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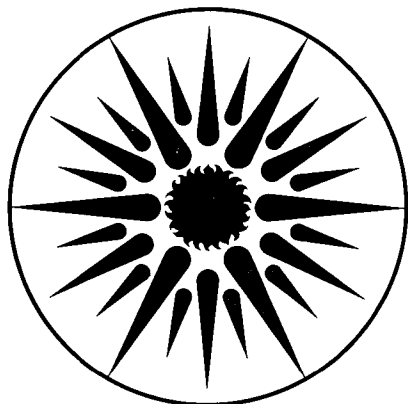
## ENERGY & ENVIRONMENT DIVISION

**Worldwide Status of Energy Standards for Buildings**

**Appendices**

K.B. Janda and J.F. Busch

February 1993



**ENERGY & ENVIRONMENT  
DIVISION**

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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)

Kathryn B. Janda  
and  
John F. Busch

February 1993

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## APPENDIX A

### Cover Letter to Respondents and Mail Survey



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.

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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 ⇒ 1. Approximately how many MANDATORY or
- Voluntary ⇒ VOLUNTARY regional energy standards apply to
- Proposed non-residential buildings in your country? \_\_\_\_\_
- None
- Uncertain 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 ⇒ 1. Approximately how many MANDATORY or
- Voluntary ⇒ VOLUNTARY local energy standards apply to
- Proposed non-residential buildings in your country? \_\_\_\_\_
- None
- Uncertain 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.)

- |  |   |   |
|--|---|---|
| <input type="checkbox"/> Offices                     | <input type="checkbox"/> Restaurants                | <input type="checkbox"/> Retail stores        |
| <input type="checkbox"/> Hotels                      | <input type="checkbox"/> Hospitals                  | <input type="checkbox"/> Schools              |
| <input type="checkbox"/> Government facilities       | <input type="checkbox"/> Churches/mosques           | <input type="checkbox"/> Industrial Buildings |
| <input type="checkbox"/> Residential (single-family) | <input type="checkbox"/> Residential (multi-family) |   |
| <input type="checkbox"/> ALL Buildings               | <input type="checkbox"/> 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<sup>2</sup>)
- 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?

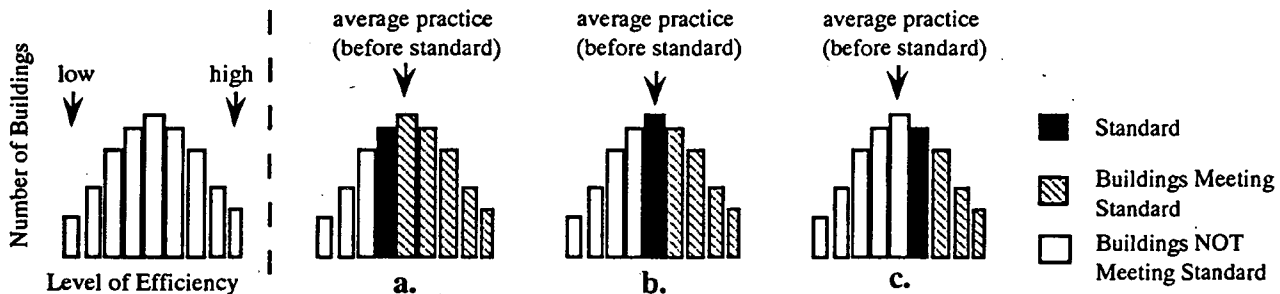
b. Are computer simulations also used to attain COMPLIANCE with the standard?

- 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  | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| b. Market or local availability of energy efficient products | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| c. Similarity/difference to local design practice            | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| d. Comfort   | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> 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 | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| b. Example calculations                                   | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| c. Compliance forms                                       | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| d. Workshop(s), seminars(s), or conference(s)             | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Uncertain |
| e. Information or resource center                         | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> 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
- I = Incentive (positive reward)
- P = Penalty (negative incentive)
- N = No mechanism
- O = Other policy mechanism
- ? = Uncertain

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

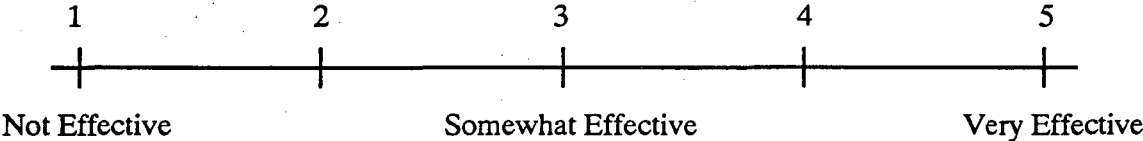
1. PRIOR to construction- (e.g., design stage analysis): C I P N O ?  
Approximately what percent of designs are checked? \_\_\_\_\_  
Comments:

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/<br>other appliances | Yes No ? | f. Thermal properties<br>of materials | Yes No ? |
|   |          | g. Other ( <i>please specify</i> ):   |          |

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:

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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)
<b>SECTION I: GENERAL OVERVIEW OF BUILDING ENERGY STANDARDS</b>	
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 and 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.
<b>SECTION II: DESCRIPTION OF SPECIFIED ENERGY STANDARDS</b>	
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 <sup>2</sup> ) 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
<b>SECTION III: STANDARDS DEVELOPMENT PROCESS</b>	
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
<b>SECTION IV: IMPLEMENTATION AND COMPLIANCE</b>	
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
<b>SECTION V: FURTHER INFORMATION ON ENERGY CONSERVATION</b>	
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)

