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ENERGY & ENVIRONMENT DIVISION

Worldwide Status of Energy Standards for Buildings

Appendices

K.B. Janda and J.F. Busch

February 1993

ENERGY & ENVIRONMENT
DIVISION

Prepared for the U.S. Department of Energy under Contract Number DE-AC03-76SF00098

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WORLDWIDE STATUS OF ENERGY STANDARDS FOR BUILDINGS

Appendices

(supporting material for the authors' article of the same title, published in *Energy—The International Journal*, 19:1, 1994)

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and
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February 1993

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APPENDIX A

Cover Letter to Respondents
and
Mail Survey

MS 90-4000; Berkeley CA 94720 USA
Fax: +1 510-486-6996

Dear Respondent:

This is an informal survey designed to gain information about the worldwide status of energy efficiency standards for buildings, particularly for non-residential buildings including offices, schools, and hotels. Our project has three goals: 1) to understand and learn from the experience of countries with existing building energy standards; 2) to locate areas where these lessons might be applied and energy standards might be effectively proposed and developed; and 3) to share the information gathered with all participating countries.

About the term "standard"
We want to gain information about activities undertaken specifically for the purpose of INCREASING ENERGY EFFICIENCY in buildings and gather existing documentation on this subject. For the purposes of this survey, we will use the word "standard" to refer interchangeably to what also might be called codes, criteria, guidelines, norms, laws, protocols, provisions, recommendations, requirements, regulations, rules, or standards. Depending on the country, the "standard" may be contained in one document, be part of another larger document (such as a general building code), or be comprised of several documents.

We are sending this survey to contacts around the world who hold various positions in organizations ranging from government to academia to professional associations. Since we designed the survey to be answered by people with this breadth of background, it is likely that some of the questions on the following pages may lie outside your area of expertise. *If you should find yourself uncertain about a particular question or set of questions, please answer the survey to the best of your knowledge, adding a question mark (?) or comment in the space provided.* If you could suggest someone else who would know the answers to some of these questions about your country, please include their name(s) and contact information so we can solicit their input. If convenient, you may also photocopy this survey and give them a copy for their use.

Since overseas mail can often be time-consuming and uncertain, we would appreciate receiving your responses by telefax if possible.

Thank you for taking the time to participate in this survey. Please contact us if you have any questions that need immediate attention.

John Busch, Ph.D.
Kathryn Janda

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Lawrence Berkeley Laboratory
Building Energy Standards Survey, 1992
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STANDARDS FOR ENERGY EFFICIENCY IN BUILDINGS

IN_____(*please fill in the name of your country*)

The focus of our research is on ENERGY STANDARDS for NON-RESIDENTIAL BUILDINGS. This survey has been designed to solicit information about this particular subject, and some questions may not apply equally to all types of energy standards for buildings. Please respond as appropriate for the situation in your country.

SECTION I: GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. Does your country have BUILDING STANDARDS of ANY KIND (e.g., health, structural safety, fire prevention)?

   a. At the NATIONAL level? ❑ Yes ❑ No ❑ ?
   b. At the STATE or regional level? ❑ Yes ❑ No ❑ ?
   c. At the LOCAL or municipal level? ❑ Yes ❑ No ❑ ?
   d. ❑ There are no building standards of ANY kind at any level. (*Go to Question 20.*)

2. Some countries have STANDARDS to INCREASE the ENERGY EFFICIENCY of BUILDINGS. Such standards can be voluntary or mandatory, and they are often developed, issued, and/or implemented by governments, electric utilities, industry groups, or professional associations.

   To the best of your knowledge, are there any proposed or existing ENERGY EFFICIENCY STANDARDS for BUILDINGS in your country? (*Check EITHER a or b.*)

   a. ❑ Energy standards for buildings DO NOT EXIST at the national, regional or local level. (*Go to Question 20.*)

   b. ❑ Energy standards for buildings DO EXIST (or have been proposed) at the national, regional, or local level.

      ➡ Which building sectors are covered by these standards? (*Check ONE of the following.*)

      1. ❑ Residential buildings ONLY (*Go to Question 4*)
      2. ❑ Non-residential buildings ONLY (e.g., commercial, institutional)
      3. ❑ BOTH non-residential and residential buildings
      4. ❑ Other: (*Please specify.*)

3. a. What is the status of energy standards for NON-RESIDENTIAL buildings at the NATIONAL level in your country? (*Check all that apply.*)

- ❑ Mandatory - compliance with standard legally required for construction approval
- ❑ Voluntary - compliance with standard recommended but not necessary
- ❑ Proposed - standard has been developed and is currently under consideration
- ❑ None - no building energy standard has been developed or proposed
- ❑ Uncertain - there may or may not be a standard at this level

➡ Approximately how many voluntary or mandatory NATIONAL ENERGY STANDARDS apply to non-residential buildings in your country? ____

b. What is the status of energy standards for NON-RESIDENTIAL buildings at the STATE or REGIONAL level? (*Check all that apply.*)

- ❑ Mandatory ➡
- ❑ Voluntary ➡
- ❑ Proposed
- ❑ None
- ❑ Uncertain

1. Approximately how many MANDATORY or VOLUNTARY regional energy standards apply to non-residential buildings in your country? ____
2. What states or regions have adopted them?

c. What is the status of energy standards for NON-RESIDENTIAL buildings in LOCAL AREAS or CITIES in your country? (*Check all that apply.*)

- ❑ Mandatory ➡
- ❑ Voluntary ➡
- ❑ Proposed
- ❑ None
- ❑ Uncertain

1. Approximately how many MANDATORY or VOLUNTARY local energy standards apply to non-residential buildings in your country? ____
2. What cities or municipal areas have adopted them?

4. Please use the following criteria to select a SINGLE energy standard (or set of standards) as a basis for answering **Questions 5-19.** (*Check all that apply and identify standard below.*)

   1. ❑ This energy standard applies to the largest number of non-residential buildings.
   2. ❑ I am most familiar with this energy standard.
   3. ❑ There is ONLY ONE energy standard for NON-RESIDENTIAL buildings.
   4. ❑ There are NO energy standards for NON-RESIDENTIAL buildings; this standard applies to _____ buildings.

   Energy Standard Title:

   Date (*Specify adopted, effective, or published*):

   Issuing Organization:

   Geographic area covered: ❑ Nation
   ❑ Region(s): (*specify*)
   ❑ City(ies): (*specify*)

SECTION II: DESCRIPTION OF SPECIFIED ENERGY STANDARDS

5. To what kinds of buildings does the standard specified in Question 4 apply?

   a. Please indicate BUILDING TYPE(s): (*Check all that apply.*)

❑ Offices	❑ Restaurants	❑ Retail stores
❑ Hotels	❑ Hospitals	❑ Schools
❑ Government facilities	❑ Churches/mosques	❑ Industrial Buildings
❑ Residential (single-family)	❑ Residential (multi-family)	
❑ ALL Buildings	❑ Other: (*Please specify.*)	

   b. Please indicate BUILDING VINTAGE: (*Check one.*)

   ❑ New buildings
   ❑ Existing buildings (through retrofits)
   ❑ Both new and existing buildings

c. Please indicate any ADDITIONAL BUILDING CHARACTERISTICS used to define the scope of the standard's applicability: (*Check all that apply.*)

1. ❑ Physical size (e.g., floor area)
   ➠ What size limit(s)?

2. ❑ Amount of energy used (e.g., kilowatts)
   ➠ What amount(s)?

3. ❑ Type of fuel used (e.g., electricity)
   ➠ Which fuel(s)?

4. ❑ Air-conditioned
5. ❑ Other: (*Please specify.*)

6. Which of the following terms best describes the basic approach of the standard(s) specified in Question 4? (*Check one.*)

❑ Prescriptive (i.e. building materials or dimensions of some building elements are specified)

❑ Performance-based
(i.e. design flexibility is maintained within a specified level of performance of the building element, system, or building as a whole)

❑ Both prescriptive and performance methods are used in the standard.

❑ Other (*Please describe*):

7. Are the following subjects INCLUDED in the energy standard identified in Question 4?

a. Whole-building ENERGY REQUIREMENTS/limitations: ❑ Yes ❑ No ❑ ?
If yes, check all that apply below:

❑ Energy target (e.g., total btu or kilowatt-hour/floor area)
❑ Peak electricity demand (e.g., peak kilowatt-hours/floor area)
❑ Energy cost target
❑ Other (*Please specify*):

b. BUILDING ENVELOPE heat loss or heat gain provisions: ❑ Yes ❑ No ❑ ?
If yes, check all that apply below:

- ❑ Roof
- ❑ Wall system (e.g., insulation, exterior surface color)
- ❑ Fenestration system (e.g., glass type, amount, placement of windows)
- ❑ Infiltration (e.g., air changes per hour)
- ❑ Other (*Please specify*):

c. LIGHTING provisions (interior or exterior): ❑ Yes ❑ No ❑ ?
If yes, check all that apply below:

- ❑ Control requirements or credits (e.g., occupancy sensors, number of switches, time clocks)
- ❑ Installed lighting power density requirements (W/m^2)
- ❑ Illumination requirements (lux, footcandles)
- ❑ Other (*Please specify*):

d. MECHANICAL provisions: ❑ Yes ❑ No ❑ ?
If yes, check all that apply below:

- ❑ Air/water distribution efficiency
- ❑ Load calculations for equipment sizing (e.g., chillers, motors)
- ❑ Controls (e.g., energy management systems, time clocks)
- ❑ Ventilation
- ❑ Equipment efficiency (e.g., motors, chillers, fans)
- ❑ Other (*Please specify*):

e. Are there any OTHER major provisions included in the standard(s) that have not been described above? (e.g., electrical specifications, thermostat settings, duration of heating or cooling season) ❑ Yes ❑ No ❑ ?
If yes, please specify:

SECTION III: STANDARDS DEVELOPMENT PROCESS

8. Please list the names of the ORGANIZATIONS that played important roles in DEVELOPING the ENERGY standard specified in Question 4: (*Attach additional pages if necessary.)*

Types of Organizations:
- G = Government agency
- I = Industry group (e.g., equipment or material suppliers)
- A = Academic institution
- R = Research group (public or private)
- L = Local interest group
- F = Foreign development agency (or other non-local institution)
- O = Other (please describe)

a. Organization Name: Type: _____(*See list above*)

b. Organization Name: Type: _____(*See list above*)

c. Organization Name: Type:_____ (*See list above*)

d. Organization Name: Type:_____ (*See list above*)

9. Which one of the following two terms BEST describes the PROCESS involved in deciding what requirements the standard should contain? (*Check one and describe below.*)

a. ❑ **Consensus** - several different organizations reached a compromise
(*If different from those listed in Question 8, please name organizations involved and comment below*)

b. ❑ **Mandate** - a single organization or entity made most decisions
(*Please provide the name of this organization or entity below*)

10. Standards are generally developed using information about physical attributes and energy use of existing buildings and climate data for the geographic area. What kind of information was used in developing the energy standard specified in Question 4? (*Check all that apply.*)

    a. PHYSICAL CHARACTERISTICS of existing buildings (e.g., size, function, types of walls and windows)

        1. ❑ Not available, and not used in standard.
        2. ❑ Estimated using professional judgement.
        3. ❑ Gathered through audits or surveys for the purpose of the standard.
        4. ❑ Already available prior to standard development.

    b. ENERGY USE of existing buildings (e.g., annual consumption, peak demand, load patterns)

        1. ❑ Not available, and not used in standard.
        2. ❑ Estimated using professional judgement.
        3. ❑ Estimated through computer simulations.
        4. ❑ Gathered through audits or surveys for the purpose of the standard.
        5. ❑ Already available prior to standard development.

    c. WEATHER data (e.g., direct and indirect solar radiation, temperature, humidity)

        1. ❑ Not available, and not used in standard.
        2. ❑ Estimated using professional judgement.
        3. ❑ Gathered through measurements for the purpose of the standard.
        4. ❑ Already available prior to standard development.

    d. Other information: (*Please specify*)

11. Energy standards are often developed with reference to standards from other countries. Were standards or information from a DIFFERENT COUNTRY (i.e., other than your own) used in developing the energy standard specified in Question 4?

    ❑ No
    ❑ Yes ➡ Please specify the country(ies) of origin and kind(s) of information used: (e.g. American: ASHRAE 90.1-1989; Jamaica: EEBC-90)

12. In developing the standard, computer simulations are sometimes used to determine energy and economic performance of different building designs. Were any COMPUTER PROGRAMS (e.g., DOE-2 or other building energy models) used in the development of the standard?

❑ No (*Go to Question 13.*)

❑ Yes ➡ a. Which programs?

b. Are computer simulations also used to attain COMPLIANCE with the standard?

❑ Yes ❑ No ❑ Uncertain

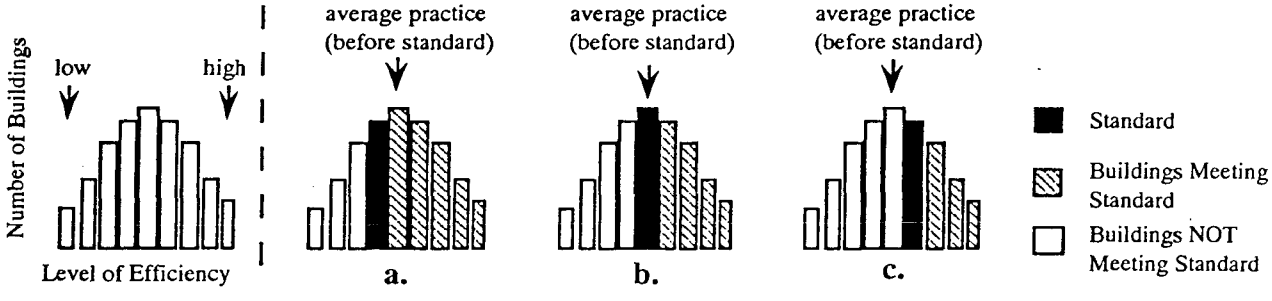
➡ If yes and different from above, please list:

13. Which of the following statements best describes the goal of the standard, as depicted in the graphs below? (*Check one.*)

a. ❑ The standard is set at a level LOWER THAN CURRENT PRACTICE to eliminate the most inefficient building designs.

b. ❑ The standard is set at a level approximately EQUAL TO CURRENT PRACTICE to encourage moderate levels of efficiency.

c. ❑ The standard is set at a level ABOVE CURRENT PRACTICE to promote highly-efficient buildings and encourage technological development.



14. Did the following considerations influence the inclusion or exclusion of certain measures in the standard? (*Check one box for each consideration and comment below.*)

a. Cost effectiveness	❑ Yes	❑ No	❑ Uncertain
b. Market or local availability of energy efficient products	❑ Yes	❑ No	❑ Uncertain
c. Similarity/difference to local design practice	❑ Yes	❑ No	❑ Uncertain
d. Comfort	❑ Yes	❑ No	❑ Uncertain

e. Other (*Please specify below*):

COMMENTS:

15. Energy standards are often revised and updated to reflect technological improvements.
    a. Is the standard in your country scheduled for regular REVIEW and REVISION?
    ❑ No (*Go to Question 16*)
    ❑ Yes ➡ Please describe process below:

    b. Does the revision process include procedures to MONITOR and EVALUATE the success of EARLIER VERSIONS of the standard?
    ❑ No (*Go to Question 16*)
    ❑ Yes ➡ Please describe procedures below:

SECTION IV: IMPLEMENTATION AND COMPLIANCE

16. In many cases, building energy standards are added to existing (non-energy) building standards. In other cases, governments have created new agencies to implement and enforce building energy standards.

    How would you characterize the ENTITIES involved in IMPLEMENTING energy standards in your country? (*Check all that apply.*)

    a. ❑ An EXISTING agency, _____(*please specify*), was made responsible for implementing building energy standards. The agency's primary focus prior to assuming responsibility for standards was: (*Check one*)

        1. ❑ Buildings
        2. ❑ Energy
        3. ❑ Other:_____(*please specify*)

    b. ❑ A NEW and separate agency, _____(*please specify*), was formed in _____(*year*) to implement energy standards for buildings.

    c. ❑ The standards are voluntary; there is no government agency designated to implement them.

    d. ❑ Other NON-GOVERNMENT entity(ies) (e.g., energy utility, professional association) issues or implements the standard. (*Please specify below*):

17. Has formal TRAINING or EDUCATION about the standard been provided for architects, engineers, and other professionals?

    ❑ No (*Go to Question 18.*)
    ❑ Yes ➡ Please indicate all TRAINING/EDUCATIONAL aids used:

a. Written guidelines to assist with compliance procedure	❑ Yes	❑ No	❑ Uncertain
b. Example calculations	❑ Yes	❑ No	❑ Uncertain
c. Compliance forms	❑ Yes	❑ No	❑ Uncertain
d. Workshop(s), seminars(s), or conference(s)	❑ Yes	❑ No	❑ Uncertain
e. Information or resource center	❑ Yes	❑ No	❑ Uncertain
f. Other (*Please describe below*):			

18. Both mandatory and voluntary standards often have mechanisms to encourage compliance. Such mechanisms can be designed as positive incentives and/or penalties, and they can apply at several different stages of the design and construction process.

a. What COMPLIANCE MECHANISMS are used in your country, and at what stage in the construction process are they directed? (*More than one term may apply.*)

Compliance Mechanisms:

C	= Certification/approval	**N**	= No mechanism
I	= Incentive (positive reward)	**O**	= Other policy mechanism
P	= Penalty (negative incentive)	**?**	= Uncertain

Please CIRCLE all appropriate terms-- C, I, P, N, O, ?-- for each construction stage below:

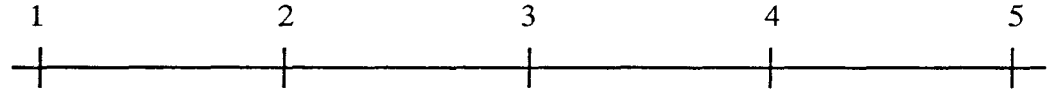
1. PRIOR to construction- (e.g., design stage analysis): C I P N O ?
   Approximately what percent of designs are checked?_____
   Comments:

2. DURING construction - (e.g., on-site inspections): C I P N O ?
   Approximately what percent of sites are checked?_____
   Comments:

3. AFTER construction - (e.g., inspection, energy analysis) C I P N O ?
   Approximately what percent of buildings are checked?_____
   Comments:

4. Are there any OTHER procedures not related to a particular stage of the construction process (e.g., utility hook-up)? (*Please specify.*)

b. Overall, how effective do you feel the combined compliance mechanisms are at gaining compliance with the standard? (*Circle one and comment below.*)



Why?

19. Have any of the following TYPES of ASSESSMENTS or audits of the impact from energy standards for buildings been conducted?

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings. (*Check all that apply.*)

1. ☐ Completed ➡ Please give reference information for any published results:
2. ☐ In progress
3. ☐ Planned
4. ☐ None conducted

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard as compared to typical buildings. (*Check all that apply.*)

1. ☐ Completed ➡ Please give reference information for any published results:
2. ☐ In progress
3. ☐ Planned
4. ☐ None conducted

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS (i.e., simulation and modelling). (*Check all that apply.*)

1. ☐ Completed ➡ Please give reference information for any published results:
2. ☐ In progress
3. ☐ Planned
4. ☐ None conducted

d. COST EFFECTIVENESS based on ACTUAL COSTS incurred and measured savings achieved (i.e., case studies). (*Check all that apply.*)

1. ☐ Completed ➡ Please give reference information for any published results:
2. ☐ In progress
3. ☐ Planned
4. ☐ None conducted

e. Other Assessments (*please describe project goal and check current stage of completion*):

1. ☐ Completed ➡ Please give reference information for any published results:
2. ☐ In progress
3. ☐ Planned

SECTION V: FURTHER INFORMATION ON ENERGY CONSERVATION

20. Are there EFFICIENCY TESTING FACILITIES and PROCEDURES established in your country for any of the following items? (*Circle all that apply.*)

a. Motors	Yes	No	?	d. Ballasts	Yes	No	?
b. Insulation	Yes	No	?	e. Fixtures	Yes	No	?
c. Air conditioners/chillers/ other appliances	Yes	No	?	f. Thermal properties of materials	Yes	No	?
				g. Other (*please specify*):			

21. To provide further information about the context of building energy issues in your country, please describe what OTHER PROGRAMS or POLICIES (besides standards) have been developed to INCREASE ENERGY EFFICIENCY in BUILDINGS. (e.g., energy utility initiatives, energy awareness campaigns, utility rebates, free or subsidized energy audits) Please list program type(s) and identify supporting organization(s):

Please suggest up to three ADDITIONAL SOURCES of information (i.e., books, periodicals, newspaper reports, or journal articles) about ENERGY EFFICIENCY for BUILDINGS in your country that could help provide a context for understanding this topic: (*Please specify language of suggested reference material, English is preferred.*)

1.

2.

3.

22. If you answered Question 4, we would like to obtain a copy of the specified ENERGY STANDARD(s) itself and supporting documentation for it (in English if possible).

    a. Whom should we contact to obtain a written copy of the ENERGY STANDARD(s) specified in Question 4? (*Please provide name, mailing address, phone number, and fax number*)

    Name:
    Address:

    Tel: Fax:

    b. Please describe the types of SUPPORTING DOCUMENTATION available for this standard(s) and whom we should contact to obtain them: (*If different from above, please provide name, mailing address, phone number, and fax number*)

    Types of Documentation:

    Contact Name:
    Address:

    Tel: Fax:

    c. Are there any OTHER energy standard(s) for NON-RESIDENTIAL buildings in your country that were NOT specified in Question 4?

    ❑ No (*Go to Question 23.*)
    ❑ Yes ➠ Please specify OTHER energy standard(s) below and whom we should contact for more information: (*Attach additional page if necessary*)

    1. Energy Standard Title:
       Issuing Organization:
       Contact Name:
       Address:

       Tel: Fax:

    2. Energy Standard Title:
       Issuing Organization:
       Contact Name:
       Address:

       Tel: Fax:

23. Are there OTHER PEOPLE or INFORMATION SOURCES in your country whom you feel should respond to the questions raised in this survey? If so, please list their names and/or titles and contact information below (attach additional page if necessary):

Contact Name:
Address:

Tel: Fax:

Contact Name:
Address:

Tel: Fax:

FINISH

Thank you for participating in this survey and contributing to our research. If you would like to receive a copy of our findings when we have compiled the results, check this box: ❑

Survey completed by

Name:
Title:
Organization:
Address:
Tel: Fax:
Date completed:

PLEASE RETURN SURVEY (VIA TELEFAX OR AIR MAIL) TO:

Kathryn Janda
Lawrence Berkeley Laboratory
Energy Analysis Program, MS 90-4000
Berkeley, CA 94720 USA
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APPENDIX B

Input Key
and
Survey Data Table

This appendix abbreviates information gathered from all 59 surveys received.

