2012 TERP STAKEHOLDERS' MEETING

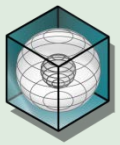
TEXAS ENGINEERING EXPERIMENT STATION

Revised July 24, 2012

2012 TERP Stakeholders' Meeting Agenda

- Introduction and Welcome
- Impact of Energy Codes Savings in Texas
- Texas Building Energy Performance Standards Rule-making Process
- 2012 IECC Significant Changes, DOE comments
- Comments Received by SECO to Changes in 2012 IECC
- 2015 IECC Proposed Changes
- Review of Available Compliance Software Tools
- IC3 History, Current Input, Planned Changes
- **<BREAK FOR LUNCH>**
- Input from Stakeholders
- Conclusion/Adjournment

IMPACT OF ENERGY CODES SAVINGS IN TEXAS



Impact of Energy Codes Savings in Texas

A recent study of energy savings in new single-family residential construction performed by the Texas Engineering Experiment Station's Energy Systems Laboratory (ESL) showed:

- $1.7 billion in energy savings in Texas from the adoption and implementation of the new energy codes for the construction of new single-family homes in the first eight years following the passage of the Texas Emissions Reduction Plan (TERP)
  - $776 million in electricity savings,
  - $927 million avoided costs of constructing new power plants and transmission lines.
- $201 first year average utility bill reduction for one million homeowners in Texas.
- 1 percent reduction in total electric demand in Texas (694 MW), reducing brownouts; equal to the power supplied by one large power plant.
- 2.8 billion gallons of water saved at power plants in Texas, equivalent to supplying water to Austin residents for approximately 24 days.
- 879 tons of NOx emissions reduction in Texas (in 2009); equal to the annual emissions from 46,000 cars. NOx emissions reduction reduces ground-level ozone levels, resulting in the avoidance of dozens of premature mortalities per year and of tens of thousands of lost school and work days due to acute respiratory symptoms.

TEXAS BUILDING ENERGY PERFORMANCE STANDARDS

TEXAS ENGINEERING EXPERIMENT STATION

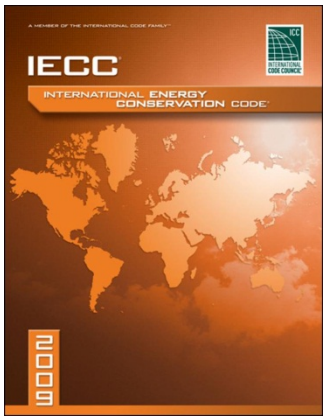
Rule-making Process

Texas Building Energy Performance Standards - SB 12/HB 3693-2007

- Amended Chapter 388: Health and Safety Code
  - Delegated SECO the authority to adopt by rule the latest published editions
    - International Residential Code (IRC), Chapter 11 (Energy Efficiency) for single-family construction; and
    - International Energy Conservation Code (IECC) for commercial and other residential construction
- ESL mandated to review the latest ICC editions
  - Ensure stringency of the IRC and IECC compared to current adopted statewide energy codes
  - Provide a written recommendation based on analysis of stringency and public review to SECO
- Cities may amend the IECC and IRC, Chapter 11
  - Review by the Energy Systems Laboratory (ESL)

2009 IECC and 2009 IRC, Chapter 11

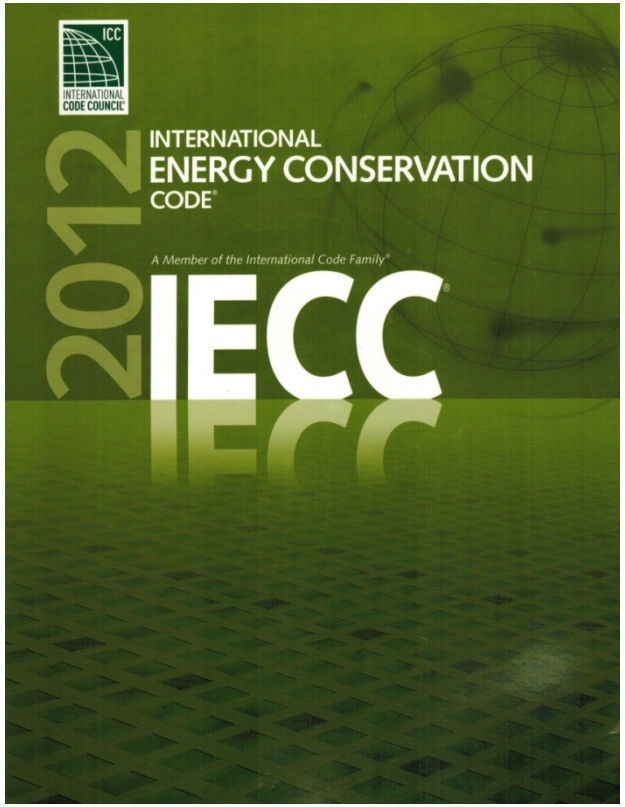
- 2009 ICC published new editions, triggering the SECO review and energy codes update process:
  - January: 2009 IECC published
  - March: 2009 IRC published
  - May: 30 days comment period on IECC
    - All comments were provided to ESL for a recommendation to SECO
  - July: 30 days comment period on IRC, Chapter 11
    - All comments were provided to ESL for a recommendation to SECO
  - 1,057 sets of comments received from elected officials, trade associations, builders, architects, environmental advocates
  - September: ESL recommended SECO the adoption of the 2009 IECC and 2009 IRC, Chapter 11
  - January-2010: SECO Stakeholder meeting
    - Allow input to draft rule prior to publication
  - March 2010: 30 days comment period for draft rule published
  - June-2010: Final rule published



Texas Building Energy Efficiency Performance Standards (TBEPS)

- §19.53.Building Energy Efficiency Performance Standards
  - (a) Single-family residential construction. Effective January 1, 2012, the energy efficiency provisions (Chapter 11) of the International Residential Code as they existed on May 1, 2009, are adopted as the energy code in this state for single-family residential construction as it is defined in Health and Safety Code, §388.002(12)
  - (b) All other residential, commercial, and industrial construction. Effective April 1, 2011, the International Energy Conservation Code as it existed on May 1, 2009, is adopted as the energy code for use in this state for all residential, commercial, and industrial construction that is not single-family residential construction under subsection (a) of this section

2012 IECC and 2012 IRC, Chapter 11



- ICC publishes a new edition, which triggers the SECO rule-making process:
  - May, 2011: 2012 IECC published
  - July, 2011: 2012 IECC available
  - Dec, 2011: ESL provided a written recommendation to SECO
  - SECO: 30 day public comment period on code recommendation published in Texas Register
    - March 30 – April 30, 2012
    - May 15, 2012 Comments forwarded to ESL for review and recommendation
  - ESL will provide final recommendation on stringency to SECO
  - SECO may publish rule in Texas Register

Local Amendments

- Prepare local amendment package and forward to the ESL with a request for review

TYPICAL REQUEST

The City of (your city) is adopting both the 2012 IRC and 2012 IECC for use in the jurisdiction and has worked to correlate them in the amendments. Attached is the amendment package.

