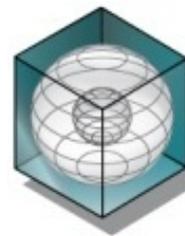
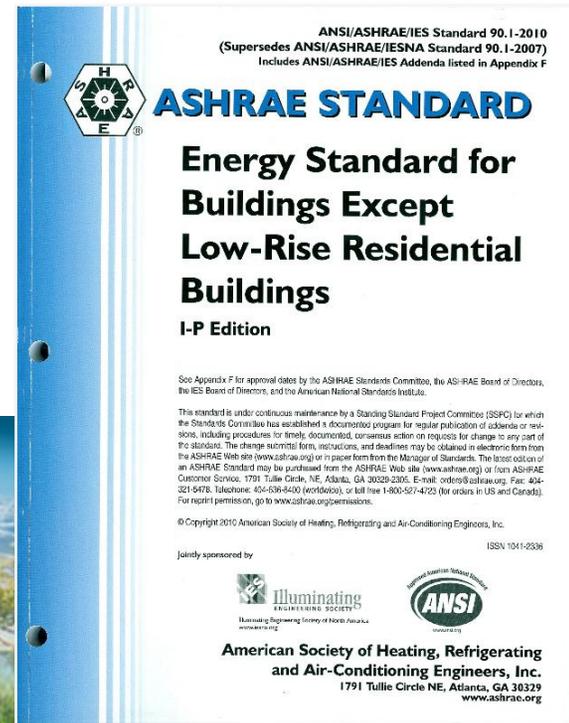


# ANSI / ASHRAE / IESNA Standard 90.1 – 2010

## Part I - Overview



**Presented by**  
**Energy Systems Laboratory**  
**Texas Engineering Experiment Station**  
**The Texas A&M University System**

**Presenter**  
**Larry O. Degelman, P.E.**  
**Professor Emeritus of Architecture, Texas A&M University**

# Acknowledgments

## Thanks to:

- The American Recovery & Reinvestment Act (ARRA)
- Department of Energy (U.S.DOE)
- Texas State Energy Conservation Office (SECO)

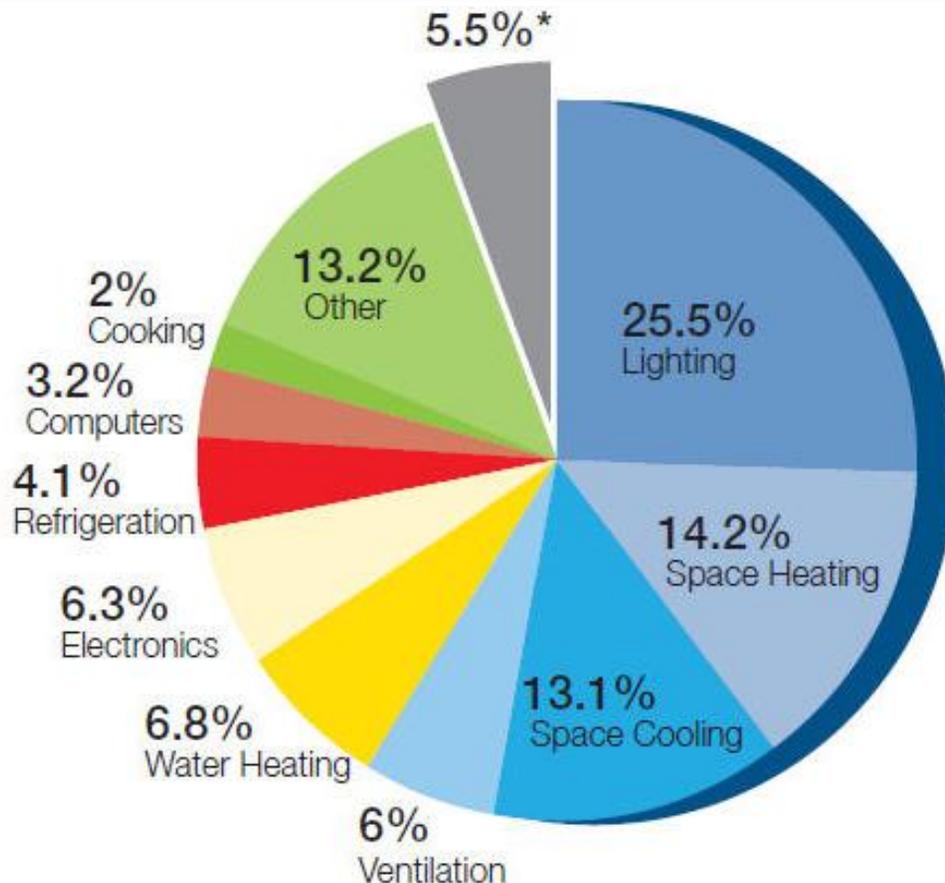


## Presenter

### **Larry O. Degelman, P.E.**

- Registered professional engineer (M.E.) in Texas since 1977
- Consultant to Energy Systems Laboratory, Texas A&M University
- Professor Emeritus of Architecture at Texas A&M (1977-2000)
- Life member of ASHRAE, HBDP & BEMP Certifications
- Former member of ASHRAE Standards committee involved with work on Human Comfort, Ventilation and Energy Efficiency in buildings
- Currently a member of ASHRAE Technical Committees, TC-4.2 (Climatic Information) and TC-4.7 (Energy Calculations)
- Specializes in energy evaluations for new and retrofit designs for buildings, engineering design of HVAC systems and energy and life-cycle cost analyses for small commercial projects
- Author of Ener-Win© software for annual energy simulations for buildings

# Commercial Buildings – Primary Energy Split



Standard 90.1 covers five of these areas, accounting for 65.6 % of all energy usage in commercial buildings.

DOE's energy efficiency standards cover the rest. (e.g., Energy Star ratings.)

