Innovations and Opportunities in Energy Efficiency Finance

Charlotte Kim, *Partner* Randy Lewis, *Partner* Robert O'Connor, *Partner*
Greg Broome, *Partner*

Kendall Bodden, *Associate*
Lauren Chase, *Associate*
Alexander Drake, *Government Affairs Advisor*
Wendra Liang, *Associate*
Sheridan Pauker, *Regulatory Counsel*
Scott Zimmermann, *Associate*

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Wilson Sonsini Goodrich & Rosati
1301 Avenue of the Americas, 40th floor, New York, NY 10019-6022, phone 212-999-5800
One Market Plaza, Spear Tower, Suite 3300, San Francisco, CA 94105-1126, phone 415-947-2000
1700 K Street NW, Suite 500, Washington, D.C. 20006-3817, phone 202-973-8800

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David Gabrielson

Bob Hinkle

Joanna Karger

Kristina Klimovich

Woolsey McKernon

Cliff Staton

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*The MESA structure was pioneered by Transcend Equity, which was acquired in 2012 by SCIenergy, and MESA is a trademark of SCIenergy.

Introduction

What a difference a year can make.

As we reflect on developments in energy efficiency finance since the publication of our 2013 white paper last May, and look ahead to the ongoing efforts of numerous stakeholders in the energy efficiency sector, we are cautiously optimistic about some of the "green shoots" that are emerging in the field.

In this, our fourth edition of our white paper on innovations and opportunities in energy efficiency finance, we will revisit the financing models with which many are familiar by now, examining key developments that have occurred since May 2013:

(1) the energy savings performance contract (ESPC) model implemented by an energy service company (ESCO), and applying the real estate investment trust (REIT) structure to energy efficiency finance;
(2) the energy or efficiency services agreement (ESA) model;
(3) the managed energy services agreement (MESA) model;
(4) the Property Assessed Clean Energy (PACE) model;
(5) on-bill financing and on-bill repayment (OBF/OBR) approaches; and
(6) the Warehouse for Energy Efficiency Loans (WHEEL) structure.

For those readers who are new to the field of energy efficiency finance, we refer you to our 2012[i] and 2013[ii] white papers, which provide more detailed overviews of the main market segments, financing models, and major issues relating to energy efficiency finance.

While challenges of course remain in unlocking the vast potential of the energy efficiency market, in the past year, some notable steps toward greater aggregation and scale have been taken using several of the financing approaches listed above. We will examine these important developments and ongoing efforts to apply well-known financing techniques commonly used to finance other asset classes—such as REITs, securitization, and various public-private financing structures—to energy efficiency.

I. Evolving Energy Efficiency Finance Structures and Negotiating Key Agreements

The American Physical Society has estimated that Americans spend 90% of their time indoors in buildings.[iii] In the United States, buildings account for 36% of total energy use, 65% of electricity consumption, and 30% of greenhouse gas emissions.[iv] The estimated $279 billion investment opportunity in the U.S. alone for making existing buildings more energy efficient[v] continues to present an enormous opportunity for business and investment, greenhouse gas reductions, and job creation.

Realizing the full potential of this opportunity, however, faces several long-standing challenges, as we have discussed at length in our previous white papers. Figure 1 below provides a handy reference chart for these issues as we examine how recent energy efficiency finance transactions have tackled these barriers.

Figure 1

First-Cost Hurdle	•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	•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	•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	•How to achieve scale by aggregation despite the often-fragmented and disparate nature of the targeted market and facilities
Existing Property or Financing Restrictions	•Restrictions under existing mortgages on mortgaged property or under existing debt financing to property owners
Energy Baseline Measurements	•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. Performance Contracting and ESPCs

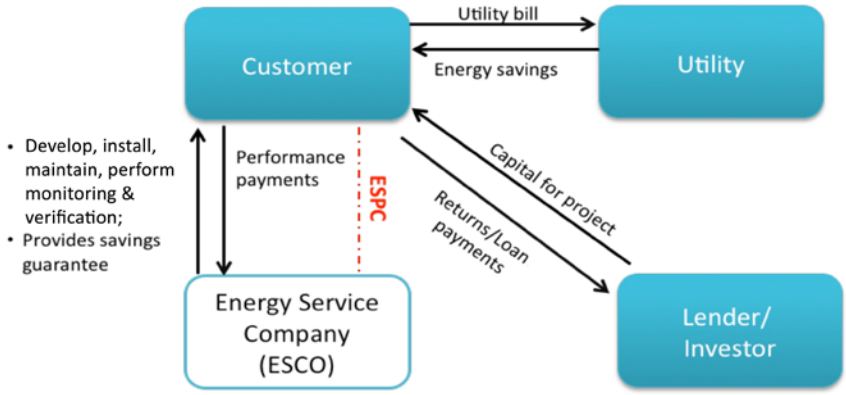
Performance contracting and the use of ESPCs continue to play an important role in financing energy efficiency, particularly in buildings in the MUSH sector.

According to one recent research report, annual revenues of the U.S. ESCO market are predicted to grow from $4.9 billion in 2013 to almost $8.3 billion in 2020.[vi] Several initiatives and programs at the U.S. federal government and various state government levels, as discussed more fully in Section II below, will continue to provide critical policy support for implementation of energy conservation measures in public and other buildings.

Basic ESPC Structure

The main elements of the basic ESPC structure, illustrated in Figure 2 below, have not changed in the past year. We refer you to our 2012 white paper for a more detailed overview of the ESPC model.

Figure 2: ESPC Basic Structure



Applying Familiar Sources of Financing: REITs

As described in our 2013 white paper, last year Hannon Armstrong Sustainable Infrastructure Capital, Inc. (Hannon) raised over $160 million in an initial public offering (IPO) as part of its conversion into a public mortgage REIT. Since its IPO, Hannon has increased its total managed assets to approximately $2.1 billion as of December 31, 2013, and about 62% of the transactions that Hannon has completed from the date of its IPO through December 31, 2013, financed energy efficiency projects.[vii]

Hannon continues to apply tried and true financing techniques (such as securitization, receivables financing, direct financing leases, project loans, and other debt investments) and the REIT construct to aggregate and finance energy efficiency and other sustainable infrastructure projects at scale. Hannon has also employed back leverage, issuing for example $100 million of 2.79% fixed-rate asset-backed nonrecourse notes in a private placement in December 2013. While the Hannon REIT example may be regarded as somewhat unique because of the significant percentage of federal government building energy efficiency projects in Hannon's portfolio, it demonstrates how REIT financing techniques may be used to aggregate energy efficiency assets that qualify for REIT purposes in large amounts.

To qualify for this tax-advantaged treatment, however, a REIT must meet several complex asset and income criteria as defined and interpreted by the IRS. In its prospectus, Hannon states that it has obtained an applicable private letter ruling from the IRS.[viii] Although the private letter ruling is redacted such that it does not specifically mention energy efficient assets, it rules that Hannon's assets are eligible real estate assets and that interest income from the financing of these assets qualifies as income from real estate for REIT purposes.[ix] Specifically, the private letter ruling finds that structural improvements that are "inherently permanent structures and not assets accessory to the operation of a business" constitute real estate.[x] Although the specific facts and circumstances may differ in any given situation, this may serve as a useful indication of the IRS's general position for other REITs pooling energy efficiency financings or projects.[xi]

It remains to be seen to what extent REITs may be deployed to aggregate and finance energy efficiency assets in other contexts or market segments. Given the complexity and cost of maintaining REIT status, in addition to the economics of generating sufficiently attractive returns for REIT investors, using a REIT structure would likely make the most sense for a large aggregation of energy-efficiency-related, qualifying assets. In addition to the current questions surrounding applicable private letter rulings from the IRS, there may be some uncertainty as to how REITs may be affected by tax law reform by Congress. It remains to be seen whether the IRS will allow a series of energy efficiency and other sustainable infrastructure investments to qualify as REIT assets on a case-by-case basis, possibly widening a pathway for more energy-efficiency-related REITs. However, the breadth of Hannon's private letter ruling provides some comfort that the REIT approach may be replicable in other market segments and with other energy efficiency assets and financings in the future.

