simply set the energy budget levels sufficiently strict, designers would find that they no longer could simply slap a few inches more insulation in the roof and walls to comply, but instead would have to build with an eye to the sun's path through the sky each day and over the year. Without directly telling designers how they should comply, tight budget figures would provide an incentive to think solar. Unfortunately, the energy budget levels picked by the Department at this stage of the rulemaking are far too lenient to encourage any such re-thinking by America's builders and designers.

All this is not to say that DOE has muffed every opportunity to encourage solar energy use in BEPS. Energy supplied by the sun is considered to be "free" and it does not count against the design budget of the facility as a whole. Solar hot water heating is encouraged particularly by this energy accounting device. Another way to encourage the use of solar energy might be to announce in advance that the Department will periodically update the Standards, tightening the budget levels. Announced in advance, technology (both design and hardware) would be forced to react, saving increasingly greater amounts of energy. BEPS should be a continuing pressure to bring designers and builders closer to the ideal of a cost-effective building.

Increase Educational Efforts:

Although it is not strictly speaking a matter of BEPS standard-setting, one final point needs to be emphasized. Unless designers are aware of new solar design techniques and ways to apply them simply in conventional buildings, improvements that incorporate solar energy will be slowed down. DOE must take the lead in educating the nation in how to use solar energy. The BEPS program itself also will require re-education of a segment of America's building industry: these efforts ought to be combined. The solar educational effort ought not be isolated from other strategies showing how to save energy in cost-effective ways. Every effort should be made to provide designs, manuals of acceptable practice, pictures, and hands-on demonstrations of solar energy working in real buildings. Since these are some of the same teaching techniques that the Department must use in implementing BEPS, the efforts are parallel and complementary.

* * *

Solar energy has been around a long, long time. Modern studies by Olgyay, Knowles, and other scholars demonstrates that the ancient Indians of the American Southwest understood how to use it. Observation demonstrates that our grandfathers knew how to design for it. We need to relearn, and BEPS ought to help us relearn.

April 9, 1980

Beps Gram

The Conservation Foundation
1717 Massachusetts Avenue, N.W., Washington, D.C. 20036

THE CLIMATE OF BEPS

Each of us has strong intuitive ideas about the ways that buildings use energy. One of the most commonly held intuitive ideas is that the amount of energy used depends almost solely on the outdoor climate. While it is true that a building in Phoenix will use a different amount of energy compared to a building in Bangor, focussing exclusively on climate to explain this difference is somewhat misleading. Variations in design and the care used in construction can sometimes overwhelm the differences that climate alone will make. The failure to take the subtle relationship between climate and other powerful factors into account limits the value of DOE's analysis of the relationship between climate and energy use.

DOE used a three-step process to incorporate climatic differences into its BEPS regulations. First, DOE standardized its sample of buildings to eliminate some of the differences attributable to design techniques. Second, it calculated the relationship between these standardized buildings and climate. Finally, it created regulations that were equally stringent for all building owners, independent of the location of the building. If buildings use less energy in Phoenix than in Bangor, BEPS should reflect this difference by setting a more stringent energy budget for Phoenix, while letting Bangor use more BTUs per square foot per year.

Most of DOE's analysis of the effects of climate can be found in the Technical Support Document Number 10, "Climate Classification Analysis." Based on an examination of this TSD #10, the Department needs to improve each of these three steps. This BEPS Gram analyzes this issue.

Standardize the Buiding Sample:

Standardizing the building sample is done in two independent steps: the actual buildings analyzed are standardized and the climate zones considered are standardized.

DOE chose two methods to standardize the buildings used in its analysis. The first method was used for single-family residential buildings only. Here, DOE selected four standard buildings: one each for single story, two-story detached, two-story attached, and split-level. Each of these four buildings was analyzed in each of ten different cities and the design energy requirements were then calculated using the computer program DOE-2. The results of the computation show that for each city, the requirements of single-story and multiple-story residences are very similar and that the only difference in design energy requirements is between detached and attached homes.

For multi-family residences and all non-residential buildings, DOE used a different method of standardization. While the single family homes were analyzed using prototypes that were independent of their location, for commercial buildings, DOE used the AIA/RC sample of 1,661 buildings located throughout the country. The sample, consisting of actually designed buildings, of course has a large variety of individual designs and is therefore much too small to make any accurate analysis. Indeed, one of the Department's contractors admitted that the designs "reflect a large variance, (thus) any statistical estimates computed from them reflect very large error limits." Nevertheless, the designs

were grouped by location and design energy requirements were calculated. Since the sample contained only blueprints (not actual buildings), these calculations were done by a computer program called AXCESS. The use of individual designs in the AIA/RC sample does not standardize the buildings as well as using the four prototype residences. DOE should use prototypes -- with all their problems -- for the commerical analysis. Only in this way can the variations other than climate be factored out.

The Department chose to standardize the climate zones used for all buildings by looking at Standard Metropolitan Statistical Areas (SMSAs). An SMSA is a collection of suburban counties and the large city in the center. BEPS has added to the list of SMSAs other, smaller cities in order to develop a total of 78 different climate zones. If a builder is beyond a certain radius from any of these zones, there is a complex procedure developed to determine which zone is to be used by the builder.

Using the SMSA-approach may be defensible, but only if it is used throughout the analysis. Unfortunately, it was not. The residential analysis was done before the SMSAs were chosen as the standard zones. Consistency is a problem for the non-residential buildings as well. Originally, in the Advance Notice of Proposed Rulemaking issued in 1978, these buildings were analyzed in seven climate zones. Thus, most of the analytical work -- including picking which buildings to include in the sample -- was done with this seven climate zone pattern in mind. If SMSAs are to be used for the final rulemaking -- and there is much to commend this choice -- DOE should clarify how builders of structures outside the 78 should areas pick a SMSA simply. Moreover, DOE should analyze the effect of its inconsistencies on the final rule.

Determine Relationship Between Climate and Energy Use:

Once the design energy requirements of all buildings have been calculated, DOE next determined how climate affects those energy requirements. Of course, climate is not a simple concept, but is made up of temperature, humidity, wind, rainfall, insolation, and altitutde, among other things. The Department states that only temperature is important for building energy use. This surprising conclusion again may be right, but it would be comforting to have some discussion concerning the basis of this conclusion.

Given this limited definition of climate, how is temperature to be measured? The most common method is to calculate "degree-days" for heating and for cooling. A heating degree-day is the number of degrees the average daily outside temperature is below an arbitrarily selected base temperature; over the course of the year, these are summed to give annual heating degree days. Customarily, degree-day figures include the base temperature in parentheses; $65^{o}F$ is a common base. Cooling degree days are basically the same concept, using number of degrees over an arbitrarily picked base point.

Despite the common usage of degree days in all kinds of work, they are not without their analytic difficulties. The base temperature selected can strongly affect the relevance of the degree day figure for estimating how warm or how cold the climate is perceived to be. If one chose a base of $32^{o}F$, many places that are commonly thought to be frigid would have relatively few annual degree days; thus this low base would not be very helpful in determining heating needs. The common base, $65^{o}F$, is near to a temperature at which most people feel more or less comfortable; even so, this human comfort range is highly variable. A second problem with degree days is that they measure only the <u>average</u> outdoor temperature. Since it would be impossible to

monitor temperature continuously at all locations, several scattered readings must be made during the day, then averaged. Both the choice of a base temperatures and the averaging of outdoor temperature have the same kind of problem: they try to accomodate a range of real-world facts in a single number. The errors that such approximation can cause can be compounded if the approximations are not representative. DOE's calculations, for example, chose a 50°F degree base for cooling and a 60°F base for heating. These figures were chosen after statistical analysis of the commerical building sample only showed the "best" relationship between design energy requirements and degree days. However, as mentioned earlier, many of the observations in the AIA/RC commercial building sample are based on behavior of individual, non-standard designs. Indeed, there is so much variation in the sample that few firm conclusions should be drawn about degree day bases from this information.

DOE should have chosen a more reasonable base temperature that reflects the comfort range of building occupants. The present bases used in the Notice of Proposed Rule Making do not give any information on comfort. In addition, DOE should not have simply assumed that comfort levels are equivalent in residential and commercial structures. Commercial buildings require more air-conditioning to compensate for their scale and their uses.

For averaging daily temperatures as well, DOE should have used a more precise procedure. For part of its analysis, this temperature was computed as follows: first, the daily average temperature was calculated by taking the difference between the highest and lowest temperatures and dividing by two. Second, these daily averages were averaged together for each month. Finally, a day was chosen from each month that had an average temperature most closely approximating the monthly average. There are so many averages used in this process that is hard to understand how DOE's "average daily temperature" can explain real world events.

DOE should have used a wide representative set of indicators of the range of daily temperatures. The Department could have strengthened its analysis, for example, by looking at the procedure adopted by the Minnesota Energy Agency in a study (Analysis of Energy Use in Minnesota State-Owned Facilities) looking at quite different questions. The Agency looked at 42 buildings and calculated energy use based on many variables. Initially, the Agency started by using six variables in its analysis; subsequently, it added other combinations of variables until it found the best explanation for the energy consumption it was trying to explain. In a similar fashion, using climate variables rather than building variables, DOE should have tried using different combinations of climatic factors rather than simply relying on one factor "averaged" beyond recognition.

In an attempt to validate the initial heating and cooling degree day analysis, the Department had a consultant map regional trends of various climatic factors. The maps are inconclusive and at one point the consultant forthrightly admits that "the algorithms (producing the maps) were not sensitive enough to subtle changes in the data and, therefore, almost any data, if mapped, would show some regional trends" (TSD #10, page B-47). The Department should not attempt to include this work to support BEPS. What is needed is a fresh start on commercial buildings, using prototype structures and a consistent and rational study design to explore the relationship between climate and energy use. In advance, there is no way to predict the outcome of this study or the effect it will finally have on the BEPS energy budget figures, but DOE needs to redo its homework in order to strengthen the analytic basis of the standards.

Make Equally Stringent Regulations:

BEPS should be equally stringent for all buildings, regardless of location. However, no work was done on this matter other than stating that it was an objective of the analysis. Had the Department used prototype buildings throughout its analysis, checking stringency would be an easy matter. Without prototypes, there is no way of knowing how stringent the regulations are for different locations.

* * *

Climate is a crucial influence on how buildings use energy. A recent book on the subject of buildings notes that "post-World War II construction and design has tended more and more to reflect a self-defeating argument against climate, rather than a compromise with it. Mechanical space-conditioning equipment (particularly air conditioning), high-speed elevators, and plumbing innovations that divorce water and sewage service from considerations of building height have all contributed to our ability to shut climate out." That era may be coming to an end, faced with the cold reality of high energy costs. We need and deserve a rigorous analysis of climate and how it can work for us in building design. DOE has started that analysis, but there is still much to be done.

BEPS Gram

The Conservation Foundation
1717 Massachusetts Avenue, N.W., Washington, D.C. 20036

DISCOUNTING BEPS

One of the more misunderstood concepts in economics is the "time valu money." Simply stated, a dollar spent today does not have the same value dollar spent a year from now. If you save your dollar, instead of spending it, can get interest from a savings account, killings on the stock market, or ev lucky day at the race track. Put differently, holding on to your dollar prov you with several opportunities to spend or invest it in the future, quite poss in ways that will bring you more satisfaction than if you spent it now. amount by which the future value exceeds the present is called your "disc rate." If you can put your money in a 18% money market fund, your dollar w be worth $1.18 a year from now; this 18% is the discount rate, and you sir multiply by the investment of $1.00 to obtain the future value.