Please review and respond at your earliest convenience. If it is easier due to the necessity of timely code adoption, we would be happy to set up a phone conference to review the documents together.

Respectfully,

Amendment Review Example

This change is recommended to mandate that cool roofs are required for low-slope roofs.
This language was previously added in the prescriptive method only, but should be required for all compliance paths.

5.4.3.5 Cool roofs. Low-slope roofs up to 2:12 shall be provided with a roof covering where the exterior surface has:

(a) a minimum total solar reflectance of 0.70 when tested in accordance with one of the solar reflectance test methods listed below, and

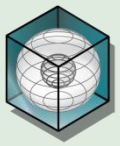
(b) a minimum thermal emittance of 0.75 when tested in accordance with one of the thermal emittance test methods listed below.

Solar Reflectance Test Methods: ASTM C1549, ASTM E903, ASTM E1175, or ASTM E1918.

Thermal Emittance Test Methods: ASTM C835, ASTM C1371, or ASTM E408.

ESL Comment (7/22/08): This change adds stringency because it is being moved from the prescriptive section to the mandatory section, thus requiring this for all options. IECC 2001 does not appear to give roof reflectance or emittance requirements.

2012 INTERNATIONAL ENERGY CONSERVATION CODE

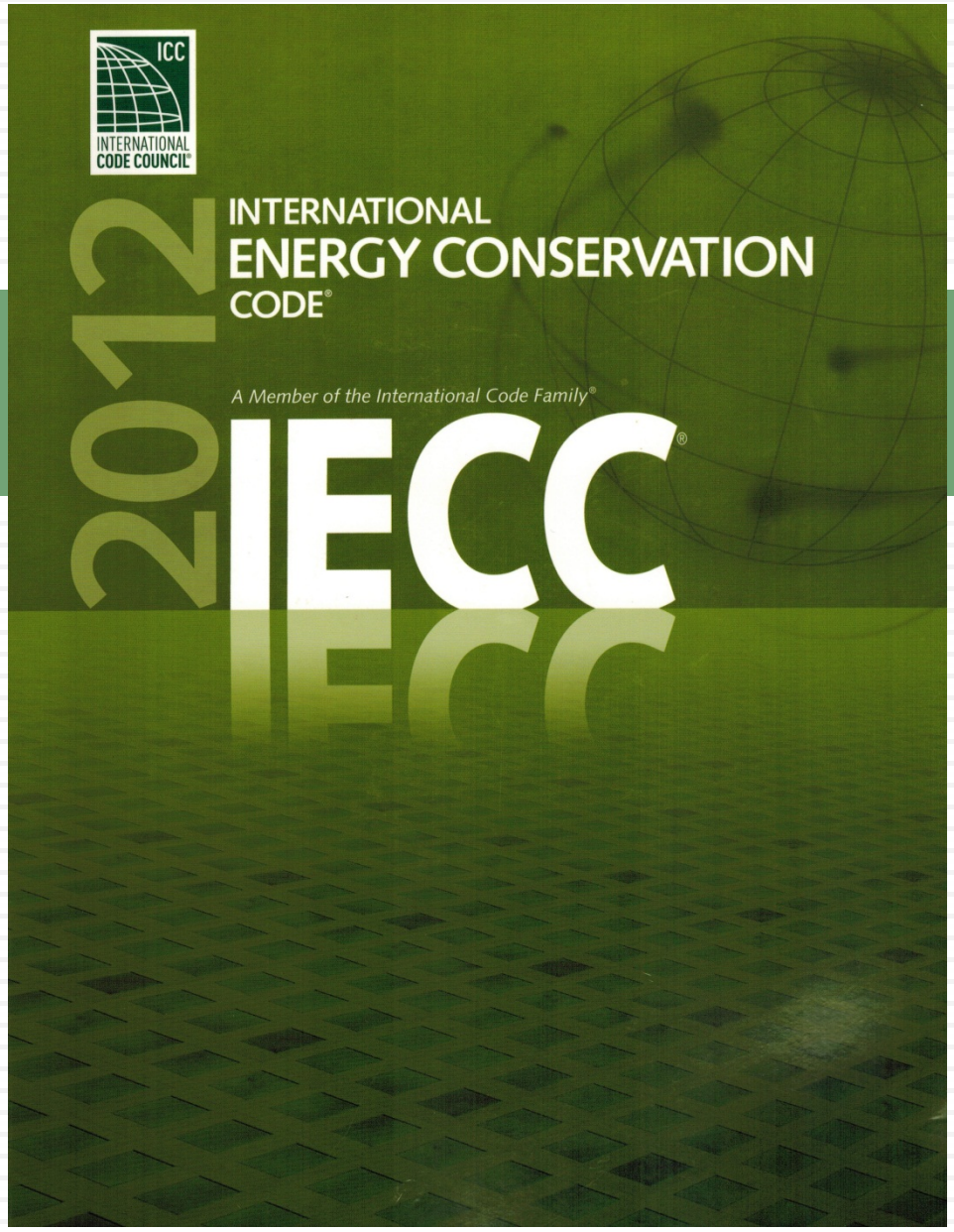


Significant Changes, DOE Comments

Agenda

1. 2012 IECC – Significant Changes
   a) Organizational
   b) Commercial
   c) Residential
2. DOE Comments

2012 IECC


ICC
INTERNATIONAL CODE COUNCIL
2012
INTERNATIONAL
ENERGY CONSERVATION
CODE
A Member of the International Code Family
IECC

Organizational Changes

- Two separate sets of provisions
  - Commercial
    - All buildings except for residential buildings 3 stories or less in height
  - Residential
    - Detached one- and two-family dwellings
    - Multiple single family dwellings
    - Group R-2, R-3 and R-4 buildings 3 stories or less in height

Table of Contents

- Chapter 1 – Scope and Administration
- Chapter 2 - Definitions
- Chapter 3 – General Requirements
- Chapter 4 – Energy Efficiency
  - Commercial
  - Residential
- Chapter 5 – Referenced Standards

Each code section is preceded by a letter. "C" for Commercial provisions and "R" for Residential provisions.

