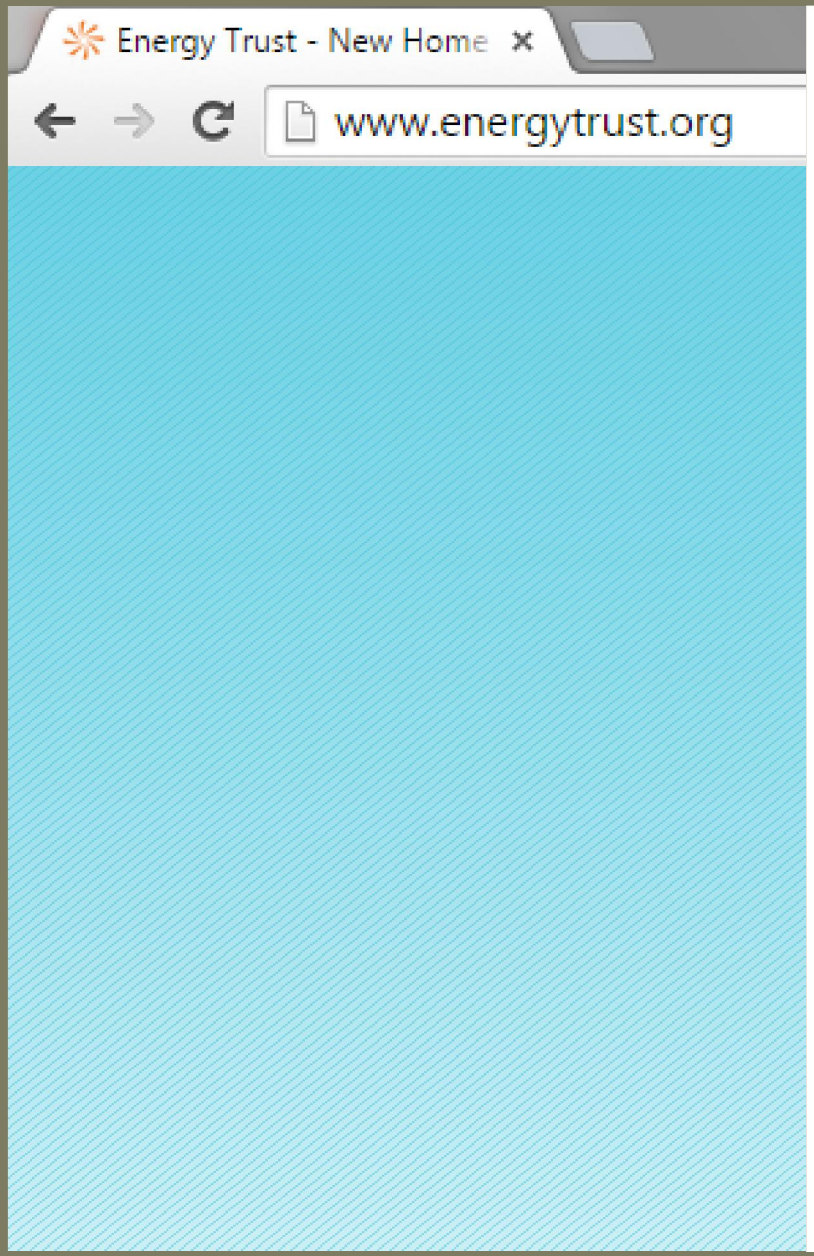
Comparison of Modeled vs. Actual Energy Use in Energy Trust of Oregon's New Homes Program

Dan Rubado – Energy Trust of Oregon

2015 IEPEC Conference — Long Beach, California

HOME
FOR
SALE



EPS
EnergyPerformanceScore
Brought to you by Energy Trust of Oregon

EPS is a tool to assess a home's energy consumption, cost and carbon footprint.

EPS™ is an energy performance score that measures and rates the energy consumption and carbon footprint of a newly constructed home. The lower the score, the better—a low EPS identifies a home as energy efficient with a smaller carbon footprint and lower energy costs.

Location
12345 SE Example Street
Portland, OR 97215

YEAR BUILT: 2012
SQ. FOOTAGE: 1,799
EPS ISSUE DATE: 4-17-12

Utilities:
Gas: NW Natural
Electric: Portland General Electric

Estimated Monthly Energy Costs

$103*

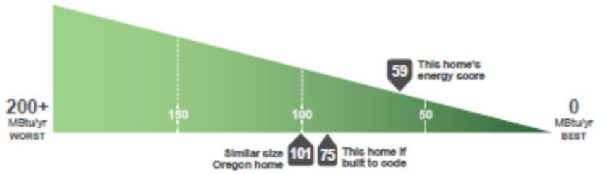
Estimated average annual energy costs: **$1,233***

Estimated average energy costs per month: Electric $78, Natural gas $25

ENERGY CONSUMPTION: Measured in millions of Btu per year (MBtu/yr). One million Btu = 293 kWh or 10 therms.

