CHAPTER 11

Driving Investment in High-Performance Commercial Buildings

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1 Driving Investment

In 2007, the US Congress defined high-performance buildings as ones which "integrate and optimize all major high performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations."[1] In recent years the attributes have organically expanded to include resiliency and incorporate the experience of building occupants. While there are numerous mechanisms (policy, rating systems, codes, standards, and design guidelines) to define high performance, as shown in Fig. 11.1 from Legrand's June 1, 2016, white paper on High-Performance

[1] https://www.nibs.org/?page=hpbc.

(Adapted from "High-Performance Buildings—Value, Messaging, Financial, and Policy Mechanism" by MJ McCabe, for the US Department of Energy and the Pacific Northwest National Laboratory, February 2011, PNNL-20176 http://www.pnl.gov/main/publications/external/technical_reports/PNNL-20176.pdf)

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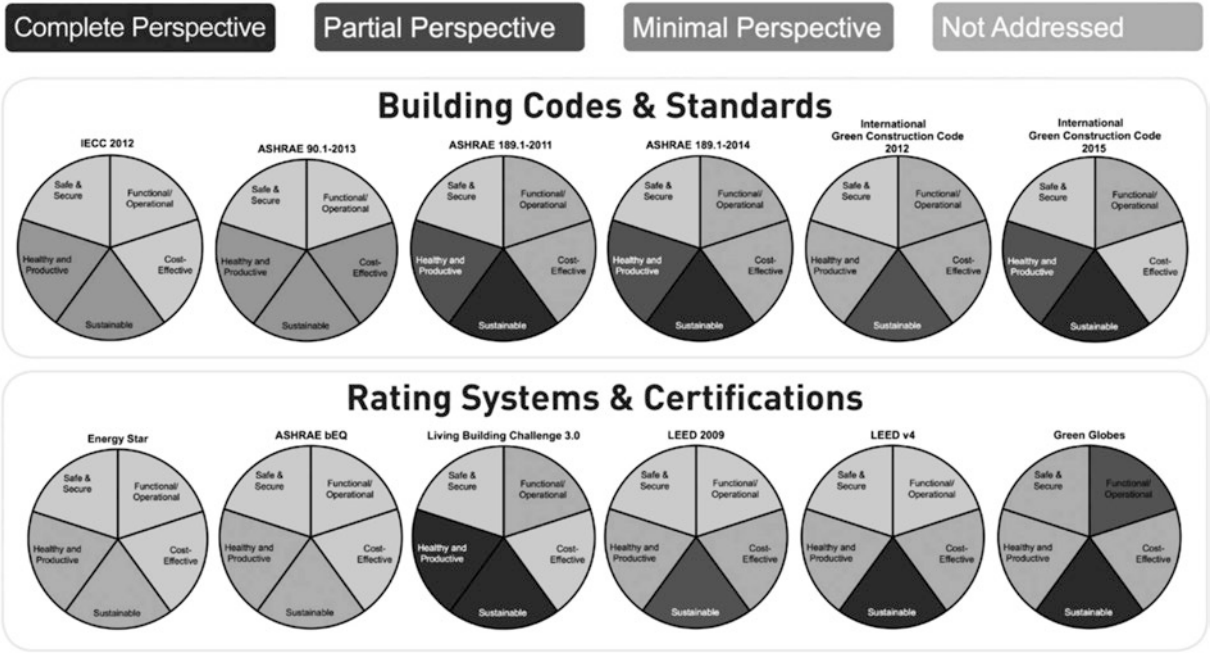

Fig. 11.1 The High Performance Building (HPB) landscape: How comprehensively do performance mechanisms address the full scope of HPB attributes? (Based on Legrand's June 1, 2016, white paper on High-Performance Buildings. In particular, Legrand assessed the degree to which each mechanism addresses these attributes: (1) sustainable, (2) healthy and productive, (3) safe and secure, (4) functional/operational, and (5) cost-effective.)

Buildings,[2] no one encompasses the full range of variables, and there is no definitive determination as to when a building has passed the threshold into "high performance." That said, mechanisms such as Leadership in Energy and Environmental Design (LEED) v4, The Living Building Challenge, The WELL Standard, EnergyStar, code changes, and energy disclosures provide benchmarks and a clear roadmap for property owners and investors. In the context of this chapter, high performance is defined as the optimization and integration of building systems (e.g., energy and water efficiency), leveraging technology and human behavior and the buildings' ability to enhance the well-being of its occupants.

In an environment where concepts such as *green*, *sustainable*, and *high performance* seem to be in the forefront, many property owners and investors have not jumped on the bandwagon. We continue to face challenges in financing such projects. Despite the available technology and the sheer amount of information on hand, actual investment in high-performance building, particularly in the US, continues to lag expectations. Why?

Despite many studies to the contrary, for many, the perceived market risks of deep energy and water efficiency and other high-performance features outweigh any potential benefits.[3] Many in the commercial building sector continue to believe that there is a significant cost premium associated with the design and construction of high-performance buildings, deep efficiency is difficult to attain, retrofits are disruptive to occupants, and cost premiums are not recovered when the buildings are sold or leased.

How do we change this perspective and get a wide array of building owners, investors, and lenders, not only engaged but excited about high-performing buildings and motivated to modify investment strategies, deploy capital, and upgrade operations and maintenance (O&M) to achieve significant resource efficiency? The short answer—it's got to make economic sense and be readily financeable. We must quantify the outcomes, both environmental and economic, and demonstrate high-performance elements are a sound investment opportunity.

This chapter is centered on the financial impact to the property and/or portfolio, specifically risk and return. The allocation of capital and financing remain critical components in deploying the necessary technology and are significant impediments to seeing substantial investment in

[2] http://go.legrand.us/hpb-whitepaper

[3] Updated and adapted from the US Department of Energy (DOE) Building Technologies Program (BTP) *Commercial Buildings Integration Multi-Year Program Plan FY 2010–2015 Opportunities and Gaps*, excerpt on Financing.

high-performance attributes. Hurdles can be pivotal and include a lack of data, first cost, capital versus operating budgets, risk exposure, the low ratio of energy costs to total operating expenses, high transaction costs, discount factor issues, and the inadequacy of traditional financing underwriting and mechanisms for energy efficiency projects. Further complicating investment decisions are the large number of small- to mid-sized buildings, wide geographic dispersion, and varying regional incentives. While some companies and property owners see the value of energy efficiency and choose to finance projects from their own budgets/accounts, others look at their available capital and make a different choice. The decision to invest is not necessarily tied to the decision to seek outside financing.

High-performing buildings are a hedge against future risks such as competitive obsolescence, energy price volatility, resource availability, and pending regulatory changes.[4] There is an increasing recognition of a link between higher-performing buildings and health of occupants and the corresponding impact on risk/return and value.[5] Ultimately, there is a need to assist property owners, investors, and lenders in evaluating the true risks associated with a given property in concert with the opportunities for return. Overall, high-performing properties save money—money that will increase net operating income and consequently the value of the property.

1.1 Value Analysis

The factors that go into making the decision to invest in a specific sustainable property or high-performance measures are inherently no different than looking at any other property type or capital investment. However, what is different is that the assessment needs to take into account the net impact of all costs and benefits related to the high-performance attributes after synergies and risk mitigation measures are considered. Sustainability-related development or retrofit costs might be higher than conventional properties due to costs related to a number of items, including energy modeling and commissioning. Further, in some markets, lack of an integrated design and construction team along with a limited availability of

[4] Energy consumption benchmarking and disclosure mandates exist in 24 cities across North America, 2 states, and 1 province, covering approximately 10.7 billion, s.f. (*www.buildingrating.org*). All enacted since 2008.

[5] Associations of Cognitive Function Scores with Carbon Dioxide, Ventilation, and Volatile Organic Compound Exposures in Office Workers: A Controlled Exposure Study of Green and Conventional Office Environments https://ehp.niehs.nih.gov/wp-content/uploads/124/6/ehp.1510037.alt.pdf

products and materials can increase costs. New modes of operation require a learning curve to get everyone from the contractor through the maintenance team up to speed. These costs can be offset through integrated operational systems as well as utility and governmental rebates and incentives.

Looking at the long-term operational aspects of the property means evaluating the resource use and potential cost reductions resulting from the efficiency measures. Putting the inherent challenges of accurate energy modeling aside, energy forecasts can be difficult—energy price volatility, changing weather, use type, and occupancy factors all impact the quality of the estimate and say nothing about the ongoing durability of the savings. Rigorous monitoring and verification along with robust commissioning, staff and tenant education and training, and an alignment of performance measurements can mitigate this risk.

The financial performance of a property is determined by a number of inputs including rent, occupancy, tenant renewals, operating costs, insurance, and a market estimation of the risk of the property investment (discount rate). The relative impact of each of these factors is critical to the overall analysis. For example, rent and revenue-related components would have a more significant impact than operating expenses. However, high-performance attributes that reduce operating expenses have a twofold impact. First, even small reductions in energy, water, and maintenance costs add up and increase net operating income. Second, persistent reductions in those same expenses reduce the operating risk of the property and can have a large impact on the discount rate and resulting value. Further, this limited look does not take into consideration the potential market value of future proofing against regulatory changes or increased marketability due to sustainable attributes.

