Battelle
The Business of Innovation

DOE Commercial Building Energy Asset Rating Program Focus Groups with Primary Stakeholders in Seattle

Final Report

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Battelle
Centers for Public Health Research and Evaluation
Seattle, Washington

Prepared for the
U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Washington, D.C.

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1.0 Introduction

The U.S. Department of Energy (DOE) commercial building energy asset rating program is intended to provide information to building owners about the energy efficiency of their buildings, allowing for a comparison of the energy performance between buildings while controlling for differences in building operations and tenant behavior(s). The goal of the program is to facilitate cost-effective investment in energy efficiency and reduce energy use in the commercial building sector. In November 2011, Battelle Centers for Public Health Research and Evaluation (CPHRE) conducted three focus groups in Seattle as part of the DOE asset rating program contract, which has been awarded to Pacific Northwest National Laboratory. The purpose of the focus groups with commercial building stakeholders (e.g., owners, investors, appraisers) is to help us understand why some asset rating certificate designs are more understandable, how asset rating scale designs would be used for decision-making and investment in commercial real estate assets, and which asset rating metrics are most important to stakeholders and decision-makers.

2.0 Methods

2.1 Study Respondents and Recruitment Procedures

Battelle recruited three types of building stakeholders to participate in the focus groups: Investor/Owner (e.g., investor, property asset manager, developer), Municipal/Utility, and Miscellaneous (e.g., engineer, architect, consultant). Focus group participants were recruited through existing contacts of the project consultant (Molly McCabe, HaydenTanner LLC) from the following Seattle-based organizations: the Building Owners and Managers Association, Seattle 2030, the Seattle chapter of the Urban Land Institute, the Cascadia Chapter of the U.S. Green Building Council, the Seattle City Government, Cushman and Wakefield, CBRE, and the Northwest Energy Efficiency Alliance. Potential participants were first sent an email invitation letting them know we would be calling them to ask for their participation in one of the focus groups. Only those who did not respond negatively, stating that they did not wish to be contacted, were called and screened for eligibility. Potential participants, who were familiar with either ENERGY STAR Portfolio Manager or Asset Rating, were invited to participate in one of the groups if the recruit was available. Once recruited, each participant was sent a confirmation letter and a copy of the consent form.

2.2 Respondent Characteristics

A total of 18 building stakeholders participated in the three focus groups. Table 1 summarizes the types of building stakeholders that participated in each focus group.

2.3 Data Collection Procedures and Analysis

A qualitative researcher conducted three focus groups with building stakeholders following a focus group moderator's guide (Appendix A). Participants were asked a series of questions on their perceptions and interests regarding energy efficiency in buildings, perceptions and understanding of the sample Asset

Rating labels and report, recommendations for improving the Asset Rating materials, and expected use of the Asset Rating Tool with ENERGY STAR Portfolio Manager. Focus groups took approximately 90 minutes to complete and were digitally recorded.

Table 1. Focus Group Participants

Focus Group	Investor/Owner				Municipal/Utility		Misc	Total
	Investor (large)	Investor (small/mid)	Property, Asset Manager	Developer	Municipality	Utility	Engineer, Architect, Consultant	
Focus Group #1	0	1	3	0	1	0	0	5
Focus Group #2	0	1	1	1	0	0	4	7
Focus Group #3	0	0	5	0	0	0	1	6
Total	0	2	9	1	1	0	5	18

Focus group recordings were transcribed, and a top lines report was drafted after the three focus groups based on review of the transcription files, notes, recordings, and moderator's impressions. This report included initial overall themes and findings from the three focus groups.

The transcribed files were imported into a qualitative analysis software package, QSR International's Nvivo9, for analysis. Battelle developed a data codebook based on the study questions, as well as on the topics and issues that emerged during the project. The codebook was refined as coding proceeded, to ensure that it fully captured both predefined and emergent themes and concepts. Given the limited number of transcripts involved, a single analyst coded all of the focus group documents. Once the coding was complete for all focus groups, the analyst retrieved coded text segments from the focus groups pertaining to each of the study questions. Data summarizing each question were reviewed and synthesized to produce information on findings both within and across building stakeholder types.

3.0 Results

In this section, we provide the key findings from our analysis, as well as recommendations for improvements to the asset rating certificate design and report based on the findings and lessons learned within the context of conducting the focus groups.

3.1 Key Findings

- Most use utility data or ENERGY STAR Portfolio Manager to evaluate energy efficiency of their buildings.
- Participants most often mentioned return on investment (ROI) as an influence on their decision-making process where energy use and/or efficiency was taken into account.

- Overall, stakeholders preferred Label A, which used an energy use index, British thermal units (kBtu), over Label B, which used a point system for rating a building.
- Color and formatting changes could make the information in the current drafts more clear.
- Many wanted some sort of regional comparison on how a building measured up in comparison to others in the local area.
- Including site versus source energy use was confusing or did not provide value. Site information was preferred by most stakeholders. Source information was useful to only a few participants.
- Many were confused by some of the information presented in the reports:
  - Some could not grasp that the rating did not account for occupancy and operations of the building.
  - Those who understood that occupancy and operations information was not part of the rating wanted it included.
  - Many wanted more definitions of the assumptions behind the ratings.
  - Some suggested that consistently providing parallel information for current and potential consumption (kBtu) or points ratings on the label may help clarify the information.
- Most participants found the "Regional source" versus "national average" on page 1 to be unclear or not useful. There were several suggestions on alternatives that could be provided instead that may be more useful: show average cost for this region, cost of kBtu/ft^2, and annual cost figure for energy usage; or add a "regional grid mix" to clarify how potential savings is derived.
- The information presented on energy savings upgrade opportunities on page 3 was too vague.
  - Who decided the rankings to determine the upgrades?
  - Most wanted more information on how the report gets generated, based on what data, and who enters it, and so on.
- Omit or alter the payback column on page 3 to be more specific.
- Some did not trust the estimated energy cost savings or predicted energy use efficiency (EUI).
- Overall, participants were excited to see the label and reports and could see the potential usefulness of these tools.
- Several had concerns regarding how useful/accurate the Asset Rating report could be without a formal inspection or audit by a professional.
- Top 3 design improvements for the label and report included
  - designing a scale that moves toward zero instead of up to 100
  - showing spatial reference to average buildings or the region
  - combining pages 2 and 3 of the report, which were viewed as useful to most people.
- The most frequently mentioned content improvement suggestions were
  - including more information in the asset rating report
  - presenting actual costs for upgrades

  - focusing on site energy.
- Other metrics desired on the label and report included
  - operating information
  - market average rating/usage as a comparison to current rating
  - building characteristics (occupancy load, cost per square foot, type of building, and other key factors)
  - showing what would be needed to achieve ENERGY STAR rating
  - actual cost of potential upgrades.
- ENERGY STAR and Leadership in Energy and Environmental Design (LEED) verified data are important to some investors.
- A few said they would use the asset rating tool either individually and/or in conjunction with ENERGY STAR Portfolio Manager.
- A few were concerned that the asset rating tool would be a duplication of ENERGY STAR Portfolio Manager.

3.2 Recommendations

Recommendation 1: *Determine the target audience and tailor the language and information in the asset rating system materials to be easily understood by the target audience.*

Building stakeholders had varying levels of understanding when presented with the asset rating report. Property managers or investors have backgrounds (e.g., business degree) that differ from those of engineers and may not understand the same technical language. Some of these building stakeholders did not understand the label using kBtu because they were not familiar with this measure. Property managers and investors are also more interested in actual costs and site energy so they did not find the source energy information as useful as other building stakeholder types. If the asset rating tool is being designed for multiple audiences with different backgrounds, it will be important to use language that can be easily understood by all types of building stakeholders. Overall, site information was more useful to most participants.

