

# Labeling and Savings Prediction Basics


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Development

# Rating Terms

- **Asset rating**
  - Based on the structure with standardized occupancy
- **Operational rating**
  - Based on the building's actual energy use
- **Statistical rating (HEY, PM)**
  - Based on national data collection system
    - CBECS, RECS
- **Technical rating**
  - Simulation of a sum of components (RESNET)

# Asset Vs Operational Rating

Energy Certificate

Building Energy Performance >		As built:	In use:
Commercial type	Public	Asset Rating	Operational Rating
Building Type	Office		
Whole or part of building			
Very energy efficient			
A			
B		B	
C			
D			D
E			
F			
G			
Not energy efficient			
Asset rating method	UK National Standard 2005	Calculated	Actual
Operational rating method	UK Office Protocol Standard 2005	48	83
Units used	kWh/m <sup>2</sup> per sq m of net area per annum		
Occupancy rate	Square metres net relative area per person	14	10
Equipment heat gain area	Watts per square metre net	10	10
Climate conditioning factor	Watts per sq. metre	50	50
Rating performance range		a-Cooling	a-Cooling
Climate performance range (cooling, heating and lighting)		a-Cooling	a-Cooling
Lighting performance range		A-Heating	a-Heating
Occupancy rating (UK Office Protocol 2005)		A-Heating	a-Heating
Internal Environmental Quality			Not assessed
Other information	Not used		Not assessed
Further information can be found in the Energy Log Book			
<b>GB 2005</b>		 <small>Directive 2002/91/EC</small>	