Legal Issues

In September 2013, the SEC issued the final rule on the registration of Municipal Financial Advisors[xii] as part of its Dodd-Frank rulemaking process. The final rule adopts an activities-based exemption approach to define activities that are excluded from regulation as a "municipal advisor," and notes that the SEC treats ESCOs as engineering companies in respect of the engineering exclusion in the rule.

Overall Assessment of ESPC Model

Strengths	Challenges
- 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	- Contractor and financier incentives limit deployment of new technology - High transaction costs - Long negotiation periods - Not a realistic framework for smaller projects - Does not incentivize energy or cost savings - On customer's balance sheet

B. Energy or Efficiency Services Agreements (ESAs)

The ESA model's innovation of translating the power purchase agreement (PPA) project financing approach into a contractual tool for third-party financing of energy efficiency improvements continues to gain market traction. As a result of the ESA model's success in commercial and industrial market segments, some innovators in energy efficiency finance have sought to use ESAs in connection with other financing strategies such as on-bill repayment (discussed in Section I.E below) and public/private financing integration (discussed in Section II below).

Description and Key Features

In an ESA financing, the ESA provider arranges for the installation of energy efficiency measures by an ESCO and implements the capital investment in the project. The ESA provider develops, finances, 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 3 depicts a typical ESA structure.

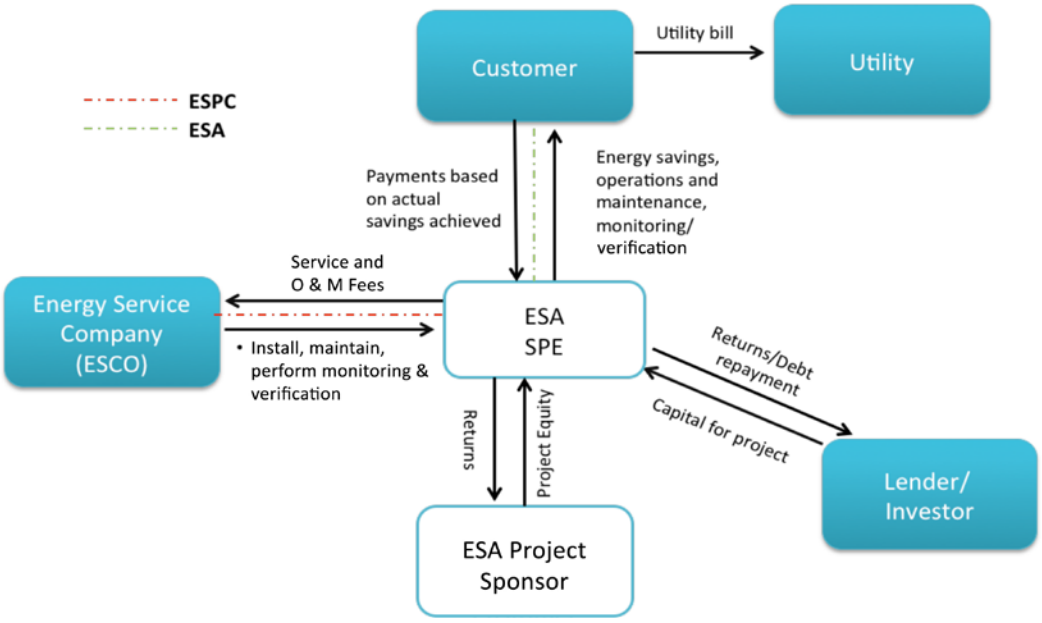
In an ESA, because the customer pays the ESA provider based on the actual amount of realized energy savings, there is an incentive to maximize the realized energy savings. As a result, this model may serve to encourage the implementation of newer technology that has been successfully piloted or demonstrated. Under certain ESA structures, 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

Both equity and debt investors may be involved in providing capital for the energy efficiency project through investments in a special purpose entity (SPE), which is typically established by the ESA provider for each energy efficiency project that is financed using an ESA structure. 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 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.

Different debt financing providers may approach ESA projects with their own varying underwriting criteria and, as a result, a lender may require certain guarantees or other credit support from project participants. Small- to medium-size energy efficiency projects (typically for customers with less than $1 million in annual energy expenditures) have been challenging to finance using private sector funds alone due to the relatively small amounts involved per project. Aggregation of these types of projects is key to financing them efficiently. While several market participants are tackling this issue, no single approach has gained significant traction yet, leaving this as an area open for new innovations and new market entrants.

Figure 3: Basic ESA Structure



Investors are repaid through the stream of customer payments for energy savings, utility incentives, rebates, and environmental attributes. The creditworthiness of the customer and the ESCO will impact the ability of the ESA provider to secure debt for an ESA-based project and the pricing of such financing. In some cases, parent guarantees or project performance insurance may be needed in innovative financing models until investors in this area become comfortable with their risk exposure. Project performance insurance has become more available and has been increasingly used to enable ESCOs that are not traditionally "creditworthy" to participate in the ESA market sector. Such an insurance product offered by Energi was instrumental in Metrus Energy's $5.8 million ESA project at Kuakini Medical Center, announced in January 2014. 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 services agreements, operating leases, or capital leases. Each ESA customer has to make its own determination of its accounting treatment of the ESA.

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.

Strengths	Challenges
- 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 - ESA providers are incentivized to maximize energy savings or other performance metrics - ESA provider may be able to monetize tax benefits that customer could not - 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	- Each ESA customer has to make its own determination of its accounting treatment of the ESA - ESA provider has to secure debt financing from providers that understand the ESA model and source equity; familiarity with the well-established PPA model, however, may help mitigate this risk

C. Managed Energy Service Agreement (MESA)

The MESA model, pioneered by Transcend Equity Development (now owned by SCIenergy) on a 24-building retrofit for Corporate Office Properties Trust (COPT), is a variant to the ESA model's successful application of the PPA structure to energy efficiency. Some MESA innovators are also exploring the possibility of using MESAs in connection with on-bill repayment (discussed in Section I.E below).