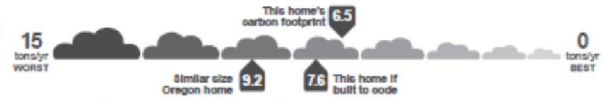
Energy Score

59



Estimated average energy usage: Electric (kWh): 9,234*, Natural gas (therms): 274

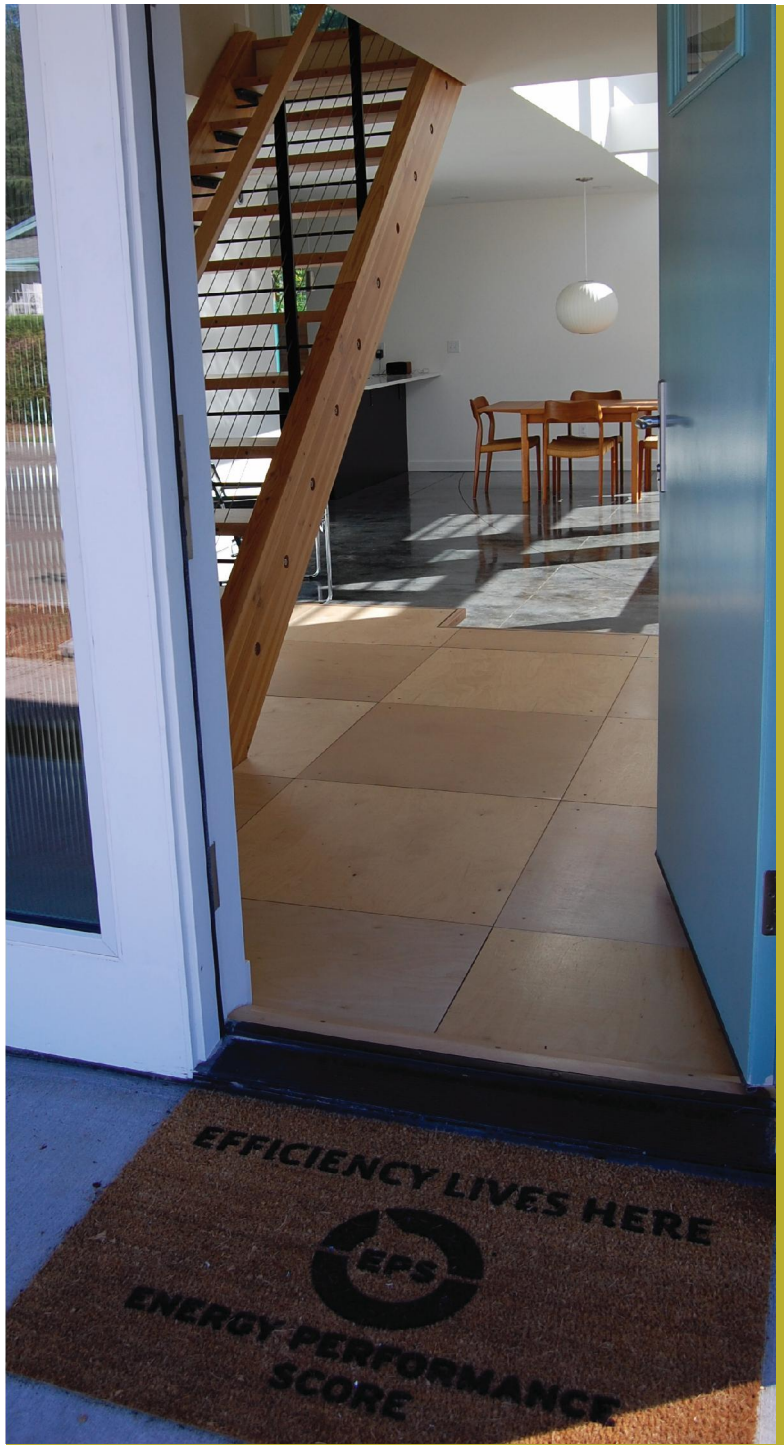
CARBON FOOTPRINT:
Measured in tons of carbon dioxide per year (tons/yr). One ton ≈ 2,000 miles driven by one car (typical 21 mpg car).



Estimated average carbon footprint: Electric (tons/yr): 4.9, Natural gas (tons/yr): 1.6

*Actual energy costs are based on many factors such as occupant behavior and weather. A home's EPS takes into account the energy-efficient features installed in the home, but does not account for occupant behavior.

EnergyTrust of Oregon



A Couple Questions…

- How accurately does the program estimate energy usage in EPS homes?
- How much variability is there for individual homes?
- How do the estimates hold up over time?

Data Analysis Methods

- Matched to post-occupancy billing data
- Weather normalization
- Determined heating fuel
- Separated gas and electric heated homes
- Attrition analysis
- Compared modeled to normalized usage
  - Mean differences
  - Differences for individual homes

RESULTS

Program Activity by Heating Fuel

Year Built	N	Mean Sq.Ft.	Mean EPS	Modeled Therm Use	Modeled kWh Use
Gas Heated Homes:					
2009	573	2,518	71.3	498	6,212
2010	482	2,146	74.5	524	6,462
2011	680	2,225	74.6	502	6,908
Electric Heated Homes:					
2009	126	2,164	51.4	54	12,398
2010	128	2,021	53.5	119	11,660
2011	134	1,856	45.4	104	9,904

Electric Heated Homes

Characteristics of final electric heated home analysis sample

Year Built	N	Mean Sq.Ft.	Mean EPS	Mean Modeled kWh Usage
2009	22	2,267	52.6	12,930
2010	23	2,087	51.7	11,870
2011	36	1,978	53.2	10,690