**Issuing organisation**

Street

Postcode

City

Country

Tel

email

**Building name**

Organisation

Street

City

Contact

Tel

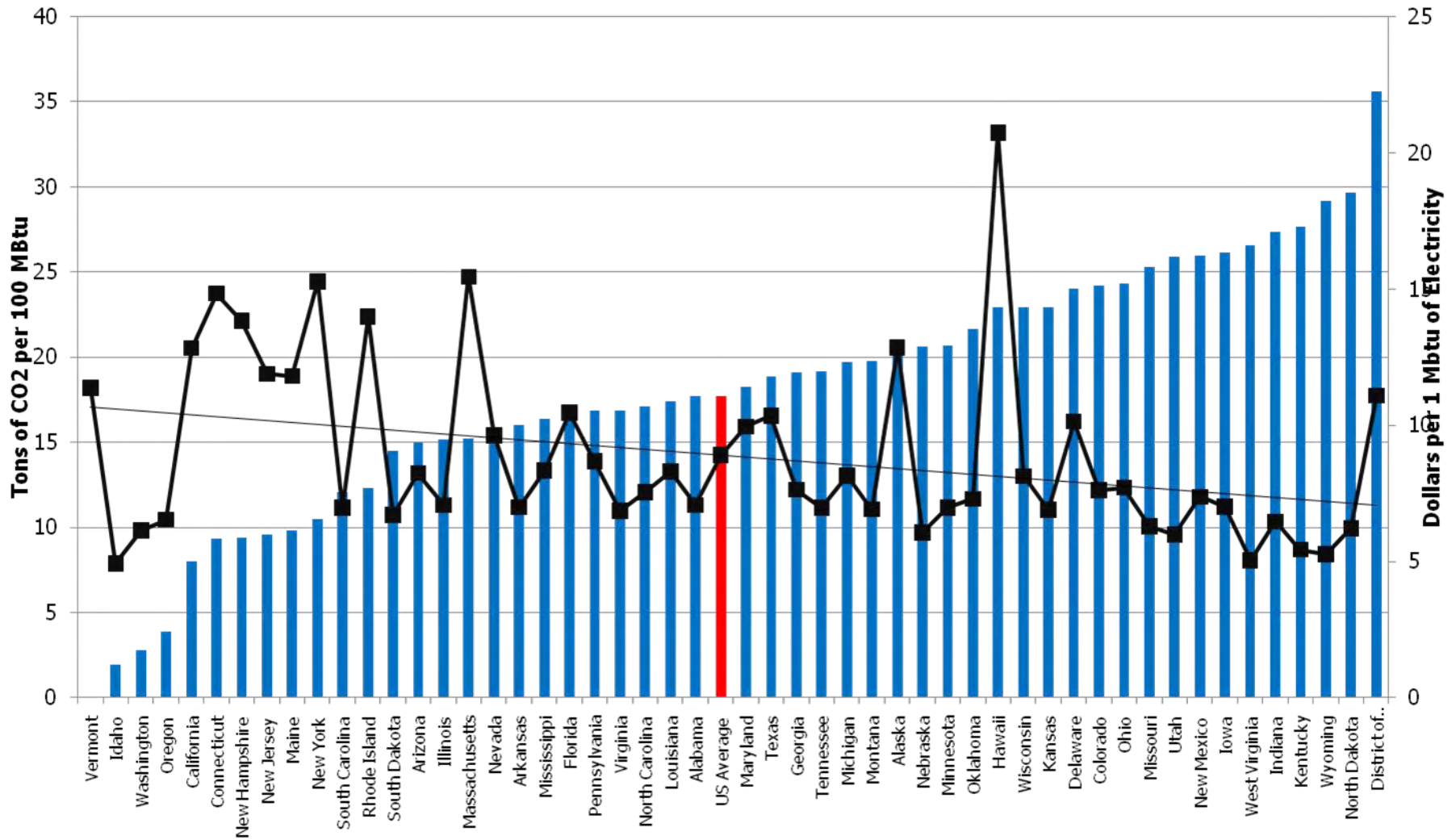
email

# Label

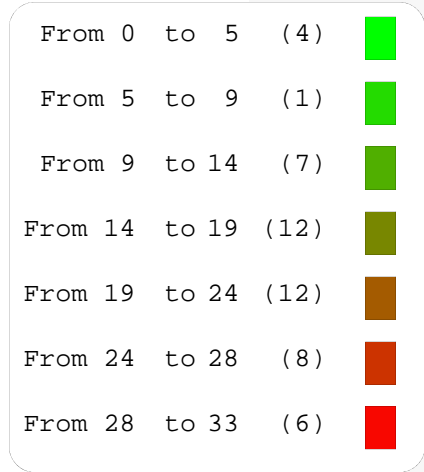
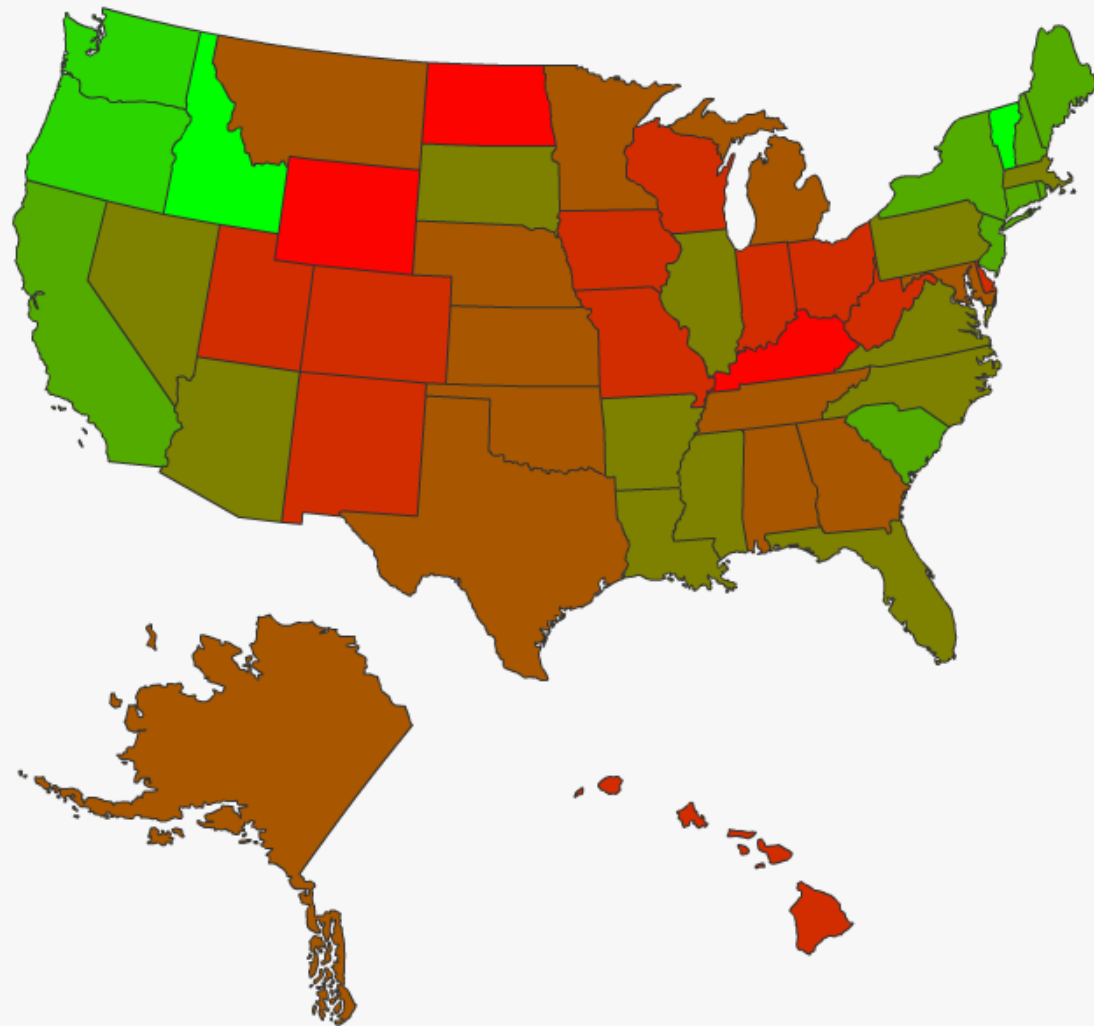
- **Basis for label**
  - Site Energy:
  - Primary (Source) Energy:
  - Site, source, cost and carbon
  - MBtu: Million British Thermal Units
- **Granularity**
  - Index (RESNET)
  - Letters (Europe)
  - Threshold (ENERGY STAR Label)