INPUT KEY FOR SURVEY DATA TABLE

Question	Letter Code = Description (Note: "-" = None exist and "?" = Not answered)
SECTION I: GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS	
1. Level at which country has building standards of any kind (e.g., health, structural safety, fire prevention).	N = National R = Regional L = Local
2. Building sectors for which energy efficiency standards for buildings have been proposed or do currently exist.	R = Residential buildings ONLY N = Non-residential buildings ONLY (e.g., commercial, institutional) B = BOTH non-residential and residential buildings O = Other (*additional description requested*)
3. Status of energy standards for NON-RESIDENTIAL buildings at the national, regional, and local levels.	M = Mandatory: compliance with standard legally required for construction approval. V = Voluntary: compliance with standard recommended by not required. P = Proposed: standard has been developed an is currently under consideration. - = None: no building energy standard has been developed or proposed U = Uncertain: there may or may not be a standard at this level.
4. Year (adopted, effective, or proposed) of energy standard .	No key necessary.
SECTION II: DESCRIPTION OF SPECIFIED ENERGY STANDARDS	
5a. Building types covered by standard specified in Question 4.	A = ALL Buildings C = Commercial/retail stores D = Hospitals E = Educational facilities (schools) F = Restaurants G = Government facilities H = Hotels I = Industrial Buildings M = Multi-family residential O = Offices R = Religion-related buildings (churches/mosques) S = Single-family residential X = Other (*additional description requested*)
5b. Building vintage covered by standard.	N = New buildings E = Existing buildings (through retrofits) B = Both new and existing buildings
5c. Additional building characteristics used to define the scope of the standard's applicability.	P = Physical size (e.g., floor area) E = Amount of energy (e.g., kilowatts) F = Type of fuel (e.g., electricity) A = Air-Conditioned O = Other (*additional description requested*)
6. Basic approach of the standard.	Pr = Prescriptive (i.e. building materials or dimensions of some building elements are specified) Pe = Performance-based (i.e. design flexibility is maintained within a specified level of performance of the building element, system, or building as a whole) Bo = Both prescriptive and performance methods are used in the standard.
7a. Whole-building energy requirements included in standard.	E = Energy amount target (e.g., total btu or kilowatt-hour/floor area) P = Peak electricity demand (e.g., peak kilowatt-hours/floor area) C = Energy cost target O = Other (*additional description requested*)
7b. Building envelope heat loss or heat gain provisions included in standard.	R = Roof W = Wall system (e.g., insulation, exterior surface color) F = Fenestration system (e.g., glass type, amount, placement of windows) I = Infiltration (e.g., air changes per hour) O = Other (*additional description requested*)
7c. Lighting provisions (interior or exterior) included in standard.	C = Control requirements or credits (e.g., occupancy sensors, number of switches, time clocks) P = Installed lighting power density requirements (W/m^2) I = Illumination requirements (lux, foot-candles) O = Other (*additional description requested*)
7d. Mechanical provisions included in standard.	A = Air/water distribution efficiency L = Load calculations for equipment sizing (e.g., chillers, motors) C = Controls (e.g., energy management systems, time clocks) V = Ventilation E = Equipment efficiency (e.g., motors, chillers, fans) O = Other (*additional description requested*)
7e. Other provisions.	Y = Yes (*additional description requested*) N = No
SECTION III: STANDARDS DEVELOPMENT PROCESS	
8. Types of organizations that played important roles in developing energy standards.	G = Government agency I = Industry group (e.g., equipment or material suppliers) A = Academic institution R = Research group (public or private) L = Local interest group F = Foreign development agency (or other non-local institution) O = Other (*additional description requested*)
9. Process involved in deciding what requirements the standard should contain.	C = Consensus - several different organizations reached a compromise M = Mandate - a single organization or entity made most decisions

10a. Information about physical characteristics of existing buildings (e.g., size, function, types of walls and windows) used.	N = Not available, and not used in standard. E = Estimated using professional judgment. G = Gathered through audits or surveys for the purpose of the standard. A = Already available prior to standard development.
10b. Information about energy use of existing buildings (e.g., annual consumption, peak demand, load patterns).	N = Not available, and not used in standard. E = Estimated using professional judgment. C = Computer simulations used for estimates. G = Gathered through audits or surveys for the purpose of the standard. A = Already available prior to standard development.
10c. Information about weather data (e.g., direct and indirect solar radiation, temperature, humidity).	N = Not available, and not used in standard. E = Estimated using professional judgment. C = Computer simulations used for estimates. G = Gathered through audits or surveys for the purpose of the standard. A = Already available prior to standard development.
10d. Other information?	Y = Yes (*additional description requested*) N = No
11. Standards from a different country used.	Name of country.
12a. Computer programs used to develop standard.	Name of program.
12b. Computer programs used for compliance.	Y = Yes N = No
13. Goal of standard	L = The standard is set at a level LOWER than current practice to eliminate the most inefficient building designs. E = The standard is set at a level approximately EQUAL to current practice to encourage moderate levels of efficiency. A = The standard is set at a level ABOVE current practice to promote highly-efficient buildings and encourage technological development.
14. Considerations influencing the inclusion or exclusion of certain measures.	E = Cost effectiveness A = Market or local availability of energy efficient products S = Similarity/difference to local design practice C = Comfort O = Other (*additional description requested*)
15a. Provision for regular review.	Y = Yes (*additional description requested*) N = No
15b. Revision includes evaluation of earlier standard.	Y = Yes (*additional description requested*) N = No
SECTION IV: IMPLEMENTATION AND COMPLIANCE	
16. Entities involved in implementing energy standards.	E = Existing agency N = New and separate agency V = Standards are voluntary; no implementation agency O = Other (*additional description requested*)
16a. Former focus of existing agency.	B = Buildings E = Energy O = Other (*additional description requested*)
17. Types of training and education provided for architects, engineers, and other professionals.	W = Written guidelines to assist with compliance procedure E = Example calculations C = Compliance forms S = Seminars(s), workshop(s), or conference(s) I = Information or resource center O = Other (*additional description requested*)
18. Compliance mechanisms before, during, and after construction.	C = Certification/approval I = Incentive (positive reward) P = Penalty (negative incentive) N = No mechanism O = Other policy mechanism (*additional description requested*) ? = Uncertain
18d. Effectiveness of mechanisms	Scale of 1 (not effective) to 5 (very effective)
19. Assessments conducted: a. Energy savings potential b. Measured energy savings c. Calculated cost effectiveness d. Actual cost effectiveness	C = Completed I = In progress P = Planned N = None conducted
SECTION V: FURTHER INFORMATION ON ENERGY CONSERVATION	
20. Items for which efficiency testing facilities and procedures exist.	M = Motors I = Insulation A = Air conditioners/chillers/other appliances B = Ballasts F = Fixtures T = Thermal properties of materials O = Other (*additional description requested*)
21. Other programs or policies developed to increase energy efficiency in buildings.	U = Utility initiatives I = Information programs R = Rebates A = Audits (free or subsidized) B = Building energy standards T = Time of day pricing L = Labeling of appliances G = Government energy policy O = Other (*additional description requested*)

Survey Data Table (all 59 Respondents)

☒ Indicates 35 surveys selected for further analysis (countries with standards)

	I: OVERVIEW						II: DESCRIPTION OF SPECIFIC STANDARD								III: DEVELOPMENT PROCESS					
	#1:	#2:	#3: Status of NON-RESIDENTIAL Standards			#4:	#5: Applicability of Standard			#6:	#7: Provisions Included in Standard					#8:	#9:	#10: Information Used			
	Any Building Standards	Energy Standard Building Sectors	National	Regional	Local	Year	Building Types	Vintage	Applicable Characteristics	Approach	Whole Building	Building Envelope	Lighting	Mechanical	Other	Organizations Involved	Decision Process	Physical Characteristics	Energy Use	Weather Data	Other
Australia ☒	NRL	B	P	P	P	1993	O	N	A	Bo	E	RWFIO	-	-	-	GGA	C	G	E	GA	-
Australia ☐	NRL	B	P	VP	P	1991	HSMED	N		Pr	-	RWIO	-	V	-	GG	M	A	CA	A	I
Australia ☐	NRL	B	P	P	P	-	-	N	-	-	?	?	?	?	-	G	C	?	?	?	-
Bangladesh ☐	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Belgium ☒	NRL	R	V	V	V	1984	SM	N	-	Pe	E	O	-	-	-	GRAI	C	GA	ECGA	GA	-
Belgium ☐	R	R	-	-	-	-	HSDMX	B	O	Pe	-	RWF	-	V	Y	GAR	C	A	A	A	-
Botswana ☐	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brazil ☐	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Canada ☒	NRL	B	P	M	M	1983	A	N	AO	Pr	?	RWFIO	P	CVE	-	RRG	M	E	E	A	-
Chile ☒	NRL	B	MV	-	-	1960	A	B	-	Pe	-	RWFI	-	-	Y	GAL	C	G	G	G	-
China ☒	NR	B	M	-	-	1993	H	N	A	Bo	E	RWFI	-	ALCVE	Y	GAA	C	EG	G	G	-
China ☐	NRL	R	-	-	-	1986	M	N	P	Bo	E	RW	?	?	-	GA	?	EGA	ECGA	GA	-
Colombia ☒	N	B	PM			199?	OHGCSM	N	PA	Bo	-	-	CPI	ALCVE	Y	GIAF	C	G	G	G	-
Colombia ☐	NL	B	M	-	-	-	A	N	P	Pr	?	?	I	-	-	GGIO	C	N	N	N	-
Costa Rica ☐	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Czechoslovakia ☒	N	B	M	-	-	1979	OHFDMX	B	PE	Pe	E	RWFIO	-	-	-	GAGO	C	EG	EG	EG	-
Czechoslovakia ☐	NR	B	P	P	P	1979	A	N	PF	Bo	-	RWFI	O	-	Y	AR	C	E	E	E	G
Czechoslovakia ☐	N	B	M	-	-	1973	A	N	PE	Bo	EPC	RWFI	-	AV	-	G	M	A	G	G	-
Czechoslovakia ☐	N	B	M	MV	-	?	A	B	PEO	Ot	EPO	-	-	-	-	GIGG	C	N	N	G	-
Denmark ☒	N	B	M	-	-	1982	A	N	P	Bo	-	RWFI	-	CVO	-	GGR	C	-	-	-	B
Denmark ☐	N	B	M	-	-	1982	A	N	-	Pe	E	RWFO	-	CVE	-	GG	M	A	A	A	-
Djibouti ☐		-				1991	S	N		Pr					-						-
England & Wales ☒	N	B	-	M	-	1990	A	B	O	Bo	EO	RWFO	-	CVO	-	GIAR	C	EGA	EA	A	Y
France ☒	NL	B	M	-	-	1988	OHGFDC	N	F	Bo	-	RWFIO	-	CV	Y	GGRG	C	GA	ECG	A	-
France ☐	N	B	M	-	-	1988	OHGFDC	N	-	Pe	-	RWFIO	-	ALCVE	Y	GGGL	C	A	A	A	-
Hong Kong ☒	N	N	P	P	P	1991	OH	N	A	Pe	?	RWF	-	-	-	GRR	C	G	CG	A	-
Indonesia ☒	NRL	N	VP	-	-	?	OHGDMI	N	A	Bo	EPC	RWFI	CPIO	ALCVE	-	GARG	C	EG	ECG	GA	D
Israel ☒	N	R	M	U	U	1989	SM	N	-	Pe	-	RWFI	-	-	-	GAA	C	EG	G	A	-
Israel ☐	NL	R	M	-	-	1989	SM	N	O	Bo	O	RWIO	-	-		GALL	C	A	C	A	S
Ivory Coast ☒	N	B	P	-	-	1992	A	B	AO	Bo	EC	RWF	CPI	ALCVE	Y	GAF	C	EGA	ECG	GA	-
Jamaica ☒	N	N	MV	-	-	1992	OHGFDR	B	PEA	Bo	EC	RWF	CPI	ALCVE	Y	GLIA	C	EGA	ECA	G	Y
Japan ☒	NL	B	MV	-	-	1980	O	N	P	Pe	-	RWFI	O	-	Y	GOO	M	A	A	A	-

Survey Data Table (cont.)

III: DEVELOPMENT (cont.)							IV: IMPLEMENTATION AND COMPLIANCE												V: OTHER INFO.		
#11: Other Information Sources	#12: Computer Programs Used	#12: Computer Compliance?	#13: Goal	#14: Considerations	#15: Regular Review?	#15: Monitor Earlier Version?	#16: Implementing Entity	#16: Former Focus	#17: Training/ Education	#18: Compliance methods: Before Construction %	#18: Compliance methods: During Construction %	#18: Compliance methods: After Construction %	#18: Compliance methods: Effectiveness	#19: Saving Assessments: Energy: Potential	#19: Saving Assessments: Energy: Actual	#19: Saving Assessments: Cost: Potential	#19: Saving Assessments: Cost: Actual	#19: Saving Assessments: Other	#20: Testing Facilities	#21: Other Programs	☒ Indicates 35 surveys selected for further analysis (countries with standards)
USA: ASHRAE	DOE-2	N	A	EASC	Y	Y	E	B	-	N	N	N		N	N	P	P	P	MIAT	UBL	Australia ☒
- None	TEMPAL CHEETAH	N	E	EASCO	Y	Y	E		WEI	C 10	C ?	C ?	5	C	P	C	N	P	IABM	ODF	Australia ☐
USA: ASHRAE CEBO Singapore	ESP-II BUNYIP DOE-2	U	E	EA	N	U	E	B	-	-	-	-		-	-	-	-	-	MAB	UG	Australia ☐
- None	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	B	Bangladesh ☐
- None	Yes	Y	A	EASC	Y	Y	E	E	WECSI	P -	P -	P -	2	C	C	C	C	N	I	IA	Belgium ☒
- None	No	U	A	ESC	Y	Y	E	B	WECSI	C 31	C 31	N	4	N	C	C	C		IATO	T	Belgium ☐
- None	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	IATO	B	Botswana ☐
- None	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MIABFT	IAL	Brazil ☐
USA: ASHRAE	- None	N	A	EASC	Y	N	E	B	WSI	C ?	O ?	C ?	5	C	C	C	C	N	MIAT	ALUG	Canada ☒
- None	- None	N	L	ASC	Y	Y	E	B	WECSI	CI	N	N	5	?	?	?	?	?	MIABFT		Chile ☒
USA: ASHRAE	- None	?	A	EAC	Y	Y	-		WECS	- -	- -	- -	-	C	N	N	N	N	IAT	?	China ☒
Yes	?	?	A	U	U	?	?		?	C ?	P ?	P ?	3	?	C	C	C	N	?	?	China ☐
USA: ASHRAE Jamaica:	DOE-2	N	E	EASC	Y	Y	E	E	WECSI	I	I	I	?	N	N	N	N	N	MB	-	Colombia ☒
USA:	- None	U	-	?	N	N	EO	O	-	C 50	U	U	2	N	N	N	N	N	?	?	Colombia ☐
- None	- None	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	AL	Costa Rica ☐
Germany: DIN Austria:	- None	?	A	ESC	Y	N	E	E	WES	C 10	P 50	C 90	5	I	C	I	I	?	MIAFTO	?	Czechoslovakia ☒
Russian: Poland: STAS Germany: DIN	Yes	U	A	U	Y	Y	E	B	WECSI	I 75	N	N	3	P	N	N	N	-	MIBT	O	Czechoslovakia ☐
- None	No	U	A	E	Y	Y	U		U	C 10	C ?	C ?	2	-	-	-	-	-	IABFT	-	Czechoslovakia ☐
Yes: EN ISO	No	N	A	-	N	N	EV		SI	-	O	O	-	I	N	N	P	P	O	-	Czechoslovakia ☐
- None	TSBI	N	A	EAC	Y	N	E	B	W	C ?	C ?	C ?	4	C	C	C	N	-	ITO	IAR	Denmark ☒
- None	No	U	A	EASC	Y	Y	E	B	WECSI	C 10	N	N	5	I	N	I	N	-	MITO	UIAR	Denmark ☐
																					Djibouti ☐
- None	BREDEM ESP-II	B	A	EACO	Y	Y	E	O	WESI	C 10	C ?	N ?	4	I	I	C	N	I	MIABTO	IG	England & Wales ☒
- None	Uncertain	U	L	EAC	Y	N	E	B	WECS	C ?	? ?	? ?	?	C	?	?	?	?	MIABFT	AIR	France ☒
- None	- None	?	A	E	N	N	E	B	WES	CI ?	CI ?	PN ?	3	C	C	I	I	N	IAT	?	France ☐
UK USA Australia &	DOE-2-1D	N	A	EAS	N	U	E	B	WEC	C 10	N	N	5	C	N	N	N	-	-	-	Hong Kong ☒
Singapore:	DOE-2 ASEAM	Y	A	EASC	Y	N	E	B	WESI	C ?	?	?	-	P	I	N	N	-	MIFT	IA	Indonesia ☒
Germany: DIN	- None	U	L	E	Y	Y	E	B	WECSI	C -	N -	C -	4	-	-	P	P	-	IAT	-	Israel ☒
- None	TARP	N	A	EAS	Y	Y	E	B	WECSI	C 15	P 15	N -	2	C	N	C	N	N	IT	-	Israel ☐
Jamaica:	OASIS CODYBA DOE-2	Y	A	EASC	U	N	E	E	WECS	- -	- -	- -	-	I	-	I	-	-	O	-	Ivory Coast ☒
USA: ASHRAE Malaysia Thailand	ASEAM DOE-2.1D	Y	A	EASC	N	N	E	B	WECSI	C ?				C	I	C	?	C	A	IG	Jamaica ☒
Uncertain	Uncertain	Y	A	ES	N	Y	E	B	WSI	C 10	N	N	5	N	-	-	-	D	MIAT	I	Japan ☒

Survey Data Table (all 59 Respondents)

☒ Indicates 35 surveys selected for further analysis (countries with standards)	I: OVERVIEW						II: DESCRIPTION OF SPECIFIC STANDARD									III: DEVELOPMENT PROCESS					
	#1: Any Building Standards	#2: Energy Standard Building Sectors	#3: Status of NON-RESIDENTIAL Standards: National	Regional	Local	#4: Year	#5: Applicability of Standard: Building Types	Vintage	Applicable Characteristics	#6: Approach	#7: Provisions Included in Standard: Whole Building	Building Envelope	Lighting	Mechanical	Other	#8: Organizations Involved	#9: Decision Process	#10: Information Used: Physical Characteristics	Energy Use	Weather Data	Other
Malaysia ☒	NRL	N	V	V	V	1989	OHGFC	N	E	Pe	-	RWFI	CPI	LCE	-	GA	C	G	GA	A	
Mexico ☐	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands ☒	NL	B	P	-	M	1992	OHSMDE	B		Pe	-	RWFI	-	O		GGRO	C	A	N	A	-
New Zealand ☒	N	B	M	-	-	1982	OHGDCR	B	P	Bo	E	RWFI	P	LCV	N	GR	M	GA	CG	A	-
New Zealand ☐	NRL	B	V	V	V	1977	OHGSFC	N	-	Bo	-	RW	-	-	-	GGAI	C	A	G	A	-
New Zealand ☐	N	R	-	-	-	1992	S	N	PO	Bo	E	RWFIO	-	-	-	IAG	O	A	C	A	-
New Zealand ☐	N	B	V	-	-	1982	OHGDCR	B	P	Bo	E	RWFI	P	LCV	-	GLIG	C	GA	CG	A	-
Northern Ireland ☒	N	B	M	M	M	1991	A	B	PE	Pe	-	RWF	-	C	-	GGR	C	G	G	A	-
Norway ☒	N	B	M	-	-	1987	A	B	-	Bo	-	RWFI	-	A	-	GRGI	M	G	C	G	-
Pakistan ☒	NRL	B	V	-	-	1990	OHGSFC	N	O	Bo	E	RWFI	CO	ALCVE	Y	GG	C	E	C	A	-
Philippines ☒	N	N	VP	-	-	198?	OHGCDF	B	E	Bo	P	RWFI	CPI	ALCVE	-	GAFO	C	G	G	G	-
Poland ☒	N	B	M	-	-	1991	A	B	PA	Pe	E	RWFIO	?	?	-	GR	?	A	?	A	-
Poland ☐	N	B	M	-	-	1991	A	B	-	Pe	-	RWFI	-	-	Y	GRG	C	E	E	N	-
Portugal ☒	N	B	M	-	-		A	B	O	Bo	E	RWFI	O	-	-	GGAA	C	A	E	A	-
Romania ☒	NRL	B	V	-	-	?	A	B	PE	Pr	E	Y	-	?	-	GRI	M	E	EG	G	-
Russia ☒	N	B	P	P	-	1991	A	B	E	Pe	E	RWFIO	-	-	-	RRRR	C	A	CG	A	-
Scotland ☒	N	B	M	-	-	?	A	N	-	Bo	E	RWF	-	Y	Y	GIAR	M	?	?	?	-
Singapore ☒	N	B	M			1980	A	N	EA	Bo	-	RWFI	CPI	CV	Y	GAGL	C	G	E	G	-
South Africa ☒	NL	N	V	V	-	?	OGD	N	E	Pe	E	?	?	?	-	A	M	E	EC	A	-
South Africa ☐	NRL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South Korea ☒	N	B	M			1992	OHGFDC	N	P	Bo	E	RWFI	CPI	LCE	Y	GGR	C	EGA	ECGA	GA	-
Sweden ☒	N	B	M	-	-	1989	A	N	O	Pe	O	RWFI	IO	V	H	G	M	-	EC	A	-
Switzerland ☒	N	B	M	M	M	1988	A	B	PEF	Bo	E	RWFI	-	LE	-	GA	C	A	E	A	-
Switzerland ☐	NRL	B	MV	M	M	88/9	A	N	EF	Bo	E	O	-	A	Y	GA	C	EG	CG	A	-
Thailand ☒	N	N	P	P	P	1987	OHGFDC	B	E	Pr	-	RWFI	CP	LVE	-	GGA	M	A	A	A	T
USA ☒	NRL	B	MV	MV	M	1989	OHFDRC	N	O	Bo	C	WF	CP	LCVE	Y	GRII	C	E	C	A	-
Venezuela ☐	N	-		-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-

Survey Data Table (cont.)