Chapter 4 (CE) – Table C402.1.2

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Insulation entirely above deck	U-0.048	U-0.048	U-0.048	U-0.048	U-0.048	U-0.048	U-0.039	U-0.039	U-0.039	U-0.039	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028
Metal buildings	U-0.044	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.03	U-0.031	U-0.029	U-0.029	U-0.029	U-0.029
Attic and other	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.021	U-0.02	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021
Walls, Above Grade																
Mass	U-0.142	U-0.142	U-0.142	U-0.123	U-0.110	U-0.104	U-0.104	U-0.090	U-0.078	U-0.078	U-0.078	U-0.071	U-0.061	U-0.061	U-0.061	U-0.061
Metal building	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.039	U-0.052	U-0.039
Metal framed	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.057	U-0.064	U-0.052	U-0.045	U-0.045
Wood framed and other	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.051	U-0.051	U-0.051	U-0.051	U-0.036	U-0.036
Walls, Below Grade																
Below-grade wall[b]	C-1.140	C-1.140	C-1.140	C-1.140	C-1.140	C-1.140	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.092	C-0.092	C-0.092	C-0.092
Floors																
Mass	U-0.322	U-0.322	U-0.107	U-0.087	U-0.076	U-0.076	U-0.076	U-0.074	U-0.074	U-0.064	U-0.064	U-0.057	U-0.055	U-0.051	U-0.055	U-0.051
Joist/framing	U-0.066	U-0.066	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033
Slab-on-Grade Floors																
Unheated slabs	F-0.73	F-0.73	F-0.73	F-0.73	F-0.73	F-0.73	F-0.54	F-0.54	F-0.54	F-0.54	F-0.54	F-0.52	F-0.40	F-0.40	F-0.40	F-0.40
Heated slabs	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.65	F-0.65	F-0.58	F-0.58	F-0.58	F-0.58	F-0.55	F-0.55	F-0.55	F-0.55

a. Use of opaque assembly *U*-factors, *C*-factors, and *F*-factors from ANSI/ASHRAE/IESNA 90.1 Appendix A shall be permitted, provided the construction complies with the applicable construction details from ANSI/ASHRAE/IESNA 90.1 Appendix A.
b. Where heated slabs are below grade, below-grade walls shall comply with the *F*-factor requirements for heated slabs.

Chapter 4 (CE) – Table C402.2

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs																
Insulation entirely above deck	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-25ci	R-25ci	R-25ci	R-25ci	R-30ci	R-30ci	R-35ci	R-35ci	R-35ci	R-35ci
Metal buildings (with R-5 thermal blocks)[b, c]	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-25 + R-11 LS	R-25 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS
Attic and other	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-49	R-49	R-49	R-49	R-49	R-49	R-49
Walls, Above Grade																
Mass	R-5.7ci	R-5.7ci	R-5.7ci	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal building	R-13 + R-6.5ci	R-13 + R-6.5ci	R13 + R-6.5ci	R-13 + R-13ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-19.5ci	R-13 + R-13ci	R-13 + R-19.5ci
Metal framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci	R-13 + R-7.5ci	R-13 + R17.5ci
Wood framed and other	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-15.6ci or R-20 + R-10ci	R-13 + R-15.6ci or R-20 + R-10ci
Walls, Below Grade																
Below-grade wall[d]	NR	NR	NR	NR	NR	NR	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-10ci	R-10ci	R-10ci	R-12.5ci
Floors																
Mass	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	R-10ci	R-10.4ci	R-10ci	R-12.5ci	R-12.5ci	R-12.5ci	R-15ci	R-16.7ci	R-15ci	R-16.7ci
Joist/framing	NR	NR	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30[e]	R-30[e]	R-30[e]	R-30[e]
Slabs-on-Grade Floors																
Unheated slabs	NR	NR	NR	NR	NR	NR	R-10 for 24" below	R-10 for 24" below	R-10 for 24" below	R-10 for 24" below	R-10 for 24" below	R-15 for 24" below	R-15 for 24" below	R-15 for 24" below	R-15 for 24" below	R-20 for 24" below
Heated slabs[d]	R-7.5 for 12" below	R-7.5 for 12" below	R-7.5 for 12" below	R-7.5 for 12" below	R-10 for 24" below	R-10 for 24" below	R-15 for 24" below	R-15 for 24" below	R-15 for 36" below	R-15 for 36" below	R-15 for 36" below	R-20 for 48" below	R-20 for 24" below	R-20 for 48" below	R-20 for 48" below	R-20 for 48" below
Opaque Doors																
Swinging	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37
Roll-up or sliding	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75

For SI: 1 inch = 25.4 mm. ci = Continuous insulation. NR = No requirement.

LS = Liner System—A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins.

a. Assembly descriptions can be found in ANSI/ASHRAE/IESNA Appendix A.

b. Where using *R*-value compliance method, a thermal spacer block shall be provided, otherwise use the *U*-factor compliance method in Table C402.1.2.

c. R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-ft² °F.

d. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.

e. Steel floor joist systems shall be insulated to R-38.

Chapter 4 (RE) – Table R402.1.1

TABLE R402.1.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b, e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5[h]	8/13	19	5/13[f]	0	5/13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5[h]	8/13	19	10 /13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5[h]	13/17	30[g]	15/19	10, 2 ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10[h]	15/20	30[g]	15/19	10, 4 ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10[h]	19/21	38[g]	15/19	10, 4 ft	15/19

For SI: 1 foot = 304.8 mm.

a. *R*-values are minimums. *U*-factors and SHGC are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall not be less than the *R*-value specified in the table.

b. The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements in Climate Zones 1 through 3 where the SHGC for such skylights does not exceed 0.30.

c. "15/19" means R-15 continuous insulation on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the home. "10/13" means R-10 continuous insulation on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.

d. R-5 shall be added to the required slab edge *R*-values for heated slabs. Insulation depth shall be the depth of the footing or 2 feet, whichever is less in Climate Zones 1 through 3 for heated slabs.

e. There are no SHGC requirements in the Marine Zone.

f. Basement wall insulation is not required in warm-humid locations as defined by Figure R301.1 and Table R301.1.

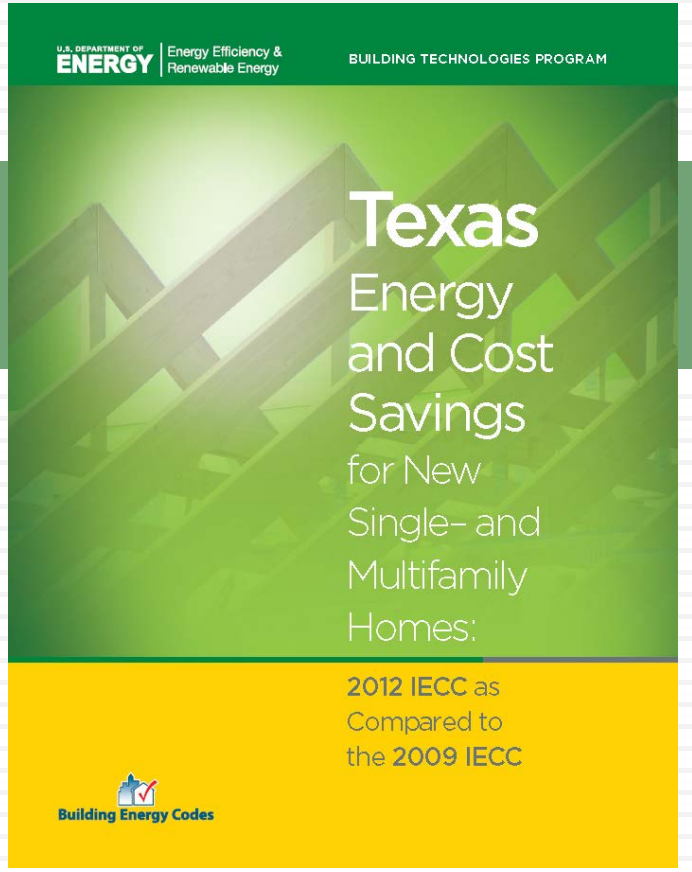
g. Or insulation sufficient to fill the framing cavity, R-19 minimum.

h. First value is cavity insulation, second is continuous insulation or insulated siding, so "13+5" means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. If structural sheathing covers 40 percent or less of the exterior, continuous insulation *R*-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used – to maintain a consistent total sheathing thickness.

i. The second *R*-value applies when more than half the insulation is on the interior of the mass wall.

