Financing for Multi-Tenant Building Efficiency: Why This Market Is Underserved and What Can Be Done to Reach It

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Executive Summary

Over the past several years, energy efficiency financing has been widely viewed as a promising solution to reducing upfront cost barriers to energy efficiency investment. However, several markets, including commercial office markets and multifamily subsectors, remain stubbornly hard-to-reach. Financing is not a panacea for serving hard-to reach markets, and driving energy efficiency investment requires overcoming many other barriers in the commercial buildings market including split-incentives, long payback periods, and perceived uncertainty surrounding the savings from energy efficiency measures. There is also a lingering question as to how and when attractive financing opportunities might make a difference in the commercial buildings market.

Studies show employees appreciate knowing they work in an environmentally-friendly office and productivity increases (Economist Intelligence Unit 2011). The International Energy Agency states that "increasing energy efficiency, much of which can be achieved through low-cost options, offers the greatest potential for reducing CO2 emissions to 2050 (IEA 2010)."

In the commercial real estate market there is also evidence that "green" or efficient buildings perform better. ENERGY STAR reports 10-20% lower operating costs in ENERGY STAR-rated office buildings. While more robust research is necessary to rule out the correlation between the "newness" of green buildings in comparison to their peers, CoStar research demonstrates that green buildings still report higher occupancy rates, rental rates, and sales prices per square foot (Table ES-1).

Table ES-1. Performance of "Green" Buildings

	No Efficiency Rating	ENERGY STAR	LEED
Occupancy Rate	87.9%	91.5%	92.0%
Rental Rate	$28.15	$30.55	$42.38
Sales Price/Square Foot	$227.00	$288.00	$438.00

Source: CoStar 2008

Office buildings currently represent about 18% of energy use in commercial buildings nationwide (CoStar 2008). Sixty percent were built before 1980, and many are in need of upgrades due to aging building equipment and systems (PNNL 2011). Thus, there is a great deal of potential to install energy-efficient, cost-effective systems in office buildings that would reduce monthly utility bills.

Upfront costs are not necessarily the primary barrier to efficiency investment, particularly for Class A (and professional Class B) owners. It is not uncommon to see energy efficiency projects self-financed through capital improvement budgets when owners are convinced of the project's value.

Split-incentives remain a primary barrier to efficiency investment in leased spaces in the commercial office and multifamily markets. Other barriers include high upfront costs and challenges surrounding aligning the installation of energy efficiency measures and payback

with owner investment horizons and financial incentives. Commercial office buildings can be owned and managed in a variety of ways and under each of these models, there are unique challenges to efficiency investment (see Table ES-2).

Table ES-2: Split Incentives in Diverse Owner-Tenant Models

Ownership Model	Challenges
Owner-occupied	Building owners may not have the credit needed for capital-intensive system upgrades. An owner needs proof that the savings from a retrofit outweigh the costs and effort.
Multi-tenant office: Tenant pays utilities	An owner's incentive is diluted because upgrades often do not translate to increased rents. Even base building upgrades are worth more to tenants since tenants are often paying for their share of the base building costs. Tenants want payback of tenant-financed upgrades in their own space to be less than the lease term to recoup their investment, and tenants must have the owner's approval to renovate the space. A green lease (described later) could be a helpful solution, but takes time. Many owners do not want to draw up a new contract until the previous contract ends. These issues are potentially multiplied over the number of tenants.
Multi-tenant office: Owner pays utilities	An owner needs to invade tenant space to perform upgrades beyond the base building. Owners may pursue base building upgrades if they recognize the value and intend to own the building for a long period of time. Depending on the owner's investment horizon, measures with longer payback periods may not be pursued. Owners typically wait until the tenant's lease is up to renegotiate the lease to include construction in the tenant space. Cost savings need to be renegotiated in tenant rents.
Multifamily: Families pay utilities	Typical 1-year leases discourage tenants from investing in large-scale energy efficiency upgrades to space they do not own. After tenants agree to allow upgrades and construction in their residences, tenants would then need to convince owners to allow upgrades to the building. Base building upgrades are dependent on the owner's investment horizon.
Multifamily: Owner pays utilities	Simple upgrades in common spaces may be more attractive to owners, but issues occur when owners need to invade tenants' residences to perform some major upgrades. This may require breaking leases, which could have legal ramifications. Owners may need to pay a fee to tenants, which could change project economics.

Today, the vast majority of energy efficiency improvements in multi-tenant spaces is covered through traditional finance mechanisms and self-finance. Driving demand for efficiency improvements is in some cases more important than creating attractive financing mechanisms in many markets.

However, there are also owners with credit constraints (likely Class B and C, particularly non-professionally managed subsectors) that may be swayed by more attractive financing opportunities. In recent years, we have seen a number of energy efficiency specific financing mechanisms gaining traction in the market. None of these mechanisms is a panacea for driving

energy efficiency investment, but some are well poised to assist building owners who would like to invest in efficiency, but face particular key barriers. Table ES-3 summarizes various energy efficiency financing mechanisms and common financing barriers each addresses.

Table ES-3: Energy Efficiency Specific Lending Mechanisms

Mechanism	Avg. Project Size	Product Type	Tenant or Base Building	Barriers Addressed
Energy Service Company (ESCO)	Varies significantly—$1m to 3m	Loan	Base—Traditionally serves single-tenant, MUSH (municipalities, universities, schools, and hospitals), and federal markets	Upfront costs, turnkey, misaligned payback period, training employees on systems
Energy Services Agreement/Managed Energy Services Agreement (ESA/MESA)	$750,000 to $1m	Services agreement	Both	Upfront costs, turnkey, manage systems, misaligned payback period, split-incentives (MESAs)
Commercial PACE (C-PACE)	$100,000 to $5m	Property tax, loan	Both	Upfront costs, split incentives, misaligned payback period (through transferability)
On-Bill Financing/On-Bill Repayment (OBF/OBR)	Varies significantly—$5,000 to $350,000	Loan, tariff, or services agreement	Both, typically utilized by small businesses	Upfront costs, misaligned payback period, split incentives
Green Leasing	Varies significantly	Contract (between owner and tenant)	Typically tenant space	Split incentives

Sources: Managan and Klimovich 2012; Bell et al. 2011; Goldman et al. 2010; Navigant 2012a; Kim et al. 2013; McCarthy 2012

Other considerations for increasing investment in energy efficiency include policies and programs that address informational barriers. Benchmarking and submetering requirements can help building owners and managers better understand how energy use affects an owner's bottom-line or how building performance compares with others in the market.

Without sufficient demand for energy efficiency projects, the market for energy efficiency financing is limited. Conversely, the availability of financing is not a solution for driving demand for energy efficiency investments. The future of this market is contingent upon the availability of reliable data and information about the performance of Energy Efficiency Measures (EEMs), incentives (which may include but are not limited to attractive financing terms) that make investment in energy efficiency attractive compared to other types of investments, and timing projects and aligning payback and incentives in a manner that is worthwhile to all key stakeholders in the space. Furthermore, the scalability of this market is contingent upon the availability of financial performance data. This type of information is important for unlocking sufficient levels of private sector capital to fulfill the market's potential.

Introduction

Over the past several years, energy efficiency financing has been widely viewed as a promising solution to reducing upfront cost barriers to investment in energy efficiency. Yet, several markets, including commercial office markets and multifamily subsectors, remain stubbornly hard-to-reach. Financing is not a panacea for serving hard-to reach markets, and driving energy efficiency investment requires overcoming many other barriers in the commercial buildings market including split-incentives, long payback periods, and perceived uncertainty surrounding savings from energy efficiency measures. There is also a lingering question as to how and when attractive financing opportunities might make a difference in the commercial buildings market. For instance, certain subsectors, such as Class A, owner-occupied buildings may have many attractive opportunities to self-finance cost-effective projects. On the other hand, a credit-constrained Class B owner who is not a professional management company could potentially leverage a targeted financing incentive to improve building performance.

The purpose of this report is to provide an in-depth look at the barriers and potential solutions to energy efficiency investment in commercial leased space markets including office and some discussion of multifamily subsectors in the United States. We will pay particular attention to specific barriers and potential solutions within Class B offices. This subsector may have high financing barriers, but will also see significant benefits from energy efficiency improvements. We start by providing an overview of energy efficiency investment benefits from the building owner's perspective. Then, we provide a description of the commercial real estate market in the United States, detailing different types of owner/manager/tenant models and their particular barriers to providing attractive energy efficiency financing within the underserved subsectors. Next, we examine the role of traditional financing and explore how energy efficiency-specific financing mechanisms that have been growing in popularity such as ESCO financing, performance contracting, PACE, and on-bill financing address or fail to address the barriers described. We conclude with a brief discussion on driving demand of efficiency projects.

The Case for Energy Efficiency Investment

Buildings account for about 40% of energy consumed in most countries. Energy is typically used for heating, ventilation, air conditioning, and powering electrical appliances. A McKinsey study estimates that by 2020, the U.S. could reduce energy consumption by 23 percent annually from a business-as-usual amount if investment was made in cost-effective energy efficiency measures. This would save 9.1 quadrillion BTUs of end-use energy, approximately equal to 1.57 billion barrels of oil (G 2009). In addition, research by ACEEE and others has demonstrated that energy efficiency improves our energy independence and national security, stimulates the economy, saves money, makes the United States more globally competitive, and creates jobs (Laitner et al. 2012; Eldridge et al. 2010; Granade et al. 2009; EIA 2009; Bell et al. 2011).

Energy efficiency also offers less obvious benefits. Studies show employees appreciate knowing they work in an environmentally-friendly office and productivity increases (Economist Intelligence Unit 2011). The International Energy Agency states that "increasing energy efficiency, much of which can be achieved through low-cost options, offers the greatest potential for reducing CO2 emissions to 2050 (IEA 2010)."

In the commercial real estate market there is also evidence that "green" or efficient buildings perform better. ENERGY STAR reports 10-20% lower operating costs in ENERGY STAR rated office buildings (CoStar 2008). While more robust research is necessary to rule out the correlation between the "newness" of green buildings in comparison to their peers, CoStar

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Upfront costs for efficiency projects can be substantial. Where credit constraints and access to capital are an issue, financing options can reduce and spread upfront costs for energy efficiency investments over years, and many innovative mechanisms have emerged and grown in popularity over the past several years. Financing is politically popular because unlike full-subsidy approaches to energy efficiency, it places some of the cost burden on those who benefit from the improvements. In addition, when loans are repaid (with the exception of direct loan cost buy-downs), they can be leveraged and re-spent to achieve greater savings per program dollar.[1] Furthermore, there have been initial steps taken toward securitizing these energy efficiency loan products and creating a secondary market, which could reduce the market's reliance on public sources of capital. Many barriers still exist to achieving a full scale secondary market, such as a need for standardized data and information on energy savings, loan performance, and project performance, but there is investor interest and progress being made on several fronts. More importantly, appropriate valuation of energy efficiency and efforts to stimulate demand (via marketing or consumer education) are necessary to get projects into the pipeline.

Commercial Real Estate Market Overview

Common Energy Efficiency Measures (EEMs) for Commercial Buildings

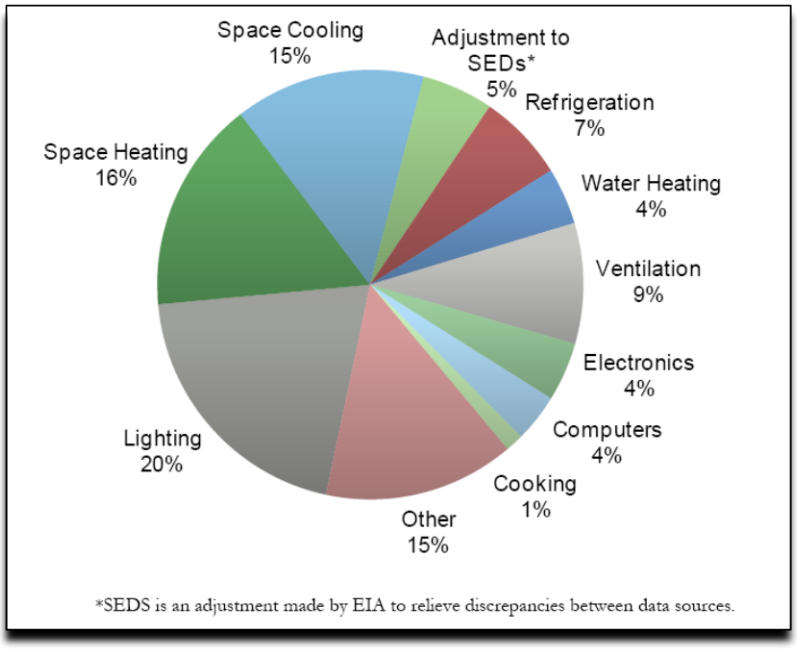
Commercial buildings consume about a fifth of the total energy used in the U.S. Although the commercial building stock in the U.S. is just about 5 million (as compared to about 115 million households), it presents a far diverse range of occupation characteristics. Hence, any attempt at standardization of Energy Efficiency Measures (EEMs)[2] for commercial buildings is fraught with

[1] However, financing programs are not in and of themselves sufficient for achieving ideal levels of efficiency, and work best when paired with additional incentives (Borgeson et al. 2012; Hayes et al. 2011).

