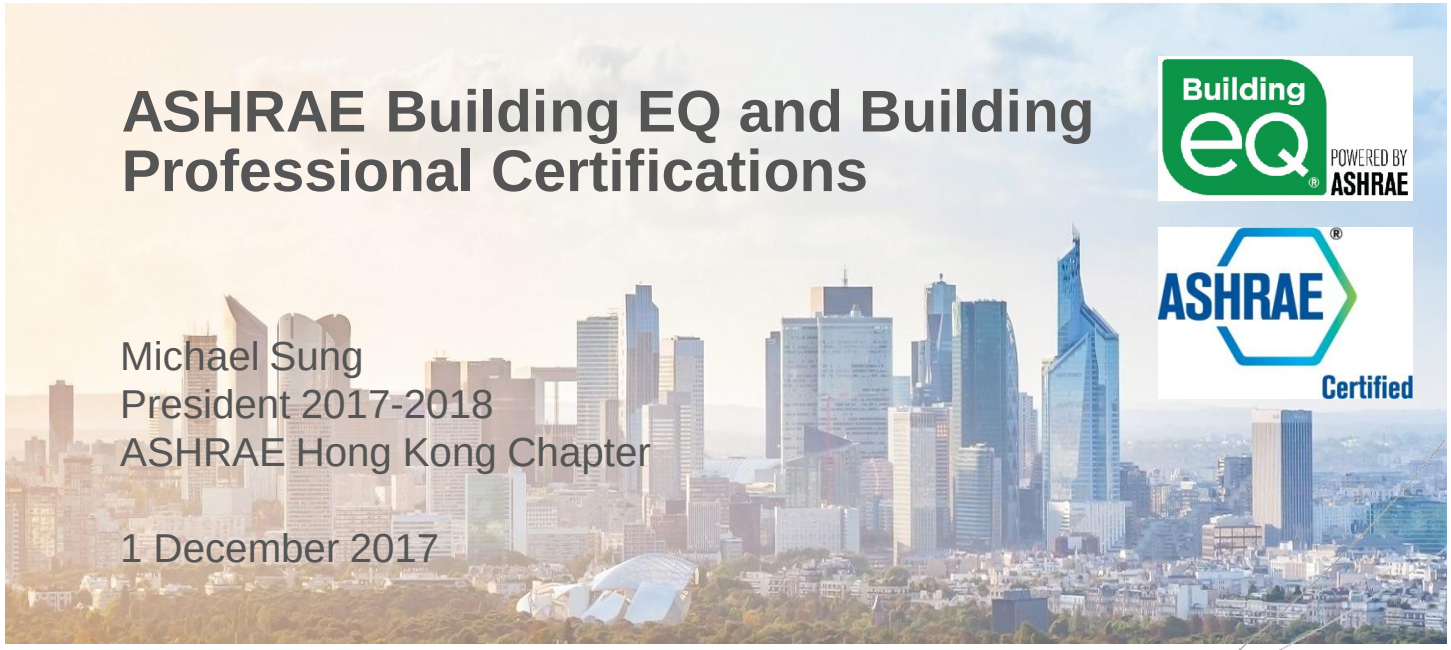
TRANE

BEYOND TOMORROW

ASHRAE Building EQ and Building Professional Certifications



Building EQ POWERED BY ASHRAE

ASHRAE Certified

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President 2017-2018
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1 December 2017

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Agenda

- ASHRAE Building EQ Overview
- ASHRAE Building EQ Portal
- In-Operation Rating Details
- As Designed Rating Details
- Rater Qualifications
- ASHRAE Building Professional Certifications
- Summary

ASHRAE Building EQ Overview

The ASHRAE Building Energy Labeling Program

Whether voluntary or mandatory, the rating of the energy use and indoor environmental quality of buildings is a growing trend worldwide. In 2009, ASHRAE introduced its "Building Energy Quotient" (bEQ) labeling program for new and existing buildings, since substantially enhanced and renamed Building EQ. It is a comprehensive and rigorous program comprising not only an energy use performance scale, but also tools and procedures for performing ratings and certifications for the qualified energy modelers and building assessors who will use them.

