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Three Empire State Plaza, Albany, NY 12223-1350
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May 19, 2017

Ms. Kathleen Burgess, Secretary
New York State Public Service Commission
Three Empire State Plaza
Albany, NY 12223-1350

Re: Case 14-M-0094 – Proceeding on Motion of the Commission to Consider a Clean Energy Fund.

Matter 16-01006 – In the Matter of the CEAC's Energy Efficiency Procurement & Markets Working Group.

Dear Secretary Burgess:

In its January 21, 2016 Order Authorizing the Clean Energy Fund Framework in Case 14-M-0094, the Public Service Commission (Commission) directed the Clean Energy Advisory Council (CEAC) to develop a recommended approach to developing a sustainable market for procuring energy efficiency as a demand reducing resource.

In compliance with this requirement, the CEAC directed the Energy Efficiency Procurement & Markets Working Group of the CEAC to develop a report on energy efficiency procurement models. On behalf of the Energy Efficiency Procurement & Markets Working Group, please find the Energy Efficiency Market Procurement Recommendations Report dated May 19, 2017 attached for filing.

Sincerely,

/s/

Marco Padula
Office of Markets & Innovation
Deputy Director, Market Structure

Enc.

Energy Efficiency Procurement and Markets Report

May 19, 2017

This report was developed by the Energy Efficiency Procurement & Markets Working Group of the Clean Energy Advisory Council

CONTENTS

CONTRIBUTING ORGANIZATIONS

- Acadia Center
- Association for Energy Affordability
- Central Hudson
- CLEAResult
- Consolidated Edison
- NYS Department of Public Service
- Lime Energy
- National Grid
- Natural Resources Defense Council
- NYCEEC
- NYSEG/RG&E
- NYSERDA
- Orange and Rockland Utilities
- PSEG Long Island
- Sealed
- TRC
- Urban Green Council

LIST OF TERMS

Advanced Measurement & Verification (also referred to as M&V 2.0) – a new M&V approach that comprises (1) automated analytics that can provide ongoing, near-real time savings estimates, and (2) increased data granularity in terms of frequency, volume, or end-use detail.

Aggregator – a market actor that implements energy efficiency measures for a large group or portfolio of customers from a certain sector and sells the total savings to the program administrator.

Auction – a selection process designed to procure (or allocate) goods and services competitively, where the award is made to a pre-qualified bidder and is based on a financial offer underpinned by a standardized contract.

Business Model - the way in which a company generates revenue and makes a profit from company operations.

Customer – a consumer of energy who pays energy bills and who may be interested in services and offerings from market actors.

Deemed Savings - the amount of energy saved per unit, typically determined in advance of installation, based on prior field data collected from a sample of customers.

Distributed Energy Resources (DERs) – a wide variety of energy resources, including end-use energy efficiency, demand response, distributed storage, and distributed generation. DER will principally be located on customer premises, but may also be located on distribution system facilities.

Energy Efficiency (EE) Measure - any intervention implemented to lower a customer's energy usage. This can include, for example, installing a device, implementing a behavioral practice, or conducting an operational/retro-commissioning action.

Energy Efficiency Project - one or more measures implemented at a single site to lower energy usage.

Energy efficiency Program - a set of activities with similar characteristics and applications (e.g., providing rebates or educating installation contractors and/or customers), administered by an entity or set of organizations to promote the adoption of EE measures. A program is usually defined by its mix of characteristics (e.g. strategy, targeted customer segment, marketing approach, and type of measure).

Efficiency Resource Units (also referred to as Negawatts or Negawatt-hours) – a unit of power or energy saved by increasing efficiency or reducing consumption (as measured using any type of measurement technique).

Evaluation, Measurement & Verification (EM&V) - a set of processes to determine project and/or program energy savings impacts. The measurement and verification steps are often referred to jointly as M&V. The definitions below describe the three processes in the order in which they are typically conducted.

Measurement: This step estimates the amount of energy and/or demand savings resulting from the implementation of an EE measure. There are several common methods of estimating savings, involving a combination of physical measurements, engineering calculations, statistical analysis, and/or computer simulation of buildings. Because EE savings are the difference between actual usage and a counterfactual baseline, "measured" savings are actually all estimations, with varying levels of confidence around the prediction.

Verification: Program staff or third parties verify (often with on-site field inspection) that EE measures have been implemented and are operating properly. This may entail counting the number of measures that have been implemented.

Evaluation: After a given project, program, or portfolio is completed, evaluations analyze its performance and operation, including total energy savings relative to predictions, impact on markets, and cost effectiveness.

Market Actor - Any entity (e.g. an individual customer, business, aggregator, or utility) that creates efficiency resource units.

Negawatts or Negawatt-hours (also referred to as Efficiency Resource Units) – a unit of power or energy saved by increasing efficiency or reducing consumption (as measured using any type of measurement technique).

Normalization – a method for isolating the effect of an EE project when comparing a site's pre- and post-project energy usage by removing the effect of common variables on the two sets of data.

Pay for Performance (P4P) – a type of program that tracks and rewards energy savings as they occur, usually by examining data from a building's energy meters, as opposed to the more common approach of estimating savings in advance of installation and offering upfront rebates or incentives in a lump-sum payment.

Procurement - the act of finding, acquiring, or buying goods, services or works from an external source, often via a tendering or competitive bidding process. This paper examines energy efficiency procurement and considers three primary methods: auction, request for proposal, and standard offer.

Request for Proposals (RFP) - a document that solicits proposals, often made through a bidding process, by an agency or company interested in procurement of a commodity, service or asset, to potential suppliers to submit business proposals.

Sector – a category for distinguishing different customer classes and energy use profiles (e.g. industrial, commercial, residential).

Segment – a division with a sector (e.g. hospitality, office, retail).

Standard Offer – a procurement method whereby a fixed price is offered per efficiency resource unit.

Tariff - A collection of public schedules detailing utility rates, rules, service territory and terms of service that a regulated utility files with its public utilities commission for official approval. A tariff approved by a public utilities commission is a binding legal document and must be made available to the public. In effect, it constitutes the contract between a utility and its customers.

EXECUTIVE SUMMARY

The EEPM Working Group was tasked with developing options and a recommended approach for: (1) sustainably procuring energy efficiency (EE) as a utility system resource, including (2) the timing for implementation or testing, (3) whether a designated approach for EE procurement under the Clean Energy Standard (CES) is warranted or a distinct/compatible market, and (4) addressing underserved customer segments (e.g., low-income residential). The Working Group was also instructed to include in its recommendations: insight from REV demonstration projects and opportunities for new commercial business models that would drive greater EE.

Early on, the Working Group developed procurement and market principles to guide efforts and future endeavors in this space. The principles, as explained in greater detail in Section 6 of the report, are summarized below:

1. Efforts should lead to decreases in energy consumption, improved system utilization, and reduced carbon emissions, relative to business as usual;
2. Acquisition should be competitive and cost-effective, relative to the value created;
3. Procurement should minimize barriers for qualified market actors and new business models;
4. Measurement of delivered efficiency resource units should be standardized to create market confidence; and
5. Procurement of efficiency resource units should aim for stability and consistency, so market actors can understand and manage risk.

The provided scope and principles above reflect the Commission's preference for increasing EE investments beyond existing programs with the objective of reducing the cost of achieving the State's energy goals, and to use innovative procurement mechanisms, business models, and third-party investment to attain greater EE savings. An overarching finding of this report is that pilots or demonstrations should be conducted prior to implementation of an efficiency credit market or a designated approach under the CES. The Working Group surveyed credit market structures in Europe, Australia, and Connecticut, and found they all relied on five key design elements: 1) obligation or target, 2) active administration, 3) cost recovery, 4) sanctions, and 5) tradability. The Group's primary concern with implementing a credit market at this time is the active administration component. The credit markets examined relied on resource-intensive measurement and verification processes, pre-approval of specific EE measures, and significant regulatory oversight that are not in line with expressed goals of the Commission, including reducing the cost of achieving the State's energy goals and creating opportunities for new business models.

In light of these concerns, the Working Group examined advanced measurement & verification (M&V). New information and communications technologies are enabling the reporting of energy use in buildings in near real-time. Automated analysis through the deployment of emerging software can use improved data access and advanced analytics to automate and accelerate the M&V process. Advanced M&V could be a potential solution to some of the group's administrative concerns, but testing and standardization of these methods is required to gain regulatory understanding of the advantages and shortcomings. The Working Group recommends that NYSERDA, DPS, and utility staff become active participants in standardization efforts that are currently underway. In addition, as access to utility billing data is required to facilitate potential benefits of advanced M&V, the group emphasizes the importance of the PSC finalizing privacy standards for aggregated whole-building energy usage data.

The advent of advanced M&V has caused renewed interest in Pay for Performance (P4P) program structures, which the group also examined. A P4P program buys actual efficiency savings on an ongoing basis from third parties, providing opportunities to shift risk from ratepayers to market actors, finance EE investments using cash flows from the energy savings, and develop an EE services market. The combination of P4P and advanced M&V with reviewable and replicable calculation methodologies could build credibility in expected energy savings, thereby enabling more participants, more liquidity, and lower prices. For this reason, the Working Group recommends testing P4P structures and advanced M&V techniques though pilots. New business models that highlight the use of these concepts are discussed in Section 5.

The group identified and analyzed three primary procurement methods for EE: standard offers, requests for proposals (RFPs), and auctions. Under a standard offer, the Program Administrators pay qualified customers an incentive for each eligible measure installed or each unit of saved energy (i.e. kWh or therm). Standard offer programs often include requirements that limit participation to specific technologies and/or customer types. A RFP is a widely-used method in which the procuring entity develops a description of the desired products or services and solicits proposals, or bids, from interested parties. The level of detail in RFP requirements varies widely, and one or more respondents may win contracts depending on the procuring entity’s objectives and requirements. Auctions are a selection process designed to procure (or allocate) goods and services competitively, where the award is made to a pre-qualified bidder and is based on a financial offer underpinned by a standardized contract. Auction award criteria are clearly defined in advance, and for the most part, made known to participants.

The group conducted various exercises and had multiple discussions to analyze the pros and cons of each procurement method and to determine if certain methods were more appropriate for specific sectors and/or preferable for market-based approaches. The group concluded that no one procurement method is preferable overall or for any given sector, but auctions require the most testing, as traditionally they have been employed the least for EE procurement. Additionally, the group determined that RFPs are better when competition is limited and qualitative selection criteria are desirable. Auctions can provide more transparency than RFPs, and are preferable when there is sufficient competition and price is the most important selection criteria. Auctions can improve price discovery, and execution and award contracting can be very time-efficient. Standard offer is a transparent method that, when appropriately and widely marketed, provides a known rebate price or incentive rate for energy saving products, equipment, and custom projects, and is a good method for providing a “minimum value” of EE. Because multiple procurement methods may be utilized by multiple entities in the future, the group also recommends that utilities work on a coordinated basis to standardize all such practices to the extent possible.

To support cost efficient procurement and an eventual move to a more market-based system, the value of EE in various contexts (e.g., as a grid resource and/or method for reducing carbon) must be more holistically defined. To think through this issue, the group analyzed various factors influencing investment, including financing, rate recovery, and the explicit value placed on EE under current regulations. Key finance takeaways are the desire for high degree of predictability in cash flow analysis, the need for generalized data sets, and the potential for standardized measurement of savings to ascribe value to EE.

With regard to rate recovery, while it was not the group's charge to analyze funding sources or cost recovery for EE, the group has concluded that the procurement of grid resources requires funding certainty, and the method for utility cost recovery and related incentives have an impact on both a utility's perception of EE as a grid resource and on market actors' expectations of risk when participating in EE procurements or markets. The report looks at the various ways utilities can recover costs, and how certain recovery methods may support different policy objectives or relate to the value EE is providing.

Market actors within the group stressed the importance of contractual and price signal certainty when developing new business models and forecasting cash flows. Capturing the long-term value of each efficiency resource unit can improve economics, stimulate more aggregation, unlock a greater level of investment, and help to stabilize the market. The group recommends evolving the regulatory treatment of energy efficiency to be based on achieved savings that reflect the measure or project life of various installations. The group also recommends the PSC develop a clear framework for funding efficiency procurement that recognizes its value as an operational and carbon reducing resource. In the medium to long term, the PSC could send clearer market signals by establishing a centralized and unified process to decide EE procurement funding rules, targets, and performance incentives out to 2030. Such a unified process would be easier for market actors to follow. In addition, some members of the Working Group stress that size of funding is also extremely important if New York wishes to cultivate a large and growing EE market. To that end, these members think the PSC should not provide any caps on energy efficiency investment, as long as this investment lowers customer bills on average.

The value ascribed to EE resources within the present regulatory construct also influences investment decisions. Under the BCA Framework, utilities are required to consider EE in the same way that it considers other, more traditional infrastructure, and the value it places on these resources is consequently more in line with the impact EE has on the grid. However, some members of the Working Group believe refinements to the BCA Framework would be helpful. These members stress the need for a transparent calculation of energy efficiency value (the "Benefit" part of BCA) to help guide market actors on whether a utility will accept or deny a proposal/bid. These members request that the PSC consider development of a public energy efficiency value calculation tool. Lastly, these members would like to raise the issue that business models relying heavily on non-energy benefits to create value for customers are at a disadvantage with the current BCA Framework, because the full costs of improvements are included while non-energy benefits are not quantified. This could discourage innovation, both by discouraging the inclusion of measures with high customer costs and potentially imposing an administrative burden on market actors. The PSC should review this issue and consider making changes or clarifications to the BCA Framework.

Finally, the Working Group would like to emphasize that the PSC should not let the perfect be the enemy of the good, and should move quickly to implement the recommendations in this report (see section 6) and test new methods. The PSC should recognize the costs of inaction to society and the grid, and direct utilities and NYSERDA to err on the side of action in moving to an efficiency procurement model based on robust third-party involvement and prices reflecting the true value of EE to the grid and society. However, the Working Group also recommends that utilities and NYSERDA implement new approaches in tandem with existing models that have proven successful to prevent backsliding and support the achievement of New York State energy and carbon goals.

1 Introduction

On January 21, 2016, the New York State Public Service Commission (PSC or Commission) approved the Clean Energy Fund (CEF) Order, which established the Clean Energy Advisory Council (CEAC or Council) to pursue consistent, effective, and transparent clean energy programs throughout the State.[1] The CEAC functions in conjunction with and in support of New York's Reforming the Energy Vision (REV)[2] and Clean Energy Standard (CES)[3] proceedings. The Council was chartered to support innovation through the transition from current program offerings in order to "enable an effective and coordinated portfolio of programs and initiatives in pursuit of New York State energy objectives, with a focus on energy efficiency, other distributed energy resources (DER)[4], and non-wires alternatives."[5]

The Council is structured to facilitate input from both market participants and policymakers and as a transparent means to create vibrant clean energy programs consistent with REV initiatives. The Council consists of a steering committee co-chaired by the Department of Public Service (DPS) and the New York State Energy Research and Develop Authority (NYSERDA). Other members include all New York utilities, including the Long Island Power Authority (LIPA) and the New York Power Authority (NYPA). The Council furthermore consists of six working groups that report directly to the steering committee. The working groups include representatives from technology providers, environmental groups, the business community, customer and low income advocates, and members from the organizations represented on the steering committee.

The Energy Efficiency Procurement & Markets Working Group (hereafter, the EEPM Working Group or Working Group) was tasked with developing options and a recommended approach for: (1) sustainably procuring energy efficiency as a utility system resource, including (2) the timing for implementation or testing, (3) whether a designated approach for energy efficiency procurement under the CES or a distinct/compatible market is warranted, and (4) addressing underserved customer segments (e.g., low-income residential). The Working Group was also instructed to include in its recommendations insight from REV demonstration projects and opportunities for new commercial business models that would drive greater energy efficiency. This report discusses the Working Group's research and analysis on energy efficiency procurement and markets, and provides recommendations consistent with the tasks enumerated above.[6]

Section 2 discusses the existing policy and regulatory framework that informed the Working Group's efforts, including the REV proceedings, the CEF Order, Energy Efficiency Transition Implementation Plans (ETIPs), the Benefit Cost Analysis (BCA) Framework, and the CES. Section 3 details

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[1] Case 14-M-0094, Proceeding on Motion of the Commission to Consider a Clean Energy Fund, Order Authorizing the Clean Energy Fund Framework (CEF Order) (Issued and Effective January 21, 2016).
[2] Case 14-M-0101, Proceeding on the Motion of the Commission in Regard to Reforming the Energy Vision.
[3] Case 15-E-0302, Proceeding on Motion of the Clean Energy Standard (CES Order) (Issued and Effective August 1, 2016).
[4] In the REV proceedings, "DER" is used to describe a wide variety of distributed energy resources, including end-use energy efficiency, demand response, distributed storage, and distributed generation.
[5] Matter 16-00561, In the Matter of the Clean Energy Advisory Council, CEAC Charter (Issued and Effective April 27, 2016).
[6] This report considers electric energy efficiency procurement only.

examples of current energy efficiency procurement and markets, including case studies from other states and countries, as well as existing REV demonstration projects. Section 4 discusses factors that can influence the adoption of energy efficiency, including financing, utility performance incentives, and cost recovery. Section 5 provides an overview of Pay for Performance (P4P), including advanced measurement and verification's (M&V 2.0) impact on P4P, and a description of several new energy efficiency business models. Section 6 provides the recommendations of the EEPM Working Group, including a discussion on foundational principles and recommended actions for moving forward.

2 Policy Context

The Working Group supports the Commission's priority on using energy efficiency as a major component to achieve New York State's energy policy goals, including both a 40 percent reduction in greenhouse gas emissions from 1990 levels by 2030, and the cost-effective achievement of a 50 percent renewables goal by 2030.[7] In order to achieve these aggressive goals, the Commission has emphasized the use, where possible, of innovative market transformation and procurement strategies to leverage customer and private investment to produce greater energy efficiency savings than are realized under existing programs.

In completing the tasks assigned to it, the Working Group is guided and informed by several recent Commission orders, including those in the REV proceeding, the authorization of ETIPs, the CEF Order, the BCA Framework, and the assumed contributions of energy efficiency in the CES. These proceedings reflect the Commission's preference for increasing energy efficiency investments beyond existing programs to reduce the cost of achieving the State's energy goals, and to use innovative procurement mechanisms, business models and third-party investment to attain these greater energy efficiency savings.