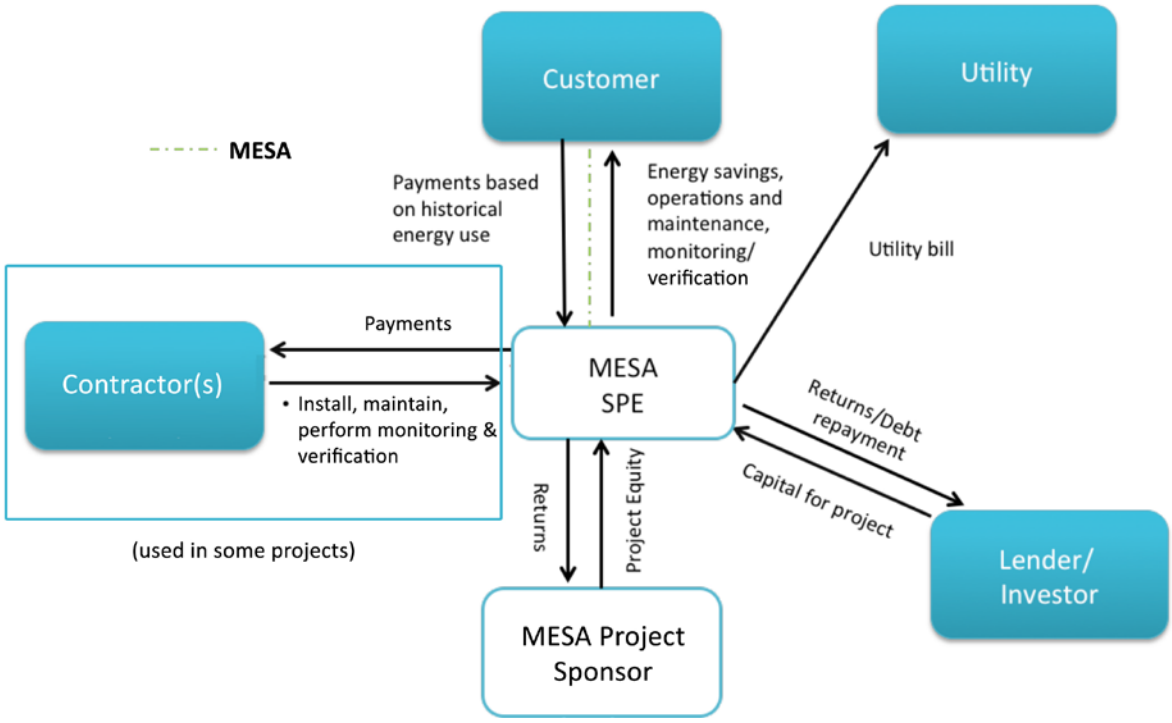
Description and Key Features

The MESA is a different version of an ESA, wherein the MESA provider owns the energy efficiency equipment (though the transaction does not always have to be structured this way) and in addition serves as a middle person between the customer and the utility by paying the utility bill directly for the host. With a MESA structure, the customer has the MESA provider as a single point of contact and makes a single payment for all of its utility expenses, which is based on their historical average. The MESA structure overcomes the split incentives hurdle in a multi-tenant building when the property owner can pass through MESA charges to tenants, since the MESA is an operating expense. The MESA approach is a possibility for multi-tenant buildings in the residential sector, as well as other sectors, in particular the private education sector. As with an ESA, MESAs involve the sale of energy savings as a service and are often structured as balance sheet neutral arrangements to ensure that no covenants would be violated in the case where a senior lien might exist. 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 offer the MESA structure to fund energy efficiency projects.

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

Figure 4 below provides an illustrative MESA structure.

Figure 4: Basic MESA Structure



Sources of Financing

The MESA provider may finance a MESA project using the same strategies as an ESA provider does as described above, including the establishment of an SPE for each MESA project. MESA projects may attract lenders because the structure does not require them to take risk on utility rates, as rate rise/fall is passed through to the owner on a transparent basis. 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 MESA energy efficiency projects. To the extent Section 179D becomes available again, it will be a viable means of bringing up to $1.80 per square foot in tax deduction to clients, which allows an ESA or MESA provider to drive a deeper, more holistic retrofit.

A MESA project may be financed using capital from a variety of sources. Availability of equity financing has traditionally been a barrier to executing MESA transactions. The $6.6 million energy efficiency project at Drexel University announced by SCIenergy in March 2014, for example, was financed by a combination of public and private sources of capital from Mitsui USA and the Pennsylvania Campus Energy Efficiency Fund, with additional investment from The Reinvestment Fund of Philadelphia and the

Philadelphia Industrial Development Corporation. Credit enhancement can also be used in the financing of a MESA project.[xiii]

Overall Assessment

Strengths	Challenges
- Customers may finance energy efficiency improvements off-balance sheet - Customers do not bear performance risk during the MESA contract term - Project sponsors are incentivized to maximize energy savings - Customer has a single point of contact and a single payment for all utility expenses - Will address the split incentives hurdle in multi-tenant buildings	- Each MESA customer has to make its own determination of its accounting treatment of the MESA

D. Property Assessed Clean Energy (PACE)

PACE was developed in 2007 and enables local governments to finance energy efficiency, renewable energy, and water conservation 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 or arrange other sources of capital to finance local improvements that have a public purpose and levy assessments against property that benefits from such improvements. The assessments are collected along with property taxes and are secured by a lien on the property.

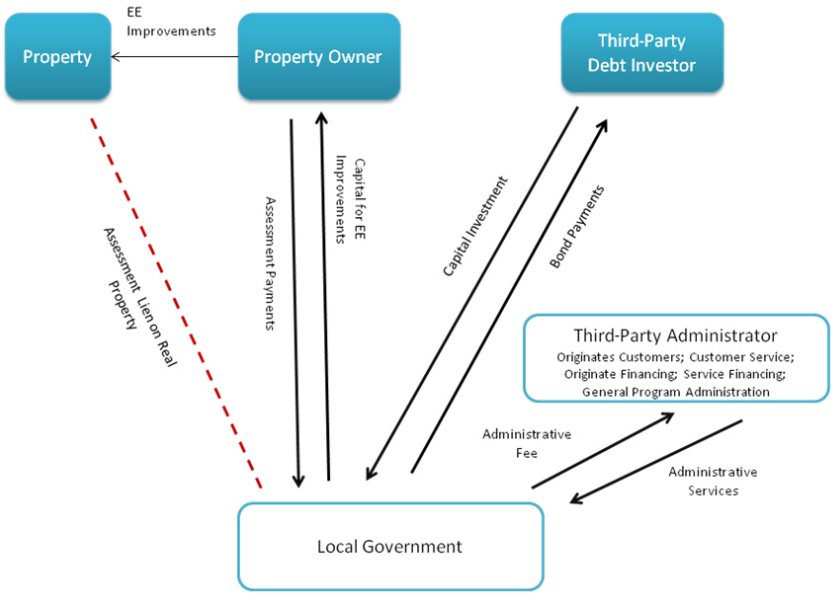
Across the U.S., approximately 500 municipalities have established or joined PACE districts that finance commercial projects.[xiv] These programs have resulted in over 200 clean energy projects on commercial buildings in eight states and D.C., representing over $70 million in investments.[xv] Commercial PACE financings doubled in 2013 and 2014 is expected to be a breakout year, as 25 commercial programs have launched, with many in development.[xvi] Residential PACE has also advanced considerably in the past year. Approximately 150 municipalities have established or joined districts that currently finance residential projects, resulting in clean energy improvements on approximately 11,500 homes across the U.S. and over $220 million in investments. [xvii] In 2014, the first securitization of PACE obligations took place, with an approximately $100 million offering led by Deutsche Bank, backed by PACE bonds issued by the Western Riverside Council of Governments.

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 5: Basic PACE Structure



In the event of a sale or transfer of the property subject to the PACE assessments, 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 attractive 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 remaining balance of future assessments). 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. 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 beginning in 2008, with 27 states[xviii] around the country passing legislation to expand existing land-secured municipal improvement district authority to enable local governments to establish PACE programs.

