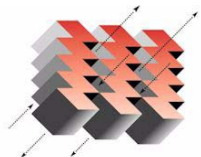


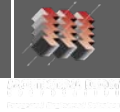
Rating Software Challenges for Existing Buildings

2009 RESNET Conference

V. Robert Salcido, P.E., LEED AP
Architectural Energy Corporation



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CORPORATION
Integrated Engineered Solutions



Home Energy Rating - (Asset Rating)

Rated
Home



Home as input

Modified
Rated Home



• Copy of home as input

- Same geometry
- Same orientation
- Same systems
- Same utility rates
- Same weather data

• RESNET rules applied

- Setpoint temperatures
- Window shading
- MV/Infiltration
- Lights and Appliances

Reference
Home

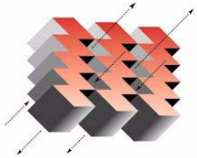


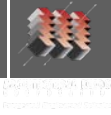
• Copy of modified rated home

- Same geometry
- Same orientation
- Same systems
- Same utility rates
- Same weather data

• Reference home rules applied

- U-values
- Infiltration rate
- Window area/orientation/SHGC
- Mechanical efficiencies
- Distribution system efficiency
- Remove renewables

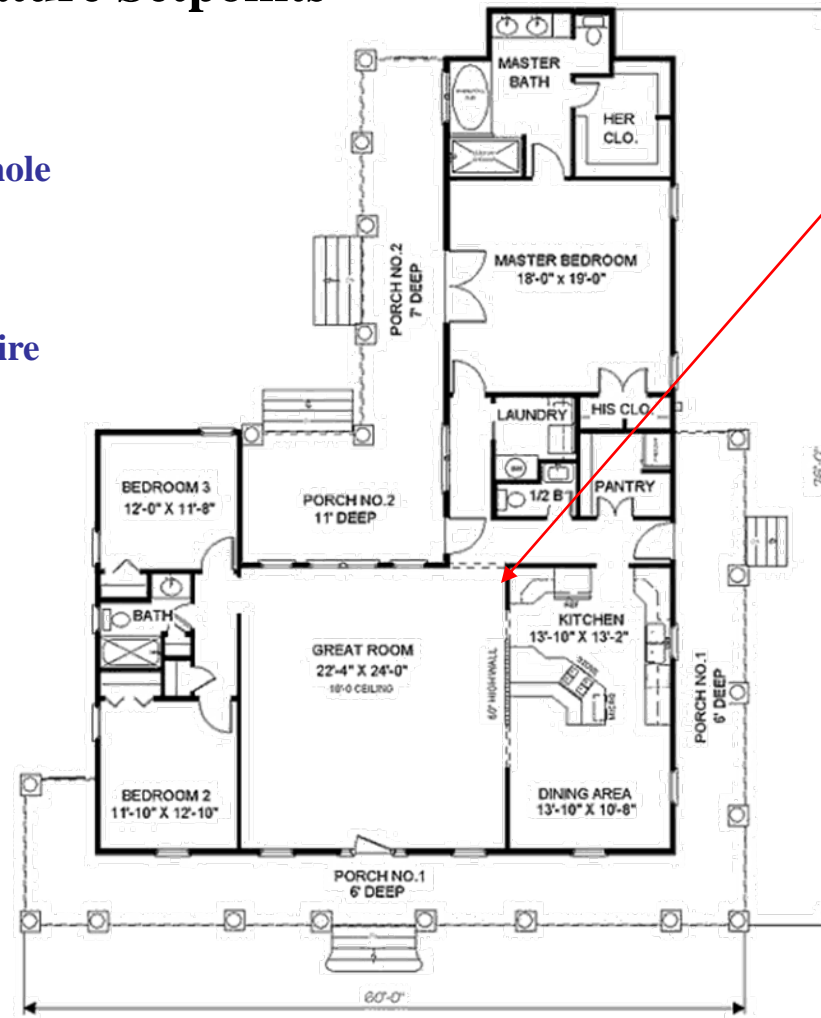




Challenges of Asset Rating on Existing Homes

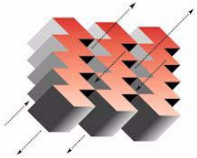
Temperature Setpoints

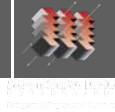
When conducting a whole building analysis, the setpoint temperature represents the average temperature in the entire building.