Recommendation 2: *Provide additional background information or details on assumptions used to create the asset rating report and to calculate the ratings and savings.*

Building stakeholders had difficulty understanding the asset rating label and report as stand-alone documents. Stakeholders asked many questions regarding definitions, how the label would be used, and how ratings or cost calculations were determined. Additional details and explanations may need to be included as a part of the asset rating report or as an accompanying document. Additional information should answer the following types of questions for building stakeholders:

- How should I use the asset rating report information?
- Who enters the information to create the asset rating report (i.e., what credentials or certifications do the data entry people possess that qualify them to enter the data?

- What does the asset rating mean (e.g., below average, average, above average)?
- How is the system evaluation conducted?
- How are building upgrade recommendations determined?
- How are the energy savings and energy costs savings calculated?
- Does the asset rating take operational (e.g., occupancy, building use) and regional (e.g., climate, source energy) differences into account?

Recommendation 3: *Include data in the asset rating report that will allow building stakeholders to clearly compare their buildings to other similar buildings in the region.*

Participants did not feel that the information in the asset rating report provided relevant comparisons. Providing regional or market average data in a clear manner will make the report more useful to building stakeholders. Participants expressed that national comparisons were not helpful due to climate and source energy differences. Building stakeholders would like to be able to compare how their buildings perform against other buildings operating in a similar manner and climate by showing the regional average on the asset rating label bar scale. Comparison information may also be useful on page 2 for the site EUI by category.

Recommendation 4: *Alter the design of the AR label to be more user-friendly and easy to understand.*

Building stakeholders would like to be able to look at the asset rating and know whether their building is "good" or "bad." They suggested using a color coding system that clearly indicates the meaning of the rating. For example, use a scale that goes from red to green (i.e., bad to good) or use shading to show an energy efficiency target range that building stakeholders should aim to reach. A point system may be confusing if building stakeholders do not know or understand the basis of the points. Consider basing the scale on net zero energy so building stakeholders can easily see how close their building rating is toward zero. Providing a spatial reference on the scale will also help building stakeholders understand the energy efficiency of their building compared to the region or market average. Doing so would allow them to compare to what degree the current rating/energy use of the building is above or below where it should be, compared to the rest of the market and/or desired energy efficiency.

Recommendation 5: *Revise the cost metric data to enhance relevance to property owners and investors and increase overall understanding.*

Property owners and investors were more interested in actual costs—for example, regional costs for energy use, estimated costs for energy consumption, and estimated costs/savings for upgrades for each system. Include estimated cost information, where possible, to address the needs of owners and investors. Building stakeholders found the time periods assigned to the payback categories (i.e., short, medium, long) to be too long for real estate. Revise the time periods to be relevant to commercial real estate by decreasing the ranges (for example, 0–2 years, 2–5 years, and 5–10 years). Some building stakeholders were confused by the potential total savings percentage calculation. Explaining how the total savings percentage is calculated from the savings by category may improve building stakeholders' understanding of the cost metric data.

Recommendation 6: *Provide additional guidance to help building stakeholders make decisions regarding the suggested energy savings upgrade opportunities.*

Building stakeholders wanted additional information on the upgrade opportunities to guide decisions. More details on the upgrades are needed because participants indicated feeling that instructions such as "Add storm windows" were too vague. The upgrade opportunities could also be ranked by effectiveness to show the best approach for building stakeholders instead of being organized by system. Providing estimated energy costs after upgrades would also be helpful. Property asset managers and investors were more interested in actual costs than kBtu per square foot. A few participants suggested indicating the necessary upgrades in order to achieve the ENERGY STAR rating.

Recommendation 7: *Avoid confusing building stakeholders by distinguishing the difference between the asset rating report and ENERGY STAR* ratings.

Differentiate the asset rating tool from ENERGY STAR Portfolio Manager. Participants were concerned that building stakeholders accustomed to the ENERGY STAR rating will be confused by a new point system. In addition, a few building stakeholders thought the asset rating tool will create duplication with the data they already enter into ENERGY STAR Portfolio Manager. Clearly describe the purpose of the asset rating tool and how it can be used effectively and efficiently alongside ENERGY STAR Portfolio Manager.

In addition, modify the design of the asset rating label so that it cannot be confused with the ENERGY STAR Portfolio Manager rating certificate. Because of the similarity in design, many participants assumed that the asset rating included operational costs/actual utility consumption. Design changes should make it clear to the user that the rating is to show the potential operational costs, given the systems and structures already in place in the building "as built."

4.0 Summary of Findings

The data analysis plan was designed to answer four overall research questions:

1. How do building stakeholders currently evaluate the energy efficiency of their buildings?
2. What are building stakeholders' opinions of the asset rating labels/report?
3. How can the asset rating label/report be improved
4. How would building stakeholders use the asset rating tool alongside ENERGY STAR Portfolio Manager (ESPM)?

The summary of findings presented in this section is organized around these four research questions.

4.1 How Building Stakeholders Currently Evaluate the Energy Efficiency of Their Buildings

Building stakeholders use a variety of methods to evaluate the energy efficiency of their buildings, such as reviewing utility data, utilizing ENERGY STAR Portfolio Manager or ratings, using national data

for benchmarking, and viewing overall cost of operation. The majority of participants mentioned using a combination of these methods. For example, a small to mid-size investor stated *"We use ESPM to benchmark our entire portfolio. That's just a baseline to really start with, and then we'll dive deeper and look at the EUI, but then also dollars per square foot as it's compared to the rest of the market."* Table 2 summarizes the methods discussed by the participants.

Table 2. Current Methods Used by Building Stakeholders to Evaluate Energy Efficiency

Subcategories	Energy Efficiency Evaluation Methods
Utility data (12)**	▪ Review original or raw utility data (9) ▪ Monitor utility expenses by month or year (4) ▪ Have separate tenant metering in buildings (2)
ENERGY STAR (8)	▪ Input data into ENERGY STAR Portfolio Manager (4) ▪ Have goals or benchmark based on ENERGY STAR rating (5) ▪ Use ENERGY STAR to some degree (2)
National data (4)	▪ Use multiple metrics or tools for benchmarking (3) ▪ Use CBECS 2003 to benchmark and set expectations for buildings (1)
Cost of operation (2)	▪ View the overall cost of operation per square foot (2)
Other (4)	▪ Engineering analyses (2) ▪ Unable to monitor because tenants pay own energy bills (2) ▪ Physical building inventory (1)

** Note for all tables: The total count in the first column will not always equal the total of the numbers in the second column because some focus group participants may mention multiple sub-points within the same theme. Totals in the first column only count the number of individuals.

Building stakeholders consider the following types of information useful for energy efficiency decisions:

- *Energy audit (5).* Useful to have actual operating energy history that is normalized for stabilized occupancy. When looking at energy use, it is also important to consider the hours-per-day or days-per-week use, peak load times, and plug load.
- *Building or equipment maintenance (4).* View the overall maintenance history to see how the building has been operated in the past, or research the reliability and energy efficiency of potential equipment.
- *Cost-benefit analysis (2).* Conduct cost–benefit analysis and look at potential cost saved over time by making a capital improvement investment.
- *Regional comparison (1).* Look at regional differences because energy rate differs across the United States.

