DOE Energy Codes Field Study
Texas

CATEE December 21, 2016

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Sr. Energy Code Manager
Residential Energy Code Field Study

• Goals:
  – Three year study to quantify the impact of an intensive education and outreach effort on energy efficiency in new home construction
  – To establish a baseline for energy efficient practices in new home construction
  – To provide the business case for private sector investment in energy efficiency
Texas Field Study Team

NASEO
National Association of State Energy Officials

SECO
State Energy Conservation Office

EUMMOT
Making Texas Energy Efficient

SPEER
The South-central Partnership for Energy Efficiency as a Resource
Field Study States

Alabama
Arkansas
Georgia
Kentucky
Maryland
North Carolina
Pennsylvania
Texas

West Virginia
Michigan
Texas Field Study Area

30 Counties with about 25% of state population
30% of permits
Field Study Phasing

Ph 1
- October, 2014 – October, 2015
- Initial Data Collection

Ph 2
- October, 2015 – October, 2017
- Outreach, Education & Collaboration

Ph 3
- July, 2017 - December, 2017
- Final Data Collection
- Analyze and Report Impacts
### Texas Sampling Plan

#### Required full Observation Sets

<table>
<thead>
<tr>
<th>Place, County</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Houston, Harris</td>
<td>17</td>
</tr>
<tr>
<td>Pearland, Brazoria</td>
<td>5</td>
</tr>
<tr>
<td>League City, Galveston</td>
<td>3</td>
</tr>
<tr>
<td>College Station, Brazos</td>
<td>2</td>
</tr>
<tr>
<td>Fulshear, Fort Bend</td>
<td>1</td>
</tr>
<tr>
<td>Conroe, Montgomery</td>
<td>2</td>
</tr>
<tr>
<td>Beaumont, Jefferson</td>
<td>3</td>
</tr>
<tr>
<td>Galveston, Galveston</td>
<td>1</td>
</tr>
<tr>
<td>Port Arthur, Jefferson</td>
<td>1</td>
</tr>
<tr>
<td>Texas City, Galveston</td>
<td>1</td>
</tr>
<tr>
<td>Baytown, Harris</td>
<td>1</td>
</tr>
<tr>
<td>Katy, Harris</td>
<td>1</td>
</tr>
<tr>
<td>Alvin, Brazoria</td>
<td>1</td>
</tr>
<tr>
<td>Dickinson, Galveston</td>
<td>1</td>
</tr>
<tr>
<td>Lumberton, Hardin</td>
<td>1</td>
</tr>
<tr>
<td>Pasadena, Harris</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>42</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Place, County</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harris County Unincorporated Area, Harris</td>
<td>13</td>
</tr>
<tr>
<td>Fort Bend County Unincorporated Area, Fort Bend</td>
<td>5</td>
</tr>
<tr>
<td>Montgomery County Unincorporated Area, Montgomery</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>21</strong></td>
</tr>
</tbody>
</table>
Texas

Lighting % High Efficacy

Observations = 66

Series 1
Envelope Tightness

- Kentucky: n = 66
- Maryland: n = 63
- Alabama: n = 65
- North Carolina: n = 67
- Pennsylvania: n = 70
- Texas: n = 65
Average Duct Leakage Rate by State

<table>
<thead>
<tr>
<th>State</th>
<th>CFM25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>8</td>
</tr>
<tr>
<td>Arkansas</td>
<td>10.6</td>
</tr>
<tr>
<td>Georgia</td>
<td>10.7</td>
</tr>
<tr>
<td>Kentucky</td>
<td>13</td>
</tr>
<tr>
<td>Maryland</td>
<td>4.7</td>
</tr>
<tr>
<td>North Carolina</td>
<td>5.8</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>21.3</td>
</tr>
<tr>
<td>Texas</td>
<td>7.1</td>
</tr>
</tbody>
</table>
Ceiling R-Value
Observations 65

- 2009 CZ 2,3 = R-30
- 2009 CZ 4 + R-38
- 2015 CZ 2,3 R-38
- 2015 CZ 4 R-49
Ceiling Insulation Grade
Observations = 49