# kWh Carbon Intensity to Cost Comparison

## EIA 2006



# National Carbon per kWh Intensity - 2006

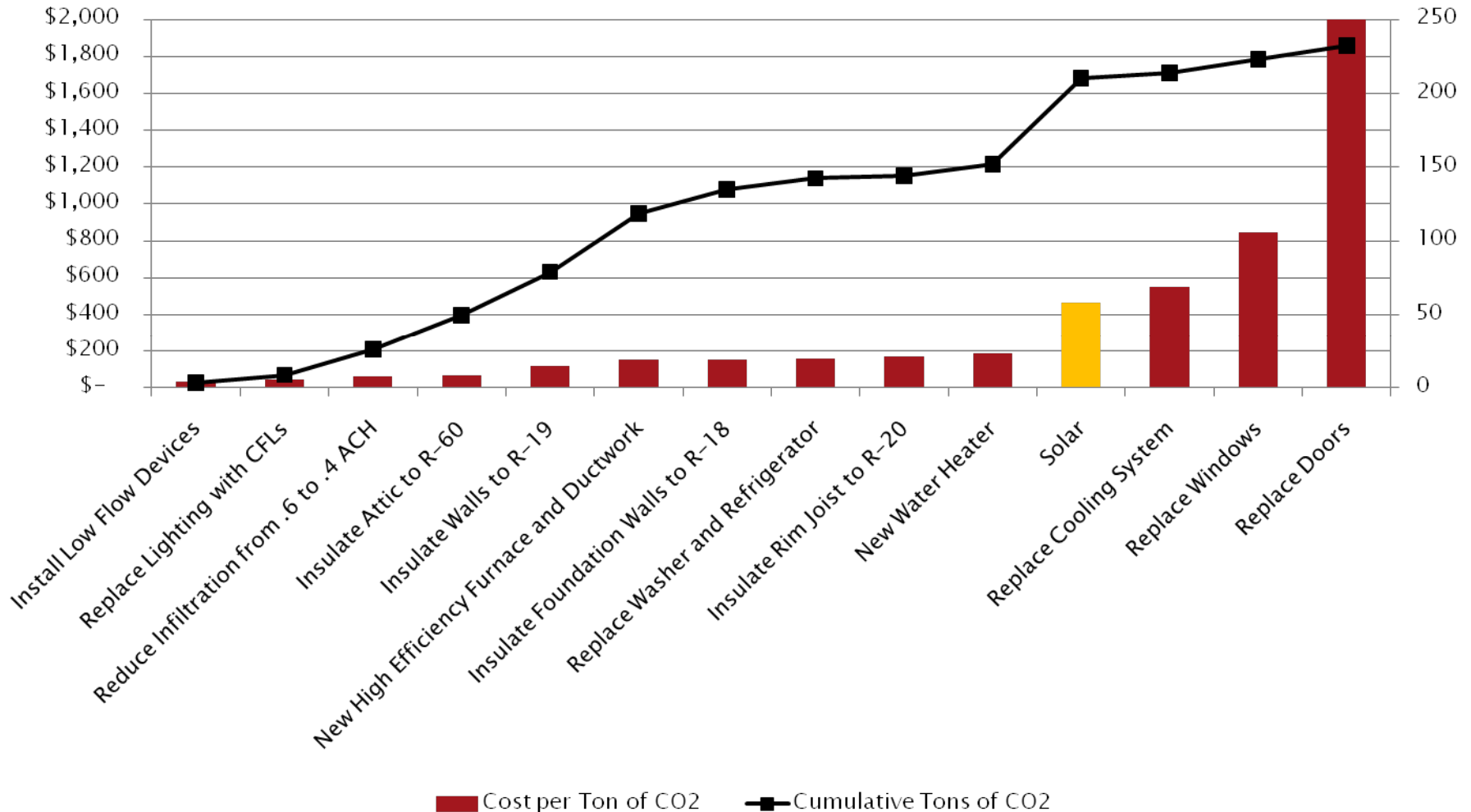


# Audit

- Calculation
  - Individual improvements
  - Interacted improvements
- Model Calibration
  - Bounded by actual bills
  - Matched to primary end uses
- Workscope
  - Actionable (Convertible directly into contract)
  - Recommendations
- Incentives
  - Fixed
  - Performance
- Granularity
  - High (1MBtu?)
  - Low (10MBtu?)

# Cost per Ton of CO2 by Improvement

New York





# Example Label and Prediction Creation Use Cases

# Integrating Ratings and Audits

- Who sets the workscope?
  - Program
  - Customer
- Is the workscope accountable?
  - Move directly to contract
  - Or recommendations requiring a subsequent inspection by a contractor
- Depth of improvements
  - Incremental
  - Or whole house
- What granularity is required? (Nominally 1MBtu or 10MBtu)
  - Cost engineering the process
- Which comes first, audit or rating?
  - Just press a button?
  - Move from low detail to high detail
  - Or move from high detail to low detail

# You Can't Have All Three



# Low Income Program Installation

- Savings prediction for program defined workscope
  - Improving accuracy
- Provide a label for the retrofitted house?

# Home Inspector Rating

- New rating type?
- Add savings prediction for energy recommendations?
  - Recommendation accuracy difficult especially without testing
  - Accountability for workscope viability and savings prediction is difficult

# Consultant Rating

- Existing rating type (RESNET)
- Cost engineering of efficient building systems
- Add savings prediction for energy recommendations?
  - Un biased third party for energy information
  - Diversify recommendations beyond energy
  - Accountability for workscope difficult

# Home Performance contractor installation

- Saving prediction for customer defined workscope
  - Improving accuracy important
  - Control of both installation and prediction creates accountability
  - How is the savings prediction and workscope controlled for bias?
- Is a label added to the savings prediction?
  - Pre
    - Increases cost of sales
  - Post
    - Increases cost of job