[2] Although used interchangeably, there is a difference between the terms energy conservation and energy efficiency. Energy conservation generally refers to actions that result in not using energy at all, such as turning off the

the risk of oversimplification. The potential for energy savings is tremendous—according to an estimate by EPA, 30% of energy in buildings is used inefficiently or unnecessarily and every year $20 billion can be saved if the energy efficiency of commercial and industrial buildings improved by 10 percent (ENERGY STAR 2013). It goes without saying that to realize savings of this magnitude commensurate financial investment is required. Hence it literally pays to look at different measures to save energy in commercial buildings. To begin with, if we look at the major end uses of energy in commercial buildings (Fig 1), space conditioning (heating and cooling) and lighting represent over 50% of energy consumption. As a result, most efficiency programs focus on these categories.

Figure 1: U.S. Commercial Sector Primary Energy End-Use (2011)



Source: Center for Sustainable Systems, University of Michigan 2012

The best and the most cost-effective approach is to adopt a systems perspective to comprehensive, whole-building retrofits. Such an approach goes beyond simple equipment upgrades to identify opportunities in system design, equipment interactions, and building operations and maintenance (Amann and Mendelsohn 2005). However, whole building retrofits often face limitations of financing and hence most often projects end up choosing a bouquet of EEMs that are low cost or offer quicker paybacks. From an energy auditor's perspective, the major opportunities for savings fall under the following categories:

appliances when not in use. Energy efficiency, on the other hand, refers to measures that result in using less energy to perform the same function, such as replacing incandescent bulbs with high efficiency compact fluorescent lights.

Table 2: Common Energy Efficiency Measures

Category	Common Energy Efficiency Measures
Building Envelope	Optimal choice of windows, optimal insulation, air sealing, attic/ceiling ventilation, ductwork and air infiltration testing
Space Heating	Good controls, optimal set-points and occupancy schedules, high efficiency furnaces, boilers and heat pumps
Space Cooling	Good controls, high efficiency chillers and central air conditioning system, high performance cooling towers, optimal set points and occupancy schedules
Lighting	High efficiency lighting (including lamps, fixtures, and ballasts and good controls such as occupancy sensors and daylight systems)
Water Heating	High efficiency water heaters and faucets and hot water loop controls, low flow showerheads
Refrigeration	High efficiency refrigerators/refrigeration systems, LED lighting
Miscellaneous Energy Loads	Power management for computers and peripherals, virtualization of network servers, smart power strips for television, office equipment, and audio/video equipment
General	Energy audits, sub-metering, building commissioning and retro –commissioning, demand controlled ventilation, under floor air distribution, LED exit signs

Details of the cost-benefit and typical payback period associated with some of these measures are summarized in Appendix B.

TYPES OF COMMERCIAL LEASED SPACE

Commercial real estate is property that is used primarily for business purposes. These buildings include segments such as lodging, retail, restaurants, office buildings, public assemblies, grocery stores, services, multifamily and warehouses. Retail, office, and lodging buildings make up the majority (56%) of energy consumption in the commercial leased market (Rockefeller and Deutsche Bank 2012).

In the U.S., office buildings make up 24% of commercial floor space and use 24% of commercial building energy (Rockefeller and Deutsche Bank 2012). Office space is segmented into different classes depending on location, age, amenities, aesthetics, and general infrastructure of the building. Though subjective, these classes typically determine price and appeal to different types of tenants.

- Class A office space has exceptional accessibility and definite market presence. These high-quality buildings are typically new high-rises, outfitted with first-class systems and amenities, and reside in city centers. Most ENERGY STAR and LEED certified office

spaces are Class A buildings. Rents for these places are typically above average and are popular among real estate, banking, and law firms.

- Class B office spaces are still nice buildings, but may not have all the aesthetics of a Class A building. Many Class B building are aged Class A buildings with visible wear and tear. Typically after about 10 years, buildings are pushed down to this class and become in need of maintenance and repair. A wide range of tenants occupy these buildings and pay average rents.
- Class C office space is functional space that resides in less-desirable locations. These buildings are usually over 20 years old and require major renovations. Due to below-average rents, smaller businesses and tenants who cannot afford other spaces reside in these buildings (BOMA 2013).

It is important to note that these classifications are not consistent across all cities. For example, a building considered to be Class B in New York City might be considered Class A in Phoenix. In addition, buildings in all three categories can be owned and managed in a variety of different ways. They might be professionally owned and managed by a property management company or Real Estate Investment Trust (REIT), or by an individual owner. The diversity of approaches to owning, managing, and leasing space in commercial buildings indicates a variety of motivations and decision-making models for investments in buildings. It also indicates that there is no one-size-fits-all approach for making the case for or driving investment in energy efficiency.

In recent years, economic uncertainty has affected tenant decisions on where to lease. In some markets, such as Washington, DC, many tenants in Class A buildings save costs by subleasing office space, many times at bargain prices. Tenants are trending toward quality spaces, causing net absorption of Class A space to increase, and utilization of Class B and C spaces to decrease (Transwestern and Delta Associates 2012). As market demand for Class B and C buildings decrease, new tenants will be willing to pay less in rent, leading to less free cash flow for the owner to spend on energy efficiency upgrades and retrofits. On the other hand, such a situation creates a desire to renovate some of these buildings to increase asset value. According to ENERGY STAR, a 10 percent decrease in energy use can lead to a 1.5 percent increase in net operating income and an additional asset value boost (ENERGY STAR 2009).

Comparisons between the Commercial Office and Multifamily Markets

Throughout this report there are several references to activity in the multifamily market. This market varies greatly from the commercial office market in terms of size and ownership and investment models, however, some mechanics of energy efficiency solutions that overcome split-incentives may have applicability within multifamily subsectors. Here we highlight general similarities and differences between multifamily and commercial office markets. While it is not possible to take all solutions and considerations posed for the commercial office market and apply it to multifamily, some insights may be applicable.

Similarities between multifamily buildings and commercial office space:

- Both are segmented into various building classes based on location and aesthetics. There are fewer financing options available to support energy efficiency retrofits of lower-class buildings than higher-class buildings.

- Both encounter the split-incentives barriers between the tenant and owner, which green leases can potentially reduce.
- When tenants pay utilities, they look for the payback period from upgrades to be less than the lease term in order to achieve a positive return on investment.
- Owners can make upgrades to common areas without invading tenant spaces, benefitting the owner if he pays utilities.
- Sub-metering, which makes tenants responsible for the amount of energy they use, and benchmarking energy consumption, are two ways to increase awareness of energy usage in both types of spaces.
- There are currently more financing opportunities available for commercial leased space, specifically the creditworthy MUSH market.
- Differences between multifamily buildings and multi-tenant commercial space:
- Multifamily buildings can be leased or owned (cooperatives or condominiums), whereas multi-tenant commercial space is typically leased.
- Multifamily owned spaces have an elected board that determines common area system upgrades, but this board has no control over in-unit appliances or HVAC equipment. Multi-tenant commercial space rarely has an elected board (ACEEE and CNT Energy 2013).
- Multifamily buildings typically have 1-year leases, while multi-tenant commercial buildings have lease terms of 3, 5 or 10 years, depending on the size of the space. This means that tenants in commercial buildings would be more likely to invest in deeper energy efficiency upgrades with longer payback periods since they have a longer time to see a return on investment (Regent 2013).

General Barriers to Energy Efficiency in Multi-Tenant Markets

Split Incentives in Diverse Owner-tenant Models

Split incentives are a major barrier in multi-tenant markets including the commercial office and multifamily markets. The split incentive issue arises when tenants and the property owner do not have interests aligned, such as when a tenant pays their own utility bills, and the landlord has control over efficiency upgrade decisions and responsibility for capitalizing them. Market failure occurs and increased efficiency is not achieved even though it may be cost-effective.

One commonality between commercial office and multifamily buildings is that they typically have many tenants and one owner, as opposed to the owner-user model, where the owner is occupying his space, paying his own utility bills and deciding on upkeep activities. In the multi-tenant model we face disagreements about which party should fund upgrades in the owner-investor structure. This ownership model adds a level of complexity to the process of financing energy efficiency upgrades and often prevents many buildings from ultimately investing in upgrades.

Commercial office buildings can be owned and managed in a variety of ways, and under each of these models, there are unique challenges to efficiency investment.

Table 3: Split Incentives in Diverse Owner-Tenant Models

Ownership Model	Challenges
Owner-occupied	Building owners may not have the credit needed for capital-intensive system upgrades. An owner needs proof that the savings from a retrofit outweigh the costs and effort.
Multi-tenant office: Tenant pays utilities	An owner's incentive is diluted because upgrades often do not translate to increased rents. Even base building upgrades are worth more to tenants since tenants are often paying for their share of the base building costs. Tenants want payback of tenant-financed upgrades in their own space to be less than the lease term to recoup their investment, and tenants must have the owner's approval to renovate the space. A green lease (described later) could be a helpful solution, but takes time. Many owners do not want to draw up a new contract until the previous contract ends. These issues are potentially multiplied over the number of tenants.
Multi-tenant office: Owner pays utilities	An owner needs to invade tenant space to perform upgrades beyond the base building. Owners may pursue base building upgrades if they recognize the value and intend to own the building for a long period of time. Depending on the owner's investment horizon, measures with longer payback periods may not be pursued. Owners typically wait until the tenant's lease is up to renegotiate the lease to include construction in the tenant space. Cost savings need to be renegotiated in tenant rents.
Multifamily: Families pay utilities	Typical 1-year leases discourage tenants from investing in large-scale energy efficiency upgrades to space they do not own. After tenants agree to allow upgrades and construction in their residences, tenants would then need to convince owners to allow upgrades to the building. Base building upgrades are dependent on the owner's investment horizon.
Multifamily: Owner pays utilities	Simple upgrades in common spaces may be more attractive to owners, but issues occur when owners need to invade tenants' residences to perform some major upgrades. This may require breaking leases, which could have legal ramifications. Owners may need to pay a fee to tenants, which could change project economics.
Owner-occupied	Building owners may not have the credit needed for capital-intensive system upgrades. An owner needs proof that the savings from a retrofit outweigh the costs and effort.
Multi-tenant: Tenant pays utilities	An owner's incentive is diluted because upgrades do not translate to increased rents. Even base building upgrades are worth more to tenants since tenants are often paying for their share of the base building costs. Tenants want payback of tenant-financed upgrades in their own space to be less than the lease term to recoup their investment, and tenants must have the owner's approval to renovate the space. A green lease (described later) could be a helpful solution, but is costly and takes time. Many owners do not want to draw up a new contract until the previous contract ends. These issues are potentially multiplied over the number of tenants.