Building stakeholders were asked how energy use and/or efficiency influence their decision-making process when deciding to purchase, making capital improvements, or divesting of a property (Table 3). Participants most often mentioned ROI as an influence. Building stakeholders want to know the ROI of energy initiatives when making decisions. Some energy efficiency changes may not provide a good ROI; however, one participant described how these energy efficiency changes may still be necessary: "*I think that the challenge is that sometimes on the investments that you make for energy efficiency, it's not always a dollar-for-dollar increase in value. That's the challenge, is that you have to pay to play. Even to get your asset marketable you have to pay to play, and so a lot of the capital improvements you have to make just to get it marketable. You may not recoup all of that in the price."*

The needs and goals of building stakeholders' clients are an important influence on energy efficiency decisions. Some clients, such as nonprofit organizations or universities, are very interested in improving energy efficiency, even if the changes require a more long-term investment; however, commercial clients are typically more focused on the ROI. One participant explained *"In some cases, in the institutional or nonprofit sector, they will build into their budget very aggressive energy policies or energy strategies including net zero or climate positive. In the commercial sector that's where we need to change the world. That's a harder range of possibilities that are obviously tied more traditionally to a lease rate and how much capital can be brought to the project from that lease rate, and so that's the ambitious frontier."* Building stakeholders' decisions regarding energy efficiency also may differ depending on whether they own or lease the building.

Table 3. Current Influence of Energy Use and/or Efficiency on Stakeholder Decisions

Subcategories	Energy Use and/or Efficiency Influence on Decisions
Return on Investment (ROI) (12)	▪ Look at ROI of energy initiatives when making decisions (11) ▪ May not recoup all costs of capital improvements (4) ▪ ROI influences whether to rehab an existing building or consider new construction (1)
Client needs or goals (9)	▪ Energy efficiency decisions influenced by the goals of the client (7) ▪ Decisions depend on whether the property is leased or owned (4)
Decisions to purchase (7)	▪ Look at energy efficiency or operating expense baseline when deciding to purchase (7) ▪ Consider potential improvements in utility expenditures during decisions to purchase (2) ▪ LEED-certification influences decision to purchase (1) ▪ Compare value of buildings to other properties when purchasing (1) ▪ Availability of rebates or tax incentives influence decision to purchase (1)
Energy efficiency ratings (2)	▪ Make energy efficiency decisions to improve ENERGY STAR ratings or move toward LEED certification (2)
No influence (1)	▪ Focus on small buildings and energy efficiency does not influence decisions (1)

Energy use and/or efficiency also influence building stakeholders' decisions to purchase a property. Building stakeholders will review a building's energy efficiency or operating expenses by looking at the historical operating expenses for the building and the physical components such as the heating, ventilating, and air conditioning system. Analyzing the physical components of the building can help building stakeholders determine potential enhancements that could be made to improve utility expenditures. Decisions to purchase a property may be influenced also by LEED certification, value comparisons to other properties, and available rebates or tax incentives available to improve energy efficiency.

A few participants mentioned making energy efficiency decisions in order to improve ENERGY STAR ratings or move toward LEED certification. One participant stated that energy efficiency does not influence decisions of owners of smaller (50,000 ft^2 or less) buildings.

4.2 Building Stakeholders' Opinions of the Asset Rating Labels and Report

Participants were presented with two sample designs for the asset rating certificate/label for the same building. Label A used an energy use index, kBtu, and Label B used a system of points. Participants were asked to discuss the two asset rating labels. Table 4 summarizes building stakeholders' asset rating label preferences.

Table 4. Asset Rating Label Design Preferred by Building Stakeholders

Preferred Label Design	Investor/Owner	Municipal/Utility	Misc	Total
Label A (kBtu)	5	0	3	8
Label B (point system)	5	0	0	5
Neither A nor B	1	0	1	2

The majority of participants preferred Label A. These stakeholders preferred having the measure of kBtu to show energy use versus having a point system, which would require looking at more data and making a qualitative judgment. One property asset manager stated *"When you're actually relating it to energy usage, it's something that people can get their arms around; whereas, with a point system you don't understand the basis of the point."* Creating another point system could also add confusion to those familiar with the ENERGY STAR rating. One member had thought the rating on Label B was the ENERGY STAR rating until later during the focus group meeting when the asset rating report was presented. He stated *"If you're creating a new way to rate buildings, you're just going to confuse the whole population that's already just beginning to understand ENERGY STAR. Again, when I looked at this I thought that we were talking about ENERGY STAR, because that's all we're talking about."* However, some property asset managers preferred Label B because a scale or point system is simple to understand, especially for property managers and investment brokers not familiar with kBtu.

4.2.1 Design Challenges

Table 5 presents building stakeholders' challenges to understanding the asset rating label or report design. Most participants preferred Label A (8). Those who did not like Label A felt the design was not user-friendly for those unfamiliar with kBtu. Participants preferring Label A did not like the point system used in Label B because it is unclear how the point system was designed. Design challenges with the overall report included difficulty with the scale. Some participants could not interpret whether the building was "good" or "bad" based on the report and felt the numbers were not as useful without regional or national comparisons. *"It's great to have a scale, but what do you compare it against? What's the most efficient use of this particular building?"*

4.2.2 Content Challenges

Building stakeholders reported several challenges with the overall content of the asset rating label and/or report. The three most-mentioned overall challenges included the following: 1) the asset rating label/report did not provide regional or other comparisons, 2) site versus source energy use information was confusing and did not provide value, and 3) the asset rating report did not provide the definitions or

assumptions used to create ratings and costs. Table 6 lists all challenges mentioned by building stakeholder type.

Table 5. Challenges with Asset Rating Label and/or Report Design

Subcategories	Asset Rating Label and Report Design Challenges
Specific to Label A	▪ kBtu design is not user-friendly for those unfamiliar with kBtu (2)
Specific to Label B	▪ Do not understand the point system (2)
Overall Report	▪ Green bar scale is not clear to know if "good" or "bad" (3) ▪ Numbers not useful without a spatial reference or other comparisons (3) ▪ Confusing showing two scores (current and potential) and source energy use on green bar (1) ▪ Do not know the meaning of the color coding of boxes on page 2 under system evaluation (1)

Table 6. Challenges with Asset Rating Label and/or Report Overall Content by Stakeholder Type

Asset Rating Label or Report Content Challenges	Investor/Owner	Municipal/Utility	Misc	Total
Lack of comparisons (e.g., regional)	6	1	2	9
Site energy use vs. source energy use is confusing or does not provide value	6	0	2	8
Lack of definitions or assumptions for findings	6	0	1	7
Does not take into account operations information such as occupancy or use type	2	0	1	3
Confused how the asset rating or information relates to ENERGY STAR program	2	0	1	3
Cannot understand language used in label/report	2	0	0	2
Asset rating is too subjective	2	0	0	2
Do not understand how label will be used	1	0	0	1

Lack of comparisons (e.g., regional). Nine of the participants discussed the lack of relevant comparisons in the asset rating label and report as a challenge. Building stakeholders do not find the information useful without being able to compare their building to others in the region to determine if their building is below average, average, or above average. Using a national average does not reflect regional differences. As one participant described, *"I'm just saying that Page 1, the way that it's presented does not make it very informative to me to make a decision. One thing, clearly, this local area benefits from hydroelectric. That's not reflected here. It just says that it's comparing whether it's electric or gas or whatever source, but that doesn't take into account our particular situation and advantage here to me."*

Comparing site energy use versus source energy use is confusing or does not provide value. Page 1 of the asset rating report compared site energy use and source energy use. Several building stakeholders did not find the source energy use information helpful because they are more concerned with site energy. For example, one participant commented *"When I first looked at this in trying to figure out what it all meant, I ended up just focusing on the "site energy use," I mean, thinking that the "source energy use" really wasn't going to be on anyone's high priority list of evaluations when they're looking at buying a building."* And another participant has this to say about source information: *"As a building owner…do I really care about source energy use? …I'm just more focused on what's it costing me."* In addition, a few building stakeholders were confused by source energy and did not understand the purpose of presenting the information.

