



Innovations and Opportunities in Energy Efficiency Finance

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MAY 2012

Second Edition

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Introduction

The purpose of this white paper is to discuss key concepts in energy efficiency finance, with a focus on emerging solutions to long-standing barriers to financing projects in the United States, as well as the specific challenges posed by energy efficiency projects, and the potentially scalable solutions that have recently gained some market traction. Although this primer is principally written for readers not yet familiar with the details of energy efficiency finance who would like to achieve a working knowledge of the main concepts, issues, and developing solutions, this paper also presents a useful précis for readers already steeped in the details of energy efficiency finance.

Energy efficiency has long been recognized as the “low-hanging fruit” in delivering a clean energy economy, especially when compared to investments in capital-intensive energy generation technologies. According to the U.S. Department of Energy, buildings account for approximately 40 percent of total U.S. energy costs, which amounts to \$400 billion each year for residential and commercial buildings alone. Reducing energy use in U.S. buildings by 20 percent would save approximately \$80 billion annually on energy bills, and savings from commercial buildings would account for half of this amount, or \$40 billion.¹

Tapping into this enormous potential for energy efficiency projects to cost-effectively lower energy consumption would help create new investment opportunities, drive economic growth, reduce air pollution and greenhouse gas emissions, increase economic efficiency and productivity, create jobs, and advance energy security. Despite these benefits, advanced energy efficiency improvements and technologies have not yet been widely adopted.

This is changing now.

Recent innovations in energy efficiency finance and the development of new business models to address the first-time cost issue and other historical market barriers have begun to accelerate this sector’s growth, and billions of dollars in project opportunities are being driven by renewed investor interest and important legislative changes. Federal mandates, state-level regulatory proceedings, and state-level financing support, in concert with innovative financing methods, are mobilizing capital for energy efficiency projects and further mitigating project-level risks.

An expanding menu of energy efficiency finance strategies is also encouraging more rapid adoption of cutting-edge technologies related to energy efficiency, such as smart grid hardware and software, energy information management and sensor controls, demand response, energy storage, super efficient lighting, and other building mechanical and electrical equipment, as well as distributed renewable generation technologies. These technologies, in turn, can facilitate more solutions to existing challenges in implementing energy efficiency projects on a larger scale.

This primer provides an overview of five major energy efficiency finance models prevalent today in the United States:

- (1) the energy savings performance contract (ESPC) model implemented by an energy service company (ESCO);



- (2) the energy services agreement (ESA) model;
- (3) the managed energy services agreement (MESA) model;
- (4) the Property Assessed Clean Energy (PACE) model; and
- (5) on-bill financing and on-bill repayment (OBF/OBR) approaches.

It also provides an analysis of the main challenges, legal considerations, and opportunities associated with scaling and deploying these models. While many other energy efficiency finance options also exist, these five models are among those attracting significant interest from both private-sector and public-sector stakeholders. This paper outlines an evolving roadmap, which we will update periodically as significant innovations in energy efficiency finance continue to be developed and refined.

I. An Introduction to Energy Efficiency Finance

A. What is Energy Efficiency Finance?

The objective of energy efficiency finance is to provide building owners with a cost-effective alternative to using their own cash on hand for the purchase or installation of energy efficiency improvements. Energy efficiency finance structures provide building owners with access to up-front capital and financing for a specific set of facility energy improvements, which are then repaid over time as energy savings are generated. Numerous financing structures propose different arrangements for how and when the cash flows from energy savings are shared among the finance provider, customer, end-user, or other project investors. The suitability of a particular financing model often depends on a combination of factors, from project size and anticipated payback period to utility incentives/rebates and security features, to name but a few.

No single “silver bullet” for financing energy efficiency projects has yet emerged. Instead, various energy efficiency finance models have developed to address the particular needs of specific end-user and customer markets, which may be generally categorized as follows:

1. Municipalities, universities, schools, and hospitals (often dubbed the “MUSH” market)
2. Commercial and industrial businesses
3. Residential customers

1. *The MUSH market*

The MUSH market generally refers to properties that are owned and operated by government entities and by nonprofit institutions, such as municipal buildings, universities, other schools, and nonprofit hospitals. These governmental and institutional properties typically have tight operating budgets, but may be able to more easily access tax-exempt municipal leases or bonds to finance energy efficiency capital improvements.

While this market segment has access to a wide range of energy efficiency finance options, such as general obligation municipal bonds or state or local government loans funded by bonds, and federally subsidized finance tools such as Qualified Energy Conservation Bonds, tax-exempt lease financing is currently the most common tool to finance energy efficiency projects, installed usually by ESCOs. Indeed,



ESCOs derive more than half of their revenues from the MUSH segment.ⁱⁱ Recently, more MUSH building segment owners have been examining alternative approaches to the ESPC/ESCO model commonly used to finance energy efficiency projects, such as the ESA and MESA models. Each of the ESPC, ESA, and MESA financing structures is discussed in further detail in Section II.

The MUSH segment is beginning to circle back to a more “energy services”-oriented financing model, which was first introduced in the U.S. in the 1980s but then gradually lost market share in favor of the ESPC structure. Thirty years later, through an energy services contract such as an ESA or MESA, some ESCOs or project developers are once again sharing the amount of energy savings with the property owner. These financing models encourage the ESCO or project developer to minimize the capital investment required and to maximize the energy savings achieved.ⁱⁱⁱ

2. Commercial and industrial market

The commercial and industrial market segment includes a range of end-users: industrial users, small and large commercial businesses, other commercial real estate, and market-rate multifamily (defined as five or more) units. While this market segment encompasses several different kinds of properties, from a financing perspective, these end-user groups often have similar economic objectives.

This market segment presents a huge opportunity, accounting for 65 percent of the total end-use efficiency potential in the U.S., according to a recent report by McKinsey & Company.^{iv} Possible funding sources in the commercial and industrial market include traditional bank loans, self-funding for large corporations, loans funded by bonds, commercial PACE financing, on-bill utility financing, lease financing options, the ESPC/ESCO model, ESA financing, and MESA models.

3. Residential market

In the single-family residential sector, traditional sources of funding, such as unsecured loans and credit and home equity lines of credit, are the primary means for financing energy retrofits in most parts of the country. In addition, utility or state-administered rebates supplemented by federal and state funds are being used to finance relatively “low tech” projects such as window and door replacements, sealing and insulation, HVAC, and appliance upgrades. New and innovative models for financing energy efficiency are beginning to emerge, including PACE and OBF/OBR. The use of PACE in the residential sector is currently on hold pending the resolution of a rulemaking proceeding at the Federal Housing Finance Agency (FHFA) and related litigation. California is exploring the use of On Bill Repayment in the multi-family residential sector, and New York’s On-Bill Repayment program provides loans to retrofit both single-family and multi-family residential buildings. The PACE and OBF/OBR models and the associated legal issues are discussed in greater detail below.

B. Energy Efficiency Finance – Risks and Returns

Like many renewable energy projects, energy efficiency projects involve many stakeholders, including end-users, technology providers, engineering procurement and construction (EPC) firms, project developers, investors, financiers, and utilities. Given this mix, energy efficiency projects and financing arrangements can quickly become complex due to diverse stakeholder interests and the introduction of



new technologies and regulatory and incentive structures. In addition, up-front capital costs, long payback periods, or performance risk aversion can discourage energy efficiency investments, even when capital for energy efficiency projects is available. Navigating and integrating financing from multiple and often complex sources (e.g., private investors, utilities, governmental sources) to address some of these challenges is further complicated by the fact that applicable regulations and incentives vary drastically from state to state and continue to evolve at the federal level. This complexity often results in high transaction costs, especially in the more fragmented commercial and residential segments. However, new financing and business models have emerged to better address these issues, alleviating some of the pain points associated with payback periods and up-front capital investments borne by the customer.

A successful energy efficiency finance structure incentivizes each of the major stakeholders involved, and balances the relative risks of implementing energy efficiency improvements with the resulting energy savings returns and benefits. Each of the five energy efficiency finance models examined in this paper achieves this balance in a different way, and addresses the following major issues to varying degrees:

First-Cost Hurdle	<ul style="list-style-type: none"> •How to finance the initial capital investment in energy efficiency measures at little or no up-front cost to the end-user •How to enable and incentivize the use of more efficient but potentially more expensive upgrades rather than lower cost, lower efficiency upgrades
Timing Mismatch	<ul style="list-style-type: none"> •How to overcome the mismatch between the longer useful lives and varying payback periods of some energy efficiency improvements (such as HVAC equipment) and the sometimes shorter expected occupancy of the property (whether by a property owner or a tenant)
Split Incentives	<ul style="list-style-type: none"> •Particularly prevalent in the commercial real estate sector, how to balance the different time horizons and incentives of a tenant versus a property owner
Scalability	<ul style="list-style-type: none"> •How to achieve scale by aggregation despite the often fragmented and disparate nature of the targeted market and facilities
Existing Property or Financing Restrictions	<ul style="list-style-type: none"> •Restrictions under existing mortgages on mortgaged property or under existing debt financing to property owners
Energy Baseline Measurements	<ul style="list-style-type: none"> •Where payments to service providers and sponsors are based on performance, how to establish baseline energy usage and normalize for changes in energy consumption that are not related to the energy efficiency project

A brief assessment of each examined financing model relative to these issues is summarized below.



