

[6450-01]

DEPARTMENT OF ENERGY

Office of Conservation and Renewable Energy

Energy Conservation Standards for New Commercial Buildings

Finding of No Significant Impact

AGENCY: Department of Energy

ACTION: Finding of No Significant Impact (FONSI) on
Proposed Interim Energy Conservation Standards for
New Commercial Buildings.

SUMMARY: The U.S. Department of Energy (DOE) is proposing interim energy conservation standards for new commercial buildings as required by the Energy Conservation Standards for New Buildings Act of 1976, as amended, (Act) 42 U.S.C. Section 6801 et seq. Federal agencies would be required to design federal commercial buildings to satisfy the energy efficiency requirements of the proposed interim standards. The proposed interim standards would not regulate non-federal construction, although DOE would recommend the use of the proposed interim standards to the design professions and owners and operators of commercial buildings as guidelines for the design of energy conserving buildings.

It is the determination of DOE that the proposed interim standards are not a major federal action significantly affecting

the quality of the human environment; therefore, an environmental impact statement (EIS) will not be prepared.

PUBLIC AVAILABILITY:

DOE's Finding of No Significant Impact for the proposed interim energy conservation standards for new commercial buildings and the Environmental Assessment (EA) prepared for the proposed interim standards are being made available to the public. Anyone wishing to receive copies of either document should contact:

Hearings and Dockets Branch
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SUPPLEMENTARY INFORMATION:

DOE performed an Environmental Assessment (EA) of the possible incremental environmental effects attributable to the application of interim energy conservation standards to the design of new federal commercial buildings. This EA was prepared pursuant to the implementing regulations of the Council on Environmental Quality (CEQ) (40 CFR Parts 1500-1808 and the National Environmental Policy Act of 1969, as amended, Pub. L. 91-190, 40 U.S.C. 4221 et seq.).

Subsequent to the preparation of the EA, the interim standards on which the EA was based were rewritten. DOE has analyzed the differences between the earlier interim standards on which the EA was based and those currently proposed to determine how, if at all, such changes would affect the potential environmental impacts analyzed in the EA. Based on this analysis, DOE concluded that the changes do not alter the assumptions which the analysis of potential impacts in the EA was conducted. The changes primarily involve format and, therefore, do not affect the potential environmental impacts of the proposed

standards. The technological changes affect neither the relative levels of conservation mandated nor the makeup of required building materials. Therefore, the changes will not affect the EA's analysis of indoor air quality or the outdoor environment. Since the changes do not affect the basic assumptions of the EA, nor its analysis of potential impacts, the impact assessment remains valid for the proposed interim standards and the conclusions of the EA remain unchanged.

The EA concludes that the effect of the proposed interim standards on a building's habitability as well as on the outdoor environment, the economy and federal institutions, will be very small. Background discussions followed by specific findings are summarized below.

Approach Used in the Analysis

The analysis supporting this finding was conducted by first reviewing the standards now in use by federal agencies, referred to as the baseline, and then comparing them to the proposed interim standards through computer simulation. The EA calculates the differences likely to occur in the new Federal commercial building construction sector. Since the proposed rule will only be available for use as a guideline to the private sector, it was neither necessary nor appropriate for DOE to assess or project the

impacts of the proposed interim standards on the nation's new private sector buildings.

In developing the proposed interim energy conservation standards for new commercial buildings, DOE considered several different levels of stringency for elements of the standards. For example, greater and lesser levels of stringency were considered for the building envelope, equipment subsystems and lighting. The proposed standards reflect the maximum feasible stringency. Development of a more stringent standard therefore was not considered reasonable. The development of a significantly less stringent standard was not considered because it was inconsistent with the statutory mandate which stipulates that DOE promulgate a standard that requires the maximum practicable energy savings.

The no-action alternative, defined as a continuation of current practices (or as the adoption of existing American Society of Heating Refrigeration and Air Conditioning Engineers Standard 90A-1980), represents a less stringent alternative than the proposed standard. Because variations in stringencies from the standards proposed were not considered practical or reasonable, the only alternative to the proposed standard that is analyzed in the EA is that of no action.

To analyze the impacts of the proposed interim standards, commercial type buildings were separated into 10 categories on the basis of major functional and design differences. To evaluate the effects that the proposed interim standards would have on energy use, capital costs, operations and maintenance (O&M) costs, and the environment, plans for existing buildings from each of the 10 categories of commercial buildings were obtained. A case study building was selected for each category. Each test building was "redesigned" on paper to meet ASHRAE 90A-80 requirements in five different climates, then upgraded again to meet the proposed interim standards. Each of the 10 buildings used in the design study and the resultant energy and cost savings analysis are described in a series of reports entitled Recommendations for Energy Conservation Standards and Guidelines for New Commercial Buildings, Volumes I through IV, October 1983 (DOE/NEB-0051 - DOE/NEB-0051/9). This analysis uses the simulated characteristics and performance of the ten case study buildings to estimate the potential incremental environmental changes attributable to the proposed interim standards.

This analysis of incremental environmental consequences emphasizes the possible alterations to building habitability (indoor air quality, health and safety) from the proposed interim standards for two reasons. First, the impacts expected to occur

in socio-economic spheres or in the outdoor environment are very slight because of the similarity of the proposed interim standards to the existing standards, the proposed interim standards' intrinsic design flexibility, and their emphasis on improved interrelationship of building components. Second, previous analysis of building standards for energy conservation have not incorporated extensive indoor environmental analyses, although this is an area of growing scientific concern.

General Findings

The overall finding of the EA is that the effect of the proposed interim building energy conservation standards on building habitability, as well as on the outdoor environment, the economy and federal institutions, will be very small. General findings are summarized below:

A. Habitability

Changes in various indoor air pollutant concentrations and concomitant occupant health and safety effects that can be attributed to design changes called for by the proposed interim standards will be minimal.