**Source: EIA Data**

\* Statistical adjustment for unaccounted energy use (5.5%)

# Chapter 447.004-TX Government Code

- States that SECO shall establish and publish mandatory energy and water conservation design standards for each new state building or major renovation project
- SECO shall define “major renovation project” and shall review and update the standards biennially



# Texas Administrative Code

## **§19.31-Requirement to Use Design Standards**

- Pursuant to Government Code, §447.004, state agencies and institutions of higher education shall use the energy and water conservation design standards that SECO has adopted under this chapter, when constructing new state buildings or conducting major renovations of existing state buildings.

# Texas Administrative Code

## §19.32-Energy & Water Design Standards

- (1) for any new construction or major renovation project, except low-rise residential buildings, with a design assignment made on or after September 1, 2011, ASHRAE 90.1-2010.
- (2) for any new construction or major renovation project for a public low-rise residential buildings with a design assignment made on or after June 1, 2011, **IECC-2009**.

# Texas Administrative Code

## §19.32-Energy & Water Design Standards

(3) Effective September 1, 2011, SECO adopts by reference the “Water Efficiency Standards for State Buildings and Institutions of Higher Education Facilities prepared by SECO-CPA and dated January 2011 as the water conservation design standards for new state buildings and major renovation projects.

(a) SECO Water Standards published at:  
[www.txbuildingenergycode.org](http://www.txbuildingenergycode.org)

# Texas Administrative Code

## §19.33-Major Renovation Projects

- For the purpose of 34 TAC, Chapter 19, Subchapter C, a major renovation project is a building renovation or improvement where the implementation cost is \$2,000,000.00 or more, based on the initial cost estimate.

# Texas Administrative Code

## **§19.34-Submission of Certification and Compliance Documentation**

- Before beginning construction of a new state building or a major renovation project, including a new building or major renovation project of a state-supported institution of higher education, a state agency or an institution of higher education shall submit to SECO a copy of the certification by the design architect or engineer that verifies to the agency or institution of that the construction or renovation complies with the standards that are established under this chapter, including engineering documentation.

# Texas State Code Compliance Form

## Energy Compliance Certification Form – Top Segment

**Non-Residential Buildings  
Energy Conservation Design Standard  
Compliance Certification**  
Form# 50-809



<i>Name of Building/Facility</i>			
<i>Location of Building/Facility (Street Address)</i>	<i>City/State</i>	<i>Zip Code</i>	<i>County</i>
<i>Building Owner (Agency/Institution)</i>		<i>Agency/Institution Number</i>	
<i>Mailing Address</i>	<i>City/State</i>	<i>Zip Code</i>	<i>County</i>
<i>Contact Person at Agency/Institution and Title</i>		<i>Telephone Number</i>	
<i>Architect/Engineering Firm</i>		<i>Telephone Number</i>	
<i>Mailing Address</i>	<i>City/State</i>	<i>Zip Code</i>	<i>County</i>
<i>Contact Person at Architect/Engineering Firm</i>		<i>Telephone Number</i>	

PROJECT DESCRIPTION

New

Renovation

Addition

Total Sq. Ft. of Conditioned Space \_\_\_\_\_

Please provide brief description of project: \_\_\_\_\_

# Texas State Code Compliance Form

## Energy Compliance Certification Form – Bottom Segment

PROJECT DESCRIPTION

New

Renovation

Addition

Total Sq. Ft. of Conditioned Space \_\_\_\_\_

Please provide brief description of project: \_\_\_\_\_

Indicate method used to verify compliance and attach documentation:  
Mandatory requirements plus

Prescriptive

Alternative Path (ENV-LTG)

Simplified Bldg (HVAC)

ECB

Compliance with the economic feasibility of incorporating alternative energy and energy efficient architectural and engineering design

Having examined the Texas Design Standard for nonresidential buildings, based on ANSI/ASHRAE/IESNA Standard 90.1-2010, and being knowledgeable of provisions thereof, I do hereby notify the agency or institution listed above and the State Comptroller's Office, State Energy Conservation Office, of the above described project and confirm, to the best of my professional ability, that the construction plans and specifications are in compliance with the provisions of the Standard in accordance with the Texas Government Code, Title 4, Ch. 447.004 (e) (f).

\_\_\_\_\_  
*Signature of Confirming Architect/Engineer*

\_\_\_\_\_  
*Title*

\_\_\_\_\_  
*Date*

\_\_\_\_\_  
*TBAE/TBPE Registration No.*

*Affix Official TBAE/TBPE Seal*

50-809 (01/12)

For the latest information on energy codes and standards visit: [www.TXBuildingEnergyCode.org](http://www.TXBuildingEnergyCode.org)

# Texas State Code Compliance Form

## Water Compliance Certification Form – Top segment

**Water Conservation Design Standard  
Compliance Certification  
For State-Funded Buildings**  
Form# 50-811



<i>Name of Building/Facility</i>			
<i>Location of Building/Facility (Street Address)</i>	<i>City/State</i>	<i>Zip Code</i>	<i>County</i>
<i>Building Owner (Agency/Institution)</i>		<i>Agency/Institution Number</i>	
<i>Mailing Address</i>	<i>City/State</i>	<i>Zip Code</i>	<i>County</i>
<i>Contact Person at Agency/Institution and Title</i>		<i>Telephone Number</i>	
<i>Architect/Engineering Firm</i>		<i>Telephone Number</i>	
<i>Mailing Address</i>	<i>City/State</i>	<i>Zip Code</i>	<i>County</i>
<i>Contact Person at Architect/Engineering Firm</i>		<i>Telephone Number</i>	

