



SEE Action
STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK

Energy Benchmarking, Rating, and Disclosure for Local Governments

What is Energy Benchmarking?

Benchmarking is the process of comparing inputs, processes, or outputs within or between organizations, often with an aim toward motivating performance improvement. Benchmarking typically measures performance using an indicator per common unit (e.g., cost per unit produced), which allows for comparison over time, to others, or to an applicable standard.

When applied to building energy use, benchmarking can provide a mechanism for measuring how efficiently a building uses energy relative to the same building over time, other similar buildings, or modeled simulations of a building built to code or some desired standard. Building energy use is typically measured in energy use per square foot (ft²). To make comparison even easier, buildings can also be rated against pre-determined scales that can provide a single rating or score, taking into account variations in building operating characteristics, climate, or other factors. By making energy performance information readily available, disclosure of such ratings can facilitate market transformation toward more energy-efficient buildings.

Why Encourage Energy Benchmarking?

Commercial buildings comprise nearly half of building energy use and roughly 20% of total energy consumption and greenhouse gas emissions in the United States.^{1,2} Government-owned buildings are nearly 25% more energy-intensive than non-government-owned buildings.¹ Energy expenditures average more than \$2 per square foot in commercial and government buildings,¹ making energy a cost worth managing.

To manage energy costs, they must be measured in a way that allows for decision making. 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.³ For example, a recent California study found that energy performance benchmarking prompted energy efficiency investment in over 60% of participants through improved energy management processes, building upgrades, and behavioral efficiency projects.⁴ Energy efficiency services companies operating in New York City and San Francisco are seeing a 30% increase in business in response to local benchmarking laws.⁵ Efficient buildings are also more profitable and more valuable at resale,⁶ which can increase property tax revenues. Building owners seek benchmarking data to differentiate a building or company, help value rental rates, and inform the sale or acquisition of existing buildings.⁴ In this role, disclosure of benchmarking data can also help strengthen local real estate markets.

By using benchmarking data to drive energy performance improvement in public buildings, governments can save taxpayer dollars while paving the way for private sector benchmarking policies. Similarly, disclosing public building energy performance data can build public trust and confidence in the effectiveness of such policies.

But, like most individual policies or practices, benchmarking and disclosure are not sufficient to realize the full efficiency potential of the commercial buildings market. Benchmarking should be considered a foundational element that can improve awareness of building energy performance and drive users to undertake other energy-efficient practices.

Key Points

- Energy benchmarking is a standardized process of measuring building energy efficiency.
- Benchmarking public buildings is a low-cost way to identify buildings that are good candidates for energy audits and upgrades.
- Local governments can lead by example with their own buildings, then phase in benchmarking and disclosure for the private sector.
- Benchmarking and disclosure policies can facilitate market-based competition and drive investment in energy efficiency, creating local jobs.

About SEE Action

The State and Local Energy Efficiency Action Network (SEE Action) is a state and local effort facilitated by the federal government that helps states, utilities, and other local stakeholders take energy efficiency to scale and achieve all cost-effective energy efficiency by 2020.

About the Working Group

The working group is comprised of representatives from a diverse set of stakeholders; its members are provided at www.seeaction.energy.gov.

Who is Affected?

Benchmarking and disclosure policies can affect key stakeholders, including:

- Public and private building owners and managers must benchmark their facilities and disclose the results.
- Interest groups that represent property managers, real estate professionals, tenants, and energy service providers may help educate owners and managers.
- Utility companies may facilitate access to energy data.
- Energy and/or environmental departments may receive and review data; information technology departments may post data online.

How Does It Work?

Local governments can start by benchmarking a sample of their own buildings, using the results to develop a more encompassing policy that requires all public buildings to be benchmarked at least annually. Governments can also reach private markets with mandatory benchmarking and disclosure policies and voluntary public-private partnerships, such as energy challenges. The remainder of this fact sheet focuses on policies requiring private sector action. Other SEE Action fact sheets provide information on public-private partnerships and ratepayer-funded programs that promote benchmarking.