In the REV Track 1 Order, the Commission began to describe its vision of a reformed electric system, driven by customers and non-utility market actors, and enabled by utilities acting as Distributed System Platform (DSP) providers. One of the foundational elements of this new approach is to integrate clean energy and energy efficiency resources within utility operations. The Commission explained that procurement of these resources will be based on RFPs and load modifying tariffs, and potentially through an auction approach. It is also anticipated that apart from these procurements, improved price transparency will result in more competitive markets for energy efficiency.[8] It further explained that "[a]chieving greater efficiency gains will require more private capital, not only in the form of sharing contributions under efficiency programs, but in the form of unsubsidized market activity."[9]

In the REV Track 2 and CES Orders, the Commission further emphasizes the critical role that energy efficiency must play in achieving state energy policy goals. In the REV Track 2 Order, the Commission explained that energy efficiency will remain a priority area in which utilities may earn performance-based incentives. It also reaffirmed the principle set forth in the ETIPs Order[10] that electric and gas efficiency targets and budgets will serve as a baseline for future efforts.[11] In the CES, the Commission stated: "[e]nergy efficiency is a crucial and cost effective means to achieve clean energy

[7] New York State Energy Planning Board (2015), The Energy to Lead: 2015 New York State Energy Plan, retrieved from: https://energyplan.ny.gov/Plans/2015.aspx.
[8] Case 14-M-0101, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, Order Adopting Regulatory Policy Framework and Implementation Plan (REV Framework Order) (Issued and Effective February 26, 2015).
[9] Id., at p.77.
[10] Case 15-M-0252, In the Matter of Utility Energy Efficiency Programs, Order Authorizing Utility-Administered Energy Efficiency Portfolio Budgets and Targets for 2016 – 2018 (ETIPs Order) (January 22, 2016).
[11] Case 14-M-0101, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, Order Adopting a Ratemaking and Utility Revenue Model Policy Framework (REV Track 2 Order) (Issued And Effective May 19, 2016).

objectives. Study after study has shown that when deployed well, energy efficiency is the cheapest and most effective manner to reduce carbon emissions in the energy sector."[12] The achievement of higher levels of energy efficiency savings can clearly benefit individual customers and create system-wide value through the cost-effective achievement of the CES and carbon reduction goals.[13]

The Commission also reinforced its desire in the Track 2 Order to increase market transformation achievements. These include both targeted efficiency that is enabled by newly monetized value streams and transactional platforms, and also efficiency implemented by customers and third-party market participants with a reduced need for direct utility support.[14] The Commission went further in the BCA Framework Order, by requiring utilities to calculate the monetary worth of some of these values, including environmental impacts, in their evaluation of competing resource needs.[15] The Commission required that the BCA Framework be applied whenever utilities propose an investment that could instead be met through DER alternatives, effectively helping to place energy efficiency on a more level playing field with more traditional utility resources when a utility must determine the most cost-effective technology to deploy on the grid.[16]

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[12] CES Order, at pg. 81.
[13] CES Order, at pg. 82.
[14] Track 2 Order, at pg. 79.
[15] Case 14-M-0101, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, Order Establishing the Benefit Cost Analysis Framework (Issued And Effective January 21, 2016) (BCA Framework Order).
[16] Id., at pg. 33.

3 Energy Efficiency Procurement and Markets

Existing energy efficiency programs utilize market forces and procurement methodologies to secure energy savings, and thus guidance can be gleaned from these efforts and used for future developments. For example, the six investor-owned utilities, along with PSEG Long Island and NYSERDA (collectively, "Program Administrators"), already procure verifiable energy savings by providing financial incentives to support the deployment and delivery of a variety of energy efficiency measures.[17] In addition, a number of market constructs have been developed that allow for energy efficiency participation. Those programs are discussed below, along with the benefits and shortcomings of each.

3.1 Procurement Models

In considering multiple alternative approaches for utility procurement of energy efficiency as a utility system resource, the Working Group identified three types of procurement methods in use today: standard offers, request for proposals (RFPs), and auctions. As reflected in the recommendations section and the discussion below, no one procurement model is recommended at this time due to the context-specific nature of choosing a procurement method.

3.1.1 Standard Offer

The majority of Program Administrators use a standard offer method in at least one customer sector to procure energy savings for qualified customers. Under a standard offer, Program Administrators pay qualified customers either a prescriptive rebate for each eligible measure installed or an energy savings incentive for each unit of saved energy (i.e. kWh or therm) achieved. Prescriptive rebates are most common in the residential sector, and energy savings incentives are most common in the commercial and industrial sector. Regardless of the type or sector, standard offer programs often include requirements that limit participation to specific technology and/or customer types. While standard offer programs theoretically can be used to incentivize any energy efficiency measure, programs generally exclude measures with higher payback thresholds and/or newer technologies.

The primary benefit of prescriptive rebates is simplicity, or the ability for market actors to have a reliable technology buy-down amount. The downside of prescriptive rebates is potential non-alignment around rebate levels versus savings levels (particularly for whole-building measures). In addition, prescriptive rebates can add significant paperwork and friction to the customer sales process. On the flip side, energy savings incentives offer the benefit of energy savings alignment, but they can suffer from complexity if the energy savings calculation process is too cumbersome. M&V is therefore an important consideration for energy savings incentives.

New York utilities and PSEG Long Island provide standard offers for the delivery of a combination of prescriptive and custom measures. Eligible energy efficiency measures have pre-determined savings

[17] The CEAC Clean Energy Implementation & Coordination Working Group compiled the "New York Program Administrator Coordination Report", which provides a snapshot of the 153 energy efficiency programs offered by the Program Administrators (input "16-01005" at: http://documents.dps.ny.gov/public/ MatterManagement/CaseMaster.aspx?MatterCaseNo=16-01005&submit=Search.)

calculations based on the "New York Standard Approach for Estimating Energy Efficiency Savings from Energy Efficiency Programs" (Version 4, effective 1/1/2017), also known as the Technical Resource Manual (TRM). Custom measure incentives are designed to accommodate more complex, aggressive, and unique energy efficiency measures and applications where the savings can vary based on facility operations and other unique facility characteristics. Custom measure incentives can be calculated using a performance-based approach for equipment and buildings, although this extends the payment timeline.

Program Administrators have used standard offers to increase market deployment of energy efficiency measures by informing third party equipment vendors and installers, aggregators, and individual customers of the standard offer incentive through various forms of outreach. Program Administrators often rely upon third parties to help administer EE programs across the State, and these third parties are typically hired as implementation contractors through a competitive RFP process. The contractual arrangements can vary, but implementation contracts currently operate largely on a fee-for-service basis and thus have less correlation to valuation of the energy savings the third-party is tasked to acquire.

Standard offer is a transparent method that, when appropriately and widely marketed, provides a known rebate price or incentive rate for energy saving products, equipment, and custom projects. When effectively administered, the standard offer can be counted on by customers and market actors. Larger project developers can factor in incentive rates when estimating costs and payback calculations for customers. Participating wholesale and retail businesses can use the "instant rebate" in their marketing to promote efficient products. Market actors can rely on the incentive levels when developing new business models and planning marketing campaigns. Finally, a standard offer approach can be combined with other procurement methods to provide a "minimum value" of efficiency. For example, a utility could hold auction events, to provide a higher incentive under specific parameters, while also having a standard offer program. In the case that an auction bidder loses, the standard offer can serve as a fallback opportunity, avoiding an "all or nothing" result.

More specifically, prescriptive rebates provide opportunities for targeted efforts. They can be offered at the customer level or can be deployed through energy services providers, installation contractors, retailers, wholesale distributors, and/or manufacturers. New products and focus areas for new customer segments can be added during the implementation of standard offer programs as opportunities arise and market intelligence informs the utility. In the case of custom incentive programs where deeper savings opportunities are possible, custom incentives are adaptable to a range of solutions. This is particularly true for complex multi-measure projects at large commercial facilities, industrial plants, and data centers where major process-related energy efficiency opportunities exist.

Standard offer procurement has disadvantages as well. With standard offer, Program Administrators need to decide what energy efficiency measures qualify and often try to limit risk via heavy-handed upfront quality assurance. This "one size fits on average" approach is not optimal for many customers. With incentive projects, delays may occur due to disagreements between customers or their representatives and program administrators over energy savings calculations. In addition, because the incentive may not be received for some time after project installation and/or may not be applied to the budget of the business unit applying for the incentive, it may not influence purchasing decisions, especially if capital is constrained. When programs are oversubscribed and paused, it is extremely disruptive to the market and may impact market confidence in future program efforts. Finally, due to standardized rates, standard offer programs may not acquire energy savings for the lowest cost. Due to locational or temporal system needs, some energy efficiency measures may be more valuable than others. This can be corrected for by varying the incentive rate accordingly, but should be balanced with efforts to minimize market confusion.

In addition, because prescriptive rebates are based on deemed savings calculations, the estimated savings may not materialize, and the process for utilities to gain approval to offer new prescriptive rebates can be long and time-consuming. Also, prescriptive rebates are usually limited to individual pieces of equipment and/or products as opposed to larger projects, systems improvements, or other activities. This may result in savings opportunities being "left on the table," if activities that contribute to a larger complementary system of savings are not included. Custom incentives can achieve deeper savings through such a complementary system of improvements, but they require more pre-engineering, M&V, and reporting. They rely on detailed engineering analysis and proof of implementation, which must be verified either by the program administrator, implementation consultant, or by another third party, making them more resource intensive. The added complexity of custom incentives also requires more technical outreach such as workshops, webinars, informal technical materials, and best practice sharing.

3.1.2 Request for Proposals

An RFP is a widely-used method for procuring products, project proposals from customers or market actors, and services from market actors (including administration of efficiency programs where other procurement methods, such as a standard offer, are used). The procuring entity develops a description of the desired products or services and solicits proposals, or bids, from interested parties. The level of detail in the requirements of RFPs varies widely, and one or more respondents may win contracts depending on the needs of the procuring entity.

RFPs can be expensive, time-consuming, and limiting to some market actors. The market actors that are able to respond to RFPs typically have to build large overhead costs into their business to ensure that they are responding appropriately, and have the company infrastructure to meet what are often extensive requirements. Also, some potential benefits of RFPs may not result if they are written incorrectly. If an RFP is written in a restrictive manner, or if the likely respondents favor standard approaches, then the RFP process will result in less transparency and potentially additional work for utilities and market actors. While any procurement method requires advance planning and administration by the utility, RFPs can require a great deal of effort to prepare. The utility must develop content and parameters for the RFP, conduct Q&A for potential respondents, read and evaluate responses (possibly with an outside evaluation panel), develop and sign contracts with awardees, and oversee implementation.

When qualitative factors are important, RFPs may be appropriate. Unlike auctions, where the selection of winning bids is done based on a pre-formulated set of criteria (often principally price), RFPs can solicit a range of potential solution types, with selection being made based on qualitative judgments. The selection process in an RFP could, for example, require proof of experience without specifying the exact requirements, in contrast to auctions and standard offer programs, which would both necessitate specific requirements given the nature in which market actors pre-qualify for those programs. In addition, RFPs allow for more customized terms and conditions. While the basic terms need to be outlined in the RFP and supporting documents, because final legal contracts are signed after an award is made, more specific terms can be negotiated after. RFPs can potentially spur innovation, depending on how they are written and conducted. If an RFP is sufficiently non-prescriptive, it may facilitate new business models. If structured correctly, RFPs can lead to competitive and cost effective EE acquisition, opportunities for new business models, and confidence in delivered energy savings.

As mentioned above, an RFP can result in less transparency than other procurement methods. Often, the actual award amount, or at least the details of the payment structure for delivery of products and services, is not completely public. The specific nature of the selection process and time-consuming and resource-intensive nature of the application process can result in fewer awardees/winners, each delivering more efficiency resource units, as compared to auction or standard offer approaches. This can result in the slower development of vibrant markets. The lack of transparent pricing and the potential limited number of awards mean that many respondents spend considerable resources on unsuccessful submissions. This can drive away potential respondents and/or drive up cost proposals.

During the 2017-2019 program cycle, some utilities are using an RFP to seek innovative models and REV-like programs developed by third-party vendors to acquire energy savings for any customer sector (i.e. residential, small business, commercial). For example, Non-Wires Alternatives (NWAs) typically use an RFP procurement method whereby vendors are invited to submit proposed DERs, including energy efficiency, which can mitigate constraints on a localized section of the electric grid. Utility ETIP solicitations also typically use RFPs.

3.1.3 Auction

In this report, auctions are defined here as a selection process designed to procure (or allocate) goods and services competitively, where the award is made to a pre-qualified bidder, or bidders, and is based on a financial offer underpinned by a standardized contract.[18] Auction award criteria are clearly defined in advance, and for the most part made known to participants. The auction mechanisms discussed here are typically conducted in real-time on a web-based platform over a predetermined duration.

Most electricity industry auction experience addresses regional capacity, energy, ancillary, and renewable energy products, with limited cases of energy efficiency procurement. Capacity auctions typically utilize a standard auction structure, where pre-qualified bidders offer to sell resources at increasing price levels to meet a total capacity need at some time in the future. Renewable energy and energy efficiency auctions often utilize a reverse auction structure, where pre-qualified bidders begin the auction at a predetermined starting or ceiling price, then competitively offer to sell or deliver resources at decreasing price levels and quantities to meet a total kW delivered or reduced, or kWh saved. Awardees are typically determined through a combination of lowest cost bid(s), kW or kWh need, and total auction funding.

[18] Maurer, Luiz T.A; Barroso, Luiz A. 2011. Electricity Auctions: An Overview of Efficient Practices, Energy Sector Management Assistance Program, World Bank (http://documents.worldbank.org/curated/en/ 150091468137983434/ Electricity-auctions-an-overview-of-efficient-practices).

This section of the report focuses on procuring energy efficiency through reverse auctions mechanisms. Reverse auctions can be designed with subtle variations and combined with other procurement methods. Some auction designs and variations include, but are not limited to:[19]

- Uniform price - the clearing price is awarded to all participants and associated quantity bid below that price.
- Pay-as-bid or hybrid auction - all participants that bid below the clearing price are awarded their associated quantity at their submitted bid price.
- Multi-round or sequential auctions - can allow for increased levels of price discovery through multiple bidding rounds or auction opportunities.
- Simultaneous auctions - can allow for participants to balance bids across different technologies, sectors, or some combination of simultaneously offered products.

If designed with transparency and ease of execution in mind, reverse auctions can be an efficient mechanism for procuring products in a price-efficient manner. The following key elements help lead to a successful auction:

Transparency: The auction design, including product details, prequalification, financial requirements, privacy, bidding, clearing, and delivery must be clearly communicated to potential bidders well-before the auction. Rules can be created in a collaborative manner with potential auction participants, but this may not always be feasible or necessary.

Product definition: The auction product must be well-defined and coupled with a clear contractual commitment for auction winners. Energy efficiency products can include kWh across service territory or specific location(s), all or specific technologies, individual projects or portfolios, among others. The awarded products must also have a temporal constraint (i.e. procurement window or implementation deadline).

Competition: The auction procurement method depends on market competition. Without sufficient competition, an efficient product price outcome might not be achieved, and collusion potential is increased. Sufficient competition can be determined through bidder count and ability to exercise market power.[20]

Enforcement: Rule enforcement is essential to attract willing auction participants and producing desired results. Strict rule enforcement is required to ensure reliable product procurement, market confidence, and prevent market abuse and other negative outcomes.

[19] One potential auction design is the "sealed bid" approach, whereby participants simultaneously submit bids without knowledge of one another's submissions. This structure is similar to RFPs, so the conclusions in that section are more applicable to that type of auction than those contained within this section.
[20] The Three Pivotal Supplier Test is utilized in the PJM markets and generally tests market structure, bidder behavior, and market impact by analyzing the degree to which three bidders can meet the market demand (http://www.monitoringanalytics.com/reports/Presentations/2007/20070727-tps.pdf).

In addition to the above considerations, regulatory and funding mechanism stability can help establish an efficient auction market. Regulatory and funding mechanism stability that supports regularly-occurring auctions helps participants invest in products and services in anticipation of auction market participation. This persistent auction occurrence can help further support price efficiency. Finally, energy efficiency technologies and projects have different associated costs. To facilitate growth of a vibrant market for many types of efficiency improvements in all customer sectors (which will be necessary for the state to achieve its policy goals), auctions may be conducted for specific energy efficiency technologies, customer classes, locations, or a combination of each. Without this design feature, market actors may engage in "cream skimming," the practice of serving only the lowest-cost customer segments with the lowest-cost technologies.

Depending on the market, once the auction structure is set up, auctions may be held in a rapid manner that takes less time than other methods to go from program design to procurement, and lead to lengthy and expensive regulatory and legal disagreements. Despite requiring more up-front design and potential costs, auction execution and award contracting can be very time-efficient. Auction contract execution often occurs the day-of or within days of auction completion, which can provide more time for product procurement. When compared to sometimes exclusive or stringent RFP processes, auctions can lower program barriers-to-entry. Less stringent prequalification requirements and an open bidder permission process can allow new entrants to compete, and be judged more on price than other enterprise factors. Any procurement risk that may arise from this process can be mitigated through contract design.

Furthermore, auction programs, if designed to award funding to specific projects or targeted needs, can encourage the installation of multi-measure projects and emerging technologies, since less-cost-effective measures can be paired with highly cost-effective measures. Or, for highly ubiquitous single technologies, auctions can help set lower prices. This scenario can also be favorable over project-based auctions or procurement methods because it may not require the customer or service provider to disclose proprietary business or technology details.

Auction Case Studies

While there are limited examples of utilizing reverse auctions to procure energy efficiency in the United States, the Missouri Department of Natural Resources and AEP Ohio have shown that energy efficiency price discovery can be achieved through reverse auctions. On July 28, 2010, the Missouri Department of Natural Resources held one of the first reverse auctions for energy efficiency.[21] The auction, held under its Energize Missouri Industries program, offered $3 million in total incentives and was funded by the American Recovery and Reinvestment Act (ARRA). Bids were evaluated on a lowest-cost $/kWh basis, and awarded up to $500,000 per pre-qualified bidder.[22] The auction had a ceiling price of $0.25/kWh, and winning bid prices ranged from to $0.0275 to $0.11/kWh. Awardees were provided approximately two

[21]Missouri DNR holds first ever energy-efficiency reverse auction. Accessed 2/20/2017 (www.wgem.com/story/12893344/missouri-dnr-holds-first-ever-energy-efficiency-reverse-auction).
[22]Energize Missouri Industries, Best Price Efficiency Program. Accessed 2/20/2017 (www.energy.mo.gov/energy/stay-informed/energize-missouri/energize-missouri-industries).

years to identify and implement projects with commercial and industrial customers, and those projects saved approximately 64 million kWh.[23]

In October 2014, AEP Ohio launched its Bid4efficiency Program, which utilizes reverse auctions to offer kW and/or kWh (depending on technology) contract awards ranging from $25,000 to $1,000,000.[24] AEP Ohio conducts auctions for different technologies, customer segments, and provider (direct non-residential customers that use 200,000kWh/year or qualified solution provider).[25] In its initial auctions, AEP Ohio was able to achieve an average incentive rate of $0.034/kWh for delivered energy efficiency projects; a level well below its custom and prescriptive incentive programs.[26] Despite this incentive rate not being directly relatable to New York market incentive rates, what's important is that price discovery was achieved at lower levels than alternate incentives.