III: DEVELOPMENT (cont.)							IV: IMPLEMENTATION AND COMPLIANCE														V: OTHER INFO.		
#11: Other Information Sources	#12: Computer Programs Used	Computer Compliance?	#13: Goal	#14: Considerations	#15: Regular Review?	Manual Version?	#16: Implementing Entity	Former Focus	#17: Training/ Education	#18: Compliance methods: Before Construction %	During Construction %	After Construction %	Effectiveness	#19: Saving Assessments: Energy Potential	Energy Actual	Cost Potential	Cost Actual	Other	#20: Testing Facilities	#21: Other Programs	☒ Indicates 35 surveys selected for further analysis (countries with standards)	
Singapore: USA: ASHRAE	DOE-2 ASEAM-2	N-	E	EAC	Y	N	V	-	ES	N	N	N		C	P	C	C		MIAB	IAE	Malaysia	☒
- None	-None	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MABT	AIB	Mexico	☐
- None	CEN TC 89 TCM ISSO pub	N	E	EC	Y	N	E	B	WECI	C 10	P 10	N 0	4	C	N	C	N	P	IATO	IURA	Netherlands	☒
USA: ASHRAE UK: BS 5422:	SUSTEP	A	E	ES	Y	N	E	B	O	C 90	C 25	C ?	4	P	C	P	P	N	IT	U	New Zealand	☒
No	No	U	A	EASC	Y	N	EN	B	-	CP 10	CP?	CP?	5	I	I	I	I	I	IT	G	New Zealand	☐
No	ALF	Y	-	O	N	N	O	?	-	C 10	N	N	3	I	I	N	N	N	IAT	U	New Zealand	☐
USA: ASHRAE UK: BS 5422:	Uncertain	U	E	ES	Y	N	E	B	-	C 90	C 25	C ?	4	P	C	P	P	N	IT	U	New Zealand	☐
England and Wales:	BREDEM CIBSE	N	A	EASCO	Y	Y	E	B	WES	C 10	C 75	C 95	5	C	I	C	I	-	IT	I	Northern Ireland	☒
Denmark Sweden Finland	Yes	?	E	E	Y	Y	E	O	WE	C 10	? ?	C ?	3	C	C	C	C	-	U	IR	Norway	☒
US: US: ASHRAE	-None	U	A	EASC	Y	N	E	O	WECS	N -	N -	N -	-	C	P	I	P	N	MBF	AIB	Pakistan	☒
Thailand:	DOE-2 ASEAM	N	E	EASC	Y	Y	E	O	-	U	U	U	-	N	N	N	N	N	ABFO	IAR	Philippines	☒
Yes	Uncertain	?	L	EASC	Y	Y	E	?	WEI	? ?	? ?	? ?	?	C	P	?	?	?	IBT	?	Poland	☒
UK: Building Sweden:	MAIN Energy	Y	A	EAC	Y	N	E	B	WES	C U	C U	N 0	2	P	I	P	P	N	IT	G	Poland	☐
France Spain	-None	U	E	S	N	-	E	O	WECS	C ?	N ?	N ?	3	C	P	P	N	P	MIAFTO	I	Portugal	☒
European	Uncertain	?	E	EAS	Y	U	U		WECS	P ?	?	?	2	I	I	I	I	I	MIT	I	Romania	☒
ISO-9164 Germany: DIN Sweden: SBN	HEAT	Y	A	EAC	Y	N	E	B	-	-	-	C	3	P	I	I	N		ITO	G	Russia	☒
England and	Uncertain	?	?	EASC	Y	Y	E		WES	U	U	U	-	-	-	-	-	-	-	-	Scotland	☒
USA: ASHRAE	-None	N	A	EASC	Y	Y	E	B	WECS	C -	N	C	5	C	C	C	C	-	IBT	I	Singapore	☒
- None	QUICK	Y	E	ESC	N	?	E	B	-	N 5	N 0	N 0	1	C	C	I	I	P	IT	AT	South Africa	☒
- None	-None	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	IT	AT	South Africa	☐
USA: BEPS USA: ASHRAE Japan: PAL,	DOE-2 Trakload TRNSYS	Y	A	EASC	Y	Y	E	B	WECS	C 50	CO 50	CP?	3	P	P	P	P	P	MIABFT	GUIA	South Korea	☒
- None	ENORM	Y	A	EC	Y	Y	E	B	WESI	C 10	C ?	C ?	5	-	-	-	-	-	IAT	-	Sweden	☒
Germany: DIN France:	-None	?	L	EC	Y	Y	?	?	ESI	C 10	- -	- -	-	I	I	I	I	-	IAT	B	Switzerland	☒
- None	DOE-2	U	L	EACO	Y	Y	E	B	WECS	C 10	N -	N -	4	C	C	C	C	N	IT	G	Switzerland	☐
Singapore USA: ASHRAE	DOE-2	Y	A	EASC	Y	-	E	E	WE	P 10	P -	P ?	-	I	P	P	N	N	AB	UG	Thailand	☒
- None	DOE-2	Y	A	AC	Y	N	EO	E	WES	C ?	U ?	U ?	5	C	C	N	N	N	MIAT	UG	USA	☒
- None	-None	-	-	-	-	-	-		-	-	-	- -	-	-	-	-	-	-	IBT	U	Venezuela	☐

APPENDIX C

Surveyed Details of Selected Energy Standards in 35 Countries

Country Name	Page Number
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Belgium	C-6
Canada	C-10
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China	C-18
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Czechoslovakia (former)	C-26
Denmark	C-30
England & Wales	C-34
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Singapore	C-110
South Africa	C-114
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Switzerland	C-126
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United States	C-138

In most cases only one survey from each country was received, but in cases where multiple surveys were returned we did not attempt to verify or "correct" discrepancies between respondents from the same country. To develop our comparative analysis set and this appendix, we selected the surveys which seemed to contain the most reliable information.

AUSTRALIA

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National | Regional | Local

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:
   a. National level: Proposed
   b. Regional level: Proposed
   c. Local level: Proposed

4. Single energy standard selected for further description:
   Title, Organization: Building Envelope, Australian Standards Association
   Year: 1993 Geographic Coverage: Nation Abbreviated Title: ASA-1993

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - ASA-1993

5. The standard defined in Question 4 applies to the following kinds of buildings:
   a. Building types:
   Offices
   b. Building vintage:
   New buildings
   c. Other characteristics:
   A - Air-Conditioned

6. Basic approach of the standard: Both prescriptive and performance

7. The following subjects are included in the energy standard:
   a. Whole building energy provisions:
   E- Energy amount target
   b. Building envelope provisions:
   Roof
   Wall system
   Fenestration system
   Infiltration
   Other: Thermal mass, internal load
   c. Lighting provisions:
   - None
   d. Mechanical provisions:
   - None
   e. Other provisions:
   - None

STANDARDS DEVELOPMENT PROCESS - ASA-1993

8. Organizations involved in developing the standard:

Government agency: Energy Research and Development Cooperation
Government agency: Standards Association, Australia
Academic institution: SOLARCH, University of New South Wales

9. Decision Process: Consensus **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Gathered through audits and surveys

b. ENERGY USE of existing buildings:

Estimated using professional judgment

c. WEATHER data

Gathered through measurements
Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

USA: ASHRAE 90.1-1989

12. COMPUTER programs used:

a. In developing the standard: DOE-2

b. For complying with the standard: No

13. Standard is set at a level: Above current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
Availability of energy efficient products
Similarity/difference to local design
Comfort

Comments:

15a. Standard scheduled for regular review and revision?

Yes: Standards Australia committees initiate these--often the professional drive it too.

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

Yes

3 AUSTRALIA

IMPLEMENTATION AND COMPLIANCE - ASA-1993

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Standards Australia

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Buildings

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

- None

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
No mechanism	No mechanism	No mechanism
Percent designs checked: ____	Percent sites checked: ____	Percent buildings checked: ____
Comment:	Comment:	Comment:

d. Other compliance procedures Some councils (local governments) are encouraging use of standards.

e. Effectiveness of combined compliance mechanisms (scale of 1-5): ____

f. Explanation for effectiveness in part e:

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

None conducted

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

None conducted

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

Planned

d. COST EFFECTIVENESS based on ACTUAL COSTS:

Planned

e. Other Assessments: Planned

FURTHER INFORMATION ON ENERGY CONSERVATION - Australia

20. Efficiency testing facilities and procedures established:

Motors
Insulation
Air conditioners/chillers/other appliances
Thermal properties of materials

21. Other programs or policies developed to increase energy efficiency in buildings:

Utility initiatives
Building energy standards
Labeling of appliances

Comment: Building energy targets developed by B.D.M.A.

Additional sources of information about energy efficiency for buildings in: Australia

1. E.R.D.C. Compendium (P.O. Box 629; Canberra, ACT. 2601, Australia)
2. A.N.Z.S.E.S. (Australia New Zealand Solar Energy Society) Proceedings of conferences.
3. AIRAH (Australian Institute of Refrigeration, Air-Conditioning, and Heating) Journal

22. Contact for written copy of energy standard specified in Question 4:

Name: Deo K. Prasad

Address: Associate Director, SOLARCH
P.O. Box 1
Kensington 2033

Country: Australia

Tel: 61-2-697-4868 **Fax:** 61-2-662-1378

Types of supporting information available:

Other energy standards for non-residential buildings:

Survey completed by: Deo K. Prasad
Title: Associate Director, SOLARCH
University of New South Wales
P.O. Box 1, Kensington
New South Wales 2033 **Country:** Australia
Tel: 61-2-697-4868 **Fax:** 61-2-662-1378

Date completed: 4/14/92

BELGIUM

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National | Regional | Local

2. Proposed or existing ENERGY standards cover the following building sectors: Residential Only

3. Status of Non-Residential Building Energy Standards at the:
   a. National level: Voluntary
   b. Regional level: Voluntary
   c. Local level: Voluntary

4. Single energy standard selected for further description:
   Title, Organization: Réglementatin thermique pour les logements neufs (K70-Be500). 1984. Ministere de la Regin Wallonne
   Year: 1984 Geographic Coverage: Regions Abbreviated Title: K70-BE500:1984

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - K70-BE500:1984

5. The standard defined in Question 4 applies to the following kinds of buildings:
   a. Building types:
   S - Single-family residential
   M - Multi-family residential
   b. Building vintage:
   New buildings
   c. Other characteristics:
   - None

6. Basic approach of the standard: Performance-based

7. The following subjects are included in the energy standard:
   a. Whole building energy provisions:
   E- Energy amount target
   b. Building envelope provisions:
   Other: performance thermique de l'envelope (globale)
   c. Lighting provisions:
   - None
   d. Mechanical provisions:
   - None
   e. Other provisions:
   - None

STANDARDS DEVELOPMENT PROCESS - K70-BE500:1984

8. Organizations involved in developing the standard:

Government agency: Ministere de la Région Wallonne
Research group: C.S.T.C.
Academic institution: U. Lg, U.C.L, U.M.S.
Industry group: Ordre des architectes; COMITA (isolants); verries etc.

9. Decision Process: Consensus **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Gathered through audits and surveys
Already available prior to standard

b. ENERGY USE of existing buildings:

Estimated using professional judgment
Computer simulations used for estimates
Gathered through audits and surveys
Already available prior to standard

c. WEATHER data

Gathered through measurements
Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

- None

12. COMPUTER programs used:

a. In developing the standard: Yes

b. For complying with the standard: Yes

13. Standard is set at a level: Above current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
Availability of energy efficient products
Similarity/difference to local design
Comfort

Comments:

15a. Standard scheduled for regular review and revision?

Yes: nouvelles normes pour le esleuf des coefficients, ventilatin tec...performance des vitrages

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

Yes

3 BELGIUM

IMPLEMENTATION AND COMPLIANCE - K70-BE500:1984

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Ministere de la Region Wallonnne D.G.C.R.

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Energy

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Compliance forms
Seminars, workshops, or conferences
Information or resource center

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Penalty	Penalty	Penalty
Percent designs checked: -	Percent sites checked: -	Percent buildings checked: -
Comment:	Comment:	Comment:

d. Other compliance procedures -None

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 2

f. Explanation for effectiveness in part e:

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Completed

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

Completed

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

Completed

d. COST EFFECTIVENESS based on ACTUAL COSTS:

Completed

e. Other Assessments: None conducted

FURTHER INFORMATION ON ENERGY CONSERVATION - Belgium

20. Efficiency testing facilities and procedures established:

Insulation

21. Other programs or policies developed to increase energy efficiency in buildings:

Information programs
Audits (free or subsidized)

Comment: Campagne cornet d'epoigne energie (habitat existent); guichets de l'energie; A geela EPEE, logements soliare, ecoles-hopitaux, lieux de cultes (diagnostics thermiques)

Additional sources of information about energy efficiency for buildings in: Belgium

1. Bilan energetique de la Walemie. Tableau de borol
2. Applicatin de la réglementatin K90-Be500
3. Ecrnotec: rentabilite des investissements URE pour le logement existant.

22. Contact for written copy of energy standard specified in Question 4:

Name:

Address: Ministere de la Région Wallonne D.G.T.R.
direction de l'energie
avenue Prince de Liege, 7
5100 Namur (Jambes)

Country: Belgium

Tel: 32 81 321 541 **Fax:** 32 81 30 66 00

Types of supporting information available:

-None

Other energy standards for non-residential buildings:

-None

Survey completed by: H. Gleniur
Title: Architecte
Ministere de la Région Walernne D.G.T.R.
Direction de l'energie; 7, avenue Prince de Liege
5100 Nomur **Country:** Belgium
Tel: 32 81 32 12 11 **Fax:** 32 81 30 66 00

Date completed: 4/14/92

CANADA

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National | Regional | Local

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:

a. National level: Proposed

b. Regional level: Mandatory

c. Local level: Mandatory

4. Single energy standard selected for further description:

Title, Organization: Loi sur l'économie de l'énergie dans le Bâtiment. Loi son Régleglément sur l'économie de l'énergie dans les nouveaux Bâtiments. Ministeres de l'energie et des resources et celui du travail. (National Research Council of Canada)

Year: 1983 Geographic Coverage: Regions Abbreviated Title: NRCC-22432

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - NRCC-22432

5. The standard defined in Question 4 applies to the following kinds of buildings:

a. Building types:

A - All Buildings

b. Building vintage:

New buildings

c. Other characteristics:

A - Air-Conditioned

O - Other: heating systems

6. Basic approach of the standard: Prescriptive

7. The following subjects are included in the energy standard:

a. Whole building energy provisions:

? - Uncertain

b. Building envelope provisions:

Roof

Wall system

Fenestration system

Infiltration

Other: thermal properties of materials

c. Lighting provisions:

Power density

d. Mechanical provisions:

Controls

Ventilation

Equipment efficiency

e. Other provisions:

- None

STANDARDS DEVELOPMENT PROCESS - NRCC-22432

8. Organizations involved in developing the standard:

Research group: Canadian National Research Council
Research group: ASHRAE with the standard 90A-1980
Government agency: Bureau de l'efficacite Enèrgétique

9. Decision Process: Mandate **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Estimated using professional judgment

b. ENERGY USE of existing buildings:

Estimated using professional judgment

c. WEATHER data

Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

USA: ASHRAE 90A-1980

12. COMPUTER programs used:

a. In developing the standard: - None

b. For complying with the standard: No

13. Standard is set at a level: Above current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
A - Availability of energy efficient products
S - Similarity/difference to local design
C - Comfort

Comments:

15a. Standard scheduled for regular review and revision?

Yes: with the CNRC's evaluation of ASHRAE 90.1-1989 and correction for Canada

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

No

3 CANADA

IMPLEMENTATION AND COMPLIANCE - NRCC-22432

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Régie du Bâtiment

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Buildings

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Seminars, workshops, or conferences
Information or resource center

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Certification/approval	Other policy mechanism	Certification/approval
Percent designs checked: ?	Percent sites checked: ?	Percent buildings checked: ?
Comment:	Comment:	Comment:

d. Other compliance procedures Yes: (see below)

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 5

f. Explanation for effectiveness in part e: Builders, architects, and engineers must give a "conform certificate" to the owner.

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Completed

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

Completed

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

Completed

d. COST EFFECTIVENESS based on ACTUAL COSTS:

Completed

e. Other Assessments: None conducted

FURTHER INFORMATION ON ENERGY CONSERVATION - Canada

20. Efficiency testing facilities and procedures established:

Motors
Insulation
Air conditioners/chillers/other appliances
Thermal properties of materials

21. Other programs or policies developed to increase energy efficiency in buildings:

Audits (free or subsidized)
Labeling of appliances
Utility initiatives
Government energy policy

Comment: Bureau de l'efficacite energetique, and Hydro-Quebec.

Additional sources of information about energy efficiency for buildings in: Canada

1. La Maîtrise de l'energie. Association Québécoise pour la maîtrise de l'energie (AQME)
   5, Place Ville-Marie, 9e étage, Bureau 903, Montreal, Quebec. H3B 2G2 Canada
2.
3.

22. Contact for written copy of energy standard specified in Question 4:

Name:

Address:
Les Publications du Québec
3, Complexe des Jardins
H5B 13E Quebec

Country: Canada

Tel: 514 873 6101 **Fax:** 514 873-0369

Types of supporting information available:

"Reglement Commenté" (New edition will be available: Autumn 1992 from les publications du Québec)

Other energy standards for non-residential buildings:

Energy Efficiency of Electrical and Hydrocarbon-Fueled Appliances Law.

Survey completed by: Jean-Pierre Roy
Title: Chef de Division: Conseils
Bureau de l'efficacité énergétique
425 Ave. Viger Ouest, Bureau 600
Montreal, H2Z 1W9 **Country:** Canada
Tel: 514-873-5463 **Fax:** 514-873-6946

Date completed: 7/13/92

CHILE

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National | Regional | Local

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:

a. National level: Mandatory
Voluntary

b. Regional level: -

c. Local level: -

4. Single energy standard selected for further description:

Title, Organization: Nch 1029 y Wch1960

Year: 1960 Geographic Coverage: Nation Abbreviated Title: Nch 1029 y Wch1960

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - Nch 1029 y Wch1960

5. The standard defined in Question 4 applies to the following kinds of buildings:

a. Building types:
A - All Buildings

b. Building vintage:
Both new and existing

c. Other characteristics:
- None

6. Basic approach of the standard: Performance-based

7. The following subjects are included in the energy standard:

a. Whole building energy provisions:
- None

b. Building envelope provisions:
Roof
Wall system
Fenestration system
Infiltration

c. Lighting provisions:
- None

d. Mechanical provisions:
- None

e. Other provisions:
Yes *(not specified)*

STANDARDS DEVELOPMENT PROCESS - Nch 1029 y Wch1960

8. Organizations involved in developing the standard:

Government agency: Institute Nacional Normalizacion
Academic institution: Universidades
Local interest group

9. Decision Process: Consensus **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Gathered through audits and surveys

b. ENERGY USE of existing buildings:

Gathered through audits and surveys

c. WEATHER data

Gathered through measurements

d. Other information

- None

11. Standards from a different country used as source material:

- None

12. COMPUTER programs used:

a. In developing the standard: - None

b. For complying with the standard: No

13. Standard is set at a level: Lower than current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

Availability of energy efficient products
Similarity/difference to local design
Comfort

Comments:

15a. Standard scheduled for regular review and revision?

Yes

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

Yes

3 CHILE

IMPLEMENTATION AND COMPLIANCE - Nch 1029 y Wch1960

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Instituto Nacional de Normalizacion

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Buildings

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Compliance forms
Seminars, workshops, or conferences
Information or resource center

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Certification/approval	No mechanism	No mechanism
Incentive		
Percent designs checked: ____	Percent sites checked: ____	Percent buildings checked: ____
Comment:	Comment:	Comment:

d. Other compliance procedures

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 5

f. Explanation for effectiveness in part e:

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

?

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

?

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

?

d. COST EFFECTIVENESS based on ACTUAL COSTS:

?

e. Other Assessments: ?

FURTHER INFORMATION ON ENERGY CONSERVATION - Chile

20. Efficiency testing facilities and procedures established:

Motors
Insulation
Air conditioners/chillers/other appliances
Ballasts
Fixtures
Thermal properties of materials

21. Other programs or policies developed to increase energy efficiency in buildings:

Comment:

Additional sources of information about energy efficiency for buildings in: Chile

1.
2.
3.

22. Contact for written copy of energy standard specified in Question 4:

Name:
Address:
Country:

Tel: **Fax:**

Types of supporting information available:

Other energy standards for non-residential buildings:

Survey completed by: Gabriel Rodriguez
Title: Engineer
IDIEM, University of Chile
Beaucheff 850
Country: Chile
Tel: 562-698-2071 x 130 **Fax:** 562-671-2799

Date completed: 4/8/92

CHINA

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National | Regional |

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:

a. National level: Mandatory

b. Regional level: - None

c. Local level: - None

4. Single energy standard selected for further description:

Title, Organization: "Energy Conservation Design Standard on Building Envelope and Air Conditioning for Tourist Hotels," The National Technology Supervision Bureau and the Ministry of Construction, 1992/93

Year: 1993 Geographic Coverage: Nation Abbreviated Title: NTSB-93

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - NTSB-93

5. The standard defined in Question 4 applies to the following kinds of buildings:

a. Building types:

H - Hotels

b. Building vintage:

New buildings

c. Other characteristics:

A - Air-Conditioned

6. Basic approach of the standard: Both prescriptive and performance

7. The following subjects are included in the energy standard:

a. Whole building energy provisions:

E- Energy amount target

b. Building envelope provisions:

Roof
Wall system
Fenestration system
Infiltration

c. Lighting provisions:

- None

d. Mechanical provisions:

Air/Water distribution efficiency
Load Calculations for equipment sizing
Controls
Ventilation
Equipment efficiency

e. Other provisions:

Yes: Thickness of insulation for pipe and duct. Thermostat settings.

STANDARDS DEVELOPMENT PROCESS - NTSB-93

8. Organizations involved in developing the standard:

Government agency: The Bureau of Standards and Rating of the Construction Ministry
Academic institution: Institute of Air Conditioning
Academic institution: Beijing Institute of Architectural Design

9. Decision Process: Consensus **Comment:** Guanzhou Institute of Architectureal Design; Middle South-China Instititute of Architectural Design; East-China

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Estimated using professional judgment
Gathered through audits and surveys

b. ENERGY USE of existing buildings:

Gathered through audits and surveys

c. WEATHER data

Gathered through measurements

d. Other information

- None

11. Standards from a different country used as source material:

USA: ASHRAE 90.1-1989

12. COMPUTER programs used:

a. In developing the standard: - None

b. For complying with the standard: ?

13. Standard is set at a level: Above current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
A - Availability of energy efficient products
C - Comfort

Comments:

15a. Standard scheduled for regular review and revision?

Yes: The standard will be approved by the Bureau of Standard and Rating of the Construction Ministry. I believe that it will be reviewed and revised after application of the Standard.

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

Yes

3 CHINA

IMPLEMENTATION AND COMPLIANCE - NTSB-93

16. Entities involved in IMPLEMENTING energy standards:

- None: the standard is proposed

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Compliance forms
Seminars, workshops, or conferences

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
-	-	-
Percent designs checked: -	Percent sites checked: -	Percent buildings checked: -
Comment:	Comment:	Comment:

d. Other compliance procedures -

e. Effectiveness of combined compliance mechanisms (scale of 1-5): -

f. Explanation for effectiveness in part e: The Standard hasn't been approved.

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Completed: research report (in Chinese)

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

None conducted

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

None conducted

d. COST EFFECTIVENESS based on ACTUAL COSTS:

None conducted

e. Other Assessments: None conducted

FURTHER INFORMATION ON ENERGY CONSERVATION - China

20. Efficiency testing facilities and procedures established:

Insulation
Air conditioners/chillers/other appliances
Thermal properties of materials

21. Other programs or policies developed to increase energy efficiency in buildings:

?

Comment:

Additional sources of information about energy efficiency for buildings in: China

1. -
2.
3.

22. Contact for written copy of energy standard specified in Question 4:

Name:

Address:

Country:

Tel: **Fax:**

Types of supporting information available:

"Item Explanation of the Standard."

Other energy standards for non-residential buildings:

-

Survey completed by: Lang Siwei
Title: Director, Institute of Air Conditioning
China Academy of Building Research
P.O. Box 752
Beijing 100013
Country: PR China
Tel: 9-011-86-1-421-1133 **Fax:** 9-011-86-1-421-3555

Date completed: 7/22/92

COLOMBIA

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:

a. National level:	b. Regional level:	c. Local level:
Proposed		
Mandatory		
Voluntary		

4. Single energy standard selected for further description:

Title, Organization: Proposed energy standard

Year: 199? Geographic Coverage: Nation Abbreviated Title: PES

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - PES

5. The standard defined in Question 4 applies to the following kinds of buildings:

a. Building types:
- O - Offices
- H - Hotels
- G - Government Facilities
- C - Commercial/retail stores
- S - Single-family residential
- M - Multi-family residential

b. Building vintage:
- New buildings

c. Other characteristics:
- P - Physical size (10,000 sq. ft)
- A - Air-Conditioned

6. Basic approach of the standard: Both prescriptive and performance

7. The following subjects are included in the energy standard:

a. Whole building energy provisions:
- None

b. Building envelope provisions:
- None

c. Lighting provisions:
- Control requirements
- Power density
- Illumination requirements

d. Mechanical provisions:
- Air/Water distribution efficiency
- Load Calculations for equipment sizing
- Controls
- Ventilation
- Equipment efficiency

e. Other provisions:
- Yes: thermostat settings

STANDARDS DEVELOPMENT PROCESS - PES

8. Organizations involved in developing the standard:

Government agency: Comicion Nacional de Energia
Industry group
Academic institution
Foreign development agency: World Bank

9. Decision Process: Consensus **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Gathered through audits and surveys

b. ENERGY USE of existing buildings:

Gathered through audits and surveys

c. WEATHER data

Gathered through measurements

d. Other information

- None

11. Standards from a different country used as source material:

USA: ASHRAE 90.1-89
Jamaica: EEBC-90

12. COMPUTER programs used:

a. In developing the standard: DOE-2

b. For complying with the standard: No

13. Standard is set at a level: Equal to current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
A - Availability of energy efficient products
S - Similarity/difference to local design
C - Comfort

Comments:

15a. Standard scheduled for regular review and revision?