Lack of definitions or assumptions for findings. Seven participants felt there was a lack of definitions and assumptions provided in the report to explain how findings were determined. Building stakeholders mentioned a lack of data to back up conclusions, no assumptions provided for climate or how building upgrades were determined, and lack of other definitions in the report. One investor summarized *"Then also to even just equate kBtu and how that's derived — whether that's through measuring or turning it from horsepower or kilowatt usage or horsepower to get to a kBtu. Those are all a lot of undefined processes to just come up with one decorative statement in summary."*

Building stakeholders also reported the following challenges with the content of the label and report: not taking operations information (e.g., occupancy, building use type) into consideration, confusion between AR rating and the ENERGY STAR rating, use of technical language, and the AR rating being too subjective. A few participants thought the asset rating lacked meaning without operations information. Two investor/owner stakeholders could not understand the technical language used in the asset rating label/report. Two property asset managers were concerned that data entered by property managers/building owners could be manipulated to affect the asset rating.

The asset rating report presented to the participants included cost metric information to help evaluate the costs and benefits of investing in improvements that increase the efficiency of a property as reflected in the Potential Asset Rating (EUI) Score. Cost metric information was presented mainly on pages 2 and 3 of the report, with exception of the estimated annual savings figures presented on the label/cover page. Table 7 describes the challenges building stakeholders had with the cost metric information, tabulated by type of building stakeholder.

Information on energy savings upgrade opportunities is too vague. Page 3 of the asset rating report presented energy savings upgrade opportunities. Several participants found information such as "Add storm windows" too vague. A few property asset managers wanted to know who would decide the ratings to determine the upgrades. One developer felt that the definition of upgrades could be variable, dependent on the owner. *"That definition of upgrades in a lot of ways is really dependent on owner/client and the interested party. I would struggle to kind of define what that is…a whole new envelope…and for another it means just a little bit of insulation and some new light bulbs."*

Issues with payback column. Page 3 of the asset rating report presents energy savings upgrade opportunities including a payback column with short (less than 3 years), medium (3–8 years), and long (8–15 years) categories. A couple of building stakeholders thought the lengths of time assigned to the payback categories were too long or wanted an explanation of how the categories were developed. One property asset manager stated *"I think that could be easily misunderstood — long/medium/short. I think*

that probably you're kind of stepping outside the realm. I think that you would let the investor decide the payback. I think that there is a liability issue, at least a little bit here with promising a payback."

Table 7. Challenges with Asset Rating Report Cost Metrics by Stakeholder Type

Asset Rating Label or Report Cost Metric Challenges	Investor/Owner	Municipal/Utility	Misc	Total
Information on energy savings upgrade opportunities is too vague	5	0	1	6
Issues with payback column	3	1	2	6
Do not trust the estimated energy cost savings or predicted EUI	2	0	3	5
Do not understand how potential savings numbers or percentages were calculated	2	0	2	4
Does not take into account regional cost differences	1	0	1	2
Explanation of ranking poor, fair, or good and replacement schedule	0	1	0	1

Do not trust the estimated energy cost savings or predicted EUI. Some building stakeholders did not trust the estimated energy cost savings figure or percentage. Three building stakeholders did not trust the accuracy of the information entered to create the estimates if property managers/building owners had entered the data, while four did not trust how the estimate was calculated. Two property asset managers did not feel that decreased energy consumption necessarily leads to savings because energy costs continue to increase. One participant thought the calculation may be overly simplistic because there could be an interactive effect of one measure on another. Another participant did not trust the predicted EUI (kBtu/ft^2/year after upgrades) on page 2 because the national modeling is miscalibrated to actual use (i.e., DOE determination analyses underpredict the EUI compared to Commercial Building Energy Consumption Surveys by 30%).

Do not understand how potential savings numbers or percentages were calculated. A few participants did not understand how the potential total savings for all opportunities combined (pages 2 and 3) equaled 19%. One participant indicated building stakeholders may get confused when viewing the cost savings by category (e.g., lighting, heating) and then overall because some may think the total savings should be 75% (adding up savings from each category). Another participant did not understand how the total EUI after upgrades (page 2) related to the total savings percentage.

Other cost metric challenges reported by building stakeholders included cost estimates not taking regional cost differences into account and lack of explanation for how poor, fair, and good categories determined for system evaluation ranking.

4.2.3 Useful Content

Building stakeholders were asked about the most useful or relevant information presented in the asset rating labels and reports. Seven participants mentioned that pages 2 and 3 of the asset rating report contained more useful information than page 1. Building stakeholders liked being provided with a

potential asset rating with improvements (2), information that could be considered as a first step for investment decisions (2), information by energy use type (e.g., lighting, heating) (1) and potential upgrade opportunities (1). Although several participants did not like the source energy as mentioned in the asset rating report content challenges (Section 4.2.2), two building stakeholders did find source and site energy information useful.

4.3 How the Asset Rating Label and Report Can Be Improved

Participants were asked how the sample asset rating labels and report could be improved. Participants provided suggestions on both the design and content of the label and report. The top three most mentioned design improvements included: 1) designing a scale that moves toward zero instead of up to 100, 2) showing spatial reference to average buildings or the region, and 3) combining pages 2 and 3 of the asset rating report. Including more information in the asset rating report, presenting actual costs, and focusing on site energy were the most mentioned content improvements. Appendix B illustrates suggested improvements to the asset rating labels and report.

4.3.1 Design Improvements

Building stakeholders suggested several enhancements to the design of the asset rating label and report.

- Have the scale move toward zero instead of moving up to 100 (4). Base the scale on net zero energy with the goal of getting close to zero.
- Show spatial reference to average buildings or region (4). Include reference to the average building rating based on region so stakeholders can compare their buildings to other buildings in similar climates. The rating will be more meaningful to building stakeholders by providing this spatial comparison.
- Combine pages 2 and 3 (4). There is wasted space on page 2 by listing identified improvement opportunities and referring to page 3 for the details. Some of the information on pages 2 and 3 are redundant and could be combined.
- Use color coding system that clearly indicates “good” or “bad” (2). Different shades of green does not clearly show whether the rating is good or bad. Consider using a color coding system, such as the National Australian Built Environment Ratings System program, that can be easily interpreted—or provide different shading to show the target range of consumption.
- Include energy use for the potential score with building upgrades using different colors (2). Using the same color and shape box for the potential score with building upgrades is confusing. Change the color of the potential score with building upgrades and provide an energy use measure for the potential score.
- Use language that can be interpreted by building managers (2). The report should be written in a format easily understood by property managers, investors, or building owners. Some of the technical language currently in the asset rating report would require some building stakeholders to hire a consultant for interpretation.

Other design suggestions mentioned by individual participants included the following: change 'award year' to 'analysis month and year,' do not include estimated annual energy savings on cover page, include 'should operate at' or 'is operating at' for the current energy use, include payback information on page 1, do not create a new ratings system, and include a key for the color-coded boxes on page 2.

4.3.2 Content Improvements

Table 8 summarizes the content improvements suggested by the building stakeholders. The majority of participants wanted additional information included in the asset rating label and report. Building stakeholders most often requested building operating information, market average or regional comparisons, and building characteristics to be included in the asset rating label and report.

