IMPROVING THE KNOW ON ENERGY EFFICIENT AND HIGH PERFORMANCE WHILE BUILDING VALUE

NC Professional Building Association Conference
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HOME ENERGY EFFICIENCY CERTIFICATIONS

WHAT IS THE VALUE OF ENERGY EFFICIENCY CERTIFICATIONS?

Third-party verifications provide a level of trust and accountability between the builders, the marketers, and the consumers. As Jim Kirby said, “Knowledge without measured review teeters on speculation.”

What benefits of EE/HP Certifications are currently understood and properly utilized? What benefits are not?

These certifications ensure the longevity and comfort of these homes; however, this information is not being effectively passed along after the building stage. Appraisers, realtors, and especially home-owners should be privy to this knowledge. Regardless of EE rating, occupant behavior can significantly impact the actual efficiency of their home.

What challenges exist in implementing EE/HP Certifications?

“Across the region, we see wide disparities in the implementation of energy code, so one thing that is needed is consistency,” according to Mark Jabaley. Disparities between energy raters can allow buildings of different standards to receive the same rating; random choosing of raters, re-inspections, etc., can help mitigate this problem.

How will collecting and correlating extensive data be conducive to increased communication across all professional fields involved?

As said by Skye Dunning, “Data, in the form of a feedback loop for individual builders/projects could be very powerful. We can show them pictures and explain everything, but seeing results, both good and bad, of their work would be much more useful. Modeling is a great tool for decision making during the design phase, but when there is no follow-up with actual performance data, it’s an incomplete process.” Increasing data collection and analysis could help ensure the efficiency of these homes and give realtors/consumers a better idea of what they are dealing with, potentially increasing overall demand for these EE/HP homes.
<table>
<thead>
<tr>
<th></th>
<th>Single Family Builders</th>
<th>Multifamily Builders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currently, doing more than 15% of project green</td>
<td>62%</td>
<td>54%</td>
</tr>
<tr>
<td>Projected by 2018, doing more than 15% of project green</td>
<td>84%</td>
<td>79%</td>
</tr>
<tr>
<td>Currently doing more than 60% of project green</td>
<td>34%</td>
<td></td>
</tr>
<tr>
<td>Currently, doing more than 90% of project green</td>
<td>19%</td>
<td>6%</td>
</tr>
<tr>
<td>Projected by 2018, doing more than 90% of project green</td>
<td>38%</td>
<td>18%</td>
</tr>
<tr>
<td>Belief that consumers will pay more for green (Up to 5%)</td>
<td>73%</td>
<td>68%</td>
</tr>
<tr>
<td>Customers request for green homes because they are better for the</td>
<td>17%</td>
<td>35%</td>
</tr>
<tr>
<td>environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market Share in 2016 Projections for Single Family Homes</td>
<td>26-33% of market (Value of $80 Billion to $101 Billion)</td>
<td></td>
</tr>
<tr>
<td>“Green Building” Market growth</td>
<td>300% from 2013 with $36 Billion to $105 Billion in 2016.</td>
<td></td>
</tr>
</tbody>
</table>
HOW MUCH WILL CONSUMERS PAY

Additional % of Home Costs Customers are Willing to Pay

- Over 10%
- 5-10%
- 1-4%
- Won't pay more
- Don't know

[Bar chart showing the distribution of willingness to pay for Single Family and Multifamily homes]
WHY ENERGY EFFICIENCY IMPORTANCE?

ENERGY USAGE

41% of the total U.S. energy (EIA, 2014).
- Residential (22%)
- Commercial (19%)

- Households spend around $230 billion each year on energy
  - 20% efficiency

- The U.S. residential utility customer consumes an average of 909 kWh/mo
  - space heating (42%),
  - Lighting and appliances (30%),
  - water heating (18%),
  - air conditioning (6%)
  - refrigeration (5%) (EIA, 2009 Residential Energy Consumption Survey).
# Value Added Propositions