1. ESPC/ESCO model

In the traditional ESCO model using an ESPC, the customer owns the energy efficiency improvements and the initial cost of equipment and installation may be self-funded by the host customer, particularly if the host customer is in the MUSH segment and can access university endowment funds, maintenance and reserve accounts, or other cash on hand. MUSH building owners have also often combined some equity contributions with some form of debt or lease financing to fund the up-front costs.

The timing mismatch and split incentive issues arise less frequently in the MUSH context because these are typically facilities that are occupied for many years, either owned by the customer or under a long-term lease.

Lease financing can take many forms, such as capital leases, operating leases, or, where available, tax-exempt lease purchase agreements. For building owners interested in using off-balance sheet structures, operating leases and tax-exempt lease purchase agreements may be suitable to finance certain kinds of energy efficiency improvements, depending on the residual value of the equipment involved. Lease financing also offers a flexible way of addressing the timing mismatch issue noted above, since the timing of lease payments can be structured to coincide with the projected energy cost savings and payback period under the ESPC and to accommodate the customer's cash flow demands.

A master lease agreement structure may be used to aggregate a series of energy efficiency projects to be implemented over time. The master lease agreement establishes a framework agreement, with separate leases executed on a project-by-project basis.

In addition, other debt financing such as bonds and loans may be used to finance energy efficiency improvements using the ESPC/ESCO model. Larger projects for creditworthy institutions may be able to access greater amounts of capital through the bond capital markets. Of course, debt financings or lease financings would need to be compatible with any existing mortgage restrictions that may apply to the applicable properties.

2. ESA and MESA models

In both the ESA and MESA models, the customer does not front the initial cost of the energy efficiency project, but instead enters into an ESA or a MESA with an energy services provider. This energy services provider handles the first-cost hurdle by fronting 100 percent of the capital to finance the energy efficiency improvements. Pursuant to the ESA or MESA, the ESA/MESA service provider owns the energy efficiency improvements and the customer pays the energy services provider over time, based, for example, on a cost-per-avoided-unit-of-energy basis, a floating percentage of the host customer's actual utility rate, or agreed-upon historical energy costs. Building owners can thus avoid expensive initial capital outlays using these PPA-like arrangements. Moreover, ESA and MESA financings may be structured as off-balance sheet for the customer under current accounting rules, and generally do not run afoul of existing mortgage restrictions.

The ESA/MESA structure can also offer an innovative solution to the split-incentive issue in multi-tenant commercial properties. Under most standard multi-tenant commercial property leases, a tenant pays its



own energy bills. The ESA/MESA financing model may allow the building owner to enter into an ESA/MESA to improve the energy efficiency of the building as a whole (thereby reducing the tenant's utility bills) and then pass through to its tenants, per the commercial lease terms, an applicable share of the ESA/MESA energy payments that the landlord pays to the energy service provider.^v Due to the decrease in the tenant's utility bills, this arrangement should be cash-flow positive for the tenant.

ESA and MESA models are particularly well suited for larger energy efficiency projects rather than smaller-scale improvements in the residential market. Standardized ESA contracts and structures could be used to aggregate projects and achieve greater economies of scale. With their often equity-like returns, energy efficiency projects financed using the ESA and MESA models may also be appealing vehicles for private equity investors interested in investing in this sector.^{vi}

3. PACE and On-Bill Finance and Repayment models

PACE financing models address many of the hurdles described above. PACE financing is a solution to the first-cost hurdle that allows local governments to use their traditional assessment or improvement district authority to provide property owners within their communities with the up-front capital for energy efficiency projects. The capital investment is then repaid through assessments levied on property that benefits from these improvements. The property assessments are secured by a lien that, as with other local government taxes and assessments, ranks senior to a mortgage lien.

Since a PACE lien is tied to the property, the term of the financing can be very long (up to 20 years in some jurisdictions). Even if the owner sells the property or a tenant leaves, the lien remains on the property. PACE has the potential to create the kinds of standardized assets that are more easily securitized and if a large enough volume of PACE loans can be aggregated, larger pools of financing may be accessed through securitization.

Due to actions by the FHFA and mortgage industry concerns, the implementation of PACE in the past two years has centered around the commercial markets. In several current commercial PACE financing programs, mortgage holder consent to the senior PACE lien is required, and in some cases, the total amount of the PACE assessment may be limited to a certain percentage of the property's value. As more jurisdictions develop commercial PACE programs and as FHFA's regulatory proceeding relating to residential PACE moves forward, this energy efficiency finance model may continue to gain ground.

On-bill finance and repayment models provide yet another method to address the first-cost hurdle for the customer in which the utility or a third party provides a zero- or low-interest loan or tariff to the customer to finance up to 100 percent of the energy efficiency improvement cost. The customer repays the loan or tariff in installment charges that are added to the customer's regular utility bill. In some cases, the threat of utility disconnection can reduce the risk of default or delinquency. The customer's monthly repayments are usually less than or equal to the energy savings. On-bill loans may be tied to the customer (i.e., if the customer moves, it must pay off the loan) or structured as tariffs that run with the meter (i.e., if the customer moves, the next occupant continues to pay the tariff).

While tying on-bill finance models to a participating utility can offer many advantages, these may also be offset by several disadvantages, as examined more fully in Section II below. The balance of pros and



cons using an on-bill finance approach depends very much on the particular utility's situation and resources.

C. Taking Measurements in Energy Efficiency Finance

It has become almost axiomatic that implementing energy efficiency improvements is the most cost-effective, rapid way to achieve energy efficiency goals and reductions mandated by both the federal and state governments, and to achieve voluntary goals adopted by a growing number of forward-thinking businesses.

A guiding principle in energy efficiency finance, often called “bill neutrality,” is that the total amount of energy savings achieved by an energy efficiency project should equal or exceed the cost of installing and servicing the energy efficiency improvement. How these energy efficiency benefits and costs are measured, however, is not as straightforward as it may first seem. Some corporations, for example, have historically used a simple payback method of calculating their returns on energy efficiency investments. Alternatively, an Environmental Defense Fund program shows how other corporations have begun to use more sophisticated cost-benefit analyses that incorporate net present value (NPV) calculations, “resulting in a more reasoned choice between projects with only modest NPVs but short payback periods and projects with very significant NPVs despite somewhat longer payback periods.”^{vii}

A related and critical development with a potentially significant impact on energy efficiency finance that has recently received increased attention is the appraisal process for properties. In June 2011, the Appraisal Foundation, a key source of national appraisal standards, and the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy announced an MOU to cooperate on creating guidelines under the Uniform Standards of Professional Appraisal Practice for green appraisals and energy performance. Because of the fundamental gatekeeper role that appraisals play in property valuations and access to finance, moving toward an industry-wide consensus on how to value greener buildings could significantly impact calculations of returns on investment in energy efficiency finance projects.^{viii}

Moreover, property appraisals currently do not incorporate the value of energy efficiency improvements because there is no uniform standard for doing so. Federal legislation has been proposed (but not adopted) that would define more standardized rating codes and require that the value of existing efficiency improvements be incorporated into property value. If adopted, this would directly impact energy efficiency financing.

Another market challenge has been the cost of performing energy audits. This is one reason that mortgage brokers and financiers do not require them. However, new home energy audit technologies are currently being developed to help bring down the cost of up-front appraisals, where both reporting standardization and requirements would make these assessments more economical and desirable for customers, mortgage brokers, and investors.

One difficulty for the energy efficiency finance structures—such as ESPC, ESA, and MESA—that are driven by the amount of energy savings actually realized by the energy efficiency improvements is difficulty in identifying the source of changes in energy consumption by the customer. Fluctuating occupancy rates, equipment usage and changes, behavior, and other factors that are out of the control



of the ESCO or the ESA/MESA project developer can undermine the efficiency project's energy savings performance, and thus the ESCO's or ESA/MESA project developer's payment stream. The customer and the ESCO or ESA/MESA project developer will go to great lengths to establish the baseline energy patterns of the customer and to determine the methodology for calculating what changes to that baseline are attributable to the energy efficiency measures for purposes of payment. One solution to this approach is to define the efficiency project's performance metrics on criteria other than electricity reduction. For example, payments are sometimes based on the average availability of the energy efficiency equipment instead of the energy savings.

Since the measurement and verification of energy efficiency savings and costs is a critical decision point for both the customer considering whether to implement and finance an energy efficiency improvement and the providers of energy efficiency finance, continued innovation in these areas will provide crucial tools to facilitate energy efficiency financings.



II. Energy Efficiency Finance Structures and Negotiating Key Agreements

The market has embraced energy efficiency as more than just incremental product upgrades; energy efficiency projects are increasingly integrated, engineered systems comprised of advanced technology products as well as the associated unique and valuable services that demand equally unique financing solutions. Figure 2 below summarizes the five emerging energy efficiency finance models covered by this primer. The ESA and MESA models have diverged from the more traditional ESPC model, while the PACE and on-bill models have developed independently as a response to market demand.