A reasonable reduction in energy use and accordingly, operating expenses can be much easier to achieve than increased rents and still have a substantive impact on value. One way to analyze the impact is to use a discounted cash flow (DCF) model over a ten-year horizon. (The DCF is the most likely analysis tool for commercial property investors.) By using a DCF, the investor is able to compare, over time, the relative value of the reduced expenses to the annual cash flow and to the ultimate value of the property. Thus a modest reduction in energy efficiency—say 20% or 30%, which can be fairly easily achieved through simple and low-cost improvements—can yield a substantial return equivalent to increases in rent, which may be far more difficult to obtain. A simple proxy for the impact of these efficiencies on the value of the property is to capitalize ("cap") the annual net operating income of a property before and after an efficiency retrofit. Let us look at an example of a 50,000-square-foot office building before and after a retrofit

that yields a 30% reduction in energy costs. In this example a reduction in electricity alone results in reduced operating expenses and an increase in Net Operating Income (NOI) (and cash flow) over $21,000. Using a 6% cap rate, this savings increases the value of the building by just over $350,000.

Box 1

Hypothetical Office Building 50,000 s.f.	**Base Case**	**30% reduction in energy cost**
Revenues		
Rent	$1,875,000	$1,875,000
Less: 10% vacancy	-$187,500	-$187,500
Effective Gross Revenue	$1,687,500	$1,687,500
Operating Expenses		
Cleaning/Janitorial	-$49,613	-$49,613
Maintenance	-$50,794	-$50,794
Utilities		
Electricity	-$70,875	-$49,613
Water & other	-$64,969	-$64,969
Adminstrative/Insurance	-$106,313	-$106,313
Real Estate Taxes	-$248,063	-$248,063
Total Operating Expenses	-$590,625	-$569,363
Net Operating Income	$1,096,875	$1,118,138
Annual Cash Flow Savings		**$21,263**
Value (NOI/cap rate*)	$18,281,250	$18,635,625
Value Difference		**$354,375**

*Assumes capitalization rate of 6%.
A quick way to estimate a property's value is to "cap" (i.e., apply a "cap rate") its net operating income. The capitalization rate ("cap rate") is the percentage number used to determine the current value of a property based on estimated future operating income. Net operating income divided by property value = the cap rate. The higher the cap rate, the greater risk the investor perceives with the property returns.

2 Challenges

Studies, such as those conducted by the World Business Council for Sustainable Development (WBCSD) and McKinsey & Company, show that vast reductions in resource use are possible, even in the face of an increasing absolute number of buildings (Granade et al., 2009; WBCSD, 2009). However, this is clearly not happening on a wide-scale basis. Why are we not deploying that which we know we have the technology to accomplish and that makes sense to deploy? The obstacles to achieving this level of performance and efficiency in the building sector take many forms, many of which derive directly from the investment side of the equation:

- first costs and short-term investment horizons
- inadequate awareness of and interest in efficiency including risks associated with the impact of future regulation and energy prices
- low priority of energy issues as compared to other factors (such as tenancy, rental income, short-term returns on investment, competing capital needs)
- difficulty in "seeing" actual energy usage or its costs in real time
- practical limitations on obtaining a complete picture of energy consumption for the entire building (i.e., lack of sub metering, lack of access to tenant data, "ownership" of energy consumption data)
- cultural inertia driven by standard practices in design, construction, and operation that enable inefficient energy use and equipment applications over the building life
- financial transaction costs that create agency issues, inherent conflicts between stakeholders; for example
  - utility incentives that reward kilowatt-hours used instead of kilowatt-hours saved
  - financial structures and investment horizons that typically do not go beyond 3–5 years and consequently do not accommodate the longer-term payback (>3 years and frequently much longer) often needed to reach deep efficiency[6]

[6] In reality, this may not be as substantial a hurdle as it appears on the surface. The issue really drives toward the nature and depth of the improvements. Amory Lovins has posited that when you reach significant efficiency, you "tunnel through the cost barrier," whereby "when designed as whole systems, the superefficient [building] can often cost less than the

  - principal-agent problems (the split-incentive), such as a difference between who pays for the investment and who benefits from the performance
  - who pays the costs of getting people up the learning curve—upfront training and education
  - societal benefits that do not translate into individual owner benefits
- operational and budgetary fragmentation that divides the analysis and decision-making regarding capital investments from operating costs
- shortage of skilled service providers
- regional differences that require capacity building among building professionals
- the imprecision of energy modeling as a tool—actual results often do not meet the modeled results, leading to skepticism about efficiency outcomes.
- inadequate persistence and performance of efficiency measures
- limited historical, comprehensive, and reliable financial data on investment returns for high-performance components.

2.1 Short-Term Focus and Unaligned Solutions

In 2007, the Swedish utility company Vattenfall AB and the consulting firm McKinsey published a very influential study comparing the greenhouse gas abatement potentials of various strategies and technologies to their respective costs, including those in the transportation, industrial, and building sectors. In January 2009, McKinsey updated this widely circulated and heavily discussed analysis (McKinsey & Co., 2009). The

original, unimproved version" (Hawken, Lovins, & Lovins, 2008, p. 114). Among others, property owners along with researchers at the New Buildings Institute have confirmed that their research and pilot projects support this conclusion. However, this presumes a **holistic and whole-building approach and creative architects and engineers, incorporating tenant engagement**—not typical of today's construction or retrofit process. One of the key challenges in reaching this point is a limited design budget that incentivizes design professionals to use existing plans as the basis for new and retrofit projects, consequently limiting overall cost and a risk factor resulting from new modes of design (one engineer mentioned that the cost of his liability insurance increases if the design is not the tried and true standard). One way to enhance deep efficiency design could be by providing technical assistance to the design team.

analysis evaluates the potential magnitude of savings in carbon dioxide (CO_2) emissions versus cost of each abatement measure. Many of the positively correlated strategies include a variety of "cost-effective" building-related changes—lighting, insulation, and retrofitted Heating, Ventilation and Air Conditioning (HVAC) systems. The report implies that future energy savings could potentially pay for the upfront costs. The International Energy Agency's World Energy Outlook for 2016[7] notes "government policies, as well as cost reductions across the energy sector [will] enable a doubling of both renewables … and of improvements in energy efficiency over the next 25 years." There are clear winners—natural gas, wind, and solar. However, the future of global energy production remains to be written. Government policies across the globe will determine where we head and under what time frame.

However, as the McKinsey authors point out, it is one thing to have significant potential and another thing entirely to implement the necessary changes. Massive behavior modification and major capital resources are required. Further, the benefits and the cost of abatement are calculated from a societal perspective rather than from an individual investor point of view. Few property owners will invest their hard-earned dollars on a philanthropic basis simply for the public good, highlighting some of the challenges inherent in making broad assumptions on the ease of implementing the technology available today. As a building owner, it would be difficult to use McKinsey's data to make investment option decisions on an individual level. Hence, it is necessary to develop a full range of tools that can be deployed in concert to maximize performance for any given building.

Integrated solutions start with a whole-building (or even district-wide)[8] approach that incorporates advanced technology, ongoing commissioning, education, and training (operations staff and occupants), along with universally agreed-upon benchmarks, measurement standards, and mandated improvements in efficiency. When supported by financial incentives, modified lease structures, and cost/benefit-sharing that align stakeholder interests, these integrated solutions result in more rapid deployment of measures and in meaningful and persistent performance, thereby facilitating investment decisions.

[7] http://www.iea.org/newsroom/news/2016/november/world-energy-outlook-2016.html

[8] www.buildingrenewal.org; IEA. *Transition to Sustainable Buildings- Strategies and Opportunities to 2050.* 2013 https://www.iea.org/publications/freepublications/publication/transition-to-sustainable-buildings.html

2.2 *Stakeholder Diversity and Market Fragmentation*

First, we need to define the audience. There are various categories and subcategories of commercial real estate owners and investors. Owner/users are those who use buildings to house their own employees to meet their own business needs—these may be corporate, institutional, or government entities. Then there is a broad category of "real estate investors"—institutional, private, core, opportunistic, large, and small—each with differing motivations, experience, and capacity.

According to the 2012 Commercial Building Energy Consumption Survey[9] Energy Information Administration (EIA), 2016), only 6% of commercial buildings are larger than 50,000 square feet. These large properties account for more than 50% of the total space by square footage and are generally owned by institutional investors. The vast majority, 72%, of the total number of commercial buildings in the US are 10,000 square feet or less. These figures reflect a highly fragmented ownership market.