The discount rate is also used to compare investments that you might m at different times in the future. Suppose you want to compare the value of dollar today with investing $1.50 ten years from now or $2.00 thirty years f now. You want to know which of these three alternatives will give you largest present value. In this example, we use the discount rate to bring fu investments back to the present time. (This is the reverse of the example ir first paragraph, which started at the present and looked forward into the fut In order to start with the future and work back to the present, you must di your investment by the discount rate. If we assume your discount rate is the present values of each investment are $1.00, $0.58, and $0.11 respectiv Thus the first alternative -- investing $1.00 today -- gives the highest pre value. It is important to remember which direction you are looking at when use a discount rate. Moreover, choosing the discount rate is not a science, rather reflects how individuals (or groups of individuals) really value t investments in the future. The discount rate should be chosen at the time investment choice is actually made: hindsight a year or so later may change opinion about proper discount rates to pick in making future choices but does affect the choice we have already made.

A final preliminary point needs to be made about discounting. Infla alters our behavior significantly, since inflation changes the value of fu money compared to present money. If we have a personal discount rate o and we invest a dollar in a savings account, a year later we expect $ However, inflation makes this $1.08 worth less in purchasing power. I assume the rate of inflation is 5%, then the real (that is, including inflation) is only 3% and our $1.08 is worth only $1.03. Economists use the terms rea current to distinguish whether the effects of inflation have been taken account. Real rates incorporate inflation and compare "constant dollars," w are dollars whose value changes only because of their time value and not bec of inflation or recession in the economy. Current rates do not incorpo inflation and use "current dollars," which are dollars whose value is determ by current economic conditions, including inflation. In this BEPS Gram, we use only real rates and real dollars, thus ignoring the effects of inflation.

How does this "primer" on elementary economics have anything to do BEPS and energy conservation? BEPS uses discount rates in two impor places: (1) to determine costs and benefits faced by each building owner ma a decision whether to install more energy conserving technology at the time building is built or to pay higher fuel bills later; and (2) to determine costs

benefits faced by all individuals in the nation collectively. The two calculations are very different. Each building owner only considers the costs and benefits he or she faces during the period of ownership, using the price of energy actually charged by the utility. However the national perspective includes these costs and benefits but also includes the costs and benefits for all buildings we occupy, the costs and benefits facing industries involved in supplying materials and labor, and the costs of supplying the new energy that is being consumed.

Let us consider the use of discounting for only the individual owner. For single family homeowners, BEPS calculates a strategy to minimize the life cycle cost faced by each individual. The discount rate used in this calculation in order to bring all future costs back to a single present value is a 3% real rate. (For commercial and multifamily buildings, discount rate is not used, since the standards are not based on life cycle costs, but rather on a sample of actual buildings designed then re-designed. In prior BEPS Grams, we have already criticized this methodology.)

Looking at the energy standards from the viewpoint of only the individual homeowner tends to understate the savings from conservation by a large amount. The energy savings accrue to the nation as a whole, and it is fair to ask all of us to make investments that pay off for the nation, not simply for us. Put differently, if we all make investments that are slightly larger than we might if only our own interests were involved, we will all be better off. This process works out in other areas of life as well. A single taxpayers' contribution to good public education may be of no immediate benefit to him or her, yet the community as a whole strongly benefits from a good education system and that community benefit makes the taxpayer better off as well.

For BEPS, we need to look at nationwide costs on a level that are less than overall benefits. These costs and benefits are determined by how strong the energy standards are. With a strict BEPS, a large amount of energy will be saved, but the costs of construction may increase. This is where discounting comes in. In order to determine how strict to set the standards, we must discount the costs of all new construction and discount the price of energy saved over the lifetime of each structure and during all the years we are interested in studying. The analysis that underlies BEPS looks at all buildings started between 1980 and 1990 and calculates costs and benefits from 1980 to 2020.

The national perspective requires that we make assumptions; unfortunately many of these assumptions were made in a way that makes conservation difficult and more expensive than it should be. For example, oil is priced at natural gas prices, which "understates the benefits of conservation since oil is more expensive than natural gas." Operating and maintenance costs of the original and redesigned commercial buildings are assumed to be the same. And fuel prices use average costs rather than marginal costs; these are matters we have discussed in prior BEPS Grams.

One assumption that is often thought to be critical is the discount rate used for the national calculations. Yet surprisingly, because of the way we actually purchase energy for use in a home, the discount rate means that there is relatively little. Energy is purchased in small, relatively uniform amounts over a very long time. Shifting from a 3% discount rate to a 10% rate (as is done in Technical Support Document #3) shows suprisingly little sensitivity to the discount rate chosen. Put differently, discount rates have much less effect than we might have supposed on the final level of the standards.

Using discount rates is a powerful method to compare present and future costs and savings. Discounting is also a field that can overwhelm and confuse the layperson. If, as DOE's work tends to show, the choice of the discount rate does not make much difference, DOE should not hide this conclusion but should clearly state the assumptions that led to the result. Many people have argued strongly for choosing one rate or another. Instead of pursuing this argument further, we suggest that commentors should choose more attractive targets. The assumptions concerning possible conservation measures to use, the future prices of energy, the first costs of efficient construction -- all of these are far more important areas to BEPS than the choice of one particular discount rate.

April 18, 1980

Beps Gram

The Conservation Foundation
1717 Massachusetts Avenue, N.W., Washington, D.C. 20036

CEC WORKSHOPS ON BEPS

The Consumer Energy Council of America, a public interest group repre senting energy consumers, is giving a series of eleven informational workshop throughout the country in January on the proposed Building Energy Performanc Standards. The workshops are being given in partnership with Rural America an the National Low-Income Housing Coalition. CEC will conduct its workshop from 1 until 5 p.m.; RA/NLIHC will follow with a workshop focussing on low income issues from 6 to 8 p.m.

These workshops will be helpful to those members of the environmental an conservation community who want to participate in the public comment proces on BEPS. On the back of this form, we have reproduced a copy of th application form for attendance. CEC has asked that you return this form t them if you plan to attend. Because this mailing is going out so close to the dat of the workshops, you do not have to hear back from CEC to attend. You shoul call CEC in Washington, D.C. (202/659-0404) a day or so before the workshop t confirm that the meeting place has not been changed.

Seminar Dates	Seminar Locations
January 10, 1980	Room 3000A - 12 & Pennsylvania NW Washington, D.C.
January 14, 1980	American Institute of Architects/Conf.Rm. 20 West 40th Street, New York City, NY
January 14, 1980	Franklin Avenue Library 5000 Franklin Ave./Des Moines, Iowa
January 15, 1980	Gardner Auditorium-Statehouse Beacon & Park Sts./Boston, MA
January 15, 1980	Coffman Union, Rm.320 Univ. of Minnesota/Minneapolis, MN
January 16, 1980	Wayne County Community College Downtown Center/1001 Fort Street Detroit, Mich.
January 16, 1980	Labor Building/2215 S.E. Division Portland, Oregon
January 17, 1980	St. Marks Community Center 1130 N. Rampart St/New Orleans, LA
January 17, 1980	Lawrence Berkeley Laboratories Bldg. 50-Auditorium 415/Berkeley Campus Berkeley, Calif.
January 18, 1980	Georgia Conservancy 3110 Maple Drive #407/Atlanta, Georgia
January 18, 1980	Science Building/Auraria Higher Education Center/12th & Lawrence Sts./Denver, CO

Attendance Form

1. I plan to attend a workshop on BEPS Yes ( ) No ( )
2. Name of organization:
3. Address:
4. Which of the workshops will you or your group be attending? (please check)

Washington, D.C. (January 10) ( )
New York City (January 14) ( )
Des Moines (January 14) ( )
Boston (January 15) ( )
Minneapolis (January 15) ( )
Detroit (January 16) ( )
Portland (January 16) ( )
New Orleans (January 17) ( )
Berkeley (January 17) ( )
Atlanta (January 18) ( )
Denver (January 18) ( )

5. How many individuals from your organization plan to attend?

Names:

6. What is your primary interest in attending the workshop?

Background information on BEPS ( )
Help in preparing oral testimony for the DOE public hearings ( )
Help in preparing a written statement for the hearing record ( )
Other (please specify)

7. Which of the sessions will you be attending?

Consumer Energy Council of America ( )
Rural America/National Low-Income Housing Coalition ( )
Both ( )

8. Whom should we contact from your organization if any of the arrangements are changed?

Name Telephone # (area code) (number)

9. Will you or anyone in your organization need special access arrangements for the handicapped? Yes ( ) No ( )

Please return attendance form to:

Mr. Teddy Sullivan
Consumer Energy Council of America
1990 M Street N.W. Suite 620
Washington, D.C. 20036
202/659-0404

Beps Gram

The Conservation Foundation
1717 Massachusetts Avenue, N.W., Washington, D.C. 20036

BEPS HEARINGS DELAYED - COMMENT PERIOD EXTENDED!

The White House has just announced that the public comment period on th Building Energy Performance Standards has been extended for two months, an the public hearings have been delayed. The new dates are as follows:

Deadline for submitting written comments: April 30, 1980

Public Hearings

City	Date	Location
Washington DC	March 24, 25 & 26	Georgetown University Hall of Nations 36th & Prospect NW Washington DC 20008
Atlanta, GA	April 14, 15 & 16	Atlanta Civic Center 395 Piedmont Avenue NE Atlanta GA 30308
Kansas City, Mo.	April 14, 15 & 16	Sheraton Downtown Sixth & Main Kansas City, MO 64105
Los Angeles, CA	April 21, 22 & 23	Holiday Inn Convention Center 1202 South Figueroa St. Los Angeles, CA 90015
Boston, Mass.	April 21, 22 & 23	McCormack Post Office and Courthouse Building Post Office Square Boston, MA 02102

In all cases, requests to speak must be submitted to the following address by March 12, 1980:

Ms. Joanne Bakos
Department of Energy
Office of Conservation and Solar Energy
Mail Station 2221C
20 Massachusetts Avenue NW
Washington, D.C. 20585
(202) 376-1651

The Consumer Energy Council of America has rescheduled its workshops on BEP as follows: Boston: Wednesday, January 23 at the McCormick State Offic Building, Conference room 2, 21st floor, One Ashburton Place. New Yor Thursday, January 24, American Institute of Architects, 3rd Floor, 20 West 49t Street. Atlanta: Friday, January 25, Georgia Conservancy, 3110 Maple Drive Room 407. Minneapolis: Wednesday, January 30, Urban Coalition of Minne apolis, 89 South 10th Street. Des Moines: Thursday, January 31, Loga Community Center, East 17th Street Court at Garfield Avenue. San Francisc Friday, February 1, Lawrence Berkeley Laboratory, Building 50, Auditorium 41 Berkeley Campus. Workshops run from 1 to 6 p.m. at each location. If you ar planning to attend, please call Ted Sullivan at Consumer Energy Counci 202/659-0404.

Department of Energy Information

Office of Public Affairs
Region VI

P.O. Box 35228
Dallas, TX 75235

TO: News Editors

December 20, 1979
FOR RELEASE: On Receipt

FROM: Gene Campbell
Public Information Officer
(214) 767-7736

DALLAS, TEXAS - A public hearing on a proposed standby gasoline rationing plan will be held January 3-4 in Room 631, F. Edward Hebert Building, 600 South St New Orleans, Louisiana, it was announced today by G. Dan Rambo, Dallas, Regional Representative for the U. S. Department of Energy.

