



## Benchmarking and Building Energy Labeling Metrics

Many studies have been completed surrounding the implementation of tracking building energy use, as well as results of benchmarking in public and commercial. Some of the more relevant metrics are gathered here to understand the current results of realized ordinances and/or programs. These metrics are gathered in the following categories:

1. Building Yearly Energy Use
2. Energy Savings Potential
3. Importance of Benchmarking for Municipal and State Governments
4. Metrics on using EPA ENERGY STAR Portfolio Manager
5. Job Creation and Growth
6. Potential Building Improvement and Investment

### 1 – Building Yearly Energy Use

#### **46% Energy Used in U.S. is by Commercial Buildings**

Commercial buildings comprise nearly half, or 46.0%, of the total US building energy Use or about 17.9 quads of primary energy in 2009 - equal to 18.9% of total energy consumption and roughly equal (18%) of the greenhouse gas emissions in the U.S.

*U.S. Department of Energy. Buildings Energy Data Book, Chapter 3. March 2011.*

<http://buildingsdatabook.eren.doe.gov/ChapterIntro3.aspx>

*U.S. Environmental Protection Agency. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2009, Table ES-8. April 2011. [www.epa.gov/climatechange/emissions/usinventoryreport.html](http://www.epa.gov/climatechange/emissions/usinventoryreport.html)*

### 2 – Energy Savings Potential

#### **1.6 Quads of Energy and \$60 billion Potential Savings**

Approximately 1.6 quads of energy and \$60 billion between 2014 and 2030 are projected to be saved with the development of a comprehensive, national building labeling and benchmarking program. [This is equivalent to avoid about 11.4 million metric tons of carbon dioxide emissions, equivalent to the annual greenhouse gas emissions of about 1,787,000 automobiles.]

Addressed at either a local, regional, or national scale, these types of programs leverage market mechanisms without requiring substantial spending or government mandates.

*ACEEE Report E136, "Overcoming Market Barriers and Using Market Forces to Advance Energy Efficiency, Shruti Vaidyanathan, et al., March 2013. <http://aceee.org/research-report/e136>*

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## Benchmarking Programs Saves an Average 1,000 MBtus per Building

Energy savings of existing non-residential benchmarking and performance programs vary widely (depending largely on facility type, size, and baseline efficiency, and whether or not gas savings are verified), but generally these programs yield savings in the range of 1,000-3,000 MBtus per participating building.

*U.S. Environmental Protection Agency, Rapid Deployment Energy Efficiency (RDEE) Toolkit: Planning & Implementation Guides, 2009. [http://www.epa.gov/cleanenergy/documents/suca/rdee\\_toolkit.pdf](http://www.epa.gov/cleanenergy/documents/suca/rdee_toolkit.pdf)*

## Potential 2.4% average, annual energy savings

According to an 2012 EPA study, buildings that benchmarked using ENERGY STAR Portfolio Manager to track their energy consumption had an average annual savings is 2.4%, with a total savings of 7.0% between 2008 and 2011.

The financial value of benchmarking three consecutive years is equivalent to the following:

- For a 500,000 square foot office building:
  - Cumulative energy cost savings of \$120,000
  - Increase in asset value of over \$1 million
- For a medium box retailer with 500 stores:
  - Cumulative energy cost savings of \$2.5 million
  - Increase in sales of 0.89%
- For a full service hotel chain with 100 properties:
  - Cumulative energy cost savings of \$4.1 million
  - Increase in revenue per available room of \$1.41
- For an 800,000 square foot School District:
  - Cumulative energy cost savings of \$140,000
  - Salary of 1.2 full time teachers each year

[http://www.energystar.gov/ia/business/downloads/datatrends/DataTrends\\_Savings\\_20121002.pdf](http://www.energystar.gov/ia/business/downloads/datatrends/DataTrends_Savings_20121002.pdf)

## 2x Higher Potential for Savings

Buildings that start with lower ENERGY STAR scores (i.e. higher energy use) achieve the greatest savings. Those buildings which start with below average energy efficiency in 2008 (i.e., score under 50) saved twice as much energy as those starting above average.

Benchmarking the energy performance of a building provides information essential to minimizing the single largest controllable cost center in building operations: energy use.

