WORKING GROUP ON BUILDING ENERGY DISCLOSURE

RATING BACKGROUND & TECHNICAL GROUNDING

August 12, 2011

Richard Faesy, Energy Futures Group
Overview

- Background for Richard Faesy
- Why disclosure is important
- Scope
- Some terms and concepts
- History of ratings/labeling/disclosure
- Rating and labeling examples
- Vermont’s experience and infrastructure
Background for Richard Faesy

- Principal at Energy Futures Group (EFG) of Hinesburg since May 2010
- Previously: 20+ years at Vermont Energy Investment Corp. (VEIC)
  - Energy Efficiency Division Manager within Consulting Group
- Founding Board Member of RESNET 1995-2010
- Started Vermont’s Home Energy Rating System in 1986
Labeling of Cars & Appliances

Compare this vehicle to others in the FREE FUEL ECONOMY GUIDE available at the dealer.

CITY MPG
23

For Comparison Shopping, all vehicles classified as COMPACT have been issued mileage ratings ranging from 1 to 31 mpg city and 16 to 41 mpg highway.

HIGHWAY MPG
30

Actual Mileage will vary with options, driving conditions, driving habits and vehicle's condition. Results reported to EPA indicate that the majority of vehicles with these estimates will achieve between 19 and 27 mpg in the city and between 26 and 35 mpg on the highway.

1993 CANARY 2.0 LITER
L4 ENGINE FUEL INJECTED
AUTO 3 SPD TRANS CATALYST
FEEDBACK FUEL SYSTEM

Estimated Annual Fuel Cost:
$850

ENERGYGUIDE

Compare the Energy Use of this Refrigerator with Others Before You Buy.

This Model Uses
442 kWh/Year

Uses Least
Energy
457

Uses Most
Energy
$30

Energy use (kWh/Year) is a measure of energy (electricity) use. Your utility company uses K to compute your bill. Only models with 20.5 to 22.4 cubic feet and the above features are used in this scale.

Refrigerators using more energy cost more to operate. This model's estimated yearly operating cost is:

$37
Why is disclosure important?

1. Creates an “MPG sticker” for buildings
2. Protects buyers and lenders by providing disclosure of energy costs
3. Protects sellers who have invested in energy improvements to their buildings
4. Delivers economic benefits to Vermont by stimulating demand for contractors reducing energy costs by as much as $800 million over 20 years
5. Supports Vermont’s goal of upgrading 80,000 homes by 25% by 2020
Building Energy Labeling Cycle

+ Bill savings
+ Green jobs
- CO₂ emissions

OWNER DISCLOSES ENERGY RATING

Owners invest in energy efficiency upgrades

Market values energy performance

Buyers/renters fully informed

Buyers/renters favor efficient properties
Scope

- Residential & Commercial
- New Construction & Existing Buildings
  - Code compliance
  - Time of transaction
  - Periodic reporting
- Government Buildings (?)
  - Some jurisdictions require regular state & municipal building reporting to encourage efficiency progress over time and accountability to taxpayers
Terms & Concepts

- **Audit:**
  - RESNET and Building Performance Institute (BPI) have standards
  - Information collection, analysis and reporting requirements by certified auditor
  - No quantification presented for house-to-house comparisons

- **Rating:**
  - *Comparative* energy performance assessment
  - “Home Energy Rating System”, or HERS, is not the only “rating”
  - “Scorecard”, “Energy Performance Score”, etc.

- **Label:** Presentation of rating results
- **Asset rating**: Comparative energy performance assessment of a building’s structural components based on building features and simulated operating conditions.

- **Operational rating**: Comparative energy performance assessment of a building based on actual energy consumption and operating conditions, typically normalized for climate, occupancy, operating hours, floor area and other factors.