	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			#4: Year	#5: Applicability of Standard			#6: Approach	#7: Provisions Included in Standard					#8: Organizations Involved	#9: Decision Process	#10: Information Used				
			National	Regional	Local		Building Types	Vintage	Applicable Characteristics		Whole Building	Building Envelope	Lighting	Mechanical	Other			Physical Characteristics	Energy Use	Weather Data	Other	
Australia	<input checked="" type="checkbox"/>	NRL	B	P	P	P	1993	O	N	A	Bo	E	RWFIO	-	-	-	GGA	C	G	E	GA	-
Australia	<input type="checkbox"/>	NRL	B	P	VP	P	1991	HSMED	N		Pr	-	RWIO	-	V	-	GG	M	A	CA	A	I
Australia	<input type="checkbox"/>	NRL	B	P	P	P	-	-	N	-	-	?	?	?	?	-	G	C	?	?	?	-
Bangladesh	<input type="checkbox"/>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Belgium	<input checked="" type="checkbox"/>	NRL	R	V	V	V	1984	SM	N	-	Pe	E	O	-	-	-	GRAI	C	GA	ECGA	GA	-
Belgium	<input type="checkbox"/>	R	R	-	-	-	-	HSDMX	B	O	Pe	-	RWF	-	V	Y	GAR	C	A	A	A	-
Botswana	<input type="checkbox"/>	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brazil	<input type="checkbox"/>	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Canada	<input checked="" type="checkbox"/>	NRL	B	P	M	M	1983	A	N	AO	Pr	?	RWFIO	P	CVE	-	RRG	M	E	E	A	-
Chile	<input checked="" type="checkbox"/>	NRL	B	MV	-	-	1960	A	B	-	Pe	-	RWFI	-	-	Y	GAL	C	G	G	G	-
China	<input checked="" type="checkbox"/>	NR	B	M	-	-	1993	H	N	A	Bo	E	RWFI	-	ALCVE	Y	GAA	C	EG	G	G	-
China	<input type="checkbox"/>	NRL	R	-	-	-	1986	M	N	P	Bo	E	RW	?	?	-	GA	?	EGA	ECGA	GA	-
Colombia	<input checked="" type="checkbox"/>	N	B	PM			1997	OHGCSM	N	PA	Bo	-	-	CPI	ALCVE	Y	GIAF	C	G	G	G	-
Colombia	<input type="checkbox"/>	NL	B	M	-	-	-	A	N	P	Pr	?	?	I	-	-	GGIO	C	N	N	N	-
Costa Rica	<input type="checkbox"/>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Czechoslovakia	<input checked="" type="checkbox"/>	N	B	M	-	-	1979	OHFDMX	B	PE	Pe	E	RWFIO	-	-	-	GAGO	C	EG	EG	EG	-
Czechoslovakia	<input type="checkbox"/>	NR	B	P	P	P	1979	A	N	PF	Bo	-	RWFI	O	-	Y	AR	C	E	E	E	G
Czechoslovakia	<input type="checkbox"/>	N	B	M	-	-	1973	A	N	PE	Bo	EPC	RWFI	-	AV	-	G	M	A	G	G	-
Czechoslovakia	<input type="checkbox"/>	N	B	M	MV	-	?	A	B	PEO	Ot	EPO	-	-	-	-	GIGG	C	N	N	G	-
Denmark	<input checked="" type="checkbox"/>	N	B	M	-	-	1982	A	N	P	Bo	-	RWFI	-	CVO	-	GGR	C	-	-	-	B
Denmark	<input type="checkbox"/>	N	B	M	-	-	1982	A	N	-	Pe	E	RWFO	-	CVE	-	GG	M	A	A	A	-
Djibouti	<input type="checkbox"/>						1991	S	N		Pr											-
England & Wales	<input checked="" type="checkbox"/>	N	B	-	M	-	1990	A	B	O	Bo	EO	RWFO	-	CVO	-	GIAR	C	EGA	EA	A	Y
France	<input checked="" type="checkbox"/>	NL	B	M	-	-	1988	OHGFDC	N	F	Bo	-	RWFIO	-	CV	Y	GGRG	C	GA	ECG	A	-
France	<input type="checkbox"/>	N	B	M	-	-	1988	OHGFDC	N	-	Pe	-	RWFIO	-	ALCVE	Y	GGGL	C	A	A	A	-
Hong Kong	<input checked="" type="checkbox"/>	N	N	P	P	P	1991	OH	N	A	Pe	?	RWF	-	-	-	GRR	C	G	CG	A	-
Indonesia	<input checked="" type="checkbox"/>	NRL	N	VP	-	-	?	OHGDMI	N	A	Bo	EPC	RWFI	CPIO	ALCVE	-	GARG	C	EG	ECG	GA	D
Israel	<input checked="" type="checkbox"/>	N	R	M	U	U	1989	SM	N	-	Pe	-	RWFI	-	-	-	GAA	C	EG	G	A	-
Israel	<input type="checkbox"/>	NL	R	M	-	-	1989	SM	N	O	Bo	O	RWIO	-	-		GALL	C	A	C	A	S
Ivory Coast	<input checked="" type="checkbox"/>	N	B	P	-	-	1992	A	B	AO	Bo	EC	RWF	CPI	ALCVE	Y	GAF	C	EGA	ECG	GA	-
Jamaica	<input checked="" type="checkbox"/>	N	N	MV	-	-	1992	OHGFDR	B	PEA	Bo	EC	RWF	CPI	ALCVE	Y	GLIA	C	EGA	ECA	G	Y
Japan	<input checked="" type="checkbox"/>	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	#13: Computer Compliance? Goal	#14: Considerations	#15: Regular Review? Major Version?	#16: Implementing Entity Former Focus	#17: Training/Education	#18: Compliance methods			#19: Saving Assessments					#20: Testing Facilities	#21: Other Programs		☒ Indicates 35 surveys selected for further analysis (countries with standards)				
							Before Construction %	During Construction %	After Construction %	Effectiveness	Potential Energy	Actual Energy	Potential Cost	Actual Cost					Other			
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	C I	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 ?	?	?	?	?	?	?	?	?	MIABFT	AIR	France	☒
- None	-None	?	A	E	N	N	E	B	WES	C I ?	C I ?	P N ?	3	C	C	I	I	N	IAT	?	France	☐
UK USA Australia & Singapore:	DOE-2.1D DOE-2 ASEAM	N	A	EAS	N	U	E	B	WEC	C 10	N	N	5	C	N	N	N	-	-	-	Hong Kong	☒
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			#4: Year	#5: Applicability of Standard			#6: #7: Provisions Included in Standard					#8: Organizations Involved	#9: Decision Process	#10: Information Used					
			National	Regional	Local		Building Types	Vintage	Applicable Characteristics	Approach	Whole Building	Building Envelope	Lighting	Mechanical			Other	Physical Characteristics	Energy Use	Weather Data	Other	
Malaysia	<input checked="" type="checkbox"/>	NRL	N	V	V	V	1989	OHGFC	N	E	Pe	-	RWFI	CPI	LCE	-	GA	C	G	GA	A	-
Mexico	<input type="checkbox"/>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands	<input checked="" type="checkbox"/>	NL	B	P	-	M	1992	OHSMDE	B		Pe	-	RWFI	-	O		GGRO	C	A	N	A	-
New Zealand	<input checked="" type="checkbox"/>	N	B	M	-	-	1982	OHGDCR	B	P	Bo	E	RWFI	P	LCV	N	GR	M	GA	CG	A	-
New Zealand	<input type="checkbox"/>	NRL	B	V	V	V	1977	OHGSFC	N	-	Bo	-	RW	-	-	-	GGAI	C	A	G	A	-
New Zealand	<input type="checkbox"/>	N	R	-	-	-	1992	S	N	PO	Bo	E	RWFIO	-	-	-	IAG	O	A	C	A	-
New Zealand	<input type="checkbox"/>	N	B	V	-	-	1982	OHGDCR	B	P	Bo	E	RWFI	P	LCV	-	GLIG	C	GA	CG	A	-
Northern Ireland	<input checked="" type="checkbox"/>	N	B	M	M	M	1991	A	B	PE	Pe	-	RWF	-	C	-	GGR	C	G	G	A	-
Norway	<input checked="" type="checkbox"/>	N	B	M	-	-	1987	A	B	-	Bo	-	RWFI	-	A	-	GRGI	M	G	C	G	-
Pakistan	<input checked="" type="checkbox"/>	NRL	B	V	-	-	1990	OHGSFC	N	O	Bo	E	RWFI	CO	ALCVE	Y	GG	C	E	C	A	-
Philippines	<input checked="" type="checkbox"/>	N	N	VP	-	-	198?	OHGCDP	B	E	Bo	P	RWFI	CPI	ALCVE	-	GAF0	C	G	G	G	-
Poland	<input checked="" type="checkbox"/>	N	B	M	-	-	1991	A	B	PA	Pe	E	RWFIO	?	?	-	GR	?	A	?	A	-
Poland	<input type="checkbox"/>	N	B	M	-	-	1991	A	B	-	Pe	-	RWFI	-	-	Y	GRG	C	E	E	N	-
Portugal	<input checked="" type="checkbox"/>	N	B	M	-	-		A	B	O	Bo	E	RWFI	O	-	-	GGAA	C	A	E	A	-
Romania	<input checked="" type="checkbox"/>	NRL	B	V	-	-	?	A	B	PE	Pr	E	Y	-	?	-	GRI	M	E	EG	G	-
Russia	<input checked="" type="checkbox"/>	N	B	P	P	-	1991	A	B	E	Pe	E	RWFIO	-	-	-	RRRR	C	A	CG	A	-
Scotland	<input checked="" type="checkbox"/>	N	B	M	-	-	?	A	N	-	Bo	E	RWF	-	Y	Y	GIAR	M	?	?	?	-
Singapore	<input checked="" type="checkbox"/>	N	B	M			1980	A	N	EA	Bo	-	RWFI	CPI	CV	Y	GAGL	C	G	E	G	-
South Africa	<input checked="" type="checkbox"/>	NL	N	V	V	-	?	OGD	N	E	Pe	E	?	?	?	-	A	M	E	EC	A	-
South Africa	<input type="checkbox"/>	NRL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South Korea	<input checked="" type="checkbox"/>	N	B	M			1992	OHGFDC	N	P	Bo	E	RWFI	CPI	LCE	Y	GGR	C	EGA	ECGA	GA	-
Sweden	<input checked="" type="checkbox"/>	N	B	M	-	-	1989	A	N	O	Pe	O	RWFI	IO	V	H	G	M	-	EC	A	-
Switzerland	<input checked="" type="checkbox"/>	N	B	M	M	M	1988	A	B	PEF	Bo	E	RWFI	-	LE	-	GA	C	A	E	A	-
Switzerland	<input type="checkbox"/>	NRL	B	MV	M	M	88/9	A	N	EF	Bo	E	O	-	A	Y	GA	C	EG	CG	A	-
Thailand	<input checked="" type="checkbox"/>	N	N	P	P	P	1987	OHGFDC	B	E	Pr	-	RWFI	CP	LVE	-	GGA	M	A	A	A	T
USA	<input checked="" type="checkbox"/>	NRL	B	MV	MV	M	1989	OHFDRC	N	O	Bo	C	WF	CP	LCVE	Y	GRII	C	E	C	A	-
Venezuela	<input type="checkbox"/>	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Survey Data Table (cont.)