Although different auction designs may lower barriers to entry and achieve improved price discovery in contrast to RFPs, complex auctions can increase transaction costs. Complex auctions may produce non-optimal outcomes if the design is not clear and fully understood by all participants. Additionally, despite being a valid mechanism to competitively procure products, auctions may not always deliver energy efficiency at a cost lower than other procurement mechanisms. This can occur if one or more of the auction design elements is missing or designed improperly, or if the energy efficiency product being offered is supply-constrained. In a supply-constrained scenario, which can occur due to locational or other broad market factors, auction participants may demand a higher price due to higher product procurement risk.[27] Accordingly, the desire to prevent cream skimming based on product and customer type must be balanced against the need for a competitive pool of resource suppliers.

There also are certain situations in which auctions are not an optimal energy efficiency procurement mechanism. These situations include, but are not limited to, where there is little competition, or when the award cannot be based on price alone.[28] In a nascent market or a market with limited competition, high transaction costs can erect barriers to entry, forcing smaller bidders out of the market. High transaction costs can lead participants to vie for the large commercial projects, which can further increase project risk and push small businesses out of the market. Ultimately, a low volume of participants can increase costs that will be passed on to the utility customer.

Other auction drawbacks include a learning curve for all participants, and high upfront costs to establish a new platform and process. Some more sophisticated auctions, such as multi-round hybrid

[23] Id.
[24] Bid4efficiency Program. Accessed 2/20/2017 (www.aepohio.com/save/business/programs/EnergyEfficiency Auction).
[25] Id.
[26] Midwest Energy Efficiency Alliance. Accessed 2/20/2017 (mwalliance.org/conference/inspiring-efficiency-awards/2016-innovation-aep-ohio).
[27] One example is Con Edison's Brooklyn-Queens Demand Management Program - Demand Response Auctions, where, due to potential procurement risk and other factors, clearing prices settled at levels higher than Con Edison's administratively-established demand response incentive levels.
[28] Maurer, Luiz T.A; Barroso, Luiz A.. 2011. Electricity auctions: an overview of efficient practices. Energy Sector Management Assistance Program (ESMAP). Washington, DC: World Bank (http://documents.worldbank.org/curated/en/150091468137983434/Electricity-auctions-an-overview-of-efficient-practices)

auctions, may have higher initial transaction costs related to auction design, software procurement, and stakeholder training. However, the benefits achieved from competition can often outweigh high setup costs. Furthermore, many of those initial setup costs will be diluted in subsequent auctions, since most of the processes and systems will already be in place and only some fine-tuning will be necessary.[29]

While the New York Independent System Operator (NYISO) has many of years of experience running economic-based demand response programs, New York State utilities are just starting to test procuring energy efficiency through auctions. Brief descriptions of the NYISO demand response and Con Edison demand management program follow.

The NYISO market pays Special Case Resources (SCR) program participants to curtail electric load to reduce stress on the electric grid. Participants may offer their capacity to curtail electric load into Installed Capacity (ICAP) auctions, or may sell capacity in bilateral contracts. If participants are awarded capacity in ICAP auctions or sell bilateral contracts, participants can receive Monthly Capacity payments. Participants can also receive Energy payments based on performance in events and tests, and the applicable Location-Based Marginal Price (LBMP).[30]

In 2018, the Con Edison Demand Management Program (DMP) will offer enhanced incentives for energy efficient technologies that help improve building operational performance and reduce electric demand. The goal of the Demand Management Program is to achieve electric demand reduction in facilities through financial incentives for qualifying technologies. Auction applications are due in the Spring and Summer of 2017, and Con Edison intends to conduct two auctions. Incentives will be set via the Demand Management Auction Mechanism (DMAM). Unlike prior programs that set incentives by technology type, the auction format will enable customers and technology solution providers to bid for the exact incentive amount needed for individual projects.

3.2 Market Models

In addition to the variety of procurements already being used to secure energy savings, a number of market constructs allow for energy efficiency participation, including capacity markets, energy efficiency credits (EEC), and certain REV demonstrations. While market models overlap to some degree with procurements – which routinely rely on existing market actors for competition purposes – the key distinction between procurement models and market models is that program administrators usually direct procurements, whereas with a market model the system operator, regulator, and increasingly program administrators, will set the rules of engagement that then allows supply and demand to more freely interact within the boundaries of that market construct. As program administrators experiment more with auctions and other more advanced market procurements, this distinction may become less important.

[29] Id.

[30] www.nyiso.com/public/webdocs/markets_operations/market_data/demand_response/Demand_Response/Reports_to_FERC /2017/NYISO%202016%20Annual%20Report%20on%20Demand%20Response%20Programs_Final.pdf

3.2.1 Efficiency in Capacity Markets

Allowing efficiency resources to compete in capacity markets has the benefit of increasing revenues to these resources, although such revenues generally account for a relatively small percentage of a developer's total cash flow from an energy efficiency improvement. Energy efficiency is allowed to bid into the capacity markets in ISO New England (ISO-NE) and in the Pennsylvania, New Jersey, Maryland Interconnection (PJM) under certain circumstances. Capacity markets are intended to purchase sufficient capacity for reliable system operations and are focused on a resource's effect on coincident peak. In New England, ISO-NE conducts a capacity market called the Forward Capacity Market (FCM), while in PJM, the capacity market is known as the Reliability Pricing Model (RPM). The FCM began operation in 2010 and has allowed energy efficiency to bid in from the start, while PJM has allowed efficiency resources to participate beginning with the 2012 delivery year. The NYISO currently does not allow energy efficiency resources to bid into its capacity market, instead treating energy efficiency as a load modifier and therefore a reduction in the capacity obligations of a load serving entity.

ISO-NE recently completed its 11th Forward Capacity Auction (FCA), which enabled procurement of sufficient resources to meet electricity demand in 2020-2021. A total of 640 MW of new energy efficiency and demand-reduction (DR) measures cleared – an amount ISO-NE describes as the equivalent of a large power plant.[31] Following this auction, the cumulative amount of EE and DR resources participating in the market will approximate 3,200 MW, or about 9% of the total capacity market. There is evidence that these resources helped reduce wholesale market prices for electricity customers. The clearing price for FCA 11 was the lowest price since 2013, at $5.30 per kilowatt-month.

PJM, which serves all or parts of 13 mid-Atlantic and Midwestern states, also allows efficiency resource providers (as well as providers of other demand resources such as distributed generation and demand response) to participate in their markets and compete with electric generators. *Utility Dive* reported in May 2016, that PJM's capacity auction continued to showcase the continued importance of efficiency and demand management, contributing to price savings for customers. 1,515 MW of efficiency cleared in the 2019/2020 auction and 613.7 MW of demand response cleared as capacity performance.

Efficiency has comprised a higher percentage of resources in the FCM vs. the RPM due to various factors. The Regulatory Assistance Project (RAP) looked at the various rules and experiences of ISO-NE and PJM as they relate to demand side resources and their participation in capacity markets.32 The study found that the rules governing the markets have a significant effect on the degree of energy efficiency participation. Rules important to the ability of energy efficiency to participate include: defined peak periods; types of measures that can participate; number of years' efficiency savings can be bid into the markets; minimum size requirements for bidding; prequalification requirements, including M&V plans; how efficiency resources are paid; and penalties for non-delivery. Other conclusions of the study include:

[31] Winter Impacts of Energy Efficiency in New England, Acadia Center (April 2015).
[32] Neme, C., and Cowart, R., Energy Efficiency Participation in Electricity Capacity Markets–The U.S. Experience (2014) (www.raponline.org/document/download/id/7303).

- Energy efficiency can make significant contributions to meeting system peak demands.
- The participation of efficiency and other demand resources in capacity markets can lower market clearing prices, with potentially large economic benefits to customers.
- Participation in capacity markets has given previously skeptical supply planners confidence that efficiency resources are "real" and can be relied upon to meet system needs.
- Participation in capacity markets has resulted in much more detailed understanding of the characteristics of savings.
- Capacity markets alone will not lead to substantial investments in efficiency.

3.2.2 Energy Efficiency Credits

A market-based mechanism called an Energy Efficiency Credit (EEC) has been utilized in a handful of countries and states in the U.S. to encourage third parties and end-users to provide energy efficiency savings. An EEC (or White Tag, White Certificate, or Energy Savings Certificate) is a document certifying that a specific amount of energy savings – usually 1 MWh – has been measured and verified. Eligible measures vary from program to program but generally include commercial and industrial lighting upgrades, cogeneration or combined heat and power (CHP), insulation, and heating, ventilation, and air conditioning (HVAC) improvements. The time frame of the savings can be the estimated savings over the expected lifetime of the measure or the annual energy savings. EECs allow for the trading of the attributes of these energy savings, making it more easily comparable to a Renewable Energy Credit (REC) and with New York's energy efficiency policies that generally focus on electricity savings.

The use of EECs is usually paired with an obligation on electric suppliers, producers, or distributors (collectively, obligated entities) to have a certain absolute amount or percentage of their load (or load growth) met with efficiency.[33] For example, a utility with annual sales of one million MWh may be required to provide one percent of this load through energy savings—10,000 MWh or the equivalent 10,000 EECs. If an obligated entity fails to self-supply the savings or purchase the corresponding EECs, an alternative compliance payment (ACP) or other penalty may be imposed. In Connecticut, for example, an ACP of $31 per EEC is charged to obligated entities that fail to meet their targets.

Like RECs used in the CES to incentivize renewable energy development, each certificate provides an additional revenue stream to developers to improve the economics of a project. In some programs, obligated entities may purchase EECs from other obligated entities or third parties, thus allowing a wider array of market actors to provide energy efficiency measures and subsequently the ability to trade to the obligated entity the resultant savings. Trading of EECs allows obligated entities that may have high compliance costs to purchase efficiency savings from low cost suppliers, thus potentially lowering the overall cost of meeting the target. Under this construct, the obligated entity can decide whether it wants to self-supply the energy efficiency savings (either directly in-house or through a subcontractor), or alternatively purchase EECs to satisfy its obligation. This allows obligated entities a flexible means of achieving energy efficiency targets.

[33] EECs can be used in both compliance markets as well as in voluntary markets, although this discussion addresses the much wider-enacted compliance markets only. Some commercial and industrial companies participate in voluntary EEC markets, where companies buy and sell EECs from voluntary energy efficiency projects.

In programs allowing for EEC trading, several methods are used in establishing the price of an EEC, although most allow market forces bounded by an ACP or other penalty for non-compliance to determine the price. EEC prices vary depending on the program, with prices ranging generally from $10 to $70 per EEC. Connecticut's current price is approximately $27 per EEC, close to the New York REC price. Some programs, like in the United Kingdom (UK), provide only a limited opportunity or incentive for trading and therefore the obligated entities usually self-supply the energy efficiency savings through in-house or sub-contracted measures installation. Few programs in fact allow or incentivize significant trading due to the difficulty and expense of verifying energy savings by third parties, among other reasons, as explained below. Consequently, in many jurisdictions, obligated entities tend to produce most of the energy efficiency efforts, either directly through in-house staff or indirectly through subcontractors.

European Experience

In Europe, several countries have implemented a variant of an EEC program, often called White Tags, although the design of these programs across Europe varies considerably. For example, the U.K., which launched its program in 2002, imposes an obligation on suppliers to improve the energy efficiency of the residential sector and grants points for each measure installed, with limited opportunity to trade the efficiency savings. In Italy, which enacted its program in 2005, and France, which started in 2007, suppliers may self-supply or purchase certificates to meet their targets similar to a more traditional REC program. A number of smaller countries in Europe have established or are considering implementing variations of an EEC program with varying levels of certificate tradability.

The UK has a unique system that uses a points-based metric in the pursuit of goals that are applicable only to the residential sector and do not specifically include load reductions.[34] Each measure installed receives a predetermined number of points that are added together in furtherance of complying with an obligated entity's target. The target points are determined according to the supplier's market share to meet the overall national targets of a carbon emissions reduction of 20.9 million lifetime tons, a carbon emissions "community" reduction of 6.8 million lifetime tons, and a home heating cost reduction of £4.2bn in cost savings. The carbon emissions goal focuses on hard-to-treat homes, including free solid wall insulation and hard-to-treat cavity wall insulation measures. The community savings goal focuses on the provision of insulation measures and connections to district heating systems to domestic energy users that live within an area of low income. The home heating cost reduction goal emphasizes measures that improve the ability of low income and vulnerable households to affordably heat their homes.

Suppliers have the obligations if they have more than 250,000 domestic customers, provide more than 400 gigawatt hours of electricity, or provide more than 2,000 gigawatt hours of gas. The penalty for not complying with the mandate can be as high as 10% of the supplier's revenue. Obligated suppliers have the option to trade their obligations with other obligated suppliers, although no formal certification of attained savings occurs, and no other party besides obligated entities can trade. While trading in obligations and of measures is permitted, little actual trading has occurred due to a lack of formal certification of

[34] The Energy Company Obligation, Briefing Paper, House of Commons Library, No. CBP 06814 (March 29, 2017).

savings, supplier's preference for preferred sub-contractors to perform the work, and the fact that suppliers can only trade once they meet their own targets.[35]

In France and Italy, the programs are more analogous to traditional REC programs that require load reductions and allow for trading of certificates, although there are a number of differences between the two.[36] In France, obligated parties are suppliers delivering electricity, gas, domestic heating fuel, and cooling and heating for stationary applications, with a threshold for the imposition of a savings target set at 0.4 TWh/year (or 5,000 liters in case of domestic fuel) and market share the dominant mechanism for distributing obligations. In Italy, electricity and gas distributors – not suppliers – with at least 50,000 customers are subject to the obligation, with market share the dominate means to distribute obligations. The total national target for France from 2015-2018 is 660 TWh cumulated over the life of the energy efficiency improvements,[37] while in Italy the target for 2017-2020 is approximately 7.8-9.7 TWh per year.[38] Unlike in the UK, Italy and France applies the obligation to not only residential load, but also commercial and industrial demand as well. The penalty for noncompliance is 0.02 Euro/kWh in France, while in Italy the penalty is determined *ad hoc* by the regulator, taking into account the actual possibility to meet the target, the magnitude of the non-compliance, and the state of affairs of the non-compliant party. In both France and Italy, certificates trade in either over-the-counter (OTC) or organized spot markets.

New South Wales, Australia

New South Wales (NSW), Australia operates an energy efficiency crediting system known as the New South Wales Energy Savings Scheme. It set targets for the state's load serving entities (i.e., suppliers) per the amount of electricity purchased by each such entity.[39] Targets have gradually increased from 1% in 2009 to 5% in 2015, with certain exemptions covering certain emissions-intensive trade-exposed industries.[40] It will increase to 7% in 2016, rise to 8.5% in 2019, and remain steady thereafter until 2025. The regulator estimates that annual incremental savings were 1.8 million MWh in 2015, or around 2.8% of sales to end-users in NSW in 2015.

Project developers can get credit for multiple years of savings upfront for some projects, subject to limitations and discounting, so target levels do not translate directly into annual incremental savings. This feature of the market enables "apples to apples" comparisons of energy savings from different measures, as opposed to encouraging measures with high annual energy savings but shorter estimated useful lives (e.g. lighting versus insulation).

Early on, a significant portion of the savings obligations were met through payment of penalties. More recently, however, load serving entities have met virtually all their obligations through surrendering credits. Moreover, the system was initially slow to react to a glut of credits from commercial lighting

[35] Assessment of White Certificate Schemes in Europe, Paolo Bertoldi and Silvia Rezessy, European Commission, DG JRC, Institute for Energy (2008).
[36] Id.
[37] Energy Efficiency Action Plan for France – 2014, Directorate General for Energy and Climate, Climate and Energy Efficiency Service (2014).
[38] Italian Energy Efficiency Action Plan, EEAP 2014 (July 2014).
[39] Compliance and Operation of the NSW Energy Savings Scheme During 2009 (July 2010), at pg. 3.
[40] NSW Energy Savings Scheme Compliance and Operation in 2015 (July 2016), at pg. 2.

projects. The NSW regulator now strictly monitors participants to ensure that credits are not created where savings are not actually realized. It does this by "monitor[ing] their energy savings activities and us[ing] third-party audits to verify savings."[41] It also uses set-aside deeds to commit credit providers to withhold from trade a percentage of the certificates they create until an audit of those certificates has satisfactorily been completed. Through these methods, the regulator has identified a small but significant portion of the credits as being improperly created. In 2015, for example, 7.3% of the credits were deemed to have been artificially created, and the companies responsible for their creation agreed to forfeit them.

Connecticut

As one of its three classes of eligible resources, Connecticut's Renewable Portfolio Standard (RPS) includes an energy efficiency credit trading system, which requires electric suppliers to obtain a specified percentage or amount of the energy they generate, save, or sell from certain distributed energy resources (DER) (defined by statute as "Class III" sources). Owners of electricity generation projects that qualify under any of the three classes of Connecticut's RPS receive one REC for every megawatt-hour (MWh) of electricity they produce; energy efficiency projects eligible under Class III likewise receive one REC for every MWh of electricity saved. RECs have a dollar value attached to them as power suppliers must reconcile each year the electricity they supply to the marketplace with the RECs they have purchased.[42]

In 2006, Connecticut created a market for Class III RECs, defined as energy efficiency, CHP, and waste heat recovery projects. Under the RPS, suppliers are required to obtain at least 4% of their retail load through Class III resources. The requirement started at 1% of retail load in 2007, and increased by 1% each year until reaching 4% in 2010, at which point it remains constant through 2020. If suppliers do not purchase enough RECs to meet their mandate, they are required to pay an ACP on a per MWh basis.[1] Connecticut contributes 25% of ACP revenues to the state's Clean Energy Fund (CEF), while the remaining 75% of funds are divided between the electricity distribution companies' (EDC) Conservation and Load Management (C&LM) Funds (devoted to energy efficiency and demand response programs) in proportion to the load served in each EDC's territory.[43]

Until 2013, the utilities could include their C&LM programs in the Class III REC market. This led to a flooding of the market, with REC prices dropping to the price floor of $10/MWh. Low REC prices made it challenging for third-party providers to secure sufficient Class III REC revenues to complete projects.[44] After 2013, Connecticut modified the program by making Class III incentives no longer available to utility-administered and ratepayer-funded programs.

Class III REC prices have been volatile, although in recent years a more stable price range has developed. In 2013, after the program was modified to reduce arbitrage, the price more than doubled in one

[41] Id., at pg. 5.
[42] PURA: Renewable Portfolio Standards Overview, The Connecticut Department of Energy and Environmental Protection, http://www.ct.gov/pura/cwp/view.asp?a=3354&q=415186.
[43] Annual Review of Connecticut Electric Suppliers' and Electric Distribution Companies' Compliance with Connecticut's Renewable Energy Portfolio Standards in the Year 2014, Docket No. 15-09-18, State of Connecticut Public Utilities Regulatory Authority, Sept. 28, 2016.
[44] Restructuring Connecticut's Renewable Portfolio Standard, Connecticut Department of Energy and Environmental Protection, April 26, 2013.

year and therefore increased the marketability and opportunity for private investors and third-parties to pursue projects.[45] Class III REC prices continued to rise to $27/MWh in 2017, which is just short of the current ACP of $31/MWh. The ACP has been set as the average cost of obtaining energy savings from C&LM programs to date. Connecticut's market relies on RPS cost estimates reported directly by utilities or regulators within annual compliance reports or other regulatory filings and translate those estimates into a set of common metrics for comparison.[46]

The Annual Reviews of Connecticut's Electric Suppliers' and EDC Companies' Compliance with Connecticut's RPS verify an increasing trend of Class III RECs purchased from 2010-2014.[47] In addition, the 2014 report shows that relatively few Class III ACPs were paid, indicating that there is adequate REC supply at the current required percentage (4% of load per year).[48] However, most of the Class III RECs have been generated by CHP, particularly after the C&LM programs were no longer eligible to participate.[49] It is therefore unclear what the clearing price would be if only energy efficiency was eligible under the Class III market.

