

Building EQ Seminar Description



- ASHRAE's Building Energy Quotient program provides a quick energy analysis that compares your building to similar buildings with the same climate. The two complementary options are:
 - *In Operation* (Compare actual building energy use to similar buildings)
 - *As Designed* (Compare potential building energy use to similar buildings)
- Building EQ can help identify means to improve your building's energy performance and provide data on Indoor Environmental Quality.
- This presentation provides details on how to use the Building EQ program as an integral part of new building design and to manage actual building energy consumption



Learning Objectives



After attending this presentation, participants will be able to:


- Understand how Building EQ rating applies to building energy use
- Explain the features of the Building EQ Portal
- Use Building EQ Performance Score to differentiate energy performance in buildings
- Explain the characteristics of Building EQ actionable energy recommendations for existing buildings
- Describe how the Building EQ process standardizes modeling so that comparisons can be meaningful




AIA/CES Registration PLACEHOLDER SLIDE



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EDUCATION PARTNER







PLACEHOLDER SLIDE

By ASHRAE


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X General CE hours
X LEED-specific hours



ASHRAE's Building EQ

Rate Your Building's Efficiency


- Compare your building to similar buildings with the same climate.

Improve Your Building's Energy Performance

- Act on *As Designed* and/or *In Operation* assessments.

Powered by ASHRAE

- Rests on ASHRAE methodologies and standards and the experience of credentialed practitioners for reliable, consistent results.



Building EQ is the most comprehensive assessment program providing actionable recommendations for today's commercial and institutional buildings.

ASHRAE's Building EQ



- Two separate ratings that work together
 - In Operation rating assesses a building's actual energy use
 - As Designed evaluates a building's potential energy use
- Allows for comparison of As Designed (asset) and In Operation (operational) ratings
- Complements other building rating/labeling programs
- Voluntary rating/labeling program



ASHRAE's Building EQ Portal provides a quick energy analysis that benchmarks a building's energy performance. Building EQ assists in the preparation of an ASHRAE Level 1 Energy Audit to identify means to improve a building's energy performance including low-cost, no-cost energy efficiency measures and an Indoor Environmental Quality survey with recorded measurements to provide additional information to assess a building's performance.



Benefits of Building EQ



- Helps building owners make informed decisions managing their building portfolios
- Assists in the preparation of an ASHRAE Level 1 Energy Audit
- Identifies actionable recommendations, costs, and payback ranges for energy improvements via retrofits, maintenance, upgrades
- Provides the credentialed practitioner with a consistent methodology to follow
- Provides the building owner with easily understood and applied information



Value of Building EQ



Building EQ provides a framework for realizing energy improvements in existing buildings

- **Greatest Value:**
 - Streamlining the energy audit process
 - Actionable recommendations for improving building energy performance
 - Documentation of the assessment and results
 - Building Label to recognize high performance
- **Long Term Value:**
 - Ability to assess effectiveness of EEMs after implementation
 - Standard and consistent process to track improvement over time



Current US/Canada Labeling Efforts



- EPA ENERGY STAR Portfolio Manager (benchmarking)
- DOE Commercial Building Energy Asset Score
- USGBC LEED (sustainability rating)
- GBI Green Globes (sustainability rating)
- BOMA 360 (six O&M focused criteria including energy)
- State and municipal building energy reporting and disclosure ordinances (BERDO)



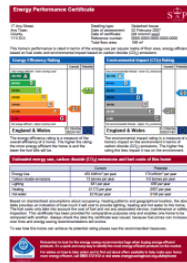
Current Global Labeling Efforts



- Widespread acceptance internationally



Austria



England & Wales



Greece



Italy



Building EQ is Different



From green building programs:

- Based solely on a building's energy use
- Focused on understanding energy use
- Identifies opportunities for improved energy performance (In Operation)
- Allows for comparison between buildings with different operating variables (As Designed)
- Consistent energy rating method for both Existing Buildings and New Construction programs



Building EQ is Different



From benchmarking programs:

- Consistent process to assess energy performance
- Identifies actionable recommendations for improving energy performance (In Operation)
- Connects Building owners with a credential practitioner to help implement recommendations identified in the assessment process
- Unified system for assessing assets and operations
- Greater differentiation for high performing buildings
- Label score emphasizes zero net energy