Thermostat location

During the heating season, temperatures in the bedrooms may be lower than the 68 F setpoint.

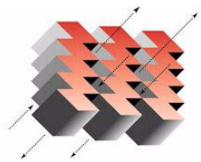
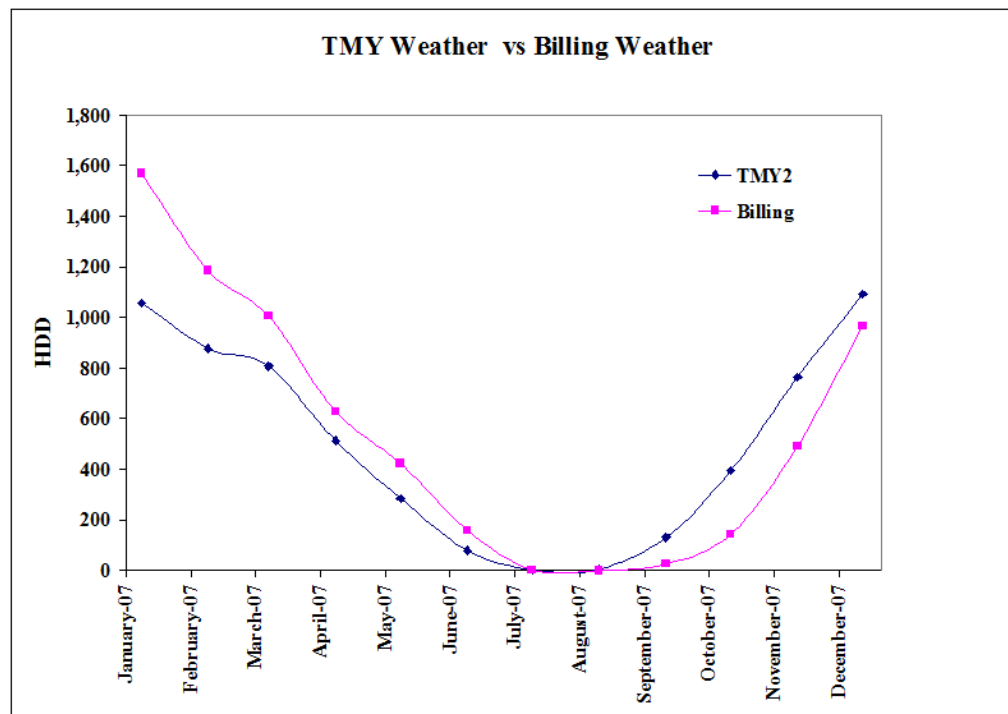


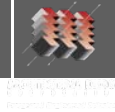


Challenges of Asset Rating on Existing Homes

Weather Extremes

- **Typical Meteorological Year (TMY2) weather data is based on 30 year average. Each month represents an average month from a specific year.**
- **Utility bills represent energy consumption from real weather and may be more or less extreme than TMY2 weather data**

