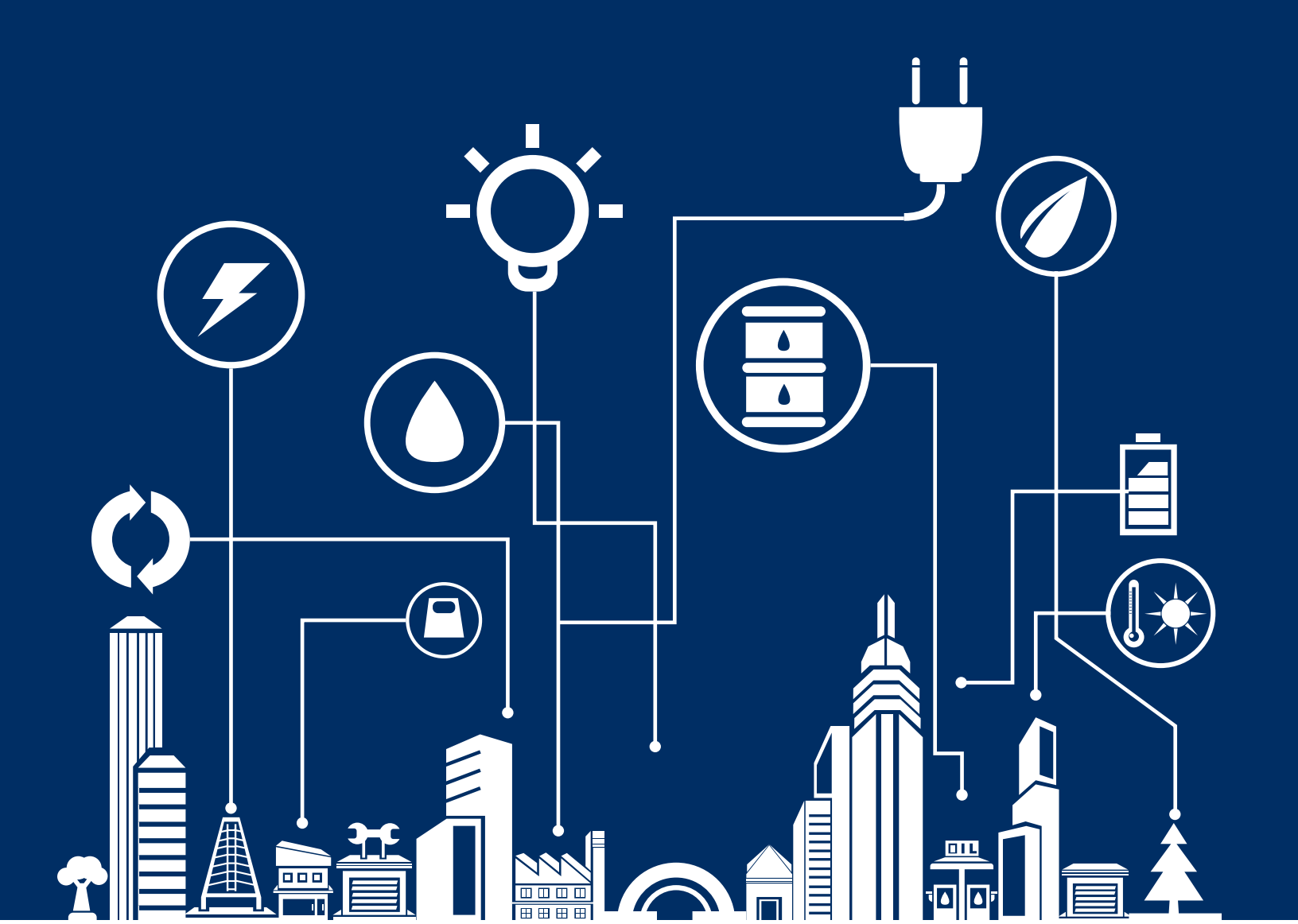


BUILDING PERFORMANCE POLICY

THE BENEFITS OF BENCHMARKING BUILDING PERFORMANCE

Zachary Hart
Institute for Market Transformation
December 2015

IMT
INSTITUTE FOR MARKET TRANSFORMATION

Pacific Coast COLLABORATIVE

Table of Contents

Executive Summary

Today, buildings account for 40 percent of the total energy used in the United States, with building owners and occupants spending roughly $450 billion on energy bills each year. Despite the size of the opportunity for improvement, building efficiency is not highly valued in the real estate market, largely due to a lack of available information about building performance and energy use. A growing number of jurisdictions in the U.S. are passing energy benchmarking and transparency policies to address this information gap. When buildings are uniformly benchmarked—meaning their energy use is measured on a consistent basis—and that information is shared publicly, the real estate market is empowered to consider and recognize the value of energy efficiency.

The overarching goal of a benchmarking and transparency policy is to encourage the development of a strong market for building efficiency. Benchmarking brings building owners' attention to energy efficiency, resulting in behavioral and operational changes that bring immediate and low-cost reductions in energy consumption. These policies also make building performance more visible in the marketplace, thus empowering consumers to more easily understand how buildings are performing and reward owners of efficient buildings.

Benchmarking information can inform policy and program development by allowing policymakers to craft more effective methods to address their jurisdictions' most inefficient buildings. Similarly, utilities can use benchmarking data to target their customers that would benefit most from their efficiency programs, thereby increasing the cost-effectiveness of the utility's efficiency investments.