Implementing Benchmarking Policies

Governments are best positioned to create a common market-based currency for building energy performance. Recognizing this, some local governments have moved to encourage or require benchmarking and performance information disclosure in their own portfolio of buildings and in private real estate markets.

Public Buildings

Local governments can benchmark their own buildings to track the performance of public buildings over time and determine which facilities to target for energy efficiency upgrades, as outlined below:

1. **Select appropriate combination of benchmarking methods.** Benchmarking can be conducted using multiple approaches including those listed below.
 - **Statistical.** A building's energy performance can be compared on a statistical basis to a population of comparable buildings. Benchmarking tools that use this approach include the U.S. Environmental Protection

Agency's (EPA) ENERGY STAR® Portfolio Manager, Lawrence Berkeley National Laboratory's EnergyIQ, and a host of proprietary tools.

- **Same building/building portfolio.** The energy performance of a building can be benchmarked against itself to track performance over time. In addition to tracking energy consumption, this can be a useful approach for measuring changes in an organization's carbon footprint or sustainability profile over time.
- **Energy simulation.** A building's energy performance can be benchmarked against an energy simulation of a building with similar physical and operational attributes. For example, Minnesota's B3 Benchmarking tool⁷ uses an energy simulation to compare a building's actual energy use to expected energy use if built to code.

A recent California study found that building owners and managers are most interested in comparing a building's performance against itself over time (81%), followed by comparison to a national rating scale based on similar buildings (65%).⁴

2. **Benchmark one or more public buildings.** Start with a sample of buildings that are suspected or known to be large energy users or poor energy performers or that reflect a diversity of building types that are representative of the government's building portfolio. This early benchmarking experience can help inform future benchmarking and disclosure policies and provide an opportunity to update building records used for maintenance and other purposes. Key data include:

- Building characteristics (e.g., age, gross floor area, percentage of gross floor area that is heated and cooled, presence of a garage)
- Operating characteristics (e.g., weekly operating hours, number of computers)
- Energy and water (optional) usage data.

EPA offers a Portfolio Manager Data Collection Worksheet⁸ to help gather necessary data inputs. Similar data are required for other benchmarking tools.

3. **Establish a benchmarking policy or plan for public buildings.** Based on the results of the sample of buildings benchmarked, develop a policy or plan for benchmarking the entire building portfolio at least annually. It may be worthwhile to establish a way to automatically transfer utility billing data to the

benchmarking software; some utilities offer this type of automated benchmarking service. Publicly disclosing the results can build public trust and confidence in the effectiveness of such policies. For example, see Arlington County, Virginia's, Building Energy Report Cards.⁹

- 4. Use benchmarking results to improve energy management.** For example, Figure 1 shows how benchmarking can help prioritize energy efficiency projects. EPA's Portfolio Manager is an example of one benchmarking tool available. It generates a 1 to 100 energy performance score comparing a building to its peers using data from sources including the national Commercial Building Energy Consumption Survey (CBECS).¹⁰ Buildings with a score below 50 are, statistically speaking, in the lower half of energy performers nationwide and therefore may require capital investment to improve their efficiency. Buildings scoring in the average to above-average range (50 to 74) can improve energy performance by adjusting their approach to energy management, largely through low-cost operations and maintenance improvements that can be identified through more detailed retro-commissioning studies. Buildings scoring 75 and higher can focus on maintaining successful practices, while continuously striving for even higher performance.

Other tools may use different scales, but accomplish similar ends: (1) analyzing buildings' operating efficiency and (2) identifying the most cost-effective energy investment opportunities across a portfolio of buildings, thereby helping to prioritize the use of limited resources.