For the commercial sector, PACE programs have been implemented on a statewide basis in eight states, and at the local level in over 500 municipalities around the country. These programs typically require mortgage-holder consent, acknowledgment, or notice of the senior PACE lien, and are available in the commercial, multi-family residential, and industrial sectors. To date, over 150 consents have been granted by senior mortgage lenders. These consents were provided by 81 financial institutions, with 22 of them providing multiple PACE consents.[xix]

In the single-family residential sector, the implementation of PACE programs has been hampered by actions taken by the GSEs and the FHFA. In 2010, the 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 and act as the conservator of 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 and to take "prudential actions," such as tightening debt-to-income and loan-to-value ratios in communities offering residential PACE programs. These actions had the effect of halting the implementation of many PACE programs in the U.S. residential sector.

Some local governments and multi-jurisdictional agencies have continued to offer or plan to re-launch PACE in the residential sector and provide disclosures to homeowners regarding the risks associated with the FHFA's actions or to restrict programs to properties not subject to a GSE-conforming mortgage. California has established a reserve fund that would make the GSEs whole in the event of foreclosure or forced sales for losses resulting from PACE payments being paid ahead of the outstanding mortgage. Other communities have decided not to pursue residential PACE unless the FHFA modifies its position on PACE, or to offer clean energy financing programs that involve subordinate liens. The FHFA's actions do not impact PACE programs in the commercial sector.

Sources of Financing

PACE improvements are financed via the issuance of bonds by local governments under land-secured municipal improvement district authority. Third-party entities typically work with the local government to arrange for lines of credit, capital warehouse facilities, or bond purchasers, as well as to provide project origination and administrative processing services. As discussed above, assessment liens provide attractive security 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 financings have the potential to evolve into standardized instruments that can be securitized and sold in the secondary markets. As stated above, the first such asset-backed securitization transaction was managed by Deutsche Bank in 2014, and the notes received an AA rating by Kroll Bond Rating Service.

Overall Assessment

PACE is a promising energy efficiency financing structure with enormous potential to scale energy retrofits. Although residential PACE has faced challenges relating to concerns of the FHFA, PACE programs continue to advance across the country in the commercial, industrial, multi-family, and residential sectors.

Strengths	Challenges
- Addresses "first-cost" hurdle to building owner adoption - Uses third-party capital with little-to-no cost to taxpayers - Senior 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 - Securitization of underlying bonds is advancing, with attractive ratings	- FHFA position has slowed implementation in the residential sector and created uncertainty - Local government approval process required to implement program

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 24 states, serving residential, commercial, and industrial customers.

The past year has seen the establishment or approval of new OBF/OBR programs, as well as the expansion of such programs past pilot stages. OBF/OBR has continued to feature very low default rates and low borrowing costs, and some programs have begun to explore combining OBR with other financing models such as ESAs or MESAs in order to allow ESA/MESA developers to consider credits that would not be financeable without the OBR program. In 2013, California's Public Utilities Commission approved a suite of OBF and OBR programs, some of which included ratepayer-funded credit enhancement features. In addition, Connecticut passed legislation creating a residential OBR program in July 2013, which will cover energy efficiency and renewable energy improvements. Overall market penetration of OBF/OBR remains low, however.

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) minimal or low up-front costs and interest rates; (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 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 certain 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 (typically less than 2%). This feature of OBF/OBR is credited with lowering borrowing costs and extending energy efficiency retrofits to parties that might not otherwise have been deemed creditworthy. As discussed below, the availability of service disconnection, particularly in the residential sector, may be subject to legal restrictions in some jurisdictions.

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 may target different types of customers, buildings, and technologies. 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. The OBR program approved by the Hawaii Public Utilities Commission is open to residential customers and small businesses,[xx] and is expected to be expanded to include commercial properties. 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 (e.g., Hawaii's program, which is expected to include solar thermal hot water and solar photovoltaic installations in addition to permanently installed energy efficiency improvements).

One key difference between programs is whether the customer's payment is characterized as payment on a loan or payment for a service, which has implications for the regulations of utilities and the transferability of the OBF/OBR payment obligations. In on-bill loan programs, the program administrator extends financing to an individual or company. The obligation to repay may be non-transferable, 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. On-bill loan programs may also subject the administrator to lending laws, as discussed further below.

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 automatically transfers to subsequent owners or occupants. It is expected that this model will be used in Hawaii's OBR program. Another example is the Oregon MPower program, which 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. On-bill tariff programs typically include notice requirements for future owners or occupants. In Midwest Energy's How$mart program, for example, Midwest Energy files a Uniform Commercial Code form with the county register to provide notice of the OBF/OBR obligation, while Vermont's PAYS® program allows subsequent tenants or owners to break a lease or purchase agreement if the landlord or previous owner failed to provide

notice. An advantage of the tariff structure is that it removes the disincentives to OBF/OBR based on whether the property is leased or the expected duration of ownership, and reduces the emphasis on the building occupant's creditworthiness as a determining factor in the application. However, owners and utilities may remain concerned about the treatment of tariffs during periods when the building is unoccupied by tenants or upon transfer of the property. Furthermore, although OBF/OBR program administrators in several states (e.g., Vermont, Oregon, Kentucky, New York, and New Hampshire) have taken the position that state laws and regulations allow for the tariff to run with the meter, the extent to which a tariff obligation is transferable is a state-by-state inquiry and remains unsettled in many jurisdictions.

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 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 (CDFIs), 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. Some utilities use ratepayer capital for OBF/OBR, such as the master metered multi-family pilot program approved by the California Public Utilities Commission in 2013, which utilizes a debt service reserve fund (but does not include utility disconnection for nonpayment). Finally, some larger banks, leasing companies, and solar developers have expressed interest in investing in appropriately structured OBR programs, and interest in creating asset-backed securities backed by on-bill obligations has emerged recently. The involvement by larger investors and the capital markets is expected to grow once volume increases and OBR agreements become more standardized.

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, $18.6 million has been allocated from the U.S. Department of Energy's (DOE's) Better Buildings grant. In addition to energy audits and retrofits, GJGNY 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. More recently, GJGNY is also relying on funds from Qualified Energy Conservation Bonds, rated AAA by Standard & Poor's.

OBR programs can also be structured to accommodate other energy efficiency financing structures, such as leases, PPAs, ESAs, and MESAs. In such circumstances, ongoing payments to the ESA project developer could be made on the utility bill. For example, the City of Seattle's Community Power Works (CPW) program features ESAs, payments on which are made through Seattle Steam Co. utility bills. A notable characteristic of the CPW program is that Seattle Steam Co. has agreed to subordinate its steam charges to the ESA payments to its partners under the CPW program, with the view that offering

OBF/OBR and lowering customer rates would improve customer retention. In circumstances where OBF/OBR is combined with other financing mechanisms, or with other energy efficiency or renewable energy incentive programs, it is important to streamline the programs to minimize customer confusion and administrative costs.

Legal Issues

Although utility service disconnection reduces default rates in OBF/OBR programs, this practice may be restricted by statute or regulation for certain customer segments in certain jurisdictions. 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." California utilities, for instance, received an exemption from the California Finance Lenders Law from the California Department of Corporations when the utilities lend to commercial entities and charge 0% interest and no fees.[xxi] When structured as a tariff, on-bill programs may avoid lending laws; this question has not yet been tested in the courts. Tariff-based programs also require regulatory approval from the relevant entities. In addition, the structure of the OBF/OBR program as a loan or an energy payment will impact its accounting treatment for the customer as on-balance sheet or off-balance sheet.