III: DEVELOPMENT (cont.)					IV: IMPLEMENTATION AND COMPLIANCE										V: OTHER INFO.											
#11: Other Information Sources	#12: Computer Programs Used	#13: Computer Compliance?	#14: Goal	#15: Regular Review? Major Version?	#16: Implementing Entity	#17: Former Focus	#18: Compliance methods	#19: Saving Assessments				#20: Testing Facilities	#21: Other Programs													
								Before Construction %	During Construction %	After Construction %	Effectiveness				Energy		Cost									
															Potential	Actual	Potential	Actual	Other							
Singapore: USA: ASBRAE	DOE-2 ASEAM-2	N	E	EAC	Y	N	V	-	ES	N	N	N		C	P	C	C	MIAB	IAE	Malaysia	<input checked="" type="checkbox"/>					
- None	-None	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MABT	AIB	Mexico	<input type="checkbox"/>					
- None	CEN TC 89 TCM ISO pub.	N	E	EC	Y	N	E	B	WECI	C	10	P	10	N	0	4	C	N	C	N	P	IATO	IURA	Netherlands	<input checked="" type="checkbox"/>	
USA: ASBRAE 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	<input checked="" type="checkbox"/>	
No	No	U	A	EASC	Y	N	EN	B	-	CP	10	CP?	CP?	CP?	?	5	I	I	I	I	I	IT	G	New Zealand	<input type="checkbox"/>	
No	ALF	Y	-	O	N	N	O	?	-	C	10	N	N	N	?	3	I	I	N	N	N	IAT	U	New Zealand	<input type="checkbox"/>	
USA: ASBRAE 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	<input type="checkbox"/>	
England and Wales:	BREDEM CIRSE	N	A	EASCO	Y	Y	E	B	WES	C	10	C	75	C	95	5	C	I	C	I	-	IT	I	Northern Ireland	<input checked="" type="checkbox"/>	
Denmark Sweden Finland	Yes	?	E	E	Y	Y	E	O	WE	C	10	?	?	C	?	3	C	C	C	C	-	U	IR	Norway	<input checked="" type="checkbox"/>	
US: ASBRAE	-None	U	A	EASC	Y	N	E	O	WECS	N	-	N	-	N	-	-	C	P	I	P	N	MBF	AIB	Pakistan	<input checked="" type="checkbox"/>	
Thailand:	DOE-2 ASEAM	N	E	EASC	Y	Y	E	O	-	U	U	U	U	U	U	-	N	N	N	N	N	ABFO	IAR	Philippines	<input checked="" type="checkbox"/>	
Yes	Uncertain	?	L	EASC	Y	Y	E	?	WEI	?	?	?	?	?	?	?	C	P	?	?	?	IBT	?	Poland	<input checked="" type="checkbox"/>	
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	<input type="checkbox"/>	
France Spain	-None	U	E	S	N	-	E	O	WECS	C	?	N	?	N	?	3	C	P	P	N	P	MIAFTO	I	Portugal	<input checked="" type="checkbox"/>	
European	Uncertain	?	E	EAS	Y	U	U		WECS	P	?	?	?	?	?	2	I	I	I	I	I	MIT	I	Romania	<input checked="" type="checkbox"/>	
ISO-9144 Germany: DIN Sweden: SBF	HEAT	Y	A	EAC	Y	N	E	B	-	-	-	C	C	C	3	P	I	I	I	N	ITO	G	Russia	<input checked="" type="checkbox"/>		
England and	Uncertain	?	?	EASC	Y	Y	E		WES	U	U	U	U	U	U	-	-	-	-	-	-	-	-	-	Scotland	<input checked="" type="checkbox"/>
USA: ASBRAE	-None	N	A	EASC	Y	Y	E	B	WECS	C	-	N	C	C	5	C	C	C	C	-	IBT	I	Singapore	<input checked="" type="checkbox"/>		
- None	QUICK	Y	E	ESC	N	?	E	B	-	N	5	N	0	N	0	1	C	C	I	I	P	IT	AT	South Africa	<input checked="" type="checkbox"/>	
- None	-None	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	IT	AT	South Africa	<input type="checkbox"/>	
USA: BEPS USA: ASBRAE 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	<input checked="" type="checkbox"/>	
- None	ENORM	Y	A	EC	Y	Y	E	B	WESI	C	10	C	?	C	?	5	-	-	-	-	-	IAT	-	Sweden	<input checked="" type="checkbox"/>	
Germany: DIN France:	-None	?	L	EC	Y	Y	?	?	ESI	C	10	-	-	-	-	-	I	I	I	I	-	IAT	B	Switzerland	<input checked="" type="checkbox"/>	
- None	DOE-2	U	L	EACO	Y	Y	E	B	WECS	C	10	N	-	N	-	4	C	C	C	C	N	IT	G	Switzerland	<input type="checkbox"/>	
Singapore USA: ASBRAE	DOE-2	Y	A	EASC	Y	-	E	E	WE	P	10	P	-	P	?	-	I	P	P	N	N	AB	UG	Thailand	<input checked="" type="checkbox"/>	
- None	DOE-2	Y	A	AC	Y	N	EO	E	WES	C	?	U	?	U	?	5	C	C	N	N	N	MIAT	UG	USA	<input checked="" type="checkbox"/>	
- None	-None	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	IBT	U	Venezuela	<input type="checkbox"/>	