Table 8. Suggested Overall Content Improvements to the Asset Rating Label and Report

Subcategories	Suggested Content Improvements to Asset Rating Label and Report
Asset Rating Label/Report Content Improvements	▪ Include more information o Operating information (intensity of use, cost of operation, hours of operation, occupancy) (9) o Comparison to market average or regional comparisons (7) o Building characteristics (suburban office vs. high-rise, traffic management plan, asset class, etc.) (3) o Realized or anticipated payback period (1) o Total cost of improvements (1) o Crossover for NAIC codes for building ratings (1) o Carbon emissions (1) o Net present value (1) ▪ Investment population more interested in site versus source energy (3) ▪ Include details on system evaluation (3) ▪ Show what would be needed to achieve ENERGY STAR rating (3) ▪ Use a standardized assessment to input the information (2) ▪ Add information about green fuel options (2) ▪ Rank the potential upgrades based on best approach or effectiveness (2)

Include more information. Building stakeholders would like building operation information, building characteristics, and comparisons to market average or regional comparisons included in the asset rating report or asset rating assumptions. Participants stressed that operation factors (e.g., intensity of use, hours of operation, and occupancy) and building characteristics such as building type (e.g., high-rise or suburban office), use (e.g., single use or mixed use), or asset class (e.g., multifamily, office, industrial) impact energy efficiency. As one participant described, *"It implies that this is the whole pie and that's not true. You really sort of at least need to make it clear on this to the building owner that sure, maybe this represents 60 percent of your energy use in these fixed asset-based issues, but the other 30 is how you run the building and maintain it and everything."* Several building stakeholders recommended adding comparisons, either market average or regional, to the asset rating report. An investor explained *"What could be helpful, too, on this second page is that it's great that you have this broken out by energy use type — lighting, heating, cooling — granulated down to on the square foot basis. Some kind of comparison there would be helpful. If my lighting is at a 10.1 EUI essentially, how does that compare to the average? Am I doing pretty good? Even though there is a 30 percent savings, where am I fitting? If I'm really good, then maybe that's not where I'm going to spend some of my capital."*

Investment population is more interested in site versus source energy. Some building owner and investor participants did not find source energy useful for their needs. Usefulness of source energy information may vary by stakeholder type; another participant indicated building owners or managers are more interested in payback information, but he would want to know the energy source for carbon impact.

Include details on system evaluation. Page 2 of the asset rating report includes a system evaluation section that ranks systems and indicates what systems have identified improvement opportunities listed on page 3. A few building stakeholders would like more information on the system evaluation. For example, include details about each system and assembly component so building stakeholders understand the baseline before looking at the potential upgrades. Also, describe how the system evaluation rankings were determined.

Show what would be needed to achieve ENERGY STAR rating. The asset rating report includes the asset rating tool rating and the current ENERGY STAR rating. In the sample report provided, the building was not currently an ENERGY STAR-certified building. A couple of property asset managers wanted the report to discuss whether implementing recommended changes would lead to achieving ENERGY STAR certification.

Participants also recommended the following enhancements to the cost metrics information.

- Revise the payback information on page 3. Nine building stakeholders did not agree with the timeframes associated with the short, medium, and long payback categories. Suggested timeframes differed among stakeholders. However, the short categories recommended were under 2 years, and the medium categories recommended were under 5 years. Other recommended changes to the payback included allowing investors to determine the payback categories, including potential ROI instead of only payback information, describing how payback was estimated, removing payback information from page 3, and including passive strategies in the upgrade information table.
- Focus on actual costs. Three participants suggested providing more cost data in the asset rating report. A couple of building stakeholders stated that cost information has more value to them when making decisions. Participants suggested providing average cost for the region instead of a site-to-source conversion factor, assigning a dollar value to each of the energy uses, or providing anticipated cost of consumption.

4.4 How Building Stakeholders Would Use the Asset Rating Tool Alongside ENERGY STAR Portfolio Manager

ENERGY STAR Portfolio Manager allows building stakeholders to track and assess energy and water consumption for an individual building as well as across a portfolio of buildings. By entering data into ESPM, building stakeholders are able to benchmark energy performance and identify opportunities for savings. Participants were asked how they would use the asset rating tool individually and alongside ESPM. Three investor/owner stakeholders indicated they would use the asset rating tool as a starting point when deciding to invest in a building but would require additional information. One participant stated *"…even though it's not exact and we would never make an investment decision solely based on this information because it's not specific enough — it's a great place to start, and to start to influence investment decisions at the beginning."* Another investor described using the AR Tool as an initial indicator of where to go for conducting a gap analysis or recommissioning.

Participants did not speak to using the asset rating tool alongside ESPM. A few building stakeholders expressed concern that the AR Tool would be a duplication of ENERGY STAR. For example, one building stakeholder commented *"I'm getting back to my original question, about how this interplays with ENERGY STAR. Our property managers are pretty much overwhelmed with having to do documentation and data entry and all that kind of stuff. This looks like it's more engineering-related, but at the same time, I'm assuming that this is going to be updated on an ongoing basis. The conflict with the task of ENERGY STAR that we've already charted our property managers with could be problematic — and possibly not well-accepted."*

Appendix A

Commercial Building Energy Asset Rating Program
Moderator's Guide

Appendix A

Commercial Building Energy Asset Rating Program Moderator's Guide

I. INTRODUCTION AND ICEBREAKER (10 minutes)

A. Introduction and purpose

Thank you for coming. Your presence and participation today are very important. My name is _____ and I will be moderating today's discussion. I am with Battelle Centers for Public Health Research and Evaluation. [NAME] will be assisting me in note-takings. She is also with Battelle.

The goal of this project is to better understand how to provide information to commercial building stakeholders about the energy efficiency of their buildings. We want to talk to you about your thoughts, opinions, and reactions to this topic. This project is being sponsored by The Department of Energy. The results of this study will be used to develop the Department's commercial building asset rating.

The feedback you will give us today is information we could not get anywhere else. Thank you for your willingness to come and give us your opinions. We'd like you to focus on how you perceive the information provided by an Asset Rating certificate and report. We can provide more information on the Asset Rating program after this session, if you are interested in the program or have more questions. For today's discussion, please assume your building can receive the energy use rating and analysis report at a low cost.

B. Procedures

Before we begin, I would like to start with some ground rules for our discussion today:

1. There are no right or wrong answers. Please be completely honest. We're as interested in learning what you don't like as we are in learning what you do like.

2. Everyone's participation is important. Part of my job as moderator is to make sure we get a chance to hear from everyone, so, at times, I may call on you, or ask you to shorten your remarks so someone else has the chance to speak.

3. We want this to be a group discussion, so you don't need to wait for me to call on you to speak, and please feel free to respond directly to other people's thoughts and ideas. We ask that you please state your first name each time have a turn to speak.

4. Our discussion is totally confidential. We will not use your names in any report.

5. Our discussion today is being tape recorded. These recordings allow us to write a more complete report, and to make sure we accurately reflect your opinions. However, please only speak one at a time, so that the tape recorder can pick up all your comments. In order to maintain confidentiality, please only use your first name when speaking, and address others by first name only during our discussion today. We will destroy all recordings after we are done writing our final report.

6. I am working with some other people on this project, and they will be observing our conversation from the corner of the room. They are taking notes and may ask you some follow up questions at the end. At the end of our discussion, someone will be available to answer your specific questions.

7. As moderator, my job is to keep the discussion focused on the subject. If I see that we are getting off the topic, I will bring us back to the topic so we can finish on time.

8. If you have a cell phone with you, please turn it off or silence the ringer. Thanks.

C. Introductions

Before we begin, I would like each of you to take a few moments to introduce yourself. Please tell the group:

- Your first name (only), and
- What is your occupational title? (but please do not state your employer's name)

[SHOW POWERPOINT SLIDE TO SUMMARIZE KEY POINTS ABOUT ASSET RATING]

- As a bit of background for our discussion, DOE is establishing a national standard for a voluntary Commercial Building Asset Rating and is creating a centralized data collection and modeling tool that can help building owners evaluate their buildings with respect to this standard.