Yes

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

Yes

3 COLOMBIA

IMPLEMENTATION AND COMPLIANCE - PES

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: utilities

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Energy

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Compliance forms
Seminars, workshops, or conferences
Information or resource center

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Incentive	Incentive	Incentive
Percent designs checked: ____	Percent sites checked: ____	Percent buildings checked: ____
Comment:	Comment:	Comment:

d. Other compliance procedures -

e. Effectiveness of combined compliance mechanisms (scale of 1-5): -

f. Explanation for effectiveness in part e:

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

None conducted

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

None conducted

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

None conducted

d. COST EFFECTIVENESS based on ACTUAL COSTS:

None conducted

e. Other Assessments: None conducted

FURTHER INFORMATION ON ENERGY CONSERVATION - Colombia

20. Efficiency testing facilities and procedures established:

Motors
Ballasts

21. Other programs or policies developed to increase energy efficiency in buildings:

- None

Comment:

Additional sources of information about energy efficiency for buildings in: Colombia

1. World Bank preliminary report: Estudiode Eficiencia Energetica en Colombia (Phase 1&2, in Spanish)
2. -
3. -

22. Contact for written copy of energy standard specified in Question 4:

Name: -

Address:

Country:

Tel: **Fax:**

Types of supporting information available:

-

Other energy standards for non-residential buildings:

-
-

Survey completed by: Santiago Moreno
Title: Principal
W.J. Dannehy
3717 Columbia Pike, Suite 200
Arlington, VA 22204 **Country:**
Tel: (703)486-8470 **Fax:** 703-486-8472

Date completed: 10/13/92

CZECHOSLOVAKIA

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:
   a. National level: Mandatory
   b. Regional level: - None
   c. Local level: - None

4. Single energy standard selected for further description:

   Title, Organization: CSN 73 0540 Thermo-technical properties of engineering structures and buildings. Nomenclature. Requirements and criteria. 1/1/79, Federal office for Standards and Measurement, Prague

   Year: 1979 Geographic Coverage: Nation Abbreviated Title: CSN 73 0540

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - CSN 73 0540

5. The standard defined in Question 4 applies to the following kinds of buildings:

   a. Building types:
   - O - Offices
   - H - Hotels
   - F - Restaurants
   - D - Hospitals
   - M - Multi-family residential
   - X - Other: agricultural buildings

   b. Building vintage:
   Both new and existing

   c. Other characteristics:
   - P - Physical size: volume
   - E - Amount of energy: dependent on size

6. Basic approach of the standard: Performance-based

7. The following subjects are included in the energy standard:

   a. Whole building energy provisions:
   - E- Energy amount target

   b. Building envelope provisions:
   - Roof
   - Wall system
   - Fenestration system
   - Infiltration
   - Other: floor

   c. Lighting provisions:
   - None

   d. Mechanical provisions:
   - None

   e. Other provisions:
   - None

STANDARDS DEVELOPMENT PROCESS - CSN 73 0540

8. Organizations involved in developing the standard:

Government agency: Federal Office for Standards and Measurement, Prague
Academic institution: Technical University, Prague; Technical University, Bratislava
Government agency: Ministry of Building Trade
Other: design organzations

9. Decision Process: Consensus **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Estimated using professional judgment
Gathered through audits and surveys

b. ENERGY USE of existing buildings:

Estimated using professional judgment
Gathered through audits and surveys

c. WEATHER data

Estimated using professional judgment
Gathered through measurements

d. Other information

- None

11. Standards from a different country used as source material:

Germany: DIN 4108 Wämeschutz im Hochban
Austria: Onorm B 8110

12. COMPUTER programs used:

a. In developing the standard: - None

b. For complying with the standard: ?

13. Standard is set at a level: Above current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
Similarity/difference to local design
Comfort

Comments:

Cost effectiveness is dominant.

15a. Standard scheduled for regular review and revision?

Yes: There are 3 proposals. Each is discussed by organizations that play important roles in developing standards.

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

No

3 CZECHOSLOVAKIA

IMPLEMENTATION AND COMPLIANCE - CSN 73 0540

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Federal Office for Standards

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Energy

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Seminars, workshops, or conferences

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Certification/approval	Penalty	Certification/approval
Percent designs checked: 100	Percent sites checked: 50	Percent buildings checked: 90
Comment:	Comment:	Comment:

d. Other compliance procedures - None

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 5

f. Explanation for effectiveness in part e: Designers and realizers [builders] must cooperate.

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

In progress

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

Completed: Rehanek, J. "Improvement of Thermo-Technical Properties of Building Structures. SNTL Prague,
In progress

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

In progress

d. COST EFFECTIVENESS based on ACTUAL COSTS:

In progress

e. Other Assessments: ?

FURTHER INFORMATION ON ENERGY CONSERVATION - Czechoslovakia

20. Efficiency testing facilities and procedures established:

Motors
Insulation
Air conditioners/chillers/other appliances
Fixtures
Thermal properties of materials
Other: fire protection of materials

21. Other programs or policies developed to increase energy efficiency in buildings:

? | **Comment:**

Additional sources of information about energy efficiency for buildings in: Czechoslovakia

1. Journal of Federal Office for Standards and Measurement (in Czech, *Magazín CSN*)
2. Halahyja, M. et. al: "Building Thermal Technics, Acoustics, and Daylighting." Alfa Bratislava, 1985. (In Slovak, "Stavebna Tepelna Technika, Akustika a Osvetlenie.")
3. Rehanek, J. 1982. Thermo-Technical Standards. (In Czech, "Tepelne Technicke Normy") Funm Prague.

22. Contact for written copy of energy standard specified in Question 4:

Name:

Address: Federal Office for Standards and Measurement
Distribution of CSN
Na Príkope 17
113 47 Prague

Country: Czechoslovakia

Tel: 235 2152 **Fax:**

Types of supporting information available:

Rehanek, J. 1982. Thermo-Technical Standards. (In Czech, "Tepelne Technicke Normy") Funm Prague.

Other energy standards for non-residential buildings:

CSN 73 0560: Thermo-Technical Properties of Engineering Structures. Industrial Plants. (FESM)

Survey completed by: Ivan Chmurny
Title: Slovak Technical University
Department of Building Physics
Radlinského 11
813 68 Bratislava **Country:** Czechoslovakia
Tel: 427-57448 **Fax:** 427-499 027

Date completed: 6/30/92

DENMARK

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:
   a. National level: Mandatory
   b. Regional level: - None
   c. Local level: - None

4. Single energy standard selected for further description:
   Title, Organization: Building Regulations, Danish Ministry of Building and Housing (Effective April 1, 1983)
   Year: 1982 Geographic Coverage: Nation Abbreviated Title: BR-DMBH, 1982

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - BR-DMBH, 1982

5. The standard defined in Question 4 applies to the following kinds of buildings:
   a. Building types:
   A - All Buildings
   b. Building vintage:
   New buildings
   c. Other characteristics:
   P - Physical size

6. Basic approach of the standard: Both prescriptive and performance

7. The following subjects are included in the energy standard:
   a. Whole building energy provisions:
   - None
   b. Building envelope provisions:
   Roof
   Wall system
   Fenestration system
   Infiltration
   c. Lighting provisions:
   - None
   d. Mechanical provisions:
   Controls
   Ventilation
   Other: Efficiency requirements for central heating
   e. Other provisions:
   - None

STANDARDS DEVELOPMENT PROCESS - BR-DMBH, 1982

8. Organizations involved in developing the standard:

Government agency: Building Agency
Government agency: Energy Agency
Research group: National Building Research Institute

9. Decision Process: Consensus **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

-

b. ENERGY USE of existing buildings:

-

c. WEATHER data

-

d. Other information

Building Regulations concern only new buildings

11. Standards from a different country used as source material:

- None

12. COMPUTER programs used:

a. In developing the standard: TSBI

b. For complying with the standard: No

13. Standard is set at a level: Above current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
Availability of energy efficient products
Comfort

Comments:

15a. Standard scheduled for regular review and revision?

Yes: the 1983 regulations are at the moment under revision.

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

No

3 DENMARK

IMPLEMENTATION AND COMPLIANCE - BR-DMBH, 1982

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Building Agency (administered by municipalities)

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Buildings

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Certification/approval	Certification/approval	Certification/approval
Percent designs checked: ?	Percent sites checked: ?	Percent buildings checked: ?
Comment:	Comment:	Comment:

d. Other compliance procedures -

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 4

f. Explanation for effectiveness in part e: Tradition and extended reliability.

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Completed

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

Completed

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

Completed

d. COST EFFECTIVENESS based on ACTUAL COSTS:

None conducted

e. Other Assessments: -

FURTHER INFORMATION ON ENERGY CONSERVATION - Denmark

20. Efficiency testing facilities and procedures established:

Insulation
Thermal properties of materials
Other: boilers (oil and gas)

21. Other programs or policies developed to increase energy efficiency in buildings:

Information programs
Audits (free or subsidized)
Rebates

Comment: Energy efficiency has been under the Ministry of Housing and Building up to 1989, whereafter the Ministry of Energy took over (i.e. Energy Agency).

Additional sources of information about energy efficiency for buildings in: Denmark

1. "Denmark Uses Energy Better," National Building Agency.
2. "Energy Efficiency in New Buildings." Report conducted by COWIconsult and SBI in Denmark at the request of the Commission of the European Communities, December 1991.
3.

22. Contact for written copy of energy standard specified in Question 4:

Name:
Address:
Country:

Tel: **Fax:**

Types of supporting information available:

Other energy standards for non-residential buildings:

"Control and Maintenance of Larger Oil- and Gas-fired Heating INstallations and Heating

Survey completed by: Jesper Lorentzen
Title: Engineering, Head of Section
Danish Energy Agency
Landemaerket 11, DK-1119
Copenhagen K **Country:** Denmark
Tel: +45 33 92 67 00 **Fax:** +45 33 11 47 43

Date completed: 4/2/92

ENGLAND & WALES

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:
   a. National level: -
   b. Regional level: Mandatory
   c. Local level: -

4. Single energy standard selected for further description:
   Title, Organization: The Building Regulations, Part L, Department of the Environment (England and Wales)
   Year: 1990 Geographic Coverage: Nation Abbreviated Title: BR-ADL1, 1990

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - BR-ADL1, 1990

5. The standard defined in Question 4 applies to the following kinds of buildings:
   a. Building types:
   A - All Buildings
   b. Building vintage:
   Both new and existing
   c. Other characteristics:
   Other: exception made for unheated buildings

6. Basic approach of the standard: Both prescriptive and performance

7. The following subjects are included in the energy standard:
   a. Whole building energy provisions:
   E- Energy amount target
   Other: target for space heating for dwellings
   b. Building envelope provisions:
   Roof
   Wall system
   Fenestration system
   Other: Floor insulation
   c. Lighting provisions:
   - None
   d. Mechanical provisions:
   Controls
   Ventilation
   Other: insulation of ducts, pipework and hot water storage
   e. Other provisions:
   - None

STANDARDS DEVELOPMENT PROCESS - BR-ADL1, 1990

8. Organizations involved in developing the standard:

Government agency: British Research Establishment
Industry group
Academic institution
Research group
Other: Public consultation

9. Decision Process: Consensus **Comment:** Lead taken by central government. Result becomes mandatory.

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Estimated using professional judgment
Gathered through audits and surveys
Already available prior to standard

b. ENERGY USE of existing buildings:

Estimated using professional judgment
Already available prior to standard

c. WEATHER data

Already available prior to standard

d. Other information

Yes: cost of improvements to enable cost-effectiveness calculations to be made.

11. Standards from a different country used as source material:

- None

12. COMPUTER programs used:

a. In developing the standard:

BREDEM
ESP-II

b. For complying with the standard:

BREDEM

13. Standard is set at a level: Above current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
Availability of energy efficient products
Comfort
Other: Capability of construction industry to standard without undue techinical risks.

Comments:

15a. Standard scheduled for regular review and revision?

Yes: 1) Consultation with Building Regulation Advisory Committee, experts; 2) Public consultation; 3) Parliamentary approval.

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

Yes: Through consultation process, with strong emphasis on technical risk.

3 ENGLAND & WALES

IMPLEMENTATION AND COMPLIANCE - BR-ADL1, 1990

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Department of the Environment, enforced at local level

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Other: Environment, planning, land use

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Seminars, workshops, or conferences
Information or resource center

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Certification/approval	Certification/approval	No mechanism
Percent designs checked: 100	Percent sites checked: ?	Percent buildings checked: low
Comment:	Comment: Random inspection for energy measures (100% for other measures, e.g. foundations).	Comment:

d. Other compliance procedures

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 4

f. Explanation for effectiveness in part e: Accepted as part of standard building control system.

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

In progress

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

In progress

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

Completed

d. COST EFFECTIVENESS based on ACTUAL COSTS:

None conducted

e. Other Assessments: In progress: survey of methods to achieve specified levels.

FURTHER INFORMATION ON ENERGY CONSERVATION - England & Wales

20. Efficiency testing facilities and procedures established:

Motors
Insulation
Air conditioners/chillers/other appliances
Ballasts
Thermal properties of materials
Other: controls

21. Other programs or policies developed to increase energy efficiency in buildings:

Information programs
Government energy policy

Comment:

Additional sources of information about energy efficiency for buildings in: England & Wales

1. The Building Regulations, 1985 (1990 Edition), Part L- The Conservation of Fuel and Power, HMSO, London.
2. A.B. Birtleg, "Achieving Energy Efficiency in Buildings," Proceedings of the 14th Annual International Conference for Energy Economics, Honolulu, 1991.
3.

22. Contact for written copy of energy standard specified in Question 4:

Name:

Address:
BRE Bookshop
Bucknalls Lane, Garston
Watford WD2 7JR England

Country: United Kingdom

Tel: 44-923-664 444 **Fax:**

Types of supporting information available:

Other energy standards for non-residential buildings:

Survey completed by: George Henderson
Title: Energy Economics and Statistics Section
British Research Establishment
Garston
Watford WD2 7JR **Country:** England
Tel: 44 923 664 517 **Fax:** 44 923 664 097

Date completed: 3/6/92

FRANCE

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National | Local |

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:

a. National level: Mandatory

b. Regional level: - None

c. Local level: - None

4. Single energy standard selected for further description:

Title, Organization: Regulmentation Thermique Tertiaire. Energy Efficiency Standards in Non-Residential Buildings. Ministry of Industry and Buildings, 1988.

Year: 1988 Geographic Coverage: Nation Abbreviated Title: CSTB-88

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - CSTB-88

5. The standard defined in Question 4 applies to the following kinds of buildings:

a. Building types:

O - Offices
H - Hotels
G - Government Facilities
F - Restaurants
D - Hospitals
C - Commercial/retail stores
E - Educational facilities (schools)
I - Industrial Buildings

b. Building vintage:

New buildings

c. Other characteristics:

F - Type of fuel: more restrictive for electric heating systems

6. Basic approach of the standard: Both prescriptive and performance

7. The following subjects are included in the energy standard:

a. Whole building energy provisions:

- None

b. Building envelope provisions:

Roof
Wall system
Fenestration system
Infiltration
Other: floor insulation, solar gains

c. Lighting provisions:

- None

d. Mechanical provisions:

Controls: descriptive on equipment
Ventilation: descriptive on equipment

e. Other provisions:

Yes: Thermostat settings. The type of use of the building is taken into account to specify standard levels depending on how much time it is used: continuous use or discontinuous.

STANDARDS DEVELOPMENT PROCESS - CSTB-88

8. Organizations involved in developing the standard:

Government agency: Minstry of Buildings
Government agency: Ministry of Industry
Research group: CSTB
Government agency: Ademe

9. Decision Process: Consensus **Comment:** Energy producers, professional associations

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Gathered through audits and surveys
Already available prior to standard

b. ENERGY USE of existing buildings:

Estimated using professional judgment
Computer simulations used for estimates
Gathered through audits and surveys

c. WEATHER data

Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

- None

12. COMPUTER programs used:

a. In developing the standard: Uncertain

b. For complying with the standard: Uncertain

13. Standard is set at a level: Lower than current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
A - Availability of energy efficient products
C - Comfort

Comments:

15a. Standard scheduled for regular review and revision?

Yes: through steps of regulation that induce an increasing level of standards: 1976, 1988, 1995 (?)

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

No: yet some surveys have been conducted to check the level of compliance to existing building energy standards.

3 FRANCE

IMPLEMENTATION AND COMPLIANCE - CSTB-88

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: CSTB

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Buildings

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Compliance forms
Seminars, workshops, or conferences

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Certification/approval	?	?
Percent designs checked: ?	Percent sites checked: ?	Percent buildings checked: ?
Comment: technical certification on materials and equipment	Comment:	Comment:

d. Other compliance procedures - None

e. Effectiveness of combined compliance mechanisms (scale of 1-5): ?

f. Explanation for effectiveness in part e:

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Completed: goal: -25% heating consumption; economy : 50,000TOE/year

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

?

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

?

d. COST EFFECTIVENESS based on ACTUAL COSTS:

?

e. Other Assessments: ?

FURTHER INFORMATION ON ENERGY CONSERVATION - France

20. Efficiency testing facilities and procedures established:

Motors
Insulation
Air conditioners/chillers/other appliances
Ballasts
Fixtures
Thermal properties of materials

21. Other programs or policies developed to increase energy efficiency in buildings:

Audits (free or subsidized)
Information programs
Rebates

Comment: Third party financing, subsidized fiscal incentives for existing buildings.

Additional sources of information about energy efficiency for buildings in: France

1. -
2.
3.

22. Contact for written copy of energy standard specified in Question 4:

Name:

Address: -

Country:

Tel: **Fax:**

Types of supporting information available:

-

Other energy standards for non-residential buildings:

Survey completed by: Robert Angioletti
Title: Environment and Energy Management Agency (Ademe)
500, route des Lucioles
Sophia-Antipolis
06565 VALBONNE CEDEX **Country:** France
Tel: 33 93 95 79 31 **Fax:** 33 93 65 31 96

Date completed: 8/3/92

HONG KONG

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Non-Residential Only

3. Status of Non-Residential Building Energy Standards at the:
   a. National level: Proposed
   b. Regional level: Proposed
   c. Local level: Proposed

4. Single energy standard selected for further description:
   Title, Organization: Code of Practice on Calculation of Overall Thermal Transfer Value to Building Envelope, Hong Kong Government (Draft, August 1991)
   Year: 1991 Geographic Coverage: Cities Abbreviated Title: OTTV-HKG, 1991

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - OTTV-HKG, 1991

5. The standard defined in Question 4 applies to the following kinds of buildings:
   a. Building types:
   - Offices
   - Hotels

   b. Building vintage:
   - New buildings

   c. Other characteristics:
   - A - Air-Conditioned

6. Basic approach of the standard: Performance-based

7. The following subjects are included in the energy standard:
   a. Whole building energy provisions:
   - ?

   b. Building envelope provisions:
   - Roof
   - Wall system
   - Fenestration system

   c. Lighting provisions:
   - None

   d. Mechanical provisions:
   - None

   e. Other provisions:
   - None

STANDARDS DEVELOPMENT PROCESS - OTTV-HKG, 1991

8. Organizations involved in developing the standard:

Government agency: Hong Kong Government, Building Ordinance Office
Research group: J. Roger Preston & Partners, Consulting Engineers
Research group: Charles Eley and Associates

9. Decision Process: Consensus **Comment:** Hong Kong Government and J Roger Preston & Partners

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Gathered through audits and surveys

b. ENERGY USE of existing buildings:

Computer simulations used for estimates
Gathered through audits and surveys

c. WEATHER data

Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

UK
USA
Australia & NZ
ASEAN
Japan

12. COMPUTER programs used:

a. In developing the standard: DOE-2-1D

b. For complying with the standard: No

13. Standard is set at a level: Above current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
Availability of energy efficient products
Similarity/difference to local design

Comments:

15a. Standard scheduled for regular review and revision?

No

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

Unsure

3 HONG KONG

IMPLEMENTATION AND COMPLIANCE - OTTV-HKG, 1991

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: The Building Ordinance Office

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Buildings

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Compliance forms

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Certification/approval	No mechanism	No mechanism
Percent designs checked: 100	Percent sites checked:	Percent buildings checked:
Comment:	Comment:	Comment:

d. Other compliance procedures - None

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 5

f. Explanation for effectiveness in part e: Because the professionals are made to be responsible and if deviations are discovered will be penalized.

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Completed

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

None conducted

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

None conducted

d. COST EFFECTIVENESS based on ACTUAL COSTS:

None conducted

e. Other Assessments: - None

FURTHER INFORMATION ON ENERGY CONSERVATION - Hong Kong

20. Efficiency testing facilities and procedures established:

- None

21. Other programs or policies developed to increase energy efficiency in buildings:

- None

Comment:

Additional sources of information about energy efficiency for buildings in: Hong Kong

1. -
2. -
3. -

22. Contact for written copy of energy standard specified in Question 4:

Name: Peter Osburne

Address: Building Ordinance Office
Buildings and Lands Department
Murray Building, Garden Road

Country: Hong Kong

Tel: 852 848 2830 **Fax:**

Types of supporting information available:

- None

Other energy standards for non-residential buildings:

- None

Survey completed by: K. C. Chan
Title: Partner
J. Roger Preston & Partners
Level 3 Maxi Mall, City Gardens
233 Electric Road **Country:** Hong Kong
Tel: 852-887-3321 **Fax:** 852-887-8897

Date completed: 3/26/92

INDONESIA

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. **General building standards exist at the following governmental levels:** National | Regional | Local

2. **Proposed or existing ENERGY standards cover the following building sectors:** Non-Residential Only

3. **Status of Non-Residential Building Energy Standards at the:**

a. National level:	b. Regional level:	c. Local level:
Voluntary	- None	- None
Proposed		

4. **Single energy standard selected for further description:**

Title, Organization: Direktorat Tata Angunan- DITABA (Directorate of Building)

Year: ? **Geographic Coverage:** Nation **Abbreviated Title:** DITABA

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - DITABA

5. **The standard defined in Question 4 applies to the following kinds of buildings:**

a. Building types:

O - Offices
H - Hotels
G - Government Facilities
D - Hospitals
M - Multi-family residential
I - Industrial Buildings

b. Building vintage:

New buildings

c. Other characteristics:

A - Air-Conditioned

6. **Basic approach of the standard:** Both prescriptive and performance

7. **The following subjects are included in the energy standard:**

a. Whole building energy provisions:

E- Energy amount target
P- Peak electricity demand
C- Energy cost target

b. Building envelope provisions:

Roof
Wall system
Fenestration system
Infiltration

c. Lighting provisions:

Control requirements
Power density
Illumination requirements
Other: recommendation to use daylight

d. Mechanical provisions:

Air/Water distribution efficiency
Load Calculations for equipment sizing
Controls
Ventilation
Equipment efficiency

e. Other provisions:

- None

STANDARDS DEVELOPMENT PROCESS - DITABA

8. Organizations involved in developing the standard:

Government agency: Directorate of Building, Department of Public Works
Academic institution: Bandung Institute of Technology
Research group: Indonesia Institute of Science
Government agency: Building Research Center, Department of Public Works
Foreign development agency: ASEAN-US Energy project, Energy Conservation in Buildings

9. Decision Process: Consensus **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Estimated using professional judgment
Gathered through audits and surveys

b. ENERGY USE of existing buildings:

Estimated using professional judgment
Computer simulations used for estimates
Gathered through audits and surveys

c. WEATHER data

Gathered through measurements
Already available prior to standard:

d. Other information

Data on local materials, equipment, and installation commonly used.