Generally speaking, some of the more difficult groups to interest in deep efficiency are polar opposites—on one hand, the smaller, less well-capitalized investors, lacking in expertise and capacity, and on the other, large aggregated pools of funds whose institutional owners have allocated a portion of their investment monies to asset managers and investment advisors in the real estate sector. These large portfolio owners are focused primarily on the real estate return compared to the return on their other investments. They typically only look at investments with a discrete payback period of three years or less. Fortunately, within the institutional and private capital group, there is an increasingly large subset of investors who do understand the benefits of high performance and efficiency and have been doing a good job maintaining and upgrading their properties. Many of these have embraced high-performance attributes particularly in new construction. On their existing properties, they make capital improvements when the timing is right (i.e., when equipment has reached the end of its useful life or a retrofit is necessary) and actively manage their buildings to maximize operational efficiency. They track their performance through Green Real Estate Benchmark (GRESB), GreenPrint, and EnergyStar and report out to their investors. These firms are forward thinking, have weathered the real estate cycles fairly well, and have positive and long-standing relationships with tenants. They often will look

[9] https://www.eia.gov/consumption/commercial/

toward utility and government incentives and rebates to offset the costs of efficiency improvements.[10]

Then there are investors who may be interested in efficiency but who do not have ready access to capital. Either they are too small or their real estate exposure is in less desirable markets, capital availability is more limited and contractor expertise and capacity is lacking. Finally, there are those smaller owners and investors who have never considered energy efficiency or high-performance attributes and for whom the issue is a low priority. There are other investor-related participants, such as tenants, lenders, real estate brokers, and rating agencies, each of which have a stake in a property's performance and returns and have significant influence on the owner/investor's decision.

3 Building the Tools and Measures

Moving from talk into meaningful action means increasing investment in deep energy savings[11] (e.g., 30–50% in the US, >75% in the European Union (EU) as compared to current state), not simply going after the "low-hanging fruit." Emerging ideas and solutions thus far are clustered around education and information transparency; codes, standards, and policies; and incentives and financing mechanisms. Crucial in ensuring ongoing success are measurement, verification, transparency, and ongoing monitoring and active management.

Cities such as New York, San Francisco, and Seattle are leading the way on benchmarking and transparency. In 2007, California approved legislation that required benchmarking and limited disclosure as of 2010. In 2008, the District of Columbia went further and required phased-in public disclosure, also starting in 2010. And in what has been called the most sweeping commercial building energy efficiency legislation, New York City passed the Greener, Greater Buildings Plan[12] in December 2009. The legislation increases energy efficiency requirements for renovations and requires most properties to undergo energy use audits and retrocommissioning[13] every ten years. The audit process will identify

[10] http://www.dsireusa.org

[11] http://www.gbpn.org/sites/default/files/08.DR_TechRep.low_.pdf

[12] http://www.nyc.gov/html/planyc2030/html/plan/buildings_plan.shtml

[13] Retro commissioning involves retuning measures that ensure building systems are operating efficiently.

capital improvements that will pay for themselves in a "reasonable" period. Perhaps most significant is the requirement that all commercial buildings greater than 50,000 square feet benchmark and publicly report their energy use. The city of Seattle followed suit in January 2010. Since then a total of 24 cities, 2 states, and 1 province have passed building rating and/or disclosure laws.[14]

3.1 Market Linkage

There is a need to link high performance and energy efficiency to the value of the property beyond that which can be achieved in operating savings. In the private-sector, efforts to capture these data are centered on linkages between properties that achieve certain levels of Energy Star and LEED ratings and their corresponding rent and sale values. According to a recent study by Dodge Analytics, building owners report that green buildings—whether new or renovated—command a 7% increase in asset value over traditional buildings.[15] This and other reports provide some compelling directional data but are still limited in the size and scope of their results. The US Green Building Council (USGBC) now requires submittal of performance data on properties that receive LEED certification. CoStar, a firm that collects real estate information on the sales and lease rates for commercial properties, has added a screen to its database that includes a check for properties rated as LEED or Energy Star.[16] The CoStar database notes if a property has received a designation but does not collect data related to property performance. As of April 2017, there were 37,300 LEED-certified projects[17] and as of year-end 2015 around 29,700 Energy Star-labeled buildings,[18] which compare to the EIA 2012 estimate of 5.5 million commercial buildings nationally. Clearly, these still account for only a small proportion of properties.

[14] http://www.imt.org/resources/detail/map-u.s.-building-benchmarking-policies, Retrieved May, 2017.

[15] The World Green Building Trends 2016 SmartMarket Report http://www.saint-gobain.co.uk/media/18079/world-green-building-trends-2016f_europe.pdf

[16] www.costar.com. www.costar.com

[17] http://www.usgbc.org/articles/usgbc-statistics

[18] https://www.energystar.gov/buildings/about-us/facts-and-stats

3.2 Validating Energy Efficiency

Supporting efforts to develop more accurate methods of verifying energy use provides clarity around efficiency results and allows private-sector capital to finance improvements. A nationally agreed-upon standard for determining energy baseline, measurement, and verification, akin to ISO 50001[19] and that targets protocols aimed at ensuring strong persistence of savings, also would help. Certainty around actual energy performance and savings requires increased focus on analytic tools that allow for accurate measurement and transparency of information.

Two equally important elements play a role here—metering and operations. Simply getting the design "right" is not enough. There must be measurable performance standards to confirm that the building works and to allow benchmarking against other buildings. The building must be operated and maintained, discrepancies immediately reported and fixed, over its whole life if we are to achieve persistent and meaningful energy efficiency.

Critical in defining which mechanisms are most practically applicable in a given region or for a specific property type are the characteristics of the building stock:

- Who are the major property owners (government, owner/user, long-term or short-term investors)?
- What percentage is leased versus owned?
- What are typical lease structures and terms?
- What is the energy makeup in a specific region in the country, and how expensive is it?
- And how much capacity building (of engineers, contractors, builders, architects) is necessary?
- Some mechanisms will be more successful in urban office building markets and some in rural retail, some in the investor markets, and others with corporate owner/users.

[19] International Organization for Standardization (ISO) International Standard 50,001. https://www.iso.org/iso-50001-energy-management.html

3.3 Tools

To monetize energy savings, the savings must be bankable. To be bankable, the investment community must believe in the level of efficiency and that it will be persistent over time, or else they will not invest in or finance the improvements. The notion of savings is predicated on the credibility and credence of a valid baseline. To achieve legitimacy, we need to:

- understand and agree on the baseline;
- validate the baseline, prove out the energy models, via measurement and verification;
- track efficiency over time; monitoring and verification equate to transparency; and
- proactively manage efficiency measures through robust operations and maintenance protocols (O&M).

Tools that facilitate this level of transparency, increase awareness, reduce risk by alleviating uncertainty, and set standards upon which appropriate benchmarks may be based by property type and region. Monitoring and verification, ongoing commissioning, and robust maintenance are critical. Through metering and response, they provide both feedback and transparency and enable persistent efficiency, increasing stability and continuity, and reducing uncertainty over time. These in turn give comfort to tenants, owners, and investors that the savings are achievable and credible and allow for the efficiency to be monetized and the benefits allocated.

3.3.1 Industry Consensus Metrics, Third-Party Standards, and Reporting

Industry consensus metrics verified by a credible third party will ensure transparency and enable sustainability value to be incorporated into value and financing decisions. There is presently no universal benchmark system. The real estate industry in the US has embraced Energy Star, but additional work is necessary to enhance and create standards that meet all property types and allow for local, national, and global comparison.

3.3.2 Access to Real-Time Numbers

Providing the technology and the means to "see" and track the consumption metrics allows owners and tenants to modify activities in ways that avoid peak pricing use and allow for rapid deployment of maintenance staff to fine-tune systems and identify and address operational failures.

One means of increasing the visibility of energy use and transparency to building owners and occupants would be some type of "dashboard" akin to that on the Prius vehicle. Metering provides transparency to the owner, the tenant, the investor, and the lender.

3.3.3 Robust Operations and Maintenance

Ensure the persistence of the efficiency results through active and effective O&M protocol. Retrocommissioning, ongoing commissioning, and the means to correct problems as they arise are critical for durable results. Consistent feedback and correction ensures the property is operating at peak levels and enables investment and financing to proceed with greater assurance of returns.

3.3.4 Monetizing Energy Efficiency

There must be a market for energy efficiency through which efficiency measures can be monetized—such as carbon and/or energy efficiency trading, policies that place energy efficiency at the same level as energy supply, white certificates, or energy performance certificates (EPCs). This market is yet unproven and considered risky. An agreed-upon baseline methodology to measure energy use and a means to consistently track performance are required. A greater amount of certainty and transparency is needed before private actors will be willing to engage further. *Investors, owners, tenants, brokers, and appraisers are pivotal to the market's development.* Through its EPCs, whereby property owners are required to measure and disclose energy use of their buildings to potential purchasers and tenants, the EU is poised to make significant progress.

3.3.5 Tenant Engagement

A key efficiency driver is a tenant who identifies high-performance attributes as a best practice. Increasingly, an investor's decision to integrate efficiency and/or high-performance attributes can be directly linked to tenant demand. The Urban Land Institute's Tenant Energy Optimization Program directly engages tenants by providing a returns-based approach via a ten-step process to integrate energy efficiency into space design and construction.[20] Tenants who have used the process have demonstrated substantial energy savings and positive returns. Once energy demand in tenant spaces is reduced, central systems can be replaced with smaller

[20] http://tenantenergy.uli.org

equipment, thus reducing first costs and the overall energy use of the building. However, the timing must be synchronized with existing business plans, capital improvement plans, and equipment replacement cycles to leverage the opportunity with the property owner.