DOE - Comments

Texas Energy and Cost Savings for New Single- and Multifamily Homes



DOE Report

- *June 19, 2012*
- The Department of Energy recently sponsored a series of cost analyses, covering the 2009 and 2012 editions of the International Energy Conservation Code (IECC) for new single and multifamily homes using the 2006 IECC as a baseline. Pacific Northwest National Laboratory (PNNL) assessed the cost-effectiveness of residential codes based on a life-cycle approach, balancing first costs against longer term energy savings over the life of the home.
- The study of National cost-effectiveness, and analysis by climate zone, is complete as are several state analyses. These are posted to the Building Energy Codes website.

Texas State Analysis

- Moving to the 2012 IECC from the 2009 IECC is cost-effective over a 30-year life cycle.
- Households save an average of $259 per year on energy costs with the 2012 IECC
- Simple payback period is 6.4 years for the 2012 IECC
- Energy costs, on average, are 19.8% lower for the 2012 IECC

STATE ENERGY CONSERVATION OFFICE

SECO
State Energy Conservation Office

TEES
TEXAS ENGINEERING EXPERIMENT STATION

Comments Received by SECO for ESL Review

Public Comments

- SECO forwarded comments to ESL concerning 2012 IECC and 2012 IRC adoption
  - 1525 comments were received
    - 858 comments from Sierra Club members and associates
    - 649 comments from Environment Texas supporters
    - 18 comments from other associations and public citizens

ESL Review

- 1523 Comments in favor of adoption
- Two comments in opposition to adoption
  - Coalition for Fair Energy Codes, American Wood Council, Texas Forest Industries Council, Texas Forestry Association, and American Forest & Paper Association
    - Economic concerns are outside ESL purview
  - Texas Builders Association
    - Included proposed amendments

Proposed Amendments

- Two comments attached proposed amendments
  - Newport Ventures – in favor
    - Proposed the provisions for mechanical ventilation in the IRC also be adopted into the IECC
  - Texas Association of Builders – in opposition
    - Proposed several modifications to IECC

NAHB Recommendations

- Proposed Amendments that are acceptable
  - Remove the 20% limit for reduced ceiling R-value in ceiling without attics
  - Reintroduce equipment trade-offs in the standard reference design case
- Proposed Amendments that reduce stringency
  - Reduce the insulation R-values for wood frame
  - Increase the SHGC for Climate Zone 2 and 3

NAHB Recommendations

- Proposed Amendments that are outside Texas
  - Change basement wall R-value and *U*-value in Climate Zones 6, 7 and 8
- Other Proposed Amendments
  - Remove the option for post-construction tests for duct leakage
  - Reintroduce language to include the use of building cavities as return ducts

ESL Recommendation

The Laboratory's recommendation to SECO will be posted on our website http://esl.tamu.edu when completed.

2015 INTERNATIONAL ENERGY CONSERVATION CODE

TEXAS ENGINEERING EXPERIMENT STATION

Proposed Changes

2015 IECC and IRC Code Change Schedule

- January 3, 2013 – Code Change Proposal due
  - March 11 - Web posting of proposed changes
  - April 1 – CD of proposed changes distribution
- April 21 – 28, 2013 – Code Development Hearings
  - Sheraton Dallas Hotel, Dallas, TX
  - May 31 - Web posting of Report of the Public Hearing
  - June 21 – CD of Report of the Public Hearing
- July 15, 2013 – Public Comments due
  - August 28 – Web posting of public comments
  - September 16– CD of public comments
- October 2 – 9, 2013 – Final Action Hearings
  - Atlantic City Convention Center, Atlantic City, NJ

Chapter 1- Scope and Administration

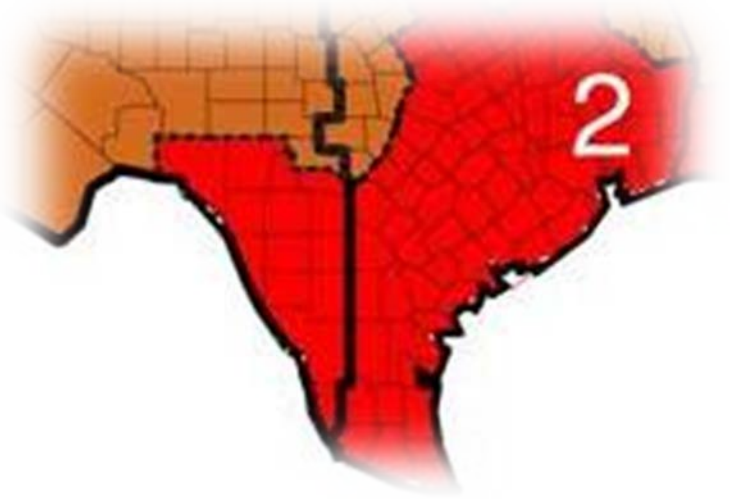
Proposed for 2015 IECC

- Commercial
  - C106.2 Conflicting requirements
    - Add exception – when using C401.2 1. ASHRAE 90.1
- Residential

Chapter 3 – General Requirements

Proposed for 2015 IECC

- Commercial
- Residential
  - Remove the Warm-Humid designation from the Texas counties located in Climate Zone 2B



- Bandera
- Dimmit
- Edwards
- Frio
- Kinney
- La Salle
- Maverick
- Medina
- Real
- Uvalde
- Val Verde
- Webb
- Zapata
- Zavala

Chapter 4 – Energy Efficiency

Proposed for 2015 IECC

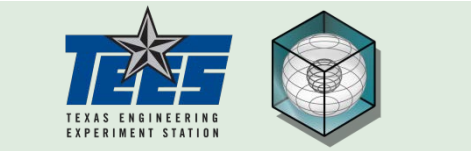
- Commercial
  - C402.3.3.1 SHGC Adjustment Multipliers
  - C402.4.1.2 – Air barrier compliance options
    - Resolve conflict between C402.4.1.2.1 (12) and C402.4.1.2.2 (2)
  - C403.2.4.4 Shutoff damper controls
    - Add an exception for kitchen hood dampers meeting the IMC
  - C403.4.1.1 Economizers for Complex Systems
    - Add Air Economizers
  - Table for High-Limit Shutoff Control Options for Air Economizers – inconsistent with ASHRAE 90.1
  - C407 – Total Building Performance
    - Remove and refer to ASHRAE 90.1