11. Standards from a different country used as source material:

Singapore: Energy Conservation Handbook

12. COMPUTER programs used:

a. In developing the standard:

DOE-2
ASEAM

b. For complying with the standard: Yes

13. Standard is set at a level: Above current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
Availability of energy efficient products
Similarity/difference to local design
Comfort

Comments:

Local design practice and local materials as well as local availability of equipment and products will give great influence on the applicability of the standard.

15a. Standard scheduled for regular review and revision?

Yes: scheduled for review after several years in use as a guideline.

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

No.

3 INDONESIA

IMPLEMENTATION AND COMPLIANCE - DITABA

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Directorate of Buildings

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Buildings

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Seminars, workshops, or conferences
Information or resource center

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Certification/approval		
Percent designs checked: ?	Percent sites checked: ?	Percent buildings checked: ?
Comment:	Comment:	Comment:

d. Other compliance procedures - None

e. Effectiveness of combined compliance mechanisms (scale of 1-5): -

f. Explanation for effectiveness in part e: No evaluation has been done.

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Planned

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

In progress

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

None conducted

d. COST EFFECTIVENESS based on ACTUAL COSTS:

None conducted

e. Other Assessments: - None

FURTHER INFORMATION ON ENERGY CONSERVATION - Indonesia

20. Efficiency testing facilities and procedures established:

Motors
Insulation
Fixtures
Thermal properties of materials

21. Other programs or policies developed to increase energy efficiency in buildings:

Information programs
Audits (free or subsidized)

Comment: Energy awareness campaigns for government officials; Energy conservation in buildings seminars.

Additional sources of information about energy efficiency for buildings in: Indonesia

1. Seminar Proceeding: Seminar Kebijaksanaan Konservasi Energy Dalam Bangunan Gedung (Seminar on Policy on Energy Conservation in Buildings). Dept. of Public Works, 1989.
2. "Penjusunan Pedoman Penggunaan Bahan Bangunan Gedung Negara Dalam Kaitannya Denga N Konservatsi Energi."
3. (translation of above) Guideline for the Use of Building Materials for Government Buildings in Relation to Energy Conservation.

22. Contact for written copy of energy standard specified in Question 4:

Name: Ir. Noraya

Address: DITABA, Public Works Department
Kramat Raya 63
Jakarta
Country: Indonesia

Tel: 62 21 346 939 **Fax:**

Types of supporting information available:

Building Standard, Daylighting and Artificial Lighting Standards (Contact Ir. Soeprapto; Puslitbang Pemukiman, Public Works Dept., Cilenyi, Bandung, Indonesia)

Other energy standards for non-residential buildings:

General Policy on Energy; Guide on Energy Conservation Practice and Monitoring

Survey completed by: Dr. Soegijanto
Title: Professor, Teknik Fisika
Institut Teknologi Bandung
Jalan Ganesha 10
Bandung 40132 **Country:** Indonesia
Tel: 62-22-84090 **Fax:** 62-22-438-338

Date completed: 3/31/92

ISRAEL

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Residential Only

3. Status of Non-Residential Building Energy Standards at the:
   a. National level: Mandatory (R)
   b. Regional level: Uncertain
   c. Local level: Uncertain

4. Single energy standard selected for further description:
   Title, Organization: "Thermal Insulation of Residential Buildings," the Standard Insitution of Israel
   Year: 1989 Geographic Coverage: Nation Abbreviated Title: TIRB-SII, 1989

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - TIRB-SII, 1989

5. The standard defined in Question 4 applies to the following kinds of buildings:
   a. Building types:
   - S - Single-family residential
   - M - Multi-family residential

   b. Building vintage:
   - New buildings

   c. Other characteristics:
   - None

6. Basic approach of the standard: Performance-based

7. The following subjects are included in the energy standard:
   a. Whole building energy provisions:
   - None

   b. Building envelope provisions:
   - Roof
   - Wall system
   - Fenestration system
   - Infiltration

   c. Lighting provisions:
   - None

   d. Mechanical provisions:
   - None

   e. Other provisions:
   - None

STANDARDS DEVELOPMENT PROCESS - TIRB-SII, 1989

8. Organizations involved in developing the standard:

Government agency: Governmental Building Office
Academic institution: Technion, Technical Institute for Building Research
Academic institution: Ben Gurion University

9. Decision Process: Consensus **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Estimated using professional judgment
Gathered through audits and surveys

b. ENERGY USE of existing buildings:

Gathered through audits and surveys

c. WEATHER data

Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

Germany: DIN Standards

12. COMPUTER programs used:

a. In developing the standard: - None

b. For complying with the standard: Uncertain

13. Standard is set at a level: Lower than current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness

Comments:

15a. Standard scheduled for regular review and revision?

Yes: The standard has been amended almost every year.

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

Yes

3 ISRAEL

IMPLEMENTATION AND COMPLIANCE - TIRB-SII, 1989

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: municipal authorities

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Buildings

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Compliance forms
Seminars, workshops, or conferences
Information or resource center

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Certification/approval	No mechanism	Certification/approval
Percent designs checked: -	Percent sites checked: -	Percent buildings checked: -
Comment:	Comment:	Comment:
		Inspection by consumers.

d. Other compliance procedures -

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 4

f. Explanation for effectiveness in part e:

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

-

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

-

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

Planned

d. COST EFFECTIVENESS based on ACTUAL COSTS:

Planned

e. Other Assessments: -

FURTHER INFORMATION ON ENERGY CONSERVATION - Israel

20. Efficiency testing facilities and procedures established:

Insulation
Air conditioners/chillers/other appliances
Thermal properties of materials

21. Other programs or policies developed to increase energy efficiency in buildings:

-

Comment:

Additional sources of information about energy efficiency for buildings in: Israel

1. The Israel Government, Office of Energy
2.
3.

22. Contact for written copy of energy standard specified in Question 4:

Name:

Address:

Country:

Tel: **Fax:**

Types of supporting information available:

Commentary for the Israeli Standard; Technical Institution for Building Research; Prof. A. Bentur; tel:972 4 292242; fax: 972 4 324 534

Other energy standards for non-residential buildings:

- None

Survey completed by: Eng. Raya Hizi
Title: Head of Building Branch
Standards Institution of Israel
Standardization Deparment, 42 Chaim Levanon St.
Tel-Aviv **Country:** Israel
Tel: 972-3-545-4154 **Fax:** 972-3-412-762

Date completed: 5/13/92

IVORY COAST

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:

a. National level: Proposed b. Regional level: - c. Local level: -

4. Single energy standard selected for further description:

Title, Organization: "Code de Qualite Energetique des Batiments", 1992. (Energy Efficiency Code, Draft Version). Ministere des Mines et de L'energie, Bureau des Economies d'Energie. Plan to be developed by Spring 1993.

Year: 1992 Geographic Coverage: Nation Abbreviated Title: IC-1993

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - IC-1993

5. The standard defined in Question 4 applies to the following kinds of buildings:

a. Building types:

A - All Buildings

b. Building vintage:

Both new and existing

c. Other characteristics:

A - Air-Conditioned

O - Other: natural ventilation

6. Basic approach of the standard: Both prescriptive and performance

7. The following subjects are included in the energy standard:

a. Whole building energy provisions:

E- Energy amount target

C- Energy cost target

b. Building envelope provisions:

Roof

Wall system

Fenestration system

c. Lighting provisions:

Control requirements

Power density

Illumination requirements: recommendations

d. Mechanical provisions:

Air/Water distribution efficiency

Load Calculations for equipment sizing

Controls

Ventilation

Equipment efficiency

e. Other provisions:

Yes: electrical specifications

STANDARDS DEVELOPMENT PROCESS - IC-1993

8. Organizations involved in developing the standard:

Government agency: Bureau des Economies d'Energie
Academic institution: E.N.S.T.P.
Foreign development agency: ESMAP/ACDI

9. Decision Process: Consensus **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Estimated using professional judgment
Gathered through audits and surveys
Already available prior to standard

b. ENERGY USE of existing buildings:

Estimated using professional judgment
Computer simulations used for estimates
Gathered through audits and surveys

c. WEATHER data

Gathered through measurements
Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

Jamaica: EEBC-92

12. COMPUTER programs used:

a. In developing the standard:

OASIS
CODYBA
DOE-2

b. For complying with the standard: Yes: may be used

13. Standard is set at a level: Above current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
A - Availability of energy efficient products
S - Similarity/difference to local design
C - Comfort

Comments:

15a. Standard scheduled for regular review and revision?

Unsure: do not know the answer, as this will be the first standard. But given the French approach, safe bet this will happen.

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

No

3 IVORY COAST

IMPLEMENTATION AND COMPLIANCE - IC-1993

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Bureau des Economies d'Energie

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Energy

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Compliance forms
Seminars, workshops, or conferences

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
-	-	-
Percent designs checked: -	Percent sites checked: -	Percent buildings checked: -
Comment:	Comment:	Comment:

d. Other compliance procedures -

e. Effectiveness of combined compliance mechanisms (scale of 1-5): -

f. Explanation for effectiveness in part e: -

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

In progress

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

-

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

In progress

d. COST EFFECTIVENESS based on ACTUAL COSTS:

-

e. Other Assessments: -

FURTHER INFORMATION ON ENERGY CONSERVATION - Ivory Coast

20. Efficiency testing facilities and procedures established:

Other: There is a building research and testing facility, but not for energy

21. Other programs or policies developed to increase energy efficiency in buildings:

-

Comment:

Additional sources of information about energy efficiency for buildings in: Ivory Coast

1. -
2. -
3. -

22. Contact for written copy of energy standard specified in Question 4:

Name:

Address:

Country:

Tel: **Fax:**

Types of supporting information available:

-

Other energy standards for non-residential buildings:

-
-

Survey completed by: Jean Thibon
Title: Ingenieur E.N.S.I.G.C
Bureaux des Economies Enérgies
B.P. 2541
Abijan 01
Country: Ivory Coast
Tel: *not on file, please* **Fax:** *not on file, please send*

Date completed: 3/20/92

JAMAICA

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. **General building standards exist at the following governmental levels:** National

2. **Proposed or existing ENERGY standards cover the following building sectors:** Non-Residential Only

3. **Status of Non-Residential Building Energy Standards at the:**

a. National level:	b. Regional level:	c. Local level:
Mandatory (G)	- None	- None
Voluntary (all		

4. **Single energy standard selected for further description:**

Title, Organization: Energy Efficiency Building Code (EEBC-92), October 1992. Jamaica Bureau of Standards

Year: 1992 **Geographic Coverage:** Nation **Abbreviated Title:** EEBC-92

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - EEBC-92

5. **The standard defined in Question 4 applies to the following kinds of buildings:**

a. Building types:

O - Offices
H - Hotels
G - Government Facilities
F - Restaurants
D - Hospitals
R - Religion-related
M - Multi-family residential
C - Commercial/retail stores

b. Building vintage:

Both new and existing

c. Other characteristics:

P - Physical size: > 93 sq. meter of floor area
E - Amount of energy: > 11 W/sq. meter
A - Air-Conditioned

6. **Basic approach of the standard:** Both prescriptive and performance

7. **The following subjects are included in the energy standard:**

a. Whole building energy provisions:

E- Energy amount target
C- Energy cost target

b. Building envelope provisions:

Roof
Wall system
Fenestration system

c. Lighting provisions:

Control requirements
Power density
Illumination requirements: recommendations

d. Mechanical provisions:

Air/Water distribution efficiency
Load Calculations for equipment sizing
Controls
Ventilation
Equipment efficiency

e. Other provisions:

Yes: electrical specifications, theromostat settings, and energy management.

STANDARDS DEVELOPMENT PROCESS - EEBC-92

8. Organizations involved in developing the standard:

Government agency: Jamaica Bureau of Standards; Ministry of Mines and Energy; Kingston Town Planning
Local interest group: Jamaica Institute of Engineers; Jamaica Institute of Architects; EEBC Review Committee
Industry group: Jamaica Public Service Co. (elec. util.); many local suppliers
Academic institution: University of West Indies
Foreign development agency: World Bank, ESMAP; Dublin Bloome & the Deringer Group

9. Decision Process: Consensus **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Estimated using professional judgment
Gathered through audits and surveys
Already available prior to standard

b. ENERGY USE of existing buildings:

Estimated using professional judgment
Computer simulations used for estimates
Already available prior to standard

c. WEATHER data

Gathered through measurements

d. Other information

Yes: See Energy and Economic Analysis Report in Support of EEBC-92 by J. Cumper & S. Marslim, 1992.

11. Standards from a different country used as source material:

USA: ASHRAE 90.1-1989
Malaysia
Thailand
Philippines
Indonesia

12. COMPUTER programs used:

a. In developing the standard:

ASEAM -2D
DOE-2.1D

b. For complying with the standard: Yes

13. Standard is set at a level: Above current practice: 30-35% above current

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
A - Availability of energy efficient products
S - Similarity/difference to local design
C - Comfort

Comments:

15a. Standard scheduled for regular review and revision?

NR

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

NR

3 JAMAICA

IMPLEMENTATION AND COMPLIANCE - EEBC-92

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Jamaica Bureau of Standards (plus other agencies involved in development)

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Buildings

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Compliance forms
Seminars, workshops, or conferences
Information or resource center

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Certification/approval		
Percent designs checked: ?	Percent sites checked:	Percent buildings checked:
Comment:	Comment:	Comment:
Certification is powerful in English tradition (strong in Jamaica)		

d. Other compliance procedures

e. Effectiveness of combined compliance mechanisms (scale of 1-5):

f. Explanation for effectiveness in part e:

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Completed: J. Deringer & J. Gilling, ACEEE Proceedings, 1992.

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

In progress

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

Completed: J. Deringer & J. Gilling, ACEEE Proceedings, 1992.

d. COST EFFECTIVENESS based on ACTUAL COSTS:

?

e. Other Assessments: Completed: Building Sample 1987-8

FURTHER INFORMATION ON ENERGY CONSERVATION - Jamaica

20. Efficiency testing facilities and procedures established:

Air conditioners/chillers/other appliances

21. Other programs or policies developed to increase energy efficiency in buildings:

Information programs
Government energy policy: DSM

Comment:

Additional sources of information about energy efficiency for buildings in: Jamaica

1. -
2. -
3. -

22. Contact for written copy of energy standard specified in Question 4:

Name: Joe Gilling
Address: ESMAP
Country:

Tel: **Fax:**

Types of supporting information available:

Other energy standards for non-residential buildings:

-
-

Survey completed by: Roosevelt DaCosta
Title: Group Director, Engineering
Jamaica Bureau of Standards
6 Winchester
Kingston 10
Country: Jamaica
Tel: 809 926-3140 **Fax:** 809 929 4736

Date completed: 10/30/92

JAPAN

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National | Local |

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:

a. National level:	b. Regional level:	c. Local level:
Mandatory	- None	- None
Voluntary		

4. Single energy standard selected for further description:

Title, Organization: "Standards of Owner's Evaluation Regarding the Rationalization of Energy Use in Buildings for Office Use" Ministry of International Trade and Industry; Ministry of Construction

Year: 1980 Geographic Coverage: Nation Abbreviated Title: MITI, 1980

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - MITI, 1980

5. The standard defined in Question 4 applies to the following kinds of buildings:

a. Building types:
- Offices

b. Building vintage:
- New buildings

c. Other characteristics:
- P - Physical size: > 2000 sq. m

6. Basic approach of the standard: Performance-based

7. The following subjects are included in the energy standard:

a. Whole building energy provisions:
- None

b. Building envelope provisions:
- Roof
- Wall system
- Fenestration system
- Infiltration

c. Lighting provisions:
- Other: covered in Japanese industrial standard

d. Mechanical provisions:
- None

e. Other provisions:
- Yes: thermostat setting- voluntary standard in Summer 28 deg. C, Winter 20 deg. C

STANDARDS DEVELOPMENT PROCESS - MITI, 1980

8. Organizations involved in developing the standard:

Government agency: Ministry of International Trade and Industry/Ministry of Construction
Other: Energy Conservation Center
Other: Institute of Building Energy Conservation

9. Decision Process: Mandate **Comment:** Ministry held a council.

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Already available prior to standard

b. ENERGY USE of existing buildings:

Already available prior to standard

c. WEATHER data

Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

Uncertain

12. COMPUTER programs used:

a. In developing the standard: Uncertain

b. For complying with the standard: Yes
Each constructor has program.

13. Standard is set at a level: Above current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
Similarity/difference to local design

Comments:

15a. Standard scheduled for regular review and revision?

No: not regularly

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

Yes: maybe?

3 JAPAN

IMPLEMENTATION AND COMPLIANCE - MITI, 1980

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: local offices of the Ministry of Construction

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Buildings

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Seminars, workshops, or conferences
Information or resource center

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Certification/approval	No mechanism	No mechanism
Percent designs checked: 100	Percent sites checked:	Percent buildings checked:
Comment: All office buildings with floor space above 2000 sq. m.	Comment:	Comment:

d. Other compliance procedures -

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 5

f. Explanation for effectiveness in part e:

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

None conducted

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

-

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

-

d. COST EFFECTIVENESS based on ACTUAL COSTS:

-

e. Other Assessments: Done by constructors voluntarily

FURTHER INFORMATION ON ENERGY CONSERVATION - Japan

20. Efficiency testing facilities and procedures established:

Motors
Insulation
Air conditioners/chillers/other appliances
Thermal properties of materials

21. Other programs or policies developed to increase energy efficiency in buildings:

Information programs

Comment: Japanese-language sample of information campaign enclosed.

Additional sources of information about energy efficiency for buildings in: Japan

1. Journal of "The Society of Heating, Air-Conditioning, and Sanitary Engineers of Japan," address: Kirashinjuke 1-8-1, Shinjuku-ku, Tokyo. Tel: 81 3 3363 8261
2. The Magazine of Building Equipment. Address: Nihonbaski Hon-Machi 4-14-2 Chiioku, Tokyo. Tel: 81 3 3668 4059
3.

22. Contact for written copy of energy standard specified in Question 4:

Name:

Address: Agency of National Resources and Energy
Ministry of International Trade and Industry
Chiyodaku; Kasumigaseki 1-3-1 Tokyo

Country: Japan

Tel: 81 3 35-01-1511 **Fax:** 81 3 3580-8439

Types of supporting information available:

-

Other energy standards for non-residential buildings:

-None

Survey completed by: Misuo Iguchi
Title: Senior Technical Advisor
Energy Conservation Center
2-39-3, Nishi-Shinbashi
Minato-Ku Tokyo **Country:** Japan 105
Tel: 81-3-3433-0312 **Fax:** 81-3-3433-0393

Date completed: 3/31/92

MALAYSIA

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National | Regional | Local

2. Proposed or existing ENERGY standards cover the following building sectors: Non-Residential Only

3. Status of Non-Residential Building Energy Standards at the:
   a. National level: Voluntary
   b. Regional level: Voluntary
   c. Local level: Voluntary

4. Single energy standard selected for further description:
   Title, Organization: "Guidelines for Energy Efficiency in Buildings", Ministry of Energy Telecommunications, and Posts.
   Year: 1989 Geographic Coverage: Nation Abbreviated Title: GEEB-METP, 1989

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - GEEB-METP, 1989

5. The standard defined in Question 4 applies to the following kinds of buildings:
   a. Building types:
   - O - Offices
   - H - Hotels
   - G - Government Facilities
   - F - Restaurants
   - C - Commercial/retail stores

   b. Building vintage:
   - New Buildings

   c. Other characteristics:
   - E - Amount of energy: peak design rate > 10W/m2 (installed)

6. Basic approach of the standard: Performance-based

7. The following subjects are included in the energy standard:
   a. Whole building energy provisions:
   - None

   b. Building envelope provisions:
   - Roof
   - Wall system
   - Fenestration system
   - Infiltration

   c. Lighting provisions:
   - Control requirements
   - Power density
   - Illumination requirements

   d. Mechanical provisions:
   - Load calculations for equipment sizing
   - Controls
   - Equipment efficiency

   e. Other provisions:
   - None

STANDARDS DEVELOPMENT PROCESS - GEEB-METP, 1989

8. Organizations involved in developing the standard:

Government agency: Ministry of Energy, Telecommunications and Posts, Malaysia
Academic institution: Universiti Technologi, Malaysia

9. Decision Process: Consensus **Comment:** Professional institutions (e.g., engineering, architecture); Building organizations/associations

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Gathered through audits and surveys

b. ENERGY USE of existing buildings:

Gathered through audits and surveys
Already available prior to standard

c. WEATHER data

Already available prior to standard

d. Other information

11. Standards from a different country used as source material:

Singapore: Building Regulations
USA: ASHRAE 90.1P

12. COMPUTER programs used:

a. In developing the standard: DOE-2, ASEAM-2

b. For complying with the standard: No

13. Standard is set at a level: Equal to current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
Availability of energy efficient products
Comfort

Comments: Standards were prepared so that it would not cost too much to implement them. Comfort is maintained.

15a. Standard scheduled for regular review and revision?

Yes: A special working group on energy conservation in buildings is working on a revision of standards.

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

No

3 MALAYSIA

IMPLEMENTATION AND COMPLIANCE - GEEB-METP, 1989

16. Entities involved in IMPLEMENTING energy standards:

Voluntary standards; no agency

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

-

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Example calculations

Seminars, workshops, or conferences

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
No mechanism	No mechanism	No mechanism
Percent designs checked: ____	Percent sites checked: ____	Percent buildings checked: ____
Comment:	Comment:	Comment:

d. Other compliance procedures

e. Effectiveness of combined compliance mechanisms (scale of 1-5): ____

f. Explanation for effectiveness in part e:

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Completed: "Energy and Economic Analysis of Commercial Buildings Standards in Malaysia." J.J. Deringer,

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

Planned

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

Completed: see above

d. COST EFFECTIVENESS based on ACTUAL COSTS:

Completed

e. Other Assessments:

FURTHER INFORMATION ON ENERGY CONSERVATION - Malaysia

20. Efficiency testing facilities and procedures established:

Motors
Insulation
Air conditioners/chillers/other appliances
Ballasts

21. Other programs or policies developed to increase energy efficiency in buildings:

Information programs: Ministry of Energy,
Audits: Ministry of Energy,
Energy Efficiency Training: Ministry of

Comment:

Additional sources of information about energy efficiency for buildings in: Malaysia

1. Seminar papers and compiled manual for energy efficiency.
2.
3.

22. Contact for written copy of energy standard specified in Question 4:

Name:

Address: Energy Unit
Ministry of Energy, Telecommunications, and Posts
Wisma Damansara, Jalan Semantran
50668 Kuala Lumpar

Country: Malaysia

Tel: 60-3-2562222 **Fax:** 60-3-255-7901

Types of supporting information available:

Other energy standards for non-residential buildings:

none

Survey completed by: K.S. Kannan
Title: Faculty of Mechanical Engineering
Universiti Teknologi Malaysia
Karung Berkunci 791; 80990 Johor Bahru
Johor Drul Takzim **Country:** Malaysia
Tel: 60-7-561-601/2/3 **Fax:** 60-7-572-555

Date completed: 3/31/92

NETHERLANDS

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National | Local |

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:

a. National level: Proposed

b. Regional level: - None

c. Local level: Mandatory

4. Single energy standard selected for further description:

Title, Organization: Bouwbersluit, Effective July 1, 1992

Year: 1992 Geographic Coverage: Nation Abbreviated Title: Bouwbersluit, 1992

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - Bouwbersluit, 1992

5. The standard defined in Question 4 applies to the following kinds of buildings:

a. Building types:

O - Offices
H - Hotels
S - Single-family residential
M - Multi-family residential
D - Hospitals
E - Educational facilities (schools)

b. Building vintage:

Both new and existing

c. Other characteristics:

6. Basic approach of the standard: Performance-based

7. The following subjects are included in the energy standard:

a. Whole building energy provisions:

- None

b. Building envelope provisions:

Roof
Wall system
Fenestration system
Infiltration

c. Lighting provisions:

- None

d. Mechanical provisions:

Other: efficiency of natural gas boilers for rooms

e. Other provisions:

STANDARDS DEVELOPMENT PROCESS - Bouwbesluit, 1992

8. Organizations involved in developing the standard:

Government agency: Ministry of Housing and the Environment
Government agency: Ministry of Economic Affairs
Research group: Novem TNO
Other: NNI - standards commission - representation of all interested groups who design standard

9. Decision Process: Consensus **Comment:** Calculations and descriptions were consensus, but the NNI commission (and the government) made the levels manatory

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Already available prior to standard

b. ENERGY USE of existing buildings:

Not available, not used in standard

c. WEATHER data

Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

- None

12. COMPUTER programs used:

a. In developing the standard:

CEN TC 89
TCM
ISSO pub. 16

b. For complying with the standard: No

13. Standard is set at a level: Equal to current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
Comfort

Comments:

15a. Standard scheduled for regular review and revision?