The larger economy also stands to benefit: benchmarking policies that cover a substantial portion of a region's building stock should lead to a widespread increase in the investment of building performance, including the creation of many jobs to conduct energy audits, retro-commission base building systems, and install upgraded systems and equipment.

Additionally, benchmarking polices produce environmental and quality of life benefits. Because energy benchmarking reduces energy use, it also reduces the greenhouse gas emissions associated with generating that energy. Furthermore, evidence is emerging that improved building performance can be beneficial to building occupant health, with energy efficiency being linked to reductions in

incidences of respiratory illness and increases in occupant comfort and productivity.

Research is showing that energy benchmarking and transparency policies and programs are important tools to transform the real estate market into one that properly values energy efficiency. As these policies become more common, building owners, tenants, governments, and the public gain an improved understanding of building energy use, resulting in significant energy reductions, rising demand for energy-efficient properties, and a range of economic and environmental benefits.

Introduction

Billions of dollars of value is currently locked inside the buildings of America's cities and towns. This untapped wealth is the gap between the amount of energy buildings use to operate and meet occupants' needs and the amount of energy that would be required if buildings were equipped with the most efficient technologies and design techniques.

Though energy efficiency has become an increasingly important factor in the design and construction industry over the past two decades, many of the nation's current buildings were constructed without much concern for it. Today buildings account for 40 percent of the total energy used in the U.S. This amounts to roughly $450 billion spent on energy bills each year, and the direct and indirect greenhouse gas emissions associated with this energy use comprise approximately 40 percent of the nation's total output. This means that investing in improving the performance of existing buildings would be a boon to the American economy, reducing environmental costs from greenhouse gas emissions, increasing operating capital for building owners and tenants, and supporting the development of a highly skilled energy-services labor market.

One of the most cost-effective ways to decrease overall energy use is to improve the energy efficiency of U.S. buildings. Many jurisdictions have made an effort to catalyze a market for energy efficiency through policy, mandating minimum standards in energy codes. However, while stronger energy efficiency standards in building codes help reduce energy consumption in new and renovated buildings, only about three percent of the U.S. building stock is newly built or renovated annually. To make a meaningful reduction in overall building energy consumption, energy inefficiency in existing buildings must be addressed.

Government and utility-sponsored efficiency incentives, though helpful, are not enough to activate a strong existing buildings efficiency market on their own. Many building owners remain unaware or uninterested in the efficiency of their buildings, leaving many cost-effective efficiency investments unpursued despite the existence of financial incentives.

A more complete policy solution is necessary to transform real estate markets into ones that correctly value resource-efficient performance. Energy benchmarking and transparency is the foundation on which such a policy solution is built.

When buildings are uniformly benchmarked—meaning their energy use is measured on a consistent basis—and when that information is shared publicly, the real estate market is empowered to consider the value of energy efficiency. Increasing the visibility of building performance in the marketplace will reward owners of efficient buildings and encourage more owners to invest in their buildings' resource efficiency. Finally, the publicly available building data will be invaluable to policymakers, utilities, and others as they design strategies and programs to serve their citizens, members, and ratepayers more cost effectively.

What is Benchmarking and Transparency?

Energy benchmarking—the process of measuring a building's energy use over time—allows building owners and occupants to understand their buildings' operational performance relative to similar buildings. Benchmarking requires an owner to enter basic building characteristics as well as their monthly energy use into tracking software. The leading benchmarking tool, ENERGY STAR Portfolio Manager, is a free online program provided by the U.S. Environmental Protection Agency (EPA). Using the data supplied by the building owner, the benchmarking software normalizes a building's energy use for weather, building type, occupancy, and other factors that affect energy consumption. This allows building owners to see how their property compares to like buildings on a level playing field.

BENCHMARKING BENEFITS FOR OWNERS

Owners that benchmark their buildings gain the following benefits:

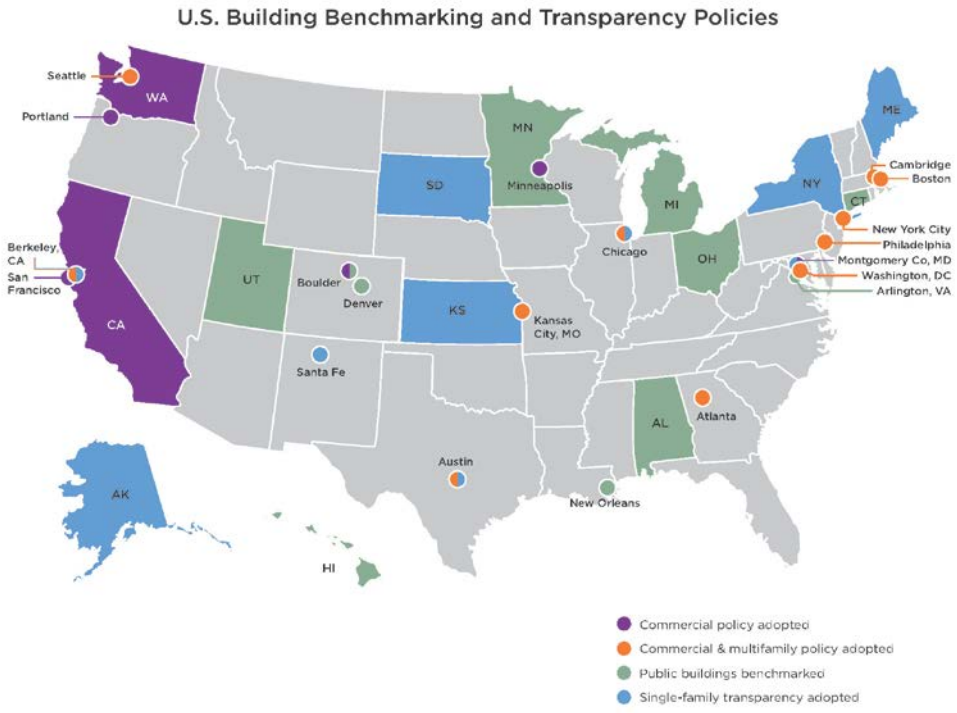
1) Baseline understanding of their building's energy use
2) Metrics to rank their building against others in their portfolio, allowing prioritization of energy efficiency investments
3) Better understanding of how their buildings' energy performance compares to competitors
4) Basis of an energy management plan to drive continuous performance improvement
5) For high performers, evidence of their building's additional value