Number

<table>
<thead>
<tr>
<th>Grade</th>
<th>Series2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>36</td>
</tr>
<tr>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>
Wall Insulation Grade
Observations = 62

<table>
<thead>
<tr>
<th>Grade</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>38</td>
</tr>
<tr>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

| count | 38 | 19 | 5   |
Percentage of Grade I Exterior Wall Insulation - By State

- Alabama: 12%
- Arkansas: 43%
- Georgia: 14%
- Kentucky: 35%
- Maryland: 59%
- North Carolina: 45%
- Pennsylvania: 32%
- Texas: 61%
Average Installed Sq. Foot / Ton - By State

- Alabama: 703.8
- Georgia: 879.3
- Kentucky: 800.9
- Maryland: 737.8
- North Carolina: 748.2
- Pennsylvania: 549.4
- Texas: 588
EUI – Statewide

Vertical black line indicates the weighted average of EUI for a 2009 IECC prescriptive code-compliant prototype.
Vertical magenta line indicates the weighted average of simulated EUI of the state.
Data Summary

- Texas builders (and builders in most states studied) are meeting the requirements of the 2009 IECC
- The 2009 IECC has been the state energy code in TX since 2011
- On September 1, 2016 the 2015 IRC (Ch. 11) becomes the state residential code
- Significant potential savings between study baseline and 2015 IECC
## Potential Savings Estimates – Texas (2015 IECC)
### Annual-First Year Savings

<table>
<thead>
<tr>
<th>Measure</th>
<th>Electricity Savings (kWh/home-yr)</th>
<th>Natural Gas Savings (therms/home-yr)</th>
<th>No. of homes</th>
<th>Total State Energy Savings (MMBtu/yr)</th>
<th>Total State Energy Cost Savings ($/yr)</th>
<th>Total State Emissions Reduction (MT CO2e/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td>261.02</td>
<td>-1.89</td>
<td>100,608</td>
<td>70,571</td>
<td>$2,774,421</td>
<td>17,100</td>
</tr>
<tr>
<td>Envelope Air Leakage</td>
<td>161.70</td>
<td>25.78</td>
<td>100,608</td>
<td>314,889</td>
<td>$4,656,869</td>
<td>24,969</td>
</tr>
<tr>
<td>Ceiling Insulation</td>
<td>24.22</td>
<td>1.53</td>
<td>100,608</td>
<td>23,677</td>
<td>$443,058</td>
<td>2,496</td>
</tr>
<tr>
<td>Duct Leakage</td>
<td>210.36</td>
<td>10.83</td>
<td>100,608</td>
<td>181,188</td>
<td>$3,582,893</td>
<td>20,371</td>
</tr>
<tr>
<td>Exterior Wall Insulation</td>
<td>240.89</td>
<td>20.91</td>
<td>100,608</td>
<td>293,040</td>
<td>$5,029,864</td>
<td>27,865</td>
</tr>
</tbody>
</table>

U.S. Department of Energy

**Ext. Wall Insulation – Install quality**
Provide Education on High Potential Measures

• Lighting
• Envelope Leakage
• Duct Leakage
• Exterior Wall Insulation
• Ceiling Insulation
SEAL THE DEAL.

Your customers want efficient, comfortable homes that last a lifetime. Build right from the start by sealing and testing the envelope.
R U Demanding Grade 1 Insulation Installation?

Build to the 2015 code and achieve wall-to-wall comfort.
GET YOUR DUCTS IN A ROW.
Seal and test the duct systems in your new homes.
Example - Lighting

• Create campaign image and tag line
  – Multiple channels
  – Raise Awareness
  – Drive to Training & Resources

• Work with industry partners to develop in depth training materials

• Deliver through webinars, in-person training and technical resources
Strategy 3, Local Level Compliance

• Local Adoption
  – Ordinances
  – Guidance on adoption process
  – Clarifying Amendments

• Third Parties
  – Certifications and Registrations
  – Forms & Documentation

• Code Official Certification and Training
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Summary

• Code compliance is better than we thought
• Still significant savings potential
• Code officials are open to training and support
• Third parties will have an impact but codes and ratings are not the same
Questions

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