

This is a July 2019 Introduction to Building EQ Presentation.

Building EQ webpage: www.ashrae.org/buildingEQ

Building EQ Video: <https://www.youtube.com/watch?v=8UprJpl5cMs&t=3s>

Building EQ Portal Training: <https://www.youtube.com/watch?v=K45K0YfOjpU&t=45s>

NOTE:

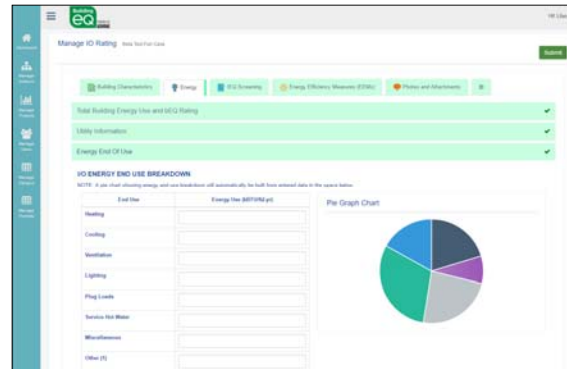
Most of the photos in the presentation with people come from and feature the actors in the Building EQ video listed above.

The 2 minute video provides a broad overview of the Building EQ program.

What is Building EQ?



- Web based portal
- Benchmarks energy performance to similar buildings in same CZ
- Calculates building EUI
- Not an energy modeling tool
- Performs both *In Operation* and *As Designed* assessment



CZ = Climate Zone

EUI = Energy Use Intensity – Btu/yr-ft²

IO = In Operation

AD = As Designed

Building EQ is a web based portal that compares your building's performance with similar building types.

- offers a consistent methodology,
- can also compare buildings within an owner's portfolio against each other
- can be re-evaluated over time to see if the improvements are getting the expected energy savings and performance results.
- allows owners to invest financial resources in their buildings in the ways that will provide the greatest return.

Building EQ is only tool that includes both In Operation (operational rating) and As Designed (asset rating).

- Taken together the As Designed and In Operation ratings provide a comprehensive view of a buildings current and potential energy performance.
- Most of the inputs are the same for both ratings which saves you time and money!

In Operation Assessment



- Uses metered energy bills for energy usage
- Reflects how the building is designed, used, and operated
- Most common application
- Rating from 0 (zero net energy) to 200 (energy inefficient)



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Building EQ In Operation process compares metered energy use to a baseline median EUI using the following formula: $(EUI_{\text{metered}}/EUI_{\text{baseline}}) \times 100$.

- Twelve consecutive months of actual metered data is required and must be within 6 months of the assessment date.
- Metered energy data can be downloaded from ENERGY STAR Portfolio Manager so the data does not need to be reentered into the Portal.

The scale barometer shown illustrates how a building's Building Performance Score indicates a building's energy performance with a score range as follows: .

- A zero net energy building will have a score of zero (zero net energy use)
- An efficient building has a score less than 100 (low energy use / energy use approaching zero net energy use)
- An average building will fall near the median value of 100 (equals median or baseline building)
- An Inefficient building has a score greater than 100 (above average energy use / high energy use)

The baseline value of 100 also represents the median (similar to mid-point or average) energy use intensity for existing buildings of that building type.

In Operation Assessment



How Good is My Building?



- Get energy bills
- Do a walk through
- Enter data into Portal
- Get score

Celebrate good score with ASHRAE Building EQ Label Award

Start a dialog with owner on how to improve building score

Submit project for official rating
OR
Use project information to start conversation

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Building EQ In Operation assesses the building's energy performance.

The assessment:

- collects metered energy data
- includes a building walk-through
- supports a Level 1 Energy Audit
- identifies where and how energy is consumed,
- provides suggested EEMs (with estimated costs and payback),
- includes an IEQ screening that records measurements for thermal comfort, lighting, and ventilation for IAQ
- provides a Building EQ Performance Score

The assessor gets information that will help the building owner.