Objectives and benefits of certification

- Promote energy efficiency
- Identify efficiency improvements
- Support building regulations

Value of certification

- Standardized process
- Actionable recommendations
- Assessment of changes over time
- Documentation
- Recognition
- Growth of benchmark database

There are many certification programs…

- Energy ratings
  - EU regulations (implemented by country)
  - US EPA ENERGY STAR (rating, benchmarking with Portfolio Manager)
  - US DOE Commercial Building Energy Asset Score
  - State and municipal building energy reporting and disclosure ordinances (BERDO)
- Sustainability ratings
  - Hong Kong BEAM Plus
  - Singapore Green Mark
  - USGBC LEED
  - GBI Green Globes
- BOMA 360 – Energy one of six O&M-focused criteria

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 proces
  - Unified system for assessing assets and operations
  - Greater differentiation for high performing buildings
  - Label score emphasizes zero net energy

Benchmarking is the fundamental step

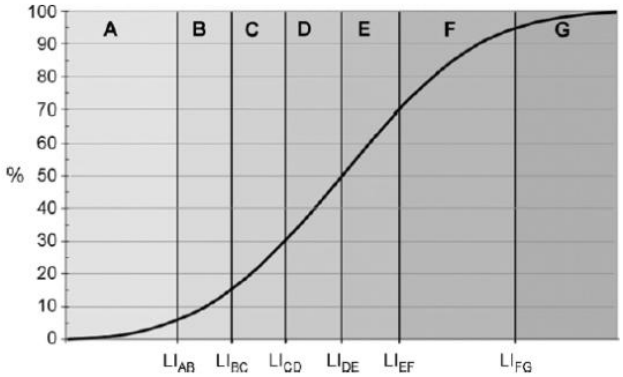
- Database of building energy performance data
- Actual building performance estimate
- Comparison of actual and typical performance
- Recommended improvements

Comparison of energy use estimation methods.

Concept	Simulation	Measured on-site
Input data	Detailed information	Energy bills or metering
Output data	Detailed and split	Global and non-split
Weather and use	Standard	Actual
Energy use	Estimated	Measured
Scope	New and existing buildings	Existing buildings
Cost and user skill	High	Low