Chapter 4 – Energy Efficiency

Proposed for 2015 IECC

- Residential
  - Removal of R401.1 Table and require a HERS rating from RESNET
  - R402.4 Air Leakage
    - Use of Table R402.4.1.1
    - Separation of Air leakage inspection from insulation inspection
  - R403.4.2 Hot water pipe insulation - footnotes

REVIEW OF AVAILABLE COMPLIANCE SOFTWARE TOOLS



RESNET Accredited IECC Performance Verification Software

- IC3 v 3.10.3

- OptiMiser

- EnergyGauge USA Version 2.8

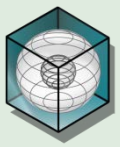
- REM/Rate REM/Design v12.91

2009 IECC Performance Verification Software for Texas:

- IC3 v 3.12.2

- ENERGY STAR Approved Software

IC3 HISTORY, CURRENT INPUT, PLANNED CHANGES



THE IC3 WEBSITE

TEXAS ENGINEERING EXPERIMENT STATION

IC3.tamu.edu

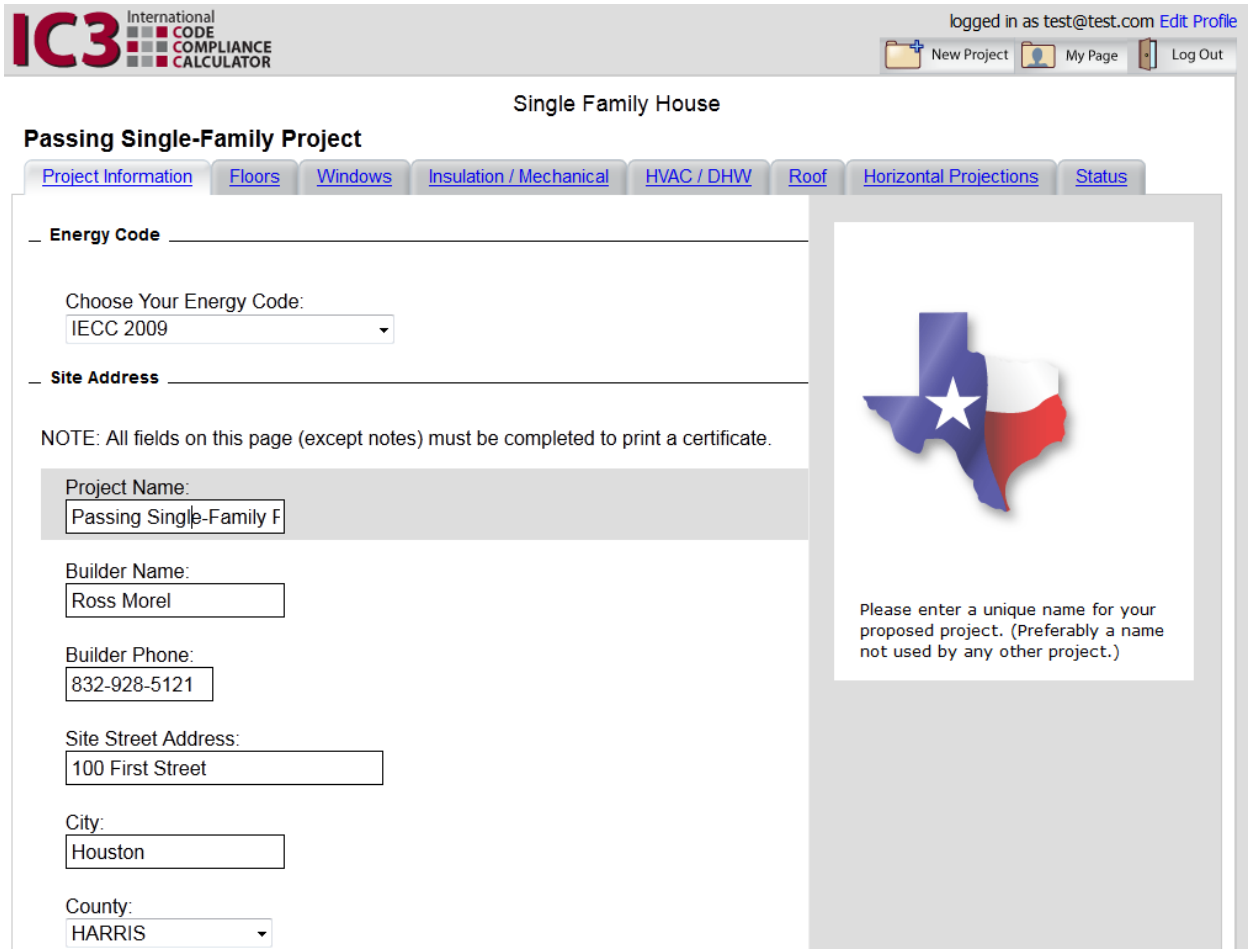
History of IC3

IC3 History

The development of IC3 was recommended by stakeholders and produced using technology originally developed under a US Environmental Protection Agency (US EPA) grant, administered by the Texas Commission on Environmental Quality, as an Engineering Proof of Concept.

The original version was delivered in 2004. In 2006 the lab began upgrading this version using input from stakeholders and IC3 users. The current version 3.12.2 was released in 2012.

IC3 website: ic3.tamu.edu



Information Needed for IC3 Project

1. County, energy code
2. Number of floors, Number of Bedrooms
3. Foundation type and insulation
4. Window SHGC and U-Factor
5. Wall and duct insulation values
6. Siding Type
7. Roof Type, Area, and insulation
8. Heater, A/C, and water heater specifications
9. Blower door and duct blaster test results
10. For each floor
    - Area, Perimeter, Ceiling height
    - For each side of the floor
        - Area of windows
        - Horizontal projections

Status Page

IC3 International Code Compliance Calculator

logged in as test@test.com Edit Pro

New Project | My Page | Log Ou

Single Family House

Project Information | Floors | Windows | Insulation / Mechanical | HVAC / DHW | Roof | Horizontal Projections | Status

Project Details for: Passing Single-Family Project

Project Information

Energy Code:	IECC 2009
Builder Name:	Ross Morel
Builder Phone:	832-928-5121
Site Street Address:	100 First Street
City:	Houston
Zip:	77845
County:	HARRIS
Notes:	This is a test

Floors

First Floor:

Conditioned Floor Area:	2500 sq ft
Perimeter of Conditioned Space:	250 ft
Ceiling Height:	9 ft

Second Floor:

Conditioned Floor Area:	2000 sq ft
Perimeter of Conditioned Space:	200 ft
Area of Conditioned Over Unconditioned:	100 sq ft

Insulation / Mechanical

Mechanical in Conditioned Space:	No
Wall Cavity Insulation:	R-35
Insulated Wall Sheathing:	R-12
Exterior Finish:	Fibrous Cement Board
Total Roof/Ceiling Insulation:	R-50
Blower Door:	5.99 (Tested)
Duct Blaster:	1 (Tested)
Supply Duct Insulation:	8
Return Duct Insulation:	8

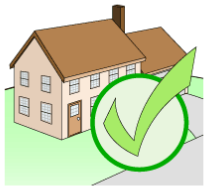
HVAC/DHW

Heating Type:	Natural Gas
Heating Efficiency:	0.7 AFUE
A/C Efficiency (SEER):	13 SEER
A/C Size (tons):	1
Water Heater Type:	Electric
Water Heater Energy Factor:	0.97

Project Status

20.4% Above Code

Congratulations! Your project has passed code requirements!