<table>
<thead>
<tr>
<th>Premium Price</th>
<th>Fewer Days on the Market</th>
<th>Location</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5,566 more</td>
<td>89 days</td>
<td>Raleigh-Durham-Chapel Hill, NC</td>
<td>NCEEA, 2011</td>
</tr>
<tr>
<td>12.9 % more</td>
<td>42 days</td>
<td>Raleigh, Durham, Chapel Hill, NC</td>
<td>Argeris, 2010</td>
</tr>
<tr>
<td>13.88% (Avg from 2007-2010)</td>
<td>None</td>
<td>Asheville, NC</td>
<td>Mosrie, 2011</td>
</tr>
<tr>
<td>9.6% more</td>
<td>None</td>
<td>Seattle, WA</td>
<td>Griffin, 2009</td>
</tr>
<tr>
<td>4.4% more</td>
<td>31 days</td>
<td>Atlanta, GA</td>
<td>Carson, 2009</td>
</tr>
<tr>
<td>4.2% more</td>
<td>18 days</td>
<td>Portland, OR</td>
<td>Griffin, 2009</td>
</tr>
<tr>
<td>$4,576 more</td>
<td>24 days</td>
<td>Chicago, IL</td>
<td>Elevate Energy, 2014</td>
</tr>
</tbody>
</table>
NC IMPLEMENTATION OF EE/HP
HIGH PERFORMANCE BUILDINGS IN NC
DATA BASELINING

Partners:
- NC Building Performance Association (NCBPA)
- Energy and Environmental Assistance Office of UNC Charlotte’s Energy Production and Infrastructure Center (EPIC)

Objective:
- Collect
- Analyze
- Distribute data

Data is essential to:
- Measure the value and benefits of EE/HP buildings
- Enhance the validation
- Enable clear communication to:
  - Home builders
  - Real estate agents
  - Appraisers
  - Lenders
  - Home buyers/sellers
DATA SET

NCBPA collected data at zip code level information on the homes and buildings which have been retrofitted, rated, or certified to agreed-upon energy efficiency and high performance standards.

Data was collected from 24 sources for certified energy efficient homes who contributed 51,084 validated data points for this study, representing 121,919 EE/HP building certifications.

The initial data evaluation has been completed to provide information in support of the strength of the EE/HP building third party certification programs in NC. It is based on the received sample set which was provided.

It is not a representative statistical sampling set with both certified and non-certified homes designed. Therefore, the current evaluation will be useful in showing the trends for EE/HP buildings in NC from 2006 – 2015.
WHERE WE’VE BEEN, WHERE WE ARE, AND WHERE WE ARE GOING!
DISTRIBUTION BY YEAR

North Carolina Energy Efficient Home and Building Certification by Year

- Commercial Building
- Manufactured Home
- Residential Multi Family
- Residential Single Family
COMPARISON WITH HOMES BUILT IN U.S.

Homes completed in the South - Highest construction completion region in U.S. (% Growth)
TRENDING US SOUTHERN HOMES AND NC EE/HP

Growth U.S. New Homes (%) vs. Growth New EE/HP Homes in South

% change in total housing  % change in EE/HP Certified Building
# Certification Programs

<table>
<thead>
<tr>
<th>Certification Programs</th>
<th># Certifications</th>
<th>% Of Certification</th>
</tr>
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<tbody>
<tr>
<td>ENERGY STAR Certified Homes</td>
<td>52,258</td>
<td>53.2</td>
</tr>
<tr>
<td>HERS Rating</td>
<td>35,097</td>
<td>35.7</td>
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<tr>
<td>LEED</td>
<td>2,682</td>
<td>2.7</td>
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<tr>
<td>2008/2012 NGBS</td>
<td>2,303</td>
<td>2.3</td>
</tr>
<tr>
<td>SystemVision</td>
<td>1,722</td>
<td>1.8</td>
</tr>
<tr>
<td>Duke Energy Progress Residential New Construction Program</td>
<td>1,481</td>
<td>1.5</td>
</tr>
<tr>
<td>ENERGY STAR Buildings and Plants</td>
<td>1,242</td>
<td>1.3</td>
</tr>
<tr>
<td>GreenBuiltNC</td>
<td>1,040</td>
<td>1.1</td>
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# Certification Method Implementation by Year