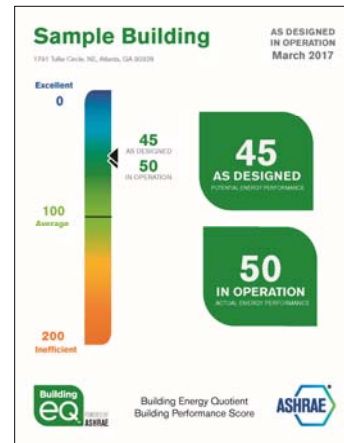
The building owner receives guidance on how to improve energy performance.

The estimated time to input the required data into the Portal is approximately 30-60 minutes depending on the size of the building and how much data is being input. This assumes that all the data is readily in hand at the time of input.

As Designed Assessment



- Evaluates potential energy use
- Uses standardized energy model
- Independent of building occupancy and operating conditions
- Rating from 0 (zero net energy) to 200 (energy inefficient)



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Building EQ As Designed compare a building's simulated energy consumption to a baseline median EUI using the following formula: $(EUI_{\text{simulated}}/EUI_{\text{baseline}}) \times 100$.

- Utilizes a standardized model of the building being evaluated
- Uses standardized inputs of operating parameters from COMNET including: occupancy, plug and process loads, schedules, setpoints. Inputs depend on building and space type.
- The baseline (median) EUI is based on the CBECS median for that specific building type, corrected for location and hours of operations and using U.S national site-to-source ratios. (CBECS = Commercial Building Energy Consumption Survey)

Because most green building programs don't normalize for operating and occupancy variables in their new construction (asset) ratings, it is very difficult to compare buildings with very different operations and occupancy to each other. The Building EQ As Designed rating allow for this comparison because it standardizes those operating variables.

The scale barometer shown illustrates how a building's Building Performance Score indicates a buildings energy performance with a score range as follows:

- A zero net energy building will have a score of zero (zero net energy use)
- An efficient building has a score less than 100 (low energy use / energy use approaching zero net energy use)
- An average building will fall near the median value of 100 (equals median or baseline building)
- An Inefficient building has a score greater than 100 (above average energy use / high energy use)
- The baseline value of 100 also represents the median (similar to mid-point or average) energy use intensity for existing buildings of that building type

As Designed Assessment



Want to buy building?
Want assessment first



- Get energy bills
- Do a walk through
- Enter data into Portal
- Score shows high energy usage



- Currently 24/7 call center
- Re-rate with **As Designed**
- Better rating because of neutralized operating conditions.



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The As Designed process involves an on-site visit by a Building Energy Modeling Professional (BEMP) to confirm that the modeling inputs are consistent with the building as constructed. The process:

- Models the building using standardized operating assumptions and modeling inputs (from COMNET).
- Calculates the rating using data generated from the model
- Allows for comparison of buildings with very different operating parameters
- Allows for comparison of a building's current energy efficiency (In Operation) to the building's potential energy efficiency

The owner is able to compare different buildings without including effects of the current occupants. The Operator is able to determine whether they are achieving the full designed potential for a particular building.

The As Designed rating may be a useful tool for real estate transactions.

The estimated time to input the required data into the Portal is approximately 30-60 minutes depending on the size of the building and how much data is being input. This assumes that all the data is readily in hand at the time of input.

As Designed Rating



New building operating less than 12 months.



- Evaluate design options
- Develop final model using as-built conditions



- Get As Designed rating
- Determine if building has energy efficient design based on assets



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Because metered data is not required, the As Designed rating can be used on new buildings that have not yet been operational for a full 12 months as well as on existing buildings that have been operating for a long time.

The As Designed process can also be applied during the design phase or construction phase to evaluate different design options. Because the As Designed rating is neutralized for occupancy and operation conditions, the design options can be compared solely based on how the building assets (bricks and mortar) and systems are expected to perform.

Note that the rating/score cannot be finalized/awarded until the building is fully constructed and the as-built conditions are finalized.