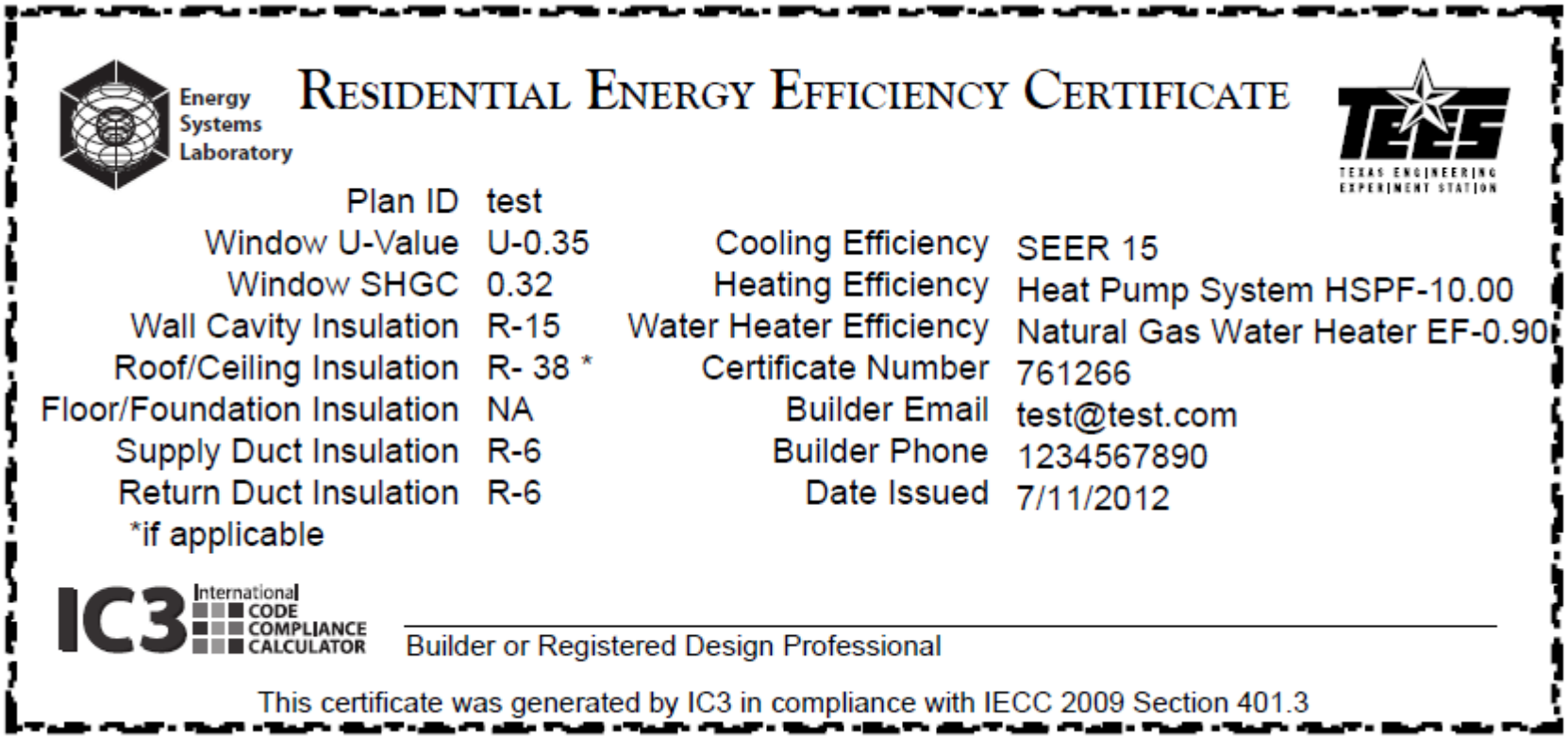
Inspection List

Certificate

Energy Report

Energy Report w/ Signature

The Certificate



Energy Systems Laboratory

Residential Energy Efficiency Certificate

TEXAS ENGINEERING EXPERIMENT STATION

Plan ID	test		
Window U-Value	U-0.35	Cooling Efficiency	SEER 15
Window SHGC	0.32	Heating Efficiency	Heat Pump System HSPF-10.00
Wall Cavity Insulation	R-15	Water Heater Efficiency	Natural Gas Water Heater EF-0.90
Roof/Ceiling Insulation	R- 38 *	Certificate Number	761266
Floor/Foundation Insulation	NA	Builder Email	test@test.com
Supply Duct Insulation	R-6	Builder Phone	1234567890
Return Duct Insulation	R-6	Date Issued	7/11/2012