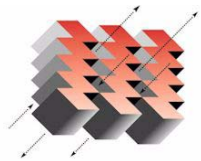
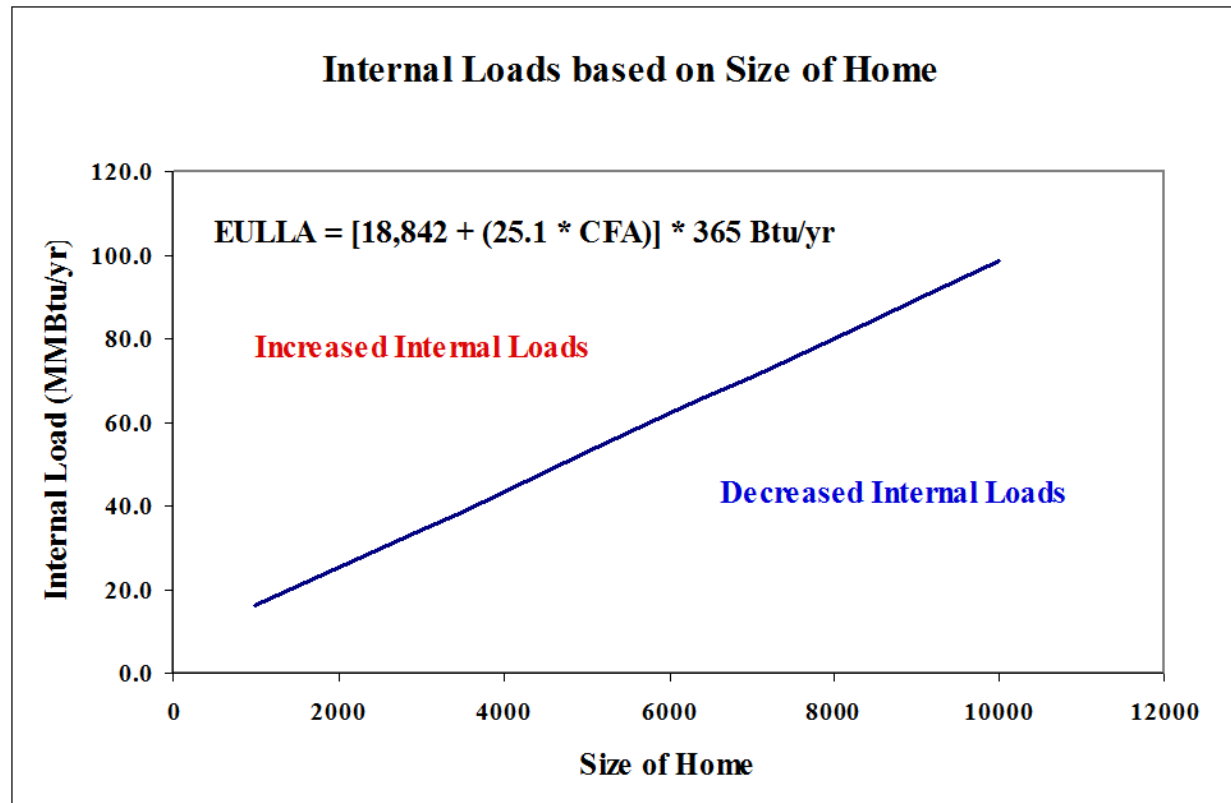


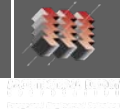


Challenges of Asset Rating on Existing Homes

Internal Loads

- RESNET guidelines state that internal loads are calculated based on conditioned floor area.
- Existing home may have lower or higher internal loading