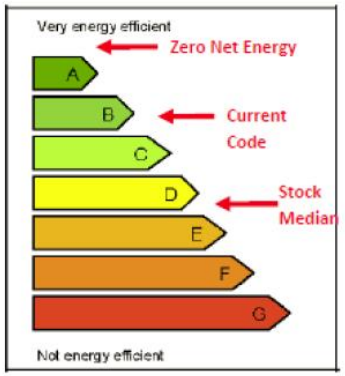
Rating Scale Approaches

Statistical



Compare value to mean of actual distribution

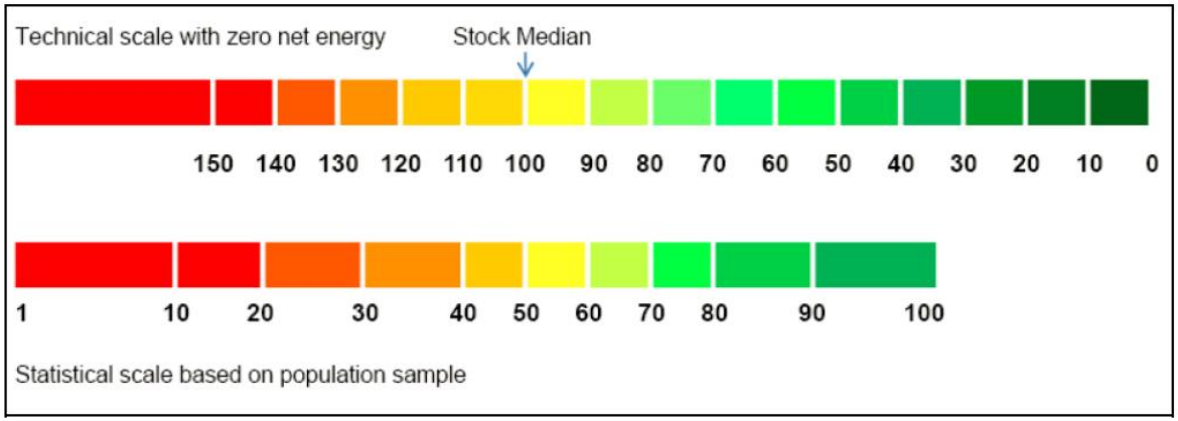
Technical Potential



Compare to what is possible, practical, typical as defined by codes

Technical potential scales can rate performance that falls outside the current distribution, like net zero or net positive buildings

Technical Potential vs. Statistical Scale



Factors that define a rating

- Modeled or measured energy use
- New or existing building
- Performance index
- Energy labeling scale
- Qualifications to perform a certification
- Energy modeling/measurement methods
- Identification of energy efficiency measures
- Communication of data and results
- Implementation: voluntary vs. mandatory

In Operation Rating

- Assessment of actual energy performance with the existing characteristics and how it is operated
- 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 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 EUI for that building type.

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

- 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

ASHRAE Building EQ Portal

Building EQ Portal

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

Building EQ Portal Features

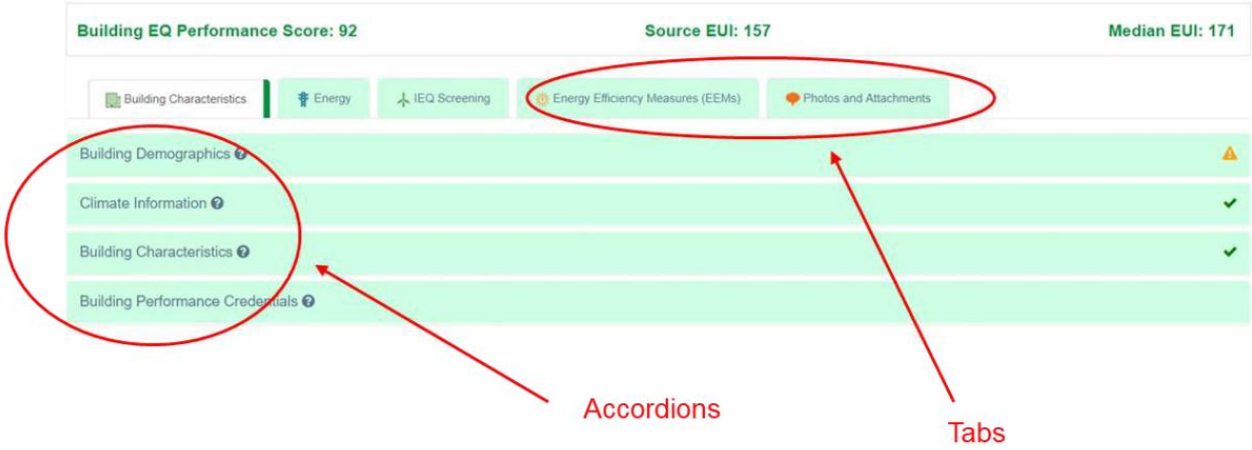
- Online data entry and submission process
- Metered energy data exchange from Portfolio Manager
- Median EUI calculation aligned with ENERGY STAR™
- Reports can be automatically generated by credentialed users
- Improved submission approval process with help and validation built in
- Redesigned label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