<table>
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<tr>
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<tr>
<td>2008</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>2009</td>
<td>2,000</td>
<td>2,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2010</td>
<td>4,000</td>
<td>4,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2011</td>
<td>6,000</td>
<td>6,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>2012</td>
<td>8,000</td>
<td>8,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>2013</td>
<td>10,000</td>
<td>10,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>2014</td>
<td>12,000</td>
<td>12,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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DISTRIBUTION IN NC
DISTRIBUTION IN NC
ZIP CODE AREA REPRESENTED

ENERGY EFFICIENT HOMES & BUILDINGS IN NC
This map is representative of structures built with confirmed energy efficiency certifications and verifications.

Energy Efficient Building Structures
Verifiable reported ZIP codes

Cartography By: UNC CHARLOTTE EBAO
Source: NCEPA, US CENSUS, NC OERMAP
ENERGY EFFICIENT HOMES & BUILDINGS IN NC

This map is representative of structures built with confirmed energy efficiency certifications and verifications.

Energy Efficient Building Structures

<table>
<thead>
<tr>
<th>Density (Square Miles)</th>
<th>Color</th>
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<tbody>
<tr>
<td>0.0085 - 2.2</td>
<td>Blue</td>
</tr>
<tr>
<td>2.3 - 6.1</td>
<td>Gray</td>
</tr>
<tr>
<td>6.2 - 12</td>
<td>Green</td>
</tr>
<tr>
<td>13 - 17</td>
<td>Yellow</td>
</tr>
<tr>
<td>18 - 23</td>
<td>Orange</td>
</tr>
<tr>
<td>24 - 32</td>
<td>Red</td>
</tr>
</tbody>
</table>

Cartography By: UNC CHARLOTTE EEAQ
Source: NCBPA, US CENSUS, NC ONEMAP
EXISTING HOMES AND BUILDINGS EE/HP CERTIFICATIONS

EE/HP Certifications on Existing Buildings by Type

- Commercial Building
- Residential Multi Family
- Residential Single Family
BRIDGING THE GAP ON VALUATION – BUILDING VALUE ACROSS THE MARKET SECTORS
LENDERS:

Challenges:

- Lower utilities cost of EE/HP homes not included within consideration of owners capacity for financial payments of mortgages.
- Risk premiums are generally considered same as code homes; however, experience has shown there is less risk within the EE/HP homes; as homebuyers are finding more satisfaction and staying longer fulfilling the debt of the home. Institute for Market Transformation (IMT) a nonprofit organization based out of Washington D.C. examined 70,000 mortgages nationwide and found the odds of default on Energy Star rated homes a third less than conventional residences at 32% (Kaza, et.al, 2014). It was also noted that the odds of prepayment which decreases the profitability level for lenders was 28% lower.

Implementation Ideas:

- Promote EE/HP building measures through direct linkage to traditional residential mortgages within the mainstream of financial markets.
- Include energy efficient renovations with mortgages for existing homes and refinancing.
- Provide greater promotion of the Energy Efficient Mortgages (EEM) backed by Federal Housing Administration and Dept. of Veterans Affairs.
- Provide premium value within the loans for lower risk; for example lower interest rates, more flexible credit profile.
- Provide for higher debt to income ratio with considerations for lower monthly utility costs.
- Develop information to enable wide spread education for lending industry on advantages of EE/HP homes.
APPRAISERS:

Challenges:

- Accurate reporting of value of EE/HP features. With features not being valued or ignored, the appraisal report will not provide a clear accounting of the home’s value; which in turn would prevent the loan amount to cover the cost and make the homes outside of the reach to many home buyers.

- Scope of work for appraisers are generally fee paid ~$200; with 34 different ways to certify a home in NC with energy efficiency the understanding of the benefits are confusing. As such a consistent benefit and value is hard to quantify with the specifics of each home having different versions and energy efficient mechanisms.

- Impacts of EE/HP homes are minimized with more changes in the certification/verification programs and values.