Leases that allow the landlord and tenant to share in the efficiency gains can further enhance owner motivation. Without modification, many lease structures exacerbate what is often called the "split-incentive." "In many commercial lease structures, the party expending capital for an energy efficiency upgrade does not sufficiently benefit from the energy savings created by that upgrade. This occurs most frequently in leases where tenants pay for utilities but the landlord is wholly responsible for capital improvements, as is the case in many net leases. The split-incentive barrier is frequently cited by property owners as a key roadblock to energy efficiency projects."[21]

In a typical lease structure such as a Full Service Gross (FSG) lease, the landlord pays all capital improvements (including energy efficiency/high-performance upgrades) and the stated rent includes the operating expenses (including utilities) and taxes for the building. In this case, the landlord benefits from reduced operating costs, but the tenant does not, giving the tenant little incentive to modify behavior to enhance savings. In contrast, in a triple net lease (NNN), the landlord pays all capital expenses, and the tenant, in addition to rent, pays all expenses of the property, such as utilities, taxes, insurance. In this case, the tenant reaps any benefits of lower property expenses, giving the landlord little incentive to invest in the capital costs of efficiency measures that may be harder to recoup. A Modified Gross Lease muddles the incentives. In some cases the landlord reaps the benefits of the efficiency improvements and in other cases, the tenant does. Regardless, any lease can incorporate green provisions, which align the financial incentives of sustainability and/or energy measures between the landlord and tenant.

With reporting standards for energy efficiency leaning toward increased transparency, property owners who have benefited from utility pass-throughs through a Full Service Lease as an additional revenue source likely will see increasing pressure to modify their agreements. (Without recognition of this issue and care in drafting new lease structures, these property owners may resist efficiency measures and/or transparency.)

[21] What's in a Green Lease? Measuring the Potential Impact of Green Leases in the US Office Sector. Andrew Feierman, Institute for Market Transformation. May 2015.

The Green Lease Library[22] maintained by the Institute for Market Transformation is a useful compendium of tools and resources to aid in crafting appropriate lease language.

3.3.6 Public/Private Partnerships

To leverage private-sector participation, governments at all levels need to reach further to create mechanisms that enable more public/private partnerships, risk sharing, and certainty. By linking multiple components in one initiative, public-private partnerships offer strong opportunities to move the market rapidly. One example is the C40 Climate Leadership Group, a network of world's largest cities committed to addressing climate change by sharing best practices, peer to peer exchanges, and city-to-city collaboration. The C40 recently launched the Cities Finance Facility (CFF) to facilitate access to financial means for climate change mitigation and resilience projects in developing countries and emerging economies and has published several best-practices reports.[23] Other possibilities include loan guarantees/credit enhancement provided by a government entity to leverage private capital investment; requirements by government-sponsored enterprises (i.e., Fannie Mae/Freddie Mac), the US Department of Housing and Urban Development (HUD), rating agencies, financial institutions, and investors for energy efficiency certification; and municipalities and utilities offering fiscal incentives for the use of specific green products or reaching and maintaining specific efficiency benchmarks.

These types of partnerships tackle multiple hurdles and leverage the policy impact, driving larger and more sustainable changes.

3.4 Communication Strategies, Messaging, and Transparency

Communication strategies must be developed and tailored to investors, owners, managers, and tenants. Delivery must be made by trusted partners and industry leaders. Partnerships that leverage key industry organizations and stakeholders to deliver targeted education, training, and information around specific incentives, financing structures, and tools will

[22] http://www.greenleaselibrary.com/guidance.html

[23] http://www.c40.org/c40_research—*Urban Efficiency II: Seven Innovative City Programmes for Existing Building Energy Efficiency, February 16, 2017,* outlining the characteristics and impact of innovative city programs emerging across the C40 cities, and that advance operational energy efficiency and retrofitting in existing, privately owned buildings.

reach a far greater audience than through one medium or strictly from one entity. Messaging that educates and looks at high-performance attributes in the context of property operations and the real-life impact on occupants, operations, cash flow, and net operating income is effective—risk and return, health, and safety.

3.4.1 Messaging

A study by Attari, DeKay, Davidson, and Bruin de Bruin (2010) surveyed 505 individuals on their perceptions of energy consumption. Results showed participants consistently and substantially underestimated energy use and savings and believed that curtailment (turning lights off) was a more effective strategy than efficiency improvements (new light bulbs). The authors posit that the lack of focus on efficiency improvements was due to the fact that efficiency improvements involve research, effort, and out-of-pocket costs. Further, participants were unable to accurately estimate the magnitude of energy use across devices and activities.

Attari et al. (2010, p. 1) concluded "The serious deficiencies highlighted by these results suggest that well designed efforts to improve the public's understanding of energy use and savings could pay large dividends." The study suggests that understanding the knowledge gaps and misconceptions will enable credible and understandable messages to be crafted that can influence better-informed decisions.

The nonprofit Technology, Entertainment, and Design (TED, www.ted.com) is a great example of successful messaging that leads to action. The TED motto is "Ideas Worth Spreading." At its core is an annual conference featuring 18-minute talks by leading-edge thinkers and innovators on a variety of topics ranging from green energy to global social issues and culture. What makes it successful in spreading ideas broadly is that in addition to live participation, the talks are available online for free. The ideas are spread by word of mouth, via online videos, and through a variety of social networking tools, including blogs, tweets, and discussion groups. The talks showcase innovative ideas with the potential for far-reaching impact—the messages are successful because they link to individual values by making an emotional connection while providing information. The participants are directly engaged and act as influencers in bringing the concepts to a wider audience.

Information leads to awareness, and awareness leads to action. Messages and mechanisms that link multiple components are likely to have wider-ranging impact and be more durable and sustainable by bringing

together stakeholders for a common goal. Incorporating meaning that ties to a common goal encourages a viral component to messaging, which is critical to widespread adoption.

So, how can this be successfully applied to incentivizing property owners and investors to invest in high-performance measures?

1. Information must reach the investors most likely to take action and act as influencers.
2. Market research is necessary to better understand the demand patterns going forward. Creating transparency around performance metrics will strengthen both the desire to achieve high performance and facilitate investment by creating certainty around results.
3. Models, programs, and standards that facilitate benchmarking[24][25]and help firms identify and set efficiency targets will elevate awareness, enhance competition among properties, and increase investor confidence.
4. Incentives that incorporate both a carrot and a stick to move investors toward certain behaviors.
5. Communication strategies that influence companies and corporate leaders and dispel misinformation. Messaging that concretely links sustainability and high performance with risk and return will prove more impactful than broad concepts.

To scale, messaging must close the gap between the innovators/early adopters (15.5% the market) and the early majority (34%).[26] Bridging this

[24] The EPA Energy Star program and American National Standards Institute (ANSI)/American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)/Illuminating Engineering Society (IES)/US Green Building Council (USGBC) Standard 189.1–2014, Standard for the Design of High-Performance Green Buildings are good examples. Standard 189.1 is modeled after LEED. Like typical codes, it provides specific requirements for energy efficiency in buildings but extends to other "green building" considerations such as materials selection. The resulting building might look and behave much like a LEED-certified building but is not labeled as such.

[25] Performance Metrics for Commercial Buildings, 2010. Pacific Northwest National Laboratory and the National Renewable Energy Laboratory. These metrics include energy, water, indoor environmental quality, transportation, maintenance, and waste and recycling. http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-19830.pdf

[26] In *Diffusion of Innovations*, Everett Rogers outlines a study by Bruce Ryan and Neal Gross that provides a well-documented examination of the diffusion and spread of hybrid seed corn in Iowa in the 1930s. Rogers defines diffusion as "the process by which an innova-

gap brings the idea to the mass market. The innovators and early adopters are comfortable making gut decisions and utilizing an imperfect model. The early majority needs more proof—they want more evidence and will try something after the opinion leaders or respected members of the community have tried it. Messaging must link beyond the "what" (energy efficiency) and "how" (lighting, building orientation) to the "why" (the cause, purpose, or belief). This increases the level of confidence in the decision beyond the rational—"I think this is the right decision" and the gut—"this feels like the right decision" to one that incorporates both. "The decision both feels right and can be justified by facts and figures"—"I know this is the right decision" (Sinek, 2009). Few people make decisions solely on facts and figures. Their fundamental values such as security, freedom, and responsibility play into their decision significantly. Property owners and corporations also operate under fundamental values such as safety, responsibility, and reliability, respect for their workers and clients, innovation, and in increasingly more cases, environmental sustainability and community commitment (with the awareness that being a good corporate citizen engenders trust and ongoing corporate sustainability and profitability).