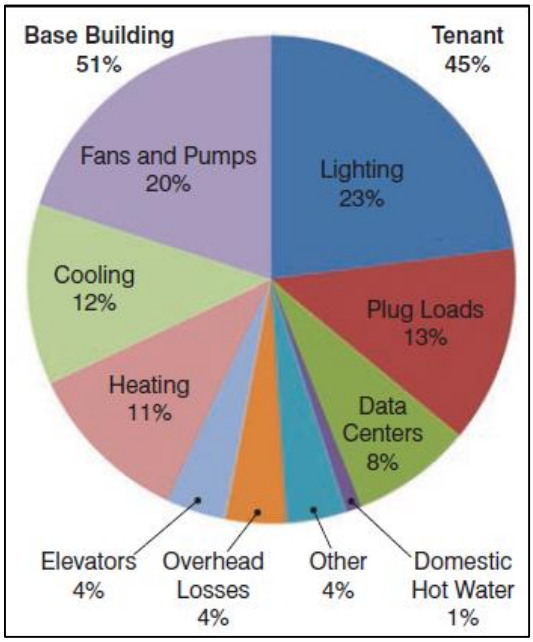
Ownership Model	Challenges
Multi-tenant: Owner pays utilities	An owner needs to invade tenant space to perform upgrades beyond the base building. Owners may pursue base building upgrades if they recognize the value and intend to own the building for a long period of time. Depending on the owner's investment horizon, measures with longer payback periods may not be pursued. Owners typically wait until the tenant's lease is up to renegotiate the lease to include construction in the tenant space. Cost savings need to be renegotiated in tenant rents.
Multifamily: Families pay utilities	Typical 1-year leases discourage tenants from investing in large-scale energy efficiency upgrades space they do not own. After tenants agree to allow upgrades and construction in their residences, tenants would then need to convince owners to allow upgrades to the building. Base building upgrades are dependent on the owner's investment horizon.
Multifamily: Owner pays utilities	Simple upgrades in common spaces may be more attractive to owners, but issues occur when owners need to invade tenants' residences to perform some major upgrades. This may require breaking leases, which could have legal ramifications. Owners may need to pay a fee to tenants, which could disrupt business.

The Energy Use Split

The split incentive issue arises in commercial and multi-family buildings in all but the first of the ownership models described above. Adding to the challenge is the fact that neither the owner nor the tenant(s) have complete control over the energy use of the entire building. Usually owners are responsible for upkeep of the building common areas which include lobbies, hallways, elevators, service areas, laundry facilities, etc. The building owner or managers control base building systems such as heating, cooling, ventilation and lighting of the common areas and sometimes in tenant occupied space as well. In commercial offices, sometimes the tenants customize their leased space at the time of moving in. The design, selection and operation of the tenant build-out have the potential to make a significant difference in their energy usage. Additionally, tenants add their unique mix of plug loads to the energy use of the building. Plug loads and other equipment such as computer servers, imaging devices, cooking appliances, and specialized lighting are almost entirely managed and controlled by the tenants.

Figure 2 depicts typical energy loads in a commercial office building. Many modern buildings have separately sub-metered spaces that can improve the apportionment of energy use and hence the share of the pie can be more accurately ascertained in these cases, especially in end uses like lighting that are usually shared between tenant space and common areas.

Figure 2. Energy Loads Split in a Typical Commercial Office Building



Source: Copeland 2012

Approximately, half or more of the total building energy is consumed in tenant space(NRDC 2012), which underscores the need for owners and tenants to work jointly to address the split incentive issue and optimize energy performance of the building. For example, energy aligned clauses in green leases can create a strong incentive for making this happen. We discuss green leases and other mechanisms to address the split incentive issue later in this report.

Building Class and Professional vs. Non-professional Management

In most major United States real estate markets, you are likely to see many Class A buildings (typically between 40-60%) that have achieved an ENERGY STAR or LEED rating (See Appendix A for more information). For this particular class, the benefits of energy efficiency seem to be widely accepted. These buildings often have several financial avenues through which to pursue energy efficiency projects, and you will often see projects that are self-financed.

Class B buildings, however, can be particularly hard to reach. Many Class B owners are smaller entities, and the network of owners is highly disaggregated. The diversity of the building stock in this market can make it difficult to find replicable approaches to energy efficiency improvements. In some cases, smaller owners can be severely debt constrained and other investments which are valued by tenants or required by law may have first priority.

In many cases, the class of a building and the ways in which owners and tenants share utility costs only provide a partial picture around energy efficiency decision making. Buildings which are professionally managed may have greater access to information that properly values efficiency investment, and directs them to resources for pursuing improvements. On the other hand, professional owners may have shorter investment horizons than non-professional "mom and pop" owners, and may not have an incentive to make investments in "deep" energy efficiency measures with long payback periods, since they plan to sell the building within a shorter timeframe. For example, some Real Estate Investment Trust's (REIT's) business models

involve buying buildings, investing in them to bring them up a level (e.g. B+ to A), leasing them up and selling them in about 5 years. There is often money for improvements but EEMs are competing with visible improvements such as lobby upgrades. In these circumstances, labeling opportunities and their anticipated return on investment (as opposed to energy savings) drive energy efficiency investment.

Class B and Class C buildings that are non-professionally managed face a variety of informational obstacles and debt constraints. While the owners may plan to hold onto the building for longer and may benefit from cost saving opportunities associated with efficiency improvements, they may struggle with upfront costs and prioritize other investments. These subsectors could stand to gain the most from targeted, energy efficiency-specific lending (e.g. performance contracting, on-bill financing, or commercial PACE), to smooth upfront costs.

Market-Specific Descriptions and Barriers

Barriers to finding effective solutions for catalyzing investment in energy efficiency and the demand for financing varies from market to market due to environmental factors such as diversity of building stock, cultural responses to energy efficiency, fuel mix, local climate, and owner/manager/tenant models. Thus, it is difficult to find solutions that can be directly replicated in diverse markets. In order to provide examples of how these regional differences can be important, we researched the real estate markets in several different metropolitan regions in diverse geographical locations across the country. Detailed findings can be found in Appendix A.

State of Energy Efficiency Financing—The Quest to Scale the Secondary Market

Over the past several years, there has been growth in the prevalence and popularity of financing solutions for overcoming the upfront cost barrier to energy efficiency. Such mechanisms include: traditional, single-project financing; on-bill financing; property assessed financing (PACE); ESCO financing; green leasing; energy service agreements (ESAs); and managed energy service agreements (MESAs).

A great deal of excitement surrounds the potential scalability of energy efficiency investments. With average default rates for energy efficiency loans estimated between 3-5% (Hayes et al. 2011), the idea of creating a secondary market for energy efficiency investment has become increasingly popular. The Rockefeller Foundation and Deutsche Bank estimate that at scale private sector entities could invest more than $279 billion across the buildings sectors. Such investment would generate more than $1 trillion in energy savings over 10 years and create 3.3 million jobs (Rockefeller and Deutsche Bank 2012).

There are, however, still numerous data and information barriers to securitizing this type of product. There are several programs and working groups attempting to overcome barriers to meaningfully recording, reporting, and utilizing data to attract financiers into the market.

To date, the most significant progress has been made in the residential, and not the commercial, market. At this time, it is likely easier to aggregate information on residential projects. The commercial market is somewhat less mature, and many projects are financed internally instead of relying on outside sources of capital. This may change as efforts are made to reach "hard to reach" subsectors such as Class B and Class C commercial, as well as affordable multifamily. In March 2013, the Pennsylvania Treasury sold nearly 4,700 residential loans from the Keystone HELP program for a projected total of $31.3 million.

The Warehouse for Energy Efficiency Loans (WHEEL) program is seeking to provide low-cost, large scale capital for state and utility-sponsored residential energy efficiency loan programs. The team consists of the Energy Programs Consortium (EPC), Pennsylvania Treasury Department, Forsythe Street Advisors,

Citigroup Global Markets, Inc., and Renewable Funding. The WHEEL program creates a secondary market for clean energy loans by purchasing unsecured residential energy efficiency loans from participating programs. The loans are combined and split into diversified pools to support rated asset backed notes sold to capital market investors.

WHEEL begins when a sponsor transfers credit enhancement funds to a custodial account at a financial institution. When a loan is originated in the sponsor's jurisdiction, the credit enhancement funds are drawn to support the purchase of the loan. WHEEL purchases loans from all participating programs to create a bond for sale to secondary market investors. After private investors in the bond are paid off with cash flows from the loan pool, the remaining cash flows are returned as revenue to sponsors for reallocation or to support future lending (NASEO 2012). However, since efficiency loans look like unsecured debt or debt underwritten by a risky asset to a secondary market that has insufficient data to justify investment, WHEEL has not yet begun to conduct transactions.

On-bill financing programs in New York and California have also been making progress toward engaging secondary market activity. Many on-bill programs leverage the potential for utility shutoff in the event of non-payment as an alternative form of securitization, and typically have default rates of less than 2% (Bell et. al. 2011). NYSERDA's residential on-bill recovery program recently sought a credit rating from Fitch Ratings in early 2013 for its secured loan product, with the intention of conducting a qualified energy conservation bond (QECB) issuance later in the year. The program found it difficult to secure a desirable credit rating due to the short repayment history of existing loans. The program was restructured to leverage an Environmental Authority bond structure, and eventually received a AA rating.

The Environmental Defense Fund's (EDF) Investor Confidence Project (ICP) is attempting to aggregate information on loan performance, project performance, and energy savings performance in an effort to expedite secondary market activity for investments in the commercial buildings sector. Without a standard and reliable approach to predicting energy savings, it is difficult to manage risk from energy efficiency investments. Therefore, loans and other investment strategies cannot often be securitized and because they do not take into account reduced operating costs and the increased value of the property.

ICP provides consistent and replicable specifications and practices for evaluating energy efficiency projects, measuring energy savings and ensuring the savings persist post-retrofit. ISP specifications include the elements, procedure and documentation of an energy efficiency project's lifecycle, including base-lining, savings projections, initial and ongoing commissioning, and measurement verification (EDF 2012).

Risk mitigation strategies to further bolster the reliability of these investments by reducing uncertainty surrounding energy savings are also emerging. Energy-savings insurance products pay for shortfalls in energy savings below a pre-agreed baseline, less a deductible (Mills 2002). Energi, an energy insurance company founded in 2005 provides products to contractors that guarantee energy savings, and allow the contractor to take the liability for the guarantee off-balance sheet (Energi 2012).

While many advances have been made in energy efficiency financing, concerns exist that financing products on their own are not sufficient for catalyzing investment in efficiency in the mainstream. Demand-side limitations to investment in energy efficiency should not be understated. Debt constraints of property owners and managers of all scales and sizes are key barriers to investment. Large property owners in the Class A market often have existing relationships with a financing source or can self-finance, and therefore do not have significant capital constraints. They may prefer to pursue investments in efficiency one by one through their annual capital allocation process rather than pursuing dedicated financing for deeper retrofits.

Successful energy efficiency programs that reach significant portions of their target markets often include financial incentives that cover half or more of the project cost (Fuller 2009). Unfamiliarity or uncertainty surrounding the value of energy savings and project timing can also dampen demand.

Financing Solutions and Opportunities

Theoretically, there may be a variety of opportunities for building owners to take advantage of market timing to invest in energy efficiency. Market research currently indicates that there is likely high demand for refinancing as commercial mortgages made during the 2007 boom mature (Satow 2012). Unfortunately, due to declining property values in the wake of the Great Recession, and the current financial positions of many companies, the market may be tight. The practical opportunity for introducing efficiency investment decisions into this process may be limited, but if there were opportunities to introduce information about efficiency during the process, there could be opportunities to leverage improved capital flow for cost-effective improvements.

As we alluded above, upfront costs are not necessarily the primary barrier to efficiency investment, particularly for Class A (and professional Class B) owners. It is not uncommon to see energy efficiency projects self-financed through capital improvement budgets when owners see the energy savings as improving their bottom lines along their investment horizons. In some cases there are informational barriers regarding building performance and expected payback, but in some cases investment horizons are simply shorter. Improved efficiency through new energy efficiency technology may help raise the investment priority of energy efficiency improvements.

Energy Efficiency-Specific Mechanisms

Today, the vast majority of energy efficiency improvements in multi-tenant spaces is covered through traditional finance mechanisms and self-finance. Driving demand for efficiency improvements is in some cases more important than creating attractive financing mechanisms in many markets.

However, there are also owners with credit constraints (likely Class B and C, particularly non-professionally managed subsectors) that may be swayed by more attractive financing opportunities. In recent years, we have seen a number of energy efficiency specific financing mechanisms gaining traction in the market. None of these mechanisms is a panacea for driving energy efficiency investment, but some are well poised to assist building owners who would like to invest in efficiency, but face particular key barriers. Table 4 summarizes energy efficiency-specific financing mechanisms available to the commercial office market, and the barriers which each may help address.