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

**APPENDIX C**  
**Surveyed Details of Selected Energy Standards in 35 Countries**

<b>Country Name</b>	<b>Page Number</b>
Australia .....	C-2
Belgium .....	C-6
Canada .....	C-10
Chile .....	C-14
China .....	C-18
Colombia .....	C-22
Czechoslovakia (former) .....	C-26
Denmark .....	C-30
England & Wales .....	C-34
France .....	C-38
Hong Kong .....	C-42
Indonesia .....	C-46
Israel .....	C-50
Ivory Coast .....	C-54
Jamaica .....	C-58
Japan .....	C-62
Malaysia .....	C-66
Netherlands .....	C-70
New Zealand .....	C-74
Northern Ireland .....	C-78
Norway .....	C-82
Pakistan .....	C-86
Philippines .....	C-90
Poland .....	C-94
Portugal .....	C-98
Romania .....	C-102
Scotland .....	C-106
Singapore .....	C-110
South Africa .....	C-114
South Korea .....	C-118
Sweden .....	C-122
Switzerland .....	C-126
Thailand .....	C-130
U.S.S.R. (former) .....	C-134
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:
- |  |   |
|--|---|
| <p>a. Building types:</p> <p><u>Offices</u></p>                    | <p>b. Building vintage:</p> <p><u>New buildings</u></p> |
| <p>c. Other characteristics:</p> <p><u>A - Air-Conditioned</u></p> |   |
6. Basic approach of the standard: Both prescriptive and performance
7. The following subjects are included in the energy standard:
- |   |  |
|---|--|
| <p>a. Whole building energy provisions:</p> <p><u>E- Energy amount target</u></p> | <p>b. Building envelope provisions:</p> <p><u>Roof</u></p> <p><u>Wall system</u></p> <p><u>Fenestration system</u></p> <p><u>Infiltration</u></p> <p><u>Other: Thermal mass, internal load</u></p> |
| <p>c. Lighting provisions:</p> <p><u>- None</u></p>                               | <p>d. Mechanical provisions:</p> <p><u>- None</u></p>  |
| <p>e. Other provisions:</p> <p><u>- None</u></p>                                  |  |



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

c. WEATHER data

Gathered through measurements

Already available prior to standard

b. ENERGY USE of existing buildings:

Estimated using professional judgment

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:**

No mechanism

Percent designs checked: \_\_\_\_\_

Comment: \_\_\_\_\_

**b. DURING construction:**

No mechanism

Percent sites checked: \_\_\_\_\_

Comment: \_\_\_\_\_

**c. AFTER construction:**

No mechanism

Percent buildings checked: \_\_\_\_\_

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: Règlementatin 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'enveloppe (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 Wallonne 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:**

Penalty

Percent designs checked: -

Comment:

**b. DURING construction:**

Penalty

Percent sites checked: -

Comment:

**c. AFTER construction:**

Penalty

Percent buildings checked: -

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

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---



---



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## 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 existant); 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 réglemantatin 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: Ministère de la Région Wallonne D.G.T.R.  
direction de l'énergie  
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

Ministère de la Région Walernne D.G.T.R.  
Direction de l'énergie; 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'énergie et des ressources 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  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

c. Lighting provisions:

Power density  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

e. Other provisions:

- None  
\_\_\_\_\_  
\_\_\_\_\_

b. Building envelope provisions:

Roof  
Wall system  
Fenestration system  
Infiltration  
Other: thermal properties of materials  
\_\_\_\_\_

d. Mechanical provisions:

Controls  
Ventilation  
Equipment efficiency  
\_\_\_\_\_  
\_\_\_\_\_



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 Energétique

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:**

Certification/approval

Percent designs checked: ?

Comment:

**b. DURING construction:**

Other policy mechanism

Percent sites checked: ?

Comment:

**c. AFTER construction:**

Certification/approval

Percent buildings checked: ?

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) _____	Comment: Bureau de l'efficacite energetique, and _____
Labeling of appliances _____	Hydro-Quebec. _____
Utility initiatives _____	_____
Government energy policy _____	_____

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

1. La Maîtrise de l'énergie. Association Québécoise pour la maîtrise de l'énergie (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:
- |   |  |
|---|--|
| <p>a. Building types:<br/> <u>A - All Buildings</u><br/>         _____<br/>         _____<br/>         _____<br/>         _____<br/>         _____<br/>         _____</p> | <p>b. Building vintage:<br/> <u>Both new and existing</u><br/>         _____</p> <p>c. Other characteristics:<br/> <u>- None</u><br/>         _____<br/>         _____<br/>         _____<br/>         _____</p> |
|---|--|
6. Basic approach of the standard: Performance-based
7. The following subjects are included in the energy standard:
- |   |   |
|---|---|
| <p>a. Whole building energy provisions:<br/> <u>- None</u><br/>         _____<br/>         _____<br/>         _____</p> <p>c. Lighting provisions:<br/> <u>- None</u><br/>         _____<br/>         _____<br/>         _____</p> <p>e. Other provisions:<br/> <u>Yes (not specified)</u><br/>         _____<br/>         _____<br/>         _____</p> | <p>b. Building envelope provisions:<br/> <u>Roof</u><br/> <u>Wall system</u><br/> <u>Fenestration system</u><br/> <u>Infiltration</u><br/>         _____<br/>         _____</p> <p>d. Mechanical provisions:<br/> <u>- None</u><br/>         _____<br/>         _____<br/>         _____<br/>         _____</p> |
|---|---|

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:**

Certification/approval

Incentive

Percent designs checked: \_\_\_\_\_

Comment:

**b. DURING construction:**

No mechanism

Percent sites checked: \_\_\_\_\_

Comment:

**c. AFTER construction:**

No mechanism

Percent buildings checked: \_\_\_\_\_

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 Architectural Design; Middle South-China Institute 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:**

-

Percent designs checked: -

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:** 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: Proposed  
Mandatory  
Voluntary
- b. Regional level: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- c. Local level: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
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:**

Incentive

Percent designs checked: \_\_\_\_\_

Comment:

**b. DURING construction:**

Incentive

Percent sites checked: \_\_\_\_\_

Comment:

**c. AFTER construction:**

Incentive

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:**

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: Estudio de 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 organizations

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

## c. WEATHER data

Estimated using professional judgment

Gathered through measurements

## b. ENERGY USE of existing buildings:

Estimated using professional judgment

Gathered through audits and surveys

## d. Other information

- None

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

Germany: DIN 4108 Wärmeschutz im Hochbau

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:**

Certification/approval

Percent designs checked: 100

Comment:

**b. DURING construction:**

Penalty

Percent sites checked: 50

Comment:

**c. AFTER construction:**

Certification/approval

Percent buildings checked: 90

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 Příkope 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:
- |   |   |
|---|---|
| <p>a. Building types:<br/> <u>A - All Buildings</u><br/>         _____<br/>         _____<br/>         _____<br/>         _____<br/>         _____<br/>         _____</p> | <p>b. Building vintage:<br/> <u>New buildings</u><br/>         _____</p> <p>c. Other characteristics:<br/> <u>P - Physical size</u><br/>         _____<br/>         _____<br/>         _____<br/>         _____</p> |
|---|---|
6. Basic approach of the standard: Both prescriptive and performance
7. The following subjects are included in the energy standard:
- |  |  |
|--|--|
| <p>a. Whole building energy provisions:<br/> <u>- None</u><br/>         _____<br/>         _____<br/>         _____</p> <p>c. Lighting provisions:<br/> <u>- None</u><br/>         _____<br/>         _____<br/>         _____</p> <p>e. Other provisions:<br/> <u>- None</u><br/>         _____<br/>         _____<br/>         _____</p> | <p>b. Building envelope provisions:<br/> <u>Roof</u><br/> <u>Wall system</u><br/> <u>Fenestration system</u><br/> <u>Infiltration</u><br/>         _____</p> <p>d. Mechanical provisions:<br/> <u>Controls</u><br/> <u>Ventilation</u><br/> <u>Other: Efficiency requirements for central heating</u><br/>         _____<br/>         _____<br/>         _____</p> |
|--|--|

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:**

Certification/approval

Percent designs checked: ?

Comment:

**b. DURING construction:**

Certification/approval

Percent sites checked: ?

Comment:

**c. AFTER construction:**

Certification/approval

Percent buildings checked: ?