PROJECT DESCRIPTION

- Residential     Commercial  
 New                 Renovation         Addition

Total Sq. Ft. of the Building \_\_\_\_\_

Please provide brief description of project: \_\_\_\_\_

# Texas State Code Compliance Form

## Water Compliance Certification Form – Bottom segment

PROJECT DESCRIPTION

- Residential     Commercial  
 New             Renovation        Addition

Total Sq. Ft. of the Building \_\_\_\_\_

Please provide brief description of project: \_\_\_\_\_

- Compliance with the 2011 State Water Efficiency Standards
- Compliance with the amended subsections (c-1) (1) and (c-1) (2) of Chapter 447.004 related to potable and non-potable water for landscape watering and rainwater harvesting technology requirement in new buildings of at least 50,000 sq. ft. that is located in an area in which the average annual rainfall is at least 20 inches
- Compliance with the new subsection (c-3) related to providing written evidence to SECO that the amount of rainwater that will be harvested from existing buildings is equivalent to the rainwater that could be harvested from the new building in an area in which the average annual rainfall is at least 20 inches

Having examined the Texas Water Efficiency Standards, based on the 2011 Water Efficiency Standards for State Buildings and Institutions of Higher Education Facilities, and being knowledgeable of provisions thereof, I do hereby notify the agency or institution listed above and the State Comptroller's Office, State Energy Conservation Office, of the above described project and confirm, to the best of my professional ability, that the construction plans and specifications are in compliance with the provisions of the Standard in accordance with the Texas Government Code, Title 4, Ch. 447.004, (c-1), (c-2), and (c-3), as amended in 2011.

\_\_\_\_\_  
Signature of Confirming Architect/Engineer

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

\_\_\_\_\_  
TBAE/TBPE Registration No.

Affix Official TBAE/TBPE Seal

50-811 (03/12)

For the latest information on energy codes and standards visit: [www.TXBuildingEnergyCode.org](http://www.TXBuildingEnergyCode.org)

# ASHRAE Compliance Forms Required by SECO

## Simplified HVAC sample - Top & Bottom segments

### HVAC Simplified Approach Option

Part I

Project Name:	
Project Address:	Date:
City:	Zip:
HVAC System Designer of Record:	Telephone:
Contact Person:	Telephone:

#### Equipment Efficiency

System Tag(s)	Mfg. & Model No.	Equipment Type	Heating			Cooling			
			Rated Capacity	Rated Efficiency	Minimum Efficiency	Rated Capacity	Rated Efficiency	Minimum Efficiency	Econ. Min. Efficiency

# ASHRAE HVAC Compliance Forms

## HVAC sample - Segment mandatory portion

### HVAC Mandatory Provisions

Part II, Page 1

Project Name:			
Project Address:		Date:	
HVAC System Designer of Record:		Telephone:	
Contact Person:		Telephone:	
City:	Climate Zone:		
Zip:	1% Summer DB Temp:	1% Summer WB Temp:	99.6% Winter Temp:

#### Mandatory Equipment Efficiency Worksheet (§ 6.4.1.1)

System Tag	Equipment Type (Tables 6.8.1A through G)	Size Category (Tables 6.8.1A through G)	Sub-Category or Rating Condition (Tables 6.8.1A through G)	Units of Efficiency (Tables 6.8.1A through G)	Minimum Efficiency (Tables 6.8.1A through G)		
					Rated	≥	Required
						≥	
						≥	
						≥	
						≥	
						≥	
						≥	
						≥	

# ASHRAE Envelope Compliance

Envelope sample - Top segment of form

## Building Envelope Compliance Documentation

Part II, Page 1

Project Name:				
Contact Person:				Telephone:
Space Category	§ 5.5.4.4.1 Exceptions	Window-Wall Ratio	Total	
<input type="checkbox"/> Nonresidential	<input type="checkbox"/>	Gross Wall Area (ft <sup>2</sup> ):		
<input type="checkbox"/> Residential	<input type="checkbox"/> Overhangs	Window Area (ft <sup>2</sup> ):		
<input type="checkbox"/> Semiheated	<input type="checkbox"/> Street Level Windows	Window-Wall Ratio:		
				Skylight-Roof Ratio
				Gross Roof Area (ft <sup>2</sup> ):
				Skylight Area:
				Skylight-Roof Ratio

### Opaque Surfaces

Description/ Name	Class (Pick one)						Pick one	Pick one	High Reflectance/Emitance Roof	Proposed Insulation R-Value, U-Factor, C-Factor or F-Factor	Criteria Insulation R-Value, U-Factor, C-Factor or F-Factor	Surface Area (ft <sup>2</sup> ) (optional)
	Roof	Wall			Floor	Slab						
	Insulation Above Deck Metal Building Attic and Other	Mass Metal Building Steel-Framed Wood-Framed / Other	Below-Grade Wall	Mass Steel Joist Wood-Framed / Other	Unheated Heated	Swinging Non-Swinging	R-value Option U-factor Option	Appendix A Defaults Calculations				
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>			
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>			
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>			
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>			



# ASHRAE ECB Compliance

## ECB sample - 2 pages of compliance report

### Energy Cost Budget (ECB) Compliance Report Page 1

Project Name:	
Project Address:	Date:
Designer of Record:	Telephone:
Contact Person:	Telephone:
City:	Principal Heating Source:
Weather Data:	<input type="checkbox"/> Fossil Fuel
	<input type="checkbox"/> Electricity
	<input type="checkbox"/> Solar/Site Recovered
	<input type="checkbox"/> Other

#### Space Summary

Building Use	Conditioned Area (ft <sup>2</sup> )	Unconditioned (ft <sup>2</sup> )	Total
Total			

#### Advisory Messages

	Proposed Building Design	Budget Building	Difference Proposed/Budget
Number of hours heating loads not met (system/plant)			
Number of hours cooling loads not met (system/plant)			
Number of warnings			
Number of errors			
Number of defaults overridden			

#### Compliance Result

The design detailed in the above referenced plans complies with the mandatory requirements of the ANSI/ASHRAE/IESNA 90.1-2007 Standard and the Design Energy Cost does not exceed the Energy Cost Budget. Therefore this design **DOES COMPLY** with the ANSI/ASHRAE/IESNA 90.1-2007 ECB Compliance Methodology.