Table 4: Energy Efficiency-Specific Lending Mechanisms

Mechanism	Avg. Project Size	Product Type	Tenant or Base Building	Barriers Addressed
ESCO	Varies significantly. $1m to 3m	Loan	Base—Traditionally serves single-tenant, MUSH and federal markets	Upfront costs, turnkey, misaligned payback period, training employees on systems
ESA/MESA	$750,000 to $1m	Services agreement	Both	Upfront costs, turnkey, manage systems, misaligned payback period, split-incentives (MESAs)
C-PACE	$100,000 to $5m	Property tax, loan	Both	Upfront costs, split incentives, misaligned payback period (through transferability)
OBF/OBR	Varies significantly. $5,000 to $350,000	Loan, tariff, or services agreement	Both, typically utilized by small businesses	Upfront costs, misaligned payback period, split incentives
Green Leasing	Varies significantly.	Contract (between owner and tenant)	Typically tenant space	Split incentives

Sources: Managan and Klimovich 2012; Bell et al. 2011; Goldman et al. 2010; Navigant 2012a; Kim et al. 2013; McCarthy 2012

ESCO Financing

Description

An ESCO (Energy Service Company) is a large service company that develops, installs, and arranges financing for energy efficiency projects for facilities over a 7 to 20 year time period. ESCOs act as project developers and assume the technical and performance risks associated with the project. Then the project cost is repaid by the building tenants or owner through the savings generated. ESCOs typically employ a wide array of cost-effective measures such as high efficiency lighting and HVAC (NAESCO 2011).

The ESCO market grew approximately 7% from 2006-2008, and anticipated growth of 25% through 2011. As of year 2000, there were over 3,000 performance-based energy contracts in the Lawrence Berkeley National Laboratory Database, generating ~$23 billion in direct benefits for customers for projects installed from 2000-2008 (LBNL 2013).

ESCOs generate performance-based contracting, which means that when an ESCO undertakes a project, the company's compensation and the project financing are often directly linked to the amount of energy actually saved. The amount of energy saved is typically measured through a meter or deemed, and the ESCO guarantees that the savings will be sufficient to cover loan

payments. The building owner takes out financing, either from his own sources or with the ESCO's assistance, and is responsible for payments.

Since Class B and C buildings are often older and in need of deep retrofits with high capital investments and long payback periods, ESCOs could provide the needed financial and technical components for a successful deep retrofit. However ESCOs typically assume all the risks involved with designing, maintaining, and guaranteeing the energy savings, so ESCOs favor buildings with the highest credit ratings and long-term occupants such as the institutional sector and the municipalities, universities, schools, and hospitals (MUSH) market. These buildings typically have less ownership and tenant turnover, reducing risks associated with ownership changes.

Since the economic downturn has decreased revenues from the commercial and industrial sectors, creditworthiness for many buildings have decreased, and ESCOs are struggling to find financing for energy efficiency contracts. Still, in 2010, the industry expanded by 1.6%, reaching $32.9 billion. Verify Markets predicts that the total energy management services market will reach $50 billion by 2017 as grant and stimulus money (such as ARRA funding) provides billions of dollars for MUSH markets (Pentland 2011).

Barriers Addressed

ESCO financing requires no money down and can be a useful tool for credit constrained companies. ESCOs will also assume the risk of measures not performing as anticipated. The ESCO financing model is a time-tested solution and provides a turnkey approach to audit, construction, and measurement and verification (M&V) (Killian 2012).

Limitations

ESCO financing does not have the capability of overcoming split-incentive problems. The business model also requires a focus on "low-hanging" fruit, or measures that have predictable levels of energy savings. Typically, this model is used in the MUSH and government markets, and there is some applicability in owner-occupied, and perhaps for some base building improvements. Deeper retrofits are difficult to reach with the typical ESCO model.

In recent years, insurance products that underwrite the risk of underperformance have emerged on the market. One example of a company that offers such services is Energi Insurances Services, Inc. This insurance removes some contingent liabilities from a participating ESCO's balance sheet, enabling deeper retrofits through risk-sharing.

ESCO financing also favors buildings with high credit ratings, and may have a difficult time financing projects for credit-constrained owners in the commercial real estate sector, particularly for Class B and Class C office space.

Energy Service Agreements

Description

Energy Service Agreements (ESAs), similar to ESCO products, provide the benefits of energy efficiency upgrades without the upfront capital expenditure. An ESA is a contract that allows energy efficiency to be paid back by building owners through energy savings. ESAs differ from ESCO financing in that most ESCO's projects are often financed through a third party, while the ESA provider may have its own fund. ESAs offer an all-in-one package. A second difference is that ESAs generally pay for realized savings, while many ESCO's use fixed payments with a performance guarantee.

In an ESA model, an investment fund pays for and installs the energy efficiency upgrades. The investment fund signs an ESA with the building owner, who agrees to pay a monthly fee. This cash flow is used to secure upfront capital from the investment fund for the energy efficiency upgrades, as well as determined periodic service fees to pay back the cost of upgrades. An Efficiency Services Performance Contract (ESPC) is then signed between the investment fund and the energy service provider, which covers the engineering, procurement, and construction of the project. The investment fund also negotiates performance guarantees with the service providers. The building owner then captures the realized savings directly through reduced energy costs.

This method mitigates financial risks that arise with high upfront capital costs. In a typical upgrade, costs are passed through to tenants, who pay them over the useful life of the equipment, increasing the risk since the payback period is long. ESAs mitigate this risk by using energy savings to cover the cost of the equipment, making the payback period much shorter. Like PACE, ESCO financing, and On-bill tariffs, ESAs are off balance sheet. Lender risks are also avoided. ESAs require little policy support.

A Managed Energy Service Agreement (MESA) is different from an ESA because the investment fund pays the owner's on-going utility bill directly and charges the building owner a monthly rate based on historical energy usage, acting as an intermediary and capturing the difference as an upgrade payback. The end result is similar to an ESA, but works well for multi-tenant commercial buildings, because the owners can pass through the MESA charges to tenants in their standard energy bills (Kapur et al. 2011).

Metrus Energy is an example of a capital provider, project developer, and asset management company for energy efficiency projects. Metrus has standardized the facilitation of energy service agreements, and typically works with large commercial, industrial, and institutional facilities. Its process is to first sign an ESA with the owner, and pay a third party contractor such as an ESCO to implement and maintain the energy efficiency project. Metrus retains ownership of the assets during the payback period. The building owner makes periodic service payments to Metrus with energy savings. After the ESA term expires, the owner has the option to purchase the energy efficiency equipment from Metrus at fair market value (Metrus 2013).

Barriers addressed

ESAs and MESAs do not require enabling legislation, and offer a clearly defined structure for outside capital to invest in the energy savings potential of a building (Rockefeller and Deutsche Bank 2012). The agreement can be structured to overcome split incentives in a variety of owner-tenant models.

Limitations

These are relatively new structures, and while companies that provide them have emerged on the marketplace, there have not been many deals completed. There is also uncertainty surrounding the future of the off-balance sheet status of these financing products. Recently, the Financial Accounting Standards Board (FASB) has undertaken a review of accounting practices for leases which have traditionally been treated as "off-balance sheet." There is a debate as to whether an ESA qualifies as a lease. As this debate plays out, it is important to clarify rights of

investors during bankruptcy, tenant roll over, and the sale of the host building (Rockefeller and Deutsche Bank 2012).

C-PACE

Description

Property Assessed Clean Energy (PACE) is an energy efficiency financing mechanism which provides building owners with upfront capital for energy efficiency investments that can be repaid through a property tax assessment. PACE zones must be standardized at the state level and require significant regulatory support to fund the program. As of July 5, 2013, 24 states had PACE-enabling legislation in place. Ten of these states have programs up and running (PACENow 2013).

Despite the issues that residential PACE programs have encountered as a result of the Federal Housing Finance Agency's (FHFA) action that effectively blocked Fannie Mae and Freddie Mac from purchasing mortgages with PACE assessments on them, there has been growing market activity for commercial PACE or C-PACE programs.

Sonoma County's Energy Independence Program (SCEIP) is an example of the PACE program in action. Commercial property owners can voluntarily finance energy efficiency and renewable energy improvements which are attached to the property and paid back via property tax annually. The commercial property must first have Pacific Gas and Electric perform an energy audit before participating in the program. The sum of all debt with the property cannot exceed the value of the property. Potential energy efficiency improvements include reflective roofs, high efficiency HVAC, efficient skylights, window films, and high efficiency lighting equipment, as well as various improvements involving renewable energy. Financing for the retrofit will be repaid over 10 or 20 years, depending on the size of the loan. SCEIP has funded more than $57 million in projects as of July 2012 (DSIRE 2013e).

Barriers addressed

Program designers and advocates identify several advantages to the C-PACE financing approach, including no upfront costs, immediate positive cash flow, transferability, low interest rates, and the ability to keep the obligation off of the owner's balance sheet (Managan and Klimovich 2012). Longer loan terms and transferability make it easier to achieve deeper retrofits than traditional ESCO financing. Furthermore, credit constrained owners may be attracted to the off-balance sheet properties of a PACE obligation.

The ability to share costs with tenants overcomes some split-incentive issues. However, it may be difficult to undertake a retrofit in the middle of a tenant's lease, and especially difficult to negotiate the timing of projects with multiple leaseholders.

Limitations

PACE requires a great deal of support from local government, and can be complex and challenging to implement.

Another major debate surrounding commercial PACE is whether or not it is necessary for the mortgage lender to give consent to property owners prior to the owner taking on a PACE assessment. In a PACENow lender support study, surveyed lenders unanimously agreed that consent was essential citing that many loan documents require notification of alterations to property as well as reserves and guarantees for alterations, completion guarantees, and escrow

of assessment payments. Lenders that have provided approvals for PACE assessments have verified that generally the projects have been small relative to the building value—about 1-3% of the property value, and were an "insignificant" risk to the mortgage (PACENow 2012). Some have begun to use the term "acknowledgement" to describe lenders legal awareness and tacit approval.

The financial performance of PACE obligations is still untested in the marketplace, which can make PACE programs slow to scale. Therefore, less creditworthy buildings, such as Class B and C buildings, are less likely to be approved for PACE financing.

On-Bill Financing and On-Bill Repayment

Description

On-bill financing allows utility customers to invest in energy efficiency improvements and repay the funds through an additional charge on their utility bill. If structured properly, an on-bill program can substantially reduce the cost of and improve access to financing. In many cases, energy savings are sufficient to cover the monthly payments for the financing so that the total monthly charge on utility bills is less than or equal to the pre-investment amount. Capital for on-bill programs comes from a variety of sources including but not limited to utility ratepayer funds, public benefit funds, and third-party financial institutions. Recently, programs capitalized through third-party financial institutions, often referred to as on-bill repayment programs, have started to emerge and are making efforts to grow in scale.

Currently, at least 24 states are home to utilities or other parties that have implemented or are about to implement on-bill financing programs, many of which (Illinois, Hawaii, Oregon, California, Kentucky, Georgia, South Carolina, Michigan, and New York) have legislation in place that supports adoption in various ways. Some states, such as Illinois and California, require utilities to implement on-bill programs. Other states remove barriers to implementation by allowing for a tariff for energy efficiency services or for financing to be collected through utility billing. In New York, legislation has provided for utilities to receive funding to update their billing systems. Additionally, a number of state utility regulators have taken action to explore the feasibility of on-bill programs.

Some on-bill programs are overcoming split-incentives in multi-tenant spaces and driving deeper retrofits in owner-occupied buildings by structuring their products as tariffs. A tariff can refer to any number of rates or charges imposed by a utility. Tariff financing is a type of on-bill financing structure. On-bill tariffs are a mechanism for charging customers for energy efficiency investments or upgrades provided as a service by the utility. On-bill tariffs assign a financial obligation to a property (often by tying the service to the building's meter), allowing the receivables incurred from the investment or upgrade to transfer to subsequent owners or renters. In many states tariffs are not considered loans and thus are subject to different laws and regulations. In addition, tariffs address gaps in energy finance for rental customers and also allow the flexibility to match financing terms to the extended payback period for some energy efficiency improvements (Fuller 2009).

On-bill tariff programs are sometimes attractive to utilities since they often do not have to stray too far from their business model in order to implement them. The process for imposing a voluntary tariff is one that may be familiar, and the product does not necessarily have to offer debt to consumers. Such a distinction can be necessary for a municipal utility that is statutorily prohibited from lending to its ratepayers (Bell et al. 2011).

Barriers addressed

On-bill repayment has a high potential for scalability since repayment on the utility bill could potentially act as a credit enhancement to attract secondary market investors. However, limited experience with the financial performance of these types of products has limited the ability of program implementers to secure a decent credit rating. Thus, the establishment of loan-loss reserves, loan guarantees, or an insurance product may be necessary for achieving scale.