In Operation Rating



- Assessment of actual energy performance with building's existing characteristics and operation
- Based on metered energy use of a building
- Confirmation that indoor environmental quality is not compromised for energy savings.
- On-site assessment with actionable recommendations for improving energy performance
- Applicable for buildings after at least 12 months of operation



As Designed Rating



- Assessment of energy performance potential, based on building's physical characteristics and systems
- Independent of building occupancy and operating conditions
- Based on results of a standardized energy model of as-built conditions as compared to a baseline
- Applicable to both new and existing buildings



Comparing Ratings



In Operation Rating

- Actual metered energy consumption
- Influenced by operational and occupancy variables
- Improved by upgrading building fabric, systems, or operating procedures

As Designed Rating

- Simulated standardized energy use
- Independent of operational and occupancy variables
- Improved only by upgrading building fabric or systems



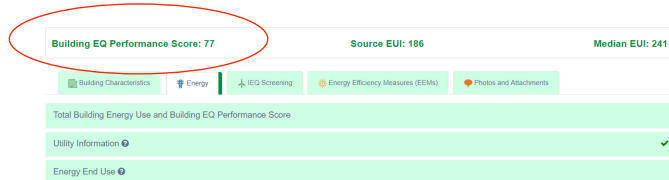
Building EQ Performance Score



- Building EQ tracks a building’s energy performance with the Building Performance Score
- The score compares the candidate building’s EUI to a baseline (median) EUI for that building type.

$$(EUI_{\text{building}} / EUI_{\text{baseline}}) \times 100$$

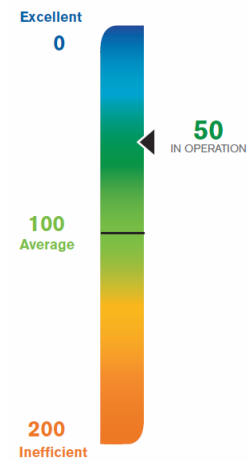
- EUIs are calculated for source energy using US national site-to-source ratios.



Rating Scale



- Rating based on Building Performance Score
- Excellent set to “zero net energy”
- Score below zero for net energy producing buildings
- Average set to U.S. median EUI for existing buildings of that building type, with adjustments
- Score exceeding 100 for buildings with higher than average energy usage.



Rating Scale



Score Range	Energy Performance
≤ 0	Net zero or energy producer
1-25	75-99% energy savings over median
26-55	45-74% energy savings over median
56-85	15-44% energy savings over median
86-115	Within 15% of median energy use
116-145	16-45% more energy than median
>145	>45% more energy than median



Introducing
Building EQ Portal

Building EQ: Be an Energy Genius



Building EQ: Be an Energy Genius

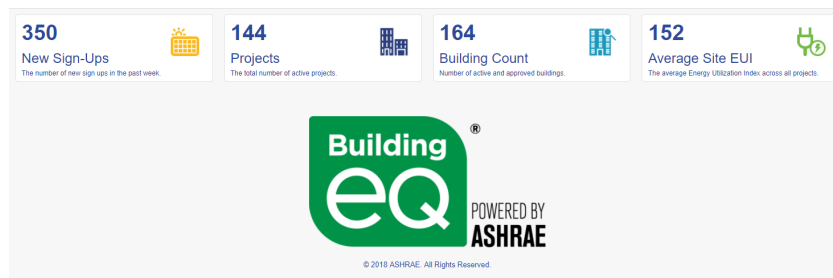
[Click HERE to view](#)



Building EQ Portal



- Web Portal for In Operation Rating – Launched in November 2017
- Web Portal for As Designed – Launched in March 2018



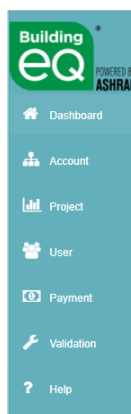
Building EQ Portal Features



- Online data entry and submission process
- Metered energy data exchange from Portfolio Manager
- Median EUI calculation aligned with ENERGY STAR™
- Improved submission approval process with help and validation built in
- Reports can be automatically generated by credentialed users
- Redesigned label award with letter grades eliminated
- Customized reporting capabilities in development