[http://www.energystar.gov/ia/business/downloads/datatrends/DataTrends\\_Savings\\_20121002.pdf](http://www.energystar.gov/ia/business/downloads/datatrends/DataTrends_Savings_20121002.pdf)

## \$1.77 per sqft spent on Energy

Energy expenditures average \$1.77 per square foot in commercial buildings (including government) using 2010 Dollars between 1950 and 2003.

*U.S. Energy Information Agency (EIA), 2003 Commercial Buildings Energy Consumption (CBECS) and Expenditures: Consumption and Expenditures Tables, Table C.*

*EIA, Annual Energy Review 2010, Aug. 2011, Appendix D, p.353 for price deflators*

<http://buildingsdatabook.eren.doe.gov/TableView.aspx?table=3.3.10>

## 3 - Importance of Benchmarking for Municipal and State Governments

**25%** Government-owned buildings are nearly 25% more energy-intensive than non-government-owned buildings.

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U.S. Department of Energy. *Buildings Energy Data Book, Chapter 3. March 2011.*  
<http://buildingsdatabook.eren.doe.gov/ChapterIntro3.aspx>

### **5.3% Reduction in CO<sub>2</sub>e emissions from First to Second Year of Benchmarking**

The average carbon footprint of the benchmarked buildings in 2011 improved by 5.3% from 2010 for City of San Francisco public buildings. The public buildings analyzed used nearly 3.5 million MMBtu of energy and were responsible for the emission of 91,454 tons of CO<sub>2</sub> equivalent in 2011.

*2011 Energy Benchmarking Report on San Francisco Municipal Buildings, October 2012.*  
<http://www.sfwater.org/modules/showdocument.aspx?documentid=2938> - see Executive Summary

### **\$1M Energy Costs Saved after Two Years of Benchmarking**

Overall Energy Use Intensity (EUI) of the City of San Francisco public benchmarked facilities in 2011 fell by 3.8% from 2010, equating to about \$1 million less in energy costs.

*2011 Energy Benchmarking Report on San Francisco Municipal Buildings, October 2012.*  
<http://www.sfwater.org/modules/showdocument.aspx?documentid=2938> - see Executive Summary

## **4 – Metrics on using EPA ENERGY STAR Portfolio Manager**

### **28.2B Square Feet Tracked**

As of December 2011, EPA ENERGY STAR Portfolio Manager Tool was used to track over 267,016 buildings, representing over 28.2 billion square feet (nearly 40% of the commercial market).

*EPA Data Trends, October 2012*

[http://www.energystar.gov/ia/business/downloads/datatrends/DataTrends\\_Savings\\_20121002.pdf](http://www.energystar.gov/ia/business/downloads/datatrends/DataTrends_Savings_20121002.pdf)

### **35% Less Energy Consumed**

Commercial Real Estate properties that earn the ENERGY STAR Label save an average of \$.50 per sqft and consume 35% less energy than non-labeled buildings. For a 100,000 sqft office building, this translates to an annual energy bill that is \$50,000 below that of an average building. The energy intensity in ENERGY STAR labeled buildings were 61.6 kBtu per square foot per year (kBtu/ft<sup>2</sup>/yr), compared to 103.2 kBtu/ft<sup>2</sup>/yr in an average building—a difference of about 35.0 kBtu/ft<sup>2</sup>/yr, being conservative.

*Greg Kats and Jeff Perlman, "Summary of Financial Benefits of ENERGY STAR Labeled Office Buildings," U.S. EPA, February 2006,*

[http://www.energystar.gov/buildings/sites/default/uploads/tools/Summary\\_of\\_the\\_Financial\\_Benefits.pdf?aa=2209](http://www.energystar.gov/buildings/sites/default/uploads/tools/Summary_of_the_Financial_Benefits.pdf?aa=2209)

### **353 ENERGY STAR Rated Buildings in Chicago**

The U.S. Environmental Protection Agency (EPA) released a list of U.S. metropolitan areas with the most ENERGY STAR Labeled buildings in 2012. In third place, with 353 buildings, "Chicago has risen through the rankings each year, starting in sixth place in 2008 and increasing the number of buildings certified by an average of 32 percent each year." Date of release - 03/12/2013 (note - similar information can be culled from the EPA website for any city)

<http://yosemite.epa.gov/opa/admpress.nsf/bd4379a92ceceac8525735900400c27/effc10b58e7b1c2785257b2c00578c0d1.ondocument>

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## 5 – Job Creation and Growth