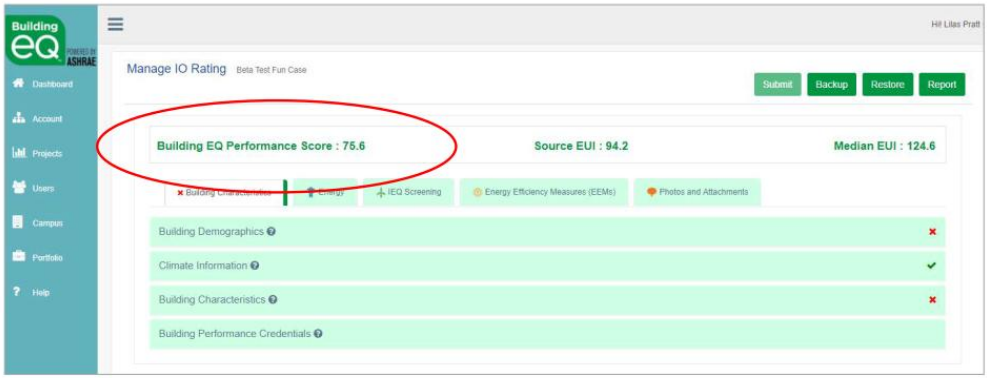


System Outputs/Reports

- Building EQ Performance Score – available to all users
- User Input Report – available to credentialed users
- Building EQ Label Report– available to credentialed users
- Disclosure Form – Coming Soon for credentialed users
- Audit Report Spreadsheets – Coming Soon for credentialed users
- Building EQ Database – Under development