Energy Efficiency Credits – Lessons Learned

While the use of energy efficiency credits has only been adopted in a few jurisdictions, experience from these programs gives policy makers valuable insight into the benefits and challenges of administering these types of constructs. Typically, these programs require five key elements for their proper design, with various sub-elements included within each: 1. Obligation; 2. Administration; 3. Cost recovery; 4. Sanctions; and 5. Tradability.[50] The lessons learned analysis will look at each of these elements in turn in order to give a fuller appreciation of the breadth and variety that these programs allow, and the consequent need for more nuanced policy recommendations for each if implementation is contemplated.

Obligation

An EEC program requires an obligation on an entity to acquire a certain absolute amount or percentage of their load (or load growth) be met with efficiency. The load reduction obligation is usually expressed as a percentage of load (e.g., Connecticut), an absolute amount of energy savings (e.g., France), or carbon reductions (e.g., UK). In establishing the stringency of the obligation, the degree of aggressiveness in the overall goal may have a substantial impact on its success: "The transaction costs of establishing and overseeing these markets seem tolerable only if the underlying energy savings target is substantial, representing a steep gain over business-as-usual improvements in energy efficiency."[51]

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[45] See footnote 42.
[46] A Survey of State-Level Cost and Benefit Estimates of Renewable Portfolio Standards, NREL, LBNL (May 2014).
[47] See footnote 42; Annual Review of Connecticut Electric Suppliers' and Electric Distribution Companies' Compliance with Connecticut's Renewable Energy Portfolio Standards in the Year 2010, Docket No. 15-09-18, State of Connecticut Public Utilities Regulatory Authority, Nov. 21, 2013.
[48] See footnote 42.
[49] Id.
[50] Energy Supplier Obligations and White Certificate Schemes: Comparative Analysis of Results in the European Union, Silvia Rezessy and Paolo Bertoldi, European Commission, Institute for Energy Joint Research Centre (2010), pg. 8-301.
[51] Should the United States Create Trading Markets for Energy Efficiency? Noah M. Sachs, University of Richmond Law School (2016).

In defining the obligation, the activities and measures eligible to generate verified savings must be established, as well as a process for updating these measures as baseline efficiency changes. A number of best practices is recommended: (1) adopting a definition of energy efficiency that properly credits beyond business-as-usual activities; (2) establishing (or retaining) other energy efficiency programs that target opportunities that may be cost-effective and desirable for other societal objective (e.g., for certain low income energy efficiency opportunities), but unlikely to be the least-cost measures and hence unlikely to be developed under a market-based system; and (3) explicit definition of sectors and/or measures qualified in each market.

The obligation must then be apportioned to electric suppliers (e.g., Connecticut, UK, France, NSW), producers, or distributors (Italy), generally in proportion to the load that they serve for the applicable sectors. As is the case with New York's CES, Connecticut, France, and the UK have chosen to impose the obligation on suppliers, while Italy applied the requirement on distributors. A number of rationales are usually cited for imposing the obligation on suppliers, including their link to retail customers, the effect efficiency has on supply costs, suppliers' motivation to market value-added services, and regulators desire to transform suppliers' business models away from pure commodity sales. For imposing the obligation on distributors, the rationales include the greater stability of the entities in contrast to suppliers who may go out of business, and their stronger trust relationships with retail customers.

In the UK and France, suppliers are moving in the direction of positioning themselves as energy efficiency providers.[52] Obligated entities in the UK have formed partnerships with energy efficiency companies, and use their brand on the delivery of energy efficiency measures via contractors. In France, obligated entities have partnered with retailers, installers, manufacturers, and banks, to offer services such as audits, low interest rate loans, and upfront subsidies. The supplier obligation has also fostered the use of standardized energy efficiency actions in the residential sector, including lighting upgrades, insulation additions, and shell measures, to minimize measurement and verification (M&V) and other transaction costs. These standardized measures will likely be accessed first because they yield the lowest-cost credits. Higher cost measures such as those targeted to low-income sectors need to be explicitly required or supported by ancillary programs.

The Connecticut example shows the importance of defining the obligation sufficiently so that resources are competing on a level playing field. Having new energy efficiency compete against mature and already subsidized CHP, as it does in Connecticut's Class III RPS tier, can distort the market signal for new resources. Energy efficiency has little to chance to compete against these resources as a result.

Active Administration

Perhaps the most difficult work associated with an EEC construct is establishing the technical processes needed to support the program, including M&V protocols for determining the amount of credits generated by each measure, a process for certifying claimed energy savings, and a trading platform, if applicable, for certificate transfers. A number of best practices in this area can be derived from other programs, including:

[52] See footnote 50 at pg. 8-308.

- Transparent and consistent M&V;
- Pre-approval of measures;
- Accreditation of third parties able to implement measures; and
- Regular auditing

The M&V process starts with the establishment of a baseline of energy consumption, which can be a moving target. Unlike RECs, where the production of renewable generation is routinely measured by the NYISO, and therefore the commodity that the REC represents is easily certified, the baseline energy use needed to measure energy efficiency savings for purposes of creating an EEC can be complicated to measure.

The existing programs have relied on two approaches for M&V: (1) *ex ante* "deemed savings"; or (2) *ex post* evaluations. Most existing programs are dominated by deemed savings measures with standardized saving factors like CFL deployment. In France, for example, suppliers can choose from a menu of over 100 projects with deemed savings. The transaction costs for ex post measurement may be too high to make the program worthwhile. Nevertheless, criticism of deemed savings measures is also common, including unreliability of claimed savings and lack of ingenuity in providing efficiency products.

Regarding the former, the NSW provides an example of the need to monitor participants to ensure that credits are not created where savings are not actually realized. It does this by monitoring claimed energy savings activities through third-party audits. The regulator identified a small but significant portion of the credits as being improperly created. In 2015, for example, 7.3% of the credits were deemed to have been artificially created, and the companies responsible for their creation agreed to forfeit them. The UK has had similar problems with the mass mailing of CFLs to potential customers with very little certainty of their effect on load even though the savings were claimed.

Accreditation is another issue in existing programs. In Connecticut, third-party energy efficiency developers can be subject to significant market access issues under Connecticut's current RPS regulations. Any energy efficiency project not explicitly defined as an eligible Class III resource in relevant statute or regulation must pursue a declaratory ruling from the Connecticut Public Utility Regulatory Authority (PURA). This can be a lengthy and/or time-consuming process, particularly if the developer is proposing an EM&V methodology outside of those used by the existing energy efficiency programs resource manual.[53] Per the head of the Connecticut Green Bank, Bryan Garcia, using a meter-based M&V standard could significantly reduce friction around Declaratory Rulings for anything outside of the TRM and build credibility in the energy savings, thereby enabling more participants, more liquidity, and lower prices.

Cost Recovery

The determination of who the obligated entity is will usually indicate the method of cost recovery, with suppliers recovering their costs through minimally regulated supply rates, and distribution utilities recovering their costs through regulated rates or surcharges. How costs are recovered may also determine the most popular measures. Suppliers will theoretically look for the most efficient method to acquire its

[53] PURA: Renewable Portfolio Standards Overview, The Connecticut Department of Energy and Environmental Protection (www.ct.gov/pura/cwp/view.asp?a=3354&q=415186).

required savings since competition with other suppliers will limit the amount of flow through its allowed through rates, whereas regulated distribution companies will likely be allowed by regulators to flow through the prudently incurred costs for the measures in their regulated rates. In France, which regulates its supplier rates, the dominant measures – boilers, heat pumps, insulation and efficient windows – are also the ones eligible for tax credits since the entities cannot flow through the costs for its required savings, so they look to find the cheapest measures possible.

Sanctions

If an obligated entity fails to self-supply the savings or purchase the corresponding EECs, an ACP or other penalty may be imposed. In Connecticut, for example, an ACP of $31 per EEC is charged to obligated entities that fail to meet their targets. The ACP was set as the average cost of obtaining energy savings from Connecticut's C&LM programs to date. Generally, the ACPs are set just above the costs of a comparable basket of energy efficiency measures to give the obligated entities an incentive to innovate to reduce costs and therefore increase its profits, instead of paying the ACP.

Tradability

For those programs with tradable certificates, a system to register credits and the rules for issuing and trading needs to be developed. Trading of EECs allows obligated entities who may have high compliance costs to purchase efficiency savings from low cost suppliers, thus lowering the overall cost of meeting the target. Obligated entities can decide whether it wants to self-supply the energy efficiency savings (either directly in-house or through a sub-contractor), or alternatively purchase EECs to satisfy its obligation. The obligated entity will purchase EECs only if they are less expensive than providing the measures itself. This allows obligated entities a flexible means of achieving energy efficiency targets at the lowest cost, and also rewards third parties and end users with an additional revenue stream that may improve the economics of an energy efficiency improvement.

Trading appears beneficial in a system with a strong target, wide sectoral scope, large array of eligible measures, and where non-obligated parties can participate.[54] The role of trading in a limited program such as the UK, which only applies to the residential sector, is less certain due to the additional administration cost of establishing and operating a trading platform and program. The more liquidity that is allowed in a system (e.g. allowing non-obligated parties to participate), the higher the transaction costs of the program due to the administrative burden of overseeing and certifying multiple market participants.[55] "Provided that administrative and monitoring costs are not disproportionate, as many parties should be allowed to trade in the scheme as possible, since this enhances the prospects of diversity in marginal abatement costs and lowers the risk of excessive market power. A key benefit of allowing many parties in the scheme is that new entrants may have the incentive to innovate and deliver energy efficiency solutions, which have a lower marginal cost."[56]

[54] Energy Supplier Obligations and White Certificate Schemes: Comparative Analysis of Results in the European Union, Silvia Rezessy and Paolo Bertoldi, European Commission, Institute for Energy Joint Research Centre (2010).
[55] Id.
[56] Assessment and Experience of White Certificate Schemes in the European Union, Paolo Bertoldi, European Commission, Directorate General JRC (December 2011) at pg. 5-27.

Five states (Connecticut, Massachusetts, Michigan, Nevada, and Pennsylvania) have authorized trading, but only in Connecticut is trading active. "EEPS in most states are not aggressive, representing small increments in energy savings beyond business as usual. As a result, utilities have been able to achieve their targets on their own initiative, without resorting to a trading mechanism."[57] In Europe, most programs provide only a limited opportunity or incentive for trading and, therefore, the obligated entities usually self-supply the energy efficiency savings through in-house or sub-contracted measures installation. There is limited trading in France and the UK because suppliers prefer to implement the projects themselves for a variety of reasons. Suppliers in the UK and France partner with equipment suppliers and installers and use their brand to market beyond commodity service. Trading is a key feature of the Italian program though, where distribution companies rely on third parties to implement projects because they have little incentive or expertise to expand their business beyond regulated service.

The existing infrastructure developed for RECs in New York – the New York General Attributes Tracking System, or NYGATS – could likely be modified to accommodate EEC trading, although the issues regarding M&V are not solved by using such a platform. REC markets are much simpler to administer because the NYISO routinely measures the generation of power, including renewables, through onsite production meters, and therefore such data can be easily transferred to NYGATS for certification. An energy efficiency developer, on the other hand, would still need to traverse the M&V issues discussed above before certification of the savings occurs. As discussed in other parts of this paper, a meter-based M&V standard for energy efficiency projects could likewise build credibility in the expected energy savings, thereby enabling more participants, more liquidity, and lower prices in an EEC program.[58]

Lessons learned from other EEC and REC programs provides the following best practices for the development of a trading platform: "Appoint an independent body that is responsible for issuing of certificates; Provide a clear definition of a certificate in terms of resource eligibility, validity, size, etc.; Formulate the 'rules of the game': what are the rules to trading, who is responsible for what; Establish a registration system where each certificate and each trade is registered; Establish independent monitoring and verification system; and Organize that each certificate consumed is redeemed, i.e. taken out of the system."[59]

3.2.3 Applicable REV Demonstration Projects

In the REV Track 1 Order, the Commission directed the six investor-owned electric utilities to develop and file demonstration projects, consistent with the guidelines adopted by the REV Track 1 Order. The REV demonstration projects are intended to exhibit new business models that are expected to provide new revenue stream opportunities for third parties and the electric utilities. It is anticipated the demonstration projects will inform decision makers with respect to developing Distributed System Platform (DSP) functionalities, measuring customer response to programs and prices associated with REV markets, determining the most effective implementation of DER, and promoting the delivery and deployment of

[57] See footnote 51.
[58] The National Energy Efficiency Registry (NEER) is a web-based platform being developed with Federal assistance that may also provide infrastructure assistance for an EEC program (http://www.theclimateregistry.org).
[59] Energy Savings Credits: Are Potential Benefits Being Realized? Joe Loper, Steve Capanna, Rodney Sobin and Tom Simchak, Alliance to Save Energy (2010).

energy efficient and renewable energy technologies across the State. The current REV demonstration projects focusing on the continued development of energy efficiency markets, customer engagement and distributed energy resources (DER) are presented as follows:[60]

National Grid has implemented two demonstration projects testing the potential for scalability and supporting different customer needs. *The Clifton Park Demand Reduction Demonstration Project* focuses on engaging and informing customers about their energy use so they can better manage their consumption. National Grid provides residential customers near real-time energy consumption data with a focus on establishing price signals to incent reductions in usage with an emphasis on system peak. It is hoped that customers will look to third-party vendors to help manage consumption as they become more aware of their energy use. With the Phase I Pre-Advanced Metering Functionality installation work underway, National Grid believes it is possible to create more responsive relationships by leveraging infrastructure, customer outreach, price signals, and DER products and services which incentivize customers to reduce peak load and energy use. *The Fruit Belt Neighborhood Solar Demonstration Project* provides LMI income customers within this Buffalo, New York neighborhood access to solar energy resources, solar bill credits, and energy efficiency offerings to further drive energy bill savings and improved energy efficiency. Learnings from this demonstration project will clarify the extent to which clean energy can be provided to underserved customer groups. In addition, utilities may learn how they can issue RFPs to third-party vendors to market energy efficiency, PV and installation services that benefit the residential property owner. This demonstration project supports multiple REV goals and progress continues to be made in the areas of customer engagement, marketing material development, and solar PV host selection.

Con Edison's *CONnectED Homes Platform* and *Building Efficiency Marketplace* focus on educating customers and streamlining the connections between customers and energy efficiency market partners. The primary goals of these two demonstration projects are to dramatically increase the volume of efficiency related market activity, enable customers to more quickly realize the benefits of energy efficiency and demand management, and deliver enhanced customer engagement with data-driven insights. *CONnectED Homes* seeks to provide targeted residential customers with a set of tools designed to proactively connect them with cost-effective energy efficiency products and services and distributed generation offering. It is expected that this demonstration project will help remove the barriers to residential adoption of DERs and connect customers with third-party vendors for assistance and implementation.

To that end, Con Ed's customers are receiving information on targeted offerings, high usage alerts, direct small product purchases, Wi-Fi thermostats and Sealed Home Services. *Building Efficiency Marketplace* is designed to examine how interval meter data analytics can be leveraged to enable targeting and multi-channel engagement of commercial customers with high energy efficiency savings and demand reduction potential. The Project has developed a web-based portal to engage customers with details about how their buildings consume energy today, their potential energy savings and demand reduction opportunities, as well as the Marketplace to streamline connections between customers and energy efficiency market partners. Virtual, automated savings measurement and verification will be provided to

[60] REV demonstration projects can be found on the NYS Department of Public Service website (www3.dps.ny.gov /W/PSCWeb.nsf/All/B2D9D834B0D307C685257F3F006FF1D9?).

customers, giving them visibility into achieved savings and maximizing the likelihood that implemented projects continue to perform over time.

Orange & Rockland's (O&R) *Customer Engagement Marketplace Platform (CEMP)* is a marketplace providing customers with DER and energy efficiency offerings, targeted incentives, easy to use interactive tools, and access to recommended third-party suppliers. The *CEMP* leverages residential customer data and analytics to educate the customer and deliver specific DER and energy efficiency solutions. The platform enhances O&R's engagement with customers by providing useful tools and information to help make informed energy choices. The platform is designed to encourage customer participation in DER and energy efficiency offerings and generate new utility revenue opportunities through the engagement third-party suppliers. O&R launched the MY ORU Store as one of the first components of CEMP and residential customers are now able to purchase a wide range of energy efficiency products including Wi-Fi thermostats, LED lighting, advanced power stripes, and other energy and water saving devices.

Central Hudson has implemented a seamless customer engagement platform, *CenHub Marketplace*. *CenHub* is an energy advisory platform providing insight into energy usage for all residential customers. The platform informs customers about energy and cost savings programs in addition to information on how to better manage their consumption. Customers can purchase products and services through the online marketplace and automatically apply rebates at checkout. The convenient and streamlined process is intended to accelerate customers' adoption of energy efficiency and lower third-party customer acquisition and transaction costs. It is expected that *CenHub* will also lower third-party customer acquisition and transaction costs, and potentially provide new revenue streams. In the last quarter of 2016, the website had over 12,000 hits with 48% of the traffic coming from first time visitors to the online store, and over 3,800 energy efficiency products were sold.

Rochester Gas and Electric Corporation (RG&E) has implemented an online platform, *Energy Marketplace*, to test energy-related online transactions, customer satisfaction and the delivery of more comprehensive energy solutions for customers. The *Energy Marketplace* specifically supports the development of retail markets by providing a platform for third-party providers to market products to customers. RG&E also named the *Energy Marketplace*, the RG&E Your Energy Saving Store "YES Store" where customers are now able to shop for and compare energy-related products to better manage their energy use. The platform provides customer engagement and awareness through targeted messaging and information, as well as the ability to connect with a DER provider to implement solutions.

New York State Electric and Gas (NYSEG) has implemented the *Community Energy Coordination (CEC)* Demonstration Project to reduce customer barriers to the adoption of DER's. Under the CEC demonstration project, NYSEG will facilitate the marketing of three DER's: residential solar, community solar and energy efficiency services, directly to its customers. NYSEG's customers will be encouraged to go to the online service marketplace to gather information and connect with third-party service providers.

4 Factors Influencing Energy Efficiency Investments

A number of issues affect the degree to which energy efficiency investments occur, including financing, the valuing of energy efficiency investments within the existing regulatory construct, and utility incentives regarding the use of these resources. Barriers to more energy efficiency investments can result from lack of financing, the utility not being encouraged to consider energy efficiency in the same light as other resources, or from difficulties in measuring energy efficiency resources to the same extent as more traditional grid architecture. Consideration of these issues contributes to a more fundamental understanding of the present limitations on energy efficiency procurements and markets, and allows policy makers insight into needed reforms that should lead to more sustainable markets in this area. Various regulatory reforms are attempting to address these barriers, as discussed below.