→ Sample sizes too small for reliable results

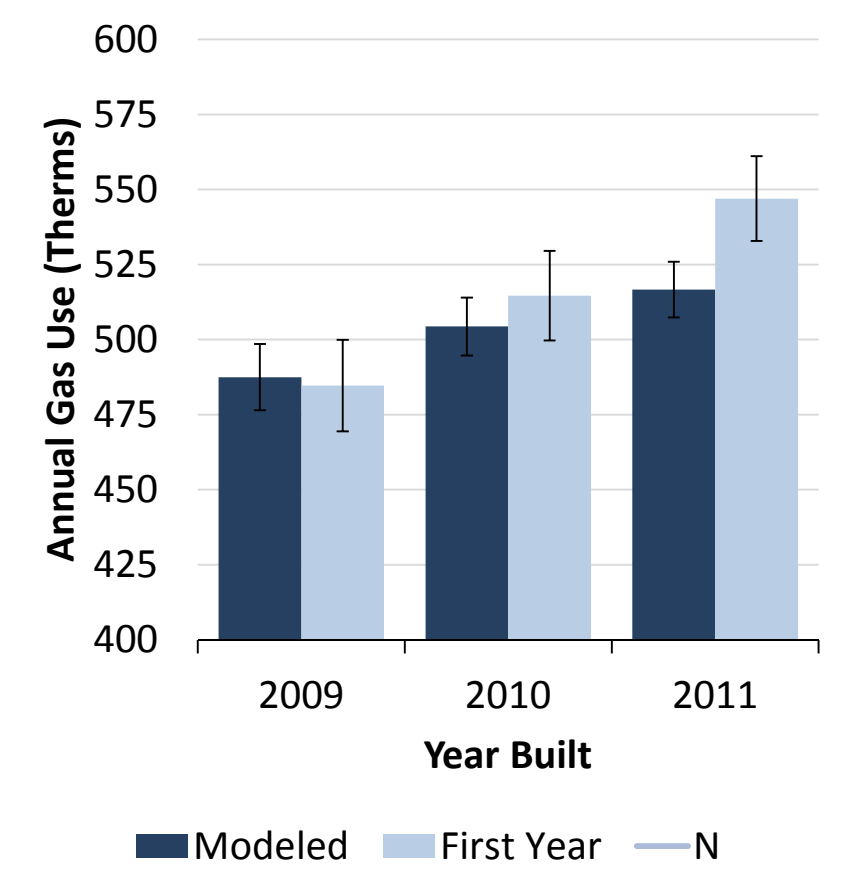
Gas Heated Homes

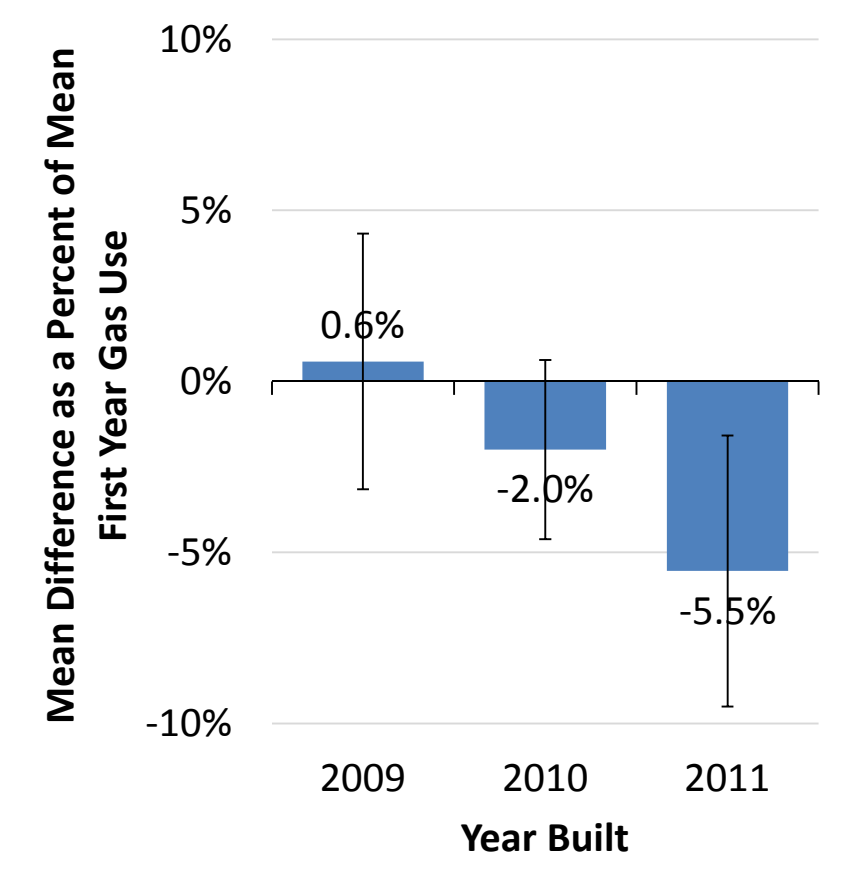
Characteristics of final gas heated home analysis sample

Year Built	N	Mean Sq.Ft.	Mean EPS	Mean Modeled Therm Usage	Mean Modeled kWh Usage
2009	176	1,994	70.7	488	6,210
2010	299	2,161	72.3	504	6,360
2011	135	2,251	74.6	517	6,340

Gas Heated Homes – Gas Use

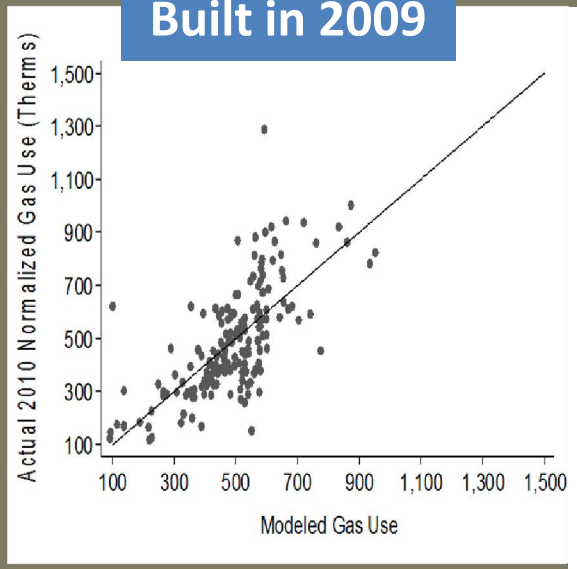
Modeled vs. normalized first year gas use