Benchmarking is the foundation of effective energy management and is quickly becoming an operational best practice of the commercial real estate industry. Benchmarking data can be used to establish a building's baseline energy performance, set performance goals, track and improve ongoing energy use, and identify buildings that are ripe for efficiency investments. However, while acquiring energy consumption data is important, it is only really effective if it inspires owners to take action. This is why benchmarking data becomes an even more powerful tool when it is made publicly available. By making this information transparent, real estate stakeholders such as prospective investors and tenants can include energy performance and expected utility costs in their decision-making processes when evaluating buildings and tenant spaces. This incentivizes building owners to improve the performance of their

buildings, as energy efficiency becomes another value differentiator when competing for buyers and tenants.

In order to stimulate a building efficiency market, 15 U.S. cities, one county, and two states have instituted benchmarking and transparency policies for commercial and multifamily buildings. In addition, a number of cities and states have enacted benchmarking policies that apply to their own publicly owned buildings, or to single family properties, as shown in Figure 1. Benchmarking and transparency policies carry a number of benefits. They bring building owners' attention to energy efficiency, resulting in behavioral and operational changes that bring immediate and low-cost reductions in energy consumption. They also empower consumers to more easily value building efficiency by improving their access to information about a building's energy use. This makes building performance more visible in the marketplace, rewarding owners of efficient buildings and encouraging more owners to invest in their buildings' resource efficiency. In addition to energy cost savings and consumer benefits, this simple policy mechanism produces a number of other environmental, health, and economic benefits.

Figure 1: U.S. Building Benchmarking and Transparency Policies as of December 2015.



Energy-Saving Benefits

The most immediate benefit of a benchmarking policy is that merely measuring and gaining awareness of a building's energy use leads to a modest but still significant reduction in energy use. By simply shedding light on the building's actual energy performance in relation to itself and to similar buildings, benchmarking draws attention to this overlooked aspect of the real estate market. Most building owners have never measured their building's relative efficiency, leaving them uninformed about how their building's performance compares to the competition. Furthermore, research has found that many owners believe their buildings to be more efficient than they actually are.[1]

Benchmarking their building's energy performance allows owners to see how their asset compares to similar buildings and increases the likelihood of taking action to improve their benchmarking results. A survey of participants and non-participants in California utility benchmarking workshops shows evidence of this effect. The survey found that of those building owners that participated, 84 percent planned or implemented efficiency improvements. The simple act of measuring and comparing their building's performance to others also led owners to consider deeper investments in efficiency. Ninety percent of the respondents agreed with the statement: "You implement more comprehensive energy efficiency measures in the buildings you benchmark."[2]

Evidence continues to accumulate showing that energy benchmarking alone leads to reduced energy use and thus consumer savings. A 2012 U.S. EPA analysis of 35,000 benchmarked buildings found average annual energy savings of 2.4 percent. The analysis also found that buildings which had benchmarked for three straight years saved an average of 7 percent over the course of that time.[3] The EPA's findings are backed by the analyses of cities that have recently enacted benchmarking and transparency policies.

---

[1]Granade, Hannah Choi, et al. "Unlocking Energy Efficiency in the U.S. Economy." McKinsey & Company. 2009.
http://www.mckinsey.com/client_service/electric_power_and_natural_gas/latest_thinking/unlocking_energy_efficiency_in_the_us_economy

[2] NMR Group, Inc. "Statewide Benchmarking Process Evaluation. April 2012.
http://www.calmac.org/publications/Statewide_Benchmarking_Process_Evaluation_Report_CPU0055.pdf

[3] United States Environmental Protection Agency. October 2012.
http://www.energystar.gov/ia/business/downloads/datatrends/DataTrends_Savings_20121002.pdf?3d9b-91a5

On the local level, New York City found that from 2010 through 2013, benchmarked buildings realized 5.7 percent energy savings, equating to total dollar savings of $267,492,147.[4]

San Francisco saw similar results from benchmarking its municipal buildings. Between 2009, when benchmarking began, and 2013, San Francisco municipal buildings reduced their overall site Energy Use Intensity (kBtu/sq. ft.) by 7.4 percent.[5] San Francisco commercial buildings that consistently complied with the city's benchmarking ordinance between 2010 and 2014 reduced their energy use by 7.9 percent and their source greenhouse gas emissions by 17 percent.[6]

In addition, a 2015 study by Resources for the Future found that office buildings in Austin, New York, San Francisco, and Seattle that were covered by benchmarking laws spent about 3 percent less on utility bills than control buildings. The authors attributed these changes to increased attentiveness among building owners to energy performance.[7]

Market Competition Benefits

Benchmarking is proving to be a reliable method of achieving immediate energy reductions in buildings, but its greatest value is in its potential to form the basis of a robust market for building efficiency that will drive deeper energy savings. One of the largest barriers to transformation of the building energy market is the problem of information gaps. Buildings can be very complex, and not all aspects are readily available for inspection by prospective buyers or tenants. A building's energy efficiency can be especially hard to determine, as it depends on the design and operations of many interacting systems whose features are often difficult to observe.