Other Energy Reporting Programs



- EPA ENERGY STAR Portfolio Manager – Benchmarking
- DOE Building Energy Asset Score
- USGBC LEED – Broader sustainability rating
- GBI Green Globes – Broader sustainability rating
- BOMA 360 – Six O&M focused criteria (including energy)
- Mandatory state and local benchmarking, labeling, and disclosure programs



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Current labeling efforts in North America (USA/Canada)

Information on State & Local rating regulations is available from the BuildingRating website (supported by the Institute for Market Transformation):

<https://www.buildingrating.org/jurisdictions>

Other websites:

- EPA ENERGY STAR: www.energystar.gov
- DOE Asset Score: <https://energy.gov/eere/buildings/commercial-building-energy-asset-scoring-tool>
- USGBC LEED: www.usgbc.org/leed
- Green Globes: www.greenglobes.com/
- BOMA 360: www.boma.org/360

How Does Building EQ compare?



	Benchmarking	Asset Rating	8760 hr Energy Modelling
Building EQ	✓	✓	
ENERGY STAR Portfolio Manager	✓		
DOE Asset Score		✓	
Energy Plus			✓
Trace, HAP, etc.			✓



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Building EQ allows for the comparison of a building's actual energy use (In Operation) to the buildings potential energy use (As Designed).

Both Building EQ and ENERGY STAR both benchmark your building against a baseline of other similar buildings.

Building EQ is a statistical scale that compares the building's score to a baseline median score and ENERGY STAR is pass/fail (75 or greater) & uses a percentile scale where a score of 75 means that building is better than 75% of other similar buildings

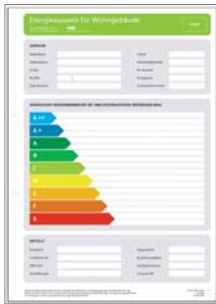
Building EQ assessment assists with the preparation of an ASHRAE Level 1 Energy Audit to identify improvements for the building – these actionable recommendations are generated by a credentialed professional (BEAP, BEMP, PE) with a site visit and recorded measurements.

DOE Asset Score has no credential requirement and the tool automatically generates building improvement suggestions which makes the quality of the suggestions somewhat uncertain.

Global Labeling Efforts



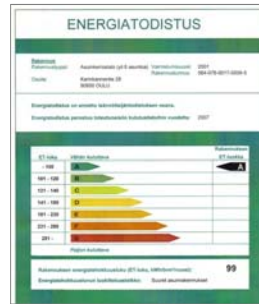
Widespread acceptance internationally



Austria



England & Wales



Finland



Greece



Current Labeling efforts – Globally/Internationally

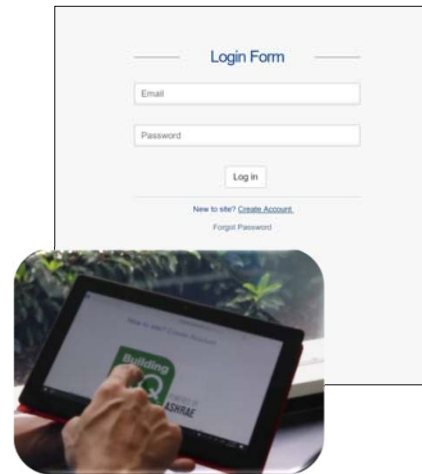
Information on the European Union requirements: DIRECTIVE (EU) 2018/844 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency.

Member States are obliged to ensure that when buildings are constructed, sold or rented out, an Energy Certificate is made available to the owner or by the owner to the tenant or potential buyer. The certification shall also include advice and information on how to improve energy performance. It concerns such elements as building envelope, windows, heating, electrical and ventilation installations, lighting, heat sources (incl. boilers, CHP units) cooling systems and others. Certain buildings over 500m² are also required to have an energy certificate on public display. This can be an asset rating or an operational rating.

Building EQ Tour - Overview



- Building EQ Portal is an online tool
- Anyone can use it and get a Building Performance Score
- Only credentialed users (ASHRAE BEAP, ASHRAE BEMP, Professional Engineer) can submit a project for ASHRAE approval



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The Building EQ Portal is an online tool that includes:

- Online data entry and submission process
- Download of metered energy data from ENERGY STAR™ Portfolio Manager

The *Building EQ Performance Score* rates the building's performance and is free to all users. Anyone can use the Portal to get the Building EQ Performance Score (i.e., the rating) which shows on the screen once the required data is entered.

