BUILDING ENERGY PERFORMANCE STANDARDS

A PROPOSED FEDERAL PROGRAM

ISSUES BRIEFING

STATE BUILDING CODE COMMISSION

JANUARY 7, 1980

- DEFINITIONS

Design Energy Budget; means the maximum allowable Design Energy Consumption, expressed as MBtu/sq. ft./yr., for a building design for a new building, without specification of the methods, materials or processes to be employed in the design

Design Energy Consumption; means the calculated annual energy consumption, expressed as MBtu/sq. ft./yr., for the gross area of a building design, calculated using the Standard Evaluation Technique specified by DOE, or an approved alternate evaluation technique.

Energy Budget Level; means a value, expressed in MBtu/sq. ft./yr., for a building classification for a specific climate and location developed in the tables contained in Appendix I.

Gross Area; means the sum of all floor areas, except unheated basements in single family residences or parking areas, measured in square feet, enclosed in a building design, measured from the exterior face of exterior walls at the floor line, disregarding protrusions beyond the nominal plane of the wall, or the centerline of common walls separting buildings.

Net Present Value; means the discounted value of projected energy savings in new buildings less the investment and operating costs necessary to achieve those reductions in energy use.

Standard Evaluation Technique; means the criteria, procedures and energy calculation methods used for determining the Design Energy Consumption of a new building design.

- RESEARCH

Commerical/Multifamily:

- Computer simulation/redesign (AXCESS)
- Net Present Value; utilized to weight economic considerations

Single-Family:

- Computer simulation/redesign (DOE-2)
- Life-cycle cost Analysis

- LEVELS OF CONSERVATION

Criteria for EBLs

R_{30} means that 30% of all the building redesigns for that building type achieved that level of design energy requirement or lower. Termed strict these EBL levels were used for large and small office buildings.

R_{70} means that 70% of the redesigns for that building type achieved that level of design energy requirement or lower. Termed <u>lenient</u> these EBL levels were used for <u>hospitals and low-rise multifamily buildings</u>.

R_{50} means that 50% of the redesigns for that building type achieved that level of design energy requirement or lower. Termed <u>nominal</u> these EBL levels were used for <u>all other commerical and multifamily buildings</u>.

Single-Family EBLs were determined by the minimum point on the life-cycle cost curves . These values are 25-30% tigher than the HUD Minimum Property Standards.

- ## REQUIREMENTS FOR THE PERFORMANCE STANDARDS

The Design Energy Consumption of the building design of a new building shall not exceed its Design Energy Budget.

<u>Determination of Design Energy Budget</u>:

- Classify the building design
- Select the appropriate climate data for the location of the new building
- Determine the MBtu/sq. ft./yr. permitted for the building design from the EBL tables.

<u>Design Energy Consumption shall be calculated in accordance with</u>:

- Standard Evaluation Technique
- An approved alternate evaluation technique

note: Provisions have been made for the use of component equivalency

- ## WEIGHTING FACTORS

<u>Weighting Factors address two issues</u>:

- The cost of fuel
- The value to the nation of conserving different fuels

<u>Weighting Factors</u>:

	Natural Gas	Oil	Electricity
Single-Family Residential	1	1.22	2.79
Commerical/Multifamily	1	1.20	3.08

<u>Use of Weighting Factors</u>:

- Calculate energy requirements by fuel type
- The energy requirements by fuel, expressed in MBtu/sq. ft./yr., are then multiplied by the appropriate weighting factor
- The sum of the weighted figures is the buildings Design Energy Consumption

note: Energy supplied by solar "systems" is not included in the calculation of Design Energy Consumption. The building design receives a credit which can be used to reduce the requirements for non-renewable fuels.

- APPLICATION

  Standard Evaluation Technique is composed of three major elements:
  - Energy calculation method
  - Fixed Parameters
  - Procedures/Instructions

  Program Matrix:

Building Category	Conventional Systems	Passive Solar	Hybrid Solar	Active Solar
Single-Family	DOE-2	DEROB	*	DOE-2/TRNSYS
Commerical (unitary)	*	*	*	*
Commerical (central)	DOE-2	*	*	DOE-2/TRNSYS

  *Not presently available.

  Standard Evaluation Technique Procedures:

  - Select appropriate computer program
  - Select appropriate weather data
  - Identify the applicable operating conditions
  - Use computer program
  - Apply weighting factors to derive Design Energy Consumption

- ISSUES

  Economic:

  Life-cycle cost utilized as the basis of single-family EBL (2.2.2, 68132)

  Net Present Value (2.2.1, 68129)

  First cost (2.2.1, 68129)

  Weighting Factors; average cost vs. replacement (2.4.1, 68138)

  Design Fees

  Programing costs

  Educational costs (professional/enforcement)

  Implementation costs

  Technical:

  Ventilation/Infiltration (2.3.1, 68134)

  Weighting Factor use of average mix of fuels (2.4.1, 68138)

  Building Classification - 22 categories (2.4.3, 68143)

  Standard Operating Conditions (2.4.4, 68144)

  Climatological Classification (2.4.5, 68145)

  Design community sufficiently skilled to promote alternative system design

Technical merit of computer programs (4.5.2, 68154)

Standard Evaluation Technique objectives (4.7, 68155)

Ability of the design community to move from linear to holistic energy code

Materials:

Availability/Compatibility/Reliability of alternative system hardware

Accessibility of computer programs

Cost projections vs. long term supply and demand

Inventories

Politics:

Interface between design and enforcement communities

Fallout from state/federal mandated programs on localities

Difficulties of imposing sophisticated code compliance options (i.e., computer simulation)