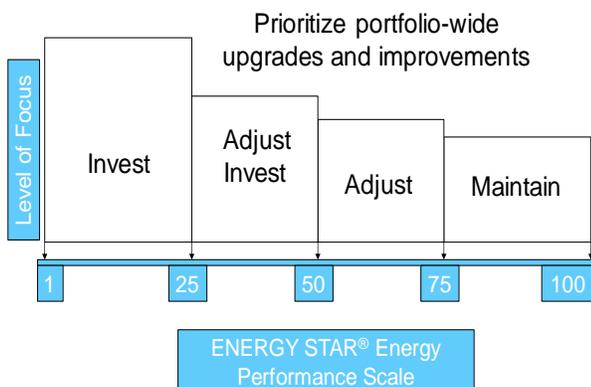


Figure 1. Example of how benchmarking can help prioritize efficiency upgrades among buildings with different scores
Source: U.S. Environmental Protection Agency

- 5. Document the costs and benefits of benchmarking.** Cost-benefit data can be invaluable in developing policies and programs that influence the private sector to follow the government's example. For example, Arlington County's benchmarking and efficiency improvement projects, completed from 2007 through 2010, have reduced the energy intensity of its building stock by nearly 10%, saving the equivalent of more than 300 U.S. homes' annual energy use and \$450,000 in avoided energy costs each year. The county has seen a 20% return on investment for projects uncovered through benchmarking and other energy management techniques.¹¹ Arlington County is sharing its lessons learned through a community-wide green business challenge, Arlington Green Games.¹²
- 6. Monitor and verify results.** Pre- and post-project benchmarking can be used to document energy savings from energy efficiency retrofit projects identified through benchmarking. Some benchmarking systems provide greenhouse gas emissions data that can be useful in calculating emissions inventories.

Private Buildings

Local governments can also influence the private real estate market by following the steps outlined below to adopt mandatory benchmarking and disclosure policies.

- 1. Assess the feasibility of benchmarking and disclosure policies in your area.** Local governments should determine whether there is active support in the public and private sectors and whether state or local law and regulatory practices permit or inhibit such policies.
- 2. Engage key stakeholders.** Engaging stakeholders from the beginning can speed the adoption of and increase the long-term effectiveness of the policy. Key stakeholders are likely to include:
 - Real estate owners and managers.** These groups, typically represented by associations or other networks, are critical to the development and execution of benchmarking policy.
 - Real estate brokers.** Brokers are important because they arrange the purchase and sale of most properties.
 - Tenant organizations.** As a primary consumer of benchmarking information, tenants can build support for the policy and ensure that policy design serves user needs.

- **Electric and gas utilities.** These energy suppliers can provide the energy use data that is the basic currency for benchmarking, in some cases through an automated process.
 - **Utility regulators.** State legislatures and executive agencies can engage regulators of ratepayer-funded programs to gain broader support in the utility sector.
 - **Energy services experts.** Engineers, consultants, contractors, and building service firms can provide support for the policy and help educate clients.
3. **Define the scope and mechanics of the requirement.** Consider what building types will be covered, the ownership type and size of affected buildings, the implementation timeframe, disclosure requirements, and possible exemptions. If specific analytical tools or software are to be used, define such technical requirements and how they will be administered and supported. Many such details need not be specified in enabling legislation, but can be worked out through agency proceedings.
 4. **Adopt policy.** Governments may consider a phased-in implementation schedule based on building size, type, etc. to help building owners and managers start small and work to a portfolio-wide benchmarking program similar to the approach recommended for public buildings.
 5. **Support post-launch activities.** To most effectively earn market acceptance, benchmarking and disclosure policies should be supported with education, outreach, and technical assistance. There is a learning curve with using Portfolio Manager and other benchmarking tools, and it may take more than one cycle before users are proficient in data entry.⁴ The many players in the affected markets need repeated opportunities to learn about and become familiar with the concept of benchmarking, new requirements, technical tools, and processes. It is especially helpful if government agencies can facilitate enhanced access to energy data by working with utilities and energy service professionals. Conversely, the benchmarking data can be invaluable to utilities in improving existing energy efficiency programs and designing new ones. Providing ongoing support for compliance and quality control can also be vital.

Existing Policies/Programs

City of Austin, Texas: Energy Conservation Audit and Disclosure Ordinance¹³

Adopted: 2008 (updated 2011) / **Effective:** 2009.

Affected Property Types: Non-residential public and private buildings greater than 10,000 ft², multifamily properties with more than five units, and single-family homes more than 10 years old.