On-bill products that are structured as a tariff can help to overcome split-incentive issues by allowing obligations to transfer with the property. In master-metered multi-tenant and multifamily buildings hybrid on-bill/ESA models such as the MPower model can also address the split incentive problem.

In the MPower model, building owners enter into an energy services contract with the utility and pay a voluntary energy efficiency tariff for the next 10 years. The cost of the energy efficiency services is then passed on to the tenants, who benefit from the cost-saving measures through a reduction in their monthly utility bills (Bell et al. 2011).[3]

Limitations

There are several barriers to the implementation of on-bill programs. While energy efficiency resource standards (EERS) and demand-side management may motivate utilities to provide programs, it can be costly for utilities to update their billing systems to include energy savings and repayment on each bill.

Utilities may also not want to assume nonpayment risk or act as financial institutions. On-bill repayment models mitigate this issue by allowing third-party financial institutions to assume responsibility for the bulk of the financial services responsibilities while utilities act as collection agents.

Given the current size of on-bill programs, they may not offer sufficient capital for large commercial projects, and are better suited for small business. This may change as more investors become engaged.

GREEN LEASING

Description

A green lease, also called an energy-efficient lease, is a standard commercial real estate lease that has been amended to blend financial and energy interests of landlords and tenants. It encourages tenants and owners to include sustainability concepts in building improvements by realigning incentives so that improvements are mutually beneficial for the tenants and owners (IMT 2013).

In order for green leasing to be effective, all measures of the building's performance, from efficiency of the systems to building construction materials, must be transparent. Both the landlord and tenant must be willing to work together to create a more sustainable facility, and green leasing costs and benefits must be properly distributed to make the investment mutually beneficial.

[3] It should be noted that there is no requirement for building owners to pass along energy savings to tenants.

A letter of intent is required that states the owner and tenant's sustainability goals such as making the building ENERGY STAR or LEED certified. The next step is to have a contractor conduct an energy audit to determine the potential savings from different types of energy efficiency renovations. The green lease itself may include provisions about sharing energy consumption information between owner and tenants, design and construction standards, and marketing any certifications, reporting building performance, and auditing the energy savings (Longinotti 2011).

For example, New York City came out with the NYC revenue clause in 2011 to help the landlord do energy efficiency improvements by performing the upgrade and passing to cost through to tenants based on the projected savings. The clause requires a 20% buffer in projected energy savings vs. the additional tenant cost, which protects tenants in the case that the project doesn't perform as well as expected. Sub-meters in tenant spaces are helpful in order to make the savings estimations and pass-through costs most accurate (California Sustainability Alliance 2009).

Barriers Addressed

While Green Leases are not a financing mechanism, and do not reduce upfront costs for improvements, they do better align incentives between building owners and tenants. With a growing consensus that the presence of attractive financing options is not sufficient to drive demand, the presence of lease terms that better incentivize reduced energy use could help advance the market.

Limitations

There are quite a few obstacles that have prevented green leases from being commonplace. Though possible, tenants and owners typically do not want to modify contracts in the middle of a lease, so they will wait until the lease is up before signing a green lease. This causes delays to retrofitting a building. Moreover, the recession has created a "tenants' market" in which owners do not want to add any factors that might delay or jeopardize lease signings. To remedy this, the tenant must be proactive and initiate the conversation with the landlord about greening the space.

Green leases are also a relatively new concept, so there is lack of standardization and knowledge about green buildings in the leasing industry. Definitions of "green", "green audits" and "sustainable" vary across the industry (California Sustainability Alliance 2009). Many energy efficiency benefits are not clearly quantitative and are therefore not understood or accepted by parties, preventing upgrades from being financed and agreed to. There must be estimations of the amount of energy that will be saved from an upgrade, and an estimation of costs and savings over time.

A second obstacle is that lawyers are frequently hired to negotiate the key points in green leases. There is no "standard" lease, so it is difficult to drop in a standardized clause. Green leasing measures can be applied to the shell of the building before construction has begun, to tenant spaces only, or to building operations. A building operations green lease could affect the building managers and workers, which adds another complexity. Also, the ownership of the energy efficiency equipment needs to be decided upon. Typically whoever purchases the equipment, owns it. Detailing this process significantly slows down the deal process and adds an additional cost to the lease, which neither party wants to pay. Therefore, the complexity and time needed to negotiate a successful green lease is often a barrier.

Driving Demand for Projects

Without sufficient demand for energy efficiency projects, there is no market for energy efficiency financing. Conversely, the availability of financing is not a solution for driving demand for energy efficiency investments. The future of this market is contingent upon the availability of reliable data and information about the performance of energy efficiency measures (EEMs), incentives (which may include but are not limited to attractive financing terms) that make investment in energy efficiency attractive compared to other types of investments, and timing projects and aligning payback and incentives in a manner that is worthwhile to all key stakeholders in the space.

BENCHMARKING AND SUBMETERING

Data and information about building performance are critical to driving demand for projects. Without understanding how energy use affects an owner's bottom-line, or how building performance compares with others in the market, it is difficult to make the case for pursuing energy efficiency improvements.

Several municipalities are attempting to minimize the information gap by requiring benchmarking of building performance. Benchmarking enables building managers to compare performance with similar buildings and compare a building with itself over time; and to identify efficiency investments and verify savings from investments. New York City is leading these efforts with their comprehensive Greener, Greater Buildings Plan. Philadelphia, the District of Columbia, Austin, Boston and Minneapolis, and the states of Washington and California have all adopted benchmarking requirements, as well.

The New York Greener, Greater Buildings Plan was conceived as a component of PlaNYC, the city's overarching sustainability plan, to address energy waste in the large existing building stock. Buildings with over 50,000 square feet account for nearly 45% of the city's total greenhouse gas emissions. The Greener, Greater Buildings Plan was enacted in 2009 with the passage of four local laws and the subsequent establishment of the New York City Energy Efficiency Corporation (NYCEEC) for financing. At its core, the program seeks to empower decision-makers with information that encourages the pursuit of cost-effective energy efficiency measures (PlaNYC 2013).

The four laws require that large buildings (greater than 50,000 square feet) benchmark their energy performance annually (Local Law 84), conduct an energy audit and retro-commissioning[4] study every 10 years (Local Law 87), and upgrade lighting in commercial space to meet code and install submetering (Local Law 88). Local Law 85 (LL85) requires the adoption of a local energy code. The city estimates that the laws will generate $700 million in savings and create roughly 17,800 construction jobs over 10 years (Burr and Sherwin 2012).

Local Law 84 was enacted in 2009, requiring nearly 3,000 public buildings, such as libraries, police and fire stations, and schools, with more than 10,000 square feet to be benchmarked by May 2010. In May 2011, 16,000 private commercial and multifamily buildings with more than 50,000 square feet were required to submit a benchmarking report, and subsequently given a

[4] Retro-commissioning is a systematic, documented process that identifies low-cost operational and maintenance improvements in existing buildings and brings the buildings up to the design intentions of its current usage.

3-month grace period for compliance. After the grace period, two-thirds of buildings had complied. The city has found that those in the consulting and service provider community have been proactive in building small business ventures to aid building owners with compliance (PlaNYC 2013).

Submetering and individually metering units within multi-tenant and multifamily buildings can both assist tenants in controlling their energy use, and drive potential demand for improvements. There is evidence to suggest that submetering may have advantages over individual energy audits in pinpointing potential energy savings measures because it can capture information over time (NSTC 2011).

The Department of Energy is also attempting to close the energy information gap and drive demand through the construction of the Buildings Performance Database (BPD). The Buildings Performance Database is a platform that enables users to perform statistical analyses on an anonymous dataset of tens of thousands of commercial and residential buildings from across the country. Users can examine the actual energy performance and physical and operational characteristics of similar buildings to quantify the likely energy savings, financial performance, and risk profiles of specific energy efficiency improvements (DOE 2013).

PROJECT TIMING AND OPPORTUNITIES

While there are options available for reducing upfront costs and aligning incentives for commercial projects, a highly significant barrier to the pursuit of retrofits is project timing. There are many implicit costs associated with pursuing retrofits in commercial buildings, and the costs of tenant relocation for deep retrofits can be significant. However, there may be several key opportunities to approach projects in existing buildings: during build-out when new tenants are beginning occupancy, during refinancing, or when undertaking critical repairs or complying with building or safety codes.

As evidenced below, it likely makes the most sense for building owners and tenants to invest in efficiency when they are making other capital decisions. Market transformation is contingent upon aligning attractive financing options with key opportunities. More importantly, timely delivery of information about the value of efficiency improvements at a point of key opportunity could play a critical role in driving demand. Below, we explore the key opportunities for project timing.

Focus on Build-out

There is a noted "compounding effect" when owners and tenants collaborate to develop highly efficient spaces. Tenants that value efficient spaces will tend to remain in buildings longer, and owners gain a competitive advantage in attracting and retaining high-value, reliable tenants (Fok and Hale 2012). Yet in addition to the split-incentive issue, a lack of economic and energy use data and the absence of a clearly defined collaborative process to assist tenants and building owners in analyzing costs and benefits of energy saving strategies can limit the pursuit of projects (Fok 2012). The National Resources Defense Council is currently working on tools to facilitate collaboration between owners and tenants, beginning with efforts to quantify the economic value of investments made by tenants in improving the energy efficiency of their space.

A critical moment for owner-tenant collaboration is during lease signing and lease renewal. These are most often the decision points for pursuing green leases, which are discussed above.

During an initial lease signing, there is often an expectation that there will be investments made to "build-out the space in anticipation of tenant's arrival. During build-out, new lighting is often installed. There may also be opportunities for improving the delivery and control of heating and cooling in spaces. Also, tenants often purchase new plug-in devices and there is an opportunity to encourage them to purchase more efficient ones. Up-to-date information about the energy performance costs of the space, how those costs compare to those in comparable spaces in the market, and timely delivery of the information from a trusted source are likely critical to driving demand for efficiency investments.

Refinancing

As mentioned previously, the market for refinancing for commercial office space is likely high in the wake of market activity prior to the Great Recession. The practical opportunity for introducing efficiency investment decisions into this process may be limited, but there are some specific opportunities to leverage federal programs for small businesses and multi-family buildings to encourage consideration of efficiency in the future.

The Green Refinance Plus program, for example, targets older, affordable multi-family properties, providing funding for refinance, as well as preservation and energy efficiency retrofits. This enhancement of the Fannie Mae/FHA Risk Sharing program will utilize a Green Physical Needs Assessment process that will ultimately reduce operating and capital costs, as well as utility costs. (HUD 2013)

Finding Opportunities with Other Required Improvements

In addition to voluntary opportunities to invest in property improvements, building owners are often required to pursue improvements to comply with safety codes and building codes. Tying efficiency opportunities and incentives to these types of projects may help to advance the market, as is seen with policies such as benchmarking requirements. The increased information available will potentially drive demand in the market.

Conclusion and Recommendations

It is not likely that financing will directly drive investment in energy efficiency in commercial office buildings. In many cases with Class A (and some professionally managed Class B) buildings it will not be necessary. However, there is a market for energy efficiency-specific lending amongst building owners with less cash on-hand. Many of these products including MESAS, C-PACE, on-bill repayment and green leasing can be structured to overcome some split incentives.

Multi-tenant leased space is a hard-to-reach market due to a variety of barriers enumerated in this report. Financing is a tool within the toolkit to address these barriers, and it can be useful within particular subsectors including Class B and Class C office, and affordable multifamily where available capital is often limited. Therefore when designing programs and incentives to drive efficiency demand, it is important to consider consider how various financing options would support these demand-driving programs.

Without sufficient demand for energy efficiency projects, there is a limited market for energy efficiency financing. Conversely, the availability of financing is not a solution for driving demand for energy efficiency investments. The future of this market is contingent upon the availability of reliable data and information about the performance of EEM's, incentives (which may include but are not limited to attractive financing terms) that make investment in energy efficiency

attractive compared to other types of investments, and timing projects and aligning payback and incentives in a manner that is worthwhile to all key stakeholders in the space. The scalability of this market is contingent upon the availability of financial performance data. This type of information is important for unlocking sufficient levels of private sector capital to fulfill the market's potential.