Yes: Until July 1, 1992, revision every year. The level of revision depends merely on the National Targets for Energy -Saving and the cost effectiveness. Technological improvement is not a goal.

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

No

3 NETHERLANDS

IMPLEMENTATION AND COMPLIANCE - Bouwbersluit, 1992

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: all local communities

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Buildings

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Compliance forms
Information or resource center

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Certification/approval	Penalty	No mechanism
Percent designs checked: 100	Percent sites checked: 10	Percent buildings checked: 0
Comment: Approval required to become the license for construction.	Comment: Penalty consists of no permission to finish construction.	Comment:

d. Other compliance procedures - None

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 4

f. Explanation for effectiveness in part e: License is needed before starting construction. Inspection during construction is very simple.

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Completed: National Environmental Plan Plus (NMP+), 1990.
Completed: Noto Energiebesparing, 1990.

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

None conducted

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

Completed: Novem, Voorbaldpahhater. Ministry of Housing.

d. COST EFFECTIVENESS based on ACTUAL COSTS:

None conducted

e. Other Assessments: Planned

FURTHER INFORMATION ON ENERGY CONSERVATION - Netherlands

20. Efficiency testing facilities and procedures established:

Insulation
Air conditioners/chillers/other appliances: white goods, boilers
Thermal properties of materials
Other: boilers

21. Other programs or policies developed to increase energy efficiency in buildings:

Information programs
Utility initiatives
Rebates
Audits (free or subsidized)

Comment: Ministry of Housing and Environment/Economic Affairs; all utilities (Milieu Aklie Plan); subsidies in existing buildings; awareness campaign in all governmental buildings by Novem and Ministry of Housing

Additional sources of information about energy efficiency for buildings in: Netherlands

1. Environmental Action Plan from the utilities. (English)
2. National Environmental Plan and Noto Energiebesporing, Ministry of Housing and Environment (English)
3. Lecture: "Regulations for the Energy Performance of Buildings: a Status Quo" by S. REnes, Government Building Agency, Ministry of Housing. (Available in English by request, R. Trines)

22. Contact for written copy of energy standard specified in Question 4:

Name: H.L. von Duijze
Address: Ministry of Housing
Box 3001
2700 KA Zosterman
Country: The Netherlands

Tel: 31 79 272 003 **Fax:** 31 79 516 431

Types of supporting information available:

Other energy standards for non-residential buildings:

Yes: Building Standards for Governmental Buildings, Government Buildings Agency.

(from above) Minn S. Renes; Box 20952; 2500 E2 Don Hoog; tel: 31 70 356 7890; fax: 31 70 356 7588

Survey completed by: Ruud Trines
Title: Project-Manager
Novem Sittard
Swentiboldstraat 21
P.O. Box 17, 6130 AA Sittard **Country:** The Netherlands
Tel: 31-0-46-595-318 **Fax:** 31-0-46-528-260

Date completed: 4/10/92

NEW ZEALAND

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:
   a. National level: Mandatory
   b. Regional level: - None
   c. Local level: - None

4. Single energy standard selected for further description:
   Title, Organization: Building Industry Authority, Approved Document H1, (refers to NZS 4220: Code of Practice for Energy Conservation in Non-Residential Buildings)
   Year: 1982
   Geographic Coverage: Nation
   Abbreviated Title: BIA H1

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - BIA H1

5. The standard defined in Question 4 applies to the following kinds of buildings:
   a. Building types:
   - O - Offices
   - H - Hotels
   - G - Government Facilities
   - D - Hospitals
   - C - Commercial/retail stores
   - R - Religion-related

   b. Building vintage:
   Both new and existing

   c. Other characteristics:
   P - Physical size: > 50 sq. m

6. Basic approach of the standard: Both prescriptive and performance

7. The following subjects are included in the energy standard:
   a. Whole building energy provisions:
   E- Energy amount target

   b. Building envelope provisions:
   Roof
   Wall system
   Fenestration system
   Infiltration

   c. Lighting provisions:
   Power density

   d. Mechanical provisions:
   Load Calculations for equipment sizing
   Controls
   Ventilation

   e. Other provisions:
   No goals or targets presently set for non-residential buildings

STANDARDS DEVELOPMENT PROCESS - BIA H1

8. Organizations involved in developing the standard:

Government agency: Building Industry Authority
Research group: Building Research Association of New Zealand

9. Decision Process: Mandate **Comment:** Decree taking into account public comment

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Gathered through audits and surveys
Already available prior to standard

b. ENERGY USE of existing buildings:

Computer simulations used for estimates
Gathered through audits and surveys

c. WEATHER data

Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

USA: ASHRAE - Handbook of Fundamentals
UK:
BS 5422: 1977
IHVE Guide Books
UK: CIBS Energy Codes

12. COMPUTER programs used:

a. In developing the standard: SUSTEP

b. For complying with the standard: ALF

13. Standard is set at a level: Equal to current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
Similarity/difference to local design

Comments:

15a. Standard scheduled for regular review and revision?

Yes: when BIA has funding, H1 will be subject to full technical and committee review

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

No

3 NEW ZEALAND

IMPLEMENTATION AND COMPLIANCE - BIA H1

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Building Industry Authority

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Buildings

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Other: training expected to be provided by industry

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Certification/approval	Certification/approval	Certification/approval
Percent designs checked: 90	Percent sites checked: 25	Percent buildings checked: 100
Comment:	Comment: Small buildings 100%; Large buildings about 25%	Comment: Territorial authority must give a code compliance certificate.

d. Other compliance procedures NB: Building code is administered by territorial authorities.

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 4

f. Explanation for effectiveness in part e:

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Planned

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

Completed: Baird, Brander, Bruhns, Donn, Isaacs, Pool, in Architecture at Victoria University, Wellington.
Completed: Other reports on CBD building energy use in Auckland and Christchurch

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

Planned

d. COST EFFECTIVENESS based on ACTUAL COSTS:

Planned

e. Other Assessments: None conducted

FURTHER INFORMATION ON ENERGY CONSERVATION - New Zealand

20. Efficiency testing facilities and procedures established:

Insulation
Thermal properties of materials

21. Other programs or policies developed to increase energy efficiency in buildings:

Utility initiatives

Comment: The major electricity generating utility has developed an "Energy Efficient House" program that includes management and appliances.

Additional sources of information about energy efficiency for buildings in: New Zealand

1. Building Research Association of New Zealand. ALF Manual.
2. Baird, Donn, Pool, Brander & Chan. "Energy Performance of Buildings," CRC Press, Boca Raton, Florida. 1983. (New Zealand commercial buildings)
3.

22. Contact for written copy of energy standard specified in Question 4:

Name:

Address:
Standards Association of New Zealand
Private Bag, Wellington

Country:

Tel: **Fax:**

Types of supporting information available:

Building Code Performance, from Hamish Handley.

Other energy standards for non-residential buildings:

NZD 4220

Survey completed by: Nigel Isaacs
Title: Research Fellow
Centre for Building Performance Research
School of Architecture, Victoria University of
PO Box 600 Wellingto **Country:** New Zealand
Tel: 64 4 495 5033 **Fax:** 64 4 495 5233

Date completed: 12/13/92

NORTHERN IRELAND

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:
   a. National level: Mandatory
   b. Regional level: Mandatory
   c. Local level: Mandatory

4. Single energy standard selected for further description:
   Title, Organization: Building Regulations (Northern Ireland) 1990 plus amendment Part F, Conservation of Fuel and Power, July 1, 1991, Department of the Environment for Northern Ireland
   Year: 1991 Geographic Coverage: Nation Abbreviated Title: BR-DENI, 1991

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - BR-DENI, 1991

5. The standard defined in Question 4 applies to the following kinds of buildings:
   a. Building types:
   A - All Buildings
   b. Building vintage:
   Both new and existing
   c. Other characteristics:
   P - Physical size: non-residential >30 sq. m floor area
   E - Amount of energy: Industrial or storage > 50W/sq. m
   other buildings > 25 W/sq. m

6. Basic approach of the standard: Performance-based

7. The following subjects are included in the energy standard:
   a. Whole building energy provisions:
   - None
   b. Building envelope provisions:
   Roof
   Wall system
   Fenestration system
   c. Lighting provisions:
   - None
   d. Mechanical provisions:
   Controls
   e. Other provisions:
   - None

STANDARDS DEVELOPMENT PROCESS - BR-DENI, 1991

8. Organizations involved in developing the standard:

Government agency: Department of the Environment for Northern Ireland
Government agency: Department of the Environment (England and Wales)
Research group: Building Research Establishment

9. Decision Process: Consensus **Comment:** Public consultation on proposals.7

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Gathered through audits and surveys

b. ENERGY USE of existing buildings:

Gathered through audits and surveys

c. WEATHER data

Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

England and Wales:

12. COMPUTER programs used:

a. In developing the standard:

BREDEM
CIBSE Energy Code

b. For complying with the standard: No

13. Standard is set at a level: Above current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

	Comments:
E - Cost effectiveness	
Availability of energy efficient products	
Similarity/difference to local design	
Cost effectiveness	
Other:	

15a. Standard scheduled for regular review and revision?

Yes: BRE research leads to proposals=>public consultation=>final proposals=>ministerial approval=> EC notification=> regulations made.

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

Yes: Building Research Establishment undertakes this on our behalf.

3 NORTHERN IRELAND

IMPLEMENTATION AND COMPLIANCE - BR-DENI, 1991

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Department of the Environment (NI)

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Buildings

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Seminars, workshops, or conferences

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Certification/approval	Certification/approval	Certification/approval
Percent designs checked: 100	Percent sites checked: 75	Percent buildings checked: 95
Comment:	Comment: Most buildings checked at some stage; many checked frequently.	Comment: Objective is inspection of every building on completion.

d. Other compliance procedures - None

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 5

f. Explanation for effectiveness in part e: Plans for every building are checked/approved. Everyone [is] aware of construction inspections and final inspections. Plus powers to force

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Completed

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

In progress

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

Completed

d. COST EFFECTIVENESS based on ACTUAL COSTS:

In progress

e. Other Assessments: - None

FURTHER INFORMATION ON ENERGY CONSERVATION - Northern Ireland

20. Efficiency testing facilities and procedures established:

Insulation
Thermal properties of materials

21. Other programs or policies developed to increase energy efficiency in buildings:

Information programs

Comment: Energy awareness campaigns- Department of Economic Development, Energy Efficiency Service

Additional sources of information about energy efficiency for buildings in: Northern Ireland

1. Department of the Environment, Approved Document L
2. BREDEM- Domestic Energy Model
3. CIBSE Building Energy Code, Part 2.

22. Contact for written copy of energy standard specified in Question 4:

Name:

Address: HMSO Bookshop
80 Chichester St.
Belfast, BTI 4JY

Country: Northern Ireland

Tel: 44-323-238451 **Fax:**

Types of supporting information available:

Buillding Amendment regulations (N.I) 1991, Technical Booklet F, Conservation of Fuel and Power.

Other energy standards for non-residential buildings:

Survey completed by: David L. Stewart
Title: Principal Architect
Department of the Environment for Northern Ireland
Cawood House, 24/26 Arthur St.
Belfast, BT 1 4 GP **Country:** Northern Ireland
Tel: 44 232 246 898 **Fax:** 44 232 233 575

Date completed: 3/13/92

NORWAY

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:

a. National level: Mandatory

b. Regional level: - None

c. Local level: - None

4. Single energy standard selected for further description:

Title, Organization: "Thermal Insulation and Air Imperviousness" (Chapter 53 of the Norwegian Building Regulations)

Year: 1987 Geographic Coverage: Nation Abbreviated Title: NBR-53-87

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - NBR-53-87

5. The standard defined in Question 4 applies to the following kinds of buildings:

a. Building types:

A - All Buildings

b. Building vintage:

Both new and existing

c. Other characteristics:

- None

6. Basic approach of the standard: Both prescriptive and performance

7. The following subjects are included in the energy standard:

a. Whole building energy provisions:

- None

b. Building envelope provisions:

Roof
Wall system
Fenestration system
Infiltration

c. Lighting provisions:

- None

d. Mechanical provisions:

Air/Water distribution efficiency

e. Other provisions:

- None

STANDARDS DEVELOPMENT PROCESS - NBR-53-87

8. Organizations involved in developing the standard:

Government agency: National Office of Building Technology and Administration
Research Group: SINTEF
Government agency: Ministry of Petroleum and Energy
Industry group: Representatives of private companies/businesses

9. Decision Process: Mandate **Comment:** National Office of Building Technology and Administration/Ministry of Local Government

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Gathered through audits and surveys

b. ENERGY USE of existing buildings:

Computer simulations used for estimates

c. WEATHER data

Gathered through measurements

d. Other information

- None

11. Standards from a different country used as source material:

Denmark
Sweden
Finland

12. COMPUTER programs used:

a. In developing the standard: Yes

b. For complying with the standard: ?

13. Standard is set at a level: Equal to current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness

Comments:

15a. Standard scheduled for regular review and revision?

Yes: every fifth year. There is currently underway a new building code. It is scheduled to be launched in 1993.

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

Yes: several surveys are undertaken in this respect as fundamental to developing new building codes.

3 NORWAY

IMPLEMENTATION AND COMPLIANCE - NBR-53-87

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: National Office of Building Technology and Administration

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Other: general building codes

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Certification/approval	?	Certification/approval
Percent designs checked: 100	Percent sites checked: ?	Percent buildings checked: ?
Comment: All designs are checked at local level. But the quality of the check is not 100%. The	Comment: Uncertain whether onsite inspections are undertaken.	Comment:

d. Other compliance procedures - None

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 3

f. Explanation for effectiveness in part e: Problems with personnel qualifications. As mentioned above, system is under revision.

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Completed: Noregian consulting firm Energidata a/s has conducted several surveys of energy savings

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

Completed: Surveys have been undertaken by the research institution NBI.

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

Completed: Ref. Energidata a/s

d. COST EFFECTIVENESS based on ACTUAL COSTS:

Completed: Ref. NBI and Energidata a/s

e. Other Assessments: - None

FURTHER INFORMATION ON ENERGY CONSERVATION - Norway

20. Efficiency testing facilities and procedures established:

Unsure

21. Other programs or policies developed to increase energy efficiency in buildings:

Information programs
Rebates

Comment: Focus on increasing efficiency in existing buildings.

Additional sources of information about energy efficiency for buildings in: Norway

1. The Ministry of Petroleum and Energy. "Energy Economizing and Energy Research," Report No. 61 to the Norwegian Storting (1988-89)
2.
3.

22. Contact for written copy of energy standard specified in Question 4:

Name:

Address:

Country:

Tel: **Fax:**

Types of supporting information available:

Other energy standards for non-residential buildings:

Survey completed by: ?

Title: Ministry of Petroleum and Energy
P.O. Box 8148 Dep.
Riso National Library, P.O. Box 49
N- 0033 Oslo 1 Rosklide **Country:** Norway

Tel: 47 2 34 63 41 **Fax:** 47 2 34 95 68

Date completed: 4/24/92

PAKISTAN

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National | Regional | Local

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:

a. National level: Voluntary

b. Regional level: - None

c. Local level: - None

4. Single energy standard selected for further description:

Title, Organization: Building Energy Code of Pakistan, ENERCON, Environment and Urban Affairs Division

Year: 1990 Geographic Coverage: Nation Abbreviated Title: BEC, 1990

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - BEC, 1990

5. The standard defined in Question 4 applies to the following kinds of buildings:

a. Building types:

- O - Offices
- H -Hotels / Hospitals/ Schools
- G - Government Facilities
- S - Single-family residential
- F - Restaurants
- C - Commercial/retail stores

b. Building vintage:

New buildings

c. Other characteristics:

Other: permanent buildings/human habitation

6. Basic approach of the standard: Both prescriptive and performance

7. The following subjects are included in the energy standard:

a. Whole building energy provisions:

E- Energy amount target

b. Building envelope provisions:

- Roof
- Wall system
- Fenestration system
- Infiltration

c. Lighting provisions:

- Control requirements
- Other: Daylighting

d. Mechanical provisions:

- Air/Water distribution efficiency
- Load Calculations for equipment sizing
- Controls
- Ventilation
- Equipment efficiency

e. Other provisions:

Yes: Thermostat settings

STANDARDS DEVELOPMENT PROCESS - BEC, 1990

8. Organizations involved in developing the standard:

Government agency: Environment and Urban Affairs Division
Government agency: Pakistan Public Works Department

9. Decision Process: Consensus **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Estimated using professional judgment

b. ENERGY USE of existing buildings:

Computer simulations used for estimates

c. WEATHER data

Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

US: California Title 24,
US: ASHRAE

12. COMPUTER programs used:

a. In developing the standard: - None

b. For complying with the standard: Uncertain

13. Standard is set at a level: Above current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
Availability of energy efficient products
Similarity/difference to local design
Comfort

Comments:

The basic aim was to produce a code which can be compiled using local expertise, materials, and technology.

15a. Standard scheduled for regular review and revision?

Yes: once every 5 years by a committee of persons from ENERCON and the Environment and Urban Affairs Division.

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

No

3 PAKISTAN

IMPLEMENTATION AND COMPLIANCE - BEC, 1990

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: ENERCON

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Other: energy efficiency

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Compliance forms
Seminars, workshops, or conferences

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
No mechanism	No mechanism	No mechanism
Percent designs checked: -	Percent sites checked: -	Percent buildings checked: -
Comment:	Comment:	Comment:

d. Other compliance procedures - None

e. Effectiveness of combined compliance mechanisms (scale of 1-5): -

f. Explanation for effectiveness in part e:

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Completed

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

Planned

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

In progress

d. COST EFFECTIVENESS based on ACTUAL COSTS:

Planned

e. Other Assessments: None conducted

FURTHER INFORMATION ON ENERGY CONSERVATION - Pakistan

20. Efficiency testing facilities and procedures established:

Motors
Ballasts
Fixtures

21. Other programs or policies developed to increase energy efficiency in buildings:

Audits (free or subsidized)
Information programs
Building energy standards

Comment: Described in "Building Sector Energy Conservation Programme of Pakistan," *Energy and Buildings*, 15-16 (1990/91):533-535.

Additional sources of information about energy efficiency for buildings in: Pakistan

1. Jamy, Gul Najam. 1990. "The Evolution and Future Direction of a Comprehensive Building Energy Conservation Programme for Pakistan." 2nd Intl Energy Conservation Symposium, Karachi--Pakistan.
2. Arshad, M.K. et al. 1990. "The Building Energy Code of Pakistan," presented at 2nd Intl Energy Conservation Symposium, Karachi--Pakistan.
3. Cunningham, Gregory W. and Jamil Masud. 1990. "Building Energy Simulation: Computer Modelling of Buildings in Pakistan," presented at 2nd Intl Energy Conservation Symposium, Karachi--Pakistan.

22. Contact for written copy of energy standard specified in Question 4:

Name: Gul Najam Jamy

Address: Deputy Chief (Buildings)
ENERCON, Buland Markaz
33-Blue Area
Islamabad

Country: Pakistan

Tel: 92 813003/813009 **Fax:** 92 826212

Types of supporting information available:

Code compliance handbook, available from ENERCON

Other energy standards for non-residential buildings:

-None

Survey completed by: Gul Najam Jamy
Title: Deputy Chief (Buildings)
ENERCON
Buland Markaz, 33, Blue Area
Islamabad **Country:** Pakistan
Tel: 92 813003 **Fax:** 92 826212

Date completed: 3/8/92

PHILIPPINES

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Non-Residential Only

3. Status of Non-Residential Building Energy Standards at the:

a. National level: Voluntary
Proposed

b. Regional level: -

c. Local level: -

4. Single energy standard selected for further description:

Title, Organization: Proposed Building Energy Use Standards, Office of Energy Affairs

Year: 198? Geographic Coverage: Nation Abbreviated Title: BEUS-OEA

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - BEUS-OEA

5. The standard defined in Question 4 applies to the following kinds of buildings:

a. Building types:
O - Offices
H - Hotels
G - Government Facilities
C - Commercial/retail stores
D - Hospitals/ schools
F - Restaurants

b. Building vintage:
Both new and existing

c. Other characteristics:
E - Amount of energy: Energy usage of more than 10W/sq.m

6. Basic approach of the standard: Both prescriptive and performance

7. The following subjects are included in the energy standard:

a. Whole building energy provisions:
P- Peak electricity demand

b. Building envelope provisions:
Roof
Wall system
Fenestration system
Infiltration

c. Lighting provisions:
Control requirements
Power density
Illumination requirements

d. Mechanical provisions:
Air/Water distribution efficiency
Load Calculations for equipment sizing
Controls
Ventilation
Equipment efficiency

e. Other provisions:
- None

STANDARDS DEVELOPMENT PROCESS - BEUS-OEA

8. Organizations involved in developing the standard:

Government agency: Office of Energy Affairs; Philippine Council for Industry and Energy Research and
Academic institution: University of Philippines
Foreign development agency: U.S. Agency for International Development; Lawrence Berkeley Laboratory
Other: technical Committee composed of building experts and practitioners

9. Decision Process: Consensus **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Gathered through audits and surveys

b. ENERGY USE of existing buildings:

Gathered through audits and surveys

c. WEATHER data

Gathered through measurements

d. Other information

- None

11. Standards from a different country used as source material:

Thailand:

12. COMPUTER programs used:

a. In developing the standard:

DOE-2
ASEAM

b. For complying with the standard: No

13. Standard is set at a level: Equal to current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
Availability of energy efficient products
Similarity/difference to local design
Comfort

Comments:

15a. Standard scheduled for regular review and revision?

Yes

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

Yes

3 PHILIPPINES

IMPLEMENTATION AND COMPLIANCE - BEUS-OEA

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Department of Public Works & Highways

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Other: public works

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

- None

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Uncertain	Uncertain	Uncertain
Percent designs checked: ____	Percent sites checked: ____	Percent buildings checked: ____
Comment:	Comment:	Comment:

d. Other compliance procedures - None

e. Effectiveness of combined compliance mechanisms (scale of 1-5): -

f. Explanation for effectiveness in part e: Compliance mechanisms are still being developed. Currently, the standardsa re subject to final approval as a referral code of the National

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

None conducted

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

None conducted

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

None conducted

d. COST EFFECTIVENESS based on ACTUAL COSTS:

None conducted

e. Other Assessments: None conducted

FURTHER INFORMATION ON ENERGY CONSERVATION - Philippines

20. Efficiency testing facilities and procedures established:

Air conditioners/chillers/other appliances
Ballasts
Fixtures
Other: fuels

21. Other programs or policies developed to increase energy efficiency in buildings:

Information programs
Audits (free or subsidized)
Rebates

Comment: Office of Energy Affairs; Philippine Council for Industry and Energy Research and Development; University of Philippines; National Engineering Center

Additional sources of information about energy efficiency for buildings in: Philippines

1. -
2.
3.