Overall Assessment

To date, OBF/OBR programs have been successful in maintaining very low rates of default, achieving bill neutrality, 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 to target multiple building sectors, which increases project volume. However, overall market penetration has remained low—approximately 1% of eligible customers.[xxii]

To scale up, OBF/OBR must 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 (in some cases), and the lack of standardized agreements. Many programs still rely on government funding, which reduces sustainability, and attracting third-party private capital continues to be challenging due to non-standard underwriting criteria and uncertainty regarding the transferability of OBF/OBR obligations. 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, and ways to ensure positive cash flows.

Strengths	Challenges
- Addresses "first-cost" hurdle to customer adoption by requiring little capital up front - Shows strong record of repayment by customers to date - Can be structured to use third-party capital at no cost to taxpayers or ratepayers - Leverages existing utility resources and customer practices to collect payments - Bundled utility bill clearly shows impact of energy efficiency on overall energy expenditures - Expands access to retrofits and lowers cost of capital because threat of utility shut-off leads customers to prioritize utility payments - Payment obligation may follow the customer or the meter - Can accommodate a variety of financing structures, including ESAs and MESAs - Can be structured to address diverse customers and market segments - Can be structured to address split energy incentives of tenants and owners	- Threat of utility disconnection may be subject to legal restrictions in some jurisdictions - May require up-front investment by utility to reform billing structures and other systems - Ensuring that energy savings will exceed loan/tariff payments is difficult - Potential consumer lending regulations increase legal costs and uncertainty for loan structure - Existing programs rely heavily on government funding and support - Scalability may be constrained by unorthodox metrics for assessing risks of default - Legal uncertainty exists in many jurisdictions regarding transferability of OBF/OBR obligations in the event of transfer, foreclosure, or bankruptcy

F. Warehouse for Energy Efficiency Loans (WHEEL)

The Warehouse for Energy Efficiency Loans (WHEEL) is an energy efficiency finance structure that leverages public or ratepayer funds to provide low-cost, large-scale capital to state and local government and utility-sponsored residential energy efficiency loan programs. WHEEL was launched in April 2014 by Renewable Funding, the State of Pennsylvania Treasury Department, and Citibank, with an initial commitment of up to $100 million. WHEEL is poised to expand to states across the country.

Description and Key Features

WHEEL is modeled after the same method of financing used for a wide array of consumer borrowings, including autos, mortgages, and credit cards. Under this model, a special-purpose entity purchases unsecured residential energy efficiency loans (such as Keystone Home Energy Loan Program (HELP) loans) from loan originators. To fund the purchase of these loans, the special-purpose WHEEL entity borrows funds under a warehouse line of capital from private investors. The special-purpose entity also obtains capital from public sources (such as remaining ARRA funds or other public funds directed to finance energy efficiency improvements), local funds, or funds provided by utility ratepayers or other

public utility commission-directed funds. The key innovation in the WHEEL model is that public sponsor funds take a subordinate position to the private debt, thereby attracting investment-grade capital to the structure. This allows for low-cost, large-scale capital to flow to the programs WHEEL supports.

The use of public sponsor capital also functions as an interest rate buydown on the cost of capital to consumers. WHEEL currently anticipates single-digit interest rates on loans. This interest rate can be further reduced via additional interest rate buydowns from the public sponsor. Loans with terms of five, seven, or ten years can be included in WHEEL.

WHEEL is structured to enable residential energy efficiency loans to be pooled, securitized, and sold in the capital markets. The proceeds of the sale of investment-grade rated debt are then recycled back into the warehouse, enabling the purchase of additional residential energy efficiency loans. By leveraging public funds and creating a secondary market for energy efficiency loans, WHEEL has the potential to bring large sources of private capital to the table and reduce borrowing costs to homeowners interested in retrofitting their homes.

Sources of Financing

Senior debt in WHEEL is provided by large institutional investors, while credit enhancement can be sourced from several different entities. Interest rate buydowns for WHEEL can be provided through a variety of state and utility sources, including federal funds (e.g., ARRA), state conservation or energy efficiency funds, utility ratepayer funds, or funds provided by local or other public agencies. The Department of Energy has issued guidance permitting state sponsors to use Energy Efficiency and Conservation Block Grant and State Energy Program funds to support the purchase of loans into WHEEL, and clarifying that revenue that flows back to sponsors is not subject to DOE or ARRA requirements for the use of such funds.[xxiii] In addition, ratepayer funds administered by utilities or utility commissions can provide subordinate debt to the WHEEL structure. As compared to programs utilizing other credit enhancement models such as loan loss reserves or guarantees, WHEEL provides public sponsors with potential upside gain due to interest earned on the loans and is therefore likely to require a lower net public subsidy.

WHEEL is organized to tap into the capital markets by issuing investment-grade rated securities backed by the underlying consumer energy efficiency loans. Investors may include pension funds, insurance companies, and large money managers. By selling into the capital markets, WHEEL generates more funds available to purchase energy efficiency loans, thereby recapitalizing the funds established to provide energy efficiency financing to homeowners. This structure is intended to bring large pools of capital into the residential retrofit markets.

Legal Issues

Because WHEEL relies on public agency sponsors to provide credit enhancement, standard political processes and governmental approvals are required to utilize WHEEL financing. Depending on the type of public sponsor or specifications regarding the source of funds, this process can be time-consuming. WHEEL is designed to comply with all issues related to sponsor funds, as well as all legal issues associated with securitization transactions involving consumer debt, including compliance with securities, consumer finance, privacy, and other laws and regulations.

Overall Assessment

WHEEL is a promising new twist on an old financing model that could bring large pools of capital to the single-family residential energy efficiency market. By incorporating public sources of financing in a subordinate position, WHEEL is poised to deliver energy efficiency finance at much larger scale and a lower cost of capital. And by securitizing this new asset class of home energy efficiency loans, WHEEL can recapitalize public energy efficiency loan pools, thereby leveraging public funds and increasing the overall financing potential.

Unsecured residential energy efficiency loans are a new asset class, and little direct data on the performance of these loans is available. It can take three to seven years of loan history for rating agencies to fully evaluate the credit of a portfolio. Over time, WHEEL will provide the capital markets with data on the performance of this asset class, enabling rating agencies to more accurately assess risk on the asset class. If the data shows strong performance, interest rates will be further reduced and public subsidies may no longer be necessary.

Thus, WHEEL is an innovative concept intended to address the significant need for low-cost financing in the single-family residential energy efficiency markets with a great deal of potential. Because it is still under development, however, the efficacy of WHEEL is as yet unproven.

Strengths	Challenges
- Addresses the "first-cost" hurdle by leveraging public or ratepayer funds to reduce interest rates on residential energy retrofit loans - Scalable: loans can be standardized and securitized, creating a secondary market in residential energy efficiency loan assets - Taps into capital markets to bring large sources of capital to energy efficiency finance - Provides public sponsors with upside potential on credit enhancement funds, reducing net subsidy	- Utilizes public sources of capital and therefore requires public agency approval, which can be time-consuming and subject to political processes - New asset class, not yet familiar to rating agencies or investors

G. Appraisals, Insurance, and Internal Revenue Code Section 179D

Since the measurement and verification of energy efficiency savings and costs are critical decision points for both the customer considering whether to implement 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.