The two-day hearing will begin at 9:30 a.m. each day. The New Orleans sess is one of five to be held across the nation. Other hearings will be January 3-4 Boston, San Francisco, and Chicago, and January 7-8-9 in Washington, D. C.

Under the proposed plan, motor vehicle registrations would be the basis for distributing ration rights, which would probably come in the form of "checks" to b used to obtain coupons to buy gasoline.

The number of coupons issued within each state would be determined by the gasoline use in the state during a specified base period. Legislation requires th rationing plan be designed so the degree of shortage is shared equally among the states.

Sufficient ration rights would be granted for certain priority activities t ensure essential public services are maintained. Businesses and government organ tions with significant off-highway gasoline requirements also would receive allot ments based on historic use. Farmers would receive the coupons necessary to meet food and fiber production goals approved by the President.

State and local rationing offices would be responsible for providing addit coupons for hardship cases and to provide for the mobility needs of the handicapp

DOE would permit the sale or transfer of ration rights among the public. However, DOE might also buy or sell coupons to insure their availability and to balance the supply of ration rights with the supply of gasoline.

The new plan contains several changes from the one which was submitted ear this year and which the Congress failed to approved.

The main differences are that the new plan provides for: proportionate sta adjustments to reflect each state's historic use of gasoline; supplemental allotme to businesses based on historic use; a more active federal role in the ration righ

(more)

market; an expanded state role in administering hardship allotments and addressing imbalances within each state; and provisions which permit the use of simplified procedures in the event it is necessary to impose rationing before all plans have b completed.

The Emergency Energy Conservation Act (EECA), signed by the President on November 5, 1979, requires preparation of a standby rationing plan.

Once a rationing plan is formally transmitted to Congress, Congress has 30 c to review it. Unless a joint resolution of disapproval is enacted, the plan would considered approved and would remain in standby status.

Rationing could be imposed only if the President finds a 20 percent shortfal of gasoline and middle distillate exists, or is likely to exist, for at least 30 da The President's decision to implement rationing would be subject to veto by either House of Congress. If the President found it necessary to impose rationing with le than a 20 percent shortfall, both Houses of Congress would have to approve.

The proposed rules for the standby gas rationing plan were published in the December 10, 1979, Federal Register (44 FR 70799); copies can be ordered from:

William Webb (Office of Public Information)
Economic Regulatory Administration
Room B110
2000 M Street, NW
Washington, D. C. 20461
(202) 634-2170

The Federal Register is available for inspection at most large public and university libraries.

Persons desiring to speak at the New Orleans hearing should contact Mac Lacefield or Robin Oliver, P. O. Box 35228, Dallas, Texas 75235, or telephone 214/767-7745.

Written comments will be accepted by the DOE Headquarters Office until January 9, 1980. The address is: Office of Public Hearing Management, Department o Energy, Room 2313, 2000 M Street, N.W., Washington, D. C. 20461.

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INFORMATION NEEDED ON THE POSTCARD:

- Your name, preferred address (including Zip Code) and daytime telephone number (including area code).
- Do you wish to continue receiving materials on BEPS?
- If you do not wish to receive materials on BEPS or if there is someone who could use it better than you can, please give us his/her name and address. We will remove your name and, if you have supplied another name, substitute that name for yours.
- If there is someone in addition to you who could use material on BEPS, please give us his/her name and address.
- If you would like to participate in a public hearing (see Notice of Proposed Rulemaking for cities and dates) or would like to submit written comments and need assistance, please mark this on the postcard or call us collect at 202/797-4370.

The Conservation Foundation
1717 Massachusetts Avenue, N.W., Washington, D.C. 20
Telephone (202)797-4300 Cable CONSERVIT

December 27, 1979

Dear Friend:

A lot of time has passed since you first asked us to keep you up to date on what the U.S. Department of Energy is doing on the Building Energy Performance Standards (BEPS). The delay has been the Department's slowness in getting proposed rules out for comment. But they finally have acted and I am delighted to enclose a copy of those proposed rules for you to review.

I am less delighted to let you know that the Department has decided to start the public hearings on January 28 and that the comment period for members of the public ends February 26. (You can find the schedule for public hearings and the comment procedure at the beginning of the proposed rule.) This short time is particularly shocking since many of the Technical Support Documents (TSDs) that underlie this proposed rule are still unavailable to the public.

This tight comment period is obviously very difficult for members of the public who must try to read and absorb a mass of technical data, presented in a not-very-lively fashion, over the Holidays, without the technical data necessary for understanding crucial decisions, all in a few short weeks. We understand that The White House is considering asking the Department of Energy to extend the comment period. We also understand that a number of Members of Congress are interested in this subject, although uncertain whether there is any interest among their constituents. At the Department of Energy here in Washington, D.C., the crucial decision-maker is Dr. Maxine Savitz, Acting Assistant Secretary for Conservation and Solar; the lead person at The White House is Mr. Harry K. Schwartz of the Domestic Policy Staff in the Old Executive Office Building.

In the meantime, the environmental community needs to react to this proposed rule. Over the next few weeks, The Conservation Foundation, working under a grant from the Department of Energy, will be mailing a series of "fact sheets" to you on the proposed rule. These fact sheets will assist you in reading and understanding the proposed rule and picking out for special analysis sections or decisions that are especially important from the environmental point of view. Those of you who are willing or able to attend a public hearing and testify should let me know (via a collect call to 202/797-4370) so we can provide you special assistance. In addition, if you are willing to prepare written comments, again let us know so we can provide technical support for your analysis.

Thank you for taking the time to work on BEPS. Although the details are technical, the basic concept -- that Americans can build homes and offices that are a credit to the nation, not a shame -- is too important to leave to the experts.

Yours very truly,

Grant P. Thompson

Grant P. Thompson
Senior Associate

Encl: Proposed Rule (BEPS)

The Conservation Foundation
1717 Massachusetts Avenue, N.W., Washington, D.C. 200
Telephone (202)797-4300 Cable CONSERVIT

December 27, 1979

Dear Friend:

We recently sent you the Notice of Proposed Rulemaking (NOPR) issued by the Department of Energy on the federal Building Energy Performance Standards (BEPS). If you have not received the NOPR, please let me know as soon as possible so that we can mail you another one.

With this mailing, The Conservation Foundation is beginning its program of distributing information to the environmental/conservation community concerning issues raised by BEPS. Our present plan is to mail frequent, short "BEPS Grams" to you, each one only a very few pages long, covering a single topic. We hope that by keeping them short and topic-oriented, we will not overwhelm you with too much information all at once.

This first mailing somewhat violates our desire to keep materials short. But in order to understand much of what appears in BEPS, it is helpful to know the history of the Standard and its precursors. Therefore, we are burdening you with a somewhat longer paper in this mailing. The paper describes the history of BEPS, outlines some of the important issues it raises, and provides a few initial reactions to the Standards from the conservation point of view.

As you know, there is an opportunity for public comment (both at public hearings and by written submissions). If you want to appear at a public hearing, you must follow the procedure set out in the NOPR in order to reserve time. We may be able to provide you with technical assistance for preparing your presentation. If you would like this assistance, please call us collect at 202/797-4370.

Thank you again for your assistance on this BEPS project. The issues that BEPS raises are important to the environment and to energy consumption patterns in this country. Only if enough citizens who care about these issues participate in the comment process will the Standards be as strong as they ought to be.

Yours very truly,

Grant P. Thompson

Grant P. Thompson
Senior Associate

THE BACKGROUND TO BEPS

This paper has two parts. First, there is a short description of the pre-BEPS standards and codes that regulated energy consumption. Second, the BEPS are described and criticized.

Energy Standards for New Construction: Pre-BEPS

Regulation of energy use within buildings does not have a long history in this country. To be sure, a few examples of requirements for relatively minimal amounts of insulation can be found, but before 1970 there was little general interest in energy-efficient construction. The most wide-spread program was not mandatory, but was a set of voluntary guidelines adopted by electric utility companies interested in making the cost of operating electric heating competitive. Homes that complied with the guidelines were awarded a Gold Medallion. The first systematic, nationwide interest in energy conservation for buildings came as a reaction to the oil embargo of 1973-74. At that time, a voluntary group representing the heating, cooling, and ventilating professions began the process of drawing up an energy efficiency code for new buildings. The group, the American Society of Heating, Refrigeration, and Air-conditioning Engineers, Inc. (ASHRAE), intended to add to their growing list of standards covering subjects ranging from ventilation rates to humidity control. Because the standard was to be the nintieth in the list of ones they had developed, it was called Standard 90P, the "P" standing for proposed.

ASHRAE and other similar voluntary professional societies were experienced in developing standards and had developed a process for making certain that all economically affected parties had an opportunity to comment on and offer revisions to a standard before it was issued in final form. This so-called consensus process demands Herculean devotion from its participants who voluntarily attend meeting after meeting without pay or travel expenses, arguing over comments ranging from word changes to the most fundamental revisions. The consensus process, by its very nature, guarantees that any standard surviving the process will have two characteristics: it will not be unacceptably controversial and it will have had little input from any person who did not have some strong (usually economic) reason to donate a very large amount of time and effort to the process. ASHRAE standards are extremely influential. Their influence comes from the fact that they are technically sound, generally accepted by most directly affected interest groups, and usually cover highly technical subjects that no non-federal level of government would have the resources to regulate thoroughly and accurately. For this reason, many local or state laws and ordinances simply refer to a particular standard, thus giving it the force of law.

ASHRAE issued its standard in final form in 1975, and it was given a suffix indicating its vintage: Standard 90-75. In the meantime, Congress had reacted for the first time to the energy crisis by passing the Energy Policy and Conservation Act (P.L. 94-163, effective December 22, 1975). Section 362 of that Act required each state to develop energy conservation plans that included five mandatory provisions. One of those provisions was "mandatory thermal efficiency standards and insulation requirements for new and renovated buildings." The federal government seized upon ASHRAE Standard 90-75, declaring that any state that adopted the Standard or its equivalent would be deemed to have complied with the Energy Policy and Conservation Act, and thus be eligible for federal assistance. In order to assist states in using ASHRAE Standard 90-75 even more rapidly, the federal government funded another voluntary group, the National Conference of States on Building Codes and Standards, to

change the Standard (a format that is unsuitable for enactment) into a code format, which local building code departments could apply. NCSBCS also developed, under contract to the federal government, a set of training courses for building code officials to familiarize them with the code based on ASHRAE Standard 90-75.

The ASHRAE standard is what is called a "component-performance" standard. This means that the builder is instructed to look at each element of a building (that is, the walls, the floor, the ceiling, the heating plant, and so on) and make certain that each one of those components had a certain minimum thermal integrity or performance. Any builder assembling a building made up of various elements, each of which had passed the Standard, would be guaranteed that the final building would be in compliance with the Standard.

This component-performance standard is relatively easy to administer, but various groups, spearheaded by the American Institute of Architects, argued that such a standard stifled innovation in building design and, in many cases, mandated construction practices that were actually wasteful of energy. After considerable efforts at persuasion, proponents of this viewpoint prevailed on Congress to mandate that states follow a quite different approach, one that looked at the total energy performance of a building. In the Energy Conservation and Production Act (P.L. 94-385, effective August 14, 1976) Congress required the Department of Energy to develop performance standards for new buildings. Section 303(9) of ECPA defined a performance standard as "an energy consumption goal or goals to be met without specification of the methods, materials, and processes to be employed in achieving that goal or goals, but including statements of the requirements, criteria and evaluation methods to be used, and any necessary commentary." The critics of the component performance standards had won a victory in the legislative arena. They had also set the Department of Energy on a long, technical, controversial, and demanding course, whose end is not yet in sight.