4.1 Financing

Many efficiency projects require significant upfront capital, so limitations on access to these resources can have a significant impact on energy efficiency deployment. Although a project sponsor may have access to sufficient capital resources, an efficiency investment may not meet internal return hurdles nor win resource allocation decisions, as it is often not a core investment. In some cases (and particularly in LMI sectors), capital resources are not available for efficiency projects, especially for the more capital-intense efficiency investments. Thus, third-party capital providers, either through the banking system, capital markets or private investment capital, are important partners in creating a well-functioning efficiency market.

The impact of financing costs can be high, particularly for companies that leverage energy service agreements that tie payments to energy savings. For example, a corporation may have a 30% Internal Rate or Return (IRR) hurdle rate, in which case a dollar of annual energy savings over 20 years may only justify $3.50 of upfront investment. Leveraging third party finance, if a company has a 15% (IRR) hurdle rate from the banks, a dollar of annual energy savings over 20 years may only justify $7 of upfront investment. On the other hand, a lower cost of capital with a 5% hurdle rate would enable over $16 of upfront investment with that same dollar of annual energy savings.

The cost of capital is therefore an important leverage point in private sector financing. The fastest way to replace ratepayer funds with private capital, therefore, is to lower the cost of financing. In doing this, there is a chicken-and-egg factor at play. Efficiency advocates point to the lack of financing capital to help scale the market, while finance professionals point to the lack of demand for efficiency project financing, thought to be indicative of a low level of efficiency investment activity. Any additional utility procurement investment to capture the grid and externality value of energy savings can therefore be used to reduce the cost of capital in the short term. In the long term, however, the cost of capital will be lowered by the fundamental market forces of higher volume, longer repayment history, and more sophisticated risk analysis.

Energy efficiency finance is an emerging field, one with a few notable success stories (for example, residential Property Assessed Clean Energy (PACE) financing in California, and financing of Energy

Performance Contracts), and a considerable amount of frustration. The following issues are prevalent in this market:

- The concept of financing negawatts is new and untested.

- Creditworthiness must be established. Typically, the credit of the existing borrower or building must be understood and vetted. In the single family residential sector, this can be addressed through customer credit analysis or FICO scores. However, in the commercial, multifamily and institutional sectors, real estate analysis (or institutional credit analysis) is required. It is difficult to divorce the efficiency cash flows from the credit of the host property.

- Traditional loans have not proven popular in the energy efficiency sector compared to PACE financing or Energy Savings Agreements (ESA, e.g. pay with your savings agreements). However, these financing alternatives do not have as much repayment data as traditional consumer loans.

- Lenders are looking for a high degree of predictability in the cash flow analysis. Efficiency cash flows can be impacted by energy prices, weather, equipment and operator performance. If price stability on individual transactions can be established through a stable efficiency unit pricing mechanism, this will support greater predictability of cash flows, but will not eliminate all cash flow variability.

- Absent the potential of more sophisticated measurement methodologies (i.e., a standardized EE meter), it is difficult to isolate, quantify and value efficiency cash flows. This makes it challenging for lenders to ascribe value to efficiency cash flows in a manner that is conducive to credit underwriting methods. Most lenders today do not "underwrite savings" although progress is being made in socializing lenders to this approach.

- There is a lack of data supporting the predictability and longevity of efficiency cash flows. Generalized data sets allow lenders to better understand the ranges of performance, thus helping to better quantify credit risk. Absent such data, risk premiums tend to increase, and underwriting will tend to be more conservative.

- Efficiency project returns are subject to equipment and operator performance risk, which is poorly understood by lenders. Most lenders do not have staff qualified to assess these risks and returns. Absent more robust and lengthy data sets on performance, insurance products and guarantees from specialized institutions (e.g., New York Green Bank) can mitigate this barrier.

- Efficiency is not one thing; it is an extensive list of various measures which must be individually and collectively understood by lenders. Most lenders lack engineering expertise, or even basic familiarity with these measures.

- Much efficiency equipment does not have hard asset or collateral value. Thus, unless there is a lien on the underlying property (as in the case of PACE financing or a "green mortgage") collateral value is weak and the financing transactions are generally viewed as unsecured (or minimally secured). This is complicated by the fact that efficiency projects often have relatively high soft costs and labor costs in relation to equipment costs.

- Existing financing arrangements (mortgages and other forms of financing) on real property often bar or limit the opportunity for incremental or supplement loans, secured or in some cases unsecured. Thus, lender consent is often required from an existing lender, complicating the financing transaction and rendering it costlier. Efficiency finance products that do not require lender consent (for example, certain ESAs or unsecured loans) can mitigate this issue.

- Because of the relatively low cost of energy and high labor, design intensity, and transactional costs in relation to capital expenditure, many efficiency projects have long payback periods. Thus, low cost, long-term financing is key, and that is often difficult to achieve on an unsecured basis. PACE and green mortgage products can mitigate this barrier.

- Volumes are low, and the market is fragmented. Fragmentation is a result of multiple building sectors and subsectors, with a wide range of credit attributes, and a wide range of technologies and technology providers. Thus, it is difficult to come up with a standardized financing product offering that appeals to a wide swath of customers.

- There is currently no established secondary market for efficiency loans, although efforts are underway to encourage this through PACE programs and entities like the New York Green Bank. Without established secondary markets, lenders must plan to hold loans to term on the balance sheet which limits the overall availability of capital to the sector.

This long list of issues illustrates financing energy efficiency is a complicated undertaking with average (at best) returns for lenders in today's market. That said, efficiency investments are sound economic investments, with numerous co-benefits for project sponsors and increasing regulatory drivers (e.g., NYC's Greener Greater Buildings laws). New York has an opportunity to improve the bankability of the sector, by advancing structures and market principles that will allow utilities to compensate project sponsors and market actors for the values of a negawatt that they are not currently able to capture. It is also important to emphasize the role of specialized and mission-based financiers and the opportunities for product innovation to help address barriers.

Fortunately, New York has the benefit of many engaged lending organizations and a full suite of efficiency products (though not always available in all areas of the State). The State has PACE enabling legislation, paving the way for individual jurisdictions to establish PACE programs. Energize New York is running a nascent but promising C-PACE program based in the Hudson Valley and active in several localities. On-bill repayment has been successfully utilized in the State in support of the residential efficiency market. Specialized lenders such as NYCEEC, M-Core Credit, Barret Capital and others are actively lending to efficiency projects.

New York also has the benefit of a well-capitalized Green Bank that is eager to participate in the development of efficiency markets. The Green Bank has made numerous efforts to engage with efficiency borrowers and small-scale lenders, and although quite a small percentage of their current portfolio represents efficiency investments, they stand ready to supply capital to the sector. Several community development finance institutions (CDFIs) and specialized lenders to the affordable housing sector have made significant commitments to efficiency, notably CPC, Enterprise, NYC's Department of Housing Preservation and Development, NYC's Housing Development Corporation, and NYS's Housing and Community Renewal, as well as several community development groups within major money center banks. Community banks and credit unions are also engaged.

Especially in the early stages of efficiency market development, lenders with a mission focus (organizational objectives beyond pure investment return) will be key to ensuring adequate access to financing resources. NYCEEC, operating primarily in the NYC market, exclusively finances energy efficiency and clean energy projects. NYCEEC's experience suggests that there are many building sectors and efficiency projects and technologies for which highly flexible, attractively priced, fixed-rate, generally unsecured debt financing – with features typically unavailable today through traditional finance institutions – is necessary to complete projects. Once greater scale in market activity is achieved, then more traditional lenders can be expected to enter the field, providing additional liquidity to economically sound investments.

Cost of capital is of course an important consideration to any borrower, although the experience in the field suggests that cost of capital itself is often not a constraining factor (the LMI sector is a notable exception). We are still in a historically low interest rate environment, though that may not remain the case in the coming years. Considerations that may be equally if not more important to project sponsors are:

- Meaningful positive cash flow after financing costs
- Longer financing terms (that help to create positive cash flows)
- Fixed rate versus floating rate financing, with fixed rate being preferred
- Risk premiums (although most current financing arrangements are driven more by underlying real estate and collateral analysis)

Banks and other debt capital resources generally require that financeable investments demonstrate creditworthiness (the ability and willingness to repay), cash flow predictability (which is enhanced by price certainty), and appropriate legal contractual protections before they feel comfortable financing new kinds of projects. Any market structure should therefore keep in mind bankability of cash flows from sales of efficiency resource units, and specifically seek to address the barriers identified above.

Another important element in attracting capital partners to support a new market is volume and standardization. Efficiency investments tend to be small in scale (as compared with energy generation projects, or real estate investments). Amongst specialized efficiency lenders, transaction size ranges from $50,000 (or less in some cases) to $3-5 million. From a capital markets perspective, aggregate volumes of less than $100 million annually are difficult to serve. Thus, achieving sufficient scale that makes it worthwhile for a financier to invest in the analysis, development of credit parameters and the professional expertise required to evaluate the credit and bankability of a new asset class is important. Without a reliable indication of volume, bankability cannot be assured.

Capital solutions cannot flourish without sufficient demand. As New York invests in advancing efficiency markets by following a set of policies designed to create a greater level of efficiency transactions between building owners and market actors (less reliant on traditional efficiency programming), opportunities for both specialized and traditional financiers to enter this market will increase. To facilitate this transition, efforts to should made to support predictability in cash flow analysis, to make generalized data sets available, and uniformly standardize measurement of savings to ascribe value to EE.

4.2 Valuing Energy Efficiency

Barriers to more energy efficiency investments can result from the utility not being encouraged to consider energy efficiency in the same light as other resources, or from difficulties in measuring energy efficiency resources to the same extent as more traditional grid architecture. Various regulatory reforms are attempting to address the first barrier, including changing the way that utilities consider energy efficiency resources in their internal evaluation of resource options, as explained in Section 4.2.1 below, and modifying cost recovery policies and performance incentives, as discussed in Section 4.3. Potential solutions to the second barrier may include smart metering deployment and advanced M&V, as discussed in Section 4.2.2.

4.2.1 BCA Framework

Under the BCA Framework Order, the PSC directed utilities to develop BCA handbooks to provide a common methodology for calculating benefits and costs of projects and investments, including energy efficiency. EE has several potential benefits, many of which are currently quantifiable and some which are not. The BCA Framework requires utilities to calculate the monetary value of some of these BCA components in their evaluation of competing resource needs. Where energy efficiency is evaluated alongside traditional utility resources, the BCA is applied to both, and the same cost recovery framework is used for both types of resources. In many cases, however, such a side-by-side comparison is difficult, because energy efficiency may provide many benefits at once, reducing the need for a variety of different types of resources, which in turn may provide some benefits that energy efficiency does not provide. Utilities engage in some form of BCA continuously for all manner of decisions and analyses, at different levels of complexity depending on the significance and time-frame of the action.

The Commission adopted the Societal Costs Test (SCT) as the primary measure of cost effectiveness under the BCA Framework. The chart below details the various values that are included within the SCT. These values will be continuously refined and updated by the utilities through a BCA Handbook. The value of different resource types is to be explicitly included in the Handbook, as well as examples of how all benefit and cost components will be applied to an illustrative portfolio of alternative resources and a description of the sensitivity analysis on key assumptions that will be applied to the BCA.

	BCA TEST PERSPECTIVE
BENEFITS	**Societal (SCT)**
Bulk System	
Avoided Generation Capacity (ICAP), including Reserve Margin	√
Avoided Energy (LBMP)	√
Avoided Transmission Capacity Infrastructure and related O&M	√
Avoided Transmission Losses	√
Avoided Ancillary Services (e.g. operating reserves, regulation, etc.)	√
Wholesale Market Price Impacts	--
Distribution System	
Avoided Distribution Capacity Infrastructure	√
Avoided O&M	√
Avoided Distribution Losses	√
Reliability / Resiliency	
Net Avoided Restoration Costs	√
Net Avoided Outage Costs	√
External	
Net Avoided Green House Gases	√
Net Avoided Criteria Air Pollutants	√
Avoided Water Impacts	√
Avoided Land Impacts	√
Net Non-Energy Benefits relate to utility or grid operations (e.g. avoided service terminations, avoided uncollectible bills, avoided noise and odor impacts, to the extent not already included above)	√
COSTS	
Program Administration Costs (including rebates, costs of market interventions, and measurement & verification Costs)	√
Added Ancillary Service Costs	√
Incremental Transmission & Distribution and DSP Costs (including incremental metering and communications)	√
Participant DER Cost (reduced by rebates, if included above)	√
Lost Utility Revenue	--
Shareholder Incentives	--
Net Non-Energy Costs (e.g. indoor emissions, noise disturbance)	√

While the utilities' BCA Handbooks provide the general methodology that utilities will use to calculate each of the various categories of benefits set forth in the BCA Framework Order, some working group members think the level of detail makes it extremely difficult if not impossible for non-utility market actors or other stakeholders to calculate a specific BCA ratio for any given energy efficiency project. Accordingly, non-utility market actors who provide energy efficiency services have little visibility as to how the benefit cost analysis will be applied to their projects.

While BCA analysis from a regulatory perspective occurs at the portfolio level rather than the program or measure level, in practice utilities aggregate BCA scores from measures and programs in developing portfolio-wide BCA scores. Accordingly, market actors perceive that the BCA score of a given energy efficiency investment influences the likelihood of that investment being included within a larger portfolio. Some members of the working group therefore believe that it would be helpful for market actors to gain a better understanding of how projects they propose will score from a BCA perspective, and would appreciate greater transparency from utilities in this area.

Such transparency could be particularly helpful as the Commission transitions to a more market-based approach in the future, because it provides market actors with the tools necessary to understand whether projects they propose will be seen as cost effective from a regulatory perspective and provides a rough estimate of the value their projects provide to the grid and to society. In the long run, additional transparency may, for example, enable a future regulatory structure where energy efficiency developers can affirmatively propose energy efficiency projects as part of a given utility's rate case, or through a future centralized Commission proceeding. Having this level of transparency would potentially enable utilities to serve in a platform role, acting as a clearinghouse for projects proposed by market actors.

Some members of the Working Group think the Order has undervalued energy efficiency measures that have significant non-energy benefits. The SCT includes "Participant DER Cost (reduced by rebates)" in the "cost" side of the equation. The SCT also includes "Net Non-Energy Benefits," which do not include societal benefits that are difficult to quantify at this time. Given the fact that customers are often motivated by non-energy benefits (e.g. comfort, health, productivity, property value, etc.), several group members believe that currently unquantified non-energy benefits are by definition equal to customer cost. For example, if a single-family homeowner has comfort issues (e.g. drafty rooms, etc.), and the customer cost (after rebates) of the insulation project they purchase is $5,000, then they are defining the non-energy benefits as at least $5,000. Without this interpretation, many energy efficiency measures, particularly deep retrofit measures that are more expensive and have a large non-energy impact, may result in low BCA values, leading to their exclusion in portfolios for which the BCA is applied, thus potentially reducing a large source of potential energy savings. The bottom line is that customers' spending decisions should not be penalized as long as the ratepayer or utility investment is creating net benefits within the remaining BCA Framework.

4.2.2 Advanced M&V

While this report does not focus on M&V, it is an important prerequisite for markets and procurement. Without a standard accounting of energy savings, market actors and other stakeholders cannot exchange value related to energy savings. The International Performance Measurement and Verification Protocol (IPMVP) is the established industry-accepted framework for M&V (also referred to here as M&V 1.0). It includes four approaches for verifying energy efficiency savings: 1) Key-Parameter Measurement, 2) All-Parameters Measurement, 3) Whole Facility, and 4) Calibrated Simulation. M&V 1.0 has been deployed for decades to evaluate the performance and effectiveness of energy efficiency investments, and while M&V 1.0 provides a standardized approach, it does not necessarily provide accuracy or uniformity in the calculation of energy savings (e.g. different engineers may arrive at different energy savings results).

For example, M&V 1.0 has historically been inconsistent across jurisdictions depending on key assumptions[61].

Because of the limitations of M&V 1.0, many industry stakeholders have been studying new M&V models that rely on meter data. As discussed in a recent Lawrence Berkeley National Laboratory report,[62] advances in data granularity in terms of frequency, volume, and end-use detail, and automated analytics that provide ongoing, near real-time savings estimates have led to advanced measurement and verification or M&V 2.0. M&V 2.0 can provide stakeholders with more timely and detailed information, allowing for more actionable insights on energy efficiency programs and projects.

New information and communications technologies (ICTs) providing hourly or even greater granular energy usage data are enabling the reporting of energy use in buildings in near real-time. The increasing prevalence of ICTs including high-resolution smart meters, communicating smart thermostats, and nonintrusive load sub-metering devices are changing the way energy efficiency projects and programs are measured.[63] AMI software enhances reliability and timeliness by enabling the frequent collection and measurement of detailed, time-based, and consistent data. Automated analysis through the deployment of emerging software can use improved data access and advanced analytics to automate and accelerate the M&V process. These tools are advancing M&V by enabling ongoing monitoring and estimating of energy savings in near real-time, both for individual premises and for portfolios of homes or businesses.

Together with higher resolution data and multi-parameter models, these methods and technologies can capture the impact of efficiency on building load shape more accurately. These approaches are intended to be conducted more quickly, more accurately, at a lower cost, and with greater value than non-automated methods. They can also facilitate financial risk-management approaches by expressing energy savings values in terms of uncertainty and confidence. An example of ICT-enabled data collection and analysis facilitating third-party financing of energy efficiency programs is the work being done by the firm Joule Assets[64] (see section 5.5). The ability of advanced M&V technologies to deliver these benefits is still being explored and evaluated, and more real world testing and standardization is required. Establishment of use cases, appropriate model methodology, acceptable confidence intervals, and how to assess error in models still needs to occur.

Some key concepts around advanced M&V include standardization around data access and confidentiality, data formatting, and benchmark and comparison testing. Standardization would allow for advanced M&V solutions to scale and apples-to-apples comparisons of savings estimates produced by different tools, but is a work in progress. In other words, rulers that give us the same measurement need to be established. Customer data is required for analytics and comparison testing, but privacy must be protected

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[61] Greentech Media, "Lies, Damned Lies and Modeling: Energy Efficiency's Problem with Tracking Savings," June 3, 2015, www.greentechmedia.com/articles/read/Overcoming-Energy-Efficiencys-Problem-With-Tracking-Savings

[62] Lawrence Berkeley National Laboratory (LBL), "The Status and Promise of Advanced M&V; An Overview of "M&V 2.0" Methods, Tools, and Applications", February 2017, https://buildings.lbl.gov/sites/all/files/lbnl-1007125.pdf

[63] Id.