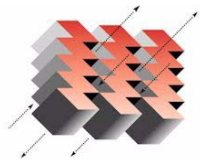
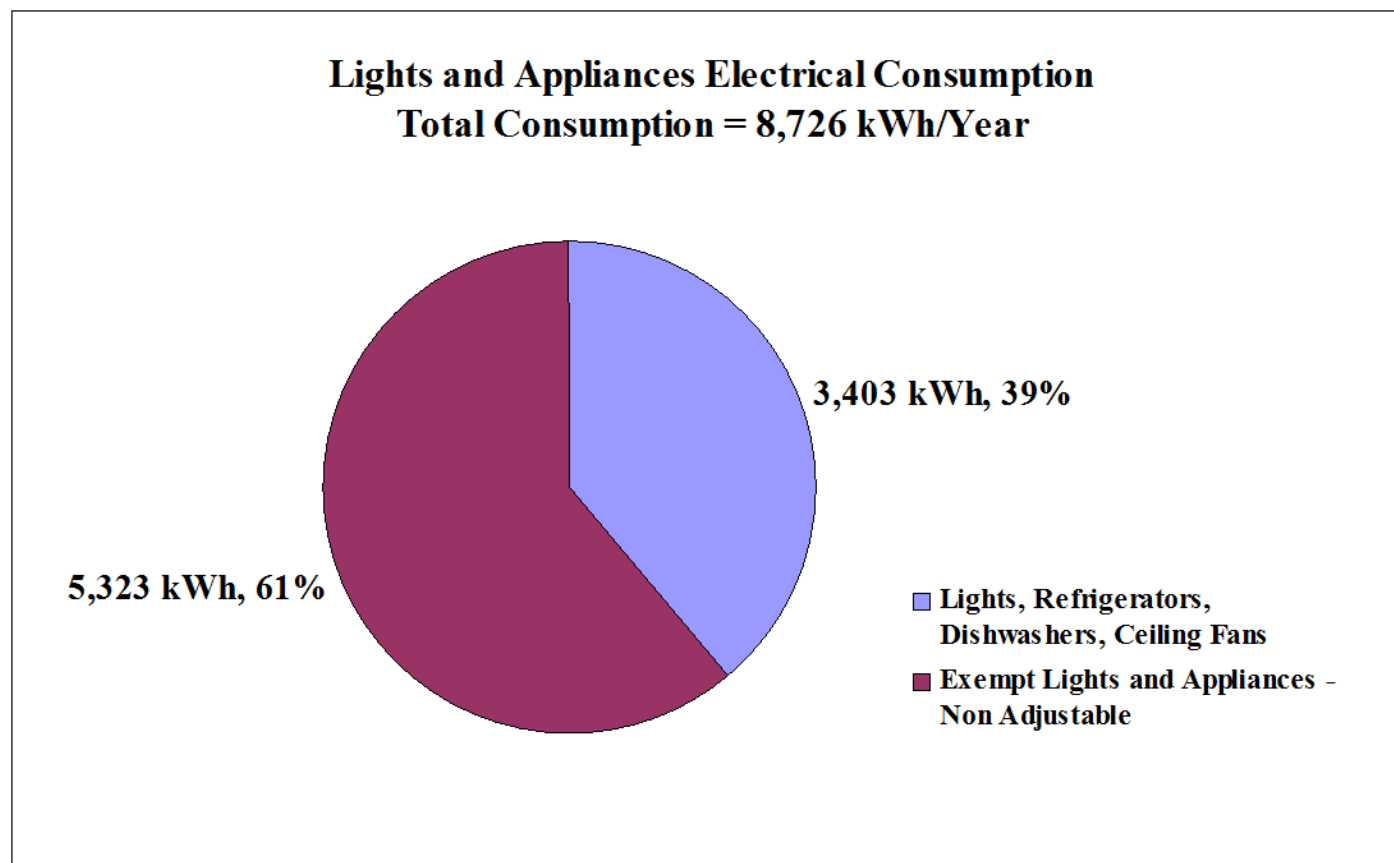


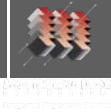


Challenges of Asset Rating on Existing Homes

Internal Loads

- Only Lighting, Refrigerators, Dishwashers, and Ceiling Fans can show energy savings for Lights and Appliances