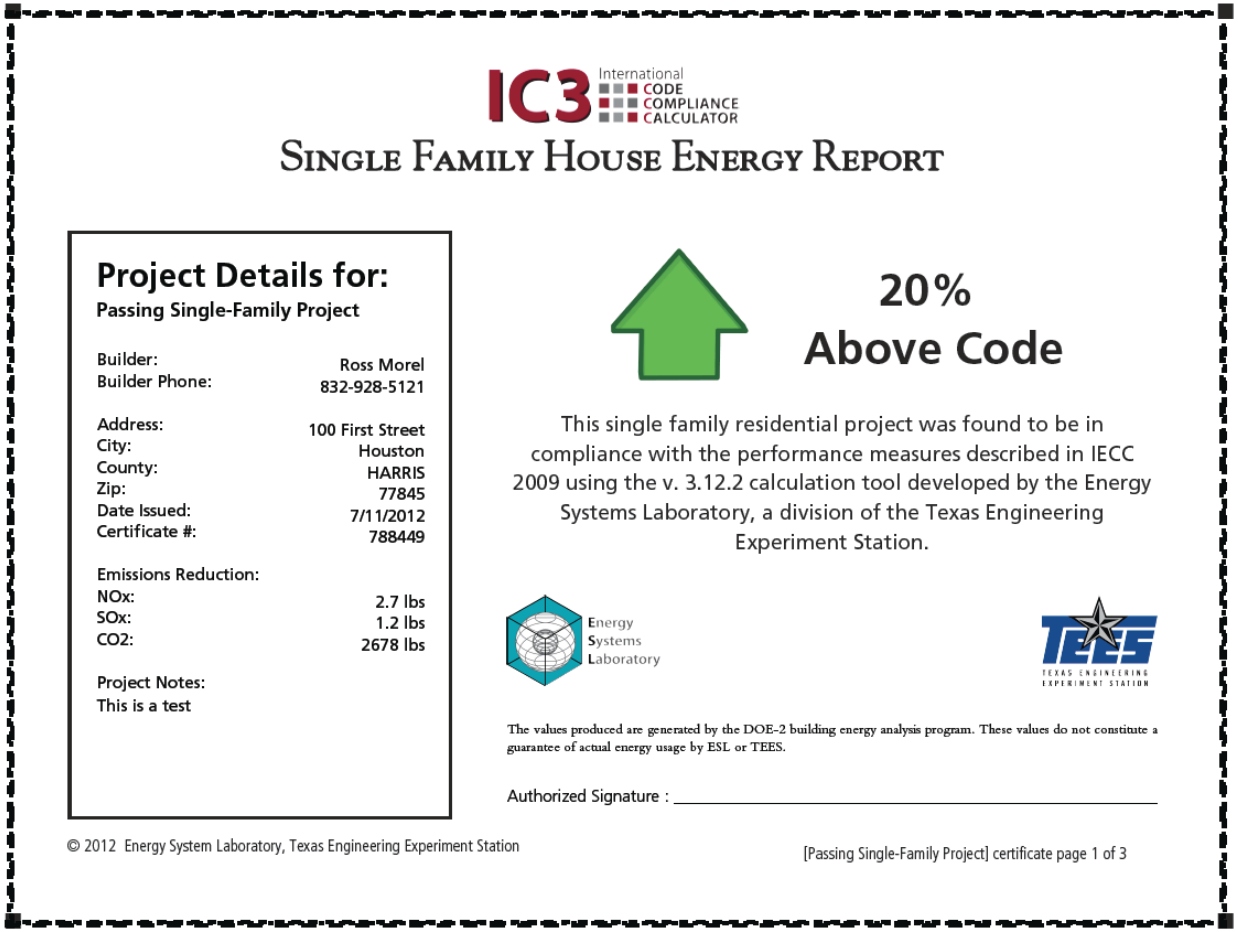
*if applicable

IC3 International CODE COMPLIANCE CALCULATOR

Builder or Registered Design Professional

This certificate was generated by IC3 in compliance with IECC 2009 Section 401.3

The Energy Report



IC3 International CODE COMPLIANCE CALCULATOR

Single Family House Energy Report

Project Details for:
Passing Single-Family Project

Builder:	Ross Morel
Builder Phone:	832-928-5121
Address:	100 First Street
City:	Houston
County:	HARRIS
Zip:	77845
Date Issued:	7/11/2012
Certificate #:	788449

Emissions Reduction:

NOx:	2.7 lbs
SOx:	1.2 lbs
CO2:	2678 lbs

Project Notes:
This is a test

20% Above Code

This single family residential project was found to be in compliance with the performance measures described in IECC 2009 using the v. 3.12.2 calculation tool developed by the Energy Systems Laboratory, a division of the Texas Engineering Experiment Station.

Energy Systems Laboratory

TEES Texas Engineering Experiment Station

The values produced are generated by the DOE-2 building energy analysis program. These values do not constitute a guarantee of actual energy usage by ESL or TEES.

Authorized Signature : _____

© 2012 Energy System Laboratory, Texas Engineering Experiment Station

[Passing Single-Family Project] certificate page 1 of 3

Floorplan Information

General	
Total Conditioned Area	4500 sqft
Average Ceiling Height	8' 6"
Number of Bedrooms	1
Orientation	North
Foundation Type	Slab
Insulation	R-12

Windows	
Solar Heat Gain Coefficient	0.35
U-Factor	0.32

First Floor	
Conditioned Floor Area	2500 sqft
Perimeter of Conditioned Area	250 ft
Ceiling Height	9 ft
Front Window Area	100 sqft
Right Window Area	50 sqft
Back Window Area	50 sqft
Left Window Area	50 sqft
Front Horizontal Projections	6' 0"
Right Horizontal Projections	0' 0"
Back Horizontal Projections	0' 0"
Left Horizontal Projections	0' 0"

Second Floor	
Conditioned Floor Area	2000 sqft
Perimeter of Conditioned Area	200 ft
Conditioned Area Over Uncond. Area	100 sqft
Ceiling Height	8 ft
Front Window Area	50 sqft
Right Window Area	50 sqft
Back Window Area	50 sqft
Left Window Area	50 sqft
Front Horizontal Projections	0' 4"
Right Horizontal Projections	0' 4"
Back Horizontal Projections	0' 4"
Left Horizontal Projections	0' 4"

Roof	
Roof Covering Material	Comp Shingle
Uses Radiant Barrier	Yes
Flat Roof Area	500 sqft
Cathedral Ceiling Area	1 sqft
Attic Floor Area	2500 sqft
Wall Area Next To Attic	None

Insulation and Mechanical	
Mechanical in Conditioned Space	No
Blower Door Measurements are	Tested
Blower Door (@ACH50)	5.99
Duct Blaster Measurements are	Tested
Duct Blaster (@CFM25)	1
Wall Cavity Insulation	R-35
Insulated Wall Sheathing	R-12
Exterior Wall Finish	Cement Board
Total Roof/Ceiling Insulation	R-50
Supply Duct Insulation	R-8
Return Duct Insulation	R-8
Slab insulation	R-12

Heating, Air Cooling, & Water Heater	
Heating Type	Natural Gas
Heating Efficiency	0.7
A/C Efficiency	13 SEER
A/C Size	1 tons
Water Heater Type	Electric
Water Heater Energy Factor	0.97

Estimated Annual Energy Usage

Energy Usage Category	Proposed Design		Standard Reference	
	Gas (therms)	Electric (kWh)	Gas (therms)	Electric (kWh)
Area Lights	—	6126	—	6126
Miscellaneous Equipment	—	7709	—	7709
Electric Space Cooling	—	3634	—	4338
Pumps and Miscellaneous	—	59	—	59
Ventilation Fans	—	1583	—	2140
Gas Space Heating	254	—	373	—
Electric Domestic Hot Water	—	1788	—	1788
Subtotal	254	20898	373	22158
Total source* energy usage converted to MMBtu**	253.2		279.9	

The values produced are generated by the DOE-2 building energy analysis program. These values do not constitute a guarantee of actual energy usage by ESL or TEES.

* Source to site conversion electric: 3.16, other: 1.1 (IECC 2009 405.3)

** Conversion factors. 1 MMBtu = 10 therms or 293.1 kWh.

*** For IECC 2009 or IECC 2009 Austin energy codes, percent above code is calculated using space cooling, ventilation fans, space heating, pumps & misc. and hot water only. Additional energy categories were not considered.