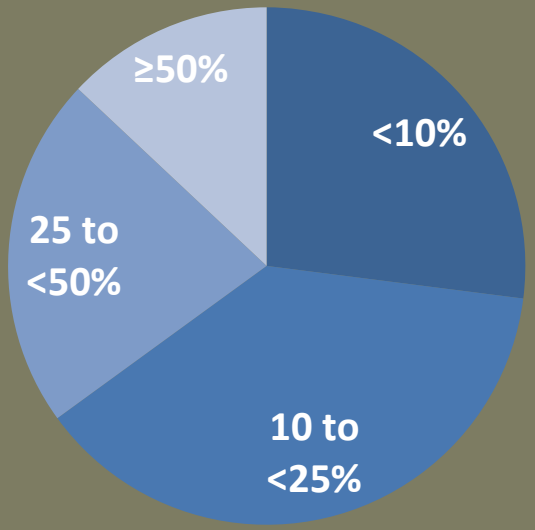




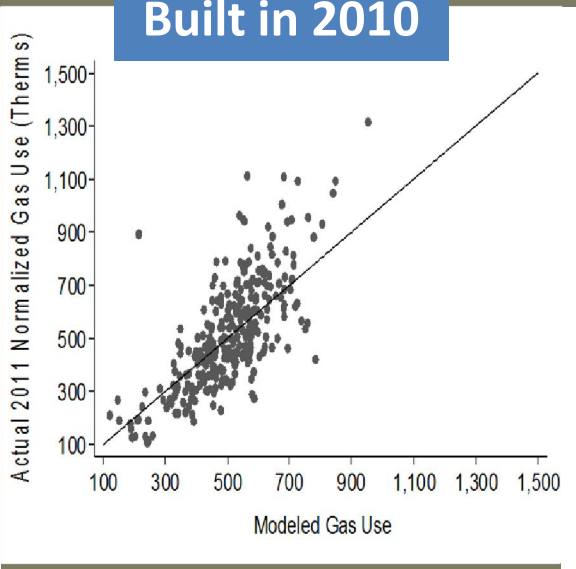
Gas Heated Homes – Gas Use

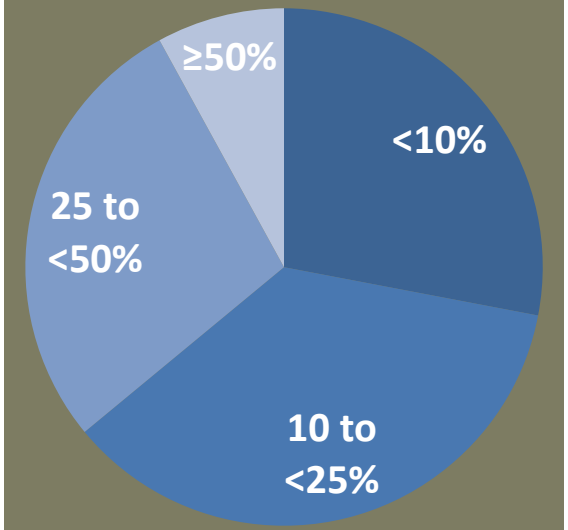
Built in 2009



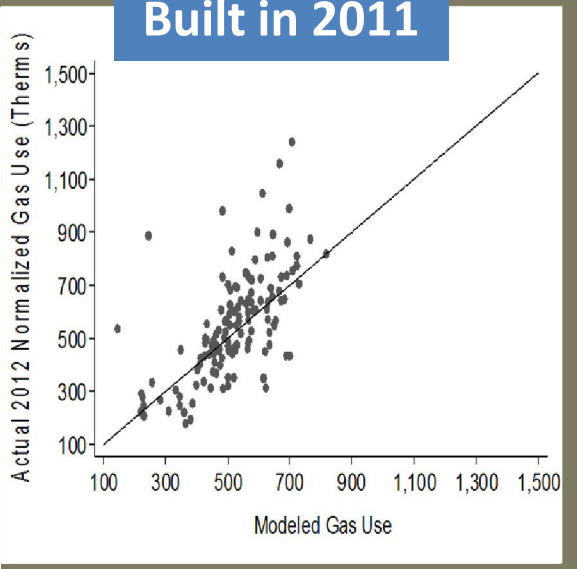


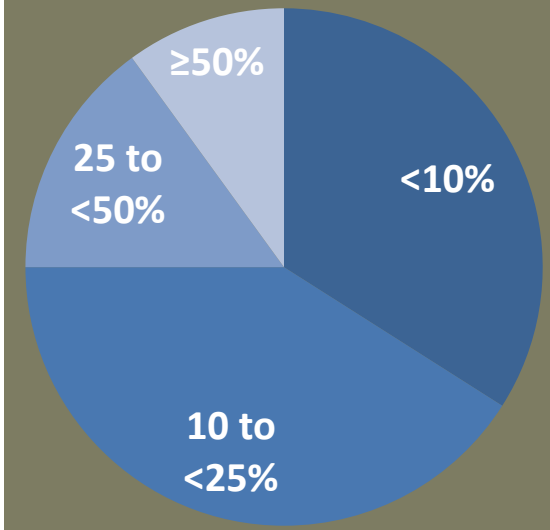
Built in 2010