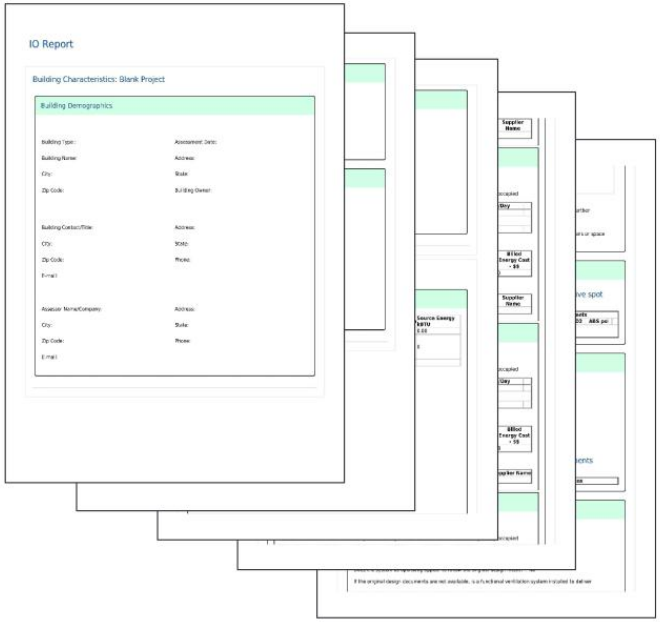
Building EQ Performance Score

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



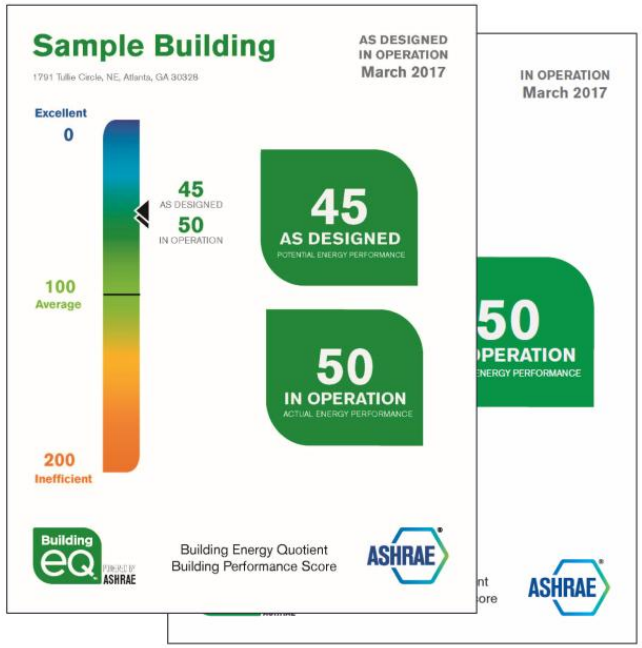
User Input Report

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



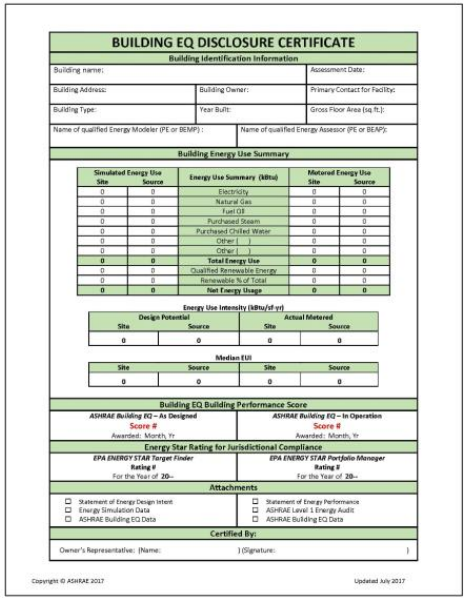
Building EQ Label Report

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



Building EQ Disclosure Form

- 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:	Building Owner:	Primary Contact for Facility:
Building Type:	Year Built:	Gross Floor Area (sq.ft.):
Name of qualified Energy Modeler (PE or BEMP) :		Name of qualified Energy Assessor (PE or BEAP):

Building Energy Use Summary

Simulated Energy Use Site	Simulated Energy Use Source	Energy Use Summary (kBtu)	Metered Energy Use Site	Metered Energy Use Source
0	0	Electricity	0	0
0	0	Natural Gas	0	0
0	0	Fuel Oil	0	0
0	0	Purchased Steam	0	0
0	0	Purchased Chilled Water	0	0
0	0	Other ( )	0	0
0	0	Other ( )	0	0
0	**0**	**Total Energy Use**	**0**	**0**
0	0	Qualified Renewable Energy	0	0
0	0	Renewable % of Total	0	0
0	**0**	**Net Energy Usage**	**0**	**0**

Energy Use Intensity (kBtu/sf-yr)

Design Potential Site	Design Potential Source	Actual Metered Site	Actual Metered Source
0	0	0	0

Median EUI

Site	Source	Site	Source
0	0	0	0

Building EQ Building Performance Score

ASHRAE Building EQ – As Designed	*ASHRAE Building EQ – In Operation*
Score #	Score #
Awarded: Month, Yr	Awarded: Month, Yr

Energy Star Rating for Jurisdictional Compliance

EPA ENERGY STAR Target Finder	*EPA ENERGY STAR Portfolio Manager*
Rating #	Rating #
For the Year of 20--	For the Year of 20--

Attachments

☐ Statement of Energy Design Intent	☐ Statement of Energy Performance
☐ Energy Simulation Data	☐ ASHRAE Level 1 Energy Audit
☐ ASHRAE Building EQ Data	☐ ASHRAE Building EQ Data

Certified By:

Owner's Representative: (Name:) (Signature:)

Updated July 2017

Coming Soon / In Development

- Audit Report Spreadsheets – Coming Soon
  - 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

ASHRAE Building EQ
- In-Operation Rating Details

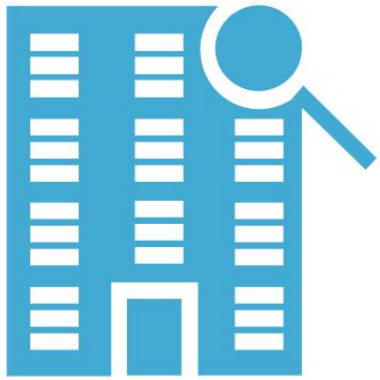
In Operation
Building Performance Score

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

- Compares metered energy use of candidate building to baseline EUI
- Baseline 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