Development of BEPS and Critique of Their Current Form

The original legislation mandating development of BEPS gave the government three years -- that is, until August 14, 1979 -- to develop the standards in their final form. The fact that BEPS were just issued in proposed form on November 28, 1979 gives some clue of the actual schedule that has been followed. It goes without saying that criticisms of BEPS at this point can only be based on the Proposed Notice of Rulemaking (to be found in 44 Federal Register 68120). Changes are both desirable and likely in the final form of the rule. The present schedule calls for promulgation of the regulations in May, 1980. However, the Department is seeking to find more time to revise and rework parts of the rule. It may well be toward the end of 1980 before final rules are available.

Under the original legislation, both the technical standard for BEPS and the implementation plan were to have been developed by the Department of Housing and Urban Development. Congress transferred the authority to develop the technical basis for the standard to the Department of Energy; however, it left the implementation development with HUD. It soon became clear that this arrangement was unworkable, since the standard development and the implementation plans are so closely allied to one another. Therefore, the two Departments entered into a Memorandum of Understanding, delegating implementation to DOE. In a confusing recent development, HUD suddenly refused to renew the Memorandum, then just as suddenly agreed to renew it. The early development of both the BEPS standard and the implementation plan were carried out at HUD. This transfer and retransfer of authority has added enormously to the difficulty of developing a workable standard.

In the early stages of standard development, HUD chose the American Institute of Architects Research Corporation as the lead contractor for the standards. In broad outline, HUD and AIA/RC decided to look at what American builders were actually designing shortly after the oil embargo, then use the best of those actual designs as the new standard for all builders. This method of setting a standard demonstrated that HUD and AIA/RC had two strong views of energy conservation in buildings. First, it showed they believed it should be based on present technology in actual use. This view is contrary, in our opinion, to the intent of the legislation, which sought to use BEPS as a technology-forcing device, bringing new designs and new technics into common use. Second, it showed that HUD and AIA/RC did not share the economists' view of energy conservation (that it is simply cost-minimization), but rather took the engineers' view (that it is plugging leaks as their existence becomes known to you).

Let us now turn to a somewhat more detailed description of the process AIA/RC followed in developing the standards. Although some of this story is now simply history, the data collected in the effort continues to exert a strong influence on the Department of Energy's views concerning what builders can actually do. AIA/RC began by surveying a large number of buildings designed during 1974-75. This period was picked both because designs were available, and because it was assumed that designers and engineers had by then taken new, higher prices into account. Enough buildings were selected so that a statistically significant sample was available for various building use categories and climate zones (defined on the basis of heating degree days only). AIA/RC used a sample size of 1,661 non-residential buildings. Data drawn from the plans of each of these 1,661 buildings were entered into a computer that estimated the amount of energy the building would consume, using a proprietary program (AXCESS) developed by the Edison Electric Institute. The computer output consisted of a figure showing how many British Thermal Units (BTUs) of energy each building would use per square foot per year.

The data generated by AXCESS permitted AIA/RC to prepare an matrix of American non-residential buildings, organized by climate zone, by building type, and by predicted energy consumption. (For example, by looking at the data books, it was possible to show a range of energy use per square foot for hotels located in climate zone 7.) This large data collection effort formed the basis for standard setting.

In order to test how much further an average designer could improve on a design, the AIA/RC then selected a sample of about 10 percent of those buildings and asked the architect teams who designed 161 buildings to attend a three-day training session on energy conservation in building design. Following this intensive session, each design team was asked to redesign their original building, but to do it within the original budget guidelines established by the client, with no additional use of active solar energy, and complying with any particular requests of the client no matter what their energy consequences might be. The result of this Phase II redesign effort should give all of us renewed hope for the future of American education! Fully 80 percent of the redesigns were so good that if they had been categorized with the original 1,661 buildings, they would have fallen at or above the top fifth of that group as measured by energy efficiency.

In the case of residential buildings, the Department took a different approach, although it was likewise one based on technical improvements in the building stock. Using data collected for a different purpose by the National Association of Home Builders, the Department analyzed the energy consumption of these residences using a computerized version of the ASHRAE Modified Degree Day Method. Experienced designers were asked to develop prototype residences that were based on the median

characteristics of the houses surveyed. These prototypes were then re-analyzed for energy consumption. Again, a technically-based methodology was used in order to set the energy performance standards.

Based on the analysis of the AIA/RC and the NAHB data, the Department selected energy budget figures that would have forced designers of all non-residential buildings subject to the BEPS to be as conscious of energy as were the better third to fifth of their colleagues. In the case of homes, builders would have been required to comply with the Thermal Performance Guidelines issued by the National Association of Home Builders. This form of the BEPS was released in an Advance Notice of Proposed Rulemaking at the end of 1978.

The criticism of these preliminary BEPS was immediate and harsh. Although there were many detailed criticisms of particular provisions, three important drawbacks were noted:

First, the standards were based simply on existing technology and based on buildings in which energy was not particularly singled out for special attention. Even in the case of the Phase II redesigns, the design teams were constrained by considerations that showed little sensitivity to use of new techniques, new machinery, and new ways of persuading clients and designers to save energy.

Second, the standards were based on buildings that were designed almost immediately after the original oil embargo. The market had not had time to readjust to the higher prices, and many clients and architects believed that the crisis would soon be over with a return to lower prices. The standards that the Department was proposing to issue stated, in effect, that in the 1980s, American designers were required to design buildings only as well as many of their colleagues were already doing in 1974.

Third, and most fundamentally, the technically-based standards ignored the most basic question of energy consumption and conservation: what is the economic balance between the discounted present cost of using energy in the future and the capital cost of taking steps to avoid using that future energy. As the recent Ford Foundation sponsored energy study, Energy: The Next Twenty Years, states the case:

> We mean by conservation those energy-saving investments, operating decisions, and changes in the goods and services that we buy and use that save money over the life of energy-consuming products. Money can be saved by substituting intelligence, prudence, maintenance, better equipment, or different equipment for purchased energy; the substitution should be made up to the point where the cost of not using the energy is equal to the cost of the energy saved.

By ignoring the life cycle costs of buildings, the Department's strategy established standards that had no sound analytic basis. The House Report on H.R. 8650, an earlier version of the bill that was eventually passed establishing BEPS, made it clear that this economic basis was what Congress had in mind. The Report noted that the bill was designed to:

> introduce discipline in the construction process which will result in lower costs to the consumer and in higher quality buildings. The Committee recognizes that the construction of more energy efficient buildings will result in higher development or initial

> costs under CURRENT DESIGN PRACTICES. However, the Committee received abundant evidence that the potential reductions in annual utility bills can offset the annual amortization costs of fairly substantial increases in front end construction costs. . . . The Committee does not regard the higher capital costs involved in energy efficient buildings to have any serious consequences with respect to the marketability of homes. . . ." H.R. Report No. 94-377, 94th Congress, 1st Session, 3 (1975).

A technically-based standard is virtually impossible to revise intelligently as fuel prices rise, since the cost/benefit calculations that form the basis of such analysis are completely missing.

For whatever combination of reasons, the Department abandoned its original goal of promulgating final regulations in February, 1979. Instead, a major new research program was undertaken in order to put the BEPS on a sounder intellectual footing. The fruits of this further labor are now available within the last few days. Let us now turn to an analysis of the new format of the BEPS.

Standard for Residential Buildings:

For the revision of BEPS, the Department undertook a number of economic studies in order to determine the life cycle costs of residential buildings. The preamble to the Notice of Proposed Rulemaking states that such a life-cycle analysis "permitted the use of well-defined economic criteria that have the potential of maximizing the net economic benefits to homeowners and to the Nation, as well as achieving maximum practicable energy conservation." In carrying out the life-cycle analysis, however, the Department constrained itself in a number of ways. It considered the use of energy conservation measures and techniques only if they are currently in common practice in the United States. Included were such conventional and timid measures as increased levels of insulation in the walls, ceilings, and floors, and use of double and triple glazing. Similarly, no conservation measure that required any significant changes in behavior or level of amenity of the occupants was permitted. For calculation of costs and benefits, the Department used the Energy Information Administration's Series B Midterm Price Forecast (44 Federal Register 25369, April 30, 1979). The discount rate was set at 3 percent, corresponding to an interest rate 3 percent higher than the inflation rate. No doubt there will be wide and merited discussion concerning whether these parameters are correct, in view of the trend of price rises and the discount rates actually used by individuals in their own economic calculations.

What effects are the BEPS likely to have on real houses? Of course, in one sense, it is impossible to answer this question. By legislative design and purpose, the federal government is not to use these standards to dictate any particular architectural solution to meeting the standard. But in actual practice, the Department from the first recognized that small builders and designers would need assistance in understanding what kinds of buildings would be likely to pass an inspection based on BEPS. Therefore, the government intends to provide a number of "cookbook" solutions for use by designers. The HUD Minimum Property Standards will be revised so that builders complying with them will also automatically comply with BEPS. Instructions will be given concerning modifications that are necessary in ASHRAE Standard 90-75 in order to make buildings designed to meet it also meet BEPS.

Most helpfully for persons trying to understand the effect of BEPS in the real world, the Notice of Proposed Rulemaking contains a sample list of measures that could

be taken in order in the design of a single-family residence in order to comply with the Standards. Let us look at two examples:

- For a gas heated home located in Chicago, Illinois, a designer could follow any of these three paths: (1) windows 15 percent of floor area distributed equally on the four walls, triple glazing, R-38 ceiling and R-19 wall insulation; or (2) windows redistributed so that south facing window area is increased by 75 percent, and east, west, and north facing window area is decreased by 25 percent, double glazing, and R-38 ceiling and R-19 wall insulation; or (3) an active solar domestic hot water heating system supplying 60 percent of the hot water needs of the home, double glazing, an R-38 ceiling and R-11 wall insulation.

- For an electrically heated home in Atlanta, Georgia, a designer could meet the standards in a number of ways, including by following any of these three packages: (1) windows 15 percent of the floor area distributed equally on the four walls, triple glazing, R-38 ceiling, R-19 wall, and R-11 floor insulation, heating supplied by a heat pump; or (2) windows redistributed so that south facing window area is increased by 80 percent, and east, west, and north facing window area is decreased by 27 percent, double glazing, R-38 ceiling, R-19 wall, and R-11 floor insulation, heating supplied by a heat pump; or (3) an active solar domestic hot water heating system supplying 60 percent of the hot water needs of the home, double glazing, R-30 ceiling, R-19 wall, and R-11 floor insulation, heating supplied by electric resistance.

The careful reader will have noticed that although the heating loads vary enormously between Chicago and Atlanta (on base 65 F^{o}, Chicago accumulates 6639 degree days, while Atlanta accumulates only 2961), the strategies that must be used to meet the BEPS are essentially identical. How can this be when the heating needs are so different? The explanation lies in the fuels the designer chose for heating: the Chicago home uses natural gas, while the Atlanta home uses electricity. The Department is thus taking into account more than just the energy use that registers on the customer's meter; it is subjecting this consumed energy to different weighting factors for each fuel type. What are these weighting factors? In effect, they are numbers assigned to each fuel type; the designer is required to multiply the amount of electricity, natural gas, or oil by the appropriate weighting factor before he adds up the number of BTUs per square foot per year the building uses.