One example of a critical development with a potentially significant impact on energy efficiency finance that has recently received increased attention is the appraisal process for properties. Under uniform

national standards, appraisals must include the value of energy efficiency and renewable energy improvements.[xxiv] The appraisal industry has evolved to enable appraisers to account for the resale value of energy efficiency and renewable energy improvements.[xxv] For example, in 2011, the Appraisal Institute issued a "Residential Green and Energy Efficient Addendum" to the Uniform Residential Appraisal Report (Fannie Mae Form 1004), which facilitates the process of determining the value of clean energy improvements and making comparable sales analyses.[xxvi] In 2010, the National Association of Realtors launched a "Green MLS Tool Kit," which facilitates the inclusion of energy efficiency and renewable energy improvements in the regional Multiple Listing Service (MLS) databases.[xxvii] 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 a Memorandum of Understanding (MOU) to cooperate on creating guidelines under the Uniform Standards of Professional Appraisal Practice for green appraisals and energy performance. This MOU has resulted in a change to the licensure requirements for appraisers, which now require education regarding energy efficiency improvements.[xxviii] The Appraisal Institute now provides extensive educational programs to assist appraisers in valuing residential clean energy features as required under the Uniform Standards of Professional Appraisal Practice.[xxix] 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.[xxx]

Another emerging tool is the use of energy savings insurance. For example, Energi Inc. now offers an "Energy Savings Warranty" intended to backstop savings guarantees provided by ESCOs or other energy efficiency contractors. Energi advertises that this warranty product allows contractors to remove the liability associated with providing an energy savings guarantee from their balance sheets. In projects that deploy novel energy efficiency technologies, lenders often require the use of insurance products to cover against technology defects until a track record is built. These insurance products are particularly useful to energy efficiency technology companies that are internally developing ESA or MESA business units seeking to expand the deployment of their technologies.

IRC Section 179D generally provides an immediate deduction (as opposed to depreciation) for an amount equal to the cost of energy efficient commercial building property placed in service before January 1, 2014. Energy efficient commercial building property is defined as depreciable property that satisfies each of the following conditions: (1) the property is installed on or in any building that is located in the United States and is within the scope of Standard 90.1-2001; (2) the property is installed as part of the interior lighting systems; the heating, cooling, ventilation, and hot water systems; or the building envelope; and (3) it is certified that the interior lighting systems; heating, cooling, ventilation, and hot water systems; and the building envelope that have been incorporated into the building, or that the taxpayer plans to incorporate into the building subsequent to the installation of such property, will reduce the total annual energy and power costs with respect to the combined usage of the building's heating, cooling, ventilation, hot water, and interior lighting systems by 50% or more as compared to a Reference Building that meets the minimum requirements of Standard 90.1-2001.

If the property does not reduce the total energy and power costs by 50%, a partial deduction under Section 179D may also be allowed for such property, provided that it reduces the total annual energy and power costs with respect to the combined usage of the building's heating, cooling, ventilation, hot water, and interior lighting systems by at least a specified percentage.

According to IRS Notice 2006-52, only taxpayers who own or lease the energy efficient commercial building may claim the credit. As a result, we are unaware of any transactions or financing structures in which the tax benefits of this immediate deduction were utilized by tax-sensitive investors.

Although the Section 179D deduction expired as of December 31, 2013, there is currently a proposal in the House to extend Section 179D through December 31, 2022.[xxxi] This bill was introduced at the beginning of April 2014 and, given how early it is, it is hard to tell whether there is much hope of an extension.

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

A. State-Level Initiatives

State lending institutions designed to support clean energy and energy efficiency projects have seen significant momentum in the past year. While each program differs in structure, most current and proposed institutions draw from a range of funding sources, such as systems benefit charges, bonds issued to private investors, private foundations, and cap and trade auction revenues.[xxxii]

The Connecticut Clean Energy Finance and Investment Authority (CEFIA) continues to forge ahead and deploy capital using multiple financing techniques to finance more efficiency and other clean energy projects. CEFIA has been hard at work leveraging public and private funds to drive investment in clean energy in Connecticut. According to CEFIA, for every $1 of ratepayer funds CEFIA invested, about $10 was invested from private capital sources. In its fiscal year 2013, more than $220 million was invested through CEFIA's various initiatives and programs to deploy clean energy and energy efficiency in Connecticut.[xxxiii] CEFIA's commercial PACE program approved 26 projects totaling $20 million in its 2013 fiscal year, with 120 more projects totaling over $60 million in the pipeline.[xxxiv]

In February 2014, the $1 billion New York Green Bank initiative opened for business and released its first request for proposal (RFP)[xxxv] for a wide range of energy efficiency and other clean energy projects. Initially capitalized with $210 million in funding in December 2013, the New York Green Bank will partner with private-sector institutions to provide financing for qualifying clean energy projects and to accelerate clean energy deployment in the state of New York. Proposed projects, including those related to energy generation and energy savings, may include a wide range of commercially proven technologies, such as solar PV and thermal, onshore and offshore wind power, fuel cells, hydroelectric, biomass, biothermal energy, biogas, liquid biofuels, and tidal/ocean power. Nuclear, municipal solid waste combustion, and adulterated biomass or biofuels are excluded. In the energy efficiency sector, comprehensive projects that result in comprehensive energy consumption improvements will be emphasized. The open, ongoing nature of this RFP and its broad range and flexibility present a unique opportunity to obtain financing for qualifying clean energy projects in New York State. While it is still early in the life of the New York Green Bank, the potential size and scale of New York's initiative, if successful, would mark a significant milestone in the growth of state green banks and serve as an important example of how public and private capital may work in partnership to aggregate and finance more clean energy projects at greater scale.

While many states are seeking to replicate CEFIA and New York Green Bank models, Hawaii's Green Energy Market Securitization (GEMS) program builds upon existing state financing authorities in an innovative way. GEMS was established 2013 and expects to begin receiving applications in the coming months pending final public utilities commission approval. With an initial $50 million capitalization from the state's Green Infrastructure Special Fund in April 2014, GEMS will be further supported by an expected issuance of $100 million in bonds enhanced by utility surcharge revenues to fund clean energy and energy efficiency projects. The program's traditional rate-reduction bond structure incorporates on-bill repayment for customers in participating utility service territories, and while GEMS is designed to

support a wide range of clean energy and energy efficiency upgrades, initial projects are expected to focus on distributed solar systems for low- and middle-income residential customers.[xxxvi]

B. Federal Financing Programs

Most notable in the range of financing programs supported by the federal government is the recently announced draft solicitation by the U.S. Department of Energy (DOE) Loan Programs Office for up to $4 billion in loans and loan guarantees for renewable energy and efficient energy projects. Borrowers under this program can receive direct loans from the Federal Financing Bank or can work with commercial lenders to receive loans guaranteed by the Department of Treasury. DOE is seeking to fund the first commercial deployment of technologies that could not achieve financing in the commercial markets; however, an applicant's creditworthiness and equity contribution to the project is key to receiving a strong evaluation from DOE in this solicitation.[xxxvii] While DOE is open to a wide range of potential projects, noted technologies of interest include the retrofit of hydro facilities or first-generation wind farms for electricity generation upgrades, energy recovery technologies from industrial processes, and systems that improve energy management and utilization across residential or commercial applications. With a final solicitation expected in June, DOE plans to begin accepting submissions in the fall of 2014.[xxxviii] While application fees for the program are not insignificant, DOE's support through the Loan Programs Office of first-of-a-kind technologies at first commercial deployment fills a much needed financing gap for clean energy and energy efficiency technologies that would likely be too expensive for many of the newly formed state financing institutions.