Without information about a building's energy performance, real estate consumers have no reliable way of distinguishing an efficient building from an inefficient one. An analogous situation existed in the automotive industry before the requirement to label cars with fuel economy information. Miles-per-gallon information

[4] U.S. Department of Energy. "New York City Benchmarking and Transparency Policy Impact Evaluation Report." May 2015. http://energy.gov/sites/prod/files/2015/05/f22/DOE%20New%20York%20City%20Benchmarking%20snd%20Transparency%20Policy%20Impact%20Evaluation....pdf

[5] 2013 Energy Benchmarking Report San Francisco Municipal Buildings. 2014. http://sfwater.org/modules/showdocument.aspx?documentid=6271

[6] ULI Greenprint Center for Building Performance. San Francisco Existing Commercial Buildings Performance Report 2010-2014. http://uli.org/wp-content/uploads/ULI-Documents/SFenergybenchmarkingreport.pdf

[7] Palmer, Karen and Margaret Walls. "Does Information Provision Shrink the Energy Efficiency Gap?" Resources for the Future. 2015. http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-15-12.pdf

enabled car buyers to compare vehicles' efficiency alongside other factors, allowing producers of vehicles with superior fuel economy to market these attributes. In the absence of such information in the real estate market, a building's energy efficiency is often not a factor in how investors, tenants, and lenders determine its value. Consequently, there has been muted demand for energy-efficient buildings and therefore little incentive for building owners to invest in improving the efficiency of their properties. This is despite the fact that energy costs comprise about 30 percent of total operating costs in the typical office building.[8] In light of this heavy expense, it would seem that prospective buyers and tenants, given sufficient information about a building's performance, would prefer to purchase or lease an energy-efficient one. This supposition has been borne out by evidence showing that buildings with "green" certifications such as LEED and ENERGY STAR outperform their peers in key financial metrics.

Lower Operating Expenses

The most obvious and most immediate benefit of owning or leasing an energy-efficient building is lower utility bills. Energy savings reduce operating expenses and increase net operating income, which can have positive effects on building value. This improves cash flow for building owners and tenants and reduces the risk of default on outstanding loans. Further operational savings can be realized by reducing maintenance costs through the installation of longer lasting, energy-efficient technologies such as LED lights.

Rental Premiums and Higher Occupancy Rates

Commercial tenants are increasingly willing to pay more for green spaces. The most sophisticated tenants recognize that renting space in green, energy-efficient buildings is an opportunity to demonstrate their commitment to sustainability, thereby attracting and retaining top-performing employees, improving productivity, and reducing utility costs. Multiple studies have found evidence that certified green buildings command higher rents than their peers.

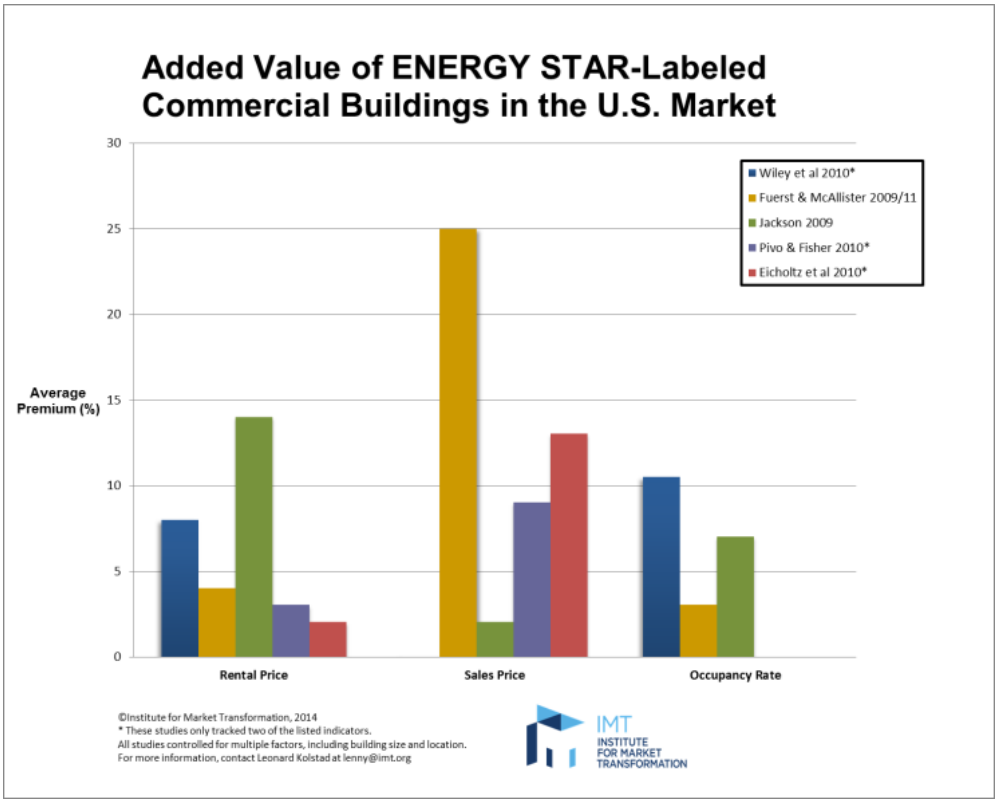
In addition to being more willing to pay for green spaces, evidence shows that tenants are also more likely to rent and remain in green spaces. Certified green buildings enjoy an occupancy advantage over their conventional peers, thus lowering their owners' lost rent due to vacancy and decreasing turnover costs.