- The AR program will evaluate the physical characteristics of the building "as built" and its overall energy efficiency independent of its occupancy and operational choices.

- The model will take into account the building envelope, the mechanical and electrical systems and other major energy using equipment. This includes heating systems, cooling systems, lighting systems, ventilation, and service hot water - things that are actually built into the building.

- The AR system will identify potential opportunities for efficiency improvements and note what impact those opportunities might have on the Asset Ratings score of a building.

II. TEST PERCEPTIONS and INTERESTS

Now let's get started. We want to gather your perceptions and interests regarding energy efficiency in buildings.

1) How do you currently evaluate the energy efficiency of your buildings?
2) When you decide to purchase, make capital improvements to, or divest of a property, in what way does its' energy use and/or efficiency fit into your decision making process?
3) Looking specifically at investing capital to improve the energy efficiency of a building, what type of information regarding the building's energy use and potential efficiency would be most useful to you? [CAPTURE LIST ON POSTER CHART]. Now let's identify the top <u>two</u> most important.
4) If this information [POINT TO TOP TWO POINTS IDENTIFIED IN PREVIOUS QUESTION] were provided by the Asset Rating Tool, how would you use this information? (Label, One-page Summary, AR Report)?

III. TEST LABEL DESIGN

Now that we have identified what you think is most important, let's look at the preliminary designs that the DOE has come up with.

[SHOW LARGE POSTERS/HAND OUT COPIES OF 2 DIFFERENT ASSET RATING CERTIFICATE/LABEL DESIGNS **FOR THE SAME BUILDING** – ALLOW A FEW MINUTES FOR PARTICIPANTS TO REVIEW AND DIGEST INFORMATION ON LABELS. WALK PARTICIPANTS THROUGH THE METHODOLOGY AND THINKING BEHIND THE DIFFERENT DESIGNS]

For the purpose of the discussion, please refer to the label with the energy use index/kBtu as Label A and the label with the points system as Label B.

1) What are the most relevant pieces of information you get from these labels?
2) Which of these designs provides the information that is most useful to you? Why?
3) Of these designs, which most clearly reflects the current state of energy efficiency in this building? Which reflects the potential for improvement?
4) Can you make some suggestions on both the layout of the labels as well as the content? Probes: a. Is there anything missing? b. What is extraneous? c. How would you re-order it?
5) Are there other metrics that would be helpful in expanding your understanding and influence your decision-making?

Now let's look at two labels with the same rating system, for two different buildings of the same type.

[SHOW LARGE POSTERS/HAND OUT COPIES OF LABELS OF THE SAME TYPE OF LABELS BUT WITH DIFFERENT BUILDINGS AND RATINGS – ALLOW A FEW MINUTES FOR PARTICIPANTS TO REVIEW AND DIGEST INFORMATION ON LABELS.]

For the purpose of the discussion, please refer to the label with rating of 62 as Label B, and the one rating of 85 as Label C.

6) Please look at the ratings on these buildings. Which building is more efficient? Which building has the most potential for improvement? [IF ESPM RATING IS ALSO REFLECTED] How do the two ratings relate to one another and what information can be drawn from that comparison?

IV. OTHER METRICS

Now we are going to look at the Asset Rating Report for this building

[SHOW LARGE POSTER/HAND OUT COPIES OF THE **ASSET RATING REPORT**. GIVE PARTICIPANTS A FEW MINUTES TO STUDY THE INFORMATION]

First, let's look at the four sections/metrics of this report. On page 1, we have energy use broken out by fuel type (including table and pie charts), the Systems Evaluation information, the Greenhouse Gas Emissions, and the Energy Star Score. On page 2 there is the Energy Savings Upgrade Opportunities. [SHOW MARKED UP COPY OF REPORT POINTING TO SECTIONS]

1) There are a number of metrics on this report, which of these sections/metrics is the most understandable? Please rank these sections/metrics on the basis of how well you understand them (and jot down a few bullet points as to why).
    a) Building Envelope
        i. Roofs
        ii. Windows
    b) HVAC Systems
        i. Air Distribution
        ii. Cooling Plant
    c) Hot Water Systems
        i. Hot water systems
    d) Lighting
        i. Lighting fixtures

ii. Daylighting

2) Which is the most useful? (How does the Systems Evaluation information on page 1 of this compare to the Energy Savings Upgrade Opportunities section on page 2? How do the pie charts on page 1 relate to the tables above them?)
3) If information on these metrics were provided, how would you use this information?
4) Cost metrics - we are looking at ways of providing a means of evaluating the costs and benefits of investing in improvements that increase the efficiency of a property (as reflected in the Potential AR (EUI) Score) - [SHOW LARGE POSTER WITH ENERGY SAVINGS INFORMATION HIGHLIGHTED]. What do you find useful about this information?
5) Would you find associated cost numbers helpful? Why or why not?
6) The Assess Rating tool will provide specific recommendations on potential improvements that can be made to the property. How would you use this information?
7) If you could design this report, what would you do differently? (What would you include, take out, add, re-order?)

VI. INTEGRATION WITH ESPM

1) For those of you that use ENERGY STAR Portfolio Manager (ESPM)? What information provided from ESPM is the most useful to you?
2) How would you use the AR tool alongside ESPM?

VII. WRAP UP

We are almost done with our discussion but before we end I would like to ask:

1. Is there information that we have not discussed today that would influence your decision on increasing the energy efficiency of your properties?

2. Are there any other thoughts you have that you would like to share with us regarding an AR tool and certificate?

VIII. FINAL COMMENTS AND THANK YOU

Your feedback and thoughts have been very important, and we appreciate your assistance.

3. Before we invite today's observers to comment, do you have anything else you would like to say?

Thank you for coming! Your comments will help be extremely helpful. As a reminder, all of your comments today will be kept confidential.

Appendix B

Seattle Focus Group Comments on Asset Rating Program Documents

Appendix B

Seattle Focus Group Comments on Asset Rating Program Documents

Participants provided suggestions on both the design and content of the asset rating label and report. The top three most mentioned design improvements included 1) designing a scale that moves toward zero instead of up to 100, 2) showing spatial reference to average buildings or the region, and 3) combining pages 2 and 3 of the asset rating report. Including more information in the asset rating report, presenting actual costs, and focusing on site energy were the most mentioned content improvements. The suggested improvements to the asset rating labels and report are illustrated in this appendix.

