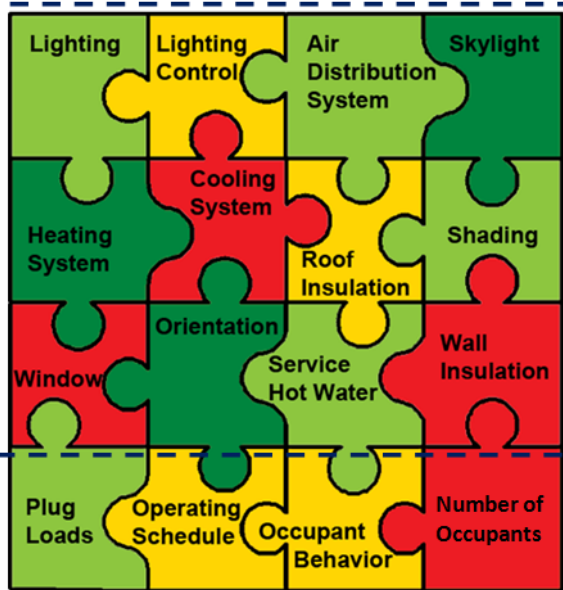


MASSACHUSETTS PILOT: RAISING THE BAR TO IMPROVE ENERGY EFFICIENCY

The Building Asset Rating (BAR) pilot is a three phase project that seeks to develop and test new methods to assess the energy performance of building assets. As a complement to tools such as the EPA’s Energy Star Portfolio Manager (ESPM), the BAR pilot focuses on analysis techniques that assess building assets rather than the operations of the building. The BAR pilot is jointly coordinated by the Massachusetts Department of Energy Resources (DOER) and Northeast Energy Efficiency Partnerships (NEEP).

Building Asset Rating



Building energy use is affected by many factors
Source: Department of Energy

WHY RAISE THE BAR?

Massachusetts adopted one of the most ambitious greenhouse gas (GHG) emissions reduction plans of any state in the nation. The [Clean Energy and Climate Plan \(CECP\)](#) outlines the Commonwealth’s strategies to achieve a 25% reduction in GHG emissions (relative to a baseline of 1990 emissions) by 2020 and an 80% reduction by 2050. Improved building energy efficiency is a key element of the CECP as the cost of the work is often quickly recouped through decreased utility bills; however, such potential savings are often left untapped. One commonly cited reason for this divide is a lack of information regarding the energy performance of building assets stemming from the costly and time-consuming nature of building analysis methods.

The BAR pilot asks: can we improve building analysis to provide credible, investment-grade information in less time and with decreased cost?

PHASE 1: “STRESS TEST” – SCOPE AND METHODOLOGY

In Phase 1, which concluded in early 2013, 11 buildings in the Greater Boston area were analyzed by four different teams. While one team performed a traditional ASHRAE Level 2-type audit for each building, the other three teams – partnerships of The Cadmus Group and First Fuel, Retroficiency, and The Weidt Group – utilized innovative analysis techniques by incorporating data sources like satellite imagery and interval meter data or using streamlined building energy modeling protocols.

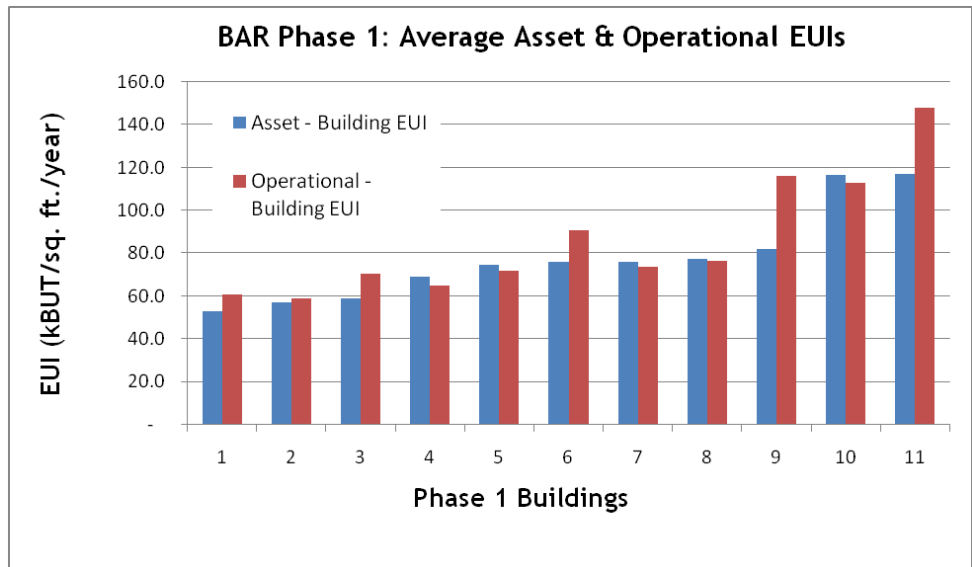
Each team was asked to: 1) collect the data necessary to construct a model of the building’s energy use; 2) calibrate the model to 12 months of historic energy consumption; and 3) normalize model parameters dependent on building operations like schedules and setpoints. Normalizing these factors better represents the energy performance capabilities of building attributes and enables an apples-to-apples comparison between buildings independent of tenancy and weather.

The models produce an area-adjusted predicted energy consumption (called an energy use intensity (EUI), reported in kBtu/sf) for each primary building system, including heating, cooling, lighting, and plug loads.

MASSACHUSETTS BUILDING ASSET RATING

PHASE 1 FINDINGS

- ✓ The innovative methods averaged **less than \$8,000 per building** while the traditional analyses averaged \$25,000 per building;
- ✓ Site visits serve to validate modeling assumptions;
- ✓ Building size or age alone do not appear correlated with energy consumption;
- ✓ Building plans are of limited value due to their scant availability and differences in as-built conditions;
- ✓ Clear, standardized guidelines are required to generate consistent, comparable results.



PHASE 2: IMPLEMENTATION & DEPLOYMENT

In Phase 2, which concluded in fall 2014, two of the innovative methodologies tested in Phase 1 were further explored through broader deployment across over 30 commercial office buildings in the Greater Boston area. This larger sample of buildings featured a range of ages, sizes, and fuel usages and included properties with interval as well as traditional meters. DOER and NEEP used the results from Phase 1 to help develop and refine protocols for data collection and reporting to improve the consistency of these asset ratings. They also worked closely with utilities and Peregrine Energy Group to streamline energy data collection and sharing.

As in the previous phase, the two teams – Retroficiency and The Weidt Group – modeled the buildings to generate energy use intensity ratings. The teams also provided nearly all of the buildings with an ESPM Score as well as recommendations for energy efficiency improvements. The reports were presented to the building owners and operators at individual meetings, which utility representatives were invited to attend to help encourage action on these recommended upgrades.



NEEP and DOER will compile a report detailing findings from Phase 2 by early 2015. Other final reports include an assessment of meter reading best practices by Peregrine Energy and a through evaluation of the Phase 2 protocols and results by Symmes Maini & McKee Associates.

PHASE 3: NATIONAL LEADERSHIP, RESEARCH, INNOVATION

The BAR Pilot is one of a few initiatives in the United States seeking improved methods to assess the energy performance of building assets. In Phase 3, DOER and NEEP will continue to coordinate with the California Energy Commission's [Building Energy Asset Rating System](#) and the US Department of Energy's [Commercial Building Energy Asset Score](#).

The BAR pilot was generously supported by funds from The Barr Foundation and the US Department of Energy.