A 2008 study by the CoStar Group found that rental rates in ENERGY STAR-labeled buildings rented at a $2.40-per-square-foot premium

[8] U.S. EPA. Energy Efficiency in Non-Governmental Buildings. http://www3.epa.gov/statelocalclimate/local/topics/commercial-industrial.html

over similar unlabeled buildings. The labeled buildings also had 3.6 percent higher occupancy rates.[9]

Figure 2: Added Value of ENERGY STAR-labeled Commercial Buildings in the U.S. Market.



A 2014 CoStar report revealed that Los Angeles tenants paid an average rent of $2.69 per sq. ft. and $2.91 per sq. ft. for ENERGY STAR-certified and LEED-certified buildings respectively. Conventional, unlabeled buildings received average rent of only $2.16 per sq. ft.[10]

Finally, an analysis of data from a single portfolio of more than 100 U.S. office buildings from 2004 to 2013 found that ENERGY STAR-certified buildings experienced 9.5 percent higher occupancy rates and 2.5 percent higher rental rates than conventional buildings. The study also found that buildings certified as energy efficient enjoyed a higher likelihood of lease renewal and average rent concessions to

[9] "CoStar Study Finds Energy Star, LEED Bldgs. Outperform Peers." http://www.costar.com/News/Article/CoStar-Study-Finds-Energy-Star-LEED-Bldgs-Outperform-Peers/99818

[10] "'Green' Buildings Thriving in LA Real Estate Market, According to CoStar Report." http://la-bbc.com/green-buildings-thriving-in-la-real-estate-market-according-to-costar-report/

tenants of just 7 percent compared to 11 percent for conventional buildings.[11]

Lower Risk to Lenders

High-performing buildings are safer investments for lenders. Lenders and underwriters are most focused on the risks associated with high-performance buildings, and how these risks affect value. High-performance buildings can offer protection against changing consumer preferences, increasing energy prices, and local green building ordinances. In addition, better market positioning is more likely to protect the going-out capitalization rate. Recognizing the relative safety of high-performing assets, one major insurer now offers discounts for high-performance buildings.

Higher Building Value and Sales Prices

The competitive advantages of green buildings translate into higher overall value in the market place and higher sales prices. The 2008 CoStar study mentioned above concluded that ENERGY STAR-labeled buildings sold at a $61-per-sq.-ft. premium compared to unlabeled peer buildings. A 2009 study by researchers at the University of California at Berkeley found that ENERGY STAR-labeled buildings sold for 16 percent more than identical unlabeled buildings.[12]

These results provide ample evidence of the financial upside of energy efficiency for real estate stakeholders and the vast amount of potential value that is currently locked up in the nation's inefficient buildings. Energy benchmarking and transparency policies offer a correction to the information asymmetry that has thus far prevented market forces from uncovering this value.

Benchmarking and transparency allows prospective buyers and tenants to see how well a building performs, and take the true value of energy-efficient buildings into account in their decision-making processes. This will make the most efficient buildings more competitive relative to their peers, rewarding owners who invest in the performance of their buildings and creating a virtuous cycle where the efficiency of the building stock continuously improves as owners compete to meet the demand for high-performing, energy-efficient buildings.

[11] Devine, Avis and Nils Kok. "Green Certification and Building Performance: Implications for Tangibles and Intangibles." The Journal of Portfolio Management. Special Real Estate Issue, 2015.
[12] Eichholtz, Piet, Nils Kok, and John Quiqley. "Doing Well by Doing Good? Green Office Buildings." Center for the Study of Energy Markets. WP 192. August 2009. http://escholarship.org/uc/item/4bf4j0gw

Government Efficiency Benefits

Benchmarking and transparency policies allow governments to gain a better understanding of their jurisdictions' building stocks. Benchmarking information can be used to set energy efficiency goals, track progress toward those goals, evaluate the performance of other efficiency policies, and create efficiency incentives and programs that target under-performing building types and geographic areas.

Benchmarking information allows policy makers to understand where the most inefficient buildings are and design more effective methods of addressing them. Before benchmarking policies, it was widely assumed that older buildings would perform more poorly than newer buildings equipped with more recent technologies. In fact, many cities have now found a more nuanced picture of energy performance in their building stocks. In its first report on benchmarking results, New York City observed that office buildings built before 1930 use less energy than newer buildings, with median source energy use intensity (kBtu/sq. ft.) increasing from 188.3 for pre-1930 buildings to 262.1 for offices built after 1990.[13]

Furthermore, in its 2014 report, after analyzing data from over 13,000 buildings, New York found that energy use varied by a factor of three to seven among properties used for similar purposes.[14] Such information can be used by jurisdictions to design efficiency programs targeted to where the need is greatest, increasing the chance for market uptake and improving program cost effectiveness.

Utilities can also use benchmarking data to make their efficiency programs more effective. Marketing efficiency incentives is currently a challenge, as there is limited data available to determine which buildings are performing poorly and which are performing well. Public benchmarking data supplies information about building characteristics that is crucial for utilities to better understand their customers. This information allows utilities to approach those customers that would benefit most from their efficiency programs, thereby increasing the cost-effectiveness of the utility's efficiency investments.