Implementation Ideas:

- Collect the data and seek for consistency in measurement of value to provide appraisers the baseline in establishing the value of EE/HP Homes.

- Seek for consistency of data to allow validation and comparison.

- Provide communication between the energy rater/verifier and the appraiser, leave the report and contact information for the appraiser.
REAL ESTATE AGENTS:

Challenges:

- EE/HP home features may not be showcased within the MLS.
  - If the features are listed, it may be limited in options to choose.
- Different fields for energy efficiency and performance in sales listings within the MLS.
- Difficult to quantify the value of the EE/HP features.
- Risks involved with overstating the value.

Implementation Ideas:

- Collect data to create the needed valuation of the features of EE/HP within a home that can be accepted and implemented.
- Work with the MLS process to get MLS listing areas for the EE/HP features.
- Work with potential owners to aid their understanding of lower utilities cost, premium home resale value and less time on the market.
- Enjoy the benefits of premium pricing and faster market sales timeframe.
- Understand the capabilities to increase customer satisfaction with homes that cost less to own, have improved air quality and are more comfortable, and require less maintenance.
HOME OWNER/CONSUMER:

Challenges:

- High upfront cost of energy efficiency features may prohibit potential homeowners in moderate to low-income accessibility to EE/HP homes.
- Costs may be above the mortgage level sought and difficult to finance.
- Difficult to understand the value to the home owner for the energy efficiency and home performance.

Implementation Ideas:

- Creation of home mortgages where the energy efficiency features are included.
- Creating affordable housing and lending mechanisms will enable a broader adoption market and rate of adoption for energy efficiency. The created utility savings enables capability for home owners within fixed income; if recognized within the lending / appraisal process.
- Documented energy savings on utility bills will incentivize owners to seek homes with EE/HP certifications; ENERGY STAR deliver about 20% savings (EPA ENERGY STAR, 2015).
- Educate home owner on the value of EE/HP homes as a better built home with increased comfort and indoor air quality, lower monthly utility bills, and improved environment stewardship than a code-built home.
BUILDERS/CONSTRUCTION/DEVELOPERS:

Challenges:

- Need an accurate value of EE/HP features recognized by market, or consumers to yield payback of investment. With features not being valued or ignored, the builder/construction/developer fails to regain investment and loses interest in pursuing EE/HP housing development.

- Continued implementation of energy efficiency features within homes. In general, homes built in 2000’s (36,000BTUs) have increased in energy efficiency (21%) when compared with homes built prior to the 1970s oil embargo (47,000 – 50,000BTUs) (Joint Center for Housing Studies, 2013). Yet, with increased sizes of homes the net gain is not recognized; it is mainly a negating of the increased sizing needs for homes 30% larger only showing a net increase of 2% (EIA, 2015).

Implementation Ideas:

- Collect the data and promote the advantages of EE/HP homes. When homes can be sold faster and for higher pricing the developer can continue to provide funding within the company to build the next homes.

- Continue the upward trends of energy efficiency.

- Provide communication between the energy rater/verifier and the appraiser, leave the report and contact information for the appraiser within the built homes.

- Build marketing campaigns to highlight the improvements within EE/HP homes to consumers and the company’s commitment and successes.
CREATING THE KNOWLEDGE BASE AND KEEPING ON THE TRACKING ROUTE

Data from 75,000 EE/HP homes
- technical report
- white paper
- presentation

Continued data collection and dissemination for EE/HP Certified Buildings
- Additional work to provide a statistical valid data set including general construction, home sales cost and timeframes, and energy efficiency savings will enhance the knowledge on EE/HP buildings values.
UNLOCKING THE VALUE OF AN ENERGY EFFICIENT HOME, A BLUEPRINT TO MAKE ENERGY EFFICIENCY IMPROVEMENTS VISIBLE IN THE REAL ESTATE MARKET

Step 1: Document energy efficiency features and improvements using consistent, standardized methods.

Step 2: Disclose inventories of energy efficient homes to track supply.

Step 3: Capitalize on existing high-quality continuing education and designation training.