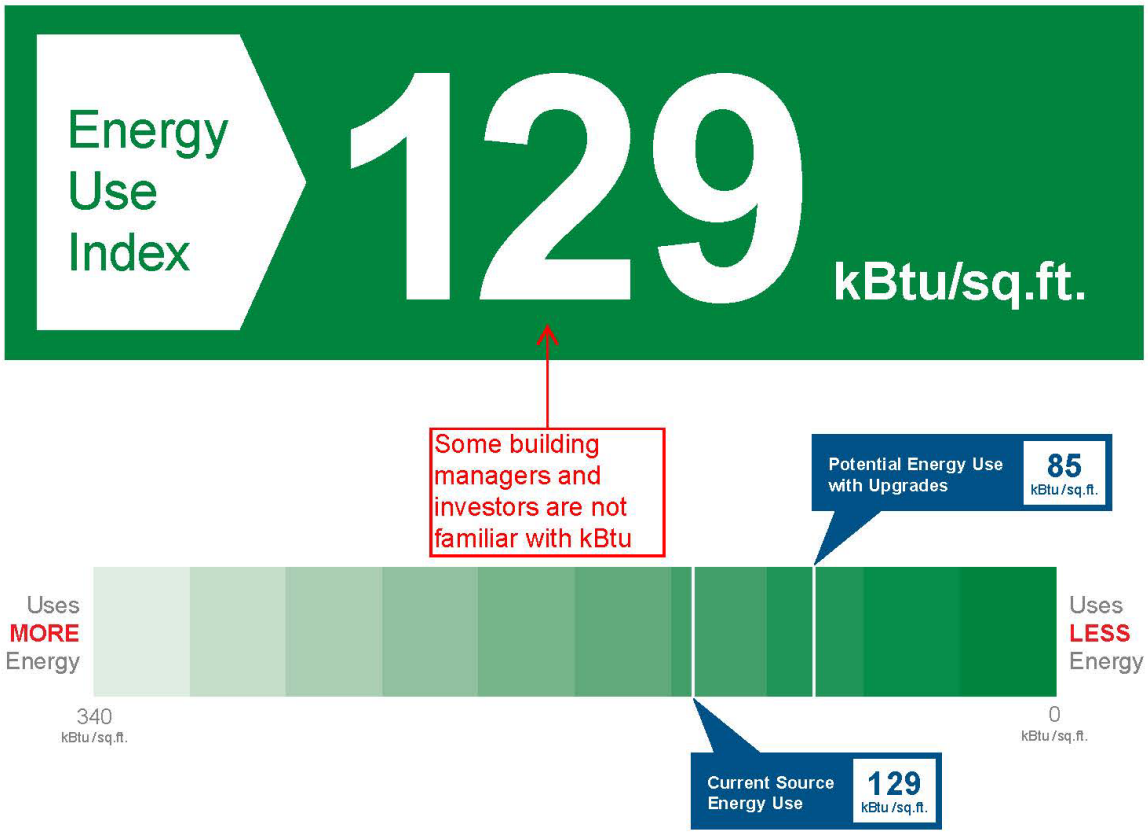
LABEL A

BUILDING ENERGY
ASSET RATING CERTIFICATE

Building Name
1 Main Road
Any City, State 99999

Building Type: **Office**
Floor Area: **100,000 square feet**
Year Built: **2009**

Label #: **WA-1234567**
Award Year: **2011**



Estimated annual energy savings with building upgrades: **19%**
Estimated annual energy cost savings with building upgrades: **$22,188***

**Based on regional average energy costs. See Asset Rating Report for identified building upgrade opportunities.*

U.S. DEPARTMENT OF ENERGY

This certificate shows the asset rating of this building.
It indicates the energy efficiency of the building system including envelope, heating, ventilation, cooling, and lighting systems.

▲ Scan the QR code with your mobile device to learn more, or visit http://www1.eere.energy.gov/buildings/commercial_initiatives/assetrating/bldg1234567.html

LABEL B

BUILDING ENERGY
ASSET RATING CERTIFICATE

Building Name
1 Main Road
Any City, State 99999

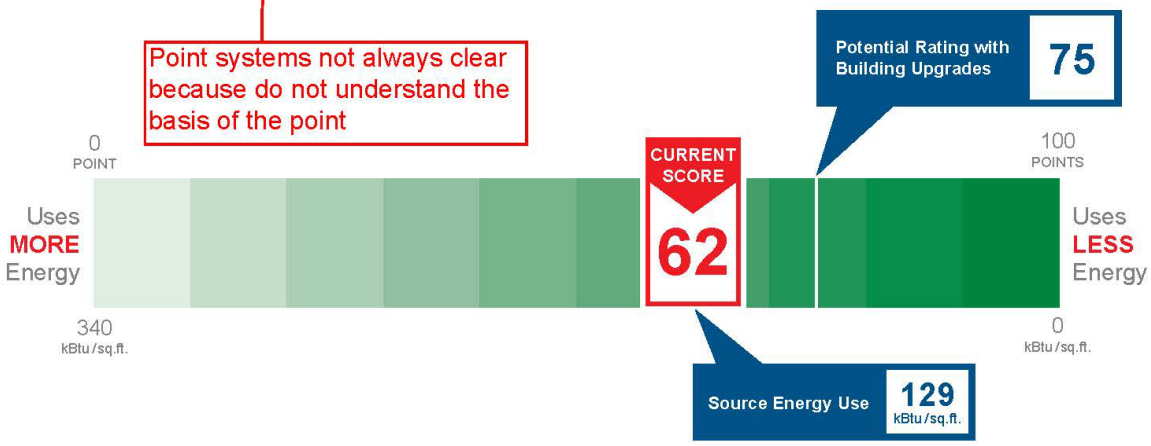
Building Type: **Office**
Floor Area: **100,000 square feet**
Year Built: **2009**

Label #: **WA-1234567**
Award Year: **2011**

62 POINTS
(out of 100 total possible)

Compared to other offices in similar climate

Point systems not always clear because do not understand the basis of the point



Estimated annual energy savings with building upgrades: **19%**
Estimated annual energy cost savings with building upgrades: **$22,188***

**Based on regional average energy costs. See Asset Rating Report for identified building upgrade opportunities.*

U.S. DEPARTMENT OF ENERGY

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Need to include definitions and assumptions used to develop the report. Stakeholders would like building characteristics and operating information considered in the rating.

BUILDING ENERGY ASSET RATING CERTIFICATE

Use analysis month and year

Building Name
999 George Washington Way
Any City, State 99999

Building Type: **Office**
Floor Area: **90,000 square feet**
Year Built: **2008**

Label #: **WA-1234568**
Award Year: **2011**

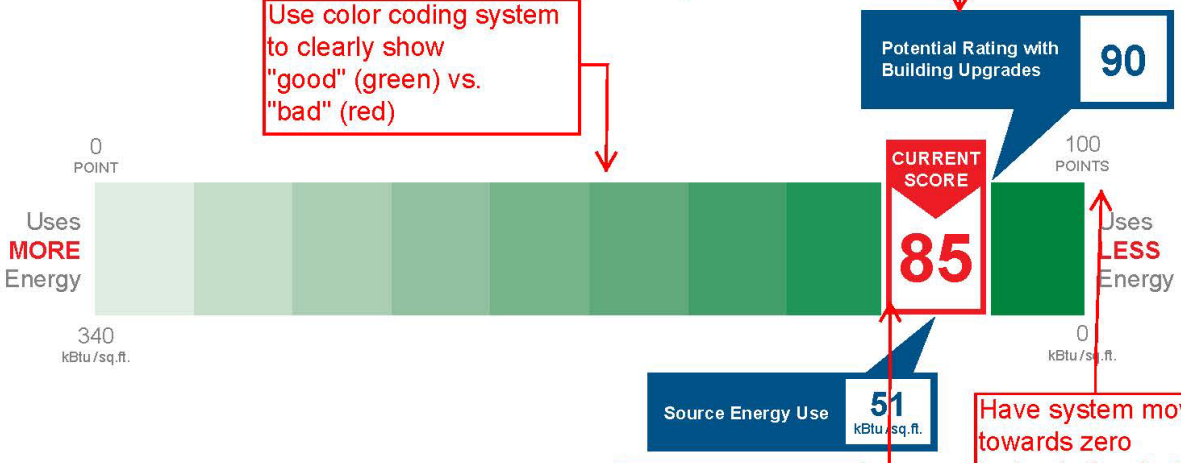
85 POINTS

(out of 100 total possible)

Compared to o… …ate

Use different color for this box and include Energy Use for Potential Rating

Use color coding system to clearly show "good" (green) vs. "bad" (red)



Have system move towards zero instead of up to 100

Show spatial reference to national or regional average

Estimated annual energy savings with building upgrades: 18%

Estimated annual energy cost savings with building upgrades: $120,355*

**Based on regional average energy costs. See Asset Rating Report for identi… …ies.*

Do not trust this estimate

U.S. DEPARTMENT OF ENERGY

This certificate shows the asset rating of this building.
It indicates the energy efficiency of the building system including envelope, heating, ventilation, cooling, and lighting systems.