In San Francisco, account representatives of Pacific Gas and Electric Company use benchmarking data to streamline outreach to building

[13] The City of New York. "New York City Local Law 84 Benchmarking Report, August 2012." http://www.nyc.gov/html/gbee/downloads/pdf/nyc_ll84_benchmarking_report_2012.pdf
[14] The City of New York. "New York City Local Law 84 Benchmarking Report, September 2014." http://www.nyc.gov/html/planyc/downloads/pdf/publications/2014_nyc_ll84_benchmarking_report.pdf

owners about specific efficiency programs. In Massachusetts, the Low-Income Energy Affordability Network, Massachusetts utilities, and WegoWise used multifamily benchmarking data as a screening tool to target low-performing buildings for improvements. The information showed that raising the performance of all of the state's affordable housing buildings to the top quartile would save 1,800 GBtu of gas and electricity per year.

Benchmarking and transparency picks up where energy codes stop. Building energy codes apply to new buildings being constructed and, with the exception of major alterations and renovations, generally have little application after the certificate of occupancy has been issued by the local government. Benchmarking and transparency policies pick up nicely where energy codes leave off. After a building is constructed and enters into operation, a typical benchmarking and transparency policy requires that the energy consumption of that building be reported on an annual basis, or at the time of a real estate transaction. By doing so, this policy encourages future energy efficiency improvements at the point in a building's life cycle where the energy code no longer plays a role. Energy benchmarking data can also be useful to code officials by providing insight into achievable efficiency goals when considering enhancements to the energy code. Eventually, the line between energy codes, which regulate physical attributes, and building performance policies, which help regulate operating characteristics, may begin to blur. This could lead to the development of a true "energy performance" code, which would consider not just building design and construction quality but also how well the completed and occupied building actually performs.

Job Creation Benefits

A benchmarking and transparency policy can serve as the backbone of a strong energy services market. Benchmarking provides building owners, managers, and operators with a measure of their buildings' performance, but it does not provide detailed information about the equipment and components that are causing poor energy performance and how they might be addressed. More detailed analysis and energy services are needed to do that. However, benchmarking and transparency policies do create conditions that allow a market for these services to develop. Once a policy is in place and building performance information is available to real estate stakeholders, owners and energy services vendors will have a better understanding of which buildings are most prime for energy upgrades and the first steps that owners can take to improve their performance. To the extent that a benchmarking and

transparency policy catalyzes the development of a strong market for building energy services, jurisdictions can expect to see significant positive impacts on their economies through deeper energy savings, reduced emissions, improved health, and job growth.

RETROCOMMISSIONING AND AUDITS

Benchmarking can be used to identify priority buildings for energy audits and retro-commissioning, leading to significant savings opportunities. An energy audit is a comprehensive assessment of building energy consumption, including systems, insulation, and operational characteristics. There are different degrees of energy audits that will give owners a progressively clearer picture of the factors affecting their building's energy performance. These results help owners and building operators understand their energy costs and measures they can take to improve energy performance. Recommendations range from simple, low-, or no-cost energy efficiency measures to technology and equipment upgrades and envelope improvements. Energy auditors provide cost and energy-savings estimates for each recommended measure, giving owners the information necessary to design a cost-effective energy improvement plan.

In San Francisco, buildings are required to perform an energy audit every five years in addition to benchmarking their energy use. Energy audits of over 800 buildings found opportunities to make $60.6 million in efficiency improvements with a net present value of $170 million. Altogether, these improvements would pay for themselves in three years and save 150 GWh of electricity and 1.4 million therms of natural gas each year.[15]

Retro-commissioning is an energy performance assessment for existing buildings that ensures systems are functioning as originally designed. It typically focuses on energy-using equipment such as mechanical equipment, lighting, and controls with the aim of optimizing their performance rather than replacing them with more efficient systems. Retro-commissioning is one of the most cost-effective methods of reducing energy use in existing buildings. Almost inevitably, even the best designed buildings will become less efficient over time. This can occur because occupancy and use differs from the assumptions used in building design, because the building is not operated as intended, or because equipment becomes uncalibrated or ceases to function correctly. The retro-commissioning process can correct these malfunctions, saving energy, reducing future maintenance and repair costs, and improving occupant comfort. A study of commissioning projects on existing buildings found 16 percent median whole-building energy savings with 1.1 year payback periods.[16]

The building efficiency market has enormous potential. The potential magnitude of the building efficiency market is so great that it could support a large energy services industry. Work by Deutsche Bank Climate Advisors and the Rockefeller Foundation estimated that cost-effective efficiency upgrades in the residential, commercial, and institutional sectors represent a $279 billion investment opportunity, returning $1 trillion in energy savings and creating a cumulative 3.3 million jobs over 10 years.[17] In the context of an individual city, a study of Philadelphia's building stock found that 77 percent of its 7,000 commercial buildings are in need of upgrades. Making all of those improvements would generate $600 million in local spending and support up to 23,000 jobs.[18] That study recommended energy benchmarking as a means to help the worst performing buildings improve.