How are these weighting factors derived? The weighting factor in the current version of the BEPS starts with the average price of fuel consumed. (Average prices of energy are based on the existing mix of old and new energy sources; replacement costs are the costs of new energy sources such as a new powerplant.) Naturally, if the BEPS propose to use economic criteria for evaluating life cycle costs, only the replacement or marginal cost of energy consumed is the proper measure of the value of energy consumed. Since the homeowner must make the choice between avoiding energy consumption (i.e., buying conservation) at marginal costs, only by considering the marginal costs of energy not consumed can the equation work fairly. As the Ford Foundation study notes, average prices

> are typically below the cost to the nation of replacing the energy consumed -- that is, they are below the marginal cost of the energy. Analysis of the regulations based solely on prices paid by the consumer will therefore understate the value to the nation of more energy-efficient buildings.

> This failure to use the regulatory process for correcting deficiencies in the residential energy market is unfortunate because the housing market is almost a classic case in which intelligently conceived regulation has a place. Homebuyers do not generally think in terms of life cycle costing. ... A standard that ... took into account the benefits of energy conservation to both the consumer and to the nation, and that permited exceptions in cases where direct regulation was inappropriate would have a great deal to commend it.

The weighting factors used by DOE also include a premium for oil and natural gas, in order to press building designers away from using these fuels. Finally, the weighting factors were based on national averages, not on regional differences in fuel costs or availability. The weighting factors chosen by DOE are as follows:

Building Type	Natural Gas	Oil	Electricity
Single-Family Residential	1.0	1.22	2.79
Commercial and Multi-family Residential	1.0	1.20	3.08

The effect of these weighting factors is to make it more "expensive" in any given energy budget to use electricity, somewhat less "expensive" to use oil, and least "expensive" to use natural gas. Solar energy and other renewable energy resources are "free" according to this scheme, so the use of such sources is highly encouraged. The other effect of the weighting factors, of course, is to announce in effect a fuels policy for the American building industry.

How Strict are the BEPS?

Any detailed analysis of the BEPS for residences is certainly premature at this time. The Department based many of its decisions on Technical Support Documents (TSDs) that were not publicly released at the time the proposed rule was published in the Federal Register. These TSDs cover such crucial analytic topics as "Energy Budget Levels Selection," "Weighting Factors," "Economic Analysis," and "Passive and Active Solar Heating Analyis." Neither is it necessary to offer a detailed criticism of rules that may well be improved by the comment process. Nonetheless, one can legitimately look to the cast of mind of the Department as it selected these budget figures. In the selection of the energy budget figures for homes, the department considered four levels: the level they chose, 10 percent tighter, 20 percent tighter, and 25 to 30 percent looser. Energy savings were 11 quads (summed over the 40 years from 1980 to 2020) for the alternative selected, but 16.5 quads for the tightest standard. Both the standard selected and the tightest standard were found to have approximately equal and favorable economic impacts on the nation and on the homeowner. The first costs of the alternative selected would be between $750 and $1,500 added to the base cost; for the tightest alternative, the additional first cost ranges from $1,500 to $3,000 (although the Department's analysis shows this first cost will tend to be smaller as new energy conservation technology is introduced to meet the tighter standard). Yet in spite of the additional energy saved, the benefits to homeowner and nation, and the relatively small additional first cost, DOE selected the less favorable alternative on the basis of "the difficulty of achieving those levels at the present time." This reasoning is hard to understand if BEPS are to be a technology forcing regulation.

Standards for Non-Residential Buildings:

For non-residential buildings, the Department was unable to conduct the kind of life cycle analysis that they did on the single family dwellings. Therefore, the proposed rules are based on the older, technically-based data base collected by AIA/RC. Using the Phase II buildings redesigned by their original architects following the three day energy conservation course, the Department looked at three budget levels for such buildings. R_{30} means that 30 percent of all building redesigns for that building type achieved that level of design energy requirement or lower. DOE calls this "strict." R_{50} indicates that 50 percent met the figure; this is called "nominal." R_{70} means that 70 percent met that level of performance; this is called "lenient" (DOE's calculations reveal that for a large office building in Kansas City, these levels of performance translate into the following number of BTUs per square foot per year: R_{30} = 46 MBtu/sq. ft./yr; R_{50} = 49 MBtu/sq. ft./year; and R_{70} = 51 MBtu/sq. ft./year.) Again, in each case, DOE found that "the net present value to the Nation of the proposed Energy Budget Levels was greatest for the strict case and lowest for the lenient case. Thus, national economic benefits are greatest for the more strict levels." Likewise, DOE reveals that in a preliminary life cycle study of a large office building, "there are designs that are economically beneficial at design energy requirement levels more stringent than those achieved by most of the redesigns in Phase II."

Nonetheless, DOE feared that designers would have difficult in reaching strict levels not because of costs or technical constraints, but merely because of "unfamiliarity of design professionals with energy efficient design strategies and available technology." For this reason, DOE has selected the following levels:

- Large and small office buildings: R_{30} ("strict").
- Hospitals and multifamily low rise residential buildings: R_{70} ("lenient").
- All other commercial and multifamily residential buildings: R_{50} ("nominal").

Again, as a preliminary matter, it appears unwise to select standards on the basis that design professionals are unfamiliar with existing technology; a better strategy would be to set stricter standards and let the manufacturers, trade associations, continuing education course instructors, and the federal Energy Extension Service educate the professionals to meet the new, higher standard.

Sanctions:

Finally, in this description of BEPS, it is worth discussing how they will actually come to have the force of law at the state and local level. The building code professionals are conservative and clannish; from the beginning, there has been considerable distrust of the federal effort, and an active movement on the part of some states to have alternative energy conservation building codes in place in order to head off the federal BEPS when it finally emerged.

Unfortunately, Congress in the original legislation devised a Draconian remedy, one that is so excessive that it certainly would never be used. According to Section 305(c) of the Energy Conservation and Production Act, the President is to transmit the final BEPS regulations to Congress with a recommendation concerning their adoption. Congress then has ninety days in which to consider them. If both Houses pass a resolution approving the regulations, they become effective. Following that, any state that does not adopt BEPS or its equivalent, can lose all federal financial assistance for building. This includes "any form of loan, grant, guarantee, insurance, payment, rebate, subsidy, or any other form of direct or indirect Federal assistance"

and "any loan made or purchased by any bank, savings and loan association, or similar institute subject to regulation" by the federal government or insurance by a government agency. This sanction is equivalent to sending policemen out in patrol cars, equipped only with fragmentation bombs: cutting off all federal aid to the building industry is too extreme a penalty ever to be imposed by Congress on any state.

We may hope that in its consideration of the standards themselves, Congress will try to develop a more graduated set of incentives and penalties for states that refuse to adopt BEPS or its equivalent. Training grants for state and local officials, incentive payments to state building agencies, educational efforts for the national code groups and voluntary organizations, and partial withholding of federal benefits are a better array of carrots and sticks with which to equip DOE.

The Conservation Foundation
1717 Massachusetts Avenue, N.W., Washington, D.C. 20
Telephone (202)797-4300 Cable CONSERVIT

December 27, 1979

Dear LWV Leader:

The federal Department of Energy has recently released a proposed regulation that could do more for energy conservation in the future than any other single action taken this year. This regulation announces the Building Energy Performance Standards (BEPS), a program established by Congress to regulate the amount of energy that any new building -- including homes and offices -- can use.

The Conservation Foundation has received a small grant from the Department of Energy to work with environmental and conservation groups to let them know about the proposed regulations, to help them prepare for the public hearings, and to serve as a technical resource for those who want to testify or prepare written comments on the rules.

I recently talked to several people at the national League office, including Dotty Powers (the National Energy Chair), Isabelle Weber (Director, Energy Department of the LWV Education Fund), and Lloyd Leonard (Action Department, LWV-US). They were enthusiastic about having key League leaders learn about the regulations. Your name was one of the ones the national office supplied to me for this purpose.

In this envelope, I am enclosing the materials that we have already mailed to others on our mailing list. You will find (1) a cover letter announcing the availability of the Notice of Proposed Rulemaking; (2) a copy of the Proposed Rule; and (3) a short history of energy conservation regulation of buildings for background reading.

We intend to send out short analytic materials every few days over the next few weeks. It would be helpful to know, in advance, if you are interested in receiving this material or whether there is someone else who should be added (or substituted) on our mailing list. For this purpose, we have enclosed a postcard in order to make sure you want to receive this material. Could you please fill out the postcard as soon as possible so we can have an accurate mailing list targeting those particularly interested in the topic.

Sent Isabelle's name 12-31-79

Time is very short for public comment on this important regulation. If you want any information or assistance in participating in the public comment opportunity, please call me collect at 202/797-4370.

We look forward to working with you on this project.

Yours very truly,

Grant P. Thompson

Grant P. Thompson
Senior Associate

The Conservation Foundation
1717 Massachusetts Avenue, N.W., Washington, D.C. 20
Telephone (202)797-4300 Cable CONSERVIT

December 27, 1979

Dear Friend:

A lot of time has passed since you first asked us to keep you up to date on what the U.S. Department of Energy is doing on the Building Energy Performance Standards (BEPS). The delay has been the Department's slowness in getting proposed rules out for comment. But they finally have acted and I am delighted to enclose a copy of those proposed rules for you to review.

I am less delighted to let you know that the Department has decided to start the public hearings on January 28 and that the comment period for members of the public ends February 26. (You can find the schedule for public hearings and the comment procedure at the beginning of the proposed rule.) This short time is particularly shocking since many of the Technical Support Documents (TSDs) that underlie this proposed rule are still unavailable to the public.

This tight comment period is obviously very difficult for members of the public who must try to read and absorb a mass of technical data, presented in a not-very-lively fashion, over the Holidays, without the technical data necessary for understanding crucial decisions, all in a few short weeks. We understand that The White House is considering asking the Department of Energy to extend the comment period. We also understand that a number of Members of Congress are interested in this subject, although uncertain whether there is any interest among their constituents. At the Department of Energy here in Washington, D.C., the crucial decision-maker is Dr. Maxine Savitz, Acting Assistant Secretary for Conservation and Solar; the lead person at The White House is Mr. Harry K. Schwartz of the Domestic Policy Staff in the Old Executive Office Building.

In the meantime, the environmental community needs to react to this proposed rule. Over the next few weeks, The Conservation Foundation, working under a grant from the Department of Energy, will be mailing a series of "fact sheets" to you on the proposed rule. These fact sheets will assist you in reading and understanding the proposed rule and picking out for special analysis sections or decisions that are especially important from the environmental point of view. Those of you who are willing or able to attend a public hearing and testify should let me know (via a collect call to 202/797-4370) so we can provide you special assistance. In addition, if you are willing to prepare written comments, again let us know so we can provide technical support for your analysis.

Thank you for taking the time to work on BEPS. Although the details are technical, the basic concept -- that Americans can build homes and offices that are a credit to the nation, not a shame -- is too important to leave to the experts.

Yours very truly,

Grant P. Thompson

Grant P. Thompson
Senior Associate

Encl: Proposed Rule (BEPS)

INFORMATION NEEDED ON THE POSTCARD:

- Your name, preferred address (including Zip Code) and daytime telephone number (including area code).
- Do you wish to continue receiving materials on BEPS?
- If you do not wish to receive materials on BEPS or if there is someone who could use it better than you can, please give us his/her name and address. We will remove your name and, if you have supplied another name, substitute that name for yours.
- If there is someone in addition to you who could use material on BEPS, please give us his/her name and address.
- If you would like to participate in a public hearing (see Notice of Proposed Rulemaking for cities and dates) or would like to submit written comments and need assistance, please mark this on the postcard or call us collect at 202/797-4370.