Key Requirements (non-residential only): Requires owners to disclose energy performance score using EPA Portfolio Manager or equivalent tool to the city, buyers, and prospective buyers at the point of sale and to the city annually thereafter. Phases into effect:

- 2012: Buildings larger than 75,000 ft²
- 2013: Buildings 30,000 to 74,999 ft²
- 2014: Buildings 10,000 to 29,999 ft².

Establishes non-compliance penalty of a class C misdemeanor with fines up to \$2,000.

New York City, New York: Local Law No. 84¹⁴ (part of the Greener, Greater Buildings Plan)¹⁵

Adopted: 2009 / **Effective:** 2010 (public buildings), 2011 (private buildings).

Affected Property Types: Non-residential and multifamily public buildings larger than 10,000 ft² and private buildings larger than 50,000 ft².

Key Requirements: Requires owners to annually disclose energy and water use intensity, ENERGY STAR energy performance score (when available), and a comparison of annual energy and water consumption data to the city using EPA Portfolio Manager (water data required for buildings with automated water meters only). Requires building tenants to disclose energy use to building owners in cases where owner does not have access to aggregate building energy use. Directs the city to disclose annual benchmarking results to the public after the second annual report. Establishes non-compliance as a violation of city construction code, with a potential \$500 quarterly penalty for continued non-compliance.

City of San Francisco, California: Existing Commercial Buildings Energy Performance Ordinance¹⁶

Adopted: 2011 / **Effective:** 2011.

Affected Property Types: Non-residential public and private buildings larger than 10,000 ft².

Key Requirements: Requires owners to annually file a benchmark report that includes an ENERGY STAR energy performance score, a California-specific energy rating, and energy intensity. Requires owners to complete an energy audit every 5 years, and file an audit report with the city, showing all retrofit and retro-commissioning opportunities with a simple payback of less than 3 years. Directs the city to disclose annual benchmarking results and audit compliance confirmation to the public

after the second annual report. Requires owners to make annual benchmarking summary available to tenants. Requires tenants who are directly metered to make energy use data available to building owners solely for the purpose of compliance. Phases into effect:

- 2011: Buildings larger than 50,000 ft²
- 2012: Buildings 25,000 to 49,999 ft²
- 2013: Buildings 10,000 to 24,999 ft².

Establishes non-compliance penalty of \$50 to \$100 a day for a maximum of 25 days.

Washington, D.C.: Clean and Affordable Energy Act¹⁷

Adopted: 2008 (updated 2010) / **Effective:** TBD.

Affected Property Types: Non-residential and multifamily public buildings larger than 10,000 ft² and private buildings larger than 50,000 ft².

Key Requirements: Requires public and private buildings to annually disclose the ENERGY STAR energy performance score to the district using EPA Portfolio Manager. Requires new buildings to use ENERGY STAR Target Finder, which is similar to EPA Portfolio Manager and enables architects and building owners to set energy performance goals based on model results before buildings are constructed, and disclose results to the district. Requires non-residential tenants to provide energy consumption and space use information to building owners to facilitate benchmarking. Directs the district to begin disclosing existing building benchmarking results to the public after the second annual benchmarking report. Requires disclosure of Target Finder results to the public. The implementing regulations are under revision, but will include a phased implementation schedule.

Complementary Policies/Programs

Benchmarking is just one component of an effective portfolio of ratepayer-funded commercial energy efficiency programs. Although it can tell a building owner how a given building rates, it does not explain how to develop solutions, how to finance them, or how to implement them. Thus, benchmarking should be part of a larger framework that includes components such as energy audits, retro-commissioning, and financial and technical assistance. The City of San Francisco's benchmarking law is a good example. The energy audit component of the law ensures that building owners are not only aware of their current energy performance but also opportunities to improve. For access to related SEE Action resources, visit www.seeaction.energy.gov/existing_commercial.html.

Other Resources

American Council for an Energy Efficiency Economy (ACEEE), Local Energy Efficiency Policy Calculator, www.aceee.org/portal/local-policy/calculator.

Efficiency Cities Network, "Building Labeling Ordinances." Presented March 1, 2011. www.energycities.org/wp-content/uploads/030111/ECN03012011.pdf.