Benchmarking creates demand for energy services. Today, the energy services industry is restrained by a market in which the availability of building performance information is limited. Energy benchmarking supplies the market with the data needed to increase demand for better buildings. Companies that benchmark their buildings have been shown to take three times the number of energy actions than companies that do not.[19] Benchmarking policies that cover a substantial portion of a region's building stock should lead to a widespread increase in investment in building performance, meaning the creation of many jobs in training workers, conducting energy audits, retro-commissioning base building systems, and installing upgraded systems and equipment. Furthermore, when benchmarking information is made transparent, these energy service providers can use the information to market their services to the clients most in need of them, reducing the cost of new customer acquisition. Cities with benchmarking and transparency laws in place are already seeing evidence of a strong response in their labor markets. Local businesses in cities with benchmarking and transparency ordinances report hiring new employees to meet new demand driven by greater awareness of the value of efficiency. As an

---

[15] SF Environment, "Why Audit." http://www.sfenvironment.org/article/energy-efficiency-audits/why-audit

[16] Mills, Evan. "Building Commissioning: A golden opportunity for reducing energy costs and greenhouse gas emissions in the United States," http://evanmills.lbl.gov/pubs/pdf/cx-enef-mills.pdf

[17] The Rockefeller Foundation and DB Climate Change Advisors. "United States Building Energy Efficiency Retrofits Market Sizing and Financing Models." March 2012. https://assets.rockefellerfoundation.org/app/uploads/20120301221532/United-States-Building-Energy-Efficiency-Retrofits.pdf

[18] Greater Philadelphia Innovation Cluster for Energy-Efficient Buildings. "The Market for Commercial Property Energy Retrofits in the Philadelphia Region. October 2011. http://energycodesocean.org/sites/default/files/resources/EEBHUB_reports_econsult_energy-market_2011-10.pdf

[19] Institute for Building Efficiency. "2012 Energy Efficiency Indicator: Global Results." 2012. http://www.institutebe.com/InstituteBE/media/Library/Resources/Energy%20Efficiency%20Indicator/2012-EEI-Global-Results-Executive-Summary.pdf

example, between 2010 and 2013, New York City calculated that 3,132 direct jobs were created by energy efficiency improvements in buildings.

Indirect Benefits

The overarching goal of a benchmarking and transparency policy is to encourage the development of a strong market for building efficiency. To the extent benchmarking and transparency succeeds in achieving this goal, jurisdictions should see economic, environmental, and health benefits resulting from increased retrofit activity and deeper energy savings. While these benefits are not directly attributable to benchmarking and transparency, their fruition is dependent on a functioning efficiency market in which building energy data is available. The following sections of this paper describe the way these indirect benefits may impact a jurisdiction.

Additional Economic Benefits

One dollar spent on energy efficiency is more economically productive than a dollar spent on buying energy. A business operating in an inefficient building uses more energy than it actually needs to produce its good and services. Therefore, it is operating in an economically inefficient way. If the business were housed in an energy-efficient building, it would be able to operate more optimally and thus more competitively as more money would be available to invest in core business activities.

Energy efficiency spending stays local. In addition to productivity benefits for businesses working in energy-efficient buildings, there are significant economic benefits that accrue to the community as a result of investments in energy efficiency. Dollars spent on energy consumption are more likely to leave the community, whereas investments in efficiency are more likely to remain in it. Investments in energy efficiency create and support jobs for local contractors, engineers, and other building professionals, producing more economic activity than many alternatives.[20] A study by the U.S. Department of Energy found that each dollar spent on energy efficiency generated $2.23 for the local economy. This number

[20] Laitner, John, Steven Nadel, R. Neal Elliott, Harvey Saches, and A. Siddiq Khan. "The Long-Term Energy Efficiency Potential: What the Evidence Suggests." January 2012. http://www.garrisoninstitute.org/downloads/ecology/cmb/Laitner_Long-Term_E_E_Potential.pdf

compares favorably to local consumer goods ($1.90) and utility services ($1.66).[21]

Energy-efficient properties are better investments. In addition to job creation and greater economic impact per dollar, there are other ways that energy efficiency can enhance a region's economic competitiveness. Studies have produced evidence that energy-efficient properties run a lower risk of defaulting on loans, because their lower operating expenses mean stronger cash flow and thus more resilience to economic hardship. A 2013 study by IMT found that mortgage default risks for energy-efficient single-family homes are on average 32 percent lower.[22] ENERGY STAR- and LEED-certified commercial buildings are correlated with lower mortgage default rates.[23] A review of energy efficiency loan programs by ACEEE revealed that default rates hovered between zero and 3 percent, making efficiency loans significantly less risky compared to other lending opportunities.[24]

Environmental and Health Benefits

Jurisdictions with benchmarking policies have seen a decrease in greenhouse gas emissions. Because energy benchmarking reduces energy use, it also reduces the greenhouse gas emissions associated with generating that energy. The degree to which emissions are reduced depends on the fuel mix that is used to supply energy to buildings. Regions that depend heavily on fossil fuels to generate energy will experience greater reductions than those that depend on low-carbon fuel sources. Cities that are dependent on carbon-heavy fuel sources have seen significant reductions since implementing benchmarking and transparency policies; though even Seattle, which receives the majority of its electricity from hydropower,[25] traces 19 percent of its greenhouse gas emissions back to commercial building energy use.[26] New York City reported that cumulative greenhouse gas emissions fell 9.9 percent from 2010 through 2013; however, a portion of this reduction can be attributed