Using the Building EQ Portal



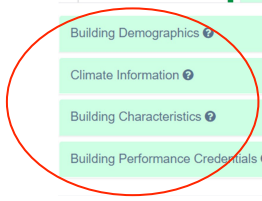
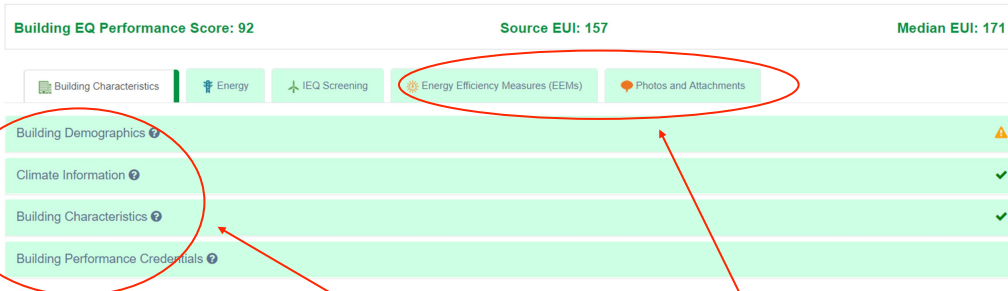
- Create a log-in and password to register as a user
- The menu on the left hand side of the screen is used to navigate around the Portal.
- Set up an account to manage users and projects
- Create a project to begin entering building data
- Projects must be submitted by a credentialed practitioners for an official Building EQ rating



Using the Building EQ Portal



Data input screens are arranged by tabs and accordions



Accordions

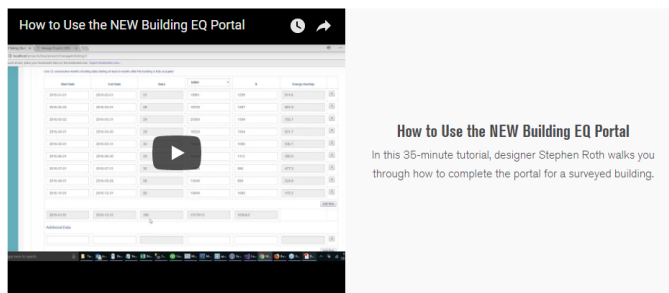
Tabs



Using the Building EQ Portal



- Building EQ Training Video available on the webpage



www.ashrae.org/BuildingEQ



System Outputs/Reports



- Building EQ Performance Score – available to all users
- User Input Report – available for all submissions
- Building EQ Label Report– available for approved submissions
- Disclosure Form – Available for approved submissions
- Audit Spreadsheets Report – Available for approved submissions (fills in data supplied by Building EQ process)
- Building EQ Database – Under development



Building EQ Performance Score



- Rates the building's performance
- Visible on input screens to all users
- No cost

Building EQ Performance Score : 75.6

Source EUI : 94.2 Median EUI : 124.6

Building Characteristics: [Red X]

Climate Information: [Green Checkmark]

Building Characteristics: [Red X]

Building Performance Credentials: [Green Checkmark]



User Input Report



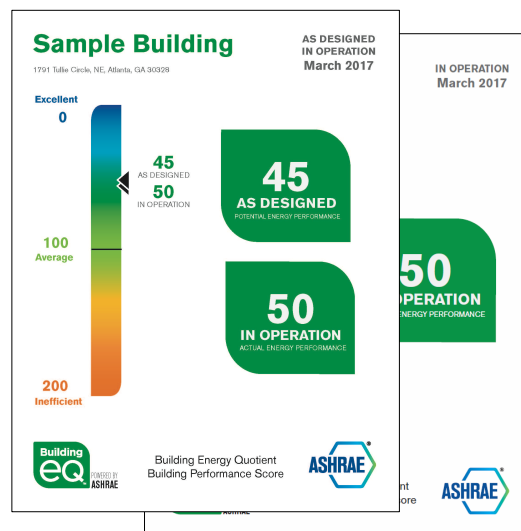
- Use blank version to collect data off-line
- Print final version to document data entered
- Available to all users
- No cost



Building EQ Label Report



- Provides visual indicator of Building EQ Performance Score on a barometer/scale
- Generated by credentialed user for approved submissions
- No cost