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:
- |   |  |
|---|--|
| <p>a. Building types:<br/> <u>A - All Buildings</u><br/>         _____<br/>         _____<br/>         _____<br/>         _____<br/>         _____<br/>         _____</p> | <p>b. Building vintage:<br/> <u>Both new and existing</u><br/>         _____</p> <p>c. Other characteristics:<br/> <u>Other: exception made for unheated buildings</u><br/>         _____<br/>         _____<br/>         _____<br/>         _____</p> |
|---|--|
6. Basic approach of the standard: Both prescriptive and performance
7. The following subjects are included in the energy standard:
- |  |   |
|--|---|
| <p>a. Whole building energy provisions:<br/> <u>E- Energy amount target</u><br/> <u>Other: target for space heating for dwellings</u><br/>         _____<br/>         _____</p> <p>c. Lighting provisions:<br/> <u>- None</u><br/>         _____<br/>         _____<br/>         _____</p> <p>e. Other provisions:<br/> <u>- None</u><br/>         _____<br/>         _____<br/>         _____</p> | <p>b. Building envelope provisions:<br/> <u>Roof</u><br/> <u>Wall system</u><br/> <u>Fenestration system</u><br/> <u>Other: Floor insulation</u><br/>         _____<br/>         _____</p> <p>d. Mechanical provisions:<br/> <u>Controls</u><br/> <u>Ventilation</u><br/> <u>Other: insulation of ducts, pipework and hot water storage</u><br/>         _____<br/>         _____</p> |
|--|---|



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

c. WEATHER data

Already available prior to standard

b. ENERGY USE of existing buildings:

Estimated using professional judgment  
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 technical 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:**

Certification/approval

Percent designs checked: 100

Comment:

**b. DURING construction:**

Certification/approval

Percent sites checked: ?

Comment:

Random inspection for energy measures (100% for other measures, e.g. foundations).

**c. AFTER construction:**

No mechanism

Percent buildings checked: low

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 &amp; 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 _____	Comment: _____ _____ _____
Government energy policy _____	
_____	

## Additional sources of information about energy efficiency for buildings in: England &amp; 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  
 Tel: 44 923 664 517  
 Date completed: 3/6/92

WD2 7JR Country: England  
 Fax: 44 923 664 097



# 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  
\_\_\_\_\_  
\_\_\_\_\_

c. Lighting provisions:

- None  
\_\_\_\_\_  
\_\_\_\_\_

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.

b. Building envelope provisions:

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

d. Mechanical provisions:

Controls: descriptive on equipment  
Ventilation: descriptive on equipment  
\_\_\_\_\_  
\_\_\_\_\_

STANDARDS DEVELOPMENT PROCESS - CSTB-88

8. Organizations involved in developing the standard:

Government agency: Ministry 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

c. WEATHER data

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

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:**

Certification/approval

Percent designs checked: ?

Comment:

technical certification on  
materials and equipment

**b. DURING construction:**

?

Percent sites checked: ?

Comment:

**c. AFTER construction:**

?

Percent buildings checked: ?

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 _____ _____	<b>Comment:</b> 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

c. WEATHER data

Already available prior to standard

b. ENERGY USE of existing buildings:

Computer simulations used for estimates
Gathered through audits and surveys

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:**

Certification/approval

Percent designs checked: 100

Comment:

**b. DURING construction:**

No mechanism

Percent sites checked: \_\_\_\_\_

Comment:

**c. AFTER construction:**

No mechanism

Percent buildings checked: \_\_\_\_\_

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 _____ _____ _____ _____	<b>Comment:</b> _____ _____ _____
--	---

**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: Voluntary  
Proposed  
\_\_\_\_\_

b. Regional level: - None  
\_\_\_\_\_  
\_\_\_\_\_

c. Local level: - None  
\_\_\_\_\_  
\_\_\_\_\_

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

c. WEATHER data

Gathered through measurements  
 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

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:**

Certification/approval

Percent designs checked: ?

Comment:

**b. DURING construction:**

Percent sites checked: ?

Comment:

**c. AFTER construction:**

Percent buildings checked: ?

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 Kebijakan Konservasi Energi 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 Dengan Konservasi 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 OfficeAcademic institution: Technion, Technical Institute for Building ResearchAcademic institution: Ben Gurion University9. Decision Process: Consensus

Comment: \_\_\_\_\_

## 10. Information used in developing the standard:

## a. PHYSICAL CHARACTERISTICS of existing buildings

Estimated using professional judgmentGathered through audits and surveys

## c. WEATHER data

Already available prior to standard

## b. ENERGY USE of existing buildings:

Gathered through audits and surveys

## 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:

Uncertain13. 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:**

Certification/approval

Percent designs checked: -         

Comment:

**b. DURING construction:**

No mechanism

Percent sites checked: -         

Comment:

**c. AFTER construction:**

Certification/approval

Percent buildings checked: -         

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


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


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**Comment:**


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**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 Department, 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

c. WEATHER data

Gathered through measurements

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

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:**

-

Percent designs checked: -

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:**

-

**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 Energies  
 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: Mandatory (G)      b. Regional level: - None      c. Local level: - 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:
- |   |   |
|---|---|
| <p>a. Building types:</p> <p><u>O - Offices</u></p> <p><u>H - Hotels</u></p> <p><u>G - Government Facilities</u></p> <p><u>F - Restaurants</u></p> <p><u>D - Hospitals</u></p> <p><u>R - Religion-related</u></p> <p><u>M - Multi-family residential</u></p> <p><u>C - Commercial/retail stores</u></p> | <p>b. Building vintage:</p> <p><u>Both new and existing</u></p> <p>c. Other characteristics:</p> <p><u>P - Physical size: &gt; 93 sq. meter of floor area</u></p> <p><u>E - Amount of energy: &gt; 11 W/sq. meter</u></p> <p><u>A - Air-Conditioned</u></p> <p>_____</p> <p>_____</p> |
|---|---|
6. Basic approach of the standard: Both prescriptive and performance
7. The following subjects are included in the energy standard:
- |   |  |
|---|--|
| <p>a. Whole building energy provisions:</p> <p><u>E- Energy amount target</u></p> <p><u>C- Energy cost target</u></p> <p>_____</p> <p>_____</p> <p>c. Lighting provisions:</p> <p><u>Control requirements</u></p> <p><u>Power density</u></p> <p><u>Illumination requirements: recommendations</u></p> <p>_____</p> <p>e. Other provisions:</p> <p><u>Yes: electrical specifications, thermostat settings, and energy management.</u></p> <p>_____</p> <p>_____</p> | <p>b. Building envelope provisions:</p> <p><u>Roof</u></p> <p><u>Wall system</u></p> <p><u>Fenestration system</u></p> <p>_____</p> <p>_____</p> <p>d. Mechanical provisions:</p> <p><u>Air/Water distribution efficiency</u></p> <p><u>Load Calculations for equipment sizing</u></p> <p><u>Controls</u></p> <p><u>Ventilation</u></p> <p><u>Equipment efficiency</u></p> <p>_____</p> <p>_____</p> |
|---|--|



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

c. WEATHER data

Gathered through measurements

b. ENERGY USE of existing buildings:

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

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:**

Certification/approval \_\_\_\_\_

\_\_\_\_\_

Percent designs checked: ? \_\_\_\_\_

Comment: \_\_\_\_\_

Certification is powerful in \_\_\_\_\_

English tradition (strong in \_\_\_\_\_

Jamaica) \_\_\_\_\_

**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:**

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 _____	Comment: _____
Government energy policy: DSM _____	_____
_____	_____
_____	_____

**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: Mandatory  
Voluntary

b. Regional level: - None

c. Local level: - None

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:**

Certification/approval

Percent designs checked: 100

Comment:

All office buildings with floor space above 2000 sq. m.