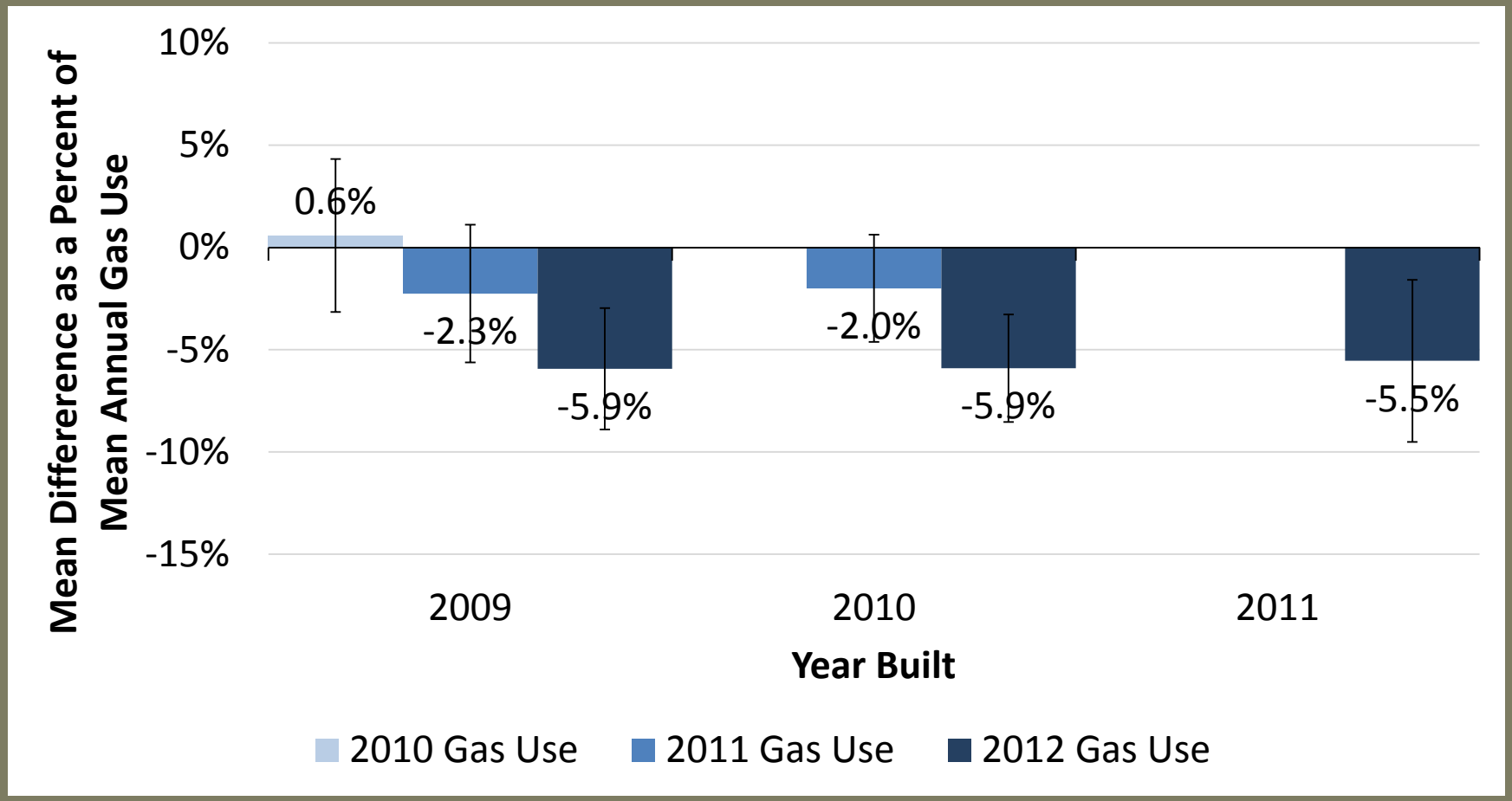
Built in 2011





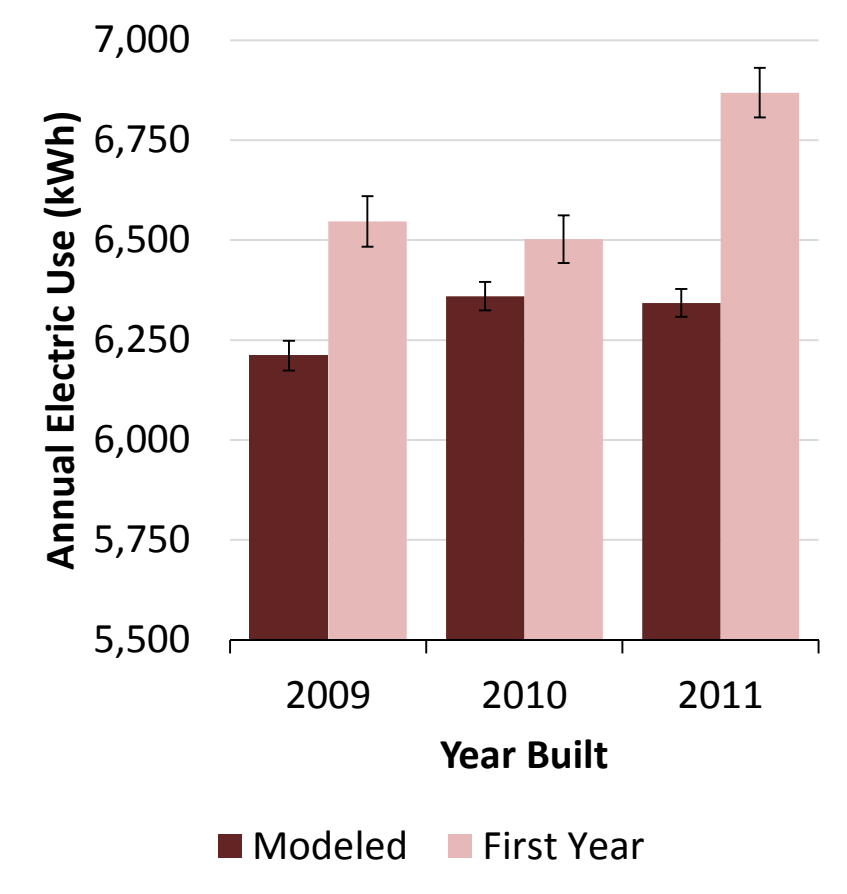
Gas Heated Homes – Gas Use

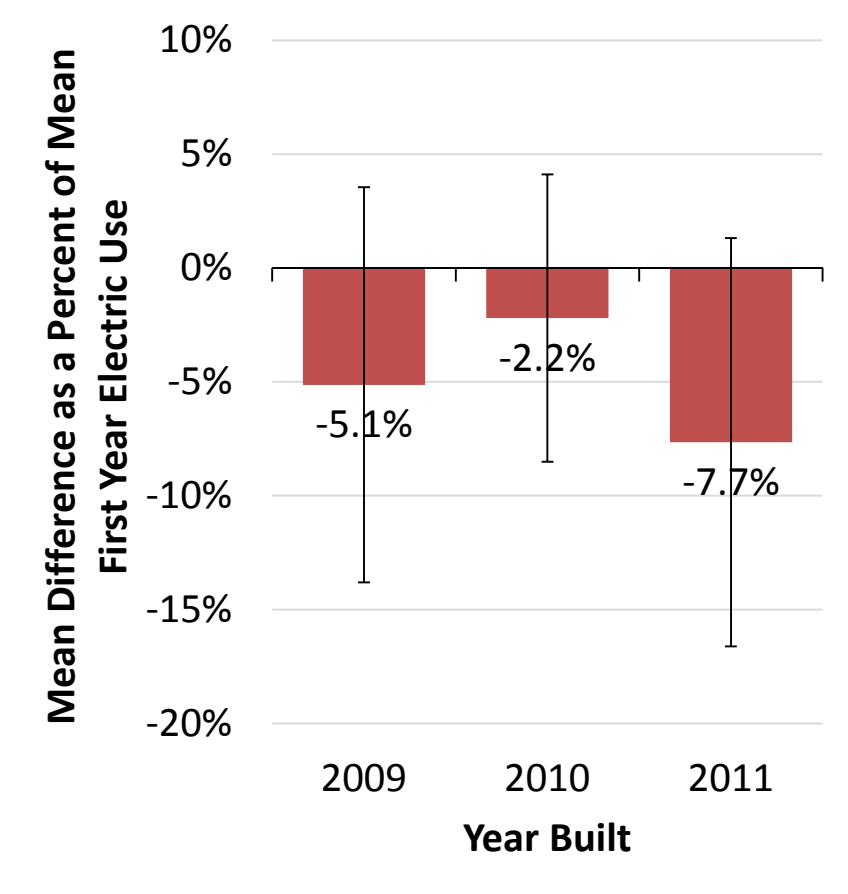
Modeled vs. normalized gas use over time



Gas Heated Homes – Electric Use