The Conservation Foundation
1717 Massachusetts Avenue, N.W., Washington, D.C
Telephone (202)797-4300 Cable CONSERVIT

December 27, 1979

Dear Friend:

We recently sent you the Notice of Proposed Rulemaking (NOPR) issued by the Department of Energy on the federal Building Energy Performance Standards (BEPS). If you have not received the NOPR, please let me know as soon as possible so that we can mail you another one.

With this mailing, The Conservation Foundation is beginning its program of distributing information to the environmental/conservation community concerning issues raised by BEPS. Our present plan is to mail frequent, short "BEPS Grams" to you, each one only a very few pages long, covering a single topic. We hope that by keeping them short and topic-oriented, we will not overwhelm you with too much information all at once.

This first mailing somewhat violates our desire to keep materials short. But in order to understand much of what appears in BEPS, it is helpful to know the history of the Standard and its precursors. Therefore, we are burdening you with a somewhat longer paper in this mailing. The paper describes the history of BEPS, outlines some of the important issues it raises, and provides a few initial reactions to the Standards from the conservation point of view.

As you know, there is an opportunity for public comment (both at public hearings and by written submissions). If you want to appear at a public hearing, you must follow the procedure set out in the NOPR in order to reserve time. We may be able to provide you with technical assistance for preparing your presentation. If you would like this assistance, please call us collect at 202/797-4370.

Thank you again for your assistance on this BEPS project. The issues that BEPS raises are important to the environment and to energy consumption patterns in this country. Only if enough citizens who care about these issues participate in the comment process will the Standards be as strong as they ought to be.

Yours very truly,

Grant P. Thompson

Grant P. Thompson
Senior Associate

THE BACKGROUND TO BEPS

This paper has two parts. First, there is a short description of the pre-BEPS standards and codes that regulated energy consumption. Second, the BEPS are described and criticized.

Energy Standards for New Construction: Pre-BEPS

Regulation of energy use within buildings does not have a long history in this country. To be sure, a few examples of requirements for relatively minimal amounts of insulation can be found, but before 1970 there was little general interest in energy-efficient construction. The most wide-spread program was not mandatory, but was a set of voluntary guidelines adopted by electric utility companies interested in making the cost of operating electric heating competitive. Homes that complied with the guidelines were awarded a Gold Medallion. The first systematic, nationwide interest in energy conservation for buildings came as a reaction to the oil embargo of 1973-74. At that time, a voluntary group representing the heating, cooling, and ventilating professions began the process of drawing up an energy efficiency code for new buildings. The group, the American Society of Heating, Refrigeration, and Air-conditioning Engineers, Inc. (ASHRAE), intended to add to their growing list of standards covering subjects ranging from ventilation rates to humidity control. Because the standard was to be the nintieth in the list of ones they had developed, it was called Standard 90P, the "P" standing for proposed.

ASHRAE and other similar voluntary professional societies were experienced in developing standards and had developed a process for making certain that all economically affected parties had an opportunity to comment on and offer revisions to a standard before it was issued in final form. This so-called consensus process demands Herculean devotion from its participants who voluntarily attend meeting after meeting without pay or travel expenses, arguing over comments ranging from word changes to the most fundamental revisions. The consensus process, by its very nature, guarantees that any standard surviving the process will have two characteristics: it will not be unacceptably controversial and it will have had little input from any person who did not have some strong (usually economic) reason to donate a very large amount of time and effort to the process. ASHRAE standards are extremely influential. Their influence comes from the fact that they are technically sound, generally accepted by most directly affected interest groups, and usually cover highly technical subjects that no non-federal level of government would have the resources to regulate thoroughly and accurately. For this reason, many local or state laws and ordinances simply refer to a particular standard, thus giving it the force of law.

ASHRAE issued its standard in final form in 1975, and it was given a suffix indicating its vintage: Standard 90-75. In the meantime, Congress had reacted for the first time to the energy crisis by passing the Energy Policy and Conservation Act (P.L. 94-163, effective December 22, 1975). Section 362 of that Act required each state to develop energy conservation plans that included five mandatory provisions. One of those provisions was "mandatory thermal efficiency standards and insulation requirements for new and renovated buildings." The federal government seized upon ASHRAE Standard 90-75, declaring that any state that adopted the Standard or its equivalent would be deemed to have complied with the Energy Policy and Conservation Act, and thus be eligible for federal assistance. In order to assist states in using ASHRAE Standard 90-75 even more rapidly, the federal government funded another voluntary group, the National Conference of States on Building Codes and Standards, to

change the Standard (a format that is unsuitable for enactment) into a code format, which local building code departments could apply. NCSBCS also developed, under contract to the federal government, a set of training courses for building code officials to familiarize them with the code based on ASHRAE Standard 90-75.

The ASHRAE standard is what is called a "component-performance" standard. This means that the builder is instructed to look at each element of a building (that is, the walls, the floor, the ceiling, the heating plant, and so on) and make certain that each one of those components had a certain minimum thermal integrity or performance. Any builder assembling a building made up of various elements, each of which had passed the Standard, would be guaranteed that the final building would be in compliance with the Standard.

This component-performance standard is relatively easy to administer, but various groups, spearheaded by the American Institute of Architects, argued that such a standard stifled innovation in building design and, in many cases, mandated construction practices that were actually wasteful of energy. After considerable efforts at persuasion, proponents of this viewpoint prevailed on Congress to mandate that states follow a quite different approach, one that looked at the total energy performance of a building. In the Energy Conservation and Production Act (P.L. 94-385, effective August 14, 1976) Congress required the Department of Energy to develop performance standards for new buildings. Section 303(9) of ECPA defined a performance standard as "an energy consumption goal or goals to be met without specification of the methods, materials, and processes to be employed in achieving that goal or goals, but including statements of the requirements, criteria and evaluation methods to be used, and any necessary commentary." The critics of the component performance standards had won a victory in the legislative arena. They had also set the Department of Energy on a long, technical, controversial, and demanding course, whose end is not yet in sight.

Development of BEPS and Critique of Their Current Form

The original legislation mandating development of BEPS gave the government three years -- that is, until August 14, 1979 -- to develop the standards in their final form. The fact that BEPS were just issued in proposed form on November 28, 1979 gives some clue of the actual schedule that has been followed. It goes without saying that criticisms of BEPS at this point can only be based on the Proposed Notice of Rulemaking (to be found in 44 Federal Register 68120). Changes are both desirable and likely in the final form of the rule. The present schedule calls for promulgation of the regulations in May, 1980. However, the Department is seeking to find more time to revise and rework parts of the rule. It may well be toward the end of 1980 before final rules are available.

Under the original legislation, both the technical standard for BEPS and the implementation plan were to have been developed by the Department of Housing and Urban Development. Congress transferred the authority to develop the technical basis for the standard to the Department of Energy; however, it left the implementation development with HUD. It soon became clear that this arrangement was unworkable, since the standard development and the implementation plans are so closely allied to one another. Therefore, the two Departments entered into a Memorandum of Understanding, delegating implementation to DOE. In a confusing recent development, HUD suddenly refused to renew the Memorandum, then just as suddenly agreed to renew it. The early development of both the BEPS standard and the implementation plan were carried out at HUD. This transfer and retransfer of authority has added enormously to the difficulty of developing a workable standard.

In the early stages of standard development, HUD chose the American Institute of Architects Research Corporation as the lead contractor for the standards. In broad outline, HUD and AIA/RC decided to look at what American builders were actually designing shortly after the oil embargo, then use the best of those actual designs as the new standard for all builders. This method of setting a standard demonstrated that HUD and AIA/RC had two strong views of energy conservation in buildings. First, it showed they believed it should be based on present technology in actual use. This view is contrary, in our opinion, to the intent of the legislation, which sought to use BEPS as a technology-forcing device, bringing new designs and new technics into common use. Second, it showed that HUD and AIA/RC did not share the economists' view of energy conservation (that it is simply cost-minimization), but rather took the engineers' view (that it is plugging leaks as their existence becomes known to you).

Let us now turn to a somewhat more detailed description of the process AIA/RC followed in developing the standards. Although some of this story is now simply history, the data collected in the effort continues to exert a strong influence on the Department of Energy's views concerning what builders can actually do. AIA/RC began by surveying a large number of buildings designed during 1974-75. This period was picked both because designs were available, and because it was assumed that designers and engineers had by then taken new, higher prices into account. Enough buildings were selected so that a statistically significant sample was available for various building use categories and climate zones (defined on the basis of heating degree days only). AIA/RC used a sample size of 1,661 non-residential buildings. Data drawn from the plans of each of these 1,661 buildings were entered into a computer that estimated the amount of energy the building would consume, using a proprietary program (AXCESS) developed by the Edison Electric Institute. The computer output consisted of a figure showing how many British Thermal Units (BTUs) of energy each building would use per square foot per year.

The data generated by AXCESS permitted AIA/RC to prepare an matrix of American non-residential buildings, organized by climate zone, by building type, and by predicted energy consumption. (For example, by looking at the data books, it was possible to show a range of energy use per square foot for hotels located in climate zone 7.) This large data collection effort formed the basis for standard setting.

In order to test how much further an average designer could improve on a design, the AIA/RC then selected a sample of about 10 percent of those buildings and asked the architect teams who designed 161 buildings to attend a three-day training session on energy conservation in building design. Following this intensive session, each design team was asked to redesign their original building, but to do it within the original budget guidelines established by the client, with no additional use of active solar energy, and complying with any particular requests of the client no matter what their energy consequences might be. The result of this Phase II redesign effort should give all of us renewed hope for the future of American education! Fully 80 percent of the redesigns were so good that if they had been categorized with the original 1,661 buildings, they would have fallen at or above the top fifth of that group as measured by energy efficiency.

In the case of residential buildings, the Department took a different approach, although it was likewise one based on technical improvements in the building stock. Using data collected for a different purpose by the National Association of Home Builders, the Department analyzed the energy consumption of these residences using a computerized version of the ASHRAE Modified Degree Day Method. Experienced designers were asked to develop prototype residences that were based on the median

characteristics of the houses surveyed. These prototypes were then re-analyzed for energy consumption. Again, a technically-based methodology was used in order to set the energy performance standards.

Based on the analysis of the AIA/RC and the NAHB data, the Department selected energy budget figures that would have forced designers of all non-residential buildings subject to the BEPS to be as conscious of energy as were the better third to fifth of their colleagues. In the case of homes, builders would have been required to comply with the Thermal Performance Guidelines issued by the National Association of Home Builders. This form of the BEPS was released in an Advance Notice of Proposed Rulemaking at the end of 1978.

The criticism of these preliminary BEPS was immediate and harsh. Although there were many detailed criticisms of particular provisions, three important drawbacks were noted:

First, the standards were based simply on existing technology and based on buildings in which energy was not particularly singled out for special attention. Even in the case of the Phase II redesigns, the design teams were constrained by considerations that showed little sensitivity to use of new techniques, new machinery, and new ways of persuading clients and designers to save energy.

Second, the standards were based on buildings that were designed almost immediately after the original oil embargo. The market had not had time to readjust to the higher prices, and many clients and architects believed that the crisis would soon be over with a return to lower prices. The standards that the Department was proposing to issue stated, in effect, that in the 1980s, American designers were required to design buildings only as well as many of their colleagues were already doing in 1974.