Messages that will resonate with investors will target two key areas—risk and return. Investments by their nature have some inherent risk—some deviation from expected returns—be it opportunity cost, risk of failure, risk of default, and lower return. An investment that yields a higher return than another is not necessarily better than the other. One needs to evaluate the overall risk associated with that return and the risk tolerance of the investor. In the case of a property owner, as we move toward an energy-conscious market, the risks associated with an inefficient building can be significant. These include regulatory risk, energy price risk,[27] energy availability and security, health and well-being of occupants, and competitive obsolescence (companies and buildings that are no longer as desirable as others—the perception of being behind the times/not cutting edge or lower performance; workers who look for "cutting-edge firms" and socially conscious firms; occupants/tenants who require sustainable properties).

tion is communicated through certain channels over time among the members of a social system" (Rogers, 2003, p. 6). The concept has been expanded by Malcolm Gladwell in *The Tipping Point* (Gladwell, 2002) and Simon Sinek in "How Great Leaders Inspire Action" (Sinek, 2009), a TEDx, Puget Sound, lecture filmed September 2009 available from http://www.ted.com/talks/lang/eng/simon_sinek_how_great_leaders_inspire_action.html (September 2010).

[27] Johnson Controls (2010b) reflects that property owners anticipate an average annual increase in energy prices of 7%.

3.4.2 Communication Strategies and Transparency

Communication strategies may subtly encourage transparency and raise the bar. Look at the results of car labeling and the Corporate Average Fuel Economy (CAFÉ) standards enacted after the 1973–1974 oil crisis.[28] The sticker is a visible announcement of a vehicle's fuel economy and allows for easy comparison between cars.

This concept is supported by a study done on Los Angeles County restaurants. In 1998, Los Angeles County introduced hygiene-quality grading cards that each restaurant was required to display in its window. As reported in Thaler and Sunstein (Thaler & Sunstein, 2008, p. 190), "[t]he researchers found that the grade cards caused the restaurant health inspection scores to improve, consumers' sensitivity to hygiene in restaurants to increase, and hospitalizations for food-borne illnesses to decrease."[29]

The two examples just presented highlight the positive implications inherent in transparency and reporting. From an energy perspective, this underpins reporting in the UK, which compels both commercial and residential property owners to provide EPCs to prospective buyers (and tenants). In addition, public buildings must post display energy certificates (DECs) of their energy usage.[30]

EPCs became compulsory on all commercial properties constructed, rented, or sold within the UK effective October 1, 2008. With the introduction of EPCs into the commercial sector, details of the energy efficiency and environmental impact of a rental property are made available to prospective tenants/buyers at the earliest opportunity. The energy certificate provides a rating of the energy efficiency and carbon emissions of a building from A to G, where A is very efficient and G is very inefficient. For rental property, an EPC is currently valid for ten years and can be reused as many times as required within that period. Landlords do not have to commission a new EPC each time a new tenancy starts, but they are required to provide a copy of the latest EPC to new tenants. Furthermore, although landlords are not obliged to make any of the changes suggested on the EPC, measures that could be taken to improve

[28] http://www.nhtsa.gov/cars/rules/cafe/overview.htm

[29] As reported in Thaler and Sunstein (Thaler & Sunstein, 2008, p. 190) who reviewed a 2003 paper by Ginger Zhe Jin and Philip Leslie.

[30] Available through the UK National Archives: http://webarchive.nationalarchives.gov.uk/+/http://www.communities.gov.uk/planningandbuilding/theenvironment/energyperformance/

the property's energy efficiency and environmental impact rating are highlighted. Public authorities with space greater than 1000 square meters (10,764 square feet) must display a valid EPC. As of 2013, listed (or historic) buildings are exempt.

Since 2007, all single-family homes in the UK and Wales require an energy rating before they can be sold.[31] EPCs are included in the Home Information Pack, which rates the home from A to G and lists efficiency measures the homeowner can take.

Linked with EPCs are *DECs*. DECs show up to three years of data on energy used in the building. They must be provided by an accredited assessor (appraiser) and must be displayed on the building.

Increasing awareness, communication strategies, transparency, and labeling are valuable components of an overall strategy to increase investment in high-performance buildings—but they are limited in scope. There also needs to be the means to deploy the improvements that lead to high-performance buildings. Financing is a means to that end.

4 Financial and Policy Mechanisms

4.1 Financing Mechanisms

Certain existing and potential financing and policy mechanisms, individually and in combination, if scaled, will help drive deployment of energy efficiency investment in the real estate sector (Table 11.1).

Beyond traditional government and utility incentives, several financing mechanisms are cropping up across the country. Some of the new and reformulated ideas include on-bill pay or on-bill financing (OBF), energy services companies (ESCOs) and energy services performance contracts (ESPCs), energy and efficiency services agreements (ESA), managed energy service agreements (MESA), energy efficiency power purchase agreements (PPAs), and property-assessed clean energy (PACE), all of which focus on the retrofit of existing buildings or renewables. Policy mechanisms include disclosure requirements, EPCs, minimum energy performance standards, renewable and energy efficiency certificates/credits (RECs), carbon offsets, cap and trade, or a carbon tax. On the market-driven front are carbon trading, emissions trading,[32]

[31] https://www.gov.uk/buy-sell-your-home/energy-performance-certificates

[32] https://icapcarbonaction.com/images/StatusReport2016/ICAP_Status_Report_2016_Online.pdf

Table 11.1 Available financing mechanisms

Type	*Mechanism*
Traditional	Loans • secured loans (mortgage/equipment) • unsecured loans Leases • operating • capital leases (equipment)
Specialized	On-bill financing (OBF) Property-assessed clean energy (PACE) Energy savings performance contracts (ESPCs)/energy services companies (ESCOs) Efficiency or energy services agreements (ESAs), managed energy services agreements (MESAs) Power purchase agreements (PPAs) Revolving loan funds Utility incentives, grants, and rebates
Innovative strategies	Modified lease structures Climate benefit districts Foundation investments Green loans/loan guarantees Tenant incentives
Government and policy supported	Government incentives, tax credits Energy performance labeling Energy performance standards Energy trading schemes (ETS) Energy efficiency trading scheme Voluntary carbon trading White certificates Clean development mechanisms

and even modified lease structures. In November 2016, Lawrence Berkeley National Lab published a comprehensive report detailing different financing mechanisms. The primary objective of their work was to provide state and local government decision-makers with information and tools to support various energy efficiency financing approaches. Though targeted at the public-sector, the information is useful for a wide variety of stakeholders.

Following Lawrence Berkeley National Laboratory's (LBNL's) lead, we'll distinguish here between "'traditional' financing products (e.g., loans and leases) that are commonly used to pay for energy efficiency as

well as many other goods and services, and 'specialized' products (e.g., PACE and on-bill financing products) that are specifically designed to support energy efficiency and other clean energy installations and to overcome market barriers."[33] Per the LBNL report, a 2015 study by Opinion Dynamics and Dunsky Energy Consulting suggest that traditional financing products, such as loans and leases, are still more widely used by customers that choose to finance projects.

Both Fannie Mae and the Department of HUD, through the Federal Housing Administration, have offered energy-efficient mortgages. Fannie Mae for example offers a suite of "green" financing products. These include lower pricing and greater proceeds (up to 5%) for multifamily properties that achieve certain green building certifications.

- Both equipment operating and capital leases are common in the private and public-sector. Capital leases are typically long term and for large items such as machinery. The lessee counts the asset on their balance sheet and can depreciate the asset. Similar to an installment sale contract. In an operating lease the lessor retains ownership of the asset and the lease cost is treated as operating expense. In this case, the lessor retains ownership of the leased asset and it does not appear on the lessee's balance sheet. While leases are used extensively in the private-sector for all kinds of equipment; there has not been significant use of leasing among private-sector customers in energy efficiency-focused programs. Leases specifically for funding energy efficiency measures have been targeted at public/institutional sector customers because they allow them to take on projects without exceeding debt limits or requiring difficult approval processes (e.g., public votes, legislative approval)

Several innovative ideas and specialized products have emerged to facilitate the movement of investment capital to the sector. The most promising of these financing structures aim to monetize energy efficiency, identify new types of collateral and means of ensuring repayment, and extend financing terms to address long payback periods.

[33] https://energy.gov/sites/prod/files/2017/05/f34/current-practices-efficiency-financing.pdf

- **PACE**: The PACE structure builds upon the common practice of special land assessment districts used for infrastructure improvements deemed to be in the public interest. PACE allows state and local governments to provide for energy efficiency and renewable energy improvements on private property, repaid through property tax bills. The structure requires each state to approve enabling legislation.