**b. DURING construction:**

No mechanism

Percent sites checked: \_\_\_\_\_

Comment:

**c. AFTER construction:**

No mechanism

Percent buildings checked: \_\_\_\_\_

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 _____ _____ _____ _____	<b>Comment:</b> 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: \_\_\_\_\_  
 Kirashinjuku 1-8-1, Shinjuku-ku, Tokyo. Tel: 81 3 3363 8261
2. The Magazine of Building Equipment. Address: Nihonbashi 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:
 

<p>a. Building types:</p> <p><u>O - Offices</u></p> <p><u>H - Hotels</u></p> <p><u>G - Government Facilities</u></p> <p><u>F - Restaurants</u></p> <p><u>C - Commercial/retail stores</u></p>	<p>b. Building vintage:</p> <p><u>New Buildings</u></p> <p>c. Other characteristics:</p> <p><u>E - Amount of energy: peak design rate &gt; 10W/m<sup>2</sup> (installed)</u></p>
---	--
6. Basic approach of the standard: Performance-based
7. The following subjects are included in the energy standard:
 

<p>a. Whole building energy provisions:</p> <p><u>- None</u></p> <p>c. Lighting provisions:</p> <p><u>Control requirements</u></p> <p><u>Power density</u></p> <p><u>Illumination requirements</u></p> <p>e. Other provisions:</p> <p><u>- None</u></p>	<p>b. Building envelope provisions:</p> <p><u>Roof</u></p> <p><u>Wall system</u></p> <p><u>Fenestration system</u></p> <p><u>Infiltration</u></p> <p>d. Mechanical provisions:</p> <p><u>Load calculations for equipment sizing</u></p> <p><u>Controls</u></p> <p><u>Equipment efficiency</u></p>
---	---



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 Teknologi, 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:**

No mechanism

Percent designs checked: \_\_\_\_\_

Comment:

**b. DURING construction:**

No mechanism

Percent sites checked: \_\_\_\_\_

Comment:

**c. AFTER construction:**

No mechanism

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:**

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 Lumpur

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:
- |  |   |
|--|---|
| <p>a. Building types:</p> <p><u>O - Offices</u></p> <p><u>H - Hotels</u></p> <p><u>S - Single-family residential</u></p> <p><u>M - Multi-family residential</u></p> <p><u>D - Hospitals</u></p> <p><u>E - Educational facilities (schools)</u></p> | <p>b. Building vintage:</p> <p><u>Both new and existing</u></p> <p>c. Other characteristics:</p> <p>_____</p> <p>_____</p> <p>_____</p> |
|--|---|
6. Basic approach of the standard: Performance-based
7. The following subjects are included in the energy standard:
- |   |  |
|---|--|
| <p>a. Whole building energy provisions:</p> <p><u>- None</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>c. Lighting provisions:</p> <p><u>- None</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>e. Other provisions:</p> <p>_____</p> <p>_____</p> <p>_____</p> | <p>b. Building envelope provisions:</p> <p><u>Roof</u></p> <p><u>Wall system</u></p> <p><u>Fenestration system</u></p> <p><u>Infiltration</u></p> <p>d. Mechanical provisions:</p> <p><u>Other: efficiency of natural gas boilers for rooms</u></p> <p>_____</p> <p>_____</p> <p>_____</p> |
|---|--|

STANDARDS DEVELOPMENT PROCESS - Bouwbersluit, 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:**

Certification/approval

Percent designs checked: 100

Comment:

Approval required to become the license for construction.

**b. DURING construction:**

Penalty

Percent sites checked: 10

Comment:

Penalty consists of no permission to finish construction.

**c. AFTER construction:**

No mechanism

Percent buildings checked: 0

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, Voorbaldpachter. 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 Akkie 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 Energiebesparing, 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  
\_\_\_\_\_  
\_\_\_\_\_

c. Lighting provisions:

Power density  
\_\_\_\_\_  
\_\_\_\_\_

e. Other provisions:

No goals or targets presently set for non-residential buildings  
\_\_\_\_\_  
\_\_\_\_\_

b. Building envelope provisions:

Roof  
Wall system  
Fenestration system  
Infiltration  
\_\_\_\_\_

d. Mechanical provisions:

Load Calculations for equipment sizing  
Controls  
Ventilation  
\_\_\_\_\_  
\_\_\_\_\_



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

c. WEATHER data

Already available prior to standard

b. ENERGY USE of existing buildings:

Computer simulations used for estimates
Gathered through audits and surveys

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 HI

**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:**

Certification/approval

Percent designs checked: 90

Comment:

**b. DURING construction:**

Certification/approval

Percent sites checked: 25

Comment:

Small buildings 100%; Large buildings about 25%

**c. AFTER construction:**

Certification/approval

Percent buildings checked: 100

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 Wellington **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

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

c. Lighting provisions:

- None

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

e. Other provisions:

- None

\_\_\_\_\_  
\_\_\_\_\_

b. Building envelope provisions:

Roof

Wall system

Fenestration system

\_\_\_\_\_  
\_\_\_\_\_

d. Mechanical provisions:

Controls

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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:

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

Comments:  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

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:**

Certification/approval

Percent designs checked: 100

Comment:

**b. DURING construction:**

Certification/approval

Percent sites checked: 75

Comment:

Most buildings checked at some stage; many checked frequently.

**c. AFTER construction:**

Certification/approval

Percent buildings checked: 95

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, BT1 4JY  
 Country: Northern Ireland

Tel: 44-323-238451 Fax:

**Types of supporting information available:**

Building Amendment regulations (N.I) 1991, Technical Booklet E, 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:**

Certification/approval

Percent designs checked: 100

Comment:

All designs are checked at local level. But the quality of the check is not 100%. The

**b. DURING construction:**

?

Percent sites checked: ?

Comment:

Uncertain whether onsite inspections are undertaken.

**c. AFTER construction:**

Certification/approval

Percent buildings checked: ?

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 Roskilde 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:
- |   |  |
|---|--|
| <p>a. Building types:</p> <p><u>O - Offices</u></p> <p><u>H -Hotels / Hospitals/ Schools</u></p> <p><u>G - Government Facilities</u></p> <p><u>S - Single-family residential</u></p> <p><u>F - Restaurants</u></p> <p><u>C - Commercial/retail stores</u></p> | <p>b. Building vintage:</p> <p><u>New buildings</u></p> <p>c. Other characteristics:</p> <p><u>Other: permanent buildings/human habitation</u></p> |
|---|--|
6. Basic approach of the standard: Both prescriptive and performance
7. The following subjects are included in the energy standard:
- |   |   |
|---|---|
| <p>a. Whole building energy provisions:</p> <p><u>E- Energy amount target</u></p> <p>c. Lighting provisions:</p> <p><u>Control requirements</u></p> <p><u>Other: Daylighting</u></p> <p>e. Other provisions:</p> <p><u>Yes: Thermostat settings</u></p> | <p>b. Building envelope provisions:</p> <p><u>Roof</u></p> <p><u>Wall system</u></p> <p><u>Fenestration system</u></p> <p><u>Infiltration</u></p> <p>d. Mechanical provisions:</p> <p><u>Air/Water distribution efficiency</u></p> <p><u>Load Calculations for equipment sizing</u></p> <p><u>Controls</u></p> <p><u>Ventilation</u></p> <p><u>Equipment efficiency</u></p> |
|---|---|

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:**

No mechanism

Percent designs checked: -

Comment:

**b. DURING construction:**

No mechanism

Percent sites checked: -

Comment:

**c. AFTER construction:**

No mechanism

Percent buildings checked: -

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) _____	Comment: Described in "Building Sector Energy Conservation Programme of Pakistan," <i>Energy and Buildings</i> , 15-16 (1990/91):533-535.
Information programs _____	
Building energy standards _____	
_____	_____

## 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:**

Uncertain

Percent designs checked: \_\_\_\_\_

Comment:

**b. DURING construction:**

Uncertain

Percent sites checked: \_\_\_\_\_

Comment:

**c. AFTER construction:**

Uncertain

Percent buildings checked: \_\_\_\_\_

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 standards are 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  
 Merritt 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:
- |   |  |
|---|--|
| <p>a. Building types:</p> <p><u>A - All Buildings</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> | <p>b. Building vintage:</p> <p><u>Both new and existing</u></p> <p>_____</p> <p>c. Other characteristics:</p> <p><u>P - Physical size</u></p> <p><u>A - Air-Conditioned</u></p> <p>_____</p> <p>_____</p> <p>_____</p> |
|---|--|
6. Basic approach of the standard: Performance-based
7. The following subjects are included in the energy standard:
- |   |   |
|---|---|
| <p>a. Whole building energy provisions:</p> <p><u>E- Energy amount target</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>c. Lighting provisions:</p> <p><u>?</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>e. Other provisions:</p> <p><u>- None</u></p> <p>_____</p> <p>_____</p> | <p>b. Building envelope provisions:</p> <p><u>Roof</u></p> <p><u>Wall system</u></p> <p><u>Fenestration system</u></p> <p><u>Infiltration</u></p> <p><u>Other: Percent of setting humidity in walls</u></p> <p>d. Mechanical provisions:</p> <p><u>?</u></p> <p>_____</p> <p>_____</p> <p>_____</p> |
|---|---|

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

c. WEATHER data

Already available prior to standard

b. ENERGY USE of existing buildings:

?