Third, and most fundamentally, the technically-based standards ignored the most basic question of energy consumption and conservation: what is the economic balance between the discounted present cost of using energy in the future and the capital cost of taking steps to avoid using that future energy. As the recent Ford Foundation sponsored energy study, Energy: The Next Twenty Years, states the case:

> We mean by conservation those energy-saving investments, operating decisions, and changes in the goods and services that we buy and use that save money over the life of energy-consuming products. Money can be saved by substituting intelligence, prudence, maintenance, better equipment, or different equipment for purchased energy; the substitution should be made up to the point where the cost of not using the energy is equal to the cost of the energy saved.

By ignoring the life cycle costs of buildings, the Department's strategy established standards that had no sound analytic basis. The House Report on H.R. 8650, an earlier version of the bill that was eventually passed establishing BEPS, made it clear that this economic basis was what Congress had in mind. The Report noted that the bill was designed to:

> introduce discipline in the construction process which will result in lower costs to the consumer and in higher quality buildings. The Committee recognizes that the construction of more energy efficient buildings will result in higher development or initial

> costs under CURRENT DESIGN PRACTICES. However, the Committee received abundant evidence that the potential reductions in annual utility bills can offset the annual amortization costs of fairly substantial increases in front end construction costs. ... The Committee does not regard the higher capital costs involved in energy efficient buildings to have any serious consequences with respect to the marketability of homes. ..." H.R. Report No. 94-377, 94th Congress, 1st Session, 3 (1975).

A technically-based standard is virtually impossible to revise intelligently as fuel prices rise, since the cost/benefit calculations that form the basis of such analysis are completely missing.

For whatever combination of reasons, the Department abandoned its original goal of promulgating final regulations in February, 1979. Instead, a major new research program was undertaken in order to put the BEPS on a sounder intellectual footing. The fruits of this further labor are now available within the last few days. Let us now turn to an analysis of the new format of the BEPS.

Standard for Residential Buildings:

For the revision of BEPS, the Department undertook a number of economic studies in order to determine the life cycle costs of residential buildings. The preamble to the Notice of Proposed Rulemaking states that such a life-cycle analysis "permitted the use of well-defined economic criteria that have the potential of maximizing the net economic benefits to homeowners and to the Nation, as well as achieving maximum practicable energy conservation." In carrying out the life-cycle analysis, however, the Department constrained itself in a number of ways. It considered the use of energy conservation measures and techniques only if they are currently in common practice in the United States. Included were such conventional and timid measures as increased levels of insulation in the walls, ceilings, and floors, and use of double and triple glazing. Similarly, no conservation measure that required any significant changes in behavior or level of amenity of the occupants was permitted. For calculation of costs and benefits, the Department used the Energy Information Administration's Series B Midterm Price Forecast (44 Federal Register 25369, April 30, 1979). The discount rate was set at 3 percent, corresponding to an interest rate 3 percent higher than the inflation rate. No doubt there will be wide and merited discussion concerning whether these parameters are correct, in view of the trend of price rises and the discount rates actually used by individuals in their own economic calculations.

What effects are the BEPS likely to have on real houses? Of course, in one sense, it is impossible to answer this question. By legislative design and purpose, the federal government is not to use these standards to dictate any particular architectural solution to meeting the standard. But in actual practice, the Department from the first recognized that small builders and designers would need assistance in understanding what kinds of buildings would be likely to pass an inspection based on BEPS. Therefore, the government intends to provide a number of "cookbook" solutions for use by designers. The HUD Minimum Property Standards will be revised so that builders complying with them will also automatically comply with BEPS. Instructions will be given concerning modifications that are necessary in ASHRAE Standard 90-75 in order to make buildings designed to meet it also meet BEPS.

Most helpfully for persons trying to understand the effect of BEPS in the real world, the Notice of Proposed Rulemaking contains a sample list of measures that could

be taken in order in the design of a single-family residence in order to comply with the Standards. Let us look at two examples:

- For a gas heated home located in Chicago, Illinois, a designer could follow any of these three paths: (1) windows 15 percent of floor area distributed equally on the four walls, triple glazing, R-38 ceiling and R-19 wall insulation; or (2) windows redistributed so that south facing window area is increased by 75 percent, and east, west, and north facing window area is decreased by 25 percent, double glazing, and R-38 ceiling and R-19 wall insulation; or (3) an active solar domestic hot water heating system supplying 60 percent of the hot water needs of the home, double glazing, an R-38 ceiling and R-11 wall insulation.

- For an electrically heated home in Atlanta, Georgia, a designer could meet the standards in a number of ways, including by following any of these three packages: (1) windows 15 percent of the floor area distributed equally on the four walls, triple glazing, R-38 ceiling, R-19 wall, and R-11 floor insulation, heating supplied by a heat pump; or (2) windows redistributed so that south facing window area is increased by 80 percent, and east, west, and north facing window area is decreased by 27 percent, double glazing, R-38 ceiling, R-19 wall, and R-11 floor insulation, heating supplied by a heat pump; or (3) an active solar domestic hot water heating system supplying 60 percent of the hot water needs of the home, double glazing, R-30 ceiling, R-19 wall, and R-11 floor insulation, heating supplied by electric resistance.

The careful reader will have noticed that although the heating loads vary enormously between Chicago and Atlanta (on base 65 F^{o}, Chicago accumulates 6639 degree days, while Atlanta accumulates only 2961), the strategies that must be used to meet the BEPS are essentially identical. How can this be when the heating needs are so different? The explanation lies in the fuels the designer chose for heating: the Chicago home uses natural gas, while the Atlanta home uses electricity. The Department is thus taking into account more than just the energy use that registers on the customer's meter; it is subjecting this consumed energy to different weighting factors for each fuel type. What are these weighting factors? In effect, they are numbers assigned to each fuel type; the designer is required to multiply the amount of electricity, natural gas, or oil by the appropriate weighting factor before he adds up the number of BTUs per square foot per year the building uses.

How are these weighting factors derived? The weighting factor in the current version of the BEPS starts with the average price of fuel consumed. (Average prices of energy are based on the existing mix of old and new energy sources; replacement costs are the costs of new energy sources such as a new powerplant.) Naturally, if the BEPS propose to use economic criteria for evaluating life cycle costs, only the replacement or marginal cost of energy consumed is the proper measure of the value of energy consumed. Since the homeowner must make the choice between avoiding energy consumption (i.e., buying conservation) at marginal costs, only by considering the marginal costs of energy not consumed can the equation work fairly. As the Ford Foundation study notes, average prices

> are typically below the cost to the nation of replacing the energy consumed -- that is, they are below the marginal cost of the energy. Analysis of the regulations based solely on prices paid by the consumer will therefore understate the value to the nation of more energy-efficient buildings.

> This failure to use the regulatory process for correcting deficiencies in the residential energy market is unfortunate because the housing market is almost a classic case in which intelligently conceived regulation has a place. Homebuyers do not generally think in terms of life cycle costing. ... A standard that ... took into account the benefits of energy conservation to both the consumer and to the nation, and that permited exceptions in cases where direct regulation was inappropriate would have a great deal to commend it.

The weighting factors used by DOE also include a premium for oil and natural gas, in order to press building designers away from using these fuels. Finally, the weighting factors were based on national averages, not on regional differences in fuel costs or availability. The weighting factors chosen by DOE are as follows:

Building Type	Natural Gas	Oil	Electricity
Single-Family Residential	1.0	1.22	2.79
Commercial and Multi-family Residential	1.0	1.20	3.08

The effect of these weighting factors is to make it more "expensive" in any given energy budget to use electricity, somewhat less "expensive" to use oil, and least "expensive" to use natural gas. Solar energy and other renewable energy resources are "free" according to this scheme, so the use of such sources is highly encouraged. The other effect of the weighting factors, of course, is to announce in effect a fuels policy for the American building industry.

How Strict are the BEPS?

Any detailed analysis of the BEPS for residences is certainly premature at this time. The Department based many of its decisions on Technical Support Documents (TSDs) that were not publicly released at the time the proposed rule was published in the Federal Register. These TSDs cover such crucial analytic topics as "Energy Budget Levels Selection," "Weighting Factors," "Economic Analysis," and "Passive and Active Solar Heating Analyis." Neither is it necessary to offer a detailed criticism of rules that may well be improved by the comment process. Nonetheless, one can legitimately look to the cast of mind of the Department as it selected these budget figures. In the selection of the energy budget figures for homes, the department considered four levels: the level they chose, 10 percent tighter, 20 percent tighter, and 25 to 30 percent looser. Energy savings were 11 quads (summed over the 40 years from 1980 to 2020) for the alternative selected, but 16.5 quads for the tightest standard. Both the standard selected and the tightest standard were found to have approximately equal and favorable economic impacts on the nation and on the homeowner. The first costs of the alternative selected would be between $750 and $1,500 added to the base cost; for the tightest alternative, the additional first cost ranges from $1,500 to $3,000 (although the Department's analysis shows this first cost will tend to be smaller as new energy conservation technology is introduced to meet the tighter standard). Yet in spite of the additional energy saved, the benefits to homeowner and nation, and the relatively small additional first cost, DOE selected the less favorable alternative on the basis of "the difficulty of achieving those levels at the present time." This reasoning is hard to understand if BEPS are to be a technology forcing regulation.

Standards for Non-Residential Buildings:

For non-residential buildings, the Department was unable to conduct the kind of life cycle analysis that they did on the single family dwellings. Therefore, the proposed rules are based on the older, technically-based data base collected by AIA/RC. Using the Phase II buildings redesigned by their original architects following the three day energy conservation course, the Department looked at three budget levels for such buildings. R_{30} means that 30 percent of all building redesigns for that building type achieved that level of design energy requirement or lower. DOE calls this "strict." R_{50} indicates that 50 percent met the figure; this is called "nominal." R_{70} means that 70 percent met that level of performance; this is called "lenient" (DOE's calculations reveal that for a large office building in Kansas City, these levels of performance translate into the following number of BTUs per square foot per year: R_{30} = 46 MBtu/sq. ft./yr; R_{50} = 49 MBtu/sq. ft./year; and R_{70} = 51 MBtu/sq. ft./year.) Again, in each case, DOE found that "the net present value to the Nation of the proposed Energy Budget Levels was greatest for the strict case and lowest for the lenient case. Thus, national economic benefits are greatest for the more strict levels." Likewise, DOE reveals that in a preliminary life cycle study of a large office building, "there are designs that are economically beneficial at design energy requirement levels more stringent than those achieved by most of the redesigns in Phase II."

Nonetheless, DOE feared that designers would have difficult in reaching strict levels not because of costs or technical constraints, but merely because of "unfamiliarity of design professionals with energy efficient design strategies and available technology." For this reason, DOE has selected the following levels:

- Large and small office buildings: R_{30} ("strict").
- Hospitals and multifamily low rise residential buildings: R_{70} ("lenient").
- All other commercial and multifamily residential buildings: R_{50} ("nominal").

Again, as a preliminary matter, it appears unwise to select standards on the basis that design professionals are unfamiliar with existing technology; a better strategy would be to set stricter standards and let the manufacturers, trade associations, continuing education course instructors, and the federal Energy Extension Service educate the professionals to meet the new, higher standard.

Sanctions:

Finally, in this description of BEPS, it is worth discussing how they will actually come to have the force of law at the state and local level. The building code professionals are conservative and clannish; from the beginning, there has been considerable distrust of the federal effort, and an active movement on the part of some states to have alternative energy conservation building codes in place in order to head off the federal BEPS when it finally emerged.