Projects must be submitted by a credentialed practitioners for an official Building EQ rating. A credentialed practitioner signs off on the project by agreeing to the Terms and Conditions (TOC) and providing their signature on the Project detail screen for that project. Credential users include ASHRAE BEAP, ASHRAE BEMP, and Professional Engineer).

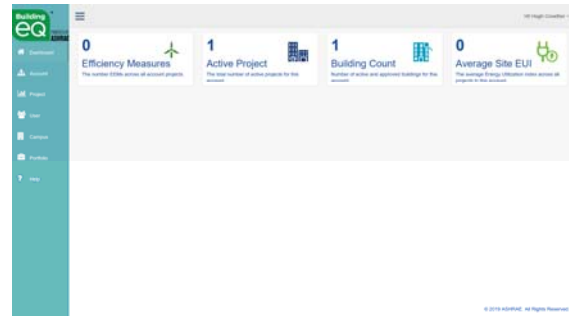
There is a one-time set up fee of \$25 for non-members and \$15 for ASHRAE members to verify the credentials of Professional /Chartered Engineers.

The fee is waived for BEAPs and BEMPs as the credentials for these Certified Providers can be automatically verified within ASHRAE's systems.

Building EQ Tour - Overview



- Communicates with BuildingSync to allow data transfer between applications
- Baseline calculations align with 2003 ENERGY STAR Portfolio Manager when the building type allows



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BuildingSync is BEDES-compliant XML schema for data transfer that allows for the output or input of data files from one application to another. For Building EQ, it will initially be inputting data from another source into the Portal.

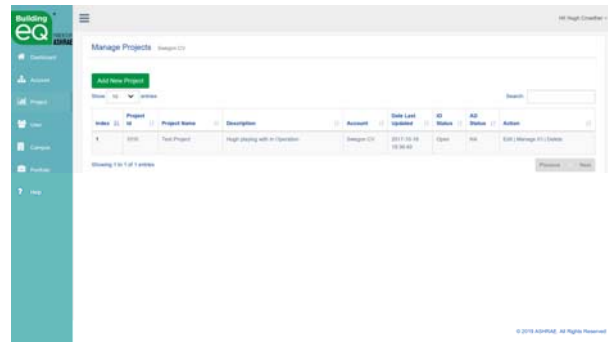
The calculation of the median EUI has been aligned with ENERGY STAR using Architecture 2030's *Zero Tool* which will bring Building EQ Performance Scores more in line with ENERGY STAR Portfolio Manager scores. This calculation methodology is available for all ENERGY STAR building types in the US and Canada.

The Building EQ Portal uses methodology aligned with ASHRAE Standard 100 for all other building types in the US and Canada and for all building types in the rest of the world.

Building EQ Tour – Project Options



- Manage projects by account, portfolio, and campus
- Maintain project data in one location
- Return to unfinished projects at a later time
- Create default building and copy to new project



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The Building EQ Portal allows you to group the projects in your account into campuses and portfolios. You can use these two designations to organize and group your projects.

The Copy Project feature creates a new project with the exact information as the original file. The new file is automatically created with “Copy 1” added to the end of the original file name. The new project can be renamed and edited as needed. This feature can be used to copy any project at any time during the data entry process or after the project has been submitted. You could use this feature to:

- Update a previously submitted project with new Utility, EEM, and/or IEQ information.
- Create an As Designed (AD) project for a building that has previously been submitted as an In Operation (IO) project, but needs to have some information that is different
- Enter historical data on a building without having to update the static building information with each new project.
- Start a new project with similar information to reduce required data entry.

Building EQ Tour – Project Options



- SI (Standard International) or IP (Inch-Pound)
- As Designed, In Operation or both
- English or French
- All Climate Zones
- Specified currency



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The metrics (SI or IP), currency type (by country), and rating type (In Operation or As Designed or both) are selected from the Manage Project page.

The climate zone is selected on the data input screens.