B. Indoor Air Quality

Various pollutants are released within commercial buildings continuously or intermittently. An indoor air quality

computation model that uses specific pollution emission values (release rates) for selected materials was used to calculate pollutant concentration levels in the 10 case study buildings, based on their design characteristics for the base case and the proposed interim standards. Incremental pollutant concentrations were calculated for radon, organics, particulates, carbon monoxide (CO) and carbon dioxide (CO₂). Based on these calculations the incremental pollutant concentrations will be minimal.

1. Radon

Calculated values for indoor air concentrations of radon indicate the changes in building insulation materials, heating, ventilation, and air conditioning (HVAC), lighting and service water designs do not increase the level of radon concentration for the redesigned commercial buildings over the base buildings.

2. Organic Compounds (including Formaldehyde)

The computed concentrations of organics depend on insulation materials chosen for the redesigned buildings. In the 10 test buildings, there was a tendency to replace insulating materials that emit formaldehyde with materials that emit other organic compounds (primarily because of cost and insulating performance criteria). In most of the test cases, therefore, levels of

formaldehyde present in buildings designed to the proposed interim standards are predicted to decline in comparison to those constructed according to current standards. Correspondingly, higher organic concentrations may occur temporarily (immediately upon completion of construction) in the redesigned buildings. Concentrations of both formaldehyde and other organic compounds can be very age dependent. The calculated concentrations are based on emission rates for new insulation materials. Aging will considerably reduce the actual long-term average concentration expected to occur in commercial buildings designed under either the existing or the proposed interim standards.

3. Combustion Products

The estimated concentration of total suspended particulates (TSP) may increase slightly between the base case and the proposed interim standards case study buildings because HVAC modifications in the latter tend to reduce the rate that air is passed through filters. (The volume of ventilation air remains constant, however.) The incremental increase in TSP levels is small even under worst case assumptions. CO and CO₂ concentrations were estimated to remain unchanged by substituting the proposed interim standards for the base case.

C. Effects on Health and Safety

In most of the test building simulations, estimated pollutant

concentrations did not change as a result of the proposed interim standards. Where small increases in pollutant concentrations did occur, the health effect of these small changes is expected to be negligible. Although our current knowledge about health effects associated with common indoor air pollutants is limited, the small changes that appear possible with the use of the proposed interim standards are unlikely to increase the risk of adverse health effects.

The proposed interim standards do not result in new or radical design approaches but rather result in fine tuning existing design approaches to reduce whole building energy consumption. Thus, the proposed interim standards are not in conflict with relevant health and safety standards. For example, the ASHRAE standard for ventilation (ASHRAE 62-1981), which sets required amounts of outside air for acceptable indoor air quality, was applied to both the base case buildings and the buildings designed under the proposed interim standards. All other existing standards for building occupants' health and safety were also applied in both cases. Changes made to lighting, heating, ventilation, air conditioning, service hot water and envelope design are expected to have very small incremental impact on human health and safety.

Effects on Outdoor Environment

Improvements in the thermal resistance of a building's envelope will often require additional use of insulation and glass. More energy efficient buildings would reduce the oil, natural gas, or electricity requirements for lighting, heating, and cooling. Any reduction in energy use will decrease the volume of pollutants that are released into the environment as the result of developing and transporting the energy used to heat/cool and light the building.

Any increase in the production of insulation and glass required to comply with the interim standards is expected to be minimal and have insignificant environmental consequences. Ambient land, air, and water quality standards or industry's ability to comply with them should not be substantially affected since any additional emissions would be an extremely small increment to current emission rates, especially at the local level.

E. Economic Effects

The total net benefits (reduction in cost of ownership and operation) of fully implementing the proposed interim standards for the federal sector are \$165.6 million (1982 dollars). These energy expenditure savings represent about 3.6 percent of the expected cost of owning and operating the buildings constructed

under the proposed interim standards during the 1981-2000 period. The reduction in energy expenditures alone is \$141.9 million (17.9 reduction) and is composed of an electricity cost reduction of 140.8 million and a natural gas cost reduction of \$1.3 million. O&M costs would decline by \$20.3 million (2.0 percent) and capital expenses would decline by \$3.4 million (0.1 percent). This decline in capital costs would result primarily from downsizing of heating and air conditioning equipment when the energy efficiency of the building is increased.

The indirect changes that occur as a result of imposing the proposed interim standards on federal building construction would be modest. Total output for all industries would be reduced by about \$50 million, almost the same magnitude of change in constant (1982) dollars as the net benefits. This decline in output, however, would be from capital-intensive (primarily utilities) to more labor-intensive industries, so that employment actually would increase by about 1,500 man-years of employment over the 20-year period, or an average of about 75 man-years of employment per year.

F. Effects on Institutions

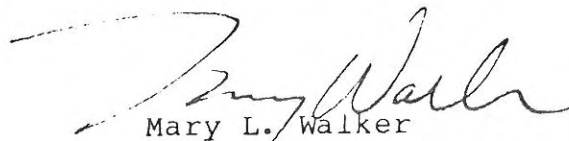
The proposed interim standards are not radically different from ASHRAE Standard 90A-1980, which is already being used by the Federal government and recommended to private sector designers by

ASHRAE. Federal agencies most likely will not experience any disruption to the procedures, calculations, and design practices that they already use when designing new commercial buildings.

Determination

Based upon the findings of this EA, DOE has determined that the proposed interim standards are not a major federal action significantly affecting the quality of the human environment within the meaning of NEPA. Therefore, an environmental impact statement is not required.

Issued in Washington, D.C., 11/3 1986.



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