[64] American Council for an Energy-Efficient Economy (ACEEE), "How Information and Communications Technologies Will Change the Evaluation, Measurement, and Verification of Energy Efficiency Programs", December 2015.

and security maintained. The ability to access utility billing data in a consistent and secure fashion is a significant challenge that needs to be addressed to facilitate potential benefits of advanced M&V. In addition, advanced M&V will require a standard data format for practical use and delivery. The Green Button initiative is driving industry adoption of some common formats, but more time and effort needs to be invested into standardizing and adopting data formats. Finally, there is a need to determine whether any given advanced M&V tool or method is robust and well implemented, which has resulted in growing industry interest in technology-performance testing procedures. There is no industry consensus yet as to whether performance-based testing alone will be sufficient to validate a given tool, or whether full transparency of algorithms will be required.[65]

California has already started to grapple with some of these concepts and is worth watching. AB 802 states, "Recognizing … the need to determine how to incorporate meter-based performance into the determination of goals, portfolio cost effectiveness, and authorized budgets, the commission … authorize … taking into consideration the overall reduction in normalized metered energy consumption as a measure of energy savings."[66] The California Public Utility Commission (CPUC) has emphasized transparency and replicability of methods and protocols in interpreting normalized metered energy consumption, and integration of advanced M&V into program design to clarify from the outset what information will need to be submitted for review.[67] The level of transparency is also an open issue in the advanced M&V space. Most tools are proprietary and unavailable through open-source code licenses, though a tool developer may offer open documentation of the specific M&V methodology that is implemented even if the code itself is not publicly available. The degree of specificity varies, and may include method inputs and outputs and analysis approaches or quantitative model definitions.[68] Therefore, even transparency must be defined in program designs.

In spite of these challenges, the promise of advanced M&V should be explored. A recent American Council for an Energy-Efficient Economy report states that in the future, advanced M&V technologies could "enable customers to recover through competitive markets the value their energy efficiency has to the larger energy system. The ability to accurately quantify and verify their energy savings creates a potentially tradable commodity. Efficiency programs could restructure to purchase this commodity, and markets could emerge to facilitate the trading of such commodities."[69] These new advances in data analytics, availability and collection hold great promise for facilitating deeper energy savings through better customer engagement, targeting and delivery of locational and temporal confirmation of energy efficiency impacts, program optimization, and increased accuracy and certainty in the measurement of energy savings. Wide implementation of M&V 2.0 has the ability to enhance energy efficiency activity through individual building

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[65] Rocky Mountain Institute (RMI), "The Status and Promise of Advanced M&V; An Overview of "M&V 2.0" Methods, Tools, and Applications", March 2017.
[66] California AB 802, Williams, Chapter 590, Statutes of 2015
[67] www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=9363
[68] Rocky Mountain Institute (RMI), The Status and Promise of Advanced M&V; An Overview of "M&V 2.0" Methods, Tools, and Applications", March 2017.
[69] American Council for an Energy-Efficient Economy (ACEEE), "How Information and Communications Technologies Will Change the Evaluation, Measurement, and Verification of Energy Efficiency Programs", December 2015.

initiatives, and new markets and procurement models that will emerge under REV, but testing/pilots are critical to better understand preferred applications and trade-offs, and to determine appropriate standards.

4.3 Energy Efficiency Rate Recovery and Utility Incentives

Each of the procurement methods discussed in Section 3 of this report require a funding mechanism.[70] The manner in which a funding mechanism is designed influences utility investment in energy efficiency, and subsequently market confidence. Importantly, a funding mechanism is required whether utilities procure energy efficiency directly or source from market actors. As discussed above, the existence of the BCA framework alone does not provide clarity regarding funding of efficiency investments, even though it could be used to develop a framework that would provide such clarity.[71]

Potential funding mechanisms are distinguished by the following factors: i) component of customer bills through which energy efficiency investments are recovered; ii) whether a return on capital or other utility incentive is permitted as part of that recovery; and iii) whether costs avoided through energy efficiency are specifically accounted for as part of the recovery mechanism. With any funding mechanism, it is important that utilities and market actors retain value from energy efficiency only to the extent that it produces ratepayer benefits. Given this principle, utilities and market actors need clear investment parameters so energy efficiency shifts from an obligation to a real investment.

4.3.1 Types of Recovery Mechanisms

A utility can recover energy efficiency investments in a variety of ways, including through its O&M and capital budgets (via rate cases), through a surcharge that is set each year in the ETIPS proceeding, through supply rates, or any mix of the above. Currently, New York utilities recover most of their energy efficiency investments through a surcharge, although increasingly some of these costs are being included within O&M or capital budgets, and therefore, are recovered in distribution rates set by the PSC in periodic rate cases. Where these energy efficiency costs are recovered can have an impact on both a utility's perception of energy efficiency as a grid resource, and on market actors' expectations of risk in participating in energy efficiency procurements or markets.

Surcharge

Utility-administered energy efficiency budgets for 2016-2018 are funded through the System Benefit Charge, a surcharge on customers' bills.[72] Surcharges generally provide more flexibility to modify funding levels or programmatic attributes, and therefore has been used extensively on a variety of utility programs and budget categories. However, because surcharge-based funding may encourage utilities to treat energy efficiency spending separately from more routine O&M and capital budget expenses, it is

[70] We note that some activities may meaningfully advance some energy efficiency without additional funding. Better data access could help customers and developers identify energy efficiency opportunities, and utilities may be able to help developers generate customer leads in return for platform services revenues. Finally, rate design could advance energy efficiency that better responds to network and system constraints.
[71] For example, the Commission could conceivably articulate a rule that utilities may recover costs for any portfolio of efficiency investments that passes the BCA.
[72] ETIPS Order, at pg. 28.

unlikely that surcharges will be the cost recovery mechanism employed to recover incremental energy efficiency procurement costs in the future. As the Commission stated in the ETIPS Order, "energy efficiency efforts funded through a surcharge should remain capped."[73]

Distribution rates

Utility energy efficiency investments may also be funded through distribution rates. The recent Con Edison Joint Proposal is an example of this method, where incremental energy efficiency costs are recovered in delivery rates rather than via a surcharge.[74] The PSC believes that incorporating these costs in distribution rates encourages utilities to treat energy efficiency investments more like traditional utility assets and works toward integrating energy efficiency into core utility operations.

Once energy efficiency costs are transferred from a surcharge to inclusion in the basic computation of a utility's revenue requirement, the costs are collected through the base rates established for various customer service classifications. There are two main options for collecting those costs in base rates: (a) inclusion of costs in rate base and (b) current recovery of costs. Including costs in rate base requires the utility to record the costs on its books as a regulatory asset. This asset is then amortized (depreciated) over a specific period of time. Costs that are amortized in any year are included in base rates for that year. Costs yet to be collected in rates (unamortized costs) are financed by the utility, like other utility capital investments. The utility is compensated for the costs of financing the unamortized amount when the pre-tax rate of return is multiplied against the unamortized amount. This amount is then included in base rates with the annual amortization. Allowing a return on the unamortized expense places energy efficiency investments on an equal footing with traditional capital infrastructure investments and works toward integrating energy efficiency into core utility operations. The approved joint settlement in the Con Edison rate case follows this model.[75] Some utilities with cash flow challenges may not support such an approach because it requires the utility to finance unamortized costs.

An alternative approach is to only permit recovery of costs for energy efficiency investments, without allowing a return on capital. Under such a model, utilities can be incented to carry out investments in energy efficiency through shareholder performance incentives (either Earnings Adjustment Mechanisms (EAMs) or shared savings), but incentives need to be at meaningful levels for success. Cost recovery coupled with performance incentives rather than permitting a return on capital spent can align utility incentives only with achievement rather than with capital spent, eliminating the incentive to spend more capital to achieve the same results.

Supply rates

Energy and capacity supply rates provide another potential option to fund energy efficiency investments. Were the Commission to adopt an obligation for LSEs to procure a specific amount of energy efficiency annually, the costs of such procurement could be reflected in supply rates in the same manner that CES procurement obligation costs may be passed through in supply rates. Supply rates could also be

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[73] Id.
[74]Case 16-E-0060, Order Approving Electric and Gas Rate Plans (issued January 25, 2017), p. 39, stating that "[T]he Company's base rates reflect the costs of its System Peak Reduction and Electric Vehicle Programs and an Energy Efficiency Program incremental to its Efficiency Transition Implementation Plan (ETIP)."
[75] Id. p.39-40.

used to fund energy efficiency investments even absent a structure relying upon an LSE obligation. For example, utilities could explicitly account for the extent to which energy efficiency investments help meet a portion each year's NYISO installed reserve margin requirements, and fund a portion of their energy efficiency investments through supply rates in accordance with the capacity savings from those programs. This could have the effect of incentivizing utilities to seek out or encourage efficiency investments that more precisely decrease their capacity and energy costs.

Shared Savings

Shared savings is a rate recovery model that relies specifically on accounting for costs avoided by energy efficiency through estimating the costs that would otherwise be incurred. This approach can be employed for any energy efficiency expenditure, but has recently manifested itself in the development of non-wires alternatives (NWAs) that reduce the need for traditional transmission and distribution infrastructure.

Under this approach, energy efficiency is part of a portfolio of alternatives that replace a more traditional infrastructure alternative and result in an overall lower cost to customers than would have occurred otherwise. Energy efficiency costs are collected in rates and incented by providing a portion of the savings produced by the efficiency relative to the traditional investments that would have otherwise been necessary. Thus, while utility rates reflect energy efficiency costs and an incentive, the shared savings approach assures the total benefits to the public outweigh the costs.

While the shared savings incentive approach could be applied other energy efficiency incentives, it appears best suited to NWAs, because NWAs facilitate an easy side-by-side comparison of alternatives. At the same time, NWAs represent a relatively narrow class of energy efficiency opportunities because they entail valuing only the avoided transmission and distribution value of energy efficiency. In theory, the approach could be expanded to attempt to account for all of the different savings that efficiency provides. Existing sources of savings from energy efficiency include avoided capacity, avoided ZEC and REC purchase obligations, and avoided transmission value. In practice, however, this would likely prove to be quite complex, because different types of utility avoided costs are reflected in different portions of customer bills.

Presently, New York utilities fund energy efficiency through a combination of mechanisms, including surcharges, distribution rates, and a shared savings construct. Some of these recovery mechanisms are finalized through rate cases, which often take place over a three-year cycle. The working group has concluded that this can create market uncertainty beyond the rate case horizon, making it difficult for utilities to develop procurement mechanisms. A utility may be disincented from engaging in the high amount of upfront work required to develop a new program or procurement mechanism, for example, since it is unclear whether it will be granted a sufficient amount of funding through subsequent rate cases to continue with the new approach in future years.

Further, the de-centralized nature of rate cases can make it difficult for market actors to follow the overall development of New York's energy efficiency market and access procurement opportunities. In addition, it is more challenging for advocates to participate to ensure that the full potential value of energy efficiency investments in each service territory is being realized. These issues could be mitigated through the development of a central framework that establishes rules for funding efficiency procurement mechanisms and specifies how and when any deviations to that framework may be made in the context of individual rate cases.

4.3.2 Utility Energy Efficiency Performance Incentives

While utilities in New York have developed and implemented energy efficiency programs for many years, they have not been integrated into the core business operations. With the development of the REV proceeding and subsequent rate cases, New York is at the forefront of figuring out how to integrate energy efficiency alongside other capital investments that are recovered through rates. At the same time, new REV policies are aiming to motivate utilities to execute on additional objectives through such mechanisms as return-on-equity adders and shared savings.

New York utilities have been effectively held to performance standards for many years. However, these performance standards are typically negative adjustments tied to basic service and reliability.[76] Positive performance incentives for energy efficiency and broader outcomes were recently introduced by the Commission in the form of earnings adjustment mechanisms (EAMs). The Commission established that "[i]ncentive opportunities should be financially meaningful and structured such that they encourage enterprise-wide attention at the utility and encourage strategic, portfolio-level approaches beyond narrow programs."[77] Earnings resulting from total EAMs are to be initially limited to a maximum of 100 basis points of utility average annual rate base. The State is at an early stage in understanding the impact or effectiveness of such incentive mechanisms, but the next few years will likely provide useful lessons.

The issue of utilities' achievement of 'enterprise-wide attention' and 'financially meaningful' performance on energy efficiency savings is beginning to gain attention across the country. A recent paper from CLEAResult explored the subject in some detail. In its *Lower Spending, Higher Returns* White Paper[78], authors surveyed Wall Street analysts, who suggested that a 10% performance incentive on, for example, a current 10% rate of return on equity (ROE) would positively impact shareholder value. This would increase ROE roughly 1 percentage point overall, to 11%. Current performance incentives in many states are important but insufficient to motivate boards of directors and utility executives to drive the shift in culture, behavior, and motivation to pursue energy efficiency investments, which ultimately lower spending.

Pathway to a 21st Century Electric Utility, a report commissioned by Ceres, found that "California has been proactive in providing incentives for utilities for encouraging energy efficiency, [but] the incentives reported in 2014 were less than 1.25% of pre-tax operating income for the largest utilities, or less than 0.1% in additional earned ROE.[79]" The *Lower Spending, Higher Returns* survey of the broader group of utilities shows that performance incentive mechanism (PIM) awards in the study year 2013 averaged less than 1% of pre-tax operating income. That level of incentive, the authors conclude, is

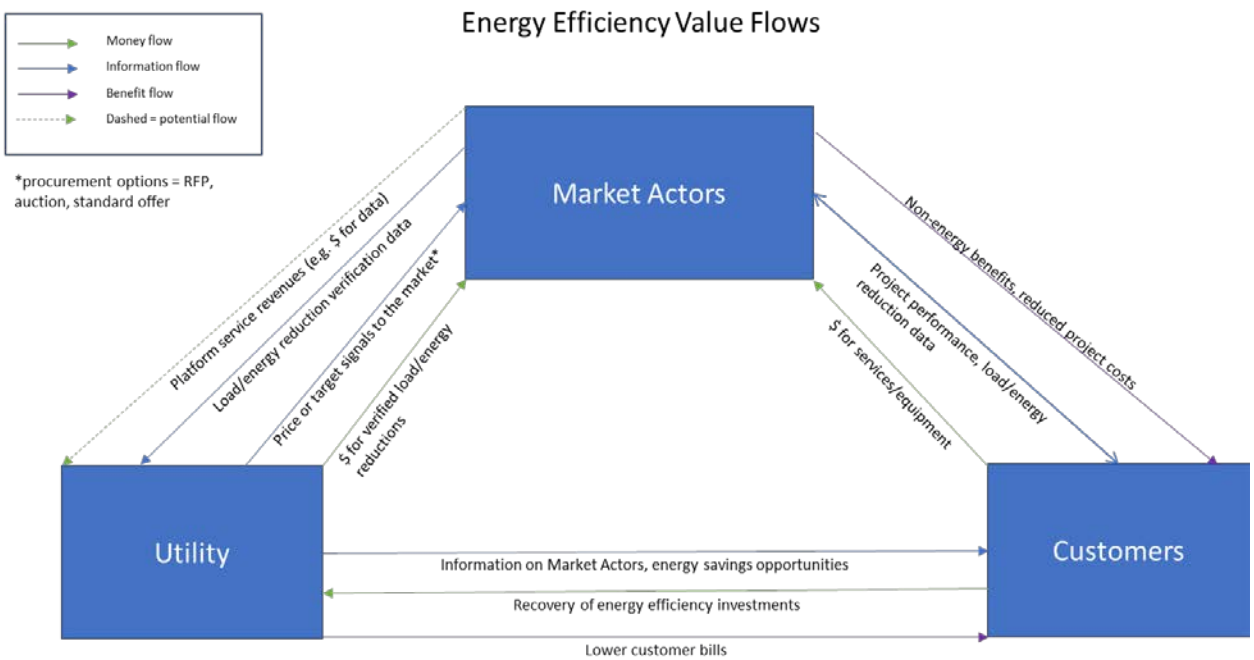
[76] See Track 2 Order.
[77] Id., at pg. 68.
[78] Lower Spending, Higher Returns, Aligning Performance Incentives to Accelerate a 21st Century Utility Model, CLEAResult, Peter Kind, Doug Lewin (January 2017).
[79] Pathway to a 21st Century Utility, Ceres (2015).

insufficient to encourage utilities to prioritize potentially lower cost EE/DERs solutions over higher cost infrastructure. The survey indicated that analysts sought a 10% or greater long-term, potential impact from performance incentives to give valuation weight to PIMs or EAMs in their assessment. Other factors they cited that would impact their weight of PIMs in their valuations included sustainability, transparency, and timeliness. The paper concludes that changes can be phased in to co-exist with traditional cost of service regulation, but performance incentives need to be robust enough to change utilities' priorities[80].

[80] Lower Spending, Higher Returns, Aligning Performance Incentives to Accelerate a 21st Century Utility Model, CLEAResult, Peter Kind, Doug Lewin (January 2017).

5 Pay for Performance and New Business Models

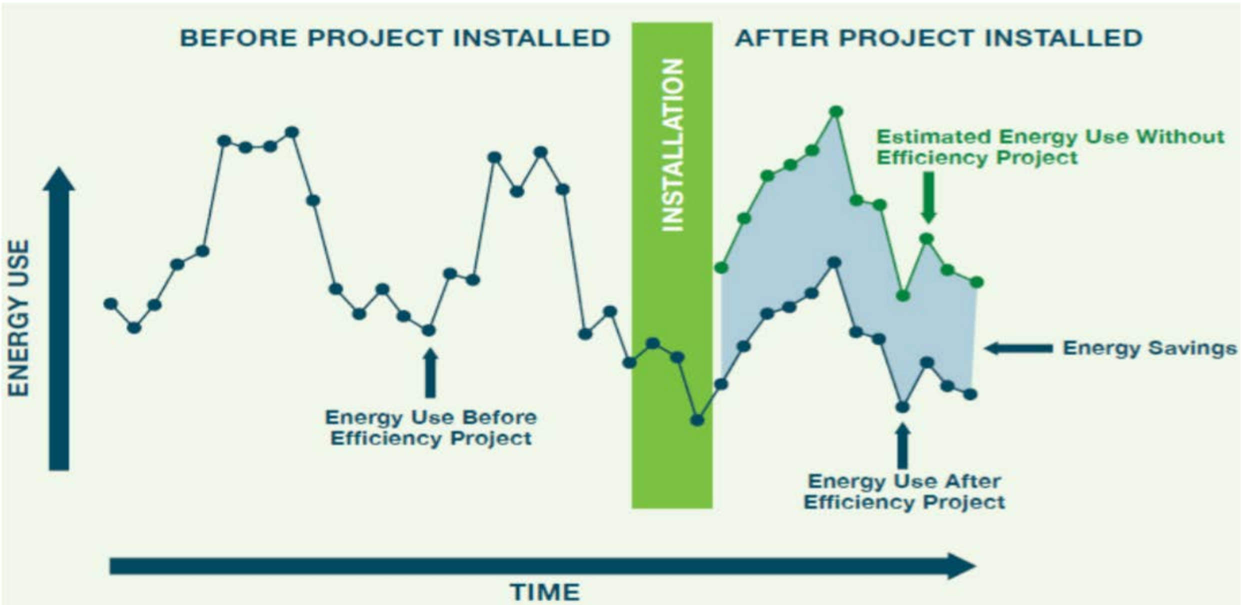
The Working Group sought to understand how funds, information, and benefits would flow between utilities, market actors, and customers with market-based approaches, and developed the following graphic to illustrate these flows. Pay for Performance program structures and new business models that reflect opportunities for advancing market-based approaches are discussed below.