Building EQ Disclosure Report



- Presents key energy information for compliance with disclosure ordinances
- Generated by credentialed practitioners for approved submissions
- Fee charged per building submission

BUILDING EQ DISCLOSURE CERTIFICATE			
Building Identification Information			
Building Name:		Assessment Date:	
Building Address:		Primary Contact for Facility:	
Building Type:		Year Built:	Gross Floor Area (sq.ft.):
Name of qualified Energy Modeler (PE or REMP):		Name of qualified Energy Assessor (PE or REMP):	
Building Energy Use Summary			
Normalized Energy Use Score	Energy Use Summary (kBtu)	Normalized Energy Use Score	
0	Electricity	0	0
0	Natural Gas	0	0
0	Fuel Oil	0	0
0	Purchased Steam	0	0
0	Purchased Chilled Water	0	0
0	Other	0	0
0	Other	0	0
0	Total Energy Use	0	0
0	Qualified Normalized Energy	0	0
0	Normalized Fuel Cost	0	0
0	Net Energy Usage	0	0
Energy Use Intensity (kBtu/sq.ft)			
Design Potential	Score	Site	Actual Measured
0	0	0	0
Median EUI			
Site	Score	Site	Score
0	0	0	0
Building EQ Building Performance Score			
ASHRAE Building EQ - In Design		ASHRAE Building EQ - In Operation	
Score #	Assessment Month, Yr	Score #	Assessment Month, Yr
Energy Star Rating for Jurisdictional Compliance			
EPA ENERGY STAR Super Saver		EPA ENERGY STAR Portfolio Manager	
Rating #		Rating #	
For the Year of 20-		For the Year of 20-	
Attachments			
<input type="checkbox"/> Statement of Energy Usage Assessor	<input type="checkbox"/> Statement of Energy Performance		
<input type="checkbox"/> Energy Simulation Data	<input type="checkbox"/> ASHRAE Level 1 Energy Audit		
<input type="checkbox"/> ASHRAE Building EQ Data	<input type="checkbox"/> ASHRAE Building EQ Data		
Certified By:			
Owner's Representative (Name):		Signature:	
		1	

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Coming Soon / In Development



- Audit Spreadsheets Report
 - Automatically populated with information gathered during the In Operation assessment
 - For use in a final audit report
 - Available to credentialed users for a fee per building submission
- Building EQ Database – In Development
 - Access to aggregated information from submitted buildings
 - Customized reporting capabilities for a fee per project or account





Getting Started with an In Operation Rating

In Operation Building Performance Score



$$(EUI_{\text{metered}} / EUI_{\text{baseline}}) \times 100$$

- Compares metered energy use of candidate building to baseline EUI
- Baseline (median) EUI is based on CBECS median for the building type, corrected for location and hours of operation
- EUIs calculated for source energy using U.S. national site-to-source factors



Building Demographics



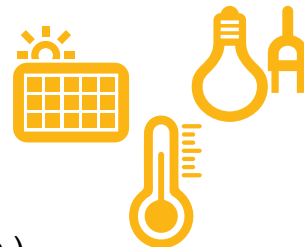
- Location / Climate
- Operating Hours
- Building gross area
- Building use type
- Multiple-use Buildings or Properties
 - Apportioned by % of area
- Output of this data determines $EUI_{baseline}$



IEQ Screening



- Review issues logs and conduct occupant survey (optional).
- Requires representative measurements
- Thermal comfort
- Lighting quality review
- Indoor Air Quality
 - Problems noted
 - Ventilation
 - HVAC system observation (drains, filters, etc.)



Energy Calculations



- Metered energy use and cost by fuel type
 - Electricity
 - Natural Gas
 - Biomass, etc.
- Data exchange from Portfolio Manager
- Review of utility information
- Output of this data determines EUI_{measured}



Energy Savings Opportunities



- Assists with ASHRAE Level 1 Energy Audit process
- Actionable Recommendations with estimated costs and payback
- Standardized EEMs including:
 - Building Envelope
 - Lighting/Daylighting
 - HVAC Systems
 - Refrigeration
 - Energy Generation
 - Other EEMs