Figure 2: Energy Efficiency Finance Models

Financing Model	Energy Savings Performance Contract (ESPC)	Energy Services Agreement (ESA)	Managed Energy Services Agreement (MESA)	Property Assessed Clean Energy (PACE)	On-Bill Financing/Repayment (OBF/OBR)
Market Penetration	High for MUSH; low for Commercial and Industrial	Low	Low	Low	Low
Target Market Segment	MUSH, Commercial, and Industrial	MUSH, Commercial, and Industrial	MUSH, Commercial, and Industrial	Residential, Commercial	Residential, Commercial, and Industrial
Balance Sheet	On or Off	On or Off	On or Off	Undetermined	On or Off
Typical Project Size	Unlimited	\$250,000 - \$10 million	\$250,000 - \$10 million	\$2,000 - \$2.5 million	\$5,000 - \$350,000
Allows for Extensive Retrofits	Yes	Yes	Yes	Yes	No
Repayment Method	Energy savings	Energy savings	Energy savings	Property assessments	Via utility bill
Security/Collateral	Depends on financing (e.g., lease or debt)	Equipment	Equipment	Assessment Lien	Equipment; Service termination
Responsibility for Utility Bills	ESCO or Customer	Customer	MESA provider	Customer	Customer

This section describes each of these emerging models in brief and provides an assessment of the advantages and disadvantages associated with each.



A. Energy Savings Performance Contracts (ESPCs)

The ESPC model has dominated the ESCO energy efficiency market to date. Sixteen major ESCOs and hundreds of smaller companies complete between \$4 to 6 billion in energy efficiency projects annually,^{ix} with the majority of these projects in public buildings that form part of the MUSH segment. The advantages of the ESPC model in leveraging experienced, multinational corporations have also yielded several challenges, as described below.

Description and Key Features

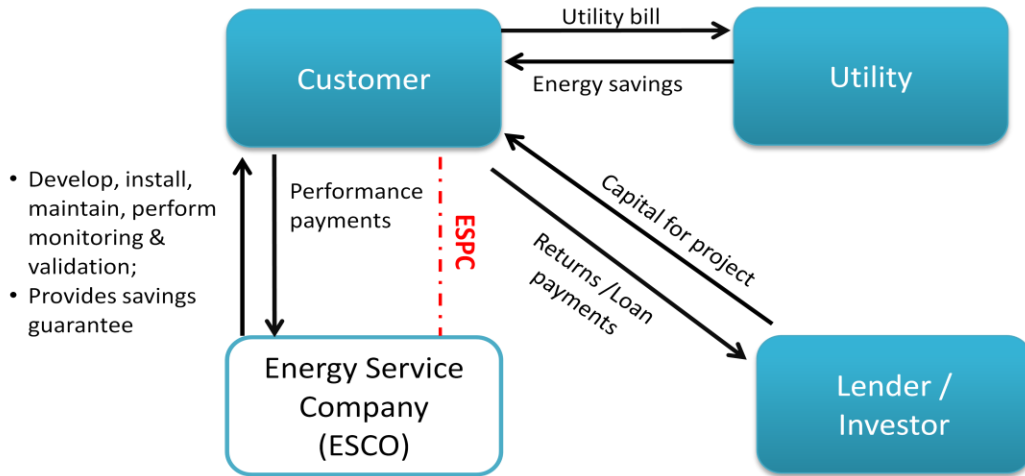
With an ESPC structure, energy efficiency improvements are owned by the customer and may be installed with little or no up-front cost. Typically, the large ESCO will play multiple roles, from originator and developer to the arranger of the financing, and for very large retrofit projects this level of centralized coordination and project/process management can be extremely useful. After project construction and implementation is complete, the ESCO monitors the savings and may also provide service upgrades for a period of time.

In an ESPC model, the ESCO installs the energy efficiency retrofit and sometimes also guarantees certain energy savings to the customer during the term of the ESPC. ESPCs are typically designed so that the value of the energy savings is split between the customer and the ESCO throughout the contract term, such that the customer's total savings exceed the sum of all of the customer's payments (financing payments and the payments to the ESCO) over the term of the 10- or 20-year contract.

After the ESPC term, payments to the ESCO cease and the customer operates and maintains the energy efficiency improvements and retains all energy savings. In many cases, an ESCO will guarantee a certain level of energy savings to the customer. If the guaranteed level of energy savings is not delivered, the ESCO will have to pay the difference between the guaranteed and the actual level of savings. An energy savings guarantee from a creditworthy ESCO can improve the financeability of the ESPC if the customer is securing financing. This financial commitment by the ESCO serves to create a baseline performance incentive; however, if all savings in excess of the guaranteed level remain with the customer, then the ESCO is not incentivized to significantly exceed the guaranteed level of energy savings. This performance contracting model, in which payments to the ESCO are based in part on the capital acquisition value and capital expenditure size, encourages increasingly bigger project sizes and incentivizes the ESCO to implement more low-risk, high-cost energy efficiency retrofits that do not necessarily result in the greatest energy savings. According to one recent study, one perceived drawback of the ESCO/ESPC model among MUSH segment property owners is that this model encourages energy efficiency installations with short payback periods, resulting in high profit margins for the ESCOs.^x Figure 3 below provides an illustrative ESPC structure.



Figure 3: ESPC Basic Structure



The baseline energy profile of the facility and predictability of the technology performance are also important inputs in determining the financeability of ESPCs. Introducing innovative technologies that lack extensive performance data increases the overall risk of the project’s performance. Because neither the lender nor the ESCO see significant upside for deploying more innovative (and potentially more effective but less reliable) technologies, ESPC arrangements tend to remain on the technologically conservative side. Even for component providers, penetrating the ESCO market can be a long and slow process, but it is not without reward given the multibillion-dollar addressable market.

ESPC contracts can also be used in projects that bundle energy efficiency and renewable energy improvements for the customer. For the customer that wishes to own energy efficiency improvements and on-site renewable energy generation, adding generation, such as a solar photovoltaic system, to the scope of the ESPC can be an efficient way to accomplish (and finance) both. In some cases, an ESPC for energy efficiency owned by the customer, coupled with a PPA for renewable energy generation owned by a third party, is the most capital-efficient way to deliver both projects, especially if the customer is a tax-exempt entity that is not able to effectively use or monetize the renewable energy generation tax benefits such as the investment tax credit (ITC) and accelerated depreciation.

Sources of Financing

The customer’s ownership of energy efficiency improvements under ESPCs may be financed using a mix of debt, equipment leasing, tax equity, government incentives, rebates, and grants, as described in Section I above. Loans are generally secured via liens on equipment installed and are underwritten based on the creditworthiness of the customer. The availability and cost of capital will largely be tied to the credit of the customer, as opposed to the potential performance of the energy efficiency upgrades, thus making financing available to primarily the most creditworthy customers, not necessarily the most efficient projects. Furthermore, the value of any energy efficiency capital investments that accrue beyond the term of the ESPC cannot readily be captured at the time of financing.

Accounting Issues

Although the ESCO is providing services relating to the installation and performance of the energy efficiency upgrades, the upgrades are owned by the customer whether or not they are financed. Thus,



the capital cost of the upgrades will appear on the customer’s balance sheet. Investments that appear on a company’s balance sheet often face a more challenging internal approval process, even where an internal champion is supportive of the project. The energy efficiency investment is not likely central to the customer’s business and, from an accounting point of view, it’s better for the customer if treated as an expense kept off its balance sheet. As compared to the ESA and MESA models in which the monthly payments are simply off-balance sheet expenses, similarly sized monthly payments for debt service that are on the balance sheet will likely be treated with greater scrutiny.

Legal Issues

As part of its Dodd-Frank rulemaking process, the U.S. Securities and Exchange Commission (SEC) has proposed that ESCOs be required to register as "municipal financial advisors" and be subject to regulatory oversight as such. The ESCO industry, however, argues that ESCOs, like engineering firms, should be exempted from this new registration requirement. This debate is ongoing and has yet to be resolved.

Overall Assessment

Strengths	Weaknesses
<ul style="list-style-type: none"> - Performance guarantees reduce project risks, which is valuable in large, complex retrofits - ESCOs have a long history of contracting experience and standardized processes - Projects are maintained through rigorous monitoring and verification 	<ul style="list-style-type: none"> - Contractor and financier incentives limit deployment of new technology - High transaction costs - Long negotiation periods - Not a realistic framework for smaller projects - Unclear whether ESCOs will be able to administer programs or originate loans without being registered Municipal Finance Advisors under the Dodd-Frank Wall Street Reform and Consumer Protection Act - On customer’s balance sheet

B. Energy Services Agreements (ESAs)

As discussed above, under an ESPC the customer owns the energy efficiency improvements on-balance sheet and either self-funds the up-front costs or uses debt or lease financing to cover the up-front costs. As an alternative, the ESA model diverged from the ESPC structure and draws its inspiration from the Power Purchase Agreement (PPA) structure. In a PPA, a utility or a host customer agrees to purchase the electricity generated by a project from the project owner. The PPA structure has been widely adopted for power projects across the U.S. for conventional, renewable, utility-scale, and distributed energy generation projects, including in the residential space. Financing innovations and tax incentives such as the ITC have led to widespread adoption of residential and commercial-scale solar projects using the PPA structure. The ESA model’s innovation is to translate the PPA into an ESA as a tool for financing



energy efficiency improvements, while also leveraging the vast resources and experience of the large, established ESPC companies.