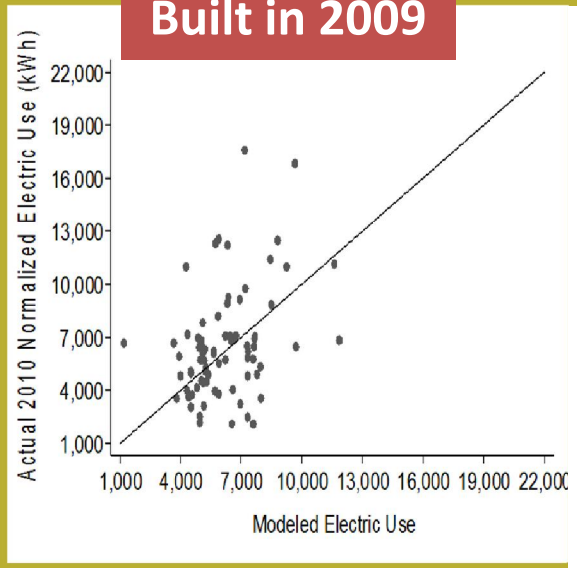
Modeled vs. normalized first year electric use

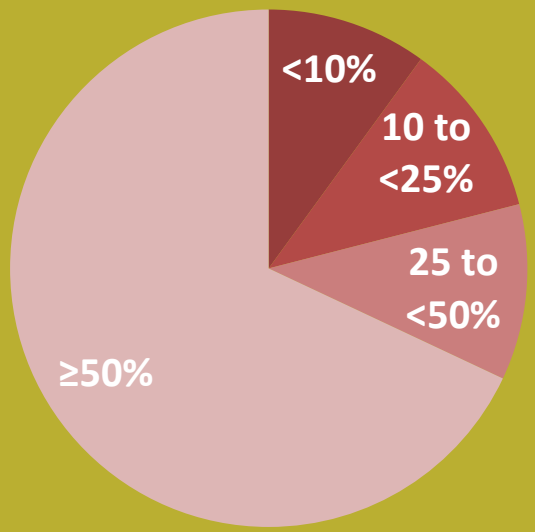




Gas Heated Homes – Electric Use

Built in 2009





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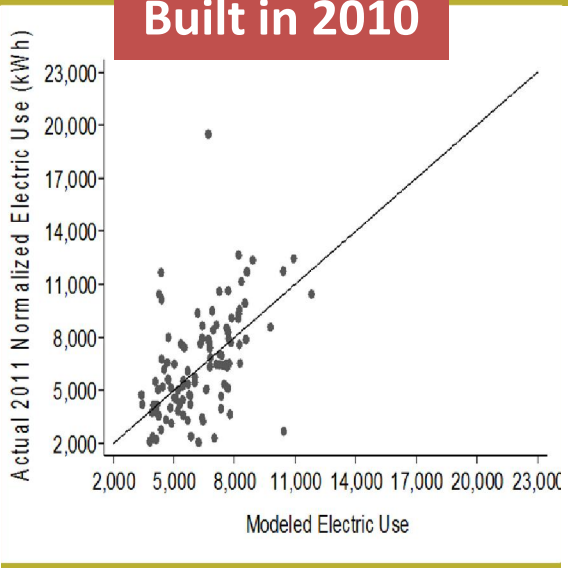