22. Contact for written copy of energy standard specified in Question 4:

Name: Charisse B. Tablante

Address: Office of Energy Affairs
Merrit Road, Fort Bonifacio
Makati, Metro Manila

Country: Philippines

Tel: 63 2 877 633 **Fax:** 63 2 877 633

Types of supporting information available:

-

Other energy standards for non-residential buildings:

None

Survey completed by: Charisse B. Tablante
Title: Chief, Conservation Division
Office of Energy Affairs; Office of the President
Merritt Rd., Fort Bonifacio
Makati, Metro Manila **Country:** The Philippines
Tel: 63-2-877-633 **Fax:** 63-2-817-8603

Date completed: 4/2/92

POLAND

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:
   a. National level: Mandatory
   b. Regional level: - None
   c. Local level: - None

4. Single energy standard selected for further description:
   Title, Organization: PN-91/B-02020, Polish Committee for Standardization, Measures, and Quality Control
   Year: 1991 Geographic Coverage: Nation Abbreviated Title: PN-91/B-02020

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - PN-91/B-02020

5. The standard defined in Question 4 applies to the following kinds of buildings:
   a. Building types:
   A - All Buildings
   b. Building vintage:
   Both new and existing
   c. Other characteristics:
   P - Physical size
   A - Air-Conditioned

6. Basic approach of the standard: Performance-based

7. The following subjects are included in the energy standard:
   a. Whole building energy provisions:
   E- Energy amount target
   b. Building envelope provisions:
   Roof
   Wall system
   Fenestration system
   Infiltration
   Other: Percent of setting humidity in walls
   c. Lighting provisions:
   ?
   d. Mechanical provisions:
   ?
   e. Other provisions:
   - None

STANDARDS DEVELOPMENT PROCESS - PN-91/B-02020

8. Organizations involved in developing the standard:

Government agency: PKNMIJ
Research group: Institute of Building Technique

9. Decision Process: ? **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Already available prior to standard

b. ENERGY USE of existing buildings:

?

c. WEATHER data

Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

Yes

12. COMPUTER programs used:

a. In developing the standard: Uncertain

b. For complying with the standard: ?

13. Standard is set at a level: Lower than current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
A - Availability of energy efficient products
S - Similarity/difference to local design
C - Comfort

Comments:

15a. Standard scheduled for regular review and revision?

Yes: The former standard PN-82/B-02020 was established 9 years ago and has been changed twice.

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

Yes: Standards PN-91/B 02020 is compulsory and PN-82/B-02020 was compulsory too.

3 POLAND

IMPLEMENTATION AND COMPLIANCE - PN-91/B-02020

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: PKNMIJ

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

?

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Information or resource center

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
?	?	?
Percent designs checked: ?	Percent sites checked: ?	Percent buildings checked: ?
Comment:	Comment:	Comment:

d. Other compliance procedures - None

e. Effectiveness of combined compliance mechanisms (scale of 1-5): ?

f. Explanation for effectiveness in part e: ?

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Completed

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

Planned

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

?

d. COST EFFECTIVENESS based on ACTUAL COSTS:

?

e. Other Assessments: ?

FURTHER INFORMATION ON ENERGY CONSERVATION - Poland

20. Efficiency testing facilities and procedures established:

Insulation
Ballasts
Thermal properties of materials

21. Other programs or policies developed to increase energy efficiency in buildings:

?

Comment:

Additional sources of information about energy efficiency for buildings in: Poland

1. -
2.
3.

22. Contact for written copy of energy standard specified in Question 4:

Name:

Address: PKNMiJ, Foreigh Relations Department
ul. Electoralna 2
00-950 Warsawa

Country: Poland

Tel: 48 22 20 54 34 **Fax:** 48 22 20 83 78

Types of supporting information available:

-

Other energy standards for non-residential buildings:

-

Survey completed by: Roland Izbicki
Title: Polski Komitet Normalizacyjny (PKNIJ)
Building Department
ul. Swietokrzyska 14b
Warszawa **Country:** Poland
Tel: 48 22 26 74 75 **Fax:** 48 22 27 41 13

Date completed: 7/22/92

PORTUGAL

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:
   a. National level: Mandatory
   b. Regional level: -
   c. Local level: -

4. Single energy standard selected for further description:
   Title, Organization: CSOPT
   Year: _____ Geographic Coverage: Nation Abbreviated Title: CSOPT-91

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - CSOPT-91

5. The standard defined in Question 4 applies to the following kinds of buildings:
   a. Building types:
   A - All Buildings
   b. Building vintage:
   Both new and existing
   c. Other characteristics:
   Other: Limiting nominal thermal loads (winter and summer conditions)

6. Basic approach of the standard: Both prescriptive and performance

7. The following subjects are included in the energy standard:
   a. Whole building energy provisions:
   E- Energy amount target
   b. Building envelope provisions:
   Roof
   Wall system
   Fenestration system
   Infiltration
   c. Lighting provisions:
   Other: power density used for calculation only
   d. Mechanical provisions:
   - None: covered in another standard
   e. Other provisions:
   - None

STANDARDS DEVELOPMENT PROCESS - CSOPT-91

8. Organizations involved in developing the standard:

Government agency: CSOPT (Lisbon)
Government agency: DGE (Lisbon)
Academic institution: FUEP (Porto)
Academic institution: IST (Lisbon)

9. Decision Process: Consensus **Comment:** Majority decision, no consensus reached for final version. Organizations included: AIP, LNEC, AECOPS

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Already available prior to standard

b. ENERGY USE of existing buildings:

Estimated using professional judgment

c. WEATHER data

Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

France (moderate extent)
Spain

12. COMPUTER programs used:

a. In developing the standard: - None

b. For complying with the standard: Uncertain

13. Standard is set at a level: Equal to current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

Similarity/difference to local design

Comments:

Pressure from AECOPS (the Building Constructors' Association) not to set the standard to a level above current practice.

15a. Standard scheduled for regular review and revision?

No

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

-

3 PORTUGAL

IMPLEMENTATION AND COMPLIANCE - CSOPT-91

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Cons. Sup. Obras Pub. Tranp.

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Other: general

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Compliance forms
Seminars, workshops, or conferences

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Certification/approval	No mechanism	No mechanism
Percent designs checked: ?	**Percent sites checked:** high	**Percent buildings checked:** high
Comment: Major local authorities enforce approval; smaller local authorities unable to enforce	**Comment:** Checks for compliance of other standards, but not for one under discussion.	**Comment:** Checks for compliance of other standards, but not for one under discussion.

d. Other compliance procedures

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 3.5

f. Explanation for effectiveness in part e: Compliance is most effective in large urban areas and there are a few problems (mainly bureaucratic) in applying the standard to smaller towns

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Completed: for solar houses made by FEUP/LNETI in the region of Porto

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

Planned: this type of work is carried out by universities

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

Planned: this type of work is carried out by universities

d. COST EFFECTIVENESS based on ACTUAL COSTS:

None conducted

e. Other Assessments: Planned: 1992 national survey sponsored by DGE

FURTHER INFORMATION ON ENERGY CONSERVATION - Portugal

20. Efficiency testing facilities and procedures established:

Motors
Insulation
Air conditioners/chillers/other appliances
Fixtures
Thermal properties of materials
Other: refrigeration equipment (tests available only for low or moderate power

21. Other programs or policies developed to increase energy efficiency in buildings:

Information programs

Comment: General public information (electricity use, heat losses in buildings); Subsidized solar thermal panels (program terminated)

Additional sources of information about energy efficiency for buildings in: Portugal

1. A energia em Portugal - DGE Min. Industria e Energia (information on the energy situation in Portugal)
2. Series of properties of building materials - thermal properties, physical properties of most common masonry solutions used in Portugal- LNEC Laboratório Nacional de Engenharia Civil
3. The Portuguese information is seldom specific for buildings. Usually it considers different sectors (industry in particular). All titles refer to Portugues language publications.

22. Contact for written copy of energy standard specified in Question 4:

Name:

Address:
Conselho Superior de Obras Públicas e Transportes (CSOPT)
R.S. Mamede ao Caldas
1196 Lisboa Codex

Country: Portugal

Tel: 351-1-8884234 **Fax:** 351-1-876430

Types of supporting information available:

Program disk: Oliveria Fernandes; FEUP - Univ. do Porto; R. dos Bragas; 4099 Porto Codex; Portugal. Tel: 351-2-311-254 ; Fax: 351-2-319-280

Other energy standards for non-residential buildings:

Yes: Reg. da Qualidade do Sist. de Climatizacao em Edificios; CSOPT

Survey completed by: Luis Roriz
Title:
Universidade do Algave
Escola Superior de Tecnologia
Quinta da Penha 800 Faro **Country:** Portugal
Tel: 351-98-803561 **Fax:** 351-98-832539

Date completed: 1/5/92

ROMANIA

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National | Regional | Local

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:

a. National level: Voluntary

b. Regional level: -

c. Local level: -

4. Single energy standard selected for further description:

Title, Organization: Building regulations, Romania

Year: ?

Geographic Coverage: Nation

Abbreviated Title: BR-Romania

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - BR-Romania

5. The standard defined in Question 4 applies to the following kinds of buildings:

a. Building types:

A - All Buildings

b. Building vintage:

Both new and existing

c. Other characteristics:

P - Physical size

E - Amount of energy

6. Basic approach of the standard: Prescriptive

7. The following subjects are included in the energy standard:

a. Whole building energy provisions:

E- Energy amount target

b. Building envelope provisions:

Yes

c. Lighting provisions:

- None

d. Mechanical provisions:

?

e. Other provisions:

- None

STANDARDS DEVELOPMENT PROCESS - BR-Romania

8. Organizations involved in developing the standard:

Government agency
Research group
Industry group

9. Decision Process: Mandate **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Estimated using professional judgment

b. ENERGY USE of existing buildings:

Estimated using professional judgment
Gathered through audits and surveys

c. WEATHER data

Gathered through measurements

d. Other information

- None

11. Standards from a different country used as source material:

European countries

12. COMPUTER programs used:

a. In developing the standard: Uncertain

b. For complying with the standard: ?

13. Standard is set at a level: Equal to current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
Availability of energy efficient products
Similarity/difference to local design

Comments:

15a. Standard scheduled for regular review and revision?

Yes: under current revision and update

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

Unsure

3 ROMANIA

IMPLEMENTATION AND COMPLIANCE - BR-Romania

16. Entities involved in IMPLEMENTING energy standards:

Under revision

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Compliance forms
Seminars, workshops, or conferences

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Penalty	?	?
Percent designs checked: ?	Percent sites checked:	Percent buildings checked:
Comment:	Comment:	Comment:
Difficult to estimate.	Difficult to estimate.	Difficult to estimate.

d. Other compliance procedures - None

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 2

f. Explanation for effectiveness in part e:

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

In progress

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

In progress

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

In progress

d. COST EFFECTIVENESS based on ACTUAL COSTS:

In progress

e. Other Assessments: In progress

FURTHER INFORMATION ON ENERGY CONSERVATION - Romania

20. Efficiency testing facilities and procedures established:

Motors
Insulation
Thermal properties of materials

21. Other programs or policies developed to increase energy efficiency in buildings:

Information programs

Comment:

Additional sources of information about energy efficiency for buildings in: Romania

1. -
2.
3.

22. Contact for written copy of energy standard specified in Question 4:

Name:

Address:

Country:

Tel: **Fax:**

Types of supporting information available:

- None

Other energy standards for non-residential buildings:

- None

Survey completed by: Adrian Gheorghe
Title: Division of Nuclear Safety
International Atomic Energy Agency
Wagramerstrasse 5, P.O. Box 200, A-1400
Vienna **Country:** Austria
Tel: 43-222-232-360 x **Fax:** 43-222-234-564

Date completed: 3/30/92

SCOTLAND

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:
   a. National level: Mandatory
   b. Regional level: -
   c. Local level: -

4. Single energy standard selected for further description:
   Title, Organization: Building Regulations, Scotland
   Year: ?
   Geographic Coverage: Nation
   Abbreviated Title: BR-SCT

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - BR-SCT

5. The standard defined in Question 4 applies to the following kinds of buildings:
   a. Building types:
   A - All Buildings
   b. Building vintage:
   New buildings
   c. Other characteristics:
   - None

6. Basic approach of the standard: Both prescriptive and performance

7. The following subjects are included in the energy standard:
   a. Whole building energy provisions:
   E- Energy amount target
   b. Building envelope provisions:
   Roof
   Wall system
   Fenestration system
   c. Lighting provisions:
   - None
   d. Mechanical provisions:
   Yes
   e. Other provisions:
   Yes

STANDARDS DEVELOPMENT PROCESS - BR-SCT

8. Organizations involved in developing the standard:

Government agency
Industry group
Academic institution
Research group

9. Decision Process: Mandate Comment:

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

?

b. ENERGY USE of existing buildings:

?

c. WEATHER data

?

d. Other information

- None

11. Standards from a different country used as source material:

England and Wales

12. COMPUTER programs used:

a. In developing the standard: Uncertain

b. For complying with the standard: ?

13. Standard is set at a level: ?

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
Availability of energy efficient products
Similarity/difference to local design
Comfort

Comments:

15a. Standard scheduled for regular review and revision?

Yes

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

Yes

3 SCOTLAND

IMPLEMENTATION AND COMPLIANCE - BR-SCT

16. Entities involved in IMPLEMENTING energy standards:

Existing agency

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Seminars, workshops, or conferences

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Uncertain	Uncertain	Uncertain
Percent designs checked:	Percent sites checked:	Percent buildings checked:
Comment:	Comment:	Comment:

d. Other compliance procedures -

e. Effectiveness of combined compliance mechanisms (scale of 1-5): -

f. Explanation for effectiveness in part e:

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

-

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

-

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

-

d. COST EFFECTIVENESS based on ACTUAL COSTS:

-

e. Other Assessments: -

FURTHER INFORMATION ON ENERGY CONSERVATION - Scotland

20. Efficiency testing facilities and procedures established:

-

21. Other programs or policies developed to increase energy efficiency in buildings:

-

Comment:

Additional sources of information about energy efficiency for buildings in: Scotland

1. -
2.
3.

22. Contact for written copy of energy standard specified in Question 4:

Name: -

Address: -

Country:

Tel: Fax:

Types of supporting information available:

-

Other energy standards for non-residential buildings:

-

Survey completed by: John Foster
Title: Senior Architect
Building Directorate, Scottish Office
Rm. 3/113 New St. Andrews House
Edinburgh EH1 3SZ Country: Scotland
Tel: 44 31 244 4782 Fax: not on file, please send

Date completed: 3/3/92

SINGAPORE

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:

a. National level: Mandatory

b. Regional level:

c. Local level:

4. Single energy standard selected for further description:

Title, Organization: "Handbook on Energy Conservation in Buildings and Building Services", Singapore Building Control Regulations; Building Control Division, Public Works Department. This Handbook is referred to in Division 10 of the general building code, S148/89.

Year: 1980 Geographic Coverage: Nation Abbreviated Title: S 148/89, Div. 10

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - S 148/89, Div. 10

5. The standard defined in Question 4 applies to the following kinds of buildings:

a. Building types:

A - All Buildings

b. Building vintage:

New buildings

c. Other characteristics:

E - Amount of energy: >30kw cooling capacity for AC equip.

A - Air-Conditioned

6. Basic approach of the standard: Both prescriptive and performance

7. The following subjects are included in the energy standard:

a. Whole building energy provisions:

- None

b. Building envelope provisions:

Roof

Wall system

Fenestration system

Infiltration

c. Lighting provisions:

Control requirements

Power density

Illumination requirements

d. Mechanical provisions:

Controls

Ventilation

e. Other provisions:

Yes: 1) Facilities for energy monitering to be profided for all new offices, hotels, and shopping centers; 2) shop units in shopping complex with doors opening directly to the atmosphere to be provided with independent A/C units separate from the building's central air-conditioning system.

STANDARDS DEVELOPMENT PROCESS - S 148/89, Div. 10

8. Organizations involved in developing the standard:

Government agency: Building Control Division, Public Works Department
Academic institution: National University of Singapore
Government agency: Public Utilities Board
Local interest group: Institution of Engineers
Local interest group: Singapore Institute of Architects

9. Decision Process: Consensus **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Gathered through audits and surveys

b. ENERGY USE of existing buildings:

Estimated using professional judgment

c. WEATHER data

Gathered through measurements

d. Other information

- None

11. Standards from a different country used as source material:

USA: ASHRAE 90

12. COMPUTER programs used:

a. In developing the standard: - None

b. For complying with the standard: No

13. Standard is set at a level: Above current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
A - Availability of energy efficient products
S - Similarity/difference to local design
C - Comfort

Comments:

15a. Standard scheduled for regular review and revision?

Yes: no fixed schedule. Review is based on feedback from industry as well as from research institution.

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

Yes: through feedback from industry

3 SINGAPORE

IMPLEMENTATION AND COMPLIANCE - S 148/89, Div. 10

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Building Control Division

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Buildings

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Compliance forms
Seminars, workshops, or conferences

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Certification/approval	No mechanism	Certification/approval
Percent designs checked: -	Percent sites checked:	Percent buildings checked:
Comment:	Comment:	Comment:
Random		Random

d. Other compliance procedures -

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 5

f. Explanation for effectiveness in part e: compliance with standard is made a responsibility of the professional

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Completed: ASEAN-US cooperative program report

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

Completed: ASEAN-US cooperative program report

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

Completed: ASEAN-US cooperative program report

d. COST EFFECTIVENESS based on ACTUAL COSTS:

Completed: ASEAN Energy Conference Proceedings (1984)

e. Other Assessments: -

FURTHER INFORMATION ON ENERGY CONSERVATION - Singapore

20. Efficiency testing facilities and procedures established:

Insulation
Ballasts
Thermal properties of materials

21. Other programs or policies developed to increase energy efficiency in buildings:

Information programs

Comment: Public Utilities Board

Additional sources of information about energy efficiency for buildings in: Singapore

1. -
2. -
3. -

22. Contact for written copy of energy standard specified in Question 4:

Name:
Address:
Country:

Tel: **Fax:**

Types of supporting information available:

-

Other energy standards for non-residential buildings:

-
-

Survey completed by: Ng Aik Huat
Title:
Building Control Division
5 Maxwell Road; Tower Block , MND Complex
Singapore 0106 **Country:** Singapore
Tel: 65-332-5635 **Fax:** 65-322-5671

Date completed: 9/4/92

SOUTH AFRICA

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National | Local |

2. Proposed or existing ENERGY standards cover the following building sectors: Non-Residential Only

3. Status of Non-Residential Building Energy Standards at the:
   a. National level: Voluntary
   b. Regional level: Voluntary
   c. Local level: - None

4. Single energy standard selected for further description:
   Title, Organization: Department of Finance
   Year: ?
   Geographic Coverage: Nation
   Abbreviated Title: BES-DF

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - BES-DF

5. The standard defined in Question 4 applies to the following kinds of buildings:
   a. Building types:
   O - Offices
   G - Government Facilities
   D - Hospitals
   b. Building vintage:
   New buildings
   c. Other characteristics:
   E - Amount of energy

6. Basic approach of the standard: Performance-based

7. The following subjects are included in the energy standard:
   a. Whole building energy provisions:
   E- Energy amount target
   b. Building envelope provisions:
   ?
   c. Lighting provisions:
   ?
   d. Mechanical provisions:
   ?
   e. Other provisions:
   - None

STANDARDS DEVELOPMENT PROCESS - BES-DF

8. Organizations involved in developing the standard:

Academic institution: University of Pretoria

9. Decision Process: Mandate **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Estimated using professional judgment

b. ENERGY USE of existing buildings:

Estimated using professional judgment
Computer simulations used for estimates

c. WEATHER data

Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

- None

12. COMPUTER programs used:

a. In developing the standard: QUICK

b. For complying with the standard: Yes

13. Standard is set at a level: Equal to current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
Similarity/difference to local design
Comfort

Comments:

15a. Standard scheduled for regular review and revision?

No

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

?

3 SOUTH AFRICA

IMPLEMENTATION AND COMPLIANCE - BES-DF

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Department of Works

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Buildings

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

- None

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
No mechanism	No mechanism	No mechanism
Percent designs checked: 5	Percent sites checked: 0	Percent buildings checked: 0
Comment:	Comment:	Comment:

d. Other compliance procedures

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 1.5

f. Explanation for effectiveness in part e: Energy conservation not perceived as important; pollution (some) not perceived as important; coal produced; energy is cheap

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Completed: National Energy Council

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

Completed: National Energy Council

In progress

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

In progress: National Energy Council

d. COST EFFECTIVENESS based on ACTUAL COSTS:

In progress: National Energy Council

e. Other Assessments: Planned: National Energy Council

FURTHER INFORMATION ON ENERGY CONSERVATION - South Africa

20. Efficiency testing facilities and procedures established:

Insulation
Thermal properties of materials

21. Other programs or policies developed to increase energy efficiency in buildings:

Audit manual made available (1987)
Time of day pricing introduced (1991) but withdrawn

Comment: Audit manual free through Department of Public Works; high demand but few audits completed. Tariff introduced by Eskom on trial basis; withdrawn due to local authority electricity departments

Additional sources of information about energy efficiency for buildings in: South Africa

1. Lewis, Basson, and Snow. "Efficient utilisation of electricity," NEC/Eskom Seminar on Electricity Strategy, April 1990.
2. Basson, "Energy Conservation R&D, Progress Report from South Africa," Building Research and Practice, Nov/Dec 1982.
3. Matthysen, "Energy Consumption in Large Buildings, a South Africa survey," South Africa Refrigeration and Air Conditioning, Nov. 1986.

22. Contact for written copy of energy standard specified in Question 4:

Name:
Address:
Country:

Tel: **Fax:**

Types of supporting information available:

Other energy standards for non-residential buildings:

Survey completed by: J.A. Basson
Title: Director, Electricity and Energy Efficiency
Energy Branch, Department of Mineral and Energy
Private Bag X03
Lynnwood Ridge, Pretoria 0040 **Country:** South Africa
Tel: 27 12 348-9564 **Fax:** 27 12 348-9676

Date completed: 5/5/92

SOUTH KOREA

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:

a. National level: Mandatory

b. Regional level:

c. Local level:

4. Single energy standard selected for further description:

Title, Organization: Building Code. Ministry of Construction. Effective June 1, 1992.

Year: 1992 Geographic Coverage: Nation Abbreviated Title: BC-1992

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - BC-1992

5. The standard defined in Question 4 applies to the following kinds of buildings:

a. Building types:

O - Offices
H - Hotels
G - Government Facilities
F - Restaurants
D - Hospitals
C - Commercial/retail stores
S - Single-family residential
M - Multi-family residential

b. Building vintage:

New buildings

c. Other characteristics:

P - Physical size: offices/shopping centers > 3000 sq. m

6. Basic approach of the standard: Both prescriptive and performance

7. The following subjects are included in the energy standard:

a. Whole building energy provisions:

E- Energy amount target (residential & office)

b. Building envelope provisions:

Roof
Wall system
Fenestration system
Infiltration

c. Lighting provisions:

Control requirements
Power density
Illumination requirements

d. Mechanical provisions:

Load Calculations for equipment sizing
Controls
Equipment efficiency

e. Other provisions:

Yes: thermostat settings, and Ondol heating system (traditional floor panel heating system)

STANDARDS DEVELOPMENT PROCESS - BC-1992

8. Organizations involved in developing the standard:

Government agency: Ministry of Construction
Government agency: Ministry of Energy and Resources
Research group: Korea Institute of Energy Research

9. Decision Process: Consensus **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Estimated using professional judgment
Gathered through audits and surveys
Already available prior to standard

b. ENERGY USE of existing buildings:

Estimated using professional judgment
Computer simulations used for estimates
Gathered through audits and surveys
Already available prior to standard

c. WEATHER data

Gathered through measurements
Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

USA: BEPS
USA: ASHRAE 90.1
Japan: PAL, Building Code, and oth. stds.