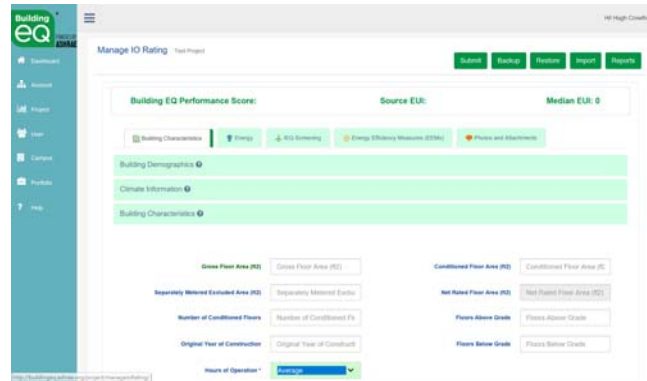
The language (English or French) is selected for the user on their user set up page.

Building EQ Tour – Portal Screens



Main Tabs Include:

- Building Characteristics
- Energy
- IEQ Screening
- Energy Efficiency Measures
- Photos and Attachments



The Data input screens are arranged by Tabs and Accordions.

- The Tabs (Building Characteristics, Energy, IEQ Screening, Energy Efficiency Measures, and Photos/Attachments) are organized horizontally across the screen.
- Each tab has multiple accordions below it vertically that open and close as needed to enter data.
- Once data entry begins a green check mark on the accordion indicates that all the required data for that accordion has been successfully entered and saved. A red “X” on either the accordion or tab indicates that some data is missing or does not fit into the required parameters.

Building EQ Tour – Data Input



Data Input:

- Accordion menus under each Tab
- Inputs adjust based on your building type
- Answer questions related to just your building type







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The Data input screens are arranged by Tabs and Accordions.

- The Tabs (Building Characteristics, Energy, IEQ Screening, Energy Efficiency Measures, and Photos/Attachments) are organized horizontally across the screen.
- Each tab has multiple accordions below it vertically that open and close as needed to enter data.
- Some fields require additional accordions that are only visible if that field is used.
- Once data entry begins a green check mark on the accordion indicates that all the required data for that accordion has been successfully entered and saved. A red “X” on either the accordion or tab indicates that some data is missing or does not fit into the required parameters.

Building EQ Tour - Help



- Help screens provide explanation, suggestions 
- Immediate notifications
- Errors (must be fixed) 
- Warnings (data seems unusual) 
- Allows for immediate corrections 



The Building EQ Portal uses several different symbols to communicate the validation status of your project.

- The question mark indicates that there is a help screen associated with the field or tab that will provide specific guidance relative to that field or tab.
- The yellow triangle is a validation warning that signals that an entered value is outside the normally expected parameters for that field. A warning message will appear in yellow text at the top of the accordion to let you know what specific field is triggering the warning. The warning allows you to verify that you have entered the information correctly. Validation warnings will not prevent you from submitting your project for approval.
- The red X mark signifies a validation error indicating that either required information is missing or that an entered value is invalid. An error message will appear in red text at the top of the accordion to let you know what specific field is triggering the error and what action is needed to correct it. A project cannot be submitted for approval until all validation errors have been addressed.
- The green check mark indicates that all required data has been entered into that accordion and that all validation tests have been met.

Building EQ Tour – Building Types



- Extensive building types
- Multiple use properties
- Lab Buildings
 - Most detailed lab benchmarking available
 - Accounts for multiple lab types, hours of operation, and lab area ratio



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Available **building types** are noted in the pull down menu for Building Type in the Building Demographics accordion (Building Characteristics tab).

- Buildings are listed by broad building activities that are broken down into more specific building types.
- Match your building's main use activities with the broader categories and then more specifically within the sub-categories underneath

A **multiple use building** contains multiple principal building activities in a single building and a property contains multiple buildings. A candidate building may be rated as a multiple use building/property using the rules detailed in the definitions including on the main Help screen in the Portal.