Description and Key Features

In an ESA financing, a project developer arranges for the installation of energy efficiency measures by an ESCO and coordinates the capital investment in the project. The project developer then owns, operates, and maintains the energy efficiency measures during the term of the ESA, while the host customer pays for the energy saved (sometimes referred to as “negawatts”) as a service. The customer’s payments are structured as a percentage of the actual energy savings achieved, either as a percentage of the customer’s utility rate or as a fixed dollar amount per kilowatt-hour saved. While fixed \$/kwh rates can insulate customers from future utility rate increases, they do not provide a hedge in the event of utility rate decreases. Figure 4 depicts a typical ESA structure.

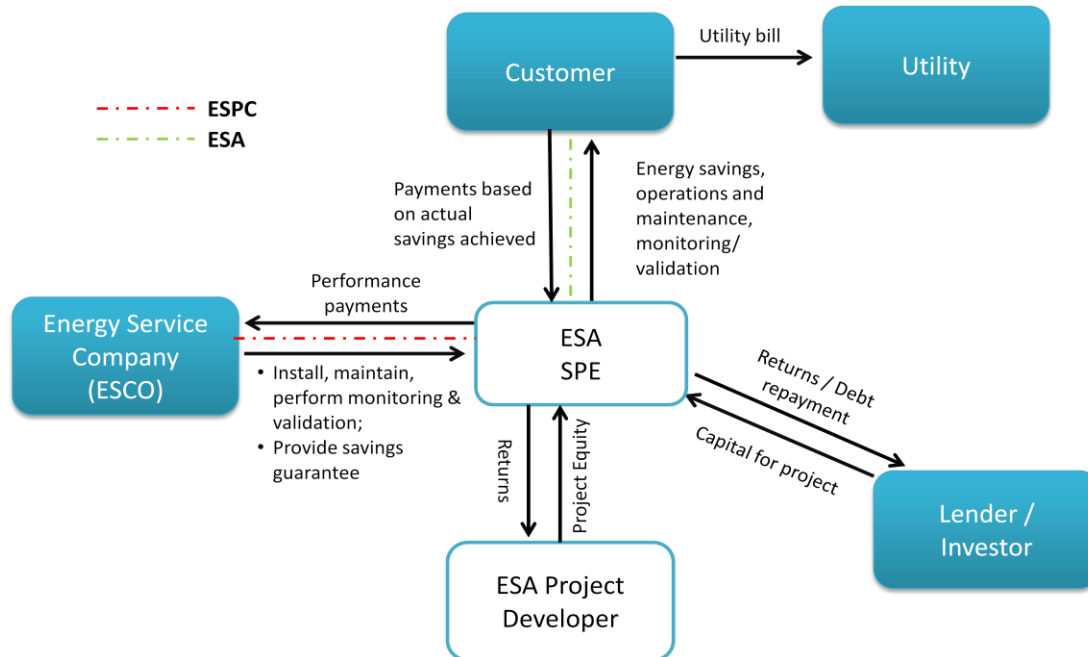
Similar to the ESPC model, in an ESA, the project developer may provide a performance guarantee to the customer, or the ESCO may provide a performance guarantee to the project developer. However, because the customer pays the developer based on the actual amount of realized energy savings, there is incremental upside to the developer for savings that exceed the baseline or guaranteed level. As a result, this model may serve to encourage the implementation of newer technology that has been successfully piloted or demonstrated. Typically, the ESA customer has an option to purchase the energy efficiency improvements at the end of the ESA contract term for their then current fair market value.

Sources of Financing

As in most energy project finance structures, a special purpose entity (SPE) is typically established by the developer for each energy efficiency project that is financed using an ESA structure. Both equity and debt investors may be involved in providing capital for the energy efficiency project through investments in the SPE. The SPE then owns the energy efficiency equipment and all rebates, tax incentives, or other government incentives. Third-party ownership of the energy efficiency equipment enables structuring approaches in which those incentives, particularly the tax incentives, belong to an entity that can make the most use out of them. The tax benefits for energy efficiency equipment, however, are significantly less than for renewable energy generation, since energy efficiency improvements do not qualify for the investment tax credit (ITC) or production tax credit (PTC). As a result, tax equity investors, who are important financiers of solar and wind projects, are typically not a source of capital for energy efficiency projects.



Figure 4: Basic ESA Structure



Investors are repaid through the stream of customer payments for energy savings, tax incentives, rebates, and environmental attributes. The creditworthiness of the customer and the ESCO will impact the ability of the project developer to secure financing for an ESA-based project and the pricing of such financing. In some cases, parent guarantees may be needed in innovative financing models until investors in this area become comfortable with their risk exposure. In an attempt to reduce transaction costs and expand investment into this segment, the market may increasingly see transactions in which a single investor funds groups of projects that meet certain criteria.

Accounting Issues

ESAs may be treated as operating leases or capital leases. Under current Federal Accounting Standards Board (FASB) standards, ESAs that are treated as operating leases remain off the customer’s balance sheet (while capital leases are on-balance sheet). However, FASB has proposed new rules that would impact the accounting treatment of operating leases. If FASB adopts this new lease treatment, ESA projects treated as operating leases would not remain off-balance sheet and instead would be placed on the customer or obligor’s balance sheet. Under the proposed FASB revisions, however, an ESA can be structured to meet the service agreement criteria (which would remain off-balance sheet), avoiding treatment as an on-balance sheet operating lease. ESA providers and providers of emerging energy efficiency financing structures such as Managed ESAs are avoiding this potential accounting issue by offering service-based agreements that are not treated as leases under current or proposed FASB standards. Managed ESAs are described in further detail below.

Overall Assessment

ESAs build on the successful PPA model of project finance, where third-party project developers and investors provide the up-front capital for energy efficiency improvements, which is repaid over time by a



customer through energy savings. This model may face barriers to implementation if revised FASB standards result in on-balance sheet treatment and ESAs cannot be structured to meet revised FASB standards for off-balance sheet treatment.

Strengths	Weaknesses
<ul style="list-style-type: none"> - Currently, customers may finance energy efficiency improvements off-balance sheet - Customers pay only for actual savings realized - Customers do not bear operation and maintenance responsibilities or performance risk during the ESA contract term - Project developers are incentivized to maximize energy savings or other performance metrics - ESA provider may be able to monetize tax benefits that customer could not - The ESA provider may be able to obtain financing for groups of similar energy efficiency projects that meet certain criteria from a single investor, thereby lowering transaction costs 	<ul style="list-style-type: none"> - Proposed FASB rule modification could subject ESAs to new accounting rules - Project developer has to secure debt and/or equity financing from providers that understand the ESA model; familiarity with the well-established PPA model, however, may help mitigate this weakness

C. Managed Energy Service Agreement (MESA)

Description and Key Features

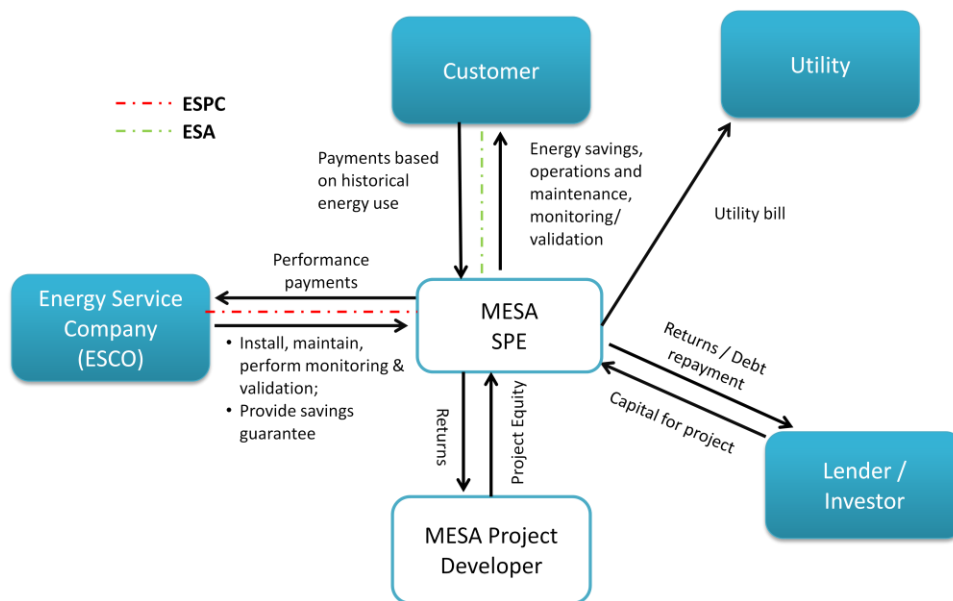
The MESA is a slightly different version of an ESA, wherein a project developer owns the energy efficiency equipment and in addition serves as a middle person between the customer and the utility. With a MESA structure, the customer has the project developer as a single point of contact and makes a single payment for all of its utility expenses. In contrast, under an ESA structure, the customer pays the ESA provider for the realized savings and then pays each of its utilities individually for the water, gas, and/or electricity that may be consumed. As with an ESA, MESAs involve the sale of energy savings as a service and are considered to be off-balance sheet arrangements at this time. Companies with a fully integrated business model (e.g., technology provider, developer, and financier) that want to enter the energy efficiency market may find it most attractive to utilize the MESA structure for energy efficiency projects.