Step 4: Work with the MLS community to ensure that data about home energy efficiency improvements are incorporated into for-sale listings.

Step 5: Ensure that the data about home energy efficiency improvements are incorporated into the appraisal process.

Step 6: Develop standards and IT solutions that allow quicker and more automated transfer of data.

Step 7: Work with partner financial institutions to ensure selection of qualified appraisers.

COMMUNICATING
BRINGING FORTH BEHAVIOR CHANGE
KEEPING EVERYONE INFORMED - CREATING VALUE ALONG THE WAY!
# A VALUE PROPOSITION FOR ALL

<table>
<thead>
<tr>
<th>Sector</th>
<th>Value Proposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Owner</td>
<td>Utility savings yielding more funds for mortgage payment, comfort, improved air quality and less maintenance.</td>
</tr>
<tr>
<td>Lender</td>
<td>Additional family funds to pay mortgages minimizing risks for default and early payoff as less is spent for utilities, Increased value of the home.</td>
</tr>
<tr>
<td>Real Estate Agent</td>
<td>Premium pricing and faster sales with a higher performance building and energy efficient features.</td>
</tr>
<tr>
<td>Builder</td>
<td>Greater market demand shown by faster sales and capabilities to recover costs.</td>
</tr>
<tr>
<td>Appraiser</td>
<td>Increased value of the home needs to be understood for EE/HP; therefore an appraiser with the capabilities to do so could be in high demand for services.</td>
</tr>
</tbody>
</table>
“Duke Energy Progress is working with builders across its service territory to build better and more efficient homes. Through the Duke Energy Progress Residential New Construction (RNC) program, homes that meet the 2012 NCECC High Efficiency Residential Option (HERO) are designed and built to increase energy savings. A builder meeting HERO requirements is producing an independently verified higher performing home. A buyer who purchases a qualifying home through the RNC program is choosing savings in energy costs, as well as better quality construction and enhanced comfort. The RNC program has 395 participating homebuilders which have incorporated energy efficiency measures in over 5000 homes resulting in over 10,000,000 kWh savings.”

IMPROVING THE KNOW ON ENERGY EFFICIENT AND HIGH PERFORMANCE WHILE BUILDING VALUE

A white paper
Call to action!
IMPROVING THE KNOW ON ENERGY EFFICIENT AND HIGH PERFORMANCE WHILE BUILDING VALUE

Energy Efficient and High Performance (EE/HP) Buildings in NC .................................. 3

So with NC leadership along with greater demand and value, why are we not yielding greater profits from EE/HP? Aha! The problem… We need to gather the facts and let others know! ................................................................................................................................. 5

Starting the Story with 121,919 EE/HP Building Certifications .............................. 5

Using Data to Show the Strength of EE/HP ................................................................. 5

Using Data to Show the Locations of EE/HP in NC ..................................................... 7

Story started and impact evident, how do we continue? Aha! The solution continues… 7

We need your help providing Data! Why? The data becomes a critical factor in providing the validity of the results. ................................................................. 8

We need your help in discussing and understanding the implications of the EE/HP within your sector of the market? Communicating brings understanding of the issues and seeks to yield behavior change! ................................................................. 8

We need to gather the facts from each of us and use it to inform all around us! .... 9

Creating the Win-Win Through EE/HP Third Party Certified Homes and Buildings! .... 9

As we all work together to provide data and inform others, we can develop an effective and efficient business process that carries EE/HP home and buildings through the process of being designed, financed, built, appraised, and bought to include the extra value. 10
AS WE ALL WORK TOGETHER TO PROVIDE DATA AND INFORM OTHERS, WE CAN DEVELOP AN EFFECTIVE AND EFFICIENT BUSINESS PROCESS THAT CARRIES EE/HP HOME AND BUILDINGS THROUGH THE PROCESS OF BEING DESIGNED, FINANCED, BUILT, APPRAISED, AND BOUGHT TO INCLUDE THE EXTRA VALUE.

To participate within data collection or discussions, Contact Regina Guyer at rguyer@uncc.edu or 704-687-1934.