The Inspection Checklist

Residential Data Collection Checklist

2009 International Energy Conservation Code
Climate Zone 2

Building ID:_____ Date:_____ Name of Evaluator(s):_____

Building Contact: Name:_____ Phone:_____ Email:_____

Building Name & Address:_____

Subdivision:_____ Lot #:_____ Conditioned Floor Area:_____ ft^2

State:_____ County:_____ Jurisdiction:_____

Compliance Approach (check all that apply): ☐ Prescriptive ☐ Trade-Off ☐ Performance

Compliance Software Used:_____ Green Building/Above-Code Program:_____

Building Type: 1- and 2-Family, Detached: ☐ Single Family ☐ Modular ☐ Townhouse

Multifamily: ☐ Apartment ☐ Condominium

Project Type: ☐ New Building ☐ Existing Building Addition ☐ Existing Building Renovation

IECC Section #	Pre-Inspection/Plan Review	Code Value	Verified Value	Complies				Comments/Assumptions[1]
				Y	N	N/O	N/A	
103.2 [PR1][1]	Construction drawings and documentation available. Documentation sufficiently demonstrates energy code compliance.			☐	☐	☐	☐	
403.6 [PR2][2]	HVAC loads calculations: Heating system size(s): Cooling system size(s):		kBtu: ____ kBtu: ____	☐	☐	☐	☐	

Additional Comments/Assumptions: _____

The IC3 website statistics

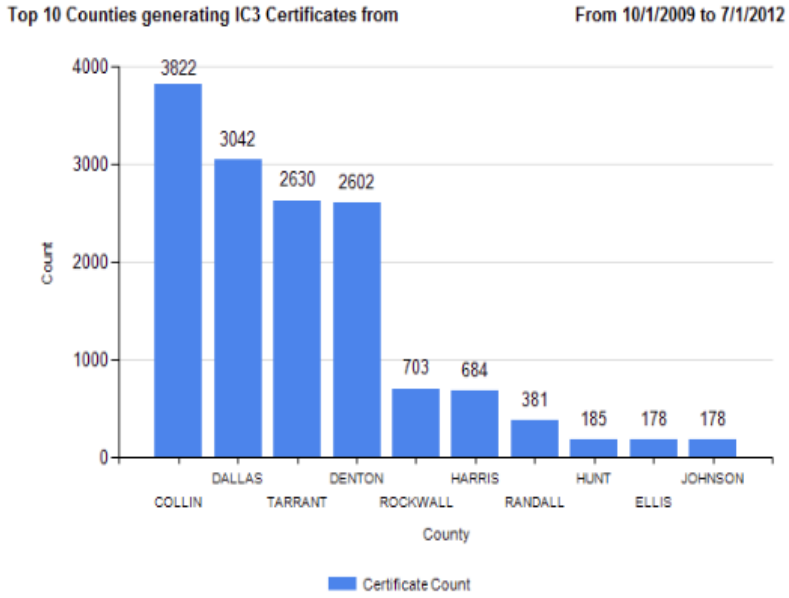
The IC3 generates monthly reports that are posted online for anyone to access. They are located at

http://esl.tamu.edu/terp/code-compliance-calculators/ic3/tbr-ic3-reports

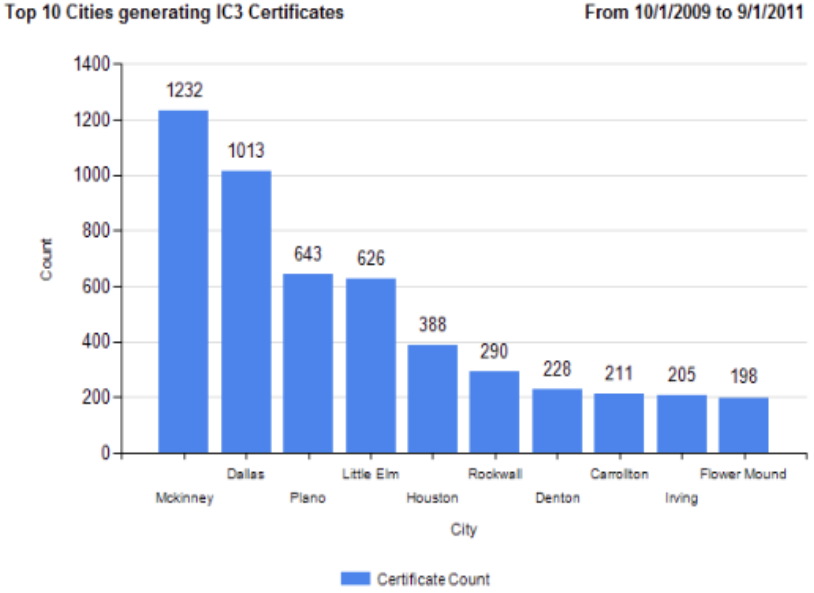
How many people are using IC3?

Who is using IC3?

By County



By City



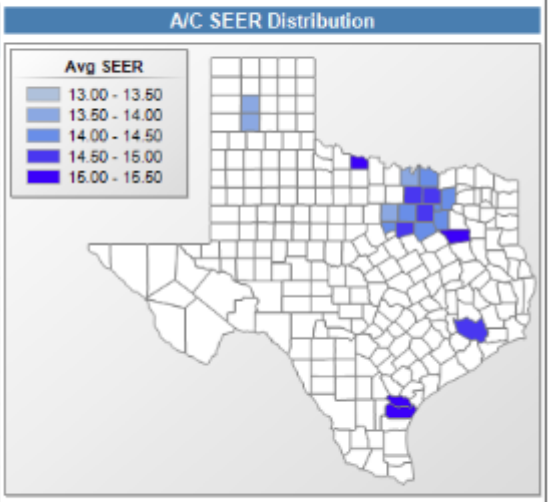
Other types of data gathered

Overall Data Statistics derived from a subset of Counties having house count > 10

Weighted Avg: 14.47 | Std Deviation: 0.57 | Total House Count: 8723

Average A/C SEER across Counties for the last 12 months ending: 7/1/2012

County	Avg A/C SEER	House Count
Bexar	16.0	24
San Patricio	15.1	12
Henderson	15.1	15
Nueces	15.0	59
Wichita	15.0	37
Harris	14.9	330
Johnson	14.7	60
Collin	14.5	1987
Dallas	14.5	1766
Denton	14.5	1346
Hood	14.5	51
Tarrant	14.4	2027
Ellis	14.3	151
Grayson	14.1	11
Rockwall	14.1	336
Hunt	14.0	70
Kaufman	14.0	125



This table and map shows which Texas Counties have the highest SEER values in their new home construction over the last twelve months.

Recent changes in IC3

There were some major changes to the IC3 website this year.

IC3 changes for 3.12

- The State of Texas has mandated that all new residential construction complies with the 2009 IECC
- Austin Energy asked for their local amendments to be added to the IC3 website as a separate energy code. The top cities using this code are:

	city	Number of Projects
1	Austin	206
2	Houston	26
3	Princeton	11
4	Round Rock	11
5	Ft Worth	7
6	garden ridge	6
7	Garland	5
8	Bryan	5
9	Canyon	5
10	Coppell	5
11	Fort Worth	5

- The energy report, certificate, and inspection list were modified to comply with the 2009 code

2012 TERP STAKEHOLDERS' MEETING

TEXAS ENGINEERING EXPERIMENT STATION