New companies in this space have established varying arrangements for how energy savings accrue to the customer. Under one structure, the customer pays the MESA project developer its baseline energy bill for the duration of the contract, and all savings accrue to the MESA project developer. In other models, the project developer guarantees a percentage reduction in energy bills to the customer, thereby sharing in the energy savings throughout the contract period.



Figure 5 below provides an illustrative MESA structure.

Figure 5: Basic MESA Structure



Sources of Financing

The MESA project developer may finance a MESA project using the same strategies as the ESA developer described above, including the establishment of an SPE for each MESA project. MESA projects will attract lenders, however, who are generally willing and able to tolerate the risk on utility rates. Since the MESA project developer is responsible for utility payments, it carries the risk of utility rates increasing faster than predicted. As with the ESA structure, since energy efficiency improvements do not qualify for the ITC or PTC, unlike solar and wind-generation projects, tax equity investors are not a primary source of capital for energy efficiency projects.

Overall Assessment

Strengths	Weaknesses
<ul style="list-style-type: none"> - Currently, customers may finance energy efficiency improvements off-balance sheet - Customers do not bear operations and maintenance responsibilities or performance risk during the MESA contract term - Project developers are incentivized to maximize energy savings - Customer has a single point of contact and a single payment for all utility expenses 	<ul style="list-style-type: none"> - Same as the ESA structure - MESA project developer typically carries utility rate escalation risk



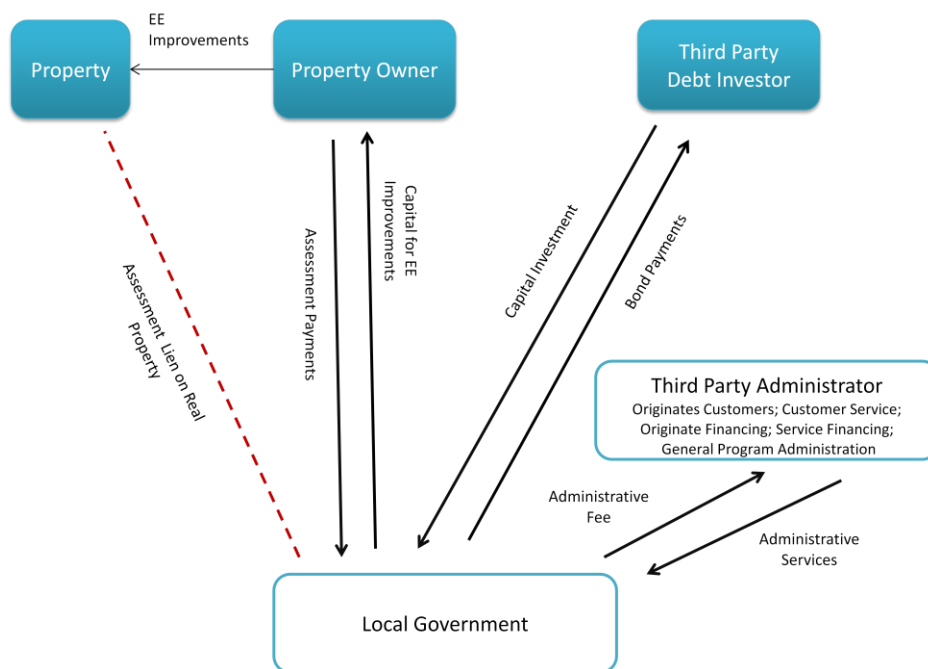
D. Property Assessed Clean Energy (PACE)

PACE was developed in 2007 and enables local governments to finance energy efficiency improvements using land-secured special assessment or improvement district structures. The authority to create land-secured municipal finance districts already exists in most states around the country and has been used as far back as the 17th century to finance local improvements such as sewer lines, sidewalks, seismic retrofits, fire safety improvements, parks, and sports arenas. Under such authority, local governments issue bonds to finance local improvements that have a public purpose and levy assessments against property benefitted by such improvements. The assessments are collected along with property taxes and are secured by a lien on the property.

Description and Key Features

In a PACE program, existing municipal improvement district authority typically is expanded to include energy efficiency or renewable energy improvements on private property. These districts generally are established as a result of petition or vote of constituents or property owners in a local jurisdiction and then approved by the governing body of that jurisdiction. Property owners voluntarily agree to have assessments levied against their property in exchange for receiving the up-front capital for the energy efficiency improvements.

Figure 6: Basic PACE Structure



In the event of a sale or transfer, the lien securing the assessments remains on the property, becoming an obligation of the next property owner. Thus, the repayment obligation is tied to the entity benefiting from the energy savings achieved at the property. As with other tax and government assessment liens, liens used to secure PACE assessments are senior to privately held liens such as mortgages. This security feature reduces risk to bond investors and lenders, thereby enabling local governments to offer this financing at relatively low interest rates. It is important to note, however, that as with property taxes, in



the event of foreclosure, only the past due assessments are paid out of the proceeds of a sale ahead of the first mortgage (i.e., rather than the full amount of the capital provided by the local government). This feature is often referred to as “non-acceleration.”

The term of PACE assessments is generally tied to the payback period for the energy savings measure, in some cases as long as 20 years. Property assessments are generally treated as an expense, not capitalized on the balance sheet as a long-term liability. However, PACE assessments are not the typical property assessment and there is no clear consensus yet from the accounting community as to whether PACE assessments should be treated as on-balance sheet or off-balance sheet.

Legal Issues

PACE gained a great deal of popularity and momentum between 2008 and 2010, with 27 states^{xi} around the country passing legislation to expand existing land-secured municipal improvement district authority to enable local governments to establish PACE programs in both the residential and commercial sectors.

In 2010, Fannie Mae and Freddie Mac (GSEs) issued advisory statements to lenders and servicers of mortgages owned or guaranteed by the GSEs stating that PACE programs were inconsistent with the GSE’s uniform security instruments because of the seniority of PACE liens. The FHFA, the agency authorized to regulate the GSEs, then issued statements upholding the GSEs’ advisories, concluding that PACE programs present “safety and soundness concerns,” and directing the GSEs to refrain from purchasing mortgages on properties with outstanding PACE liens. These actions had the effect of halting the implementation of PACE programs in the U.S. residential sector, with the exception of pilot programs in Sonoma County, Palm Desert, Boulder, and the Town of Babylon, New York. The State of California, Sonoma County, and others brought suit in federal court and obtained an order requiring the FHFA to conduct a formal rulemaking proceeding on PACE under the Administrative Procedures Act. The uptake of PACE in the residential sector is currently on hold pending the outcome of the FHFA’s rulemaking proceeding (which was in progress at the time of this writing).

In the meantime, several jurisdictions have advanced commercial PACE programs, including Ann Arbor, San Francisco, Los Angeles, Sacramento, and Lantana, Florida. Currently, several commercial PACE programs require consent or acknowledgment by the existing mortgage holder.

Sources of Financing

PACE improvements are financed via the issuance of bonds by local governments under existing land-secured municipal improvement district authority. Third-party entities typically work with the local government to arrange for lines of credit, capital warehouse facilities, project origination, and administrative processing. As discussed above, assessment liens are attractive security instruments to the capital markets and lower the effective cost of capital to property owners. Several jurisdictions are permitting commercial property owners to arrange financing directly with lenders. In fact, some existing mortgage holders are expressing an interest in providing PACE financing to properties in their portfolios. PACE has the potential to evolve into standardized instruments that can be securitized and sold in the secondary markets.

Overall Assessment

PACE is a promising energy efficiency financing structure with enormous potential to scale energy retrofits. Currently, the implementation of PACE in the residential sector is on hold pending the outcome



of the FHFA’s rulemaking proceeding and federal litigation. PACE is advancing and holds promise as a model for financing energy efficiency improvements in the commercial sector.

Strengths	Weaknesses
<ul style="list-style-type: none">- Assessment lien is attractive to investors; security feature enables competitive interest rates- Repayment obligation remains with property in the event of sale or transfer by owner- Term tied to payback period	<ul style="list-style-type: none">- Legal challenges to lien priority in the residential sector- Local government approval process required to implement program- While PACE provides a model for raising financing for capital investments, it does not provide a model for financing the servicing aspects of energy efficiency- No consensus yet regarding accounting treatment as on-balance sheet or off-balance sheet

E. On-Bill Financing/Repayment

On-Bill Financing/On-Bill Repayment (OBF/OBR) uses utility or third-party capital to pay for energy efficiency or renewable energy retrofits in a building, the cost of which is repaid by the customer on the customer’s utility bill. OBF refers to programs that use utility capital, whereas OBR programs leverage third-party capital. To date, various forms of on-bill programs have been implemented in over 20 states, serving residential, commercial, and industrial customers. While OBF/OBR programs are currently in pilot stages and market penetration is still low, these programs are generally seen as successful, with low default rates and borrowing costs.