- **Site Energy vs. Source Energy**: Customer side “of the meter” vs. from extraction and utility
Hierarchy for “Rating Tools”

HEST vs. HERS Granularity

Home Energy Score

Online Screening

In-Home Survey

Diagnostic Home Survey

RESNET HERS Rating

Comprehensive Energy Audit

Building Labeling History

1997
Mandatory disclosure
Denmark (res+comm)

1999
Mandatory disclosure
Australian Capital Territory ACT (residential)

2003
EU EPBD - must be transposed to national law by member states
Jan. 2006

2007-09
Multiple regions pass legislation or announce schemes in US and elsewhere

2009
Mandatory disclosure implementat’n (res+comm) for all EU member states
IMT’s Commercial Report
C&I Terms & Concepts

- **Benchmarking**: Process of comparing building energy performance against a baseline and generating performance metrics.

- **Portfolio Manager**: Building energy rating tool administered by EPA that generates energy performance metrics for commercial and multifamily building types.
What is “Portfolio Manager”?

- Free, web-based tool for benchmarking existing non-residential and multifamily buildings
- Provides benchmarks for all commercial buildings, including: ENERGY STAR energy performance score (1 to 100) for eligible buildings
- Normalized energy use intensities (EUI) for all buildings
  - EUI = a measurement of the energy consumed by a building relative to its size
- Facilitates applications for ENERGY STAR certification and Leaders recognition (top 25% in each building class)
## U.S. Commercial Rating & Disclosure Summary

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Benchmarking (Building Type and Size)</th>
<th>Disclosure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-residential</td>
<td>Multi-family</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Austin</td>
<td>10k SF+</td>
<td>-</td>
</tr>
<tr>
<td>California*</td>
<td>1k SF+</td>
<td>-</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>50k SF+</td>
<td>50k SF+</td>
</tr>
<tr>
<td>New York City</td>
<td>50k SF+</td>
<td>50k SF+</td>
</tr>
<tr>
<td>San Francisco</td>
<td>10k SF+</td>
<td>-</td>
</tr>
<tr>
<td>Seattle</td>
<td>10k SF+</td>
<td>5+ units</td>
</tr>
<tr>
<td>Washington</td>
<td>10k SF+</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 1: U.S. Rating and Disclosure Policy Summary

*Requirements subject to change by the California Energy Commission.*
EU Labels
Some U.S. Options

The image on the left shows a HERS® Index chart with the HERS® Index ranging from 0 to 150. The chart includes categories for existing “Typical” Home, American Standard New Home (2006), and EPA ENERGY STAR New Home. The HERS® Index for This Home is 70.

The image on the right depicts a chart for Building Energy Quotient with different performance levels: Net-Zero Energy, High Performance, Very Good, Good, Fair, Poor, and Unsatisfactory.
The EFS is brought to you by Energy Trust of Oregon. Energy Trust makes it easy for homes to identify ways to use energy more efficiently. We provide cash incentives for everything from energy-saving products to insulation to solar energy systems.

For more information visit www.energystat.or/eps.
DOE’s New Home Energy Score

HOME ENERGY SCORE

Address: 555 Park Lane
Pittsburgh, PA 99999

Total Energy: 190 MBTU / year
Home Size: 1,500 square feet
Air Conditioning: Yes

Climate Zone

Score with Upgrades: 8
Current Score: 6

Estimated Annual Savings: $520

Top 20% of similarly sized homes score here or better

Uses More Energy: 1, 2, 3, 4, 5
Uses Less Energy: 9, 10

Energy use reported in Million British Thermal Units (MBTU). Estimated savings reflect the amount a homeowner will save on their annual utility bill if all recommended improvements are made. Both energy use and savings estimates assume that 2 adults and 1 child live in the home. Your actual energy use and savings will depend on how you maintain your home, how many people live there, your day-to-day habits and weather. To learn more about how to save energy and money in your home, as well as more about the home energy score, visit:

homeenergyScore.gov

Assessor #: 85317 Assessment Date: 11/05/2010 Label #: 000062465
**Uniform Energy Rating System**