12. COMPUTER programs used:

a. In developing the standard:

DOE-2
Trakload
TRNSYS
KIZRB1

b. For complying with the standard: Yes

13. Standard is set at a level: Above current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
A - Availability of energy efficient products
S - Similarity/difference to local design
C - Comfort

Comments:

Some of energy efficient products are imported from foreign countries.

15a. Standard scheduled for regular review and revision?

Yes: review in research institute => governmental agency => revision

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

Yes

3 SOUTH KOREA

IMPLEMENTATION AND COMPLIANCE - BC-1992

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Ministry of Construction and Ministry of Domestic Affairs

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Buildings

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Compliance forms
Seminars, workshops, or conferences

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:

Certification/approval

Percent designs checked: 50

Comment:

b. DURING construction:

Certification/approval
Other policy mechanism

Percent sites checked: 50

Comment:

c. AFTER construction:

Certification/approval
Penalty

Percent buildings checked: 100

Comment:

d. Other compliance procedures Yes: we have to receive the inspections for fire protection, utility hookups, etc.

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 3

f. Explanation for effectiveness in part e: We don't have perfect one.

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Planned

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

Planned

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

Planned

d. COST EFFECTIVENESS based on ACTUAL COSTS:

Planned

e. Other Assessments: Planned

FURTHER INFORMATION ON ENERGY CONSERVATION - South Korea

20. Efficiency testing facilities and procedures established:

Motors
Insulation
Air conditioners/chillers/other appliances
Ballasts
Fixtures
Thermal properties of materials

21. Other programs or policies developed to increase energy efficiency in buildings:

Government energy policy
Utility initiatives
Information programs
Audits (free or subsidized)

Comment: Electricity peak load reduction: Ministry of Energy and Resources;

Additional sources of information about energy efficiency for buildings in: South Korea

1. Energy Research and Development, Korea Insitute of Energy Research
2. Energy Management, Korea Energy Management Corporation
3. Energy Economy (newspaper)

22. Contact for written copy of energy standard specified in Question 4:

Name: Sang Dong Park

Address: Director, Building Energy Research Departmen
Korea Institute of Energy Research
P.O. Box 5, Daedeok Science Town
Daejeon 305-343

Country: Korea

Tel: 82 42 860 3200 **Fax:** 82 42 861 6224

Types of supporting information available:

- None

Other energy standards for non-residential buildings:

Rational Energy Utilization Law, Ministry of Energy and Resources

Survey completed by: Sang Dong Park
Title: Director, Building Energy Research Department
Korea Institute of Energy Research
P.O. Box 5, Daedeok Science Town
Daejeon 305-343 **Country:** Korea
Tel: 82 42 860 3200 **Fax:** 82 42 861 6224

Date completed: 11/10/92

SWEDEN

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:
   a. National level: Mandatory
   b. Regional level: - None
   c. Local level: - None

4. Single energy standard selected for further description:
   Title, Organization: Nybyggnadsregler, BFS 1988: 18. Boverket, 1989-01-01
   Year: 1989 Geographic Coverage: Nation Abbreviated Title: BFS 1988: 18

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - BFS 1988: 18

5. The standard defined in Question 4 applies to the following kinds of buildings:
   a. Building types:
   A - All Buildings
   b. Building vintage:
   New buildings
   c. Other characteristics:
   Other: all permanently used buildings

6. Basic approach of the standard: Performance-based

7. The following subjects are included in the energy standard:
   a. Whole building energy provisions:
   Other: reference building
   b. Building envelope provisions:
   Roof
   Wall system
   Fenestration system
   Infiltration
   c. Lighting provisions:
   Illumination requirements: daylighting
   Other: daylighting
   d. Mechanical provisions:
   Ventilation
   e. Other provisions:
   Heat exchanger for ventilation

STANDARDS DEVELOPMENT PROCESS - BFS 1988: 18

8. Organizations involved in developing the standard:

Government agency: Boverket

9. Decision Process: Mandate **Comment:** Boverket

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

-

b. ENERGY USE of existing buildings:

Estimated using professional judgment
Computer simulations used for estimates

c. WEATHER data

Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

- None

12. COMPUTER programs used:

a. In developing the standard: ENORM

b. For complying with the standard: Yes

13. Standard is set at a level: Above current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
Comfort

Comments:

15a. Standard scheduled for regular review and revision?

Yes

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

Yes

3 SWEDEN

IMPLEMENTATION AND COMPLIANCE - BFS 1988: 18

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Boverket

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Buildings

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations
Seminars, workshops, or conferences
Information or resource center

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Certification/approval	Certification/approval	Certification/approval
Percent designs checked: 100	Percent sites checked: 1-100	Percent buildings checked: 100
Comment:	Comment:	Comment:

d. Other compliance procedures - None

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 5

f. Explanation for effectiveness in part e: Why not?

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

-

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

-

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

-

d. COST EFFECTIVENESS based on ACTUAL COSTS:

-

e. Other Assessments: -

FURTHER INFORMATION ON ENERGY CONSERVATION - Sweden

20. Efficiency testing facilities and procedures established:

Insulation
Air conditioners/chillers/other appliances
Thermal properties of materials

21. Other programs or policies developed to increase energy efficiency in buildings:

-

Comment:

Additional sources of information about energy efficiency for buildings in: Sweden

1. Nybggnads Regler, BFS 1988: 18, ISBN 91-38-09758-3
2.
3.

22. Contact for written copy of energy standard specified in Question 4:

Name: Stephan Norrman

Address: Boverket
Box 534 S37123 Karlskrona

Country: Sweden

Tel: 46 455 53215 **Fax:** 46 455 53221

Types of supporting information available:

Byggtjanst; S171 88 Solna, Sweden; tel: 46 8 734 5100; fax: 46 8 734 5098

Other energy standards for non-residential buildings:

- None

Survey completed by: Stephan Norrman
Title: Boverket
National Board of Housing, Building and Physical
P.O. Box 534
S-37-123 Karlskrona **Country:** Sweden
Tel: +46-455-53-215 **Fax:** +46-455-53-221

Date completed: 6/25/92

SWITZERLAND

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:
   a. National level: Mandatory
   b. Regional level: Mandatory
   c. Local level: Mandatory

4. Single energy standard selected for further description:
   Title, Organization: Energie im Hochbau, Schweizerischer Ingenieur und Architekrenverein (SIA)
   Year: 1988 Geographic Coverage: Nation Abbreviated Title: EH-SIA, 1988

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - EH-SIA, 1988

5. The standard defined in Question 4 applies to the following kinds of buildings:
   a. Building types:
   A - All Buildings
   b. Building vintage:
   Both new and existing
   c. Other characteristics:
   P - Physical size
   E - Amount of energy
   F - Type of fuel: oil, gas, electricity

6. Basic approach of the standard: Both prescriptive and performance

7. The following subjects are included in the energy standard:
   a. Whole building energy provisions:
   E- Energy amount target
   b. Building envelope provisions:
   Roof
   Wall system
   Fenestration system
   Infiltration
   c. Lighting provisions:
   - None
   d. Mechanical provisions:
   Load Calculations for equipment sizing
   Equipment efficiency
   e. Other provisions:
   - None

STANDARDS DEVELOPMENT PROCESS - EH-SIA, 1988

8. Organizations involved in developing the standard:

Government agency: Bundesant energiwirishaft
Academic institution: SIA

9. Decision Process: Consensus **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Already available prior to standard

b. ENERGY USE of existing buildings:

Estimated using professional judgment

c. WEATHER data

Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

Germany: DIN
France: AFNOR

12. COMPUTER programs used:

a. In developing the standard: - None

b. For complying with the standard: ?

13. Standard is set at a level: Lower than current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
C - Comfort

Comments:

15a. Standard scheduled for regular review and revision?

Yes

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

Yes

3 SWITZERLAND

IMPLEMENTATION AND COMPLIANCE - EH-SIA, 1988

16. Entities involved in IMPLEMENTING energy standards:

?

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

?

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Example calculations
Seminars, workshops, or conferences
Information or resource center

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:

Certification/approval

Percent designs checked: 100

Comment:

b. DURING construction:

-

Percent sites checked: -

Comment:

c. AFTER construction:

-

Percent buildings checked: -

Comment:

d. Other compliance procedures -

e. Effectiveness of combined compliance mechanisms (scale of 1-5): -

f. Explanation for effectiveness in part e: -

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

In progress

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

In progress

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

In progress

d. COST EFFECTIVENESS based on ACTUAL COSTS:

In progress

e. Other Assessments: -

FURTHER INFORMATION ON ENERGY CONSERVATION - Switzerland

20. Efficiency testing facilities and procedures established:

Insulation
Air conditioners/chillers/other appliances
Thermal properties of materials

21. Other programs or policies developed to increase energy efficiency in buildings:

Building energy standards

Comment: SIA 380/4 Elektrische Energie im Hochbau

Additional sources of information about energy efficiency for buildings in: Switzerland

1. -
2. -
3. -

22. Contact for written copy of energy standard specified in Question 4:

Name: -

Address:

Country:

Tel: **Fax:**

Types of supporting information available:

-

Other energy standards for non-residential buildings:

-
-

Survey completed by: Santiago Schuppiser
Title: Dipl. Arch
Schweizerischer Ingenieur und Architekrenverein
Postfach CH-8039
Zürich **Country:** Switzerland
Tel: 41 1 383 1515 **Fax:** 41 1 201 6335

Date completed: 7/14/92

THAILAND

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Non-Residential Only

3. Status of Non-Residential Building Energy Standards at the:
   a. National level: Proposed
   b. Regional level: Proposed
   c. Local level: Proposed

4. Single energy standard selected for further description:
   Title, Organization: "Guidelines and Requirements for Energy Conservation in New Buildings, "National Energy Office, Office of the Prime Minister, and the Ministry of Science, Technology, and Energy
   Year: 1987 Geographic Coverage: Nation Abbreviated Title: ECNB, 1987

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - ECNB, 1987

5. The standard defined in Question 4 applies to the following kinds of buildings:
   a. Building types:
   - O - Offices
   - H - Hotels
   - G - Government Facilities
   - F - Restaurants
   - D - Hospitals
   - C - Commercial/retail stores

   b. Building vintage:
   Both new and existing

   c. Other characteristics:
   E - Amount of energy: 1000 kilowatts

6. Basic approach of the standard: Prescriptive

7. The following subjects are included in the energy standard:
   a. Whole building energy provisions:
   - None

   b. Building envelope provisions:
   - Roof
   - Wall system
   - Fenestration system
   - Infiltration

   c. Lighting provisions:
   - Control requirements
   - Power density

   d. Mechanical provisions:
   - Load Calculations for equipment sizing
   - Ventilation
   - Equipment efficiency

   e. Other provisions:
   - None

STANDARDS DEVELOPMENT PROCESS - ECNB, 1987

8. Organizations involved in developing the standard:

Government agency: Dept. of Energy Affairs, Ministry of Science, Technology, and Energy
Government : National Energy Policy Office, Office of Prime Minister
Academic : Division of Energy Technology, Asian Institute of Technology

9. Decision Process: Mandate **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Already available prior to standard

b. ENERGY USE of existing buildings:

Already available prior to standard

c. WEATHER data

Already available prior to standard

d. Other information

The standards have been developed based on information compiled for central region. More information is being compiled to strengthen the

11. Standards from a different country used as source material:

Singapore
USA: ASHRAE 90 A,B,C

12. COMPUTER programs used:

a. In developing the standard: DOE-2

b. For complying with the standard: Yes

13. Standard is set at a level: Above current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
Availability of energy efficient products
Similarity/difference to local design
Comfort

Comments:

15a. Standard scheduled for regular review and revision?

Yes: It is believed that a review procedure will be developed.

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

3 THAILAND

IMPLEMENTATION AND COMPLIANCE - ECNB, 1987

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Dept. of Energy Affairs

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Energy

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure
Example calculations

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Penalty	Penalty	Penalty
Percent designs checked: 100	Percent sites checked: -	Percent buildings checked: 100
Comment:	Comment:	Comment:

d. Other compliance procedures -

e. Effectiveness of combined compliance mechanisms (scale of 1-5): -

f. Explanation for effectiveness in part e: -

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

In progress

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

Planned

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

Planned

d. COST EFFECTIVENESS based on ACTUAL COSTS:

None conducted

e. Other Assessments: None conducted

FURTHER INFORMATION ON ENERGY CONSERVATION - Thailand

20. Efficiency testing facilities and procedures established:

Air conditioners/chillers/other appliances
Ballasts

21. Other programs or policies developed to increase energy efficiency in buildings:

Utility initiatives
Government energy policy

Comment: An Energy Conservation Act was passed in March 1992, (effective April) that emphasizes use of incentive and disincentive means to encourage compliance. Requirements passed by the Building Central Commission could become

Additional sources of information about energy efficiency for buildings in: Thailand

1. Publications in journals of: Engineering Institute of Thailand
2. Publications in journals of: Siam's Architectural Society
3.

22. Contact for written copy of energy standard specified in Question 4:

Name:

Address: Division of Energy Economics
Department of Energy Affairs
Ministry of Science, Technology, and Energy
Rama I Road Bangkok

Country: Thailand

Tel: **Fax:**

Types of supporting information available:

Handbook on Energy Conservation for Buildings

Other energy standards for non-residential buildings:

- None

Survey completed by: Surapong Chirarattananon
Title: Energy Technology Division
Asian Institute of Technology
GPO Box 2754
Bangkok 10501 **Country:** Thailand
Tel: 662-529-0100 **Fax:** 662-516-2126

Date completed: 4/15/92

U.S.S.R.

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. General building standards exist at the following governmental levels: National

2. Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential

3. Status of Non-Residential Building Energy Standards at the:
   a. National level: Proposed
   b. Regional level: Proposed
   c. Local level: - None

4. Single energy standard selected for further description:
   Title, Organization: Building Thermophysics (draft), The Research Institute for Building Physics (NIISF)
   Year: 1991 Geographic Coverage: Nation Abbreviated Title: BT-NIISF, 1991

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - BT-NIISF, 1991

5. The standard defined in Question 4 applies to the following kinds of buildings:
   a. Building types:
   A - All Buildings
   b. Building vintage:
   Both new and existing
   c. Other characteristics:
   E - Amount of energy: minimization during design process

6. Basic approach of the standard: Performance-based

7. The following subjects are included in the energy standard:
   a. Whole building energy provisions:
   E- Energy amount target
   b. Building envelope provisions:
   Roof
   Wall system
   Fenestration system
   Infiltration
   Other: main floor above and below grade
   c. Lighting provisions:
   - None
   d. Mechanical provisions:
   - None
   e. Other provisions:
   - None

STANDARDS DEVELOPMENT PROCESS - BT-NIISF, 1991

8. Organizations involved in developing the standard:

Research group: The Research Institute for Building Physics
Research group: The Research and Design Institute for Industrial Buildings
Research group: The Research and Design Institute for Residential Buildings
Research group: The Research and Design Institute for Rural Buildings

9. Decision Process: Consensus **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Already available prior to standard

b. ENERGY USE of existing buildings:

Computer simulations used for estimates
Gathered through audits and surveys

c. WEATHER data

Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

ISO-9164
Germany: DIN 4108
Sweden: SBN 1980
America: California Energy Code

12. COMPUTER programs used:

a. In developing the standard: HEAT

b. For complying with the standard: Yes

13. Standard is set at a level: Above current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

E - Cost effectiveness
Availability of energy efficient products
Comfort

Comments:

15a. Standard scheduled for regular review and revision?

Yes: every five years

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

No

3 U.S.S.R.

IMPLEMENTATION AND COMPLIANCE - BT-NIISF, 1991

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Research Institute for Building Physics

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Buildings and energy

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

- None

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
-	-	Certification/approval
Percent designs checked: ____	Percent sites checked: ____	Percent buildings checked: ____
Comment:	Comment:	Comment:

d. Other compliance procedures

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 3

f. Explanation for effectiveness in part e:

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Planned

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

In progress

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

In progress

d. COST EFFECTIVENESS based on ACTUAL COSTS:

None conducted

e. Other Assessments:

FURTHER INFORMATION ON ENERGY CONSERVATION - U.S.S.R.

20. Efficiency testing facilities and procedures established:

Insulation
Thermal properties of materials
Other: Thermal properties of envelope; air-tightness; energy consumption

21. Other programs or policies developed to increase energy efficiency in buildings:

Government energy policy

Comment: Energy policy of Russian Federation in new economic conditions, Russian Government

Additional sources of information about energy efficiency for buildings in: U.S.S.R.

1. "Methodology and Principles Involved in the Setting of Codes on Building Heat Engineering in the U.S.S.R." *Energy and Buildings* (1990) 14: 401-409.
2. "Concepts of the Development of Building Physics in the U.S.S.R." *Energy and Buildings* (1992) 13: 25-33.
3. Yu. Matrosov. "Trends of Development of Energy Consumption in Buildings and Energy Efficiency Projects Being Undertaken in the Soviet Union." 15th Annual International Scientific Forum, "Making

22. Contact for written copy of energy standard specified in Question 4:

Name:
Address:
Country:

Tel: **Fax:**

Types of supporting information available:

Other energy standards for non-residential buildings:

Survey completed by: Dr. Yu. A. Matrosov
Title: Head of Laboratory
Research Institute for Building Physics (NIISF)
21, Locomotivnij proezd
127238 Moscow **Country:** USSR
Tel: 7 095 482-3710 **Fax:** 7 095 482-4060

Date completed: 5/15/92

USA

GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS

1. **General building standards exist at the following governmental levels:** National | Regional | Local

2. **Proposed or existing ENERGY standards cover the following building sectors:** Both Residential and Non-Residential

3. **Status of Non-Residential Building Energy Standards at the:**

a. National level:	b. Regional level:	c. Local level:
Mandatory	Mandatory	Mandatory
Voluntary	Voluntary	Voluntary

4. **Single energy standard selected for further description:**

Title, Organization: "Energy Efficient Design of New Buildings Except New Low-Rise Residential Buildings," ASHRAE/IES, 1989.

Year: 1989 **Geographic Coverage:** Nation **Abbreviated Title:** ASHRAE 90.1-89

DESCRIPTION OF SPECIFIED ENERGY STANDARDS - ASHRAE 90.1-89

5. **The standard defined in Question 4 applies to the following kinds of buildings:**

a. Building types:

O - Offices
H - Hotels
F - Restaurants
D - Hospitals
R - Religion-related
C - Commercial/retail stores
E - Educational facilities (schools)
I - Industrial Bldgs (non-process areas)

b. Building vintage:

New buildings

c. Other characteristics:

O - Other: buildings designed for human occupancy (not storage)

6. **Basic approach of the standard:** Both prescriptive and performance

7. **The following subjects are included in the energy standard:**

a. Whole building energy provisions:

C- Energy cost target

b. Building envelope provisions:

Wall system
Fenestration system

c. Lighting provisions:

Control requirements
Power density

d. Mechanical provisions:

Load Calculations for equipment sizing
Controls
Ventilation
Equipment efficiency

e. Other provisions:

Yes: service water heating

STANDARDS DEVELOPMENT PROCESS - ASHRAE 90.1-89

8. Organizations involved in developing the standard:

Government agency: Department of Energy, Office of Building Technology
Research group: American Society of Heating, Refrigeration, and Air-Condintioning Engineers
Industry group: Gas Appliance Manufacterers Assn (GAMA); Air-Conditioning and Refrigeration Inst. (ARI)
Industry group: North American Insulation Manuf. Assn. (NAIMA); Portland Cement Assn. (PCA)
Industry group: National Concrete and Masonry Assn. (NCMA); Primary Glass Manuf. Council (PGMC);

9. Decision Process: Consensus **Comment:**

10. Information used in developing the standard:

a. PHYSICAL CHARACTERISTICS of existing buildings

Estimated using professional judgment

b. ENERGY USE of existing buildings:

Computer simulations used for estimates

c. WEATHER data

Already available prior to standard

d. Other information

- None

11. Standards from a different country used as source material:

- None

12. COMPUTER programs used:

a. In developing the standard: DOE-2

b. For complying with the standard: Yes: Software

13. Standard is set at a level: Above current practice

14. Considerations influencing the inclusion or exclusion of measures in the standard:

A - Availability of energy efficient products
C - Comfort

Comments:

15a. Standard scheduled for regular review and revision?

Yes: Standards are reviewed on a five year cycle for revision or reaffirmation

b. Does revision include procedures to MONITOR and EVALUATE earlier versions of the standard?

No

3 USA

IMPLEMENTATION AND COMPLIANCE - ASHRAE 90.1-89

16. Entities involved in IMPLEMENTING energy standards:

Existing agency: Department of Energy

Other non-governmental agency: Building code officials (ICBO, CABO, SBCCI, BOCA)

If an existing agency was made responsible for implementation, its former focus was on buildings, energy, or another area:

Energy

17. TRAINING & EDUCATION provided for architects, engineers and other professionals:

Written guidelines to assist with compliance procedure

Example calculations

Seminars, workshops, or conferences

18. Compliance mechanisms used at different stages in construction process:

a. PRIOR to construction:	b. DURING construction:	c. AFTER construction:
Certification/approval	Uncertain	Uncertain
Percent designs checked: ?	Percent sites checked: ?	Percent buildings checked: ?
Comment:	Comment:	Comment:

d. Other compliance procedures - None

e. Effectiveness of combined compliance mechanisms (scale of 1-5): 5

f. Explanation for effectiveness in part e: Most commercial buildings require the professional seal of a registered architect or engineer in order to be approved.

19. Types of assessments or audits of energy standards' impact:

a. ENERGY SAVINGS POTENTIAL based on prototypical (not actual) buildings:

Completed: ASHRAE Journal and Transactions

b. MEASUREMENTS OF ENERGY SAVINGS in actual buildings complying with standard:

Completed: ASHRAE Journal and Transactions

c. COST EFFECTIVENESS based on engineering economic CALCULATIONS:

None conducted

d. COST EFFECTIVENESS based on ACTUAL COSTS:

None conducted

e. Other Assessments: None conducted

FURTHER INFORMATION ON ENERGY CONSERVATION - USA

20. Efficiency testing facilities and procedures established:

Motors
Insulation
Air conditioners/chillers/other appliances
Thermal properties of materials

21. Other programs or policies developed to increase energy efficiency in buildings:

Utility initiatives
Government energy policy

Comment:

Additional sources of information about energy efficiency for buildings in: USA

1.
2.
3.

22. Contact for written copy of energy standard specified in Question 4:

Name:

Address: ASHRAE
1791 Tullie Circle, NE
Atlanta GA 30329
Country: USA

Tel: 404-636-8400 **Fax:** 404-321-5478

Types of supporting information available:

Other energy standards for non-residential buildings:

Department of Energy Standards: Jean Boulin; 1000 Independence Ave.: Washington, D.C. 20585

Survey completed by: Merle McBride
Title: Research Associate
Owens-Corning Fiberglass Corp.Bldg.; 72-1
2790 Columbus Road, Rt. 16
Granville, OH 43023-1200 **Country:** USA
Tel: 614-587-7083 **Fax:** 614-587-7009

Date completed: 11/4/92