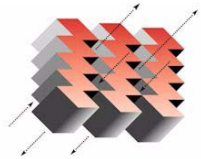
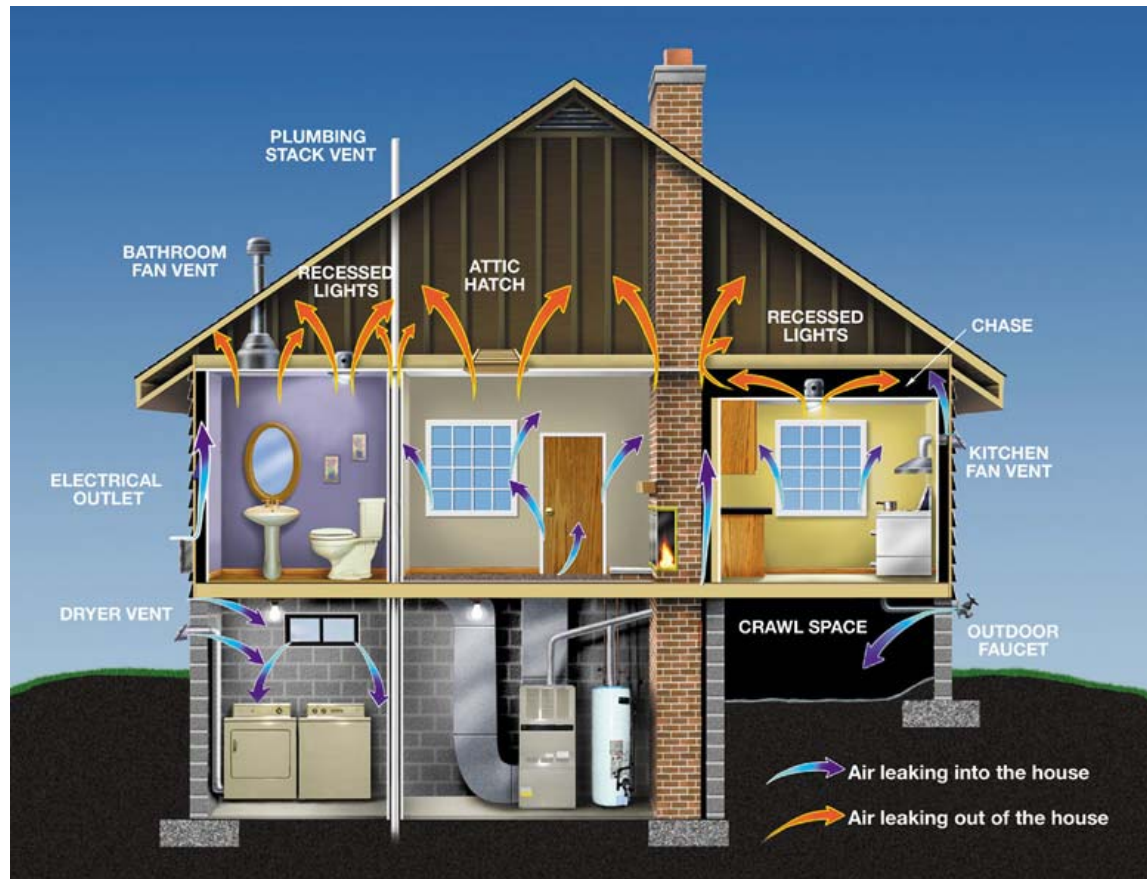




Challenges of Asset Rating on Existing Homes

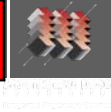
Data collection

- Balance between speed and accuracy



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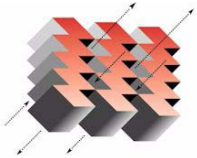
Integrated Engineered Solutions

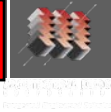


Operational Rating for Existing Buildings

RESNET Existing Homes Committee developing protocols for an Operational Rating of Existing Homes

- **Informative rating for homeowners in making decisions on energy conservation strategies**
- **Accounts for consumer behavior**
- **Simplification of rating method for existing homes**
- **Could be combined with an Asset Rating or Stand Alone**
- **Development of a national carbon tool**
- **Software accreditation through BESTEST-EX and RESNET Operational Rating Standard**





Existing Home Energy Rating - (Operational Rating)

Existing Home



Home as input

Modified Existing Home



- Copy of home as input
- Home calibrated to utility bills
 - Setpoints adjusted based on real setpoints and average temperature of the home
 - Internal loads reflect real equipment in home
 - Weather normalize the energy consumption to real weather data
 - Adjust input variables based on uncertainty

Asset Rating Reference Home

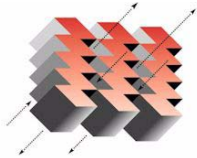


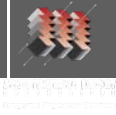
- Copy of modified existing home
- Asset Rating Reference Home rules applied

Operational Rating Reference Home



- Copy of modified existing home
- Operational Rating Reference Home rules applied
 - Rules TBD
 - **Could be Stand Alone without Asset Rating**





Rating Software Challenges for Existing Buildings

Thank You!