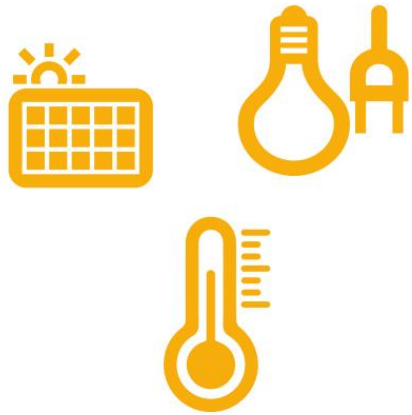
Building Demographics

- Location / Climate
- Operating Hours
- Building gross area
- Building use type
- Multiple-use Buildings or Properties
  - Apportioned by % of area
- Output of this data determines EUIbaseline



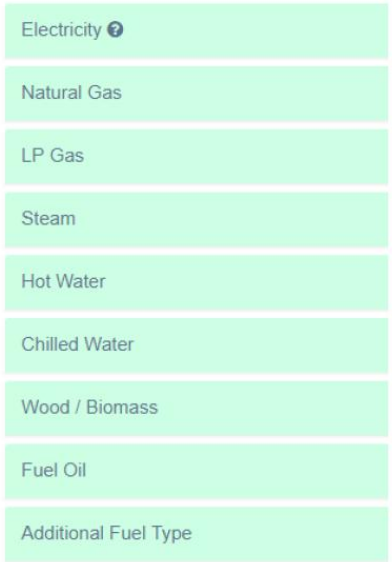
IEQ Screening

- 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.)



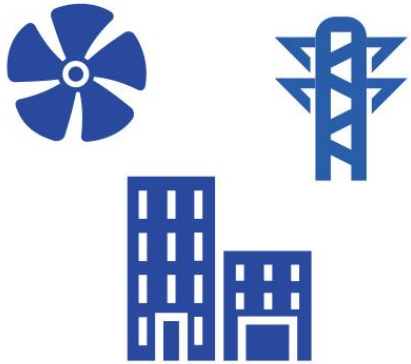
Energy Calculations

- 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 EUImeasured



Energy Savings Opportunities

- 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



ASHRAE Building EQ
- As Designed Rating Details

As Designed
Building Performance Score

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

- Compares simulated energy use of candidate building to baseline EUI
- Baseline 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
- COMNET is a quality assurance initiative to standardize building energy modeling, by creating consistent baselines relative to various energy codes and standards
- Use 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

ASHRAE Building EQ
- Rater Qualifications

Credentialed Users

- Official submissions require:
- PE/PEng 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)

ASHRAE Building Professional Certifications

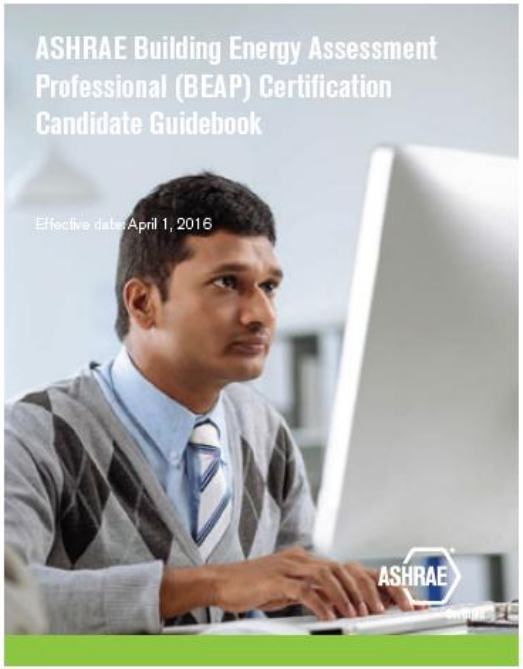
ASHRAE Certification Programs

- Over 2,500 certifications earned to date
- Created to meet industry needs as identified through market research
- Developed by SMEs, including those recruited from allied professional organizations
- Aligned with ANSI/ISO/IEC 17024 accreditation standard