5.1 Pay for Performance Program Approaches

The concept of Pay for Performance (P4P) has been in existence for some time, and is well-chronicled in *Putting Your Money Where Your Meter Is: A Study of Pay-for-Performance Energy Efficiency Programs in the United States*.[81] As discussed in the report, "Overall motivation for the P4P examples falls into five general areas: meeting EE or broader demand-side management (DSM) goals for energy savings, using EE as a resource on the grid, financing EE investments using cash flow from the energy savings, targeting specific sectors for EE savings, and developing an EE services market." A P4P program buys actual efficiency savings on an ongoing basis from market actors and aggregators. Previously, P4P relied on lengthy M&V processes to measure the impact of energy efficiency, which increased costs, thereby limiting the effectiveness for this approach. While market actors, utilities, and regulators are still gaining comfort with advanced M&V techniques (see section 4.2.2), this innovation has caused there to be renewed interest in P4P programs and the potential to unlock new benefits of this approach.

[81] Putting Your Money Where Your Meter Is: A study of pay-for-performance energy efficiency programs in the United States. NRDC. January 2017 (www.nrdc.org/sites/default/files/pay-for-performance-efficiency-report.pdf).



Energy Use Before and After Project Implementation with Counterfactual[82]

Competitive markets can animate industry when private companies can align potential profits with acceptable levels of risk. This is more difficult for regulated utilities who are investing ratepayer dollars, because they must ensure their investments are as cost-effective as possible. This dynamic forces programs to try to limit risk via heavy-handed upfront quality assurance, often limiting the potential of market animation by lengthening sales cycles and restricting deal flow. When states and utilities only pay for the value of realized energy efficiency, it frees the market to experiment with new models of delivering energy efficiency. P4P programs shift the risks and rewards for participants, utilities, aggregators, and regulators. They shift responsibility for obtaining energy savings from utilities and program administrators to market actors. This is effective for motivating persistent savings when the entity bearing the performance risk is responsible for installing and maintaining the energy-saving measures. This shifting of performance risk is critical because it aligns the market actor and aggregator profit potential with its realized savings over time, encouraging an ongoing relationship between participants and those parties to drive as much actual savings as possible.

The procurement method is a key component that will affect the impact of a P4P approach. Standard offer programs can be used in conjunction with P4P, and may be useful for initial implementation when pricing and risks are less understood, but auctions should ultimately result in more competitive pricing and innovation. A benefit of P4P with advanced M&V is that it does not force participants to focus on specific energy efficiency measures that are defined by the program administrator. Rather, market actors are free to experiment with different approaches to maximize their profit potential. As certain strategies show their effectiveness at creating profit, other companies will copy and augment those approaches to make them more effective, and drive costs down. Thus, in implementing a new P4P program, it makes sense to procure at regular intervals and to potentially change the procurement method once more data is available. This will

[82] Putting Your Money Where Your Meter Is: A study of pay-for-performance energy efficiency programs in the United States. NRDC. January 2017 (www.nrdc.org/sites/default/files/pay-for-performance-efficiency-report.pdf).

facilitate the participation of new companies and competitive pricing. In addition, procuring at regular intervals allows for prices to reflect changing geographic and temporal needs.

Another benefit of P4P with advanced M&V is it can increase confidence in the achievement of energy savings, unlocking the potential for energy efficiency to be employed more widely as a capacity resource for the electric power system. This new value stream would facilitate the creation of cash flows over time for third party aggregators, a critical component for market animation because it impacts bankability, as discussed in section 4.1. P4P programs with advanced M&V can be targeted to address particular types of savings (such as comprehensive retrofit projects with multiple energy efficiency measures and projects focused on behavioral and operational efficiency), specific locations, and/or system peaks with increased reliability. The accuracy of the baseline gets better over time with larger data sets and smart grids tracking electrons from creation to use, allowing administrators to continually improve programs, adjust portfolios based on evolving goals or market needs, and pilot innovative approaches.

P4P, with advanced M&V, may be a promising market mechanism that can enable scale and innovation while de-risking and minimizing the cost of acquiring energy efficiency over time for states and utilities. Traditional program implementers can continue to participate, but will have to compete with other aggregators in the market on a continual basis. Open competition drives innovation and cost reduction in a way traditional RFPs cannot. Transition to a flexible market driven approach will increase customer demand, reward innovation, and drive significant private capital investment to energy efficiency.

5.2 Sealed

Sealed is a start-up company based in New York that helps homeowners pay for home efficiency upgrades with their energy savings. With Sealed's HomeAdvance program, customers pay little to nothing out of pocket, and pay Sealed based on the amount of energy they save. Similar to a Power Purchase Agreement ("PPA"), Sealed is aligning financial reward with energy savings performance. Sealed calculates energy savings leveraging proprietary data, analytics, and software, which enables Sealed to effectively "guarantee" savings to customers and/or third parties (e.g. banks). While Sealed does not know how much an individual home will save, it guarantees a portfolio of energy savings using an actuarial approach.

Sealed works with local contractors that provide home energy consultations and construction services related to major efficiency retrofits (insulation, air sealing, HVAC, etc.). Contractors give customers the option to pay with their energy savings via the HomeAdvance program and work with Sealed to calculate the energy savings. Sealed customers receive a bill each month based on the energy they save, which is calculated based on past energy usage patterns and weather. Customers also have the option to consolidate their energy bills, with Sealed acting as a billing agent to pay the customers' utility bills on their behalf. If customers install additional efficiency improvements, Sealed invests additional capital in the home.

In 2016, Sealed partnered with the New York Green Bank to provide the upfront capital to customers. The Green Bank advances capital based on the expected energy savings, and is then paid back by customer energy savings payments. The Green Bank is therefore helping Sealed to animate the market by demonstrating the reliability of energy savings cash flows. In 2016, Sealed also partnered with several New York utilities, including two as part of REV Demonstrations (ConEdison Connected Homes Demonstration and Orange & Rockland Utilities Marketplace Demonstration). As part of these REV Demonstrations, Sealed is connecting with utility customers, and helping them solve comfort problems in their home that can be paid with their energy savings. Sealed pays the utilities (or their market partners) for these marketing services, providing a new revenue stream.

In 2017, Sealed received the first ever residential energy savings insurance policy from Hartford Steam Boiler, a large property insurance company owned by Munich Re. This policy enables Sealed to further reduce the risk of energy savings calculations to third parties, which should lower the cost of capital. Sealed is therefore demonstrating a private business model that requires no utility or ratepayer investments; however, participating in utility energy efficiency procurements would add another revenue stream and improve this business model. In the context of REV, Sealed's challenges are four-fold:

- Sealed's business is aligned with actual energy savings, but current rebates and incentives received by customers are based on project cost, not actual performance or price signals. Sealed is therefore not always able to reduce the cost sufficiently for customers, even if they are expected to save a lot of energy. This is especially true right now, as Sealed's cost of capital is higher due to the company's early stage.

- Sealed and their contractor partners have to deal with unpredictable program funding cycles rather than transparent pricing of negawatts based on the value of energy efficiency. This means there are unclear price signals being sent by utilities and NYSERDA regarding the value of energy savings, making it harder to target customers appropriately.

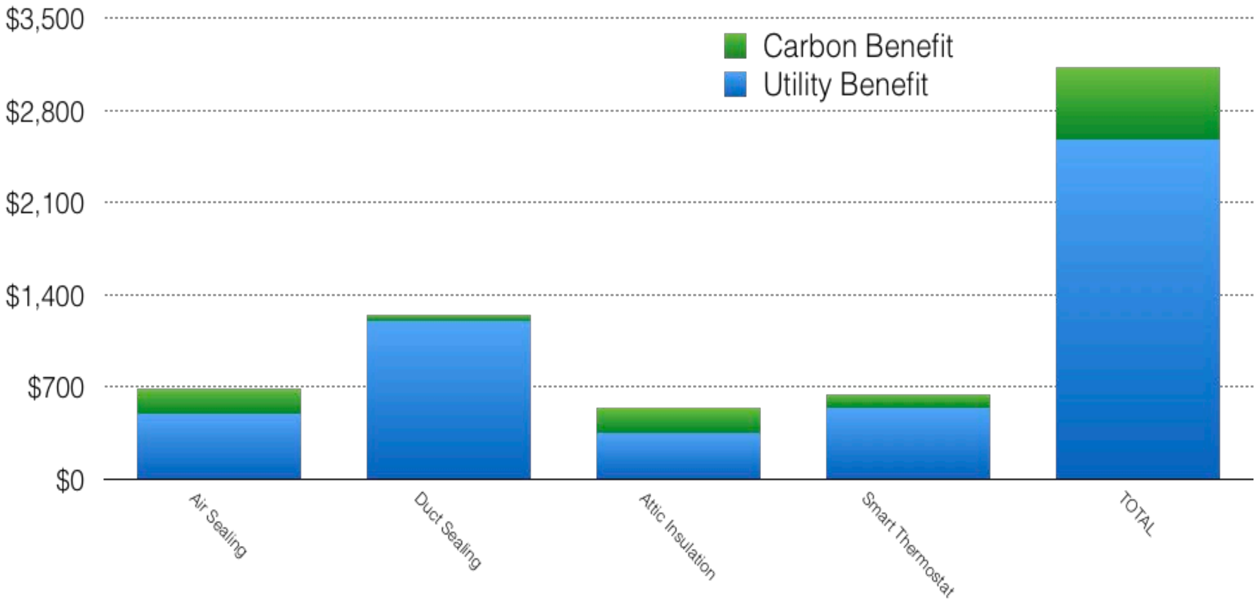
- Sealed's calculations rely on accurate historical energy usage information, which can be challenging for contractors to access easily. In addition, the Green Button protocol currently does not require actual versus estimate usage tags, thus forcing Sealed to create workarounds for each utility to obtain accurate energy usage data.

- Sealed's actuarial approach requires high quality data sets to accurately calculate energy savings. While Sealed has this data for many measures, it is difficult to obtain data on newer technologies (e.g. heat pumps) and non-traditional fuels (e.g. propane).

Sealed's business model is not dependent on utilities or efficiency procurement. Sealed offers value to customers based on their energy bill savings regardless of monetization of capacity, distribution, carbon, or other externality benefits. That said, the impact of efficiency procurement on a company like Sealed can be significant. The total utility value per standard BCA assumptions for a typical retrofit of a single-family home that heats with natural gas (e.g. air sealing, duct sealing, attic insulation, and smart thermostat) is estimated by Sealed to be approximately $3,000[83], or about half the cost of many retrofits. Even if that

[83] Electric capacity value based on Appendix C to the BCA Framework Order. Electric distribution savings based on the DPS spreadsheet, "LRACs for Electric-Gas for 2013-Inflation". Carbon value assumption is $27 per ton. Energy savings estimates based on the (upstate) TRM assumptions and typical retrofits performed by Sealed contractor partners. Discount rate is based on 5.5% utility discount rate and 3% societal discount rate, per the BCA Order.

amount is reduced based on transaction costs and risk, utilities should be able to cost-effectively invest $1500-$2,000 per typical home retrofit. Combined with Sealed's HomeAdvance program ($3000-$4,000 contribution per home), that means that most New York homeowners could receive a no or very low cost retrofit. Currently, that is only possible with homeowners that heat with oil, have very high energy usage, and/or receive low-income subsidies.



Carbon and Utility Benefits Resulting from Home Retrofits

Sealed is planning to expand within New York and beyond, creating jobs both at the company and with many contractors. Sealed's model also demonstrates the potential for the market to take on energy savings risk, thus potentially removing the need for ratepayers (current state of affairs) or utilities to bear this risk.

5.3 Lime Energy

Lime Energy is a national leader in providing utility clients with small-business-focused, pay-for-performance energy efficiency programs. Since 2009, through operation of small business direct install energy efficiency programs, Lime has provided NY State's investor-owned utilities with a reliable source of energy efficiency savings from an underserved market. Lime focuses on customer service excellence and have sought reductions in both project incentives and implementation costs for utility clients. Lime delivers energy savings through a customer-focused and technology-enabled program management platform with dedicated regional management and operations teams in Western NY, Central NY, and in the Hudson Valley. Lime brings a deep established ecosystem that includes the world's largest manufacturers and distributors of smart building products, along with a network of more than 100 installation contractors in NY. Lime's extensive body of work has enabled investment in the technology and processes needed to cost-effectively serve this challenging market, and has yielded over 15,000 small- and medium-sized business (SMB) energy efficiency projects per year.

Current State: Utility Pay for Performance Model

Lime's use of a *Utility Pays for Performance* (UP4P) compensation structure is at the heart of its operation. UP4P model mitigates the utility's risk associated with paying for program administration and implementation functions while not receiving directly proportional energy savings results. The utility is only invoiced for kWh (and DTH) delivered. Lime does not charge separate fees for administration, staff time, material, or customer energy assessments (audits). The utility procures system-wide energy efficiency for a maximum fixed price per unit (e.g. kWh) from this difficult to serve customer segment. Other utility programs in NY, operated by Lime competitors, have also adopted the UP4P approach.

Benefits of this approach include:

- **Cost Efficiency.** Over the last two years, Lime's rate-payer-cost efficiency gains with the SMB sector have been tremendous. Lime has reduced the incentive levels in NY State utility programs by over 25% over the course of 2016, and the company continues to reduce rebate levels while adding project financing options.

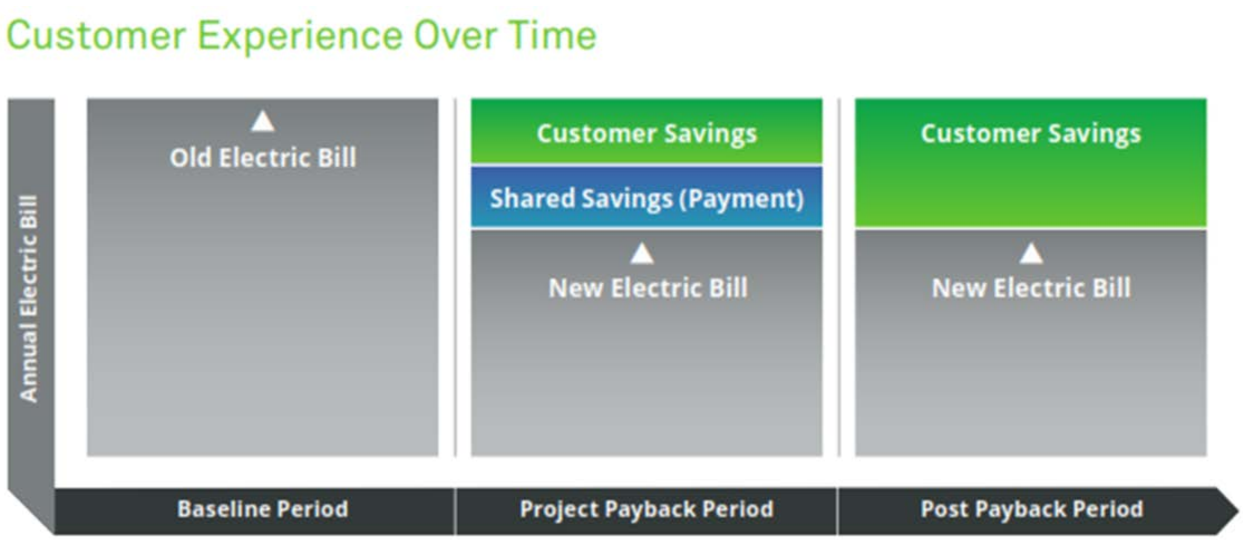
- **Deeper Market Penetration.** Under this model, Lime is fully financially motivated to exceed the energy savings targets provided. Lime manages the budget on a cents-per-kWh basis, so as many customers as possible are served.

- **Customer Satisfaction.** Lime makes certain the customer is pleased all the way through project completion and acceptance. Without a customer acceptance, the energy savings cannot be accounted for and billed to the utility.

- **Embedded Quality.** Lime is only paid for installed energy savings that pass inspection.

Lime has developed some new approaches for serving SMBs that are aligned with REV goals. Lime has begun proposing a "no money down" customer offering that will rely on third-party financing in conjunction with a relatively low utility rebate. Project costs will be paid back as the customer experiences the energy savings. The customer's "savings payment" will use advanced M&V based upon a pre-installation measured baseline and on-going post installation measurements using state-of-the-art, low-cost circuit level sub-metering. The use of sub-metering circuits with installed efficiency measures will not only determine the customer's savings payment but will also provide the utility with ongoing M&V analysis.

Under the standard small business direct install program arrangement, Lime contracts with customers on a fixed-price basis, applying utility incentives to lower the overall amount payable by the customer for the project. Estimated energy savings and simple paybacks are presented to the customer in the project proposal for informational purposes -- to persuade the customer of the economic value – but this information has no bearing on the project price. Lime is now testing a Customer Pay for Performance (CP4P) contract targeting small commercial customers. The energy savings presented in the customer proposal will be contractually guaranteed by Lime. Lime will market, scope, sell, finance, and perform the project, apply any utility buy-down funds. The customer will not be required to pay for any portion of the retrofit on an upfront basis, nor will they need to sign a project financing agreement. Instead – following the retrofit – the customer will be billed for measured, actual energy savings achieved, making monthly payments during the term of the CP4P contract. Beyond the CP4P contract term, they will own the equipment free and clear and benefit from the ongoing savings of the installation.