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:**

?

Percent designs checked: ?

Comment:

**b. DURING construction:**

?

Percent sites checked: ?

Comment:

**c. AFTER construction:**

?

Percent buildings checked: ?

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

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

?

Comment:

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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, Foreign Relations Department  
ul. Electoralna 2  
00-950 Warszawa

Country: Poland

Tel: 48 22 20 54 34

Fax: 48 22 20 83 78

Types of supporting information available:

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---

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:**

Certification/approval

Percent designs checked: ?

Comment:

Major local authorities enforce approval; smaller local authorities unable to enforce

**b. DURING construction:**

No mechanism

Percent sites checked: high

Comment:

Checks for compliance of other standards, but not for one under discussion.

**c. AFTER construction:**

No mechanism

Percent buildings checked: high

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 _____ _____ _____ _____	<b>Comment:</b> 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 Portuguese 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 Algabe  
 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:
- |   |   |
|---|---|
| <p>a. Building types:<br/> <u>A - All Buildings</u><br/>         _____<br/>         _____<br/>         _____<br/>         _____<br/>         _____<br/>         _____</p> | <p>b. Building vintage:<br/> <u>Both new and existing</u><br/>         _____</p> <p>c. Other characteristics:<br/> <u>P - Physical size</u><br/> <u>E - Amount of energy</u><br/>         _____<br/>         _____<br/>         _____</p> |
|---|---|
6. Basic approach of the standard: Prescriptive
7. The following subjects are included in the energy standard:
- |   |  |
|---|--|
| <p>a. Whole building energy provisions:<br/> <u>E- Energy amount target</u><br/>         _____<br/>         _____<br/>         _____</p> <p>c. Lighting provisions:<br/> <u>- None</u><br/>         _____<br/>         _____<br/>         _____</p> <p>e. Other provisions:<br/> <u>- None</u><br/>         _____<br/>         _____<br/>         _____</p> | <p>b. Building envelope provisions:<br/> <u>Yes</u><br/>         _____<br/>         _____<br/>         _____</p> <p>d. Mechanical provisions:<br/> <u>?</u><br/>         _____<br/>         _____<br/>         _____</p> |
|---|--|

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:**

Penalty

Percent designs checked: ?

**Comment:**

Difficult to estimate.

**b. DURING construction:**

?

Percent sites checked:

**Comment:**

Difficult to estimate.

**c. AFTER construction:**

?

Percent buildings checked:

**Comment:**

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 \_\_\_\_\_  
 \_\_\_\_\_

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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:
 

<p>a. Building types:</p> <p><u>A - All Buildings</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>b. Building vintage:</p> <p><u>New buildings</u></p> <p>_____</p> <p>c. Other characteristics:</p> <p><u>- None</u></p> <p>_____</p> <p>_____</p> <p>_____</p>
---	---
6. Basic approach of the standard: Both prescriptive and performance
7. The following subjects are included in the energy standard:
 

<p>a. Whole building energy provisions:</p> <p><u>E- Energy amount target</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>c. Lighting provisions:</p> <p><u>- None</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>e. Other provisions:</p> <p><u>Yes</u></p> <p>_____</p> <p>_____</p>	<p>b. Building envelope provisions:</p> <p><u>Roof</u></p> <p><u>Wall system</u></p> <p><u>Fenestration system</u></p> <p>_____</p> <p>_____</p> <p>d. Mechanical provisions:</p> <p><u>Yes</u></p> <p>_____</p> <p>_____</p> <p>_____</p>
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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:**

Uncertain \_\_\_\_\_

Percent designs checked: \_\_\_\_\_

Comment: \_\_\_\_\_

**b. DURING construction:**

Uncertain \_\_\_\_\_

Percent sites checked: \_\_\_\_\_

Comment: \_\_\_\_\_

**c. AFTER construction:**

Uncertain \_\_\_\_\_

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:**

- \_\_\_\_\_

**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:
- |   |  |
|---|--|
| <p>a. Building types:</p> <p><u>A - All Buildings</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> | <p>b. Building vintage:</p> <p><u>New buildings</u></p> <p>_____</p> <p>c. Other characteristics:</p> <p><u>E - Amount of energy: &gt;30kw cooling capacity for AC equip.</u></p> <p><u>A - Air-Conditioned</u></p> <p>_____</p> <p>_____</p> <p>_____</p> |
|---|--|
6. Basic approach of the standard: Both prescriptive and performance
7. The following subjects are included in the energy standard:
- |  |  |
|--|--|
| <p>a. Whole building energy provisions:</p> <p><u>- None</u></p> <p>_____</p> <p>_____</p> <p>_____</p>  | <p>b. Building envelope provisions:</p> <p><u>Roof</u></p> <p><u>Wall system</u></p> <p><u>Fenestration system</u></p> <p><u>Infiltration</u></p> <p>_____</p> |
| <p>c. Lighting provisions:</p> <p><u>Control requirements</u></p> <p><u>Power density</u></p> <p><u>Illumination requirements</u></p> <p>_____</p> | <p>d. Mechanical provisions:</p> <p><u>Controls</u></p> <p><u>Ventilation</u></p> <p>_____</p> <p>_____</p>  |
- e. Other provisions:
- Yes: 1) Facilities for energy monitoring to be provided 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.

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:**

Certification/approval

Percent designs checked: -

Comment:

Random

**b. DURING construction:**

No mechanism

Percent sites checked: \_\_\_\_\_

Comment:

**c. AFTER construction:**

Certification/approval

Percent buildings checked: \_\_\_\_\_

Comment:

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:
- |   |   |
|---|---|
| <p>a. Building types:</p> <p><u>O - Offices</u></p> <p><u>G - Government Facilities</u></p> <p><u>D - Hospitals</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> | <p>b. Building vintage:</p> <p><u>New buildings</u></p> <p>_____</p> <p>c. Other characteristics:</p> <p><u>E - Amount of energy</u></p> <p>_____</p> <p>_____</p> <p>_____</p> |
|---|---|
6. Basic approach of the standard: Performance-based
7. The following subjects are included in the energy standard:
- |   |  |
|---|--|
| <p>a. Whole building energy provisions:</p> <p><u>E- Energy amount target</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>c. Lighting provisions:</p> <p><u>?</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>e. Other provisions:</p> <p><u>- None</u></p> <p>_____</p> <p>_____</p> | <p>b. Building envelope provisions:</p> <p><u>?</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>d. Mechanical provisions:</p> <p><u>?</u></p> <p>_____</p> <p>_____</p> <p>_____</p> |
|---|--|



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

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

c. WEATHER data

Already available prior to standard

\_\_\_\_\_

b. ENERGY USE of existing buildings:

Estimated using professional judgment

Computer simulations used for estimates

\_\_\_\_\_  
 \_\_\_\_\_

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:**

No mechanism

Percent designs checked: 5

Comment:

**b. DURING construction:**

No mechanism

Percent sites checked: 0

Comment:

**c. AFTER construction:**

No mechanism

Percent buildings checked: 0

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

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## 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:

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Other energy standards for non-residential buildings:

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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:
- |  |  |
|--|--|
| <p>a. Building types:</p> <p><u>O - Offices</u></p> <p><u>H - Hotels</u></p> <p><u>G - Government Facilities</u></p> <p><u>F - Restaurants</u></p> <p><u>D - Hospitals</u></p> <p><u>C - Commercial/retail stores</u></p> <p><u>S - Single-family residential</u></p> <p><u>M - Multi-family residential</u></p> | <p>b. Building vintage:</p> <p><u>New buildings</u></p> <p>c. Other characteristics:</p> <p><u>P - Physical size: offices/shopping centers &gt; 3000 sq. m</u></p> |
|--|--|
6. Basic approach of the standard: Both prescriptive and performance
7. The following subjects are included in the energy standard:
- |  |   |
|--|---|
| <p>a. Whole building energy provisions:</p> <p><u>E- Energy amount target (residential &amp; office)</u></p> <p>c. Lighting provisions:</p> <p><u>Control requirements</u></p> <p><u>Power density</u></p> <p><u>Illumination requirements</u></p> <p>e. Other provisions:</p> <p><u>Yes: thermostat settings, and Ondol heating system (traditional floor panel heating system)</u></p> | <p>b. Building envelope provisions:</p> <p><u>Roof</u></p> <p><u>Wall system</u></p> <p><u>Fenestration system</u></p> <p><u>Infiltration</u></p> <p>d. Mechanical provisions:</p> <p><u>Load Calculations for equipment sizing</u></p> <p><u>Controls</u></p> <p><u>Equipment efficiency</u></p> |
|--|---|

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

c. WEATHER data

Gathered through measurements  
 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

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) _____	<b>Comment:</b> 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 Institute 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 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

**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

- General building standards exist at the following governmental levels: National
- Proposed or existing ENERGY standards cover the following building sectors: Both Residential and Non-Residential
- Status of Non-Residential Building Energy Standards at the:
  - National level: Mandatory
  - Regional level: - None
  - Local level: - None
- Single energy standard selected for further description:
 

Title, Organization: Nybyggnadsregler, BES 1988: 18, Boverket, 1989-01-01

Year: 1989 Geographic Coverage: Nation Abbreviated Title: BFS 1988: 18

## DESCRIPTION OF SPECIFIED ENERGY STANDARDS - BFS 1988: 18

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

<p>a. Building types:</p> <p><u>A - All Buildings</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>b. Building vintage:</p> <p><u>New buildings</u></p> <p>_____</p>
	<p>c. Other characteristics:</p> <p><u>Other: all permanently used buildings</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>
- Basic approach of the standard: Performance-based
- The following subjects are included in the energy standard:
 

<p>a. Whole building energy provisions:</p> <p><u>Other: reference building</u></p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>b. Building envelope provisions:</p> <p><u>Roof</u></p> <p><u>Wall system</u></p> <p><u>Fenestration system</u></p> <p><u>Infiltration</u></p> <p>_____</p>
<p>c. Lighting provisions:</p> <p><u>Illumination requirements: daylighting</u></p> <p><u>Other: daylighting</u></p> <p>_____</p> <p>_____</p>	<p>d. Mechanical provisions:</p> <p><u>Ventilation</u></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>
<p>e. Other provisions:</p> <p><u>Heat exchanger for ventilation</u></p> <p>_____</p> <p>_____</p>	



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 - BPS 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:**

Certification/approval

Percent designs checked: 100

Comment:

**b. DURING construction:**

Certification/approval

Percent sites checked: 1-100

Comment:

**c. AFTER construction:**

Certification/approval

Percent buildings checked: 100

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:**

_____ _____ _____ _____	<b>Comment:</b> _____ _____ _____ _____
----------------------------------	--

**Additional sources of information about energy efficiency for buildings in: Sweden**

1. Nybyggnads 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:**

Byggtjänst; 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 Architektenverein (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
- \_\_\_\_\_
- \_\_\_\_\_
- c. Lighting provisions:
- None
- \_\_\_\_\_
- \_\_\_\_\_
- e. Other provisions:
- None
- \_\_\_\_\_
- b. Building envelope provisions:
- Roof
- Wall system
- Fenestration system
- Infiltration
- d. Mechanical provisions:
- Load Calculations for equipment sizing
- Equipment efficiency
- \_\_\_\_\_
- \_\_\_\_\_

STANDARDS DEVELOPMENT PROCESS - EH-SIA, 1988

8. Organizations involved in developing the standard:

Government agency: Bundesant energiwirtschaft

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 Architektenverein  
 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:
- |   |   |
|---|---|
| <p>a. Building types:</p> <p><u>O - Offices</u></p> <p><u>H - Hotels</u></p> <p><u>G - Government Facilities</u></p> <p><u>F - Restaurants</u></p> <p><u>D - Hospitals</u></p> <p><u>C - Commercial/retail stores</u></p> | <p>b. Building vintage:</p> <p><u>Both new and existing</u></p> <p>c. Other characteristics:</p> <p><u>E - Amount of energy: 1000 kilowatts</u></p> |
|---|---|
6. Basic approach of the standard: Prescriptive
7. The following subjects are included in the energy standard:
- |   |  |
|---|--|
| <p>a. Whole building energy provisions:</p> <p><u>- None</u></p> <p>c. Lighting provisions:</p> <p><u>Control requirements</u></p> <p><u>Power density</u></p> <p>e. Other provisions:</p> <p><u>- None</u></p> | <p>b. Building envelope provisions:</p> <p><u>Roof</u></p> <p><u>Wall system</u></p> <p><u>Fenestration system</u></p> <p><u>Infiltration</u></p> <p>d. Mechanical provisions:</p> <p><u>Load Calculations for equipment sizing</u></p> <p><u>Ventilation</u></p> <p><u>Equipment efficiency</u></p> |
|---|--|



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  
 \_\_\_\_\_  
 \_\_\_\_\_

c. WEATHER data

Already available prior to standard  
 \_\_\_\_\_

b. ENERGY USE of existing buildings:

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:**

Penalty

Percent designs checked: 100

Comment:

**b. DURING construction:**

Penalty

Percent sites checked: -

Comment:

**c. AFTER construction:**

Penalty

Percent buildings checked: 100

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-NHSF, 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  
 \_\_\_\_\_  
 \_\_\_\_\_

c. WEATHER data

Already available prior to standard  
 \_\_\_\_\_

b. ENERGY USE of existing buildings:

Computer simulations used for estimates  
Gathered through audits and surveys  
 \_\_\_\_\_  
 \_\_\_\_\_

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-NIISE, 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:**

-

Percent designs checked:       

Comment:       

**b. DURING construction:**

-

Percent sites checked:       

Comment:       

**c. AFTER construction:**

Certification/approval

Percent buildings checked:       

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: Mandatory  
Voluntary

b. Regional level: Mandatory  
Voluntary

c. Local level: Mandatory  
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-Conditioning Engineers
Industry group: Gas Appliance Manufacturers 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:

Certification/approval

Percent designs checked: ?

Comment:

b. DURING construction:

Uncertain

Percent sites checked: ?

Comment:

c. AFTER construction:

Uncertain

Percent buildings checked: ?

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 _____	Comment: _____
Government energy policy _____	_____
_____	_____
_____	_____

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

LAWRENCE BERKELEY LABORATORY  
UNIVERSITY OF CALIFORNIA  
TECHNICAL INFORMATION DEPARTMENT  
BERKELEY, CALIFORNIA 94720