  The local government loans money to owners to make energy-efficient improvements or add renewable power to their property. To secure the loan, a lien is placed on the property in the form of an additional property tax assessment. Liens are repaid via an add-on to the property tax bill at an established rate of interest over a specific period, generally 20 years. The lien remains with the property, even upon sale, until fully repaid. As the PACE assessment attaches to the property, rather than the borrower, the lien sits in priority to the property's first mortgage. Consequently, this has raised concern with regulators and financial institutions, especially in the residential markets, about loan priority and collateral sufficiency. In the commercial markets, mortgage language typically requires lender consent when incurring new debt (which generally includes tax assessments) and they are notified when tax assessments are added to the property.
- **OBF** or On-bill Repayment (OBR): A utility company (or some other entity) finances the energy efficiency improvements. The property owner receives the benefit of the efficiency reduction in the form of a partial reduction in the monthly utility with the balance between the actual savings and the rate payment used to amortize the improvements plus interest. The obligation runs with the property, is attached to the utility bill, and would be passed along to subsequent purchasers. On-bill financing has been around in some form since the 1970s. Presently, at least 45 programs are active offering some sort of OBF to both their residential and commercial customers.[34]

  The benefits of OBF include a one-stop provider, vetted certified professional contractors, long-term financing, ease of repayment (through a regular billing cycle), and a lien that attaches to the property instead of to the borrower. Further, because both the local municipality and/or utility touch all members of the community, the program could be scaled. In the short run, the scalability of the model is hampered by a financial structure for utilities that disincen-

[34] ibid.

tivizes efficiency, the fragmented nature of the utility industry. In addition to federal regulations, each state has its own overarching requirements for utilities and many states have more than one regulated utility. Further, neither the utility nor the municipality has lending (or energy efficiency) as a core business. Consequently, a new core competency and protocol would need to be developed for success.

- **ESAs**: An ESA requires no upfront capital from the commercial property owner; third-party financing cover all project costs. The provider initiates and maintains the contractual relationship with the efficiency retrofit contractor and handles ongoing management of the systems. The client continues to pay the energy bill plus an energy services payment to the provider, who takes a fee for managing the process and repays the debt and equity. The combined net payment is intended to be equal to or less than the pre-retrofit energy cost. In a Managed Energy Services Agreement (MESA), the provider becomes a signer on the customer's utility account and takes over responsibility for paying the customer's utility bill. The client pays a predetermined bill to the MESA provider that incorporates an estimate of the utility expenses plus a provider fee.
- **ESPC**: ESPCs are typically provided by **ESCO**s that provide energy-efficiency–related and other value-added services to building owners and performance contracting is a core part of its business. ESCOs have been around since the late 1970s and early 1980s when energy prices spiked after the Arab oil embargo. Although a relatively young industry in the US, they have been around in Europe for about a century. They typically provide four main services: the development, installation, and arrangement of financing for energy efficiency improvements and then, through an ESPC, ongoing maintenance, operation, and a guarantee of energy savings. The cost of the improvements is paid from the savings generated by the efficiency.

  Through an ESPC, the ESCO "guarantees" the project will maintain a stipulated level of energy savings over a certain period—anywhere from 7 to 20 or even 25 years, based upon specific parameters such as load, usage patterns, hours of operation, and maintenance. The ESCO model has worked almost exclusively in the so-called MUSH (municipalities (state/local governments), universities, K-12 schools, and hospitals) market, which along with federal government clients, accounts for about 84% of total revenues for the ESCO

industry. In 2014, $4.1 billion in investment were made through ESPCs, with $3.9 billion in the public and institutional market and $171 million in the commercial and industrial market.[35]

Due to the nature of the financing structure, the applicability of the ESCO model is generally limited to an entity with a desire for outside financing, a high credit rating (generally investment grade), and planned continued ownership.

Anecdotally, private commercial property owners report a distrust of the energy savings purported to be achieved by the ESCOs as well as an unwillingness to "give away" excessive economic returns. As noted previously, the inability to maintain persistent energy efficiency over time is common. Most buildings and facilities exhibit the same basic limitations with respect to energy conservation and optimum maintenance.

US government studies show that due to the lack of ongoing commissioning and robust maintenance, building systems routinely fail to meet performance expectations, and these faults often go unnoticed over time. For example, a 2005 report released by the US Government Accountability Office (GAO) validates the concerns raised by private property owners. The study, which looked at federal ESPCs, suggested there might not be sufficient data to prove that the gains delivered by ESCOs were sustainable over time. The report further questions the practice of having ESCOs monitoring and validating the performance of their own projects (GAO, 2005).[36]

A LBNL report (Hopper, Goldman, Gilligan, Singer, & Birr, 2007) shows that residential and public housing markets together account for only 5% of industry revenues and are targeted by only a handful of ESCOs. Due to high transaction costs and institutional barriers in the case of public housing, these remain a niche market for ESCOs. In small-size properties, the energy cost savings are generally not significant enough to offset the transaction costs inherent in implementing performance-based contracts.

[35] Deason, Leventis, Goldman, & Carvallo, 2016

[36] The Office of the Under Secretary of Defense for Technology, Acquisition, and Logistics agreed with the GAO findings, stating "Although these complicated contracts are structured to ensure that savings will exceed costs," and further, "we recognize that our measurement and verification procedures must be improved to confirm estimates with actual data."

The core market in which the ESCO business model has been most successful is in energy efficiency retrofits to large buildings owned primarily by institutional clients. There is increasing interest in energy efficiency and clean energy among municipal governments that are pursuing sustainable energy and/or climate change initiatives. There are untapped opportunities in both the residential and commercial markets that will require some sort of aggregation of small projects to reduce the transaction costs.

In addition to providing financing, an ESCO provides energy audits, recommendations, and performance contracting as a core part of the business. The majority of the market is driven by federal, state, local, university, and educational projects. Barriers in the typical commercial and/or residential real estate markets include the high transaction costs per project, credit-worthy borrowers (single-family residential and/or multifamily, along with single-asset partnerships and an expectation of nonrecourse debt) and an inability to adequately secure the loans (collateral and first mortgage-holder challenges). From the borrower/property owner perspective, ESCOs are not always viewed as being transparent. The ESCO industry is dominated by product manufacturers who combine the energy audit with purchase recommendations and ultimately sell their products to meet the needs identified through the audit—potentially an inherent conflict of interest.

- **PPA:** In simplest terms, a PPA is a legal contract between an electricity generator and a purchaser of energy or capacity (power or ancillary services). Prologis, a large real estate investment trust of warehouse space, has entered into several of these types of contracts in the US (Southern California, Virginia, Oregon), Japan, and the EU (Spain, Germany, France, Italy, UK) through feed-in tariff laws that promote investment in renewable energy. Under the EU feed-in tariff laws, regional or national utilities are obligated to purchase renewable energy at rates set by the government based on the cost of the generating the renewable power. The Prologis properties have incorporated solar panels onto their rooftops (typically flat, industrial properties) and have entered into 20- to 25-year agreements to sell energy back to the utility grid. In the case of the Southern California property, the sales price to the utility is based on the amount of energy produced by the rooftop. The properties are metered and send a bill to the utility on a monthly basis. Prologis reports that

between 2007 and 2016, they installed solar on 95 rooftops in 8 countries and generated 140 megawatts of solar energy, enough to power nearly 23,000 homes. The company's goal is to generate 200 megawatts of solar power by 2020.[37]

- **Revolving Loan Funds:** *Revolving loan funds* deploy public-sector capital to meet needs that contribute to the public good. They are applicable to commercial, residential, and neighborhood buildings. Generally speaking, these funds supplement private capital in areas where private capital is less available. A revolving loan program (similar to a community development block grant) lends money and earns a return on their capital. As loan funds are repaid, the principal and interest are added back into the fund and become available for future projects. These funds also can be used in conjunction with private-sector capital to leverage project financing.

  One such municipality currently using this tool to combat climate change and encourage energy efficiency is the Toronto Atmospheric Fund (TAF).[38] Originally endowed by public funds in 1992, TAF, which is run by an agency of the City of Toronto, has innovated a program called the Green Condo Loan and Towerwise (both targeted at high-rise apartments and condominiums) whereby efficiency loans are made to the condo association for the building efficiency measures and repaid by the residents/owners via their energy bill savings. The TAF developed a loan concept, the energy retrofit STEP Loan, which facilitates deep efficiency. The STEP Loan is essentially three loans rolled into one: a short-term loan covering fast payback items (like lighting); a medium term-loan for items with a mid-term payback (e.g., HVAC equipment); and a long-term loan for items with long paybacks (e.g., cladding).

4.2 Barriers

The applicability of each mechanism depends not only on the property type but also on regional context and existing market structures. Currently,

[37] https://americas.uli.org/uli-connect/solar-energy-commercial-real-estate-navigating-opportunities-risks/

[38] http://www.toronto.ca/taf/ and http://www.toronto.ca/taf/pdf/leveraging-leadership.pdf and www.towerwise.ca

the most prevalent are incentives, grants, and rebates, and conventional loans for those who can qualify. These structures limit the amount and depth of efficiency that can be achieved. Beyond federal inducements, regional incentive structures, amounts, and requirements vary across the country, making it difficult for portfolio owners to implement a strategy that scales across their assets. For portfolio owners, transaction costs associated with meeting individual program requirements for a single asset can offset the benefits associated with retrofit rebates.