Individual certifying authenticity of the data provided in this analysis:

Signature	Title:
-----------	--------

### Energy Cost Budget (ECB) Compliance Page 2

Project Name:	
Contact Person:	Telephone:

#### Energy Summary by End Use

End Use	Energy Type	Proposed Building		Budget Building		Proposed / Budget Energy (%)
		Energy (10 <sup>6</sup> Btu/yr)	Peak (10 <sup>2</sup> Btu/h)	Energy (10 <sup>6</sup> Btu/yr)	Peak (10 <sup>2</sup> Btu/h)	
Lighting (conditioned)						
Lighting (unconditioned)						
Space heating (1)						
Space heating (2)						
Space cooling						
Pumps						
Heat rejection						
Fans (interior ventilation)						
Fans (interior exhaust)						
Fans (parking garage)						
Service water heating						
Office equipment						
Elevators & escalators						
Refrigeration (food, etc.)						
Cooking (commercial)						
Total Building Consumption						

#### Energy Summary by End Use

	Proposed Building		Budget Building		Proposed / Budget	
	Energy (10 <sup>6</sup> Btu/yr)	Cost (\$/yr)	Energy (10 <sup>6</sup> Btu/yr)	Cost (\$/yr)	Energy (%)	Cost (%)
Electricity						
Natural gas						
Other fossil fuel						
District steam						
Total Nonsolar						
Solar or site recovered						
Total Including Solar						

\* These results use assumptions for showing compliance during a typical year; actual energy costs may be substantially different.

# DOE's Determinations of Progress in ASHRAE 90.1

## **Federal Register, December 30, 2008:**

The U.S. Department of Energy (USDOE) determines that ASHRAE Standard 90.1-2004 would achieve greater energy efficiency for commercial building energy consumption than Standard 90.1-1999.

- 13.9% - in source-line (primary) energy savings, or
- 11.9% - in site-line (end-use) energy savings.

## **Federal Register, September 3, 2010:**

DOE determines that Standard 90.1-2007 would achieve the followings savings compared to Standard 90.1-2004.

- 3.7% - in source-line energy savings, or
- 4.4% - in site-line energy savings.

## **U.S. DOE PNNL Progress Indicator Report, January 2012:**

- DOE determines that Standard 90.1-2010 achieves 30% more savings when compared to Standard 90.1-2004.

# Commercial Energy Codes (Evidence of Impact)

## Adoption Growth from 1992 to 2008

1992



Territories		
American Samoa	N. Mariana Islands	U.S. Virgin Islands
Guam	Puerto Rico	

ASHRAE 90.1-89 equivalent or better

2008



Territories		
American Samoa	N. Mariana Islands	U.S. Virgin Islands
Guam	Puerto Rico	