Description and Key Features

Although OBF/OBR programs vary significantly, key elements include (1) repayment of the costs of building energy efficiency retrofits through the customer’s utility bill; (2) very low up-front costs to the customer and very low interest rates (often zero percent); (3) threat of utility disconnection in the event of default; and (4) use of utility or third-party capital for the initial cost of energy efficiency retrofits (see “Sources of Financing” below).

The central feature of OBF/OBR programs is that repayment for energy efficiency improvements is bundled into the customer’s monthly utility bill. This feature allows customers to immediately see the effect of energy efficiency improvements on their overall energy expenditures, which often decrease immediately—even with the bundled repayments—due to low interest rates and minimal up-front costs for the customer. Because customers are able to quickly realize the economic benefits of energy savings, OBR/OBF addresses the “first-cost” hurdle to energy efficiency retrofits and expands customer demand. The utility bill repayment mechanism also lowers administrative costs by leveraging the existing infrastructure and resources of the utility (which typically administers the program or partners with the administrator), including customer relationships and billing systems.



Another key element of most OBF/OBR programs is the threat of utility disconnection: customers tend to place a high priority on utility bill payments due to the threat of shutdown, and because OBF/OBR payments are bundled into the utility bill, default rates for OBR/OBF programs have been exceedingly low to date (mostly 0-2 percent). This feature of OBF/OBR is credited with lowering borrowing costs and extending energy efficiency retrofits to parties that might not otherwise have been creditworthy. As discussed below, the availability of service disconnection, particularly in the residential sector, is subject to legal uncertainty.

Within this basic framework, OBF/OBR programs vary significantly. In addition to variation in sources of financing (discussed below), programs are administered by various types of entities (e.g., utilities, government agencies, or other third parties) and target different types of customers and buildings. For example, New York's Green Jobs Green New York (GJGNY) program, which is administered by the New York State Energy Research and Development Authority (NYSERDA), targets residential buildings, multi-family residential buildings, and nonprofits and small businesses, with different eligibility requirements, loan sizes, and payback periods for each. In comparison, California's on-bill programs, which are administered by investor-owned utilities, only extend loans to business customers. The types of retrofits and technologies covered by OBF/OBR programs vary as well: a number of programs specifically exclude lighting and non-permanent fixtures, while others also cover renewable energy installation.

One key difference between programs is whether the customer's payment is characterized as payment on a loan or payment for a service. In on-bill loan programs, the program administrator extends financing to an individual or company. The obligation to repay is typically non-transferrable, even if the customer sells or ceases to occupy the building, unless there are provisions in the program or its enabling legislation that allow for such transfer. In contrast, under on-bill tariff programs, the payment is structured as a tariff that the customer pays in return for energy efficiency services. The obligation to pay is tied to the property or utility meter and transfers to subsequent owners or occupants, usually subject to certain notice requirements. For example, the Oregon MPower program is set up such that the utility pays all of the up-front costs for retrofitting a multi-family residential building. The building owner agrees to a 10-year tariff, which is pro-rated across all of the meters in the building, and addresses the division of energy savings in rental agreements with tenants. An advantage of the tariff structure is that it removes the disincentive for renters to apply for OBF/OBR in programs that allow renters to initiate the application process, and reduces the emphasis on the building occupant's creditworthiness as a determining factor in the application. Tariff programs also avoid certain legal issues related to lending laws, as discussed below.

Sources of Financing

Existing OBF/OBR programs rely on a mix of public, private, and ratepayer funds. Many programs currently rely on public capital, such as revolving loan or public benefits funds, some of which are capitalized with American Recovery and Reinvestment Act (ARRA) funds and continue to draw from federal loans, bonds, or grants. These funds typically cover the up-front costs of retrofits and energy audits and may provide credit enhancements, such as loan-loss reserves or payment guarantees, to manage default risk and reduce borrowing costs.

Community Development Financial Institutions (CDFI), which serve a community development purpose and often lend at lower interest rates and expected returns, have also played a role in administering



OBF/OBR. Clean Energy Works Portland, for example, is an OBF/OBR program in Oregon that is administered by a CDFI using \$3 million in federal stimulus dollars, and provides loans to parties that could not have obtained financing for energy efficiency from traditional lenders. To a lesser extent, some utilities use ratepayer capital for OBF/OBR, though concern has been expressed that this practice could expose utilities to lending laws, and it has not been widely adopted. Finally, though capital markets and larger banks could be tapped in the future, they have not been a significant source of financing to date due to the relatively small volume and lack of standardization of OBF/OBR agreements.

New York provides an interesting example of OBF/OBR financing because of the combination of financing sources on which it relies. GJGNY was started with seed funding from proceeds from the Regional Greenhouse Gas Initiative (RGGI), a cap-and-trade program in the Northeast that has allocated \$112 million to GJGNY's revolving loan fund. In addition to energy audits and retrofits, GJGNY also provides credit enhancements through a separate loan-loss reserve that draws from ARRA funding. The objective is for these credit enhancements to eventually make the GJGNY revolving loan fund attractive to the capital markets. The loans provided to customers are secured with a mortgage on the property that is subordinate to existing and future mortgages, and that attaches to the property, rather than the owner or occupant.

Legal Issues

Although utility service disconnection reduces default rates in OBF/OBR programs, this practice is subject to legal uncertainty as well as political controversy. For example, the California Public Utilities Commission (CPUC) proposed the establishment of an OBR program for investor-owned utilities (IOUs) in California. In response, the state's IOUs and ratepayer advocacy groups expressed concern that state law prohibits termination of residential service for non-payment to a third party. The CPUC subsequently narrowed its OBR proposal to the commercial sectors, and proposed a possible OBR program in the multi-family residential sector, indicating that legislative changes may be required to extend OBR to the single-family residential sector. OBF remains an energy efficiency financing option for commercial buildings in California. Capital providers do not view the threat of service termination as a security instrument, however, and in some cases data on default rates for existing OBF/OBR programs is not yet widely available. In the interim, projected interest rates on OBR financing are likely to be tied to customer creditworthiness in the absence of ratepayer-funded credit enhancements.

Another legal issue at play with OBF/OBR is the application of state and federal consumer lending laws when the financing is structured as a "loan." Utilities and other entities for which lending is not the core business are wary of being regulated as financial institutions, particularly as the regulatory scheme evolves in the shadow of the banking crisis. On-bill tariff programs can avoid lending laws, but tariffs still require regulatory approval from the relevant entities. In addition, the structure of the OBF/OBR program as a loan or a payment will impact its accounting treatment for the customer as on-balance sheet or off-balance sheet.

Overall Assessment

OBF/OBR is a relatively new structure, with most programs still in pilot or early phases of deployment, and has low market penetration overall. However, it has been widely adopted across the country, and most pilots have been successful at achieving very low rates of default, having positive cash flow (i.e., energy savings in excess of loan or tariff payments), and reaching underserved customers. Some keys to



this financing model's success seem to be the ability to combine multiple funding sources within one program and the ability to target multiple building sectors, which increases project volume.

To scale up, however, OBF/OBR programs would need to overcome a number of barriers. Administrative costs remain high, particularly for programs that serve residential customers, due to the need for individual energy audits and new billing structures, and the lack of standardized agreements. Many programs still rely on government funding, which reduces sustainability. And while pilot programs have had low default rates, there are a number of matters that would need to be dealt with more thoroughly to make OBF/OBR viable on a larger scale, including financial and consumer protection regulations, allocation of risk in the event of default, priority of OBF/OBR-related payments as compared to customers' regular energy bills, transferability of obligations in the event of property sale, and ways to ensure positive cash flows.