<table>
<thead>
<tr>
<th>Uniform Energy Rating System</th>
<th>Energy Efficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Star</td>
<td></td>
</tr>
<tr>
<td>1 Star Plus</td>
<td></td>
</tr>
<tr>
<td>2 Stars</td>
<td></td>
</tr>
<tr>
<td>2 Stars Plus</td>
<td></td>
</tr>
<tr>
<td>3 Stars</td>
<td></td>
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<td>3 Stars Plus</td>
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<td>500-401</td>
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<td>400-301</td>
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<tr>
<td>85-71</td>
<td></td>
</tr>
<tr>
<td>70-0</td>
<td></td>
</tr>
</tbody>
</table>

**HERS Index:** 55

**General Information**

- **Conditioned Area:** 2146 sq. ft.
- **Conditioned Volume:** 15473 cubic ft.
- **Bedrooms:** 3
- **House Type:** Single-family detached
- **Foundation:** Unconditioned basement

**Mechanical Systems Features**

- **Heating:** Fuel-fired hydronic distribution, Propane, 92.0 AFUE.
- **Water Heating:** Integrated, Propane, 85 EF, 80.0 Gal.
- **Duct Leakage to Outside:** NA
- **Ventilation System:** Exhaust Only: 169 cfm, 54.0 watts.
- **Programmable Thermostat:** Heating: Yes, Cooling: No

**Building Shell Features**

- **Ceiling Flat:** R-37
- **Vaulted Ceiling:** NA
- **Above Grade Walls:** R-19
- **Foundation Walls:** R-10.0
- **Slab:** None
- **Exposed Floor:** R-39, R-0
- **Window Type:** U:0.35, SHGC:0.30
- **Infiltration Rate:** Htg: 830 CfG, 830 CFM/50
- **Method:** Blower door test

**Lights and Appliance Features**

- **Percent Fluorescent Pin-Based:** 70.00
- **Clothes Dryer Fuel:** Electric
- **Percent Fluorescent CFL:** 0.00
- **Range/Oven Fuel:** Propane
- **Refrigerator (kWh/yr):** 460.00
- **Ceiling Fan (cfm/Watt):** 0.00
- **Dishwasher Energy Factor:** 0.66

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**Estimated Annual Energy Cost**

<table>
<thead>
<tr>
<th>Use</th>
<th>MMBtu</th>
<th>Cost</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating</td>
<td>71.7</td>
<td>$2276</td>
<td>67%</td>
</tr>
<tr>
<td>Cooling</td>
<td>0</td>
<td>$0</td>
<td>0%</td>
</tr>
<tr>
<td>Hot Water</td>
<td>3.9</td>
<td>$125</td>
<td>4%</td>
</tr>
<tr>
<td>Lights/Appliances</td>
<td>22.6</td>
<td>$868</td>
<td>26%</td>
</tr>
<tr>
<td>Photovoltaics</td>
<td>-0.0</td>
<td>$-0</td>
<td>-0%</td>
</tr>
<tr>
<td>Service Charges</td>
<td>119</td>
<td>$119</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>$3389</td>
<td>100%</td>
</tr>
</tbody>
</table>

**This home meets or exceeds the minimum criteria for all of the following:**

- Federal Energy Policy Act, 2005*
- Vermont Energy Star Homes Criteria*
- Vermont Residential Energy Code*

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* Compliance with criteria for this program is determined by the rater.

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Vermont Energy Investment Corp.
255 South Champlain St.
Burlington, VT 05401
800-639-6099
Fax 802-658-1643
www.velco.org
Less Granular HERS Concept
Vermont’s Experience & Infrastructure

- **Home Energy Rating Systems (HERS)**
  - Started Energy Rated Homes of Vermont in 1987
  - Board director of RESNET (national HERS standards-setting organization) since its inception in 1995 (www.resnet.us)
  - Basis for ENERGY STAR Homes, Green Building Standards (LEED, NAHB...)

- Developed and ran Energy Improvement Mortgage programs in Vermont through the 90s with the VHFA, FHA, VA, Freddie, Fannie etc.

- **Building Performance Institute (BPI) Certification**
  - 70+ certified contractors & businesses
  - Statewide presence of energy professionals
  - Audit and improvement work completion capability and capacity
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