ASHRAE 90.1-2004/2006 IECC, equivalent or better

ASHRAE 90.1-1999/2001 IECC or equivalent

ASHRAE 90.1-2001/2003 IECC or equivalent

ASHRAE 90.1-1989/2000 IECC or equivalent

No Statewide Code

Older or less stringent than ASHRAE 90.1-1989/2000 IECC

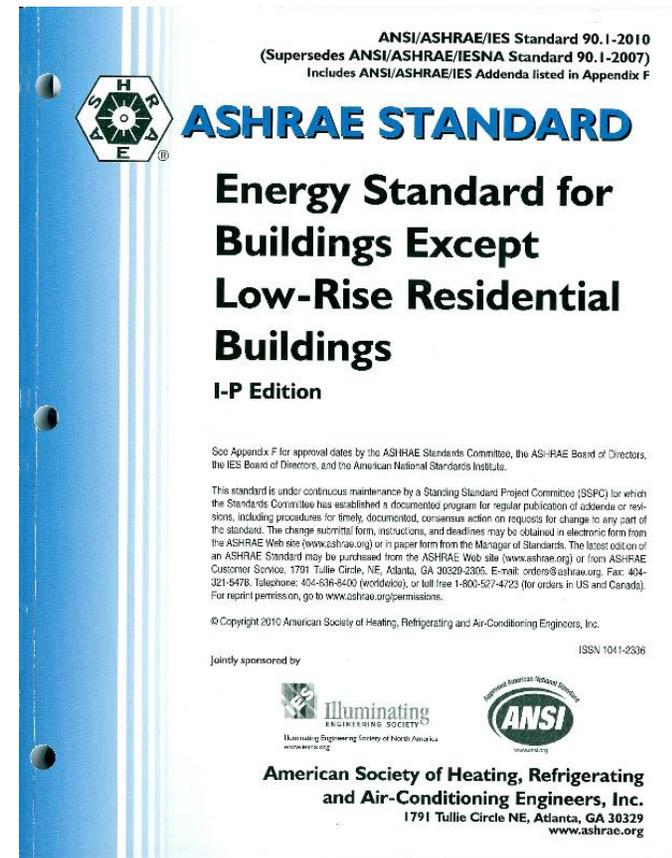
\* Adoption by county/jurisdiction

**Adoption is mainly ASHRAE 90.1 and the IECC codes.**  
**Source: EIA Data**

# Document Overview

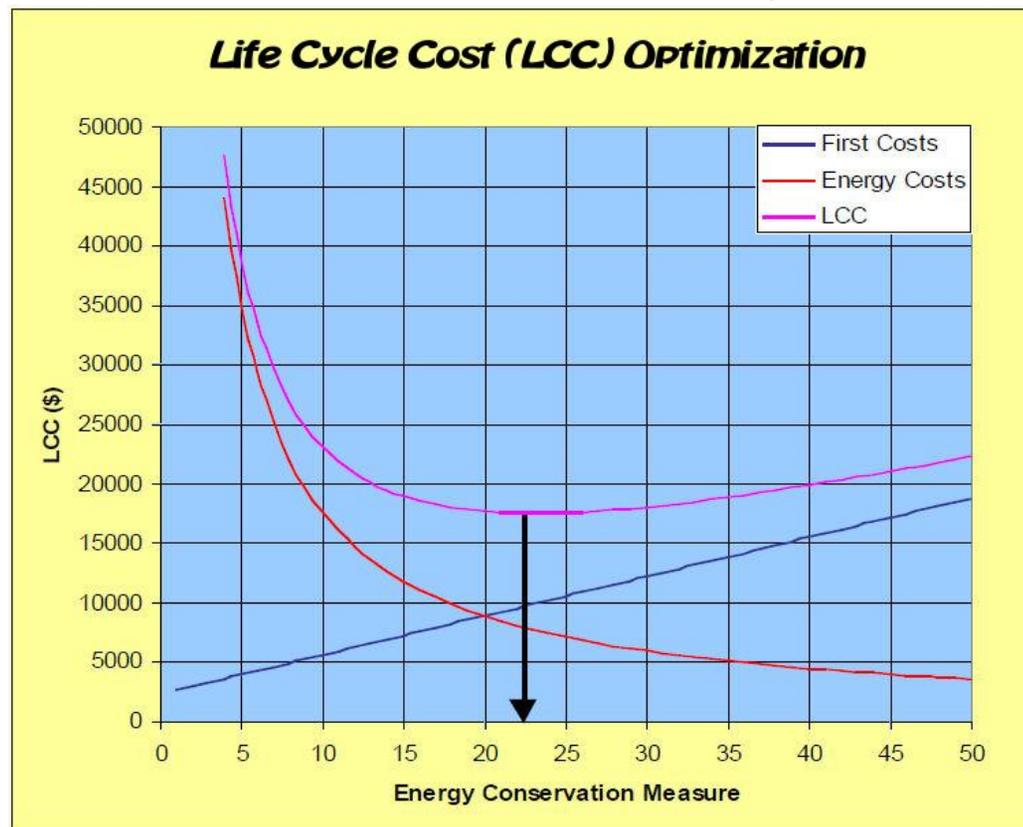
- It supercedes ANSI/ASHRAE/IESNA Standard 90.1-2007 by adding more than 100 Addenda.
- Has become the reference standard for the 2012 IECC.
- It is the professional “standard of care” for energy efficiency set by ASHRAE consensus.
- Format: Structured like a code document, with a consistent numbering scheme.
- Estimated savings compared to the 90.1-2007 version are about 25%, and about 30% compared to the 90.1-2004 version.
- Climate zones:
  - Defined geographically by county lines, not by individual city or climatic Degree Days.
  - Metropolitan areas kept together.

(221-page document)



# Energy Economics

Criteria not on lowest energy **use**, but rather, on energy **costs**.  
Optimizations are Based on Life Cycle Cost (LCC)



# The Document Structure

## Sections in the document

1. Purpose
  2. Scope
  3. Definitions, Abbrev. & Acronyms
  4. Administration and enforcement
  5. Building envelope
  6. HVAC
  7. SWH
  8. Power
  9. Lighting
  10. Other equipment
  11. Energy Cost Budget (ECB)
  12. Normative References
- Appendices A – G

## Technical Sections Outline

- x.1 General – Scope & conditions
- x.2 Compliance Paths
- x.3 Simplified Building
- x.4 Mandatory Provisions
- x.5 Prescriptive Compliance Path
- x.6 Alternative Compliance Path
- x.7 Submittals – Drawings, manuals, labeling, etc.
- x.8 Product Information – Equipment efficiencies, installation requirements, etc.

“Exceptions” are common and are stated under each requirement in the standard.

# Organization of Technical Sections

**X.1** General – Scope, other special conditions

**X.2** Compliance Paths

**X.3** Simplified Building (**only used in HVAC**)

**X.4** Mandatory Provisions

- Must be followed for all buildings.

**X.5** Prescriptive Compliance Path

- Must be followed or traded-off **w/ ECB**

**X.6** Alternative Compliance Path (**only in section 5, Envelope, and section 9, Lighting**)

**X.7** Submittals – Drawings, manuals, labeling, etc.

**X.8** Product Information – Equipment efficiencies, installation requirements, etc.

# Section 1 – Purpose

The purpose of this standard is to provide minimum requirements for the energy-efficient design of buildings except low-rise residential buildings for:

1. design, **construction, and plan for O&M, and \*\***
2. Utilization of on-site, renewable energy sources.

---

“Low-rise residential” is defined as single-family homes, manufactured housing, and other residential structures that are less than 4 stories above grade.

---

**\*\* Note: The portion in red is new in the 2010 version.**

## Section 2 – Scope

- **Provisions apply to:**
  - New building portions and systems in new and existing (renovated) buildings.
  - **New equipment or systems that are identified as part of industrial or manufacturing processes.**
  - Envelope:
    - if heated by a heating system with an output capacity  $\geq 3.4 \text{ Btu/h-ft}^2$  or
    - if cooled by a cooling system with a sensible output capacity  $\geq 5 \text{ Btu/h-ft}^2$
  - Virtually all mechanical, power, and lighting systems are covered

---

**\*\* Note: Red text portion new in the 2010 version.**

## Section 3 – Definitions

- **Conditioned space:**
  - cooled by a cooling system with a sensible output capacity  $>5$  Btu/h-ft<sup>2</sup>
  - heated by a heating system with an output capacity  $\geq$  Table 3.1
  - indirectly conditioned space – adjacent to conditioned space but neither heated nor cooled
  
- **Semiheated space:** heated at  $\geq 3.4$  Btu/h-ft<sup>2</sup>, but not classified as conditioned.
  
- **Unconditioned space:** e.g., crawl spaces, attics, etc.