Institute for Market Transformation. *Building Energy Transparency: A Framework for Implementing Commercial Energy Rating & Disclosure Policy* Report. www.buildingrating.org/Building_Energy_Transparency_Implementation_Report.

Institute for Market Transformation, Energy Disclosure Website, www.buildingrating.org.

Northeast Energy Efficiency Partnerships. *Valuing Building Energy Efficiency through Disclosure and Upgrade Policies: A Roadmap for the Northeast U.S.*, http://neep.org/uploads/policy/NEEP_BER_Report_12.14.09.pdf

SEE Action, Benchmarking and Disclosure: State and Local Policy Design Guide and Sample Policy Language. www.seeaction.energy.gov/pdfs/commercialbuildings_benchmarking_policy.pdf.

U.S. Environmental Protection Agency, Automated Benchmarking System, www.energystar.gov/istar/has.

U.S. Environmental Protection Agency, ENERGY STAR Portfolio Manager, www.energystar.gov/benchmark.

U.S. Environmental Protection Agency, ENERGY STAR Target Finder, www.energystar.gov/targetfinder.

U.S. Environmental Protection Agency, *State and Local Governments Leveraging ENERGY STAR*. www.energystar.gov/ia/business/government/State_Local_Govts_Leveraging_ES.pdf.

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References

¹ U.S. Department of Energy (DOE). *Buildings Energy Data Book*, Chapter 3. March 2011.

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

² 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.

³ U.S. Environmental Protection Agency, *Rapid Deployment Energy Efficiency (RDEE) Toolkit: Planning & Implementation Guides*. December 9, 2009.

www.epa.gov/cleanenergy/documents/suca/rdee_toolkit.pdf.

⁴ 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>.

⁵ Hurley, A.K.; Burr, A. *Building Energy Disclosure Laws Push Companies to Hire*. www.bepanews.com/images/pdf/Disclosure_Laws_Push_Companies_Hire.pdf.

⁶ Burr, A. "CoStar Study Finds Energy Star, LEED Bldgs. Outperform Peers." March 26, 2008.

www.costar.com/News/Article/CoStar-Study-Finds-Energy-Star-LEED-Bldgs-Outperform-Peers/99818.

⁷ State of Minnesota, B3 Benchmarking Program Website. www.mnbenchmarking.com/.

⁸ U.S. Environmental Protection Agency, ENERGY STAR Portfolio Manager Data Collection Worksheet.

www.energystar.gov/ia/business/downloads/PM_Data_Collection_Worksheet.doc.

⁹ Arlington County, Virginia, Building Energy Report Cards. May 25, 2011. www.arlingtonva.us/Portals/Topics/AIRE/BuildingEnergy.aspx.

¹⁰ U.S. Department of Energy. Commercial Building Energy Consumption Survey. www.eia.doe.gov/.

¹¹ Arlington County, Virginia. "Return on Investment: Energy efficiencies yield big paybacks." February 27, 2007. www.arlingtonva.us/portals/topics/documents/9768ReturnInvestment.pdf.

¹² Arlington County, Virginia. Green Games Website. www.arlingtongreengames.com.

¹³ City of Austin, Texas. Energy Conservation Audit and Disclosure Ordinance. www.ci.austin.tx.us/edims/document.cfm?id=152241.

¹⁴ New York City, New York. Local Law No. 84, www.nyc.gov/html/planyc2030/downloads/pdf/l184of2009_benchmarking.pdf.

¹⁵ New York City, New York. Greener, Greater Buildings Plan. www.nyc.gov/html/planyc2030/html/about/ggbp.shtml.

¹⁶ City of San Francisco, California. *Existing Commercial Buildings Energy Performance Ordinance*. www.sfbos.org/ftp/uploadedfiles/bdsupvrs/committees/materials/LU012411_101105.pdf.

¹⁷ Washington, D.C. *Clean and Affordable Energy Act*. www.ddoe.dc.gov/ddoe/lib/ddoe/information2/public_notices/CAEA_of_2008_B17-0492.pdf.

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