TXU Electric Delivery 2004 ENERGY STAR® Homes Program

Quality Assurance and Quality Control Program

ENERGY STAR PARTNER

TXU Electric Delivery

Today's Agenda

TXU Electric Delivery ENERGY STAR Homes Program:

A. Background

QAQC Program:

A. Planning
B. Implementation
C. Analysis and Results
D. Corrective Action Plan
E. Recommendations
F. Conclusions

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TXU Electric Delivery ENERGY STAR Homes Program

Background

Program Year	Significant Events
2001	• Introduced pilot program
2002	• Created competitive, market-based HERS rating infrastructure
2002 - 2004	• Fueled rapid expansion of program and rating industry

The results….

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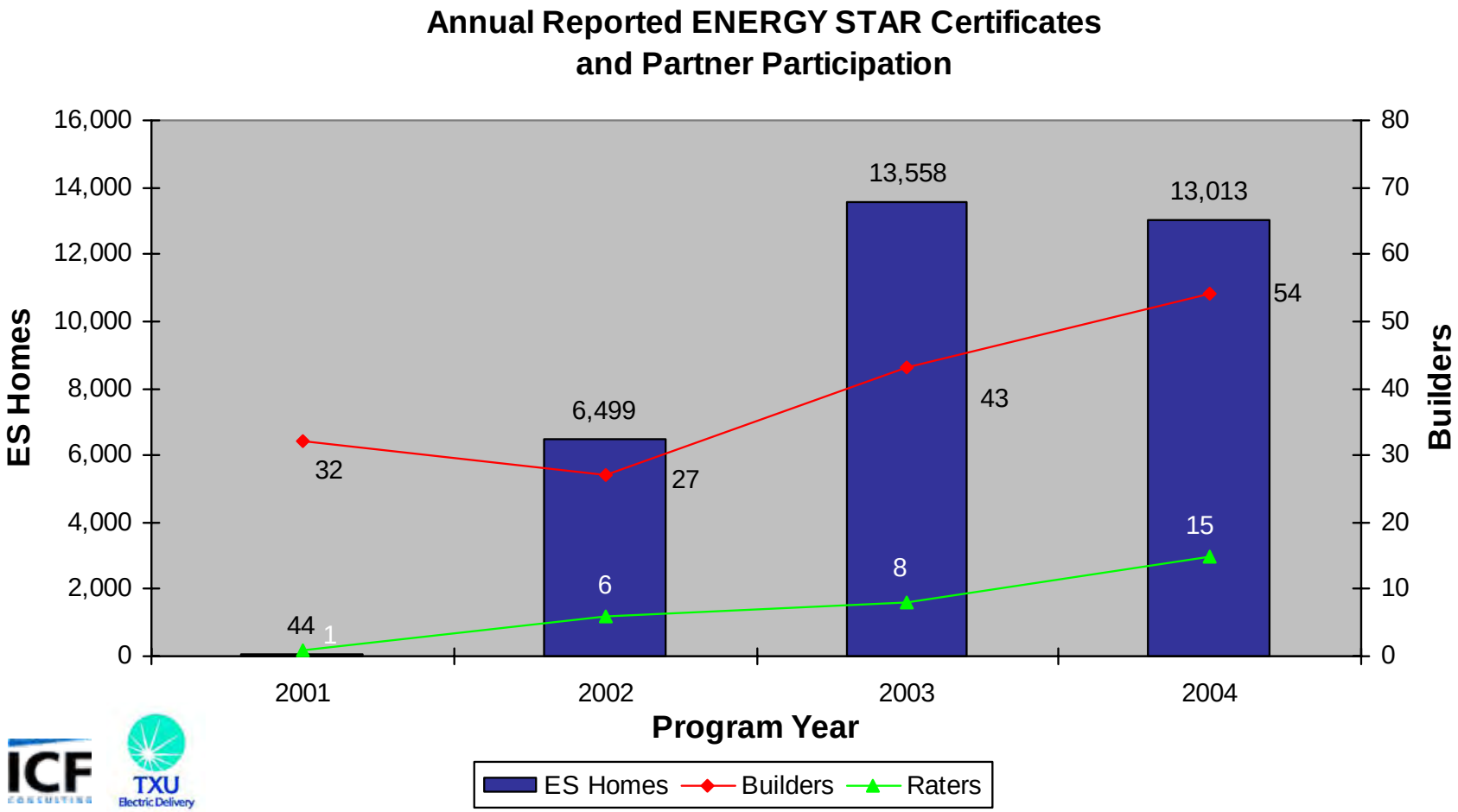
energy
ENERGY STAR