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Appendix A: Market-Specific Descriptions and Barriers

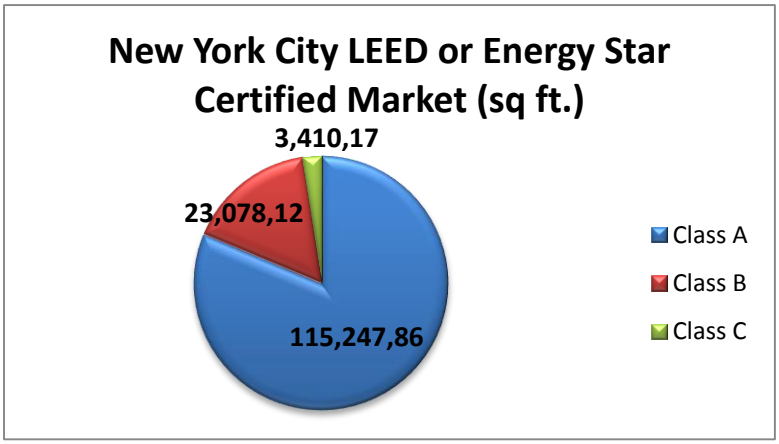
Barriers to finding effective solutions for catalyzing investment in energy efficiency and the demand for financing varies from market to market due to environmental factors such as diversity of building stock, cultural responses to energy efficiency, fuel mix, local climate, and owner/manager/tenant models. Thus, it is difficult to find solutions that can be directly replicated in diverse markets. In order to provide examples of how these regional differences can be important, we researched the real estate markets in several metropolitan regions with diverse geographical locations across the country.

New York City

Table A-1. New York City Market Characteristics

Type	Average Space (sq ft)	Multitenant Space (sq ft)	Vacancy	LEED or ENERGY STAR Certified
Class A	692,134	294,151,148	8.6%	39.18%
Class B	117,169	149,544,159	5.8%	15.43%
Class C	38,262	70,148,946	6.1%	4.86%
Multifamily	43,449	704,879,513	x	0.28%

Source: CoStar 2012



Source: CoStar 2012

Market Overview

New York City is the largest commercial office market in the country. The market boasts about 500 million square feet of space, with relatively close demand for Class B office space. Vacancies have risen in recent quarters due to uncertainties in the financial services sector, which showed low employment growth, combined with new office availabilities. 2013 predictions show a decrease in vacancies due to job growth. There is lots of large, high quality space available, and new space will be pricy (JLL NYC 2012).

In the competitive New York market, the demand for Class B space can be high, as it is often seen as an affordable alternative in prime locations to Class A and trophy properties. Therefore, a great deal of the efficiency potential may be found in the Class C market, which in Manhattan

can be described as "Class B buildings that lack services." The New York Times notes that many of these buildings have in recent years been upgraded to Class B standards or converted into residential space (Satow 2011).

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Notable Energy Efficiency Programs

The New York market is a leader in energy efficiency. Given the size of the market, the potential for meaningful energy savings is also high. The retrofit of the Empire State Building, led by Jones Lang LaSalle is an often-cited case study. The project is expected to reduce energy consumption in the pre-war, Class B building by 38%, resulting in $4.4 million in energy savings.

More broadly, the city has positioned itself to reduce energy use through the Greener Greater Buildings Plan. The New York Greener, Greater Buildings Plan was conceived as a component of PlaNYC, the city's overarching sustainability plan, to address energy waste in the large existing building stock. Buildings with over 50,000 square feet account for nearly 45% of the city's total greenhouse gas emissions. The Greener, Greater Buildings Plan was enacted in 2009 with the passage of four local laws and the subsequent establishment of the New York City Energy Efficiency Corporation (NYCEEC) for financing. At its core, the program seeks to empower decision-makers with information that encourages the pursuit of cost-effective energy efficiency measures (PlaNYC 2013).

The four laws require that large buildings (greater than 50,000 square feet) benchmark[5] their energy performance annually (LL84), conduct an energy audit and retro-commissioning[6] study every 10 years (LL87), and upgrade lighting in commercial space to meet code and install submetering[7] (LL88). Local Law 85 (LL85) requires the adoption of a local energy code. The city estimates that the laws will generate $700 million in savings and create roughly 17,800 construction jobs over 10 years (IMT 2012).

Benchmarking enables building managers to compare performance with similar buildings and compare a building with itself over time; and to identify efficiency investments and verify savings from investments. Local Law 84 was enacted in 2009, requiring nearly 3,000 public buildings, such as libraries, police and fire stations, and schools, with more than 10,000 square feet to be benchmarked by May 2010. In May 2011, 16,000 private commercial and multifamily buildings with more than 50,000 square feet were required to submit a benchmarking report, and subsequently given a 3-month grace period for compliance. After the grace period, two-thirds of buildings had complied. The city has found that those in the consulting and service provider community have been proactive in building small business ventures to aid building owners with compliance (PlaNYC 2012).

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[5] Benchmarking compares a building's energy use with other similar structures and looks at how it varies from a baseline.

[6] Retro-commissioning is a systematic, documented process that identifies low-cost operational and maintenance improvements in existing buildings and brings the buildings up to the design intentions of its current usage.

[7] Sub-metering refers to the individual metering of utilities in a multi-use building.

Additionally, NYSERDA is offering the opportunity for multi-family buildings to gain low-interest financing on energy-saving building and renovation projects. Both market rate and affordable housing buildings are eligible for this financing.

Market-Specific Barriers and Opportunities for Energy Efficiency Investment

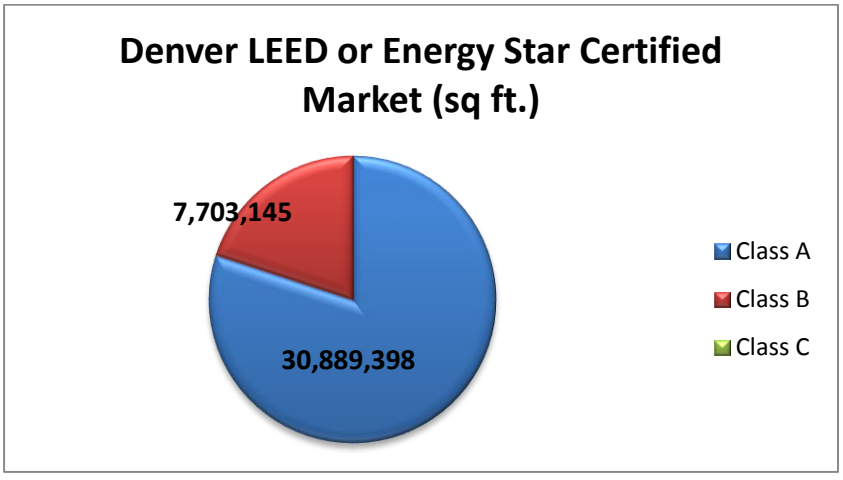
Given the saturation of the market, it can be difficult to relocate tenants in order to pursue building improvements. While the Greener, Greater Buildings Plan should provide additional information on building energy use, it may take the market some time to adapt to how to use this type of information. Competition for affordable space in a good location makes space very expensive, and energy use may be a low priority to the tenant unless there is sufficient evidence that it will help their bottom line. Lease negotiations may contain provisions for energy efficiency improvements, but given the highly competitive market, the cost burden will likely fall to the tenant. Class B space is saturated, so there may be opportunities for upgrading Class C spaces to make them competitive.

Denver

Table A-2. Denver Market Characteristics

Type	Average Space (sq ft)	Multitenant Space (sq ft)	Vacancy	LEED or ENERGY STAR Certified
Class A	190,519	49,347,452	14.6%	62.60%
Class B	26,683	81,095,261	16.1%	9.50%
Class C	7,702	18,220,349	9.2%	0%
Multifamily	44,564	255,352,632	x	0.12%

Source: CoStar 2012



Source: CoStar 2012

Market Overview

Denver's unemployment rate is decreasing due to growth in the oil and gas industry. Unemployment and vacancies in office buildings are correlated, thus, office demand is expected

to increase through 2013. As vacancies decrease in the central business district, landlords will continue to gain leverage there and also in suburban markets. Class A and B rental rates were similar in 2012, so Class A spaces increased in demand. This combined with the fact that there are few new buildings under construction means that landlords raising rates in Class A buildings and lowering concessions to tenants. Overall, Denver's property market is rising and landlords will have increasing market power in 2013. (JLL Denver 2012).

Notable Energy Efficiency Programs

Denver's drastic weather fluctuations throughout the year make energy efficiency upgrades a sensible way to save costs on utilities. The city's cold winters and dry, hot summers typically mean that buildings blow either air conditioning or heating through most of the year.

This City & County of Denver program provides free energy efficiency services to residents and businesses in Denver. The program offers free energy advising, loans for energy improvements, as well as recognition for those who take action (Denver Energy Challenge 2012). Elevations Credit Union also provides loans for energy efficiency and renewable energy upgrades for homes and businesses in Boulder and Denver. The counties have set aside nearly $8 million of grant funds to retrofit existing buildings and stimulating local economic growth (Elevations Credit Union 2012).

Xcel Energy's Business Demand-Side Management products serve both commercial and industrial customers with their offerings. The plan estimated to save over $88 million in energy expenditures in 2012. Many products focus on upgrading the most common equipment, but there are custom products available that encourage savings from new and unique technologies or measures. Educational products that help customers identify efficiency opportunities are also available. These customers also pay a Public Service business rate for electric and retail natural gas service (Xcel Energy 2011)[8].

The City of Denver has sustainability goals to reduce energy usage by one percent annually, and by five percent by 2011 compared to the 2006 baseline. To achieve this, all new City building construction and major renovations are required to be built and certified at least LEED Silver and achieve ENERGY STAR status (DSIRE 2013b).

Market-Specific Barriers and Opportunities for Energy Efficiency Investment

There is PACE-enabling legislation in Colorado, but programs are not running at full-scale in Denver. Relatively low vacancy rates in Class C buildings may indicate that there is opportunity within that class (though relative square footage is small). It is likely that Class B space is where most of the market opportunity is, as these buildings may better compete with Class A space with a LEED or EnergyStar certification or newer, more efficient equipment and lighting. As overall vacancies decrease, the Denver market may face similar challenges to New York, where energy efficiency costs will largely be borne by tenants, and opportunities for improvements may be few and far between.

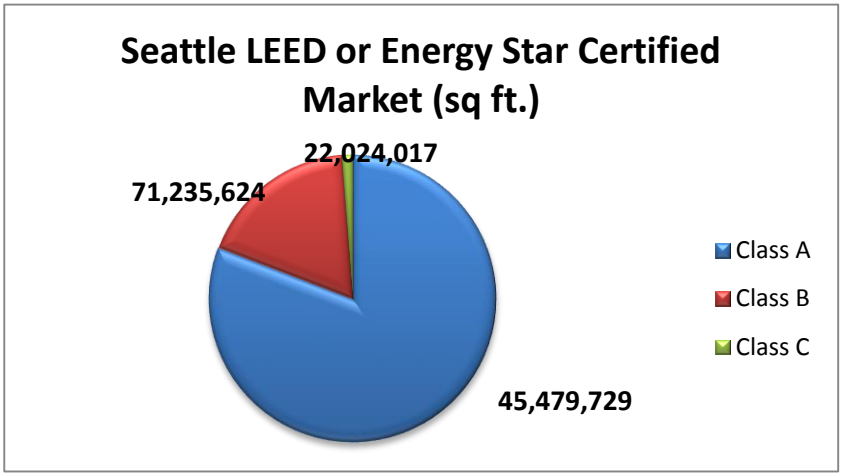
[8] See http://www.xcelenergy.com/staticfiles/xe/Regulatory/Regulatory%20PDFs/CO-DSM-2011-Annual-Status-Report.pdf

Seattle

Table A-3. Seattle Market Characteristics

Type	Average Space (sq ft)	Multitenant Space (sq ft)	Vacancy	LEED or ENERGY STAR Certified
Class A	224,900	45,479,729	15.8%	56.01%
Class B	32,865	71,235,624	13.4%	7.98%
Class C	7,086	22,024,017	7.7%	1.69%
Multifamily	30,191	304,114,569	x	0.11%

Source: CoStar 2012



Source: CoStar 2012

The technology sector is a large driver in demand for office space in the Seattle area. These tenants seek modern buildings with lots of natural light, state of the art facilities, and open, collaborative spaces. Thus, Class A space downtown is in great demand as large technology companies grow even larger and seek quality spaces. The unemployment rate in the Seattle-Bellevue-Everett area is 5.9%, significantly below the statewide average of 7.5%, leading to expectations that demand in office space will continue to grow through 2013 (JLL Seattle 2013). Though the business districts are experiencing rising markets where landlords have the power to set rents, the suburban market is experiencing more balanced conditions (JLL Seattle 2012).