The primary energy efficiency financing program for the U.S. Department of Agriculture (USDA), the Rural Energy for America Program (REAP), published a Notice of Funding Availability on May 5. USDA announced up to $12.4 million in available grant funding and up to $57.8 million in guaranteed loans for qualifying projects. This funding opportunity is supported by carryover authority from USDA's fiscal year 2013 budget allocation, and is awarded via USDA state offices for renewable energy systems and energy efficiency improvements. Each applicant, such as an agricultural producer or a rural small business, can receive up to $250,000 in grant funding, as well as up to a $25 million guaranteed loan, and applications are due July 7 for consideration by USDA.[xxxix] Despite REAP's issuance of nearly $220 million in grants and $180 million in loan guarantees since 2008, the program's under-subscription in recent years makes it an attractive financing option for a wide range of upgrades in often underserved rural areas.

C. Introduced Legislation in 113th Congress

The Energy Savings and Industrial Competitiveness Act of 2014 (ESIC), introduced in February by Sen. Jeanne Shaheen (D-NH) and Sen. Rob Portman (R-OH), may provide a vehicle for the first energy efficiency legislation in nearly five years. ESIC's provisions include the promotion of model building codes to incentivize adoption for commercial and federal buildings, the authorization of competitive awards for supply chain efficiency from the Department of Energy, and coordination of energy efficiency best practices and information sharing across the federal government. Two notable financing provisions in ESIC apply primarily to the Department of Housing and Urban Development (HUD). ESIC authorizes a budget-neutral demonstration program for performance-based contracts for multi-family housing units participating in HUD's support program, wherein HUD is authorized to reimburse private investors for

the up-front cost of energy and water efficiency upgrades via savings from reduced utility bills.[xl] Additionally, ESIC incorporates key provisions from the Sensible Accounting to Value Energy (SAVE) Act. The SAVE Act language instructs HUD to account for expected energy cost savings in the mortgage underwriting process for all issued, insured, purchased, or securitized home mortgages. The fate of these key financing provisions lies on the House-Senate conference negotiations, however; the corresponding bipartisan legislation in the House for ESIC, the Energy Efficiency Improvement Act sponsored by Rep. David McKinley (R-WV) and Rep. Peter Welch (D-VT), was approved in March without either of these provisions.

The Green Bank Act of 2014, sponsored by Rep. Chris Van Hollen (D-MD) in the House and with a companion bill in the Senate sponsored by Sen. Chris Murphy (D-CT), builds upon previously passed legislation in 2009 by the House of Representatives. Introduced in April and modeled off of the demonstrated success of CEFIA in Connecticut, the Green Bank Act would form a federal green bank with an initial capitalization of $10 billion from treasury-issued bonds. While direct offerings for qualifying energy efficiency projects would include loans, loan guarantees, debt securitization, insurance, and portfolio insurance, the federal green bank could act as a source of low-cost capital for state energy efficiency financing entities as well.[xli]

The Department of Defense Energy Security Act of 2014 (DODESA), introduced in April by Sen. Mark Udall (D-CO), significantly expands the use of ESPCs for the Department of Defense. The proposed expansion of ESPC authority would allow for the inclusion of energy savings from mobile power generation assets in forward operating bases, as well as savings specific to transportation assets such as ground vehicles, ships, and aircraft throughout the various services.[xlii] DODESA would allow for the inclusion of secondary energy savings, such as reduced costs for fuel delivery, logistical support, and personnel costs in the Department of Defense's performance-based contracting as well.

III. Conclusion

As David Brinkley famously remarked, "a successful man is one who can lay a firm foundation with the bricks others have thrown at him."

In the past year, we have seen several significant advances in realizing more of the estimated $1 trillion market opportunity in energy savings.[xliii] We are seeing increasing cross-fertilization, wherein companies and investors are applying financing techniques and know-how from other successful and mainstream areas—such as REITS, PPAs, consumer finance, and securitization—to energy efficiency finance at greater scale across different market segments.

For example, Hannon, through its REIT, aggregated approximately $500 million of managed assets of energy efficiency and other sustainable infrastructure projects in 2013, to a total of $2.1 billion as of December 31, 2013. Kilowatt Financial recently closed a $100 million debt facility to finance energy efficiency loans for homeowners, applying a consumer finance approach to financing energy efficiency improvements for homes. The WHEEL program, developed by Renewable Funding in collaboration with the Energy Programs Consortium and the Pennsylvania Treasury, takes an important step toward creating a secondary market for residential energy efficiency loans by purchasing qualifying loans originated in participating state and local government and utility-sponsored programs, and aggregating the loans into diversified pools. These pools may then be used to support the issuance of rated, asset-backed securities. The HERO financing program, administered by Renovate America, funded over $100 million in projects in the program's first 18 months, and also illustrates how PACE can help finance and aggregate energy efficiency, water, and other clean energy upgrades in residential and commercial properties at scale. The Joule Energy Reduction Assets Fund, a private equity fund targeting $100 million in investments recently launched by Joule Assets Inc., seeks to aggregate small and medium efficiency projects in the $50,000 to $500,000 range.

Concurrently, the shared savings agreement approach is also being applied at greater scale, and many small- and medium-sized energy efficiency projects using this approach may be financed and aggregated, as demonstrated by the recent announcement by Noesis Inc. of a $30 million debt facility to finance efficiency projects in the commercial and industrial sectors. Providing efficiency as a service also continues to gain market traction as a critical and flexible financing tool that is increasingly being adapted and expanded to provide other, related services in the commercial, industrial, residential, and MUSH sectors.

State initiatives such as Hawaii's OBF program, the growth of Connecticut's green bank CEFIA, and the opening of New York's $1 billion green bank initiative, together with the numerous other state and federal government policies and developments discussed in Section II and our previous white papers, provide crucial policy support for the critical mass that is taking shape in energy efficiency finance.

Investors are also showing greater interest in energy efficiency investments and putting more capital to work in this area. The Investor Confidence Project, an innovative program of the Environmental Defense Fund, is providing an essential forum for investors and other key stakeholders to develop common, consistent energy performance protocols for energy efficiency projects to facilitate underwriting and investment. Similarly, the launch of the Green Bond Principles[xliv] in January 2014 marks an important milestone in developing standardized guidelines to facilitate green investments. Global investor demand

for green bonds, the proceeds of which are used to finance energy efficiency and other green activities, arrived at a significant turning point in the past year. Beginning with Electricité de France's twice-oversubscribed €1.4 billion green bond issuance and Bank of America's $500 million green bond issuance to finance energy efficiency projects and other green investments in November 2013, followed by Toyota's oversubscribed $1.75 billion green bond issuance to help finance loans for hybrid and electric vehicles and Unilever's £250 million green bond issuance to reduce its environmental footprint in March 2014, the green bond market has expanded substantially in both size and scope, with corporate issuers joining the traditional supranational institution issuers.[xlv] Moreover, the kinds of investors in green bonds have shifted from being predominantly pension funds that own assets in 2012 to more than half of investors being asset managers such as BlackRock.[xlvi] Global green bond issuance reached $11 billion in 2013 and $7.4 billion in the first quarter of 2014, according to Dealogic.[xlvii]

Unlocking $1 trillion of anything is a monumental endeavor and as such should not be expected to occur quickly. However, as discussed in this paper, momentum has built significantly with the recent progress that has been made and is ongoing. This momentum will continue to gain impetus as energy efficiency becomes more integrated with other market trends such as the proliferation of the Internet of things, advances in software tools to analyze big data, and expanding investor interest in energy efficiency as well as other green investments. The evolution of energy efficiency investments as an asset class will prove particularly key to continuing to build momentum and widening the causeways toward a more competitive, sustainable, and efficient economy.