Background


Annual Reported ENERGY STAR Certificates
and Partner Participation
ES Homes
Builders
Program Year
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
80
70
60
50
40
30
20
10
0
2001
2002
2003
2004
44
6,499
13,558
13,013
1
6
8
15
32
27
43
54
ES Homes
Builders
Raters

Background

Overview of HERS Rating Infrastructure:

- Less than 3 years old
- Many companies new to the home energy rating business

Success of program and rapid growth of rating infrastructure lead to certain questions:

- *How are raters performing?*
- *Are they following RESNET standards?*
- *Are the homes truly meeting ENERGY STAR specifications?*

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Background

Program responses:

- Established Texas HERO:
  - Non-profit, industry association
  - Provides credibility for rating industry
  - Facilitates discussion on standards and best practices
  - Provides continuing education/training

- Implemented QAQC Program

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QAQC Program: Planning

Design

- Systems approach to verify quality and assurance
- Based on:
  - Deming model of Plan, Do, Check, Act
  - ISO 14000: Environmental Management Systems

Goals

1. Validate the accuracy of the information reported to the Program by participating HERS raters

2. Confirm the data used by TXUED to calculate predicted kW and kWh savings reported to the PUCT

3. Help strengthen the integrity of the ENERGY STAR Home label and the HERS rating industry

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Objectives to Achieve Goals

A. Verify RESNET standards for home ratings are being followed by accredited HERS raters;

B. Identify areas of inconsistencies and misinterpretations;

C. Establish continuous feedback loop and facilitate corrective actions; and

D. Encourage Texas HERO and RESNET to adopt best practices and industry standards

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QAQC Program: Implementation

Methodology

1. Determine variance thresholds for QAQC Program
2. Generate sampling protocol for QAQC Program
3. Collect necessary data from actual building plan specifications and on-site inspections of *tested* and *batched* homes
4. Generate *worst-case* QAQC results and compare to data generated and reported by raters
5. Identify discrepancies and conduct further analysis to determine cause
6. Share results with Texas HERO and rating providers

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Methodology

Acceptable variances for the QAQC program (as agreed to by TXU ED, Texas HERO, ICF):

- HERS score → +/- 0.5 point
- IECC score → +/- 3%

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Sample Generation

- Included all ESHP participating raters (mid-year entries not included)
- Priorities:
  - 1st: proportionate to rater participation
  - 2nd: proportionate to builder participation
- Final sample: 289 homes (2% of 2004 TXU ED ENERGY STAR Homes Program)

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Sample Generation

Distribution of Sample Among Raters

Rating Provider	Percentage of Total Homes in ESHP	Percentage of Total Homes in QAQC Program
Provider A	1.1%	1.0%
Provider B	7.2%	5.6%
Provider C	11.7%	18.5%
Provider D	4.4%	6.3%
Provider E	0.6%	0.7%
Provider F	20.7%	18.2%
Provider G	6.0%	11.3%
Provider H	4.1%	2.6%
Provider I	3.3%	4.0%
Provider J	37.1%	30.8%
Provider K	0.1%	1.0%

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Sample Generation

Distribution of Sample Among Builders

Top 12 Homebuilders in ESHP	Percentage of Total Homes in ESHP	Percentage of Total Homes in QAQC Program
Buescher Homes	0.9%	3.6%
Choice Homes	3.9%	4.3%
D.R. Horton Homes Inc.	4.1%	2.6%
Fox & Jacob	15.0%	6.0%
Goodman Family of Builders	7.6%	6.0%
KB Home	7.3%	5.0%
Legacy Homes	4.5%	3.0%
Lennar Homes Dallas	5.4%	6.0%
MHI	3.9%	7.3%
Optima Homes	1.5%	4.3%
Pulte Homes of TX	4.2%	5.0%
Ryland Homes	7.1%	6.6%

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Data Collection

Data collected from HERS rating providers:

- Final *REM/Rate* files with “confirmed” HERS score
- Building plans
- Spec sheets if applicable

Data Collection

Data collected by third party during on-site verification of *tested* and *batched* homes:

- Home location
- Number of stories
- Window type
- Blower door methodology
- Whole house infiltration from blower door test
- Total duct leakage
- Duct leakage to the outside
- HVAC coil and condenser brand, model, and serial number
- Attic insulation installation grade
- HVAC installation grade

On-site verification was performed
at least 72 hours after raters' final test

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QAQC Program: Analysis and Results

Analysis

ENERGY STAR Performance Verification:

A. HERS Score Analysis

B. Percent Savings Above IECC Analysis

C. HERS and IECC

Additional Factors Reviewed:

C. SEER Analysis

D. Climate Zone Usage Analysis

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A. HERS Analysis Results

- 20 homes (6.9%) failed to reach HERS 86
- Most common probable reason for failure:
  - No attic insulation verified (14 of 20 homes)

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B. Percent Savings Above IECC Analysis Results

- 30 homes (10.4%) failed to reach percent savings above code of 15%

- Most common probable reasons for failure:
  - No attic insulation verified (14 of 30 homes)
  - Poor duct leakage performance (13 of 30 homes)

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How Many Homes Were Appropriately Certified?