ASHRAE Certification

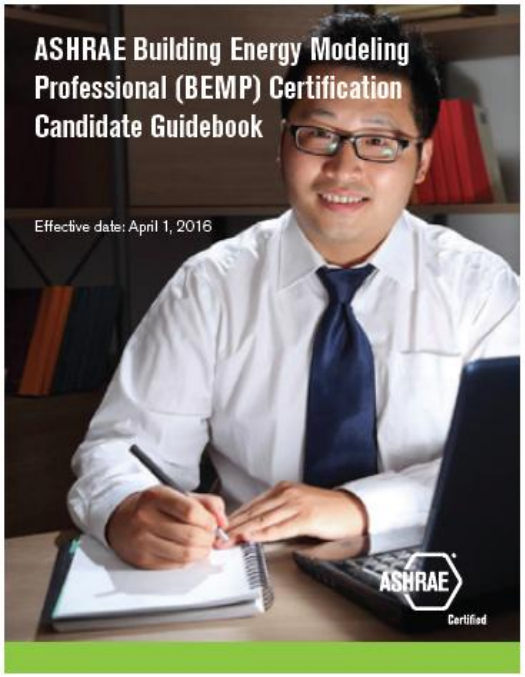
- ü Commissioning — BCxP
- ü Energy Auditing — BEAP
- ü Energy Modeling — BEMP
- ü High-Performance Building Design — HBDP
- ü Healthcare Facility Design — HFDP
- ü Building Operations & Performance — OPMP

Building Energy Assessment Professional (BEAP) Certification



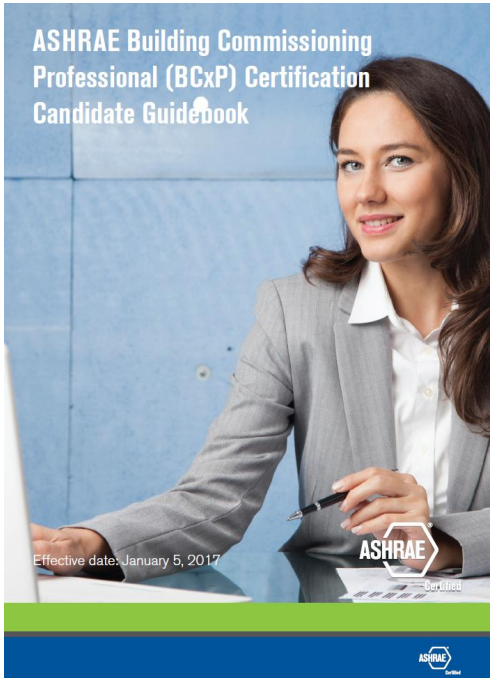
The growing emphasis on energy consumption reduction and cost savings has highlighted the need for credible specialists who assess energy use in buildings. The BEAP certification validates competency to *audit, assess and analyze residential, commercial and industrial building energy use and develop and implement recommendations.*

Building Energy Modeling Professional (BEMP) Certification



The BEMP certification validates competency to *evaluate, select, implement, calibrate and interpret the results of energy modeling software when applied to new and existing building and systems energy performance.*

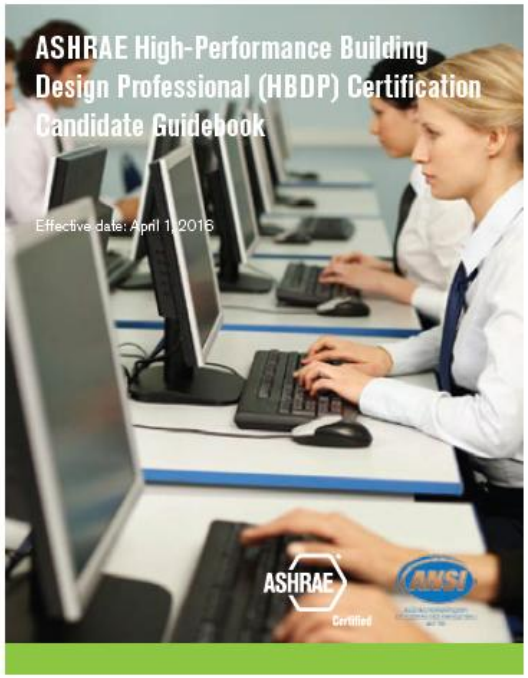
Building Commissioning Professional (BCxP) Certification.