▲ Scan the QR code with your mobile device to learn more, or visit http://www1.eere.energy.gov/buildings/commercial_initiatives/assetrating/bldg1234568.html

BUILDING ENERGY
ASSET RATING REPORT

Building Name
1 Main Road
Any City, State 99999

Building Type: **Office**
Floor Area: **100,000 square feet**
Year Built: **200**

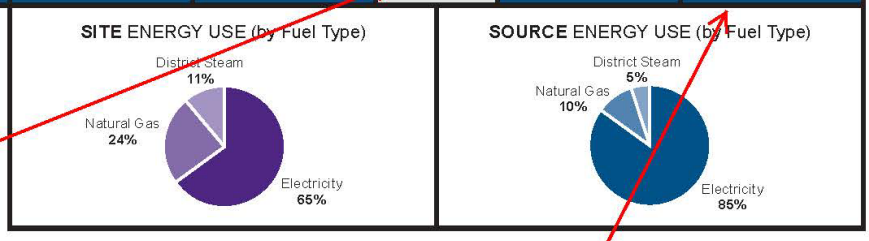
Label #: **WA-1234567**
Award Year: **2011**

Investors and building managers are more interested in site energy vs. source energy.
There is also some confusion between site and source energy.

MODELED ENERGY CONSUMPTION (un

Include estimated costs for energy consumption

		SITE ENERGY USE: Site Energy Use PER YEAR kBtu/yr	SITE ENERGY USE: Site Energy Use INTENSITY kBtu/sq.ft/yr	Site-to-Source CONVERSION FACTOR (National Avg.)	SOURCE ENERGY USE: Source Energy Use PER YEAR kBtu/yr	SOURCE ENERGY USE: Source Energy Use INTENSITY kBtu/sq.ft/yr
Electricity	Consumption	3,541,170	35.4	3.340	10,965,788*	109.7
	On-site Generation	-258,000	-2.6			
Natural Gas		1,232,092	12.3	1.047	1,290,000	12.9
District Steam		533,058	5.3	1.21	645,000	6.5
District Chilled Water		–	–	1.05	–	–
District Hot Water		–	–	1.28	–	–
Fuel Oil		–	–	1.01	–	–
Propane		–	–	1.01	–	–
TOTAL		5,048,320	50.5		12,900,788	129.0



Could provide average cost for the region here

*Based on the predicted purchased electricity (the sum of consumption and on-site generation).

More interested in actual cost per kBtu per square foot

OPTIONAL INFORMATION

Greenhouse Gas:

767 $MTCO_2e$/year

Greenhouse gas emission is calculated using national average emission factors when this building is under standard operating conditions.

ENERGY STAR Current Rating:

ENERGY STAR

This building is not an ENERGY STAR certified building.
(As of August 2011)

71

Confused how ENERGY STAR relates to AR rating

U.S. DEPARTMENT OF ENERGY

This certificate shows the asset rating of this building.
It indicates the energy efficiency of the building system including envelope, heating, ventilation, cooling, and lighting systems.

▲ Scan the QR code with your mobile device to learn more, or visit http://www1.eere.energy.gov/buildings/commercial_initiatives/assetrating/bldg1234567.html

BUILDING ENERGY
ASSET RATING REPORT

Combine pages 2 & 3

(Page 2 of 3)

Building Name
1 Main Road
Any City, State 99999

Building Type: **Office**
Floor Area: **100,000 square feet**
Year Built: **2009**

Label #: **WA-1234567**
Award Year: **2011**

This seems like wasted space

SYSTEM EVALUATION

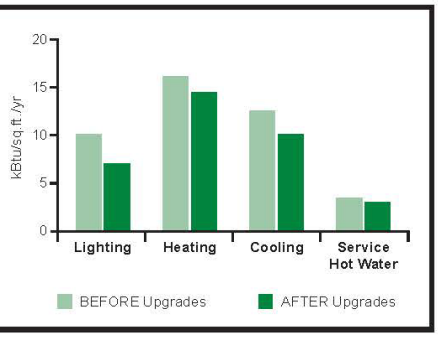
Need a key for color coding

	RANKING	IDENTIFIED IMPROVEMENT OPPORTUNITIES See page 3 for details
Lighting System	Poor	✔
Heating Plant	Good	–
Cooling Plant	Poor	✔
Air Distribution System	Fair	✔
Roof	Poor	✔
Wall	Fair	–
Window	Poor	✔
Service Hot Water	Fair	✔

How is Good, Fair, or Poor determined?

SITE ENERGY USE INTENSITY (by Category)

	BEFORE Upgrades kBtu/sq.ft/yr	Potential SAVINGS	AFTER Upgrades kBtu/sq.ft/yr
Lighting	10.1	30%	7.1
Heating	16.2	10%	14.5
Cooling	12.6	20%	10.1
Service Hot Water	3.5	15%	3.0
Miscellaneous	8.1		8.1
TOTAL	50.5	19%	42.8



How does this number relate to the potential savings total?

U.S. DEPARTMENT OF ENERGY

This certificate shows the asset rating of this building.
It indicates the energy efficiency of the building system including envelope, heating, ventilation, cooling, and lighting systems.

▲ Scan the QR code with your mobile device to learn more, or visit http://www1.eere.energy.gov/buildings/commercial_initiatives/assetrating/bldg1234567.html

BUILDING ENERGY
ASSET RATING REPORT

Building Name
1 Main Road
Any City, State 99999

Building Type: **Office**
Floor Area: **100,000 square feet**
Year Built: **2009**

Label #: **WA-1234567**
Award Year: **2011**

Information on upgrades is too vague

ENERGY SAVINGS UPGRADE OPPORTUNITIES

Rank the potential upgrades based on best approach or effectiveness

	Savings*	Payback**
BUILDING ENVELOPE		
Roofs: • Add insulation (2 inches fiberglass) to interior surface of metal roof.	5%	LONG
Windows: • Install aluminum frame double pane argon/Low-E window OR • Add storm windows	5% OR 2%	MEDIUM SHORT
HVAC SYSTEMS		
Air Distribution Systems: • Convert a constant air volume system into a variable air volume system with variable speed drives on fan motors	8%	MEDIUM
Cooling Plant: • Replace single building air-cooled electric chiller (chilled water output) with newer, more efficient air-cooled electric chiller	3%	MEDIUM
HOT WATER SYSTEMS		
Hot Water Systems: • Replace distributed tank system with electric resistance water heater (R-16 insulation)	2%	MEDIUM
LIGHTING		
Lighting Fixtures: • Replace 40W T12 fluorescent lights with 32W T8 fluorescent lights	3%	SHORT
Daylighting: • Install daylighting sensors in the daylit area	2%	LONG
›› POTENTIAL TOTAL SAVINGS FOR ALL OPPORTUNITIES COMBINED	19%	MEDIUM

** Percentage of total building energy use. Each energy conservation measure is evaluated individually, assuming other building systems remain unchanged.*

*** Short: Less than 3 years*
Medium: 3 - 8 years
Long: 8 - 15 years

Do not understand how calculated 19%

Do not agree with year categories for short, medium, and long

U.S. DEPARTMENT OF ENERGY

This certificate shows the asset
It indicates the energy efficiency of envelope, heating, ventilation, cooli

▲ Scan the QR code with your mobile device to learn more, or visit http://www1.eere.energy.gov/buildings/commercial_initiatives/assetrating/bldg1234567.html