**Table 5-G—Heated Space Criteria**

(This is Table 3.1 in the Standard)

<i>Heating Output (Btu/h·ft<sup>2</sup>)</i>	<i>Climate Zone</i>
5	1 and 2
10	3
15	4 and 5
20	6 and 7
25	8

## Section 4 – Administration & Enforcement

### Standard 90.1 applies to:

- New buildings
- Additions to existing buildings \*
- Alterations to existing buildings \*
- Replacement of parts of existing buildings \*
- Changes in HVAC \*



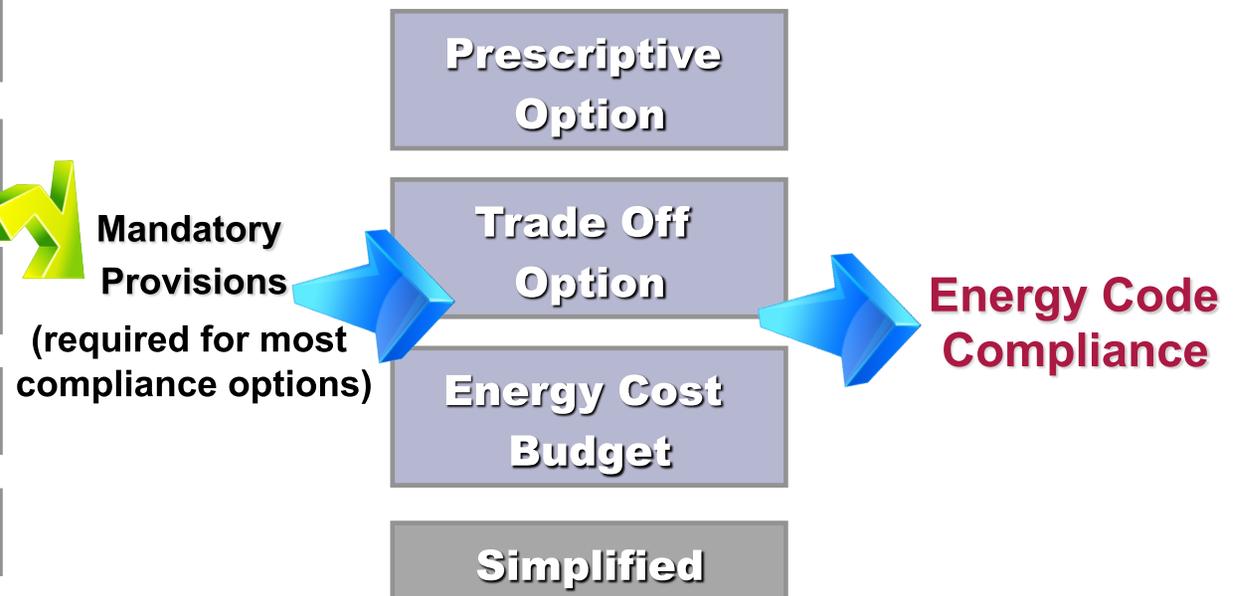
**\* Additions & alterations permit tradeoffs and have other exceptions.**