"When the speed of rushing water reaches the point where it can move boulders, this is the force of momentum."

– Sun Tzu, The Art of War

[i] *Available at* http://www.wsgr.com/publications/PDFSearch/WSGR-EE-Finance-White-Paper.pdf.
[ii] *Available at* http://www.wsgr.com/publications/PDFSearch/WSGR-EE-Finance-White-Paper_13.pdf.
[iii] "Buildings" in *Energy Future: Think Efficiency*, American Physical Society, September 2008, page 52.
[iv] Source: U.S. Green Building Council.
[v] "U.S. Building Energy Efficiency Retrofits," Rockefeller Foundation and DB Climate Change Advisors, March 2012.
[vi] Source: Navigant Research, 2013.
[vii] Source: Hannon's Form 10-K as of December 31, 2013.
[viii] From the Prospectus dated April 17, 2013, filed by Hannon Armstrong Sustainable Infrastructure Capital, Inc., with the Securities and Exchange Commission, Registration No. 333-186711.
[ix] IRS Priv. Ltr. Rul. 2013-23-016 (June 7, 2013).
[x] Generally, for REIT purposes, real estate includes land or improvements thereon, such as buildings or other inherently permanent structures thereon (including items that are structural components of those buildings or structures). The term includes, for example, the wiring of a building, plumbing systems, central heating or central air-conditioning machinery, pipes or ducts, elevators or escalators installed in the building, or other items that are structural components of a building or other permanent structure. The term does not include assets accessory to the operation of a business, such as machinery, printing press, transportation equipment that is not a structural component of the building, office equipment, refrigerators, individual air-conditioning units, grocery counters, furnishings of a motel, hotel, or office building, etc., even though those items may be termed fixtures under local law.
[xi] Importantly, private letter rulings are non-precedential and may not be relied upon by any taxpayer other than its recipient.
[xii] *Available at* http://www.sec.gov/rules/final/2013/34-70462.pdf.
[xiii] A recent example is the retrofit of 125 Maiden Lane in New York City, which was financed with a MESA provided by SCIenergy and credit enhancement from the New York City Energy Efficiency Corporation.
[xiv] These estimates are based on project completion data provided to PACENow by program administrators and other sources, but has not been independently verified by PACENow or Wilson Sonsini Goodrich & Rosati.
[xv] *Id*.
[xvi] *Id*.
[xvii] *Id*.
[xviii] The Database of State Incentives for Renewable Energy (DSIRE) website maintains a map showing states with PACE authority; *available at* http://www.dsireusa.org/documents/summarymaps/PACE_Financing_Map.pdf.
[xix] PACENow, Lender Support Update Senior Mortgage Lender Considerations of Commercial PACE Transactions in 2013 (March 2014), *available at*: http://pacenow.org/wp-content/uploads/2014/03/Lender-Support-Update-2014.pdf.
[xx] This program was approved pursuant to Order No. 30974 of the Public Utilities Commission of the State of Hawaii on February 1, 2013.
[xxi] California Department of Corporations Release 60-FS, July 16, 2006; *available at* http://www.corp.ca.gov/Commissioner/Releases/60-FS.asp.
[xxii] Most residential OBF programs have exhibited a participation rate of under 1% of all possible customers. As of January 2013, the highest observed participation rate for a residential program was 1.3%, for the Midwest Energy How$mart program. Harcourt Brown & Carey Energy & Financing, "On-Bill Financing in Hawaii: Prepared for the Hawaii Public Utilities Commission," January 4, 2013.
[xxiii] U.S. Department of Energy, EECBG Program Notice 12-001, June 4, 2012; U.S. Department of Energy, State Energy Program Notice 12-002, June 4, 2012.
[xxiv] *See, e.g.,* "Selling Guide Fannie Mae Single Family," May 2012, p. 562; *available at* https://www.efanniemae.com/sf/guides/ssg/sg/pdf/sel051512.pdf; S.K. Adomatis, "Describing the Green House

Made Easy," *The Appraisal Journal,* Winter 2012, p. 29 (citing Uniform Standards of Professional Appraisal Practice Rule 1-1(e)).

[xxv] V. Doyle and A. Bhargava, "The Role of Appraisals in Energy Efficiency Financing," May 2012, p. 8; *available at* http://www.nrel.gov/docs/fy12osti/54329.pdf.

[xxvi] Residential Green and Energy Efficient Addendum (AI Reports® Form 820.03); *available at* http://www.appraisalinstitute.org/education/downloads/ai_82003_reslgreenenergyeffaddendum.pdf *and* http://www.appraisalinstitute.org/education/green_energy_addendum.aspx.

[xxvii] The Green MLS Tool Kit, *Welcome to the Green MLS Tool Kit*; *available at* http://www.greenthemls.org/index.cfm.

[xxviii] S.K. Adomatis, "Describing the Green House Made Easy," *The Appraisal Journal,* Winter 2012, p. 22 (citing Uniform Standards of Professional Appraisal Practice Rule 1-1(e)); V. Doyle and A. Bhargava, "The Role of Appraisals in Energy Efficiency Financing," May 2012, pp. 17-18.

[xxix] Information about the Appraisal Institute's "Valuation of Sustainable Buildings Professional Development Program" and other courses is available at http://www.appraisalinstitute.org/education/green_energy_addendum.aspx and http://www.appraisalinstitute.org/education/prof_dev_programs.aspx.

[xxx] D. Sheridan, "Financing for Green Building and Energy Efficiency Makes Incremental Gains," July 29, 2011.

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For more information on these issues and energy efficiency finance, please contact any of the following:

Charlotte Kim, *Partner,* New York
ckim@wsgr.com; 212-453-2888

Randy Lewis, *Partner,* San Francisco
rlewis@wsgr.com; 415-947-2101

Robert O'Connor, *Partner,* San Francisco
roconnor@wsgr.com; 415-947-2123

Greg Broome, *Partner,* San Francisco
gbroome@wsgr.com; 415-947-2139

Kendall Bodden, *Associate,* Seattle
kbodden@wsgr.com; 206-883-2558

Lauren Chase, *Associate,* Los Angeles
lchase@wsgr.com; 323-210-2913

Alexander Drake, *Government Affairs Advisor,* Washington, D.C.
adrake@wsgr.com; 202-973-8852

Wendra Liang, *Associate,* Palo Alto
wliang@wsgr.com; 650-849-3008

Sheridan Pauker, *Regulatory Counsel*, San Francisco
spauker@wsgr.com; 415-947-2136

Scott Zimmermann, *Associate,* San Francisco
szimmermann@wsgr.com; 415-947-2167

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