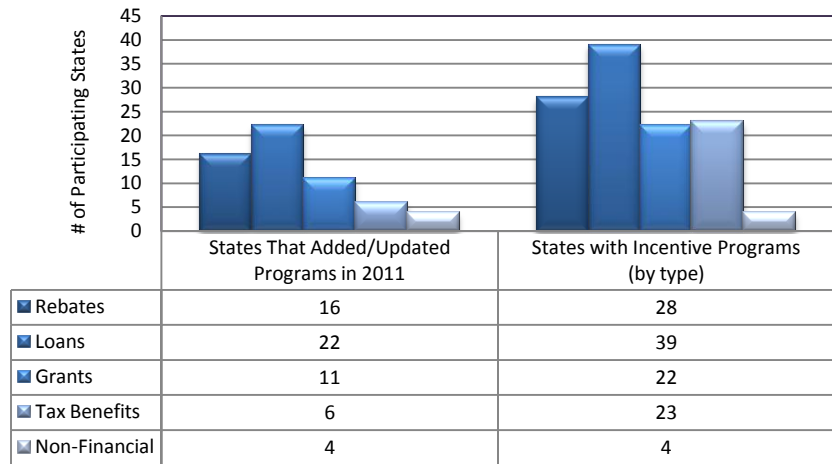
Strengths	Weaknesses
<ul style="list-style-type: none"> - Addresses “first-cost” hurdle to customer adoption by requiring little capital up front - Shows strong record of repayment by customers to date - Leverages existing utility resources and customer practices to collect payments - Bundled utility bill clearly shows impact of energy efficiency on overall energy expenditures - Payment obligation may follow the customer or the meter - Can be structured to address diverse customers and market segments - Can be structured to address split energy incentives of tenants and owners - Accounting treatment may be on-balance sheet or off-balance sheet 	<ul style="list-style-type: none"> - In some cases, requires a third party to bear the “first costs” that are avoided by the customer - Threat of utility disconnection is subject to legal uncertainty - May require high up-front investment by utility to reform billing structures and other systems - Assuring that energy savings will exceed loan/tariff payments is difficult - Potential consumer lending regulations increase legal costs and uncertainty - Obtaining landlord buy-in may be difficult if the tenant reaps all of the energy efficiency benefits - Transaction and implementation costs can be relatively high - Existing programs rely heavily on government funding and support



III. The Role of Public-Private Partnerships: Integrating Public and Private Financing

Innovation in the energy efficiency sector is occurring at both the state and federal levels. States have been increasingly aggressive in their adoption of energy efficiency programs and many offer a range of incentives that can finance projects. According to the National Governor’s Association,^{xii} 48 states expanded their energy efficiency measures in 2011, with 40 states adopting or updating their energy efficiency funding and financing mechanisms. As

Figure 7:
Activity in State-Level Energy Efficiency Financing Programs



depicted in Figure 7 to the right, a number of states created or updated their loan and rebate programs in 2011, making these the most prevalent tools for supporting energy efficiency retrofits and other measures. According to information collected by the National Association of State Energy Officials (NASEO), there are at least 66 different state loan funds in the U.S. and its Territories. Some loan funds have been operating for years, while others were created and capitalized through the American Recovery and Reinvestment Act (ARRA) of 2009.

The federal government provides accelerated depreciation for certain energy efficiency property under Section 179D of the Internal Revenue Code. The Section 179D tax deduction is available for the installation of lighting systems, HVAC systems, hot water systems, and certain other building efficiency improvements that meet specified energy efficiency standards and that are installed prior to January 1, 2014, with the total amount available based on the square footage of building space. The accelerated depreciation benefit is modest in comparison to the energy credit available to renewable energy systems, but for certain building owners and/or tax equity investors who value accelerated depreciation, it does provide an additional financial incentive to justify energy efficiency projects.

State-level financing can also serve as a critical foothold in attracting private capital. Many companies are reaping significant benefits in leveraging the very low interest rates of state-level debt and, in some cases, the ability to subordinate public capital to private debt. Over the next year, emerging state-level authorities such as Connecticut’s Clean Energy Finance and Investment Authority^{xiii} and new public private partnerships such as Tennessee’s INCITE Initiative^{xiv} are expected to bring momentum to the energy efficiency financing sector. These and other state-level efforts to pair public investment capital with access to strategic networks are an increasingly common trend because of the economic development potential in energy retrofits and efficiency improvements. Moreover, states are actively



working to attract and augment the success of innovative entrepreneurs, where in some cases prospective investment deal flow is more limited than the funding available.

There are also certain benefits to working at the state level because loan and grant programs are typically processed more quickly than federal-level funding, creating new project pipelines or potentially filling a funding gap in an existing project. In addition, the funding landscape tends to evolve quickly. For example, some state revolving loan funds solicit new projects or investments as soon as funds become available, with less formally announced or scheduled requests for proposals. Opportunities are often channeled through economic development offices versus state energy offices, and in some cases through the state governor's office. Regardless of program origination, successfully weaving public capital into a private project requires a strategic dialogue with the state to understand its preferences and available investment tools. Delving into the local landscape and getting to know the state-level landscape can be tremendously valuable in capitalizing on what are sometimes fleeting windows of opportunity.

In addition to evaluating sources of state-level financing for energy efficiency, various federal-level policies and initiatives are spurring both public projects and private markets. For example, the Better Buildings Initiative, announced by President Obama on February 3, 2011, sets a national target for improving energy efficiency in commercial buildings by 20 percent by 2020.

One way the Better Buildings Initiative is mobilizing private capital is by applying public tools such as ESPC contracting authority. In 2009, a new Super ESPC vehicle was established and qualified 16 ESCOs to exercise their contracting authority and bid on government project opportunities. Each of the 16 indefinite quantity contracts with the ESCOs has a ceiling authority of \$5 billion. However, this authority has not been fully exercised due to a number of factors, including challenges associated with streamlining the bidding process for government projects under the new Super ESPC contract vehicle.

Within the Better Buildings Initiative, the President signed an MOU directing all federal agencies to maximize their existing authorities to use performance-based contracting, setting a minimum of \$2 billion dollars in contracts to be implemented over the next two years. Because of the nature of performance contracting and ESPCs, this \$2 billion commitment is not in the form of up-front capital to be expended by the federal government; rather, it provides a market opportunity for ESCOs, as well as companies that partner with ESCOs through ESAs and other innovative structures. Another significant component of the Better Buildings Initiative is the Better Buildings Challenge, designed as a public-private partnership to mobilize \$2 billion in private financing for building energy upgrades.

A second federal mechanism that is spurring energy efficiency opportunities within the federal government is the implementation of two Presidential Executive Orders. Executive Order (EO) 13423,^{xv} Strengthening Federal Environmental, Energy, and Transportation Management, and EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance,^{xvi} collectively contain mandates that federal agencies measure, establish, and implement energy efficiency and renewable energy goals. EO 13423 requires federal facilities to reduce facility energy use per square foot by 3 percent annually, stemming back from 2006 through 2015, or 30 percent by the end of 2015. Under EO 13514, energy efficiency and renewable energy goals were expanded and, as was required, each agency has developed a Strategic Sustainability Performance Plan (SSPP) that defines specific targets and milestones for achieving its various energy objectives.



The scale of energy efficiency opportunities under the Better Buildings Initiative, EO 13424, and EO 13514 becomes more evident when combined with the fact that the federal government accounts for approximately 1 percent of total U.S. energy consumption. Moreover, the Department of Defense (DOD) is one of the largest single government consumers of energy. As a result of these and other federal mandates, project opportunities are evolving most rapidly within DOD, where pursuit of these projects can be a useful strategy for companies seeking a creditworthy customer with aggressive goals for reducing energy consumption as well as adopting new technologies. The current ESPC structure has been most widely adopted by government customers for energy efficiency improvements, but as discussed previously, this structure often does not encourage the adoption of new technologies. And, as a significant potential customer for energy efficiency improvements, DOD is in need of innovative financing solutions that can spur the adoption of new technology. In particular, methods that bring third-party financing to the table and offer unique risk-mitigation strategies will be attractive to DOD.

The Army, given its vast number of domestic installations, is aggressively pursuing energy efficiency. In 2011, the Army launched its Net Zero initiative with 17 bases designated Net Zero Energy, Net Zero Water, and/or Net Zero Waste. Each designated base will be implementing projects to achieve Net Zero status, and the Army has an overall goal to have 25 Net Zero installations by 2030. Figure 8 below provides a list of the designated installations, although all military installations are expected to implement projects.

Figure 8: Army Net Zero Installations

NET ZERO ENERGY PILOT SITES	NET ZERO WATER PILOT SITES	NET ZERO WASTE PILOT SITES
Fort Detrick, MD	Aberdeen Proving Ground, MD	Fort Detrick, MD
Fort Hunter Liggett, CA	Camp Rilea, OR	Fort Hood, TX
Kwajalein Atoll, Republic of the Marshall Islands	Fort Buchanan, PR	Fort Hunter Liggett, CA
Parks Reserve Forces Training Area, CA	Fort Riley, KS	Fort Polk, LA
Sierra Army Depot, CA	Joint Base Lewis-McChord, WA	Joint Base Lewis-McChord, WA
West Point, NY	Tobyhanna Army Depot, PA	U.S. Army Garrison, Grafenwoehr, Germany
Fort Bliss, TX		
Fort Carson, CO		



Due to the geographic diversity of the installation locations as well as various other factors, many Army bases will adopt energy efficiency initiatives in combination with renewable energy improvements. Given the significant amount of investment required at military bases to achieve DOD’s energy objectives, leveraging untapped resources at the state level and/or navigating local regulatory issues may be crucial elements in bringing these projects to fruition. While the current model of choice for DOD may be the ESPC, new energy efficiency financing models offer an element of scalability that DOD desires.