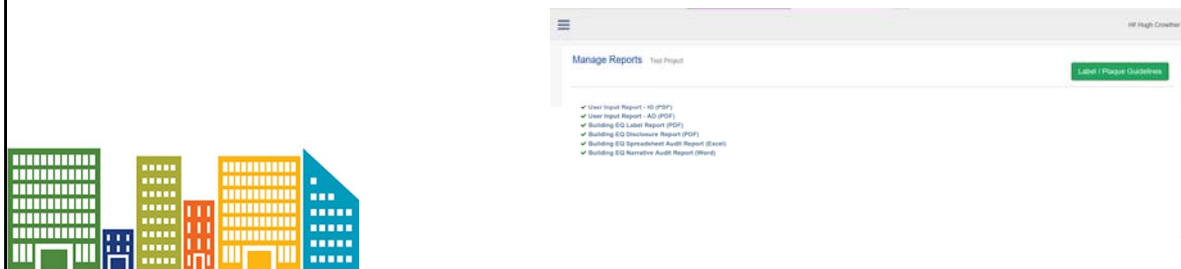
Lab Buildings: in order to produce a more accurate baseline median EUI for Lab buildings, the Building EQ Portal uses a calculation methodology that accounts for multiple lab types, hours of operation, and the lab area ratio.

Existing methodologies in other programs do not distinguish between different lab types or the percentage of lab area in a lab building (lab area ratio) making it difficult to get a fair comparison of performance.

Building EQ Tour - Reports



- FREE** • User Input Report – PDF of Portal inputs
- FREE** • Building EQ Label Report – graphically shows your score
- \$50** • Disclosure Report – PDF of key energy performance data
- \$50** • Spreadsheet Audit Report (Excel) – Level 1 Energy Audit
- \$200** • Narrative Audit Report (Word) – Level 1 Energy Audit



The following items are delivered by the Portal:

Building EQ Label Report - Free to credentialed users for approved submissions

Building EQ Disclosure Report - Available for a \$50 fee to credentialed users for approved submissions

Building EQ Spreadsheet Audit Report - Available for a \$50 fee to credentialed users for approved submissions

Building EQ Narrative Audit Report - Available for a \$200 fee to credentialed users for approved submissions

Also available but not listed on slide:

Calculated Building EQ Performance Score - Visible at top of Portal page after inputting minimum required data, Free to all users

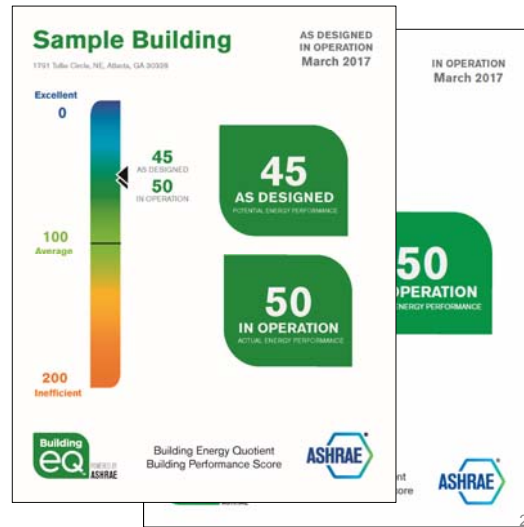
User Input Report - Recaps all data entered into the Portal, Free to all users

- Blank report can be printed for use of data collection offline

Building EQ Label Report



- Visual indicator of Building EQ Performance Score on a barometer/scale
- **FREE** to credentialed user for approved submissions
- Buildings that like their score can get a plaque for display



Building EQ Label Report

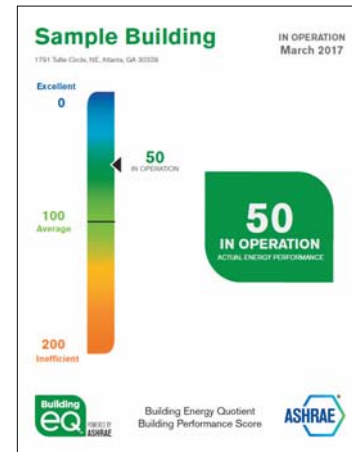
- Graphic representation of Building EQ Performance Score score
- Free to credentialed users for approved submissions
- Can be used to create a building plaque (see Plaque Guidelines on Portal)

Note: The building's calculated Building EQ Performance Score is visible at top of Portal page after inputting minimum required data and is available and free to all users

Building EQ Performance Score



- Building Performance Score opens dialog on improving the building
- In Operation based on actual energy costs – Resonates with decision makers
- As Designed based on standardized model – Provides additional information for decision makers



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Benefits of the Building EQ Performance Score:

The score provides an indicator of how the building is performing and along with additional information produced during the assessment process allows for a conversation with the building owner on how to improve the building's energy performance.