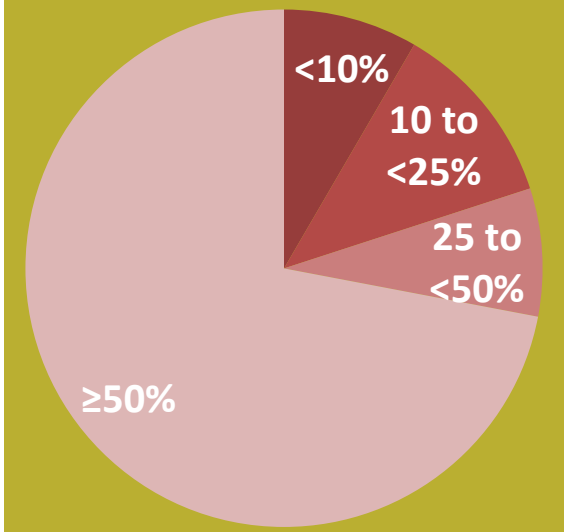

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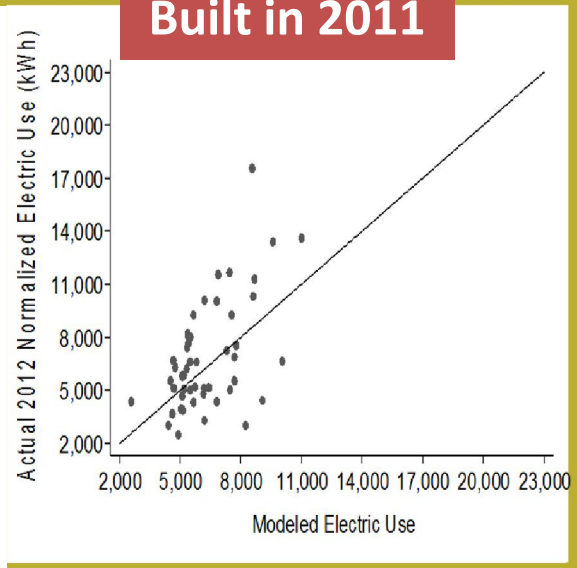
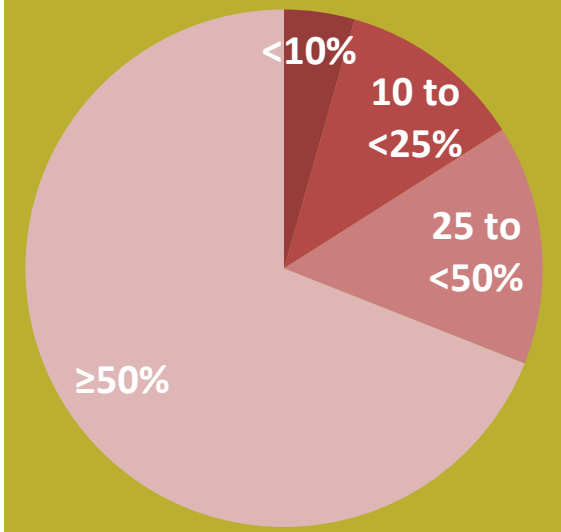
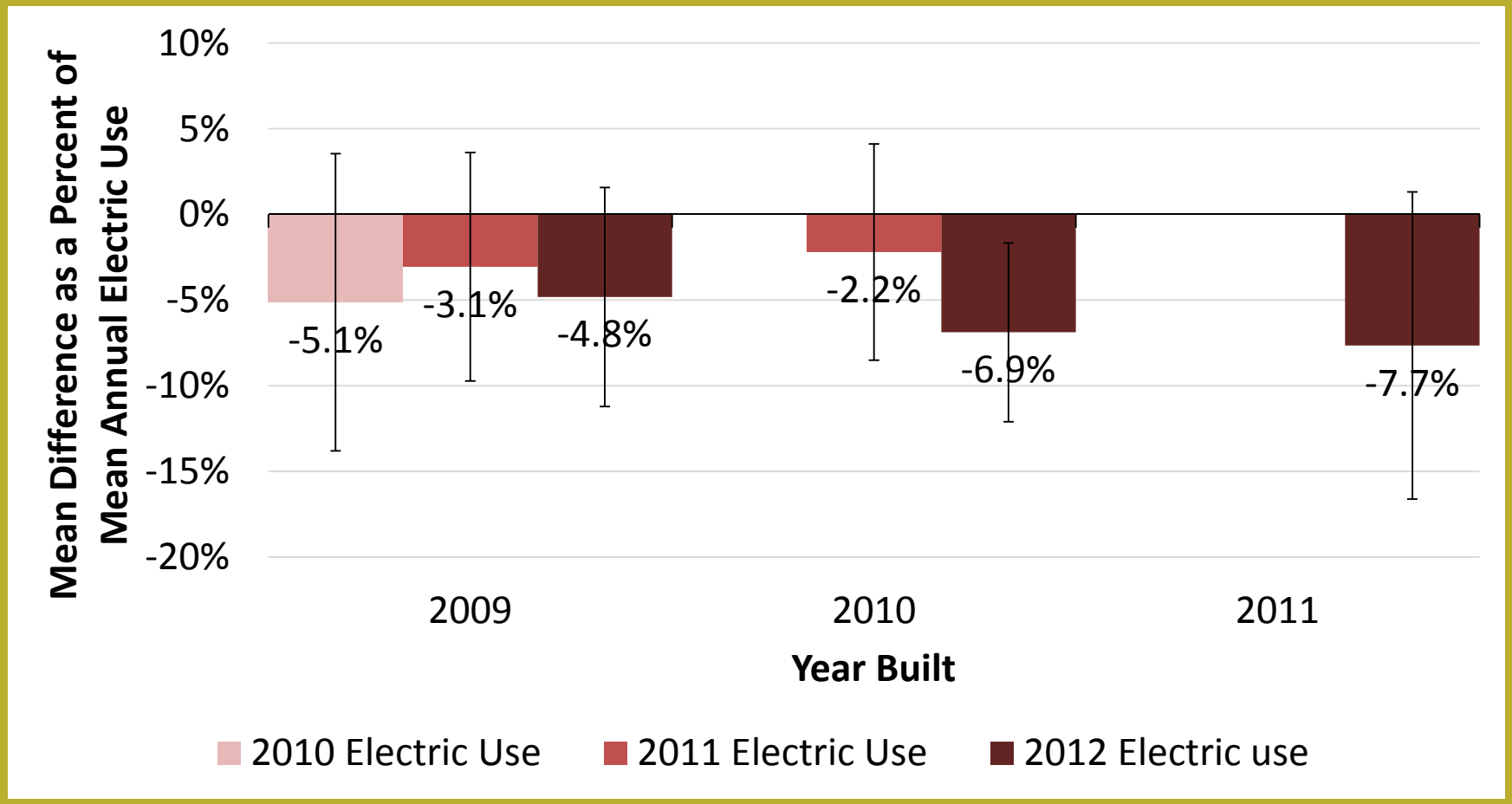
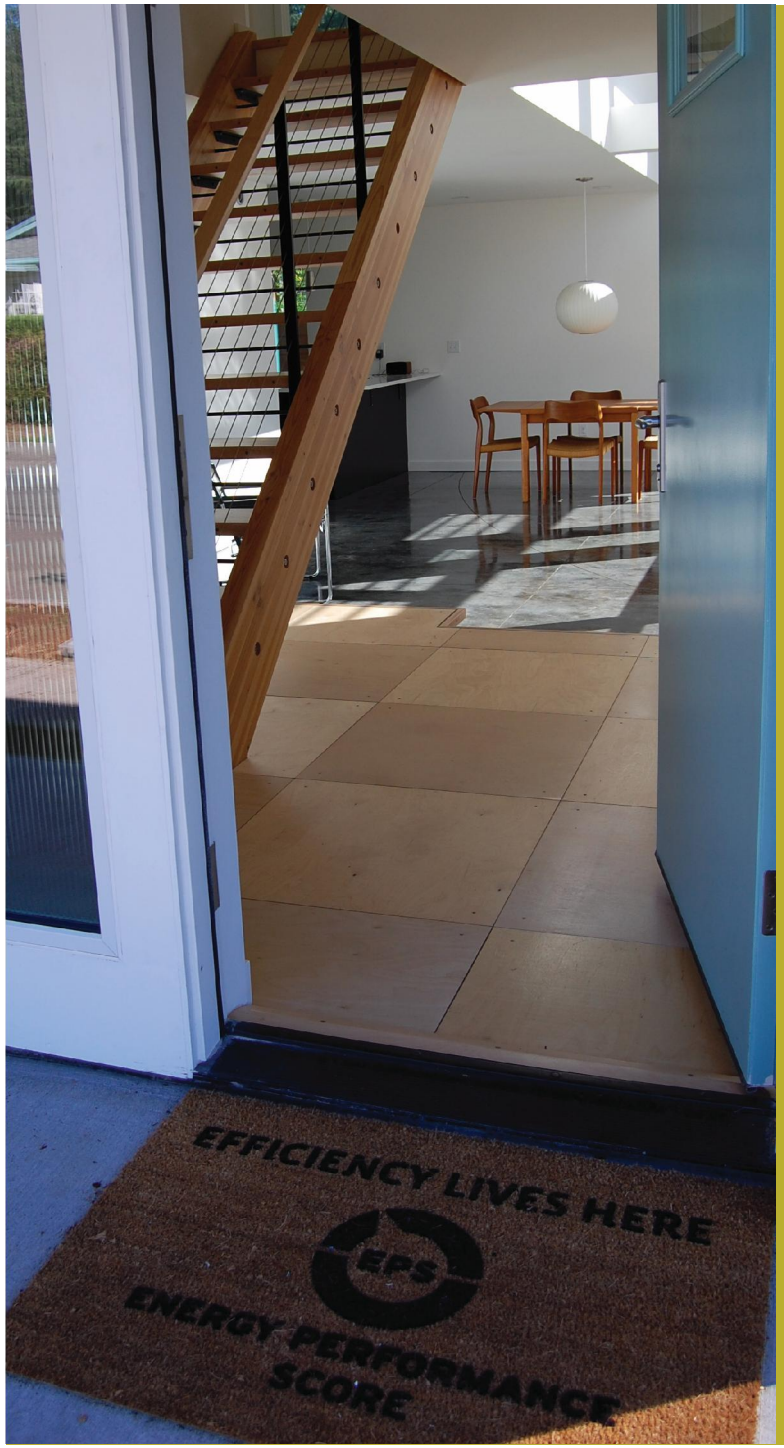




Gas Heated Home – Electric Use

Modeled vs. normalized electric use over time





Conclusions

- On average, energy use estimates were relatively accurate
- Gas was more accurately estimated than electric base load usage
- Substantial variability from home to home
  - ➢ Estimates are off for individual homes

Thank You

Dan Rubado

Evaluation Project Manager

dan.rubado@energytrust.org

503.459.4069

EnergyTrust of Oregon