Getting Started with an As Designed Rating

As Designed Building Performance Score



$$(EUI_{\text{simulated}} / EUI_{\text{baseline}}) \times 100$$

- Compares simulated energy use of candidate building to baseline EUI
- Baseline (median) EUI is based on CBECS median for the building type, corrected for location
- Uses standardized modeling inputs of operating parameters (COMNET)
 - Occupancy, plug and process loads, schedules, setpoints
 - Depends on building and space type
- EUIs calculated for source energy using US national site-to-source factors



Standardized Modeling Inputs



- Building energy models contain hundreds of variables
- In typical energy modeling, buildings are modeled to operate as envisioned by modelers
- Buildings often operate differently than originally envisioned
- The same building modeled by different modelers will almost certainly show different energy outcomes because of different assumptions.



Standardized Modeling Inputs



- Building EQ As Designed models are required to use standardized inputs from COMNET for the candidate building
- COMNET is a quality assurance initiative to standardize building energy modeling, by creating consistent baselines relative to various energy codes and standards
- Building EQ uses the Building EQ tab on the COMNET spreadsheets.



Standardized Input Variables



- Automatic Lighting Controls
- Plug Loads
- Occupancy
- Ventilation Rates
- Processes
- Schedules – includes lights, receptacles, HVAC Operating hours, HVAC set points, domestic hot water use, refrigeration, elevators, etc.



Building Specific Input Variables



- Building envelope/enclosure
- HVAC system type
- Cooling type/source
- Heating Type/source
- Service water heating
- Fuel types
- Energy efficiency measures modeled.



Using the As Designed Rating



- Compare buildings in terms of energy consumption characteristics
- Scale highlights normalized energy costs among similar buildings
 - Linear Scale
 - Building that matches baseline will receive a 100 rating
 - Building that uses half the energy of the baseline will get a 50 (by using half the energy, the cost should be roughly half)
 - Building that is designed as net-zero will get a 0



Qualifications for Building EQ Submissions

Credentialed Users



Official submissions require:

- PE licensed in the jurisdiction where project located
or
- ASHRAE Certified Provider
 - Building Energy Assessment Professional (BEAP) for the In Operation rating. www.ashrae.org/BEAP
 - Building Energy Modeling Professional (BEMP) for the As Designed Rating www.ashrae.org/BEMP



Why Get Certified?



- Recognition of ability to deliver components of Building EQ rating
- Demonstrates understanding of respective body of work
- Keeps that understanding current through professional development
- Allows use of Building EQ Certified Provider logo.
- Aligns with DOE Better Buildings Workforce Guidelines (BEAP)
- ANSI accredited (BEAP & BEMP)



Building Energy Assessment Professional (BEAP)



Certifies ability to:

- Audit and analyze buildings
- Determine project scope and collect data
- Analyze building performance and interpret results
- Evaluate alternatives and recommend EEMs
- Assist with EEM implementation



www.ashrae.org/BEAP

Building Energy Modeling Professional (BEMP)



Certifies ability to:

- Evaluate, choose, use, calibrate, and interpret results of energy modeling software when applied to building and systems energy performance and economics.
- Competence to model new and existing buildings and systems with their full range of physics.



www.ashrae.org/BEAP



Building EQ Applications

Individual Buildings



- ASHRAE members using Building EQ to evaluate individual buildings
- Value Added
 - Member price on credential verification one-time set up fee
 - Credential verification fee waived for Certified Providers
- Outreach through grassroots organization



Institutional Buildings



- Universities and organizations with campuses
- Value Added:
 - Multiple projects entered into system/database
 - Review data for entire building inventory
- Outreach to APPA: Leadership in Educational Facilities



Government / International



- State and federal governments, municipalities, utilities
- Value Added:
 - Demonstrates compliance with benchmarking ordinances
 - Customize portal to meet specific needs of customer
- Outreach through GGAC (Grassroots Government Advocacy Committee), Chapters and Regions





Other Developments

New ASHRAE University Course



- Course name: *Benchmarking and Assessment of Energy Performance for Existing Buildings*
- University or college senior-level undergraduate or graduate course developed by ASHRAE
- Covers building energy auditing and analysis using Building EQ as a learning framework
- Students experience project-based learning through hands-on engineering in real buildings under the guidance of industry professionals



www.ashrae.org/educationalresources

Questions?



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