Unfortunately, Congress in the original legislation devised a Draconian remedy, one that is so excessive that it certainly would never be used. According to Section 305(c) of the Energy Conservation and Production Act, the President is to transmit the final BEPS regulations to Congress with a recommendation concerning their adoption. Congress then has ninety days in which to consider them. If both Houses pass a resolution approving the regulations, they become effective. Following that, any state that does not adopt BEPS or its equivalent, can lose all federal financial assistance for building. This includes "any form of loan, grant, guarantee, insurance, payment, rebate, subsidy, or any other form of direct or indirect Federal assistance"

and "any loan made or purchased by any bank, savings and loan association, or similar institute subject to regulation" by the federal government or insurance by a government agency. This sanction is equivalent to sending policemen out in patrol cars, equipped only with fragmentation bombs: cutting off all federal aid to the building industry is too extreme a penalty ever to be imposed by Congress on any state.

We may hope that in its consideration of the standards themselves, Congress will try to develop a more graduated set of incentives and penalties for states that refuse to adopt BEPS or its equivalent. Training grants for state and local officials, incentive payments to state building agencies, educational efforts for the national code groups and voluntary organizations, and partial withholding of federal benefits are a better array of carrots and sticks with which to equip DOE.

CONSUMER ENERGY COUNCIL of AMERIC

1990 M Street NW Suite 620 Washington DC 20036-202-659-040

Formerly Energy Policy Task Force of the Consumer Federation of Amer

December 20, 1979

Dear Friend:

Now that the proposed rules for the Building Energy Performance Standards (BEPS) have been issued, the Consumer Energy Council of America has set dates for a series of eleven informational workshops around the country. The list of sites and dates is enclosed.

The workshops are being held in partnership with Rural America Inc./National Low-Income Housing Coalition (NLIHC) in each of the eleven cities. The Consumer Energy Council of America will conduct its workshop from 1-5 pm; Rural America Inc./NLIHC will follow with a workshop focusing on low-income issues from 6-8 pm.

Public hearings on BEPS are scheduled to begin January 28, 1980, and the comment period ends February 26. The schedule for the public hearings and details on the comment period are described in the beginning of the proposed rules. This is a remarkably short period of time for the public to digest and analyze regulations which are largely technical. Hopefully, our workshops will simplify the mass of data contained in BEPS and provide special assistance for those of you who wish to prepare oral or written testimony. Further technical assistance just prior to the hearings will also be available.

Despite any help we can provide, for many of you the time frame is prohibitive. If you believe, as we do, that more time should be provided, there are several avenues available for requesting an extension of the comment period. At the Department of Energy, Dr. Maxine Savitz, Deputy Assistant Secretary for Conservation and Solar, Room 2228, 20 Massachusetts Ave. NW, Washington, D.C. 20585, is responsible for the final decision. At the White House, the lead person would be Mr. Harry K. Schwartz of the Domestic Policy Staff, Old Executive Office Building, 1600 Pennsylvania Ave. NW, Washington, D.C. 20500. Many of you have Congressional representatives who may be interested in intervening if their constituents are concerned about the time factor. If you feel more time is needed, write to any of these individuals and please send us a copy of your correspondence.

-continued-

We urge you to attend the workshops and continue to work on BEPS. While we do not have the luxury of the two and a half years that the utility companies, the building industry, and state and local governments have had, we can certainly match their enthusiasm and make some cogent and incisive comments about the regulations.

Rural America Inc. has limited funds available for travel reimbursement for those who cannot afford the expense. Please complete the appropriate attendance/travel reimbursement application forms if you plan to attend the informational seminars.

Best wishes for a happy holiday season!

Sincerely,

Ellen Berman

Ellen Berman
Executive Director

CONSUMER ENERGY COUNCIL of AMERIC

1990 M Street NW Suite 620 Washington DC 20036-202-659-040

Formerly Energy Policy Task Force of the Consumer Federation of Ame

Sent in questionnaire 12/13

November 5, 1979

Dear Friend,

Thank you for your recent inquiry concerning our role in the development of the Building Energy Performance Standards (BEPS), which have recently been issued in proposed form by the Department of Energy. BEPS could affect all of us for years to come. Depending on the nature of the Standards ultimately adopted, BEPS may conserve large amounts of energy and save consumers a great deal of money. Or, they may simply continue the status quo. Your input could determine the result.

The Consumer Energy Council of America -- a broad-based coalition of major national consumer, labor, farm, public power, rural electric cooperative, urban, and senior citizen organizations -- has received an award from the Department of Energy to provide information, technical assistance, and limited financial resources to assure consumer participation in the formulation of these important standards.

The skyrocketing cost of energy underscores the need for major conservation efforts. The cost of heating and cooling a home places a larger and larger burden on family budgets. Our alarming dependence on unstable supplies of imported oil points up the need to drastically increase our use of renewable energy sources, such as solar and wind power.

BEPS have the potential to cut residential energy costs, conserve resources, and encourage the use of renewables. Rather than specifying the components a building must use to be energy efficient, BEPS will set a limit on the amount of energy a given type of building in a given climate zone may use. But BEPS will let the architects and builders determine how this energy conservation goal will be achieved. With residential and commercial buildings consuming nearly one third of all primary energy used in the United States, BEPS could reduce our energy bills substantially.

Whether or not BEPS realize their potential of vast energy savings and lower energy bills for consumers could depend on how effectively consumers make their voices heard. Consumers will have an opportunity to do so this winter, when the Department of Energy holds public hearings on its proposed standards for BEPS. Hearings are now scheduled for January 28 in Washington, D.C., February 4 in Atlanta and Kansas City, Missouri, and February 11 in Los Angeles and Boston. Additionally, written comments may be submitted for the record until March, 1980.

Isabelle -

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copy -

Diana

League of Women Voters of the United States • 1730 M Street, N.W., Washington, D. C. 20036 Tel. (202) 296-1770

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EXTENDED COMMENTS ON

TESTIMONY BEFORE THE DEPARTMENT OF ENERGY

MARCH 26, 1980

ON

BUILDING ENERGY PERFORMANCE STANDARDS
(BEPS)
BY

DOROTHY K. POWERS, ENERGY CHAIR
LEAGUE OF WOMEN VOTERS OF THE UNITED STATES

APRIL 30, 1980

The League is a volunteer citizen education and political action organization with 125,000 members in 1,400 Leagues in all fifty states, Puerto Rico, the US Virgin Islands and the District of Columbia.

In March 1978, League members across the country completed a two-year study of the US energy situation. The purpose of the study was to determine the optimum mix of energy sources the US should use, energy growth rate targets and policies to bring them about. One of the most extensive looks at energy ever taken by a public interest organization, the study findings form the basis of the League's action on energy issues.

Our members took a hard look at our national energy picture and concluded it was time for some fundamental changes in the direction of reduced consumption and additional use of renewable resources. League members said that increased

conservation should be the keystone of any national energy program and called for a significant and progressive reduction in the annual energy growth rate. They also said that government policies should aim to effect a shift to a predominant reliance on renewable resources beyond the year 2000.

To reach these goals, League members expressed overwhelming support of mandatory federal standards for energy conservation. This was the basis of the League's support of EPCA* in 1975 which included provisions for federal mandatory fuel economy standards for new automobiles and for mandatory appliance efficiency standards. It was also the basis for our support of ECPA** in 1976 which called for the development of mandatory federal thermal efficiency performance standards for new buildings, both commercial and residential. (*EPCA--The Energy Policy and Conservation Act of 1975: **ECPA--The Energy Conservation and Production Act)

America's buildings now use about one-third of the total energy consumed in the United States and as much as one-half of this energy is needlessly wasted. We believe that implementation of BEPS will have the same healthy impact on the building industry that mileage efficiency standards have had on the automobile industry. Although market forces already are encouraging construction of more energy-efficient buildings, BEPS will enable us to move ahead more expeditiously and thus realize significant energy and monetary savings at an earlier date.

Performance standards such as BEPS are preferable to prescriptive or component performance type standards. The prescriptive or component-performance approach allows little room for innovative design and alternative technology and does not encourage the use of renewable resources as mandated by Congress. The performance standards are, however, new and complex and will require careful and flexible implementation. Their success will depend, to a large degree, on how well they are understood by

homeowners and those who must work with BEPS on a daily basis -- contractors, builders, lending institutions and code officials.

The League compliments DOE for funding a variety of efforts to explain the significance and goals of BEPS to citizens and to involve them in this hearing process. This is a good first attempt to educate people and we urge you to continue this process. Otherwise, implementation will not be accomplished, the goals of the BEPS program will not be achieved and the time and money already spent in developing the standards will have been wasted. The Committee on Nuclear and Alternative Energy Systems (CONAES) for the National Academy of Sciences report concluded that, "the energy demand for buildings in 2010 could be below today's level of 16.8 quads, despite a projected 30 percent increase in population and a 63 percent increase in residential buildings." While we fully recognize the need to tighten the federal budget, we believe that federal dollars must be spent on implementation of programs like BEPS if we are to achieve such savings.

What kind of education and training efforts does the League suggest?

One important focus of this education program should be the issue of first cost to homeowners or life-cycle costing. BEPS will increase the average cost of constructing new homes and buildings. According to DOE's figures, conservation measures, including more insulation and window glazing, will add between $750 to and $1500 to the base cost of a new home. Citizens will be reluctant to make the original investment in conservation and solar energy techniques unless they understand that they will recoup that investment in a reasonable time period.

Further, designers, contractors and builders (especially the smaller, less sophisticated ones), unfamiliar with energy performance standards and the utilization of solar energy will need training. The lending community must be educated to understand that financing energy-efficient homes and buildings is a better risk and preferential loans should be encouraged accordingly. The Department of Energy should also direct major training efforts toward state and local building code officials. Training seminars and workbooks on the application of BEPS will be needed. Special emphasis should be directed to explaining how passive and active solar designs can be combined with appropriate conservation measures to meet BEPS standards.

Finally, we would like to comment briefly on the need to strengthen the standards. The proposed building energy performance standards are minimal; they are based on technologies in use since the mid-70's and do not include many additional features that are cost-effective at the present time. We believe DOE was overly cautious and conservative in developing BEPS and would like to see the standards tightened at least to the level that is economically justified in its own analysis. We would also like to see them more explicitly encourage the use of non-depletable sources of energy, one of ECPA's mandates.

While we would prefer to see BEPS strengthened before the final building standards are adopted by DOE, we believe that the concept of energy conservation standards is so important and the potential so great that we support DOE's moving ahead to implement even these minimal standards as soon as possible. At the same time, we recommend that DOE establish goals and adopt a timetable that will progressively tighten the standards, similar to the path followed when federally mandated automobile fuel efficiency standards were adopted.

The League is pleased to have the opportunity to comment on this important energy conservation initiative. We believe BEPS represents a major step towards reducing our crippling dependence on imported oil by increasing the efficiency with which we use energy in our homes, schools, hospitals, industries and businesses. Therefore, (1) we strongly support federal mandatory building performance standards as a means of hastening this process; (2) we support a variety of educational and training efforts funded by the federal government to insure their implementation; (3) we urge that BEPS be strengthened and more explicitly encourage the use of non-depletable energy sources; (4) we recommend that a timetable and goals to progressively tighten the standards be announced at the time that BEPS are adopted.

Public Law 94-385, Energy Conservation and Production Act, 8-14-76

Chap. II of Title 10, Code of Federal Regulations, Part 435,
Energy Performance Standards for New Buildings

Procedure in arriving at

Commercial
Residential

Deaton

Nature of regulations

Design Energy Budget

Building type
Size
Location
Fuel

Toll free
1-800-424-9040

Evaluation--computer
equivalency codes

Implementation

State, local

Enforcement