# Remodeler

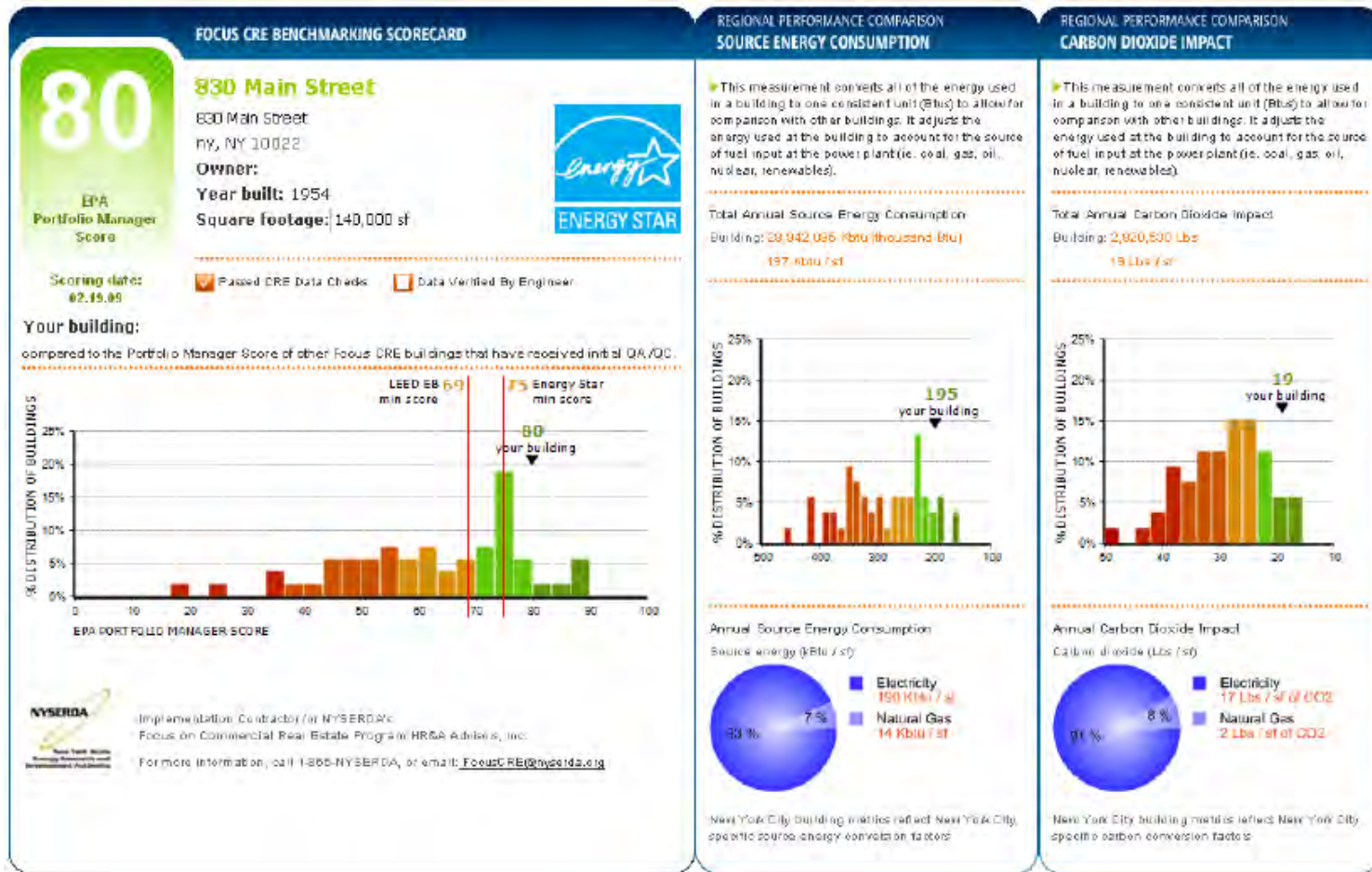
- Can a rating and label be added to a remodeling job?
  - Cost engineering of efficiency related choices
  - Added market value for integrating efficiency