# Technical Sections (5 – 10)

## Building System (technical sections)

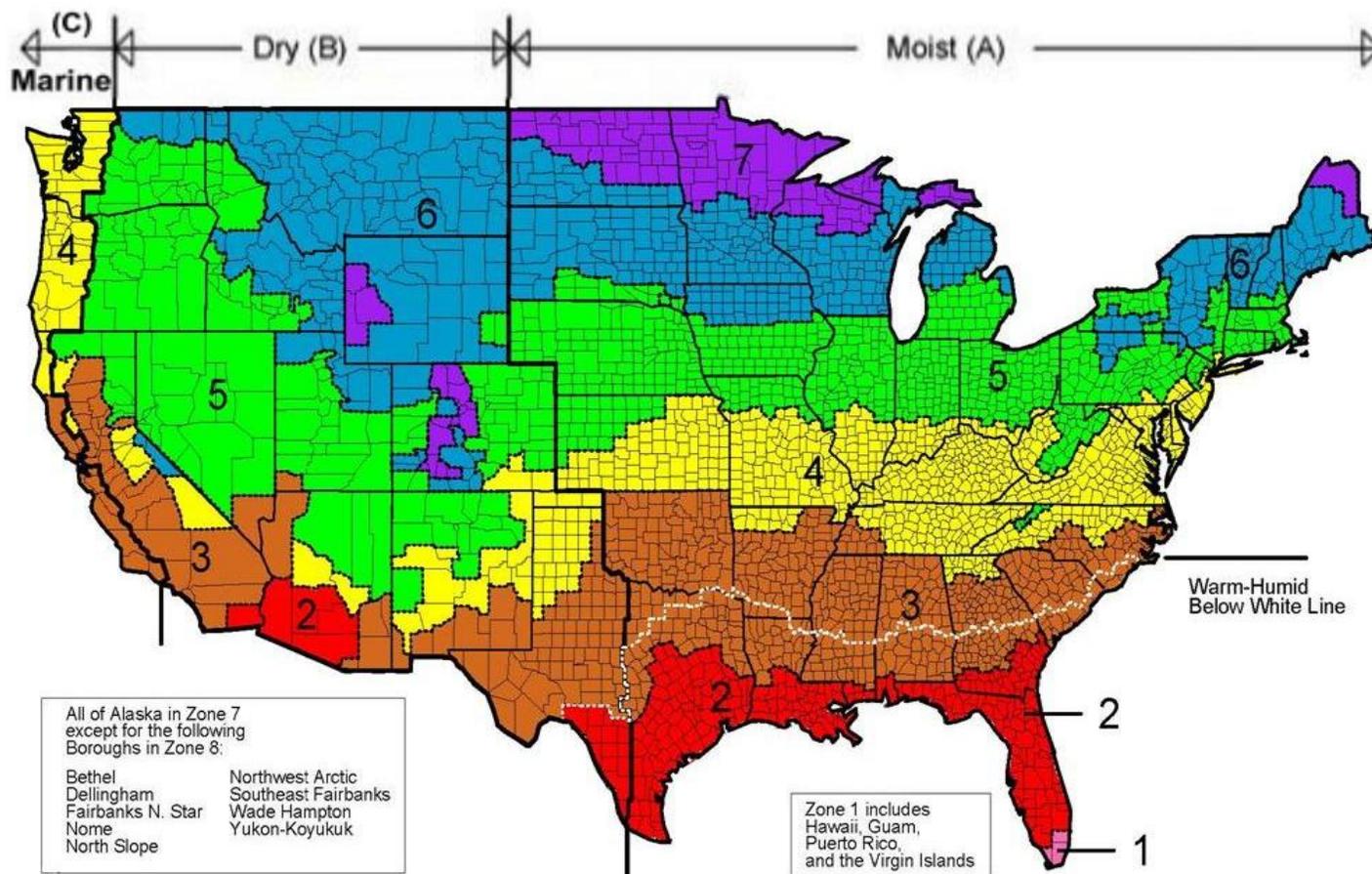


## Compliance Options

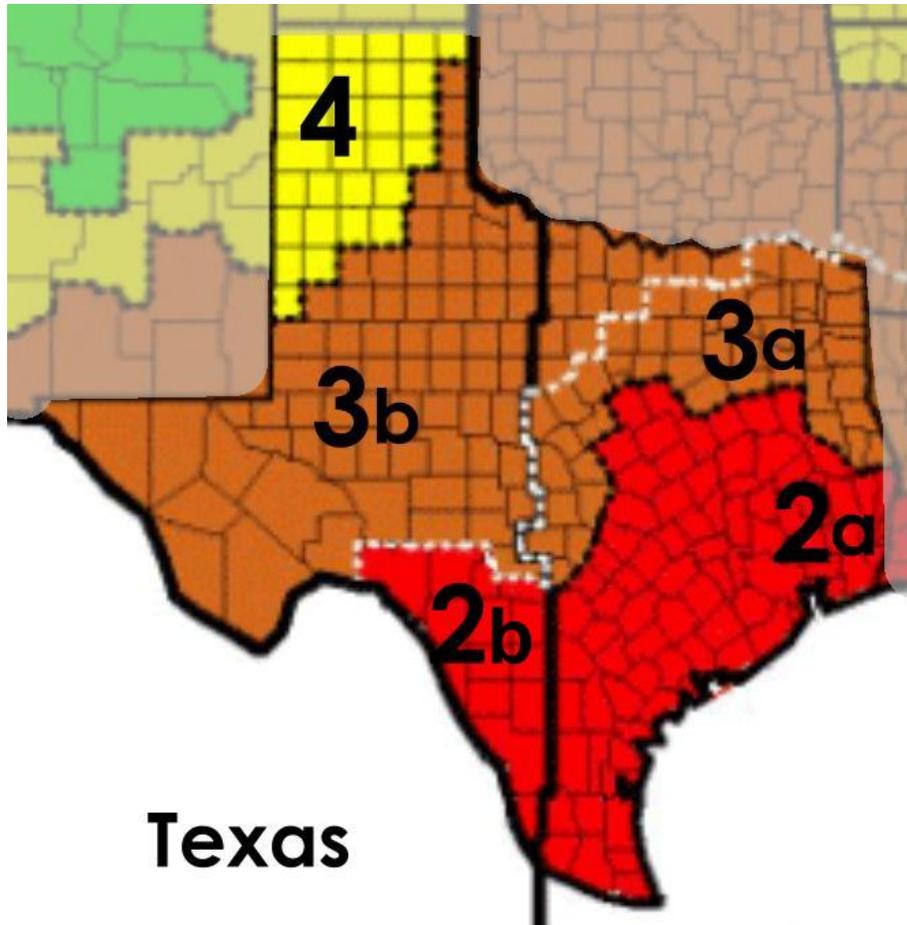


# Eight Climate Zones

Zones based on several climatic parameters: Locations are listed in Appendix B on county-by-county basis for the 50 US states.



# Texas Climate Zones

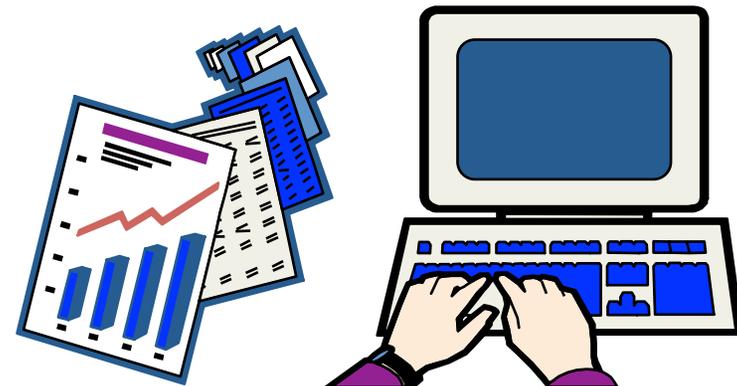
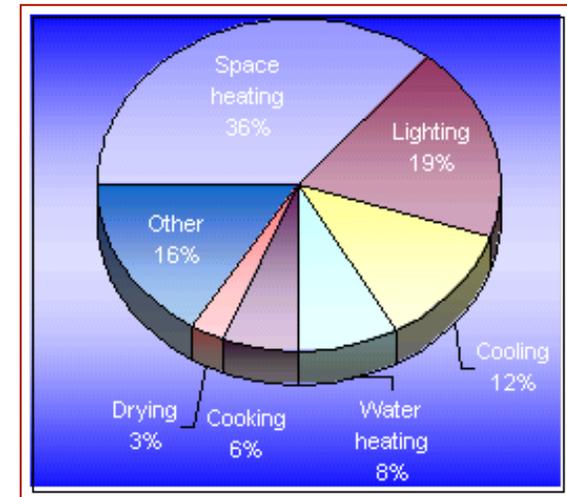


Insulation not required for non-residential "mass walls" in locations below the "warm-humid" line.

# Energy Cost

## Budget (ECB) Method | Section 11

- **Allows tradeoffs between building functions**
- **Limits allowable energy costs of the design to those of a building meeting the standard**
- **Whole-building performance approach**



# Appendices

## NORMATIVE

- A. Assembly U-, C-, and F-Factor Determination
- B. Climate Zones Designations
- C. **Envelope** Trade-Off Methodology
- D. Climatic Data

## INFORMATIVE

- E. Informative References
- F. Addenda Description Information

Appendix G. Performance Rating Method (new)



# Performance Rating Method

## Appendix G

- The performance rating method is a modification of the ECB method in Section 11 and is intended for use in rating the energy *efficiency* of building designs that exceed the requirements of the standard. It is not an alternative path for compliance; rather, it is for those wishing to quantify performance that substantially exceeds the requirements of Standard 90.1, typically to gain **LEED** rating points.
- Like ECB, it requires the use of approved simulation software.