The In Operation assessment:

- Based on actual energy costs
- Resonates with decisions makers
- Provides actional recommendations for improvement

The As Designed evaluation:

- Based on standardized model of the building
- Provides additional information for decision makers
- Indicates the building's potential energy performance

Building EQ & Level 1 Energy Audits



- Efforts are very close
- Field data is almost the same
- Site visit required for both
- Building EQ delivers a Level 1 Energy Audit Report aligned with ASHRAE Standard 211
- Customer gets understanding of how building ranks against similar buildings AND the initial evaluation on how to improve the building



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ANSI/ASHRAE/ACCA Standard 211-2018 Standard for Commercial Building Energy Audits

Information on a building energy's use is the critical first step in making the necessary changes and choices to reduce energy use and costs.

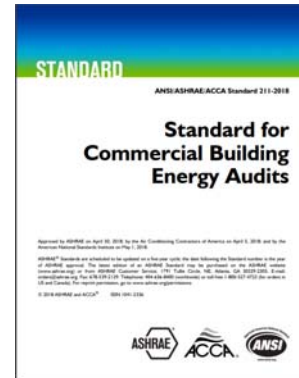
The Building EQ In Operation assessment process:

- focuses on the building's metered energy use for the preceding 12 to 18 months.
- includes the collection of information that aligns with an ASHRAE Level 1 Energy Audit
- helps in the preparation of an ASHRAE Level 1 Energy Audit report
- provides building owners with building-specific energy savings measures with estimated costs and payback information that can be used to improve building energy performance

ASHRAE Standard 211



- Normative language standard for energy audits
- Consistent approach to energy audits
- Raises and maintains the bar
- Level 1 Energy Audit is initial review that identifies possible areas for improvement (EEMs)
- Starts conversation with building owner for further investigation, action, and improvement



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ANSI/ASHRAE/ACCA Standard 211-2018 – Standard for Commercial Building Energy Audits
EEM = Energy Efficiency Measures

The basic parts of a Level 1 energy audit are:

- Energy-use Analysis – review of monthly energy bills and utility information
- Walk-thru Survey
- Identification of low-cost/no-cost energy improvement measures
- Estimated Costs and Savings
- Summary of Special Problems/Needs

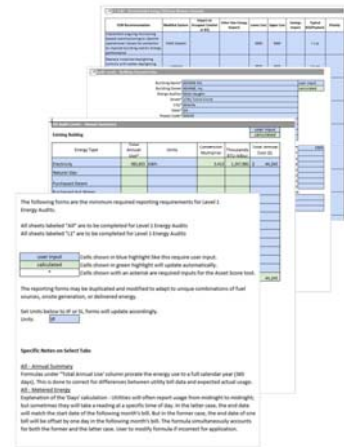
The Building EQ In Operation assessment process:

- provides a consistent process for evaluating a building's energy use
- identifies actionable recommendations of EEMs that can be used to improve building energy performance
- allows a building to benchmark their building now and then re-assess after improvements have been made to verify the energy savings.

Building EQ & Level 1 Energy Audits



- In Operation aligned with Standard 211 Level 1 reporting requirements
- Blank forms and device responsive screens to collect data while on site
- Extensive library of EEMs from pull-down menus in Portal
- Building EQ Spreadsheet Audit Report auto populates Std 211 spreadsheets



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ANSI/ASHRAE/ACCA Standard 211-2018 Standard for Commercial Building Energy Audits
EEM=Energy Efficiency Measures

The Building EQ In Operation assessment process is aligned with and helps with the preparation of an ASHRAE Level 1 Energy Audit.

Energy Efficiency opportunities are selected from pull-down menus of standardized options. Free form fields are also available.