In considering the potential role of public-private partnerships for developing and financing energy efficiency projects, it is also important to note that since energy efficiency and energy efficiency finance are less politically charged topics, they typically garner bipartisan support. Six major bipartisan policies have been presented in Congress in the past year that promote energy efficiency. These bills include a national energy efficiency strategy and a new way to finance energy-saving home upgrades:

Bill Name	Summary and Status ^{xvii}
Electric Consumer Right to Know Act, or e-KNOW (S. 1029)	<ul style="list-style-type: none"> • Introduced by Senators Mark Udall (D-CO) and Scott Brown (R-MA) in May 2011; the bill is under consideration in the Committee on Energy and Natural Resources. • If enacted, e-KNOW would require utilities to provide customers and other third parties with their energy-usage information, including data from smart meters. E-KNOW also would assist energy auditors, demand response aggregators, and energy service providers in helping consumers reduce energy use.
Energy Savings & Industrial Competitiveness Act (S. 1000)	<ul style="list-style-type: none"> • Introduced by Senators Jeanne Shaheen (D-NH) and Rob Portman (R-OH) in May 2011. The Senate Energy Committee reported it in July 2011 with strong bipartisan support (18–3 vote); the bill is awaiting consideration in the House. • If enacted, it would greatly improve energy efficiency in residential and commercial buildings, as well as in industry and manufacturing.
PACE Assessment Protection Act (H.R. 2599)	<ul style="list-style-type: none"> • Introduced by Representatives Nan Hayworth (R-NY), Mike Thompson (D-CA), and Dan Lungren (R-CA) in July 2011; the bill is under consideration in the Financial Services Committee. • The measure is a budget-neutral, no-mandate policy that would enable local governments to finance home energy efficiency projects with repayment through property taxes. • At the local level, 27 states and the District of Columbia already approved PACE-enabling initiatives.
Roofing Efficiency Jobs Act (H.R. 2962, S. 1575)	<ul style="list-style-type: none"> • Introduced by Representatives Tom Reed (R-N.Y.) and Bill Pascrell (D-N.J.) in the House in September 2011, and Senators Ben Cardin (D-MD) and Mike Crapo (R-ID) in the Senate. The bill has been referred to the House Ways and Means and Senate Finance Committees for further consideration.



	<ul style="list-style-type: none"> The measure would incentivize energy efficient commercial roof replacements by accelerating depreciation for new roofs with cool roof coatings and good insulation.
Sensible Accounting to Value Energy Act (S. 1737)	<ul style="list-style-type: none"> Introduced by Senators Michael Bennet (D-CO) and Johnny Isakson (R-GA) in October 2011; the bill is under consideration in the Committee on Banking, Housing, and Urban Affairs. The measure is a no-cost, no-mandate policy that would require residential energy efficiency to be considered in determining mortgage eligibility.
Cut Energy Bills at Home Act (S. 1914)	<ul style="list-style-type: none"> Introduced by Senators Olympia Snowe (R-ME), Jeff Bingaman (D-N.M.), and Dianne Feinstein (D-CA) in November 2011. It has since been referred to the Finance Committee. If enacted, the bill would provide a performance-based tax credit for deep home retrofits. The size of the credit would depend on predicted cost savings from energy efficient improvements to a home’s heating, cooling, lighting, and water systems

Although a majority of these bills originated in the Democrat-controlled Senate, all of them have received bipartisan support. With the upcoming November elections comes an expected lull in the advancement of any significant energy policies, as leadership positions for these issues are established and the pulse of the new Congress is taken, including their views on the costs and benefits of energy policy. Regardless of the momentum of energy legislation, energy efficiency and innovations in energy efficiency finance are uniquely positioned to continue to gain traction and market adoption, because many of the necessary tools are available today and because of the economic development potential of this industry.

IV. Conclusion

Improving the energy efficiency of our built environment represents a \$279 billion investment opportunity in the U.S. alone.^{xviii} Investment of private capital in this market has the potential to drive deeper energy savings, grow the clean energy economy, and lead to reduced greenhouse gas emissions, as well as produce significant returns for the market leaders that emerge.

According to some surveys, lack of capital is one of the main barriers to wider implementation of energy efficiency projects. Providers of capital, however, point to a lack of energy efficiency finance projects to finance as a key barrier. In practice, these two aspects affect and inform each other—as more capital and energy efficiency finance options become available, more energy efficiency finance projects become practical. As more energy efficiency finance projects become financeable and are aggregated, additional energy efficiency financing options develop. With their vast footprints and infrastructure, utilities have the potential to be important aggregators and facilitators in this ongoing process.



As the energy efficiency finance market continues to grow and evolve, we see a positive dynamic beginning to develop in some market segments, with greater investor interest centered around the ESA, MESA, and commercial PACE financing models in particular. The essential building blocks for a broader energy efficiency finance framework are forming as disparate threads are beginning to come together, such as innovations in how up-front costs and subsequent energy savings are measured; increasing understanding in the appraisal community about green appraisals and valuing energy efficiency improvements; innovations in technologies to conduct more cost-effective and standardized energy audits; reinvigorated interest among investors and local governments in commercial PACE; more advances in state legislation to encourage some forms of energy efficiency finance; growth of the ESA and MESA financing structures; and rare bipartisan political support for increased energy efficiency. Even the U.S. military is getting involved with its multibillion-dollar Net Zero program. In short, momentum is building.

Of course, there are still barriers to overcome and complex problems to solve. But emerging energy efficiency finance structures and ongoing legislative changes are enabling investors to enter this market at an increasing rate, providing more customers and energy efficiency project developers with capital necessary to perform retrofits and install energy efficiency technologies and improvements. Tax, accounting, regulatory, and legal issues surrounding energy efficiency finance structures are in flux, shifting the relative merits of these models. Key stakeholders at the forefront of energy efficiency finance are actively exploring further innovations in energy efficiency finance structures. Increasingly, parties are beginning to work out solutions to the challenges and realize the opportunities that energy efficiency finance presents to promote more sustainable economic development, increase energy security, and improve economic competitiveness. To paraphrase a timeless classic:

*“The situation gives rise to measurements; measurements give rise to balancing;
and balancing gives rise to triumph.”*

– Sun Tzu, The Art of War



- ⁱ <http://www1.eere.energy.gov/buildings/about.html>
- ⁱⁱ “Exploring Innovation in Energy Efficiency Financing,” Cleantech Group presentation, January 24, 2012.
- ⁱⁱⁱ “Energy Efficiency Financing in California, Needs and Gaps,” Harcourt Brown & Carey, Inc., July 8, 2011.
- ^{iv} “Unlocking Energy Efficiency in the U.S. Economy,” McKinsey & Company, July 2009.
- ^v “Energy Efficiency Paying the Way: New Financing Strategies Remove First-Cost Hurdles,” by Bob Hinkle and David Kenny, CalCEF Innovations White Paper, February 2010.
- ^{vi} “Energy Efficiency Financing – Models and Strategies,” prepared by Capital E for the Energy Foundation, by Greg Kats (Principal Author), Aaron Menkin, Jeremy Dommu, and Matthew DeBold, March 2012.
- ^{vii} “Show Me the Money; Energy Efficiency Financing Barriers and Opportunities,” by Namrita Kapur (EDF), Jake Hiller (EDF), Robin Langdon (US EPA), and Alan Abramson (Nicholas Institute for Environmental Policy Solutions), July 2011.
- ^{viii} “Financing for Green Building and Energy Efficiency Makes Incremental Gains,” by Dan Sheridan, July 29, 2011.
- ^{ix} “U.S. Building Energy Efficiency Retrofits,” Rockefeller Foundation and DB Climate Change Advisors, March 2012.
- ^x “Energy Efficiency Financing in California, Needs and Gaps,” Harcourt Brown & Carey, Inc., July 8, 2011.
- ^{xi} The Database of State Incentives for Renewable Energy (DSIRE) website maintains a map showing states with PACE authority, available here: http://www.dsireusa.org/documents/summarymaps/PACE_Financing_Map.pdf.
- ^{xii} 2011 Clean Energy Update – State Energy Actions, January 31, 2012, at <http://www.nga.org/cms/home/nga-center-for-best-practices/center-publications/page-eet-publications/col2-content/main-content-list/clean-and-secure-energy-2011.html>.
- ^{xiii} For more information, visit: <http://www.ctcleanenergy.com/default.aspx>.
- ^{xiv} For more information, visit: www.tntechnology.org/incite.
- ^{xv} EO 13423 was issued in January 2007 and can be found at: <http://www.gpo.gov/fdsys/pkg/FR-2007-01-26/pdf/07-374.pdf>.
- ^{xvi} EO 13514 was established by President Obama in October 2009, with the directive that: “Federal agencies shall increase energy efficiency; measure, report, and reduce their greenhouse gas emissions from direct and indirect activities; conserve and protect water resources through efficiency, reuse, and storm water management; eliminate waste, recycle, and prevent pollution; leverage agency acquisitions to foster markets for sustainable technologies and environmentally preferable materials, products, and services; design, construct, maintain, and operate high performance sustainable buildings in sustainable locations; strengthen the vitality and livability of the communities in which Federal facilities are located; and inform Federal employees about and involve them in the achievement of these goals.”
- ^{xvii} Alliance to Save Energy website: www.ase.org.
- ^{xviii} “U.S. Building Energy Efficiency Retrofits,” Rockefeller Foundation and DB Climate Change Advisors, March 2012.



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