Hurdles posed on the financial side can be pivotal. They include lack of data, first cost, capital versus operating budgets, risk exposure, the low ratio of energy costs to total operating expenses, high transaction costs, discount factor issues, and the inadequacy of traditional financing mechanisms for energy efficiency projects, as follows:

- Most financial institutions are accustomed to an asset-based lending structure and are not equipped to view cash flow generated from energy efficiency as an asset that can be monetized or used as credit enhancement.
- Identifying the means to collateralize the financing of improvements has been challenging (as illustrated by the current issues with PACE[39] financing). One option is to take the equipment (or efficiency features) as collateral. Difficulties with holding the equipment or improvements as collateral are threefold:
  - First, the property owners (at least in the commercial markets) have a contractual obligation with their tenants to provide a specific level of comfort and safety in the building. Hence, they want to maintain control of systems.
  - Second, any improvements would, by their nature, be affixed to the building (e.g., windows, chillers). As a consequence, they become *real property* as defined by law. This compares to furniture, fixtures, and equipment, which are considered personal property, not integral to the operations of the building, and which

[39] Property-assessed clean energy (PACE) provides for energy investments to be financed and collateralized through a property tax lien, which has, from the mortgage lenders' perspective, raised issues of priority in collecting debt. Updates on PACE are available from http://pacenation.us

can have a Uniform Commercial Code (UCC) filing[40] placed on it. Clearly, in the event of a default, it would be impractical to remove many of the efficiency improvements (e.g., consider windows).
  - Third, mortgage holders take a blanket lien on the real property. They need to ensure the property is able to perform as intended, both while owned by their borrower and in the event of a foreclosure. Consequently, they are not willing to allow anyone else to have a claim on assets that are necessary to keep the building operational.
- In the case of energy per se, there are ordinances related to safety and security that are dictated by local laws.
- Financing periods are generally short (less than ten years), and interest rates can be high.

Financing remains a critical component in deploying the necessary technology and is a significant hurdle, even if in some cases only a psychological one, to seeing substantial investment in high-performance attributes. A concerted approach to facilitating these mechanisms is necessary. Research shows no single response will meet all needs, there are significant barriers and competing interests, public/private partnerships add value, the solutions must be contextual, a value must be put on energy usage, and government has a significant role to play.

5 The Path Forward

To support and encourage investment in and deployment of high-performance measures in all building classes, both quickly and at scale, we need to engage real estate professionals on the basis of financial returns over the holding period of the property and include a wide variety of inputs beyond energy or resource cost. The following criteria must be addressed:

[40] A Uniform Commercial Code (UCC) filing is made under the UCC and is a lien placed upon a business or the assets of a business and registered with the state in which the business is located.

- value proposition that articulates the link between efficiency and returns;
- leadership modeled and best practices publicized;
- clear action steps that set the framework for success;
- transparency and certainty around energy use and efficiency performance;
- persistence of high-performance measures over time;
- education/training tailored for key stakeholders such as occupants, operators, and investors;
- investment/financing which values high-performance and efficiency as a *bankable* asset; and
- ease and simplicity of solutions that make adoption of high-performance measures effortless.

Many of these needs identified (Table 11.2) can be addressed by individual actors alone, or in partnership to promote investments in high-performance buildings. These efforts include:

- Facilitate (and publicize) pilot projects between property owners, utilities, and financing sources.
- Develop a set of consistent, agreed-upon standardized metrics and valuation methodology so that properties can be evaluated across the sector allowing for comparison between assets and enhancing uniform lending and investment strategies.
- Partnerships between industry organizations to present tailored and targeted training for major stakeholder groups, such as the Building Owners and Managers Association (BOMA), Urban Land Institute, Institute of Real Estate Managers, National Association of State Energy Officials, and the American Bankers Association.
- Develop databases to collect and widely disseminate meaningful performance and valuation data on high-performance buildings, allowing real estate professionals to compare properties more effectively and ultimately allowing for data to be standardized, risk analyzed, and financial market mechanisms crafted.
- Evaluate the correlation between the default rate on property mortgages and incremental increases in energy prices, to enable investors, owners, financiers, and tenants to evaluate the potential for risk reduction associated with persistent high-efficiency performance.

6 Conclusion

While we have the technology to achieve increased efficiency, we must tie efficiency and high performance to the real risk, return, and value impact in order to facilitate meaningful action. Deployment must incorporate a multidisciplinary approach and collectively address the issues of finance, investment, and incentives; metrics and verification; O&M; awareness, education, and training; design and construction; and the energy and utility landscape.

- Current technology is capable of delivering substantial efficiency. However, technology alone cannot solve the problem.
  - While there is an increasing level of consciousness around energy efficiency, this does not reflect a concrete commitment to actual investment in, or implementation of, efficiency or high-performance measures.
  - The equipment must be purchased, installed, and properly run for efficiency to be realized.
- Financing remains a critical component in deploying the necessary technology and is a significant hurdle to seeing substantial investment in high-performance attributes. Hurdles can be pivotal and include a lack of data, first cost, capital versus operating budgets, risk exposure, the low ratio of energy costs to total operating expenses, high transaction costs, discount factor issues, and the inadequacy of traditional financing mechanisms for energy efficiency projects.
- Deployment is accelerated with the right mix of financial tools.
  - Direct funding for efficiency retrofits is neither sustainable nor scalable; tactics must leverage a range of options.
  - Deployment must incorporate a multidisciplinary approach and collectively address the issues of finance, investment and incentives; metrics and verification; O&M; awareness, education, and training; design and construction; and the energy and utility landscape.
- For real estate investors, owners, and financiers, traditional bottom-line factors such as revenue, expenses, risk, and return, lead investment analysis and decision-making rather than the narrower life-cycle cost analysis (LCCA).

Table 11.2 Identified needs

Criterion	*Solution*
Value proposition	Tie to risk/return Tie to health and safety (which leads to improved building performance and reduced risk)
Leadership	Publicize successes and failures to generate best-practices summary Model construction and retrofit of high-performance buildings Provide technical assistance
Clear action steps	Step-by-step decision-making tool box, addressing impact of key performance attributes on risk and return • road map that outlines discrete path for the investment decision process—Including short- and long-term outcomes • easily replicable and customizable by property type and specific property Quick wins • facilitate pilot projects—Engage property owners and lenders around a real building, a real project, with real leases and real tenants. • encourage use of model lease language. List available at www.greenleaselibrary.com, BOMA and GSA
Transparency/ certainty	Standardized baseline and metrics Industry benchmarking—For example, EnergyStar, GRESB, GreenPrint, DOE buildings performance database Dashboard Standardized underwriting[a] Social networking postings Competitions
Persistence	Measurement and verification—Metering, real-time monitoring Robust O&M—Ongoing commissioning, active and immediate tuning, and correction of identified problems.
Education/ training	Detailed summary of finance/investment options that address key points for each: • description, applicability, availability, maturity, terms and limits, benefits, and hurdles. • capacity building of service providers, municipalities, real estate professionals • partnerships between key stakeholder organizations to provide education and training: – building owners and managers association, urban land institute, National Association of realtors, International Council of Shopping Centers, National Association of state energy officials, American bankers association, and so on. – webinars, presentations to property owners, investors, realtors, energy officials, financiers, rating agencies, and municipalities through industry meetings, conventions, trainings, events, and online presence.

(*continued*)

Table 11.2 (continued)

Criterion	*Solution*
Investment/ financing	On-bill pay Energy-efficiency services agreement Property-assessed clean energy (PACE) —Modified to incorporate greater transparency of performance metrics Incentives/rebates to supplement and leverage internal cash and financing options.
Ease	"One-stop" providers, including financing, approved (and trained) contractors, performance guarantee, real-time monitoring, verification, and maintenance.

  - Real estate investment decisions are multi-faceted and complex. Different owner strata have differing motivations. Decisions involve numerous stakeholders with often competing and complimentary objectives. To be successful, solutions and messaging must directly address value and bottom-line results.
  - Value considerations are important in framing the message.

Broadly speaking, the industry judges the market risks associated with high-performance attributes to be greater than potential benefits. In part, this is based in reality, and in part due to cultural barriers, business norms, and competing stakeholder interests.

The perception of value depends on the stakeholders, investment objectives, access to and cost of capital, property type, and lease structure.

Reducing the uncertainty around energy savings is critical. The investment community must believe the efficiency is both meaningful and persistent over time in order to finance and invest in improvements. Continued focus on baselines and metrics, as well as encouraging best practices for measurement, verification, and monitoring, will reduce the perceived risk and help provide a means for defining the value of high-performance attributes.

- To monetize energy savings, the savings must be *bankable*. To be bankable, the investment community must believe the efficiency is meaningful and will be persistent over time, or else they will not invest in or finance the improvements.

  - Monitoring and verification, ongoing commissioning, and robust maintenance are critical. Through metering and response, they provide transparency and enable persistent efficiency, increasing stability and continuity, and reducing uncertainty over time.

Language and messaging must tie directly to the overall investment analysis, not just life-cycle cost. Traditional bottom-line factors such as revenue, expenses, risk, and return drive the investment analysis and decision-making.