- 256 homes (88.6%) were appropriately ENERGY STAR certified (HERS 86 and 15% above IECC)

- 33 homes (11.4%) did not qualify for ENERGY STAR certification. They had a failing:
  - HERS score;
  - Percent savings above IECC score; or
  - Both

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A Closer Look…

Possible explanations for lack of attic insulation at time of on-site inspection by QAQC program:

- On-site inspection took place prior to the raters' testing of the home or home completion;
- On-site inspection took place after the raters' testing, but before the necessary re-work and changes were made; or

Most likely scenario – must have insulation to meet code

- There is no attic insulation installed in the home and this was not identified or reported.

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A Closer Look…

Homes must have attic insulation to meet code and receive certificate of occupancy.

So….

Re-calculating the HERS and percent savings above IECC scores with attic insulation:

- 11 of the 14 homes would have passed

Final Results: 267 homes (92.4%) were ENERGY STAR qualified

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A Closer Look…

It is important to understand these results in relation to defined acceptable variances…

- Of the 33 homes that failed, 9 homes (3.1%) were within the acceptable variance levels
- Conservativeness of QAQC Program still categorizes the 9 homes as **failed** homes

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C. SEER Analysis

QAQC Confirmed SEER was compared to:

- SEER in *REM/Rate* file
- SEER reported to online system

C. SEER Analysis Results

- *REM/Rate* file comparison
  - 97.5% of homes were within +/- 1 SEER level
- Online system comparison
  - 98% of homes were within +/- 1 SEER level

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D. Climate Zone Analysis Results

31.1% of homes used questionable climate zone

- 27.7% of flagged homes in Dallas/Ft. Worth area:
  - Dallas/Fort Worth, TX weather file was used
  - Correct weather file is Sherman, TX, but…
  - All addresses physically closer to Dallas/Fort Worth
- 3.5% of flagged homes in Austin area
  - Austin, TX weather file was used
  - Correct file is from a major city other than Austin, but…
  - Austin weather file is only file in *REM/Rate* that is geographically close to Austin

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Why The Inconsistencies?

- Climate zone usage rules and regulations are vague and unclear
- The number of weather files is very limited and the selection of them is non-intuitive and is causing confusion, or
- The rating providers are using an incorrect climate zone because it is less stringent and generates higher HERS and percent savings above IECC scores

Given results, first two are most likely

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QAQC Program: Corrective Action Plan

Goals

- Achieve continuous improvements in the TXU Electric Delivery ENERGY STAR Homes Program and home certification process

- Help advance the development and acceptance of industry standards and best practices by Texas HERO

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Steps

1. Meet with raters as a group and individually to review results, discuss causes of inconsistencies, and identify potential solutions

3. Present systemic discrepancies to Texas HERO, EPA and RESNET and encourage clarification on standards and the adoption of best practices

4. Monitor progress toward improvements during 2005 QAQC Program

5. Discontinue accepting certificates from rating providers who continuously deliver inconsistent results

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QAQC Program: Recommendations

Recommendations

1. Encourage the adoption of national performance standards and variance thresholds for QAQC programs

2. Encourage raters to visually inspect 100% of homes to verify energy efficient levels and proper installation of equipment and products if they cannot be obtained through current batching method.

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Recommendations

3. Discuss climate zone issue with EPA, RESNET, Texas HERO, and developer of *REM/Rate* software program

Rules and guidelines should be clarified and a best practice should be established

Recommendations

4. Identify reasons for lack of attic insulation and immediately resolve. Possible solution includes:

   – Improve the current QAQC Program test scheduling process to ensure that homes are completed before on-site verification is performed

Recommendations

5. Determine reason for discrepancy of duct leakage test results and develop improvement plan. Possible solutions include:

   – Determine “industry accepted” variances for duct leakage results
   – Verify equipment is being calibrated properly
   – Provide information to HERS rater training provider to incorporate into future training classes

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Conclusions

- Achieved a very conservative passing rate of 92.4% for the first year of a QAQC program (not taking variances into account)
- National QAQC protocol and standards are needed to achieve greater improvements and continue to advance industry
- A competitive, market-based HERS rating industry is a viable option for utilities or states interested in sponsoring a cost-effective ENERGY STAR homes program

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THANK YOU

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