It is worth noting that many tenant leases have capital recovery clauses that share the burden incurred by owners for investing in upgrades to their buildings. Many Class C buildings are targeted for demolition and redevelopment in the next few years, and are generally smaller in size with below-market rents, so upgrades in these buildings have not been pursued. If given the option, owners would generally prefer to construct a new energy-efficient building than retrofit an existing building because the cost of new construction is less than the cost of a retrofit 5 to 10 years later for the same improvements (Morgan 2012).

In January 2010, the Seattle City Council unanimously passed CB 116731, an ordinance that established a requirement for mandatory energy performance disclosure in commercial and

large multi-family buildings. High tech expansion is expected to fuel the recovery in the Puget Sound economy over the coming years (BetterBricks and Cushman & Wakefield, 2011).

Notable Energy Efficiency Programs

In terms of energy costs, Seattle's hydropower base makes energy significantly less expensive than in other parts of the U.S. This reduces building operating costs and decreases the risk in building investment, making buildings more creditworthy for funding. Thus, in Seattle, owners have more opportunities to purchase deeper energy-efficient upgrades with longer payback periods. (Kauffman 2012).

Puget Sound Energy (PSE) works with designers and developers of major remodels and new commercial facilities, and proposes cost-effective energy-efficient upgrades that exceed energy codes or standard practice. PSE also offers fixed rebates for commonly applied measures to commercial customers. Energy savings that are reasonably standardized over a wide variety of applications and have competitive market pricing can attain rebates. Then program refinements are made on an ongoing basis to ensure cost effectiveness and respond to changes in technology (PSE 2011).

Seattle City Light's Energy Smart Services offers financial incentives to help medium and large businesses including rebates, up to 70% of equipment costs for Lighting, HVAC, Controls, Transformers, Glazing and Insulation, and up to 70% of costs for qualifying industrial process improvements (DSIRE 2013e).

Market-Specific Barriers and Opportunities for Energy Efficiency Investment

Cheap fuel is a substantial barrier to investment in energy efficiency. Some building management companies are seeking utility sharing options for buildings close to each other, as well as options to sell back energy savings from efficient construction to the utility at a rate comparable to a retrofit (Morgan 2012). An obstacle for smaller projects looking to invest in energy efficiency is that utilities prefer to bundle small projects together before offering rebates, stalling improvements (Myrter 2012).

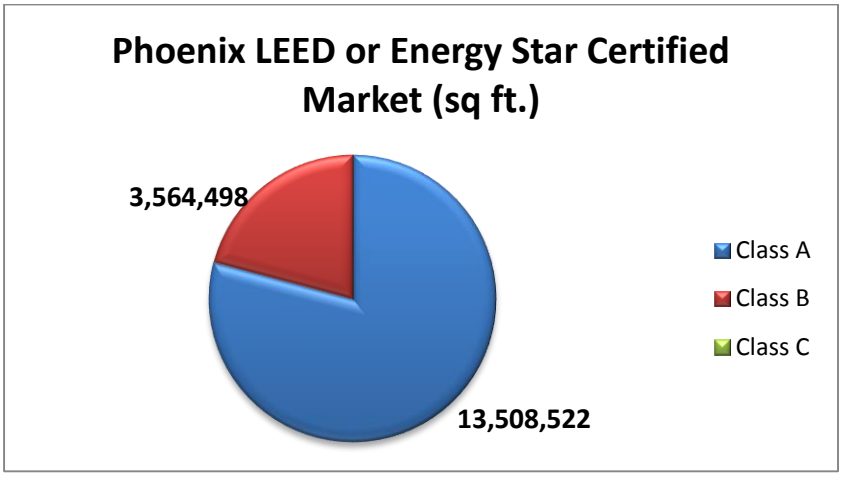
Given the demand for state of the art facilities with high aesthetics, it might be necessary for Class A buildings to upgrade to remain competitive. This is also a tremendous opportunity for Class C space, as reconstruction in the area presents a real opportunity for incorporating energy-saving measures. Financing could play a key role in this space as it could help with the overall costs of renovation.

Phoenix

Table A-4. Phoenix Market Characteristics

Type	Average Space (sq ft)	Multitenant Space (sq ft)	Vacancy	LEED or ENERGY STAR Certified
Class A	163,396	34,516,908	23.9%	39.14%
Class B	21,155	75,163,608	24.9%	4.74%
Class C	6,677	16,141,786	15.8%	0.00%
Multifamily	64,027	298,619,608	x	x

Source: CoStar 2012



Source: CoStar 2012

Market Overview

Phoenix's office building occupancy rate is volatile since employment rates in various sectors rise and fall from economic uncertainty in the U.S. The development pipeline in Phoenix is almost empty and the vacancy rate is above average. In Q1, 2013, Phoenix experienced employment declines in professional and business services, as well as in trade, transportation and utility sectors, but gains in the mining and logging industries (JLL Phoenix 2013). Tenants should have the upper hand in the Phoenix market through 2013, but begin to find good deals in nice places increasingly rare. Current vacancy rates in Phoenix are still quite high at over 20% (JLL Phoenix 2012).

Notable Energy Efficiency Programs

Energy efficiency programs are increasingly needed in Phoenix to cope with the rising demand of energy, particularly during the hot summers. The City of Phoenix has the Energize Phoenix incentive program which provides rebates up to $200,000 on energy saving technologies (DSIRE 2013e). The HVAC tune-up program offers incentives to help pay for a diagnostic performance check of HVAC cooling equipment for businesses in the Energize Phoenix Corridor.

The Energize Phoenix Business Program provides rebates for energy efficiency projects such as lighting, HVAC, motors and refrigeration (Energize Phoenix 2010).

The Salt River Project (SRP) has a Standard Business Solutions program that provides rebates for purchasing high-efficiency equipment used in lighting, HVAC, compressed-air and refrigeration applications. The SRP New Construction Solutions program provides consulting, technical assistance and financial rebates to help architects, engineering professionals and building owners optimize energy and demand savings, and reduce operating costs in new commercial buildings larger than 75,000 square feet that have a monthly demand greater than 400 kW. There is also a Retro-commissioning Solutions program, where SRP helps customers identify and implement low- and no-cost measures to improve the operation of mechanical and control systems to reduce energy and demand (SRP 2012).

APS' Multifamily Energy Efficiency Program is a comprehensive offers free energy assessments for common areas, free measures for resident units, and builder incentives for new construction and renovations based on ENERGY STAR's Home Performance standards (ACEEE 2013).

Market-Specific Barriers and Opportunities for Energy Efficiency Investment

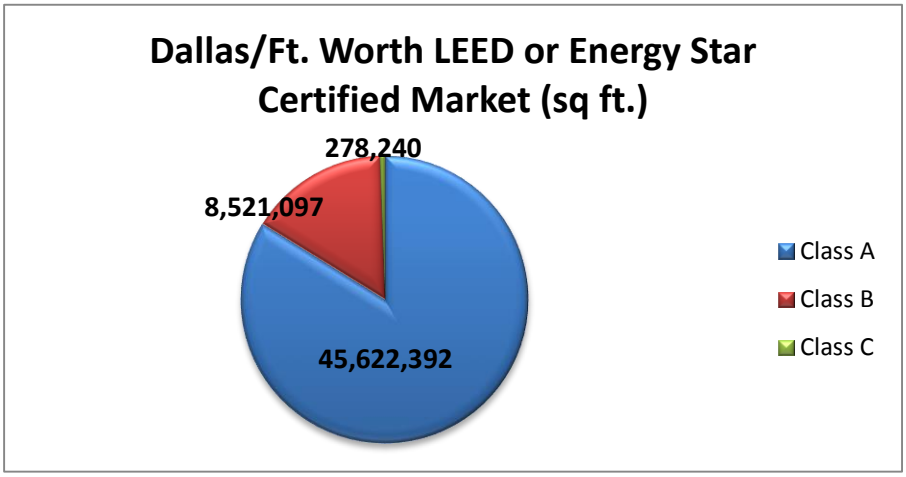
Given high vacancy rates, there may be a marketing opportunity for owners to attract tenants with energy-efficient buildings. Cooling costs can be significant and can potentially drive demand for energy efficiency, making it slightly easier to demonstrate potential cost savings. Class B buildings might gain a market advantage as space becomes more competitive.

Dallas

Table A-5. Dallas/Fort Worth Market Characteristics

Type	Average Space (sq ft)	Multitenant Space (sq ft)	Vacancy	LEED or ENERGY STAR Certified
Class A	280,785	102,801,251	19.4%	44.38%
Class B	35,497	120,713,645	21.9%	7.06%
Class C	9,453	34,560,517	14.0%	0.81%
Multifamily	129,696	598,548,029	x	0.05%

Source: CoStar 2012



Source: CoStar 2012

Market Overview

Dallas, unlike many of the other U.S. markets discussed, shows a strong pipeline of construction projects for 2013 in submarkets, and limited impact from the slow U.S. economy (JLL Dallas 2013). Dallas is considered one of the top metropolitan regions for job creation in the U.S. Top sectors for job creation include health care, professional and business services, hospitality, and construction, leading to impressive occupancy gains. Dallas is also a development-friendly city, and power that landlords have is predicted to decrease once new buildings are completed. Overall, the Dallas market is rising and the suburbs are asking for the highest rents (JLL Dallas 2012).

Notable Energy Efficiency Programs

In 2007, the Dallas City Council established a Green Building Incentive for commercial and residential buildings. All new construction will have to be LEED certifiable, Green Built Texas, or an equivalent green building standard (Dallas City Hall 2012). The ordinance calls for buildings that have less than 50,000 square feet of space to meet minimum energy consumption required by the Dallas Energy Conservation Code. Additionally, all new buildings must be LEED certified, meaning many new buildings will have ENERGY STAR Cool Roofs. New buildings that qualify for LEED silver or higher will also qualify for expedited review (DSIRE 2013a).

Oncor implemented energy efficiency Standard Offer Programs (SOPs) and Market Transformation Programs (MTPs) to meet its 20% energy efficiency savings goal, procuring 74,995 kW in demand savings Oncor provides incentives to Energy Efficiency Service Providers who install approved energy efficiency measures in business, government, nonprofit, and worship facilities in Oncor's service area. These include lighting, motors, cooling, ENERGY STAR® Roofs, window film, renewable energy projects, and process upgrades as well as new construction exceeding existing energy code baselines. (Oncor 2012).

Market-Specific Barriers and Opportunities for Energy Efficiency Investment

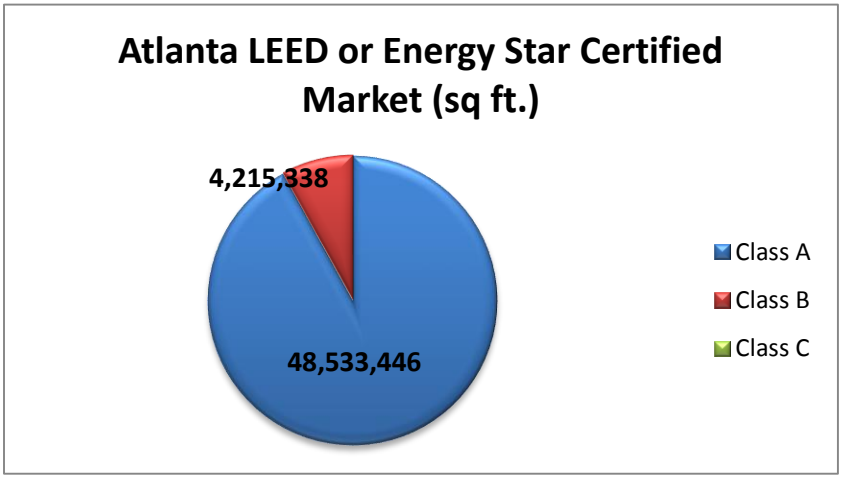
Dallas is another city with high cooling costs. Given the performance requirements for large, commercial office buildings, there may be high demand for financing opportunities. Texas recently amended and passed PACE enabling legislation, which Simon Properties and Prologis intend to utilize (PACENow 2013). In addition, there is a growing interest in enabling on-bill financing programs in Texas.