- There is a need to create partnerships between seemingly disparate groups, some with competing agendas and differing financial and regulatory incentives. This includes engaging the regulated utility market and addressing inherent complexities that serve to dampen rather than promote investment in efficiency.
- To forge common understanding and shared objectives, language needs to be broadened to incorporate financial and energy metrics in the same medium; for example, cost per kilowatt-hour needs to be translated easily to cost per square foot.

Real estate investment decisions are multi-faceted and complex. Different owner strata have differing motivations. Decisions involve numerous stakeholders with often competing and complimentary objectives. To be successful, solutions and messaging must directly address value, bottom-line results and the often complex interests of the stakeholders.

References

Allen, J. G., MacNaughton, P., Satish, U., Santanam, S., Vallarino, J., & Spengler, J. D. (2016). Associations of Cognitive Function Scores with Carbon Dioxide, Ventilation, and Volatile Organic Compound Exposures in Office Workers: A Controlled Exposure Study of Green and Conventional Office Environments. *Environmental Health Perspectives, 124*(6). Harvard T.H. Chan School of Public Health, Boston, MA. Retrieved from https://ehp.niehs.nih.gov/wpcontent/uploads/124/6/ehp.1510037.alt.pdf

American Recovery and Reinvestment Act of 2009. (2009). Public Law 111-5, as Amended, 26 USC 1 et seq.

ANSI/ASHRAE/USGBC/IES Standard 189.1-2009. Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings.

American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., Atlanta, Georgia.

Attari S. Z, DeKay, M. L., Davidson, C. I., & Bruin de Bruin, W. (2010). *Public Perceptions of Energy Consumption and Savings*. Proceedings of the National Academy of Sciences. PNAS Direct Submission. Retrieved September, 2010, from The PNAS Open Access Option http://www.pnas.org/cgi/doi/10.1073/pnas.1001509107

Deason, J., Leventis, G., Goldman, C., & Carvallo, J. (2016). *Energy Efficiency Program Financing: Where It Comes From, Where It Goes, and How It Gets There*. Lawrence Berkeley National Laboratory. Retrieved from https://eta.lbl.gov/sites/default/files/publications/lbnl-1005754.pdf

Dembo, R. (2009). *Let's Do For Buildings What We Have Done For Cars*. Toronto, ON: Zerofootprint Foundation. Retrieved September, 2010, from http://www.zerofootprintfoundation.org/images/uploads/Lets_Do_For_Buildings_What_We_Have_Done_For_Cars_US.pdf

Eastern Research Group, InnoVest Group, et al. (2003). *Estimating the Value of Participation in EPA's Energy Star Program*. Presented at the United Nations Environment Programme–Principles for Responsible Investment (UNEP–PRI) Webinar, January 2009.

EIA. (2016). 2012 CBECS Detailed Tables. Building Characteristics Tables for All Buildings (Including Malls), Table A1. Energy Information Administration, U.S. Department of Energy, Washington, DC. Retrieved May, 2017, from https://www.eia.gov/consumption/commercial/data/2012/

Emergency Planning and Community Right-to-Know Act. (1986). Public Law 99-499, as amended, 42 USC 11001 et seq.

GAO. (2005). *Energy Savings – Performance Contracts Offer Benefits, But Vigilance Is Needed to Protect Government Interests*. GAO-05-340. Washington, DC: U.S. Government Accountability Office. Retrieved September, 2010, from http://www.gao.gov/products/GAO-05-340

Gladwell, M. (2002). *The Tipping Point: How Little Things Can Make a Big Difference*. Boston, MA: Back Bay Books, Hachette Book Group.

Global Buildings Performance Network. What Is a Deep Renovation Definition? (2013, February). Technical Report. Paris, France. Retrieved from http://www.gbpn.org/sites/default/files/08.DR_TechRep.low_.pdf

Granade, H. C., Creyts, J., Derkach, A., Farese, P., Nyquist, S., & Ostrowski, K. (2009). *Unlocking Energy Efficiency in the U.S. Economy*. New York: McKinsey & Company.

Hamilton, J. T. (2005). *Regulation Through Revelation: The Origin, Politics, and Impacts of the Toxics Release Inventory Program*. New York: Cambridge University Press.

Hawken, P., Lovins, A., & Lovins, L. H. (2008). *Natural Capitalism: Creating the Next Industrial Revolution* (Chapter 6). Boston, MA: Back Bay Books,

Hachette Book Group. Retrieved February, 2011, from http://www.natcap.org/images/other/NCchapter6.pdf

Hendricks, B., Campbell, B., & Goodale, P. (2010). Efficiency Works—Creating Good Jobs and New Markets Through Energy Efficiency. Energy Resource Management Corporation, Southfield, Michigan. Retrieved September, 2010, from http://www.americanprogress.org/issues/2010/08/pdf/good_jobs_new_markets.pdf

Hopper N., Goldman, C., Gilligan, D., Singer, T. E., & Birr, D. (2007). *A Survey of the U.S. ESCO Industry: Market Growth and Development from 2000 to 2006.* LBNL-62679. Berkeley, CA: Lawrence Berkeley National Laboratory.

ICAP. (2016). *Emissions Trading Worldwide: Status Report 2016.* Berlin: ICAP. Retrieved from https://icapcarbonaction.com/images/StatusReport2016/ICAP_Status_Report_2016_Online.pdf

International Energy Agency. (2016). World Energy Outlook 2016. International Energy Agency, Paris, France. Retrieved from http://www.iea.org/Textbase/npsum/WEO2016SUM.pdf

Kibert, C. J. (2007). *Sustainable Construction: Green Building Design and Delivery* (2nd ed.). Indianapolis, IN: John Wiley & Sons, Inc.

Kok, N., Eichholz, P., & Quigley, J. (2009). *Doing Well by Doing Good? Green Office Buildings.* Berkeley, CA: Center for the Study of Energy Markets, University of California Energy Institute. Retrieved September, 2010, from http://escholarship.org/uc/item/4bf4j0gw

Leventis, G., Fadrhonc, E. M., Kramer, C., & Goldman, C. (2016). Current Practices in Efficiency Financing: An Overview for State and Local Governments. LBNL-1006406. Ernest Orlando Lawrence Berkeley National Laboratory (LBNL). Berkeley, CA. Retrieved November, 2016, from https://energy.gov/sites/prod/files/2017/05/f34/current-practices-efficiency-financing.pdf

Lutzenhiser, L., Biggart, N. W., Kunkle, R., Beamish, T. D., & Burr, T. (2001). *Market Structure and Energy Efficiency: The Case of New Commercial Buildings.* Institute for Energy Efficiency, College of Engineering, UC Santa Barbara, California (Formerly the California Institute for Energy Efficiency).

McKinsey & Co. (2009). *Pathways to a Low-Carbon Economy – Version 2 of the Global Greenhouse Gas Abatement Cost Curve*. New York: McKinsey & Company. Retrieved September, 2010, from www.mckinsey.com/clientservice/ccsi/pathways_low_carbon_economy.asp

McKinsey & Co. (2017). *Pathways and Obstacles to a Low-Carbon Economy—Podcast*. New York: McKinsey & Company. Retrieved from http://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/pathways-and-obstacles-to-a-low-carbon-economy

Muldavin, S. R. (2010). *Value Beyond Cost Savings: How to Underwrite Sustainable Properties.* San Rafael, CA: Green Building Finance Consortium, The Muldavin Company, Inc. Retrieved September, 2010, from http://www.greenbuildingfc.com/

NREL. (2009). *Decoupling Policies: Options to Encourage Energy Efficiency Policies for Utilities*. NREL/BR-6A2-46606. Golden, CO: National Renewable Energy Laboratory. Retrieved September, 2010, from http://www.nrel.gov/docs/fy10osti/46606.pdf

Pivo, G., & Fischer, J. (2009). Investment Returns from Responsible Property Investments: Energy Efficient, Transit Oriented and Urban Regeneration Office Properties in the US from 1998–2008.

Real Estate Settlement Procedures Act. (1974). 12 USC 27, Sections 2601–2617.

Risser, R., & Wood, L. (2009). *Making the Business of Energy Efficiency Both Scalable and Sustainable*. Policy Brief 09-01. Washington, DC: The Brookings Institution. Retrieved September, 2010, from http://www.brookings.edu/papers/2009/04_energy_efficiency_wood.aspx

Rogers, E. M. (2003). *Diffusion of Innovations* (5th ed.). New York: Free Press, Simon & Schuster.

Sinek, S. (2009). *Start with Why: How Great Leaders Inspire Everyone to Take Action*. New York: Portfolio Hardcover, Penguin Group (USA).

Thaler, R. H., & Sunstein, C. R. (2008). *Nudge—Improving Decisions About Health, Wealth and Happiness*. New Haven, CT: Yale University Press.

WBCSD. (2009). Energy Efficiency in Buildings—Transforming the Market. World Business Council for Sustainable Development. Retrieved September, 2010, from http://www.wbcsd.org/Plugins/DocSearch/details.asp?DocTypeId=251&ObjectId=Mzc5NDk