Application procedure, examination requirement, resources , detailed examination content outline etc, in Candidate Guidebook

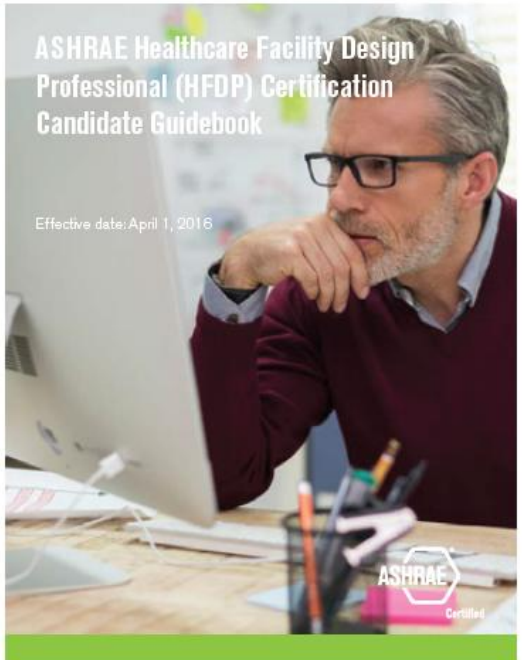
The BCxP certification validates competency to *develop and manage the whole building commissioning process.*

High-Performance Building Design Professional (HBDP) Certification



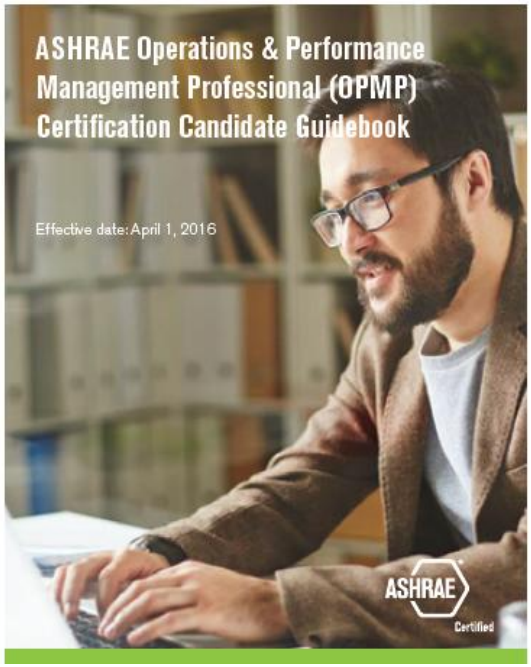
The HBDP certification, an ANSI accredited certification program, validates competency to *design and integrate sustainable HVAC&R systems into high performing buildings.*

Healthcare Facility Design Professional (HFDP) Certification



The HFDP certification validates competency to *incorporate standards, guidelines and regulatory codes as well as unique healthcare facility requirements and design principles in HVAC system design.*

Operations and Performance Management Professional (OPMP) Certification



The OPMP certification validates competency to *manage facility operations and maintenance to achieve building performance goals, including those related to indoor environmental quality, health and safety.*

Summary

Summary - 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.

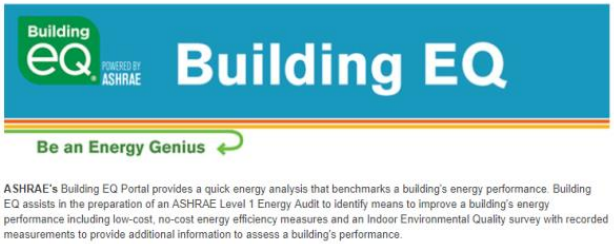
Powered by ASHRAE

- 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.

Summary - ASHRAE's Building EQ

- Two separate ratings that work together
  - In Operation rating assesses a building's actual energy use
  - As Designed evaluations 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



Question and Answer

Thank You!

Ingersoll Rand