### 5 to 15 Green Jobs Created per \$1 Million Invested

A Non-Residential Benchmarking and Performance program helps develop the market for building performance specialists, metering equipment, building operators and managers, and installation contractors. By making energy performance measurable and visible, local governments can encourage building owners to improve the efficiency of their buildings, which can drive new investment and create an estimated 5 to 15 green jobs per \$1 million invested. *U.S. Environmental Protection Agency, Rapid Deployment Energy Efficiency (RDEE) Toolkit: Planning & Implementation Guides.* [www.epa.gov/cleanenergy/documents/suca/rdee\\_toolkit.pdf](http://www.epa.gov/cleanenergy/documents/suca/rdee_toolkit.pdf)

### 30% Increase in Business for Energy Service Companies

Energy efficiency services companies in New York City and San Francisco are seeing a 30% increase in business in response to local benchmarking laws.

*Hurley, A.K.; Burr, A. Building Energy Disclosure Laws Push Companies to Hire, 2012.* [www.bepanews.com/images/pdf/Disclosure\\_Laws\\_Push\\_Companies\\_Hire.pdf](http://www.bepanews.com/images/pdf/Disclosure_Laws_Push_Companies_Hire.pdf)

## 6 – Potential Building Improvement and Investment

### Income Increases by 2-3% through Energy Savings in Operating Expenses

In a typical urban office building, energy costs range from 15% to 25% of operating expenses. This variance depends on a number of factors such as building age, systems employed, location of property, and predominate form of energy used in the building. Depending on the lease structure, the landlord and/or tenant could be responsible for part, or all of those costs. Any efforts to decrease controllable expenses, like energy use, fall directly to the bottom line and can increase net income by 2%–3%. As energy prices increase over time, savings and net income will grow as well, positively impacting building value.

*Energy Efficiency Improvements: Do they Pay? Ciochetti and McGowan, Journal of Sustainable Real Estate, 2010,* [http://www.josre.org/wp-content/uploads/2012/09/Energy\\_Efficiency\\_Improvements-JOSRE\\_v2-141.pdf](http://www.josre.org/wp-content/uploads/2012/09/Energy_Efficiency_Improvements-JOSRE_v2-141.pdf)

### 60% Building Owners Acted on Benchmarked Information

Energy performance benchmarking prompted energy efficiency investment in over 60% of participants through improved energy management processes, building upgrades, and behavioral efficiency projects.

*NMR Group, Inc. and Optimal Energy, Inc., Statewide Benchmarking Process Evaluation, Volume 1: Report, April 2012.*

<http://www.energydataweb.com/cpucFiles/pdaDocs/837/Benchmarking%20Report%20%28Volume%201%29%20w%20CPUC%20Letter%204-11-12.pdf>

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## 6b – Potential Building Improvement and Investment for ENERGY STAR Labeled Buildings (Steps beyond Typical Benchmarking Ordinances)

### 3% Premium for Occupancy Rates

Occupancy rates in ENERGY STAR Labeled buildings represent a 3% premium over comparable non-ENERGY STAR buildings.

*An Investigation of the Effect of Eco-Labeling on Office Occupancy Rates, Fuerst and McAllister, Journal of Sustainable Real Estate (JOSRE), Volume 1, No. 1 – 2009. [http://www.josre.org/wp-content/uploads/2012/09/Investigation\\_of\\_Effects\\_of\\_Eco\\_Labeling-JOSRE\\_v1-31.pdf](http://www.josre.org/wp-content/uploads/2012/09/Investigation_of_Effects_of_Eco_Labeling-JOSRE_v1-31.pdf)*

### 10% Decrease in Energy Consumption Equates to a 1% Rent Premium (w/o Rating)

Buildings with an ENERGY STAR Rating are associated with 3.3% higher rental rate per sqft; the difference in effective rent is estimated to be about 7% for commercial buildings – for both Classes A and B. Selling price may be offer a premium of as much as 16%. Separating energy savings from the rating, a 10% decrease in energy consumption leads to an increase in value of about 1%, over and above the rent and value premium for the label itself.

*Eichholtz, Kok, and Quigley, Doing Well by Doing Good? Green Office Buildings, American Economic Review 100, December 2010.*

[http://urbanpolicy.berkeley.edu/pdf/AER\\_Revised\\_Proof\\_101910\\_wcover.pdf](http://urbanpolicy.berkeley.edu/pdf/AER_Revised_Proof_101910_wcover.pdf)