# Label Deployment:

- Mandatory or Voluntary
- Triggered or Scheduled
- Community or National

# Commercial Community Scorecard (NYC)



# Quality Control and Quality Assurance

# User

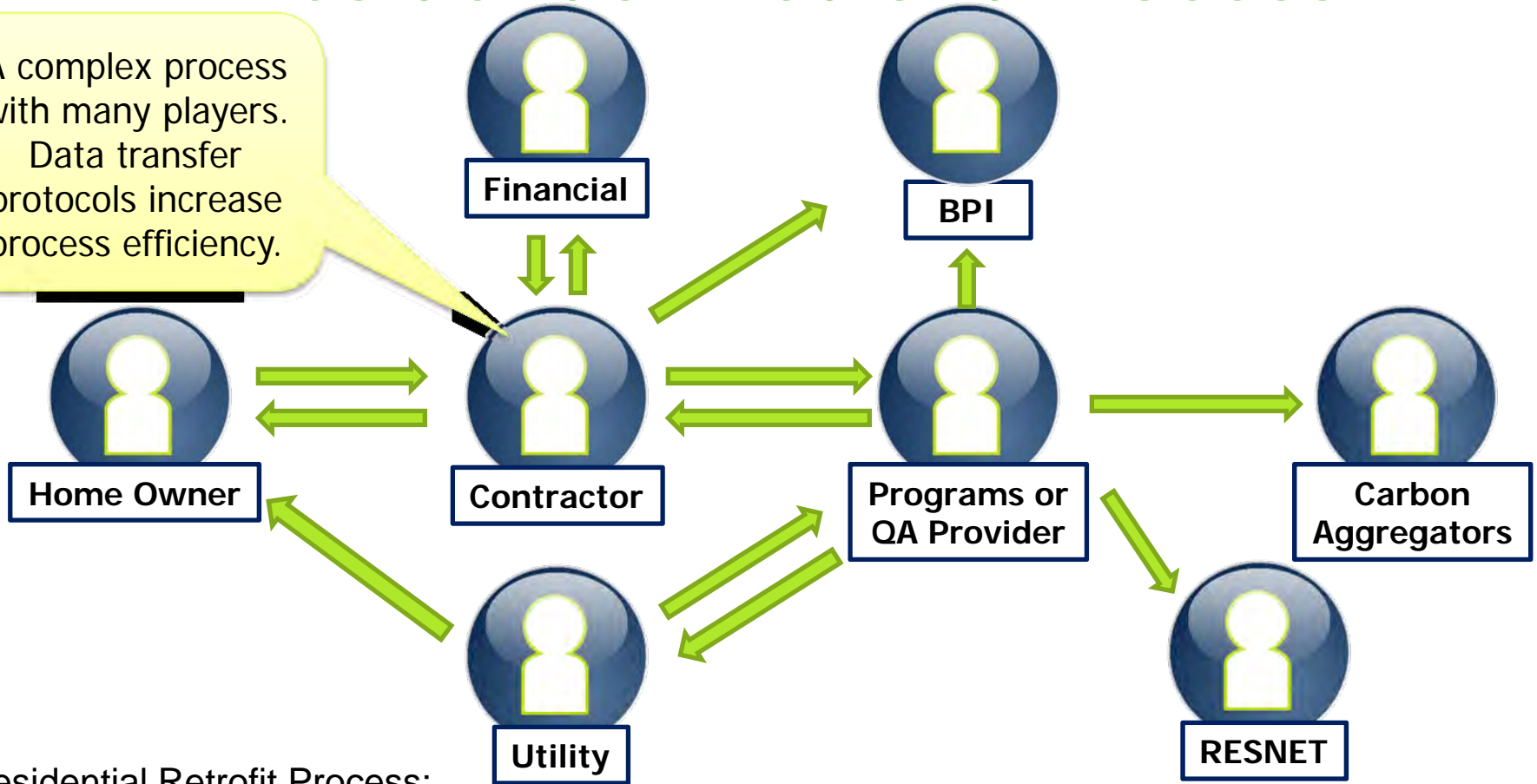
- Certification (RESNET, BPI)
- Third party
  - In lieu of QC/QA? Who checks the checkers?
  - Raters get paid by who?
- Contractor
  - What systems will support a contractor accessing incentives? (Home Performance with ENERGY STAR)
  - Enhanced QC/QA with degree of financial involvement

# Software Standards

- BESTEST
- BESTEST-EX
- RESNET Performance (Plant, Distribution, DHW)
- RESNET Rating
- ASHRAE
- Others
- Data transfer standards

# Residential Retrofit Process

A complex process with many players. Data transfer protocols increase process efficiency.



Residential Retrofit Process:



# Data

- Both Label and Savings Prediction require QC and QA
- Integration with field inspections
- Error detection
  - Parameter screening
  - Calibration
- Gaming detection
  - Performance incentives - Detecting high pre or low post
    - Calibration
  - Labeling - detecting low
    - With retrofit
    - Without retrofit

# Actual Results

- How do we transition to using real energy savings as the measure of successful performance?
  - Integrating behavior and installation performance



# Poor Performance Detected and Controlled