# Additions/Alterations

- Altered components must meet new construction requirements, but with various exceptions for:
  - Envelope
  - HVAC
  - Water Heating
  - Lighting
- Applies to affected components only!
- Cosmetic treatments do not need to be considered....unless they expose energy components
- Allows energy trade-off compliance method in addition to prescriptive



# Additions/Alterations

Bottom Line: no increase in energy use

- Addition: an increase in floor area or building height
  - Compliance same as new buildings, except ECB can be used by including the *existing portion*.
- Alteration: replacement of parts of a building or its systems. (Maintenance, repair, or service are not considered as alterations)

- 
- **Exception:**  
Compliance w/ sections 5-10, except “National Registry of Historic Places” or total energy consumption  $\leq$  equivalent design that complies with sections 5 through 10.

# Advanced Energy Design Guides

Download free at: <http://www.ashrae.org/publications/page/1604>



AEDGs available as of Jan. '12

1. **Small Office Buildings**
  - Up to 20,000 ft<sup>2</sup>
2. **Small Retail Buildings**
  - Up to 20,000 ft<sup>2</sup>
3. **K-12 School Buildings**
  - Elementary, Middle, and High School
4. **Small Warehouses and Self-Storage Buildings**
  - Warehouses up to 50,000 ft<sup>2</sup>
  - Self-storage with unitary HVAC
5. **Highway Lodging Buildings**
  - For typical hotels found along highways having up to 80 rooms
6. **Small Hospitals & Healthcare Facilities**
7. **Small to Medium Office Buildings (Targeted at 50% savings.)**
8. **Medium to Big Box Retail Buildings (NEW, and targeted at 50% savings.)**
9. **K-12 School Buildings (NEW, and targeted at 50% savings.)**



**Initially 30% Savings compared to 90.1-1999, now at 50%.**

# Digging Deeper Options

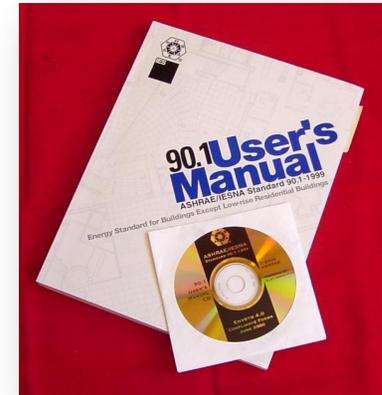
**ASHRAE Standards, Guidelines, Online Courses & Users Manuals at the ASHRAE Bookstore**  
(Provides much of the background):

- <http://www.ashrae.org/technology/page/548>
- <http://www.techstreet.com/ashraegate.html>
- <https://www.ashrae-elearning.org/>

**Formal Interpretations, but**  
Formal written interpretations take time.

**Informal Interpretations,**  
Quick, informal answers to questions.

**Or, Contact ASHRAE Manager of Standards**  
by phone at (404) 636-8400



# Where to Get More Information

- [www.ashrae.org](http://www.ashrae.org) and local ASHRAE chapters
- [www.txbuildingenergycode.org](http://www.txbuildingenergycode.org)
- [www.energycodes.gov](http://www.energycodes.gov)
- [www.nfrc.org](http://www.nfrc.org)
- [www.ansi.org](http://www.ansi.org)
- [www.ahrinet.org](http://www.ahrinet.org)
- [www.icccampus.org](http://www.icccampus.org)
- [www-esl.tamu.edu](http://www-esl.tamu.edu)



# Copies of the 90.1 Standards?



Standards 90.1-1999, 2001, 2004, 2007, 2010 and matching users manuals are available from ASHRAE.

Preview entire 90.1-2010 document free at:  
[http://openpub.realread.com/rrserver/browser?title=/ASHRAE\\_1/ashrae\\_90\\_1\\_2010\\_IP\\_1024](http://openpub.realread.com/rrserver/browser?title=/ASHRAE_1/ashrae_90_1_2010_IP_1024)

or the 189.1-2009 document free at:  
<http://www.ashrae.org/technology/page/548>



(404) 636-8400

# Additional Information

**Technical Contact:**

**Larry Degelman, P.E.**

[ldegelman@suddenlink.net](mailto:ldegelman@suddenlink.net)

College Station, TX

**Additional information on code training and adoptions in specific municipalities:**

**Websites:**

SECO Bldg. Codes & Standards:

<http://www.txbuildingenergycode.org>

Energy Systems Laboratory:

<http://www-esl.tamu.edu>

**Felix Lopez, P.E.**

[felix.lopez@cpa.state.tx.us](mailto:felix.lopez@cpa.state.tx.us)

Comptroller of Public Accounts, SECO

**Bahman Yazdani, P.E.**

[bahmanyazdani@tees.tamus.edu](mailto:bahmanyazdani@tees.tamus.edu)

Associate Director, Energy Systems Laboratory

Texas Engineering Experiment Station (TEES)

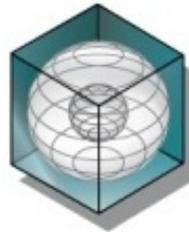
**Shirley Ellis**

[shirleyellis@tamu.edu](mailto:shirleyellis@tamu.edu)

Energy Code Specialist

Energy Systems Laboratory, TEES

This Concludes:  
**ANSI / ASHRAE / IESNA Standard 90.1 – 2010**  
Part I - Overview



Presented by  
Energy Systems Laboratory  
Texas Engineering Experiment Station  
The Texas A&M University System

Presenter  
Larry O. Degelman, P.E.  
Professor Emeritus of Architecture, Texas A&M University

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