[21] Meres, Ryan, Jeremy Sigmon, Mike DeWein, Ken Garrett, and Jim Brown. "Successful Strategies for Improving Compliance with Building Energy Codes." 2012. http://aceee.org/files/proceedings/2012/data/papers/0193-000112.pdf
[22] http://www.imt.org/uploads/resources/files/IMT_UNC_HomeEEMortgageRisksfinal.pdf
[23] An, Xudong and Gary Pivo. "Default Risk of Securitized Commercial Mortgages: Do Sustainability Property Features Matter?" March 30, 2015. http://www.reri.org/research/files/2014funded_An-and-Pivo.pdf
[24] Hayes, Sarah, Steven Nadel, Chris Granda, and Kathryn Hottel. "What Have We Learned from Energy Efficiency Financing Programs?" September 20, 2011. http://aceee.org/research-report/u115
[25] Seattle City Light Fuel Mix. 2013. http://www.seattle.gov/light/FuelMix/
[26] "2012 Seattle Community Greenhouse Gas Emissions Inventory." April 2014. http://www.seattle.gov/Documents/Departments/OSE/2012%20GHG%20inventory%20report_final.pdf

to mandated phase-out of fuel oil #6 in favor of cleaner fuels.[27] In San Francisco, where buildings are responsible for 52 percent of the city's greenhouse gas emissions, the city found that buildings that were subject to the city's benchmarking and energy audit requirements decreased source emissions by 17 percent.[28]

Mounting evidence shows that reducing energy consumption and greenhouse gases can have profound implications for public health. New York City's first city-wide benchmarking report observed a strong correlation between the number of emergency room visits for asthma incidences and the average building energy intensity in a neighborhood, raising the possibility that targeted energy efficiency projects could help relieve asthma incidences where they are most common.[29] In San Francisco, a health impact assessment by the city's Department of Public Health found that standard energy efficiency upgrades of the city's housing stock would reduce deaths caused by fine particle pollution by four percent. When energy efficiency improvements included ventilation and filtration systems, the number rose dramatically to a reduction of 43–55 percent.[30]

Occupants of energy-efficient buildings benefit from superior comfort and better health and well-being, translating into higher productivity and lower absenteeism. Even small improvements in productivity and health-related costs can mean huge benefits for businesses—for whom the vast majority of expenses are employee salaries and benefits. Many energy efficiency measures such as improved ventilation, expanded daylighting, and improved lighting are associated with gains in occupant productivity. A meta-analysis by the World Green Building Council of productivity benefits experienced by occupants of high-performance buildings found that productivity increases by 23 percent from better lighting, 11 percent from better ventilation, and 3 percent from individual temperature control.[31]

---

[27] U.S. Department of Energy. "New York City Benchmarking and Transparency Policy Impact Evaluation Report." May 2015. http://energy.gov/sites/prod/files/2015/05/f22/DOE%20New%20York%20City%20Benchmarking%20snd%20Transparency%20Policy%20Impact%20Evaluation....pdf

[28] ULI Greenpoint Center for Building Performance and SF Environment. "San Francisco Existing Commercial Buildings Performance Report 2010-2014." http://www.sfenvironment.org/sites/default/files/fliers/files/sfe_gb_ecb_performancereport.pdf

[29] "New York City Local Law 84 Benchmarking Report." August 2012. http://www.nyc.gov/html/gbee/downloads/pdf/nyc_ll84_benchmarking_report_2012.pdf

[30] San Francisco Department of Public Health. "Saving Energy, Improving Health: Potential Impacts of Energy Efficiency Program Design on Noise and Air Pollution Exposure." May 2013. http://www.pewtrusts.org/en/~/media/assets/external-sites/health-impact-project/savingenergyimprovinghealth_finalhia.pdf

[31] World Green Building Council. "The Business Case for Green Building." 2013. http://www.worldgbc.org/files/1513/6608/0674/Business_Case_For_Green_Building_Report_WEB_2013-04-11.pdf

Conclusion

Energy benchmarking and transparency is proving to be a crucial policy tool for transforming the real estate market into one that properly values energy efficiency. As benchmarking and transparency policies have become more common, building owners, tenants, governments, and the public have gained an improved understanding of building energy use. This understanding has already resulted in significant energy reductions and the increasing demand for energy-efficient properties. As time goes on, U.S. jurisdictions with benchmarking and transparency policies in place will stand to benefit from the even greater economic and environmental benefits that will follow a fully functioning market for energy efficiency.

Acknowledgements

This report was prepared for the Pacific Coast Collaborative by Zachary Hart of the Institute for Market Transformation, December 2015.

The information, data, or work presented herein was funded in part by the Office of Energy Efficiency and Renewable Energy (EERE), U.S. Department of Energy, under Award Number DE-EE0006890.

About the Institute for Market Transformation (IMT)

The Institute for Market Transformation (IMT) is a Washington, DC-based nonprofit organization promoting energy efficiency, green building, and environmental protection in the United States and abroad. IMT's work addresses market failures that inhibit investment in energy efficiency and sustainability in the building sector. For more information, visit imt.org.

About the Pacific Coast Collaborative

The Pacific Coast Collaborative (PCC) was launched in 2008 to set a cooperative direction in key policy areas of mutual interest among North America's West Coast jurisdictions. In 2013, the Governors of California, Oregon, and Washington and the Premier of British Columbia announced the Pacific Coast Action Plan on Climate and Energy as an initiative of the PCC, outlining a set of shared goals for reducing carbon emissions and building a clean energy economy on the West Coast. With a population of 54 million people and an economy that is the 5th largest in the world, the West Coast jurisdictions that compose the PCC are demonstrating that transitioning to a low-carbon economy can create jobs and support robust economic growth. For more information, visit www.pacificcoastcollaborative.org.

Disclaimer

completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

The information, data, or work presented herein was produced in collaboration with the Pacific Coast Collaborative. The views and opinions of authors expressed herein do not necessarily state or reflect the Pacific Coast Collaborative's endorsement of specific policies or programs.