User Input Report

- A blank version can be printed before a project is started and used to collect data offline – NOTE: the blank version is available from the main help screen
- Final report documents the data entered into the Building EQ Portal for a specific project
- A final version can be printed for a project to document the data entered.
- The report is free to all users for all submissions

Building EQ Spreadsheet Audit Report

- ASHRAE Level 1 Energy Audit spreadsheets in MS Excel format as required by Standard 211
- Auto populated with all information collected during In Operation assessment
- Additional information entered by user
- Available for \$50 to credentialed users for approved submissions

NOTE: not all required data is currently collected during the Building EQ process – but ASHRAE is working to add more fields to increase the data consistency

Building EQ Narrative Audit Report



- Customizable MS Word report template
- Meets Std 211 Level 1 report requirements
- Auto-populates data from Portal into report
- Saves report preparation time for Assessor
- Can be edited and tailored to distinguish Assessor or their firm
- Allows for consistent reporting format regardless of who produces report



- **\$200** to credentialed practitioners for approved submissions

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Building EQ Narrative Audit Report

- Template for a full narrative ASHRAE Level 1 Energy Audit report in MS Word format
- Follows ASHRAE Standard 211 reporting requirements
- Auto populated with all information collected during In Operation assessment
- Additional information entered by user
- Available for \$200 to credentialed users for approved submissions

Specific ways this report is useful:

- Provides recommended text and boiler plate language to assist the user in preparing a comprehensive Level 1 Energy Audit report.
- Audit specific information populated from the Building EQ Portal fills in tables in the report
- Auto population saves data entry and report preparation time
- Provided in MS Word format so that all text can be edited as needed by the user.
- User can add or delete information based on what they wish to include in their report
- Can be customized to provide a more professional looking product by adding appropriate letterhead or logo.

Building EQ 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



Unlike many other programs (i.e., DOE Asset Score), Building EQ requires a credential user to submit a project for approval to get an official Building Performance Score and to access the reports. A credentialed user is either a BEAP, BEMP or a licensed Professional/Chartered Engineer (US, UK, Canada, International).

There is a one-time set up fee of \$25 for non-members and \$15 for ASHRAE members to verify the credentials of Professional /Chartered Engineers.

The fee is waived for BEAPs and BEMPs as the credentials for these Certified Providers can be automatically verified within ASHRAE's systems.

The bEQ Certified Provider logo can only be used by individuals certified by ASHRAE as Building Energy Modeling Professionals or Building Energy Assessment Professionals. Full guidelines for the use of the logo are available from ASHRAE.

To learn more about becoming ASHRAE certified, visit www.ashrae.org/bemp or www.ashrae.org/beap.

Summary: Building EQ



- Benchmarking, assessment, and asset rating tool that performs both In Operation and As Designed ratings
- Helps make bad buildings good and good buildings great
- Flexible for managing large portfolios of buildings and users
- Aligns with ASHRAE Standard 211 Level 1 Energy Audits
- Makes it easy to deliver both a benchmark and an energy audit
- Allows for consistent benchmarking and audit formats from a group of contractors



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Please also see the following resources for additional information:

- **Intro to Building EQ Details and Background** – available to presenters of this slide presentation
- **Building EQ FAQs** – available on the Building EQ webpage and sent to presenters of these slides
- **Building EQ Video** – accessible on the Building EQ webpage and at <https://www.youtube.com/watch?v=8UprJpl5cMs&t=3s>
- **Building EQ Portal Training** – accessible on the Building EQ webpage and at <https://www.youtube.com/watch?v=K45K0YfOjpU&t=45s>
- **Building EQ webpage** at www.ashrae.org/BuildingEQ



Check it out!

www.ashrae.org/BuildingEQ



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Access the Building EQ Portal at www.ashrae.org/buildingEQ
Questions can also be sent to buildingEQ@ashrae.org

Building EQ webpage: www.ashrae.org/buildingEQ

Building EQ Video: <https://www.youtube.com/watch?v=8UprJpl5cMs&t=3s>

Building EQ Training: <https://www.youtube.com/watch?v=K45K0YfOjpU&t=45s>



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