Atlanta

Table A-6. Atlanta Market Characteristics

Type	Average Space (sq ft)	Multitenant Space (sq ft)	Vacancy	LEED or ENERGY STAR Certified
Class A	230,887	100,662,464	19.1%	48.21%
Class B	22,672	99,514,582	20.0%	4.24%
Class C	5,893	39,762,138	15.9%	0.00%
Multifamily	134,145	491,238,773	x	0.09%

Source: CoStar 2012



Source: CoStar 2012

Market Overview

Many submarkets and Class B spaces in Atlanta have significant vacancies and no projections for increased job growth to reduce these vacancies. Atlanta still has new buildings that were added to the market in the last high-development period. Only Class A buildings seem to be benefiting from the trend toward quality office space. Overall, there are still no solid signs of growth for Atlanta's market recovery (JLL Atlanta 2012a). This means that rents are expected to stay low through the next year, and that tenants are making real estate decisions in advance to determine the best deals for their future plans. (JLL Atlanta 2012b)

Notable Energy Efficiency Programs

Georgia State offers corporate clean energy tax credits in the areas of lighting, lighting controls and sensors, and comprehensive measures. Companies can earn $.60 per square foot of building for lighting retrofits, and $1.80 per square foot of building for energy efficiency projects. The state has budgeted $5 million annually through 2014 for this program (DSIRE 2013d).

The Ygrene Energy Fund provides 100% financing to commercial property owners for renewable energy and energy efficiency improvements in its Clean Energy Atlanta program. Financing is repayable over the long term via property taxes, allowing customers to add value

to their homes or businesses with no upfront costs. The program also provides access to contractors to perform the upgrade, and web tools to track the project (Clean Energy Atlanta 2012).

The Georgia Power Company's (GPC's) EarthCents Commercial Custom Incentive program does not define a specific list of eligible measures but bases participation on the verifiable energy savings resulting from measures implemented. The Commercial Prescriptive Incentive program provides rebates to promote purchasing high-efficiency equipment installed at customer facilities. There is also an EarthCents Home Energy Improvement program that offers incentives for multifamily property owners (Georgia Power Company 2011).

Market-Specific Barriers and Opportunities for Energy Efficiency Investment

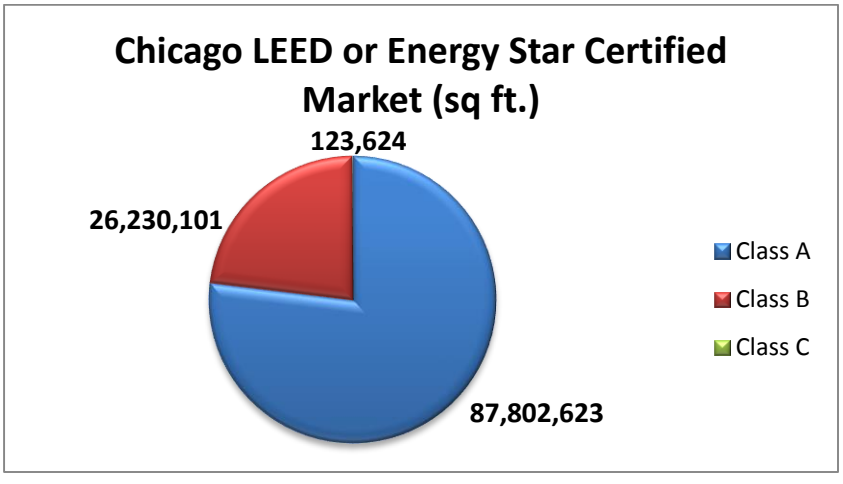
Currently, a very low percentage of Class B buildings are LEED or ENERGY STAR certified in Atlanta. With Class B space in such low demand, there could be opportunities in this market if there were some potential for reclassification.

Chicago

Table A-7. Chicago Market Characteristics

Type	Average Space (sq ft)	Multitenant Space (sq ft)	Vacancy	LEED or ENERGY STAR Certified
Class A	297,583	152,680,798	17.6%	57.51%
Class B	33,666	177,524,950	16.5%	14.78%
Class C	13,946	74,627,796	12.3%	0.17%
Multifamily	38,903	552,260,925	x	0.18%

Source: CoStar 2012



Source: CoStar 2012

Market Overview

Though Chicago's economy is growing slowly, the decrease in unemployment rate is a positive indicator for the future of office leases. There was no new supply of buildings in 2012 as Chicago is waiting for employment to pick up before rents can rise. Therefore, there are trends

of suburban tenants moving downtown, taking advantage of low rents (JLL Chicago 2012a). Tenant conditions in the business district will likely remain favorable in the near term, but large blocks of premium space are increasingly difficult to find (JLL Chicago 2012b).

Notable Energy Efficiency Programs

The Chicago Infrastructure Trust was created to facilitate infrastructure projects in the city. The Trust uses a range of financial tools to provide innovative, transparent financing strategies to fund various projects (Chicago Infrastructure Trust 2012).

The Retrofit Chicago initiative was announced by Mayor Emanuel in June 2012 to accelerate energy efficiency in commercial, residential, and municipal buildings across the city. The program began with 14 large, commercial buildings that signed on to the initiative, saving an estimated $5 million per year in energy costs. This initiative was inspired by The Obama Administration's Better Buildings Challenge which would create jobs as well as reduce energy usage (Retrofit Chicago 2013).

ComEd is has programs to reduce energy costs for all types of businesses and buildings. In multi-tenant, commercial buildings, ComEd's Smart Ideas for Your Business provides resources from real estate, engineering and marketing professionals to overcome split incentive issues that may arise. ComEd offers incentives for energy-efficient lighting, refrigeration, and variable speed drives on chillers, HVAC fans and pumps. ComEd also provides cash incentives for businesses that utilize their technical assistance in designing and constructing new buildings to surpass standard efficiency measures (ComEd 2013).

CNT Energy and Community Investment Corporation have an Energy Savers Multifamily Residential Exemplary Program that targets multifamily building owners. This turnkey model includes an Energy Savers team that guides building owners through every step of the process, from providing customized, cost-effective energy-saving recommendations for each building, to obtaining low-cost financing and utility rebates, overseeing construction, and ensuring reliable results. The hope is that the success of this turnkey approach to energy efficiency could lead to the development of similar programs in the Midwest and other parts of the country.

Market-Specific Barriers and Opportunities for Energy Efficiency Investment

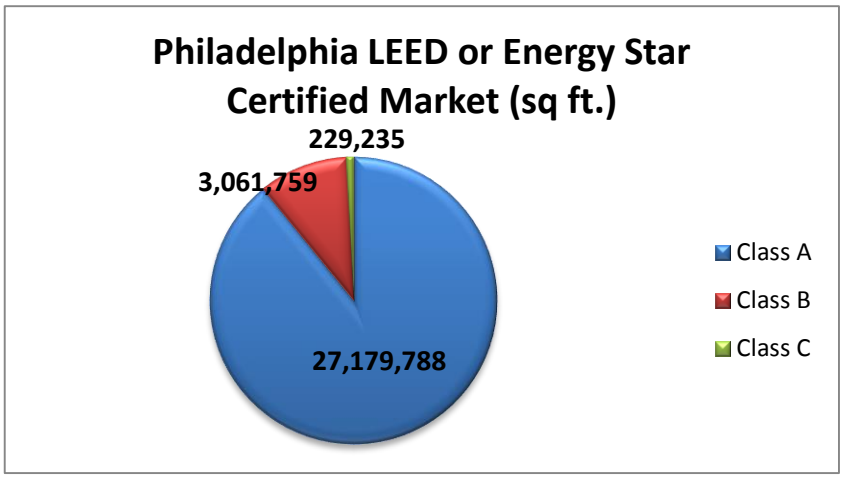
Much of the Class A retrofit projects Chicago is self-financed. As downtown office space continues to rise in demand, there may be significant opportunities to renovate and retrofit Class C space.

Philadelphia

Table A-8. Philadelphia Market Characteristics

Type	Average Space (sq ft)	Multitenant Space (sq ft)	Vacancy	LEED or ENERGY STAR Certified
Class A	135,474	108,360,203	13.9%	25.08%
Class B	22,5428	134,982,182	15.8%	2.27%
Class C	8,514	73,764,405	11.8%	0.31%
Multifamily	57,266	404,871,899	x	0.17%

Source: CoStar 2012



Source: CoStar 2012

Market Overview

Success in the Philadelphia market is largely due to mid-sized tenants renewing leases. Approximately 17,500 professional and business service jobs were added in 2012, but unemployment in the Philadelphia area remained flat. Overall, we see rents rising in the Philadelphia area and landlords gaining more power in the market (JLL Philadelphia 2012).

Notable Energy Efficiency Programs

Pennsylvania Act 129 of 2008, mandated energy savings and peak demand reduction goals for the largest electric distribution companies (EDCs) in Pennsylvania. Each EDC submitted energy efficiency and conservation plans which were approved by the Pennsylvania Public Utility Commission.

PECO has commercial energy efficiency programs that incentivize smart cooling, equipment and construction. The Commercial Smart A/C Saver Program is available to small commercial customers who install programmable thermostats in small businesses with qualified air conditioners. The Smart Equipment Incentives: Commercial and Industrial program offers incentives to customers who install high-efficiency electric equipment. The Smart Construction

Incentives (SCI) program provides facility designers and builders with training, design assistance, and incentives to incorporate energy-efficient systems in facilities, improving the energy efficiency of completely renovated or newly constructed facilities (Navigant 2012b).

In June 2012, Philadelphia passed energy benchmarking legislation for buildings over 50,000 square feet.

Market-Specific Barriers and Opportunities for Energy Efficiency Investment

Philadelphia is a fairly saturated real estate market, with low overall attention to energy efficiency. Class B space is likely the best segment to target for retrofit projects.

Appendix B: Typical Payback Periods for Energy Efficiency Measures

The table below summarizes the approximate payback period of some of the common energy efficiency measures employed in commercial and multi-family apartment buildings. Payback periods are on the incremental cost of the measure and are calculated as simple return of capital without any additional return. The data for these calculations are from multiple sources and as such the payback periods are estimates with no assurance of these being met in every case.

Efficiency Measures	Measure Life (Years)	Measure % Savings (relative to baseline)	Approximate Incremental Cost per Unit	Simple Payback (years)
Operations and Maintenance				
Retro-commissioning	5	10%	$0.13-0.75 per s.f.	1 to 2
Controls and set points	2	5-10%	Low	0 to 2
Building Shell				
Cool roof	20	10%	$ 1.5-3.0 per s.f.	3 to 6
Roof insulation	25	3%	NA	2 to 3
Low-e windows	25	4-10%	$ 2.0-4.0 per s.f.	4 to 6
HVAC				
Duct testing and sealing	10	10%	$3,375	1 to 3
Variable volume air handlers	10	25%	$6,650	2 to 4
High-efficiency unitary AC & heat pump	15	7%	$629	4 to 6
Packaged Terminal AC and heat pump	15	8%	$88	4 to 5
Efficient room air conditioner	13	13%	$35	3 to 5
High-efficiency chiller system	23	20%	$9,900	3 to 4
Dual enthalpy control	10	20%	$889	2 to 4
Demand-controlled ventilation	15	20%	$3,450	3 to 5
HVAC tune-up (smaller buildings)	3	11%	$158	1 to 2
Water Heating				
Energy star commercial clothes washer	11	62%	$300	
Heat pump water heater	12	50%	$4,000	
Refrigeration				
ENERGY STAR refrigerators	12	15%	$300	4 to 5
Efficient ice-makers	10	29%	$500	4 to 5
Vending machines (to ENERGY STAR V3)	10	50%	$250	2 to 3

Efficiency Measures	Measure Life (Years)	Measure % Savings (relative to baseline)	Approximate Incremental Cost per Unit	Simple Payback (years)
Vending miser	10	35%	$150	2 to 3
Lighting				
Replace T12 to T8 with electronic ballasts	13	27%		2 to 5
Replace incandescent lamps w/ CFLs	13	72%	NA	1 to 3
Replace incandescent lamps w/ LEDs	9	88%	$755	2 to 3
Occupancy sensor for lighting	10	19%	$48	1 to 2
Daylight dimming system	20	35%	$68	1 to 2
Outdoor lighting—controls	14	NA	$43	1 to 2
Office Equipment				
Smart power strips for office equipment	5	40%	$30	0 to 1
Turn off office equipment after-hours	5	30%	NA	0 to 1