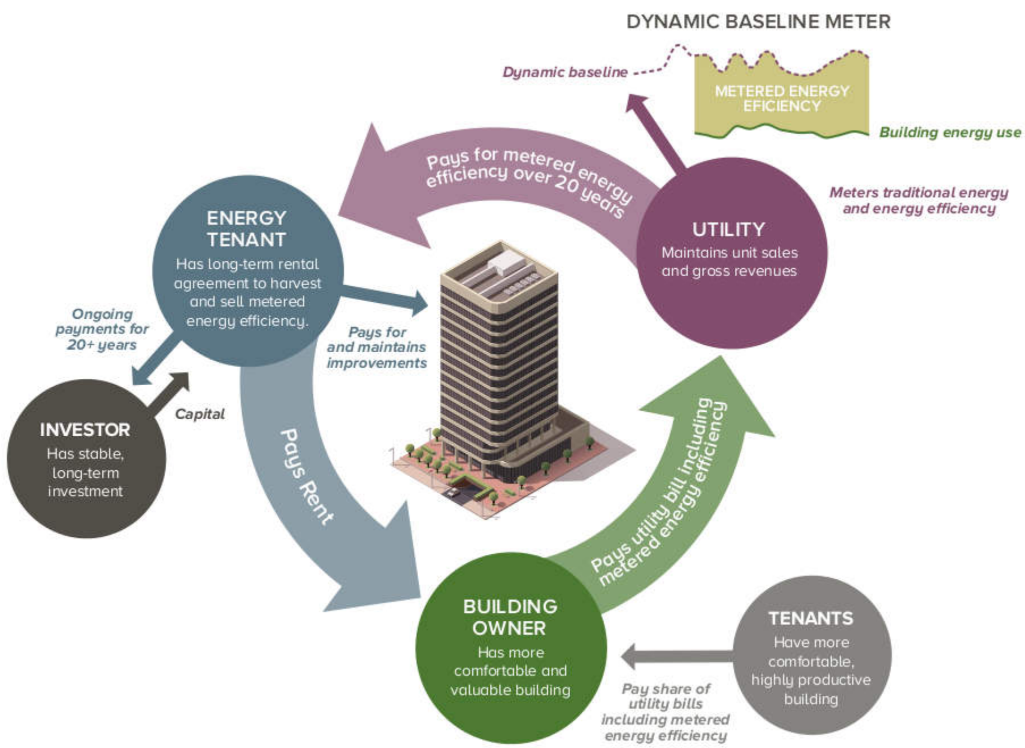


Pay-for-Performance/ Pay-through-Savings for the Customer

Lime has worked with a technology partner to develop a low-cost integrated package of circuit level sub-meters, data acquisition devices, and a cloud-based software solution -- in combination with a smartphone application for customer use. The solution is easy to install and minimizes disruptions for the customer's business. Lime has been testing the solution in partnership with utility clients in commercial facilities in New York and Ohio, and it is ready to be installed at scale. This advanced M&V technology solution would have two major potential impacts: 1) The data collected can be used to verify savings, compute a customer project performance report, and generate a bill for the payable portion of the savings; and 2) this process would eliminate the need for third-party consultants to perform complex sampling and modeling for M&V. The data collected through the solution can be used to verify savings on an empirical basis, particularly if the introduction of smart meters among these customers is going to take some time.

5.4 Metered Energy Efficiency Transaction Structure (MEETS)

Metered Energy Efficiency Transaction Structure (MEETS) is an innovative approach to aligning the incentives of all stakeholders for energy efficiency projects in commercial buildings. Retrofits in commercial buildings can generate significant energy savings over the life of the building (or the retrofitted equipment) and provide good returns on the initial investment. However, without opportunities for building owners, tenants, and utilities to benefit sufficiently from those savings, there is little incentive to drive the investment. Building owners only benefit from efficiency improvements while they own the building. If the payback is not within their planning horizon, they can simply pass on the energy costs to tenants, who often do not occupy a building long enough to realize the full value of savings.



How MEETS Works[84]

[84] http://www.meetscoalition.org/wp-content/uploads/HowMEETSWorks.jpg

As illustrated above, a MEETS transaction aligns incentives for these parties in a structure in which outside financiers can invest. At the center of the structure is the EnergyTenant™, which could be the building owner, utility, or a third-party entity that holds an energy tenancy or equivalent rights.[85] The EnergyTenant is financed by an investor to pay for and maintain energy efficiency retrofits to the building.[86] The investor also pays rental fees via the EnergyTenant to the building owner for using the facility as a vehicle to harvest energy efficiency savings. The utility bills the facility at retail rates for both the energy consumed, as well as the metered energy efficiency yield. In effect, the utility bills the facility for energy that would have been consumed without retrofits. The utility then makes monthly payments to the EnergyTenant for actual energy savings based on a long-term PPA. This payment then goes to the investor in return for the upfront investment.

The savings achieved are measured and tracked using DeltaMeter software, an advanced M&V approach. Based on a simulation model derived from monthly billing data and local temperatures over a year, it creates a "dynamic baseline" of what the energy consumption would have been without efficiency upgrades to calculate energy savings at future temperatures and occupancy conditions. The long-term PPA circumvents the principal-agent problem by enabling the value of energy efficiency to pass on if the facility's ownership or occupancy changes. It also provides additional benefits to the stakeholders in the following ways:

- **Utilities**
  The payment they make for savings under the PPA become progressively cheaper as retail rates rise. They only pay for savings that are delivered, and acquire a reliable, large-scale, location-specific resources for planning. In addition, if utilities themselves function as the EnergyTenant, they have opportunity to earn a regulated rate of return from the retrofit investments.

- **Investors**
  The investment produces a cash-flow that is long-term and reliable using well understood instruments like PPAs, or utility bonds and equities when utilities function as the EnegyTenant. They can also aggregate these investments into a portfolio for increased liquidity.

- **Building Owners**
  Building owners see the value of their asset rise without risking their own capital through outside investment and with no need to be involved in the energy business. They also earn additional revenue through the rental payments from EnergyTenant.

- **Regulators and ISOs**
  They can align the incentives between utilities, ratepayer advocates, environmental advocates, ESCOs, etc. and gain a long-term, reliable, location-specific, plannable, quantifiable resource.

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[85] MEETS: The Metered Energy Efficiency Transaction Structure. April 2016 (www.meetscoalition.org/wp-content/uploads/MEETS-AC-Description.pdf).
[86] Putting Your Money Where Your Meter Is: A study of pay-for-performance energy efficiency programs in the United States. NRDC. January 2017 (www.nrdc.org/sites/default/files/pay-for-performance-efficiency-report.pdf).

5.5 Joule Assets

Joule Assets has created an investment fund to target an often-overlooked gap in the EE market: small-to-medium-sized commercial retrofit projects, from $50,000 to $500,000. Joule manages the Joule Energy Reduction Asset (ERA) Fund, a $100m private equity fund that finances energy efficiency and demand response projects like HVAC, lighting, or energy management controls. Joule finances the contractors' energy efficiency installations, so that customers bear no upfront costs and are guaranteed savings. In addition, Joule also secures operations and management services from the contractor for their equipment, and provides ongoing management of the efficiency project including measurement and verification of performance. Depending on the contractor and customer, Joule offers multiple financing options, such as:

- Loan with fixed payment
- Service agreement with fixed payment
- Service agreement with guaranteed savings
- Service agreement with shared savings[87]

Joule Assets works with contractors that implement energy efficiency upgrades in small-to-medium commercial buildings. Joule's financing helps energy efficiency contractors support a pipeline of customers and allows them to scale up. Joule also provides guidance to contractors unfamiliar with the array of incentives and market credits, thus helping to monetize untapped revenue streams beyond just energy savings. These include:

- DR rebates and market payments
- Dynamic pricing tariffs
- Peak demand management

The financing contract is typically 3-5 years.[88] During this period, Joule and the contractor share energy savings and demand response revenue generated by each facility, above and beyond the guaranteed energy savings to the customer. If the estimated savings are not realized, ERA Fund is covered by a cash collateral account and the loss reserve that the contractor puts up. Joule retains title to the installed equipment as well as the right to replace a non-performing contractor. The ERA Funds expected base returns are 8-10%[89].

[87] Joule Assets, Integrated Utility Services Model, available at twitter.com/JouleAssets/status /583980531970347011/photo/1.
[88] Joule Assets, "Frequently Asked Questions" (www.jouleassets.com/faq).
[89] Joule Assets, "ERA Fund Overview" (era.jouleassets.com/erafund-overview/).

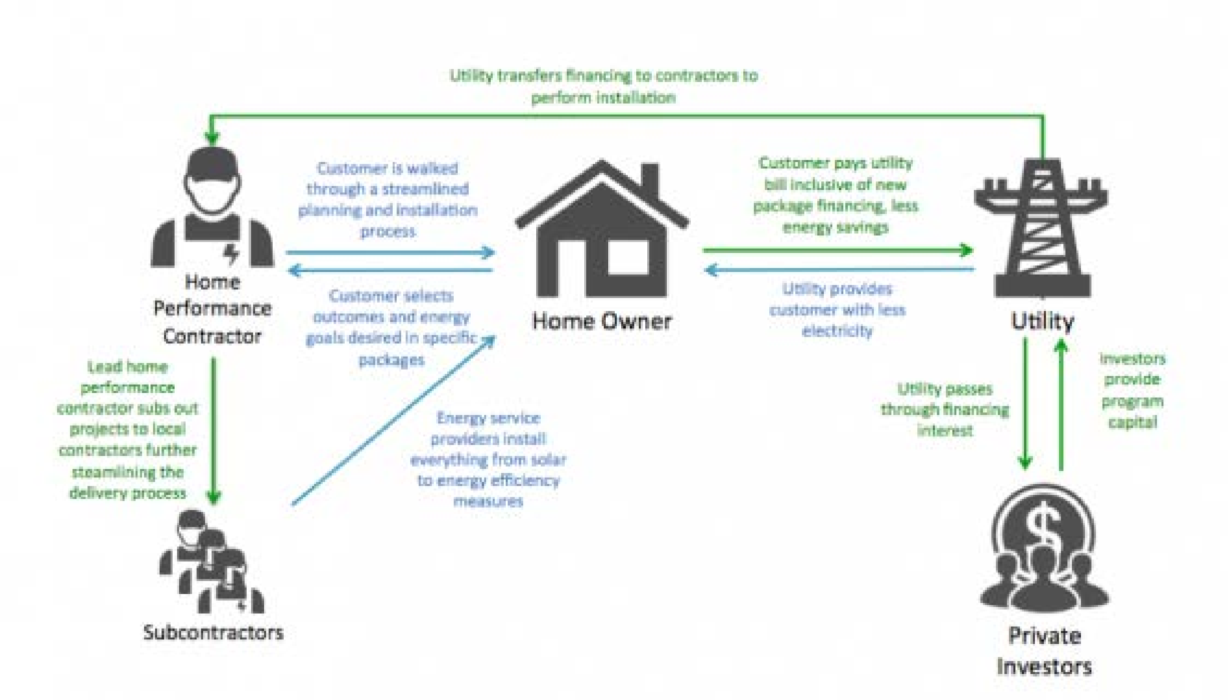

Diagram of an Integrated Utility Service Model: Joule Assets both acts as the private investor and secures funding for operations and management services from the home performance contractor or subcontractors.[90]

[90] Joule Assets, Integrated Utility Services Model, available at https://twitter.com/JouleAssets/status/583980531970347011/photo/1.

6 Energy Efficiency Procurement and Markets Recommendations

The CEAC EEPM Working Group has identified a set of principles that should underlie the implementation of any energy efficiency procurement mechanism and/or market approach, and specific actionable recommendations the Commission can pursue to move energy efficiency procurement and markets forward.

As explained more fully below, the Working Group has identified general principles that should guide the Commission, including: the prioritization of simplicity where appropriate and innovation when possible; retaining existing market actors while attracting new ones; and adding regulations over time based on lessons learned. The goal is to ensure a high-functioning and competitive market that may more accurately estimate the quantity of energy efficiency resources delivered as well as leverage more dynamic and other real-time pricing mechanisms.

6.1 Market Principles

1. Efforts should lead to decreases in energy consumption, improved system utilization, and reduced carbon emissions, relative to business as usual

Ultimately, the measure of success for market-based procurement is if it aids in the achievement of state policy goals, noted above. The working group believes that an action-oriented approach is critical to laying the foundation for potential energy efficiency market. In practice, this requires a willingness to proceed both quickly and incrementally. Our examinations of new procurement mechanisms and discussions with experts revealed that these approaches can be implemented side-by-side with existing energy efficiency portfolios. Further, given the need to advance in many areas at once, there was widespread agreement that the perfect should not be the enemy of the good in implementing new approaches. A deeper understanding of approaches that pair Pay for Performance (P4P) with meter-based measurement and verification and the applicability of different procurement methods is needed. This will come from experimentation, access to consumption and other relevant data, and coordinated efforts on the part of NYSERDA and the utilities.

2. Acquisition should be competitive and cost-effective, relative to the value created

Efficiency resource units should be acquired in a competitive and cost-effective manner relative to the value (system or societal) of the efficiency resource. This may mean that in certain applications, such as Non-Wires Alternatives (NWA) projects, efficiency resource units acquired from certain sectors, locations, or time periods may be more expensive, but should receive increased levels of compensation if they provide more value to the system. In addition, the level of risk undertaken by third parties should be accounted for in assessing costs and benefits. This will require effective oversight and an evolving price structure as more granular system data becomes available.

3. Procurement should minimize barriers for qualified market actors and new business models

A key goal of market-based procurement is to animate new business models that will increase innovation, and allow for more cost-effective efficiency resource generation in the long term. During initial development of market-based approaches, simplicity should be prioritized. Efforts should be made to minimize measure-level restrictions to enhance participation and the creation of new business models, while maintaining boundaries to prevent duplicative incentives. This approach has some risks and requires effective oversight to balance simplicity with minimum performance standards that will ensure the disqualification of market actors who attempt to manipulate the system and/or have consistently poor results. As lessons are learned, additional competitive dynamics can be added to achieve other goals.

4. Measurement of delivered efficiency resource units should be standardized to create market confidence

Confidence in delivered efficiency resource units is critical to delivering value to customers. Deemed savings, modeled savings, and M&V savings serve many sectors well. Nevertheless, they do not guarantee the same calculated savings result and may not optimally incent delivered efficiency as compared to a more performance-oriented approach. This creates uncertainty in the results of energy efficiency projects results, causing energy efficiency to be considered separately from other DERs, limiting confidence in energy efficiency as a grid resource, and limiting interest from capital markets. A promising innovation for some contexts (particularly where customers can be aggregated and averaged), is the use of meter-based data and standardized normalization mechanisms (advanced M&V). A deeper understanding of its applicability to various sectors and effective methods of regulation are critical to market development.

5. Procurement of efficiency resource units should aim for stability and consistency, so market actors can understand and manage risk

Market actors need transparent and reliable price signals to leverage private capital and generate efficiency resource units. Certainty is valuable at the macro level to signal to market actors to enter the New York market and/or hire employees with confidence that future jobs will not need to be cut after investments in the New York market are made. It is also valuable at the more granular project level to ensure that investors can raise capital for specific projects. Improvements can be made at both levels. Currently, while efficiency program budgets and goals are set as part of the regulatory process, program design can change drastically from year-to-year, creating uncertain and unreliable price signals to market actors with regard to the overall size of the market. At the project level, procurement mechanisms should provide enough certainty to make projects "bankable," meaning that they are able to provide a sufficient collateral, future cash flow, and probability of success to be acceptable to institutional lenders for financing. The goal of market-based approaches should be to remove uncertainty as much as possible at both levels, while providing data and structures that allow market actors to take on and manage risk, and maintain the ability to innovate in designing particular procurement approaches.

6.2 Actionable Recommendations

The principles above reflect the Commission's preference for increasing EE investments beyond existing programs with the objective of reducing the cost of achieving the State's energy goals, and to use innovative procurement mechanisms, business models, and third-party investment to attain greater EE savings. In examining various existing and new potential procurement mechanisms (including standard offer, RFPs, and auctions), the Working Group determined that each mechanism has pros and cons that make particular mechanisms better suited to different types of energy efficiency investments in different sectors.

However, the group agrees that auctions hold significant promise and need more testing. In the group's consideration of credit markets and new business models with pay for performance structures, the group determined that new near-term efforts should focus on the creation of standardized efficiency resource units. The group believes this could enhance the value of energy efficiency as a grid resource and sustainably drive scale in a REV-like manner. Advanced M&V and standardization efforts in this area present a potential pathway by which creation of the counterfactual case and resulting measurement of delivered efficiency can be automated in a consistent manner with an acceptable level of accuracy. However, this requires testing of concepts to establish use cases, compare different methodologies, and determine acceptable error bands.

The group's recommendations below reflect actions that should be taken to adhere to the principles developed by the group, actions that lead to testing of the concepts that may lead to standardized efficiency resource units, and regulatory changes that would increase market actor and investor confidence in the energy efficiency space and promote market-based valuation and acquisition and energy efficiency. It should be noted that the recommendations are not listed in order of priority. Following the recommendations is a chart that shows how the recommendations align with the established principles.

The following two recommendations do not require regulatory changes, and focus on Commission support of the principles outlined in the proceeding section.

1. The PSC should recognize the costs of inaction to society and the grid and consider directing utilities and NYSERDA to err on the side of action in moving to an efficiency procurement model based on robust third-party involvement and market prices based on the true value of the resource.

2. To help ensure the achievement of New York's clean energy policy goals, the PSC should consider directing utilities and NYSERDA to implement new approaches in tandem with existing models that have proven successful to prevent backsliding.

The following two recommendations do not require regulatory changes, and focus on utility actions to support innovative procurements of energy efficiency that engage a broad range of market actors.

3. Utilities should test new energy efficiency procurement mechanisms, such as auctions, utilizing assistance from NYSERDA when needed and appropriate.

4. As utilities develop new procurement practices, they should work on a coordinated basis to standardize all such practices to the extent possible. For example, pre-screening of market actors to qualify them for the bidding process could be done in a unified manner across service territories, and procurement schedules could be posted for all utilities on a single website where utilities also post non-wires alternative procurement information.

The following recommendation does not require regulatory changes, and addresses the question in the scope of whether a designated approach for EE procurement under the Clean Energy Standard (CES) is warranted or a distinct/compatible market.

5. The PSC should not attempt to create an energy efficiency credit market at this time, given the central importance and administrative burden associated with verifying savings under energy

efficiency credit markets and the ability for program loopholes to develop without robust regulatory oversight and proven M&V. *(See section 3.2.2 for further discussion)*

The following recommendations address testing innovative business models and advanced M&V methods on a smaller scale to answer questions around use cases, comparison of methods, and acceptable confidence intervals.

6. The PSC should consider directing utilities and NYSERDA to coordinate efforts to test Pay for Performance (P4P)-type program structures that use reviewable and replicable advanced M&V methods to estimate actual energy and/or demand savings. The pilots should be conducted in a variety of sectors and should provide payment for an extended term (beyond first year savings). The pilots should also employ various procurement methods with minimal subjective requirements, in an effort to include a robust variety of market actors. *(See section 5 for further discussion)*

7. NYSERDA, DPS, and utility staff should become active participants in advanced M&V standardization efforts.

The following recommendation addresses finalization of current regulatory efforts (data anonymization rules) that will support advanced M&V and new business models.

8. The PSC should prioritize finalizing privacy standards for aggregated whole-building energy usage data that is sufficiently anonymized to be shared with the public.

The following recommendations address near-term procurement of energy efficiency and evaluation under the BCA Framework.

9. Some members of the Working Group stress the need for a transparent calculation of energy efficiency value (the "Benefit" part of BCA) to help guide market actors on whether a utility will accept or deny a proposal/bid. These members request that the PSC consider development of a public energy efficiency value calculation tool, consulting both utilities and market actors to ensure practicality, usability, and efficacy. Since this calculation tool will not be available immediately, the PSC should consider publishing and consolidating existing relevant information on energy efficiency value in one place as a helpful guide to market actors.[91] *(See section 4.2.1 for further discussion)*

10. Business models that rely heavily on non-energy benefits to create value for customers are at a disadvantage with the current BCA Framework, because the full costs of improvements are included while non-energy benefits are not quantified. The PSC should review this issue and consider making changes or clarifications to the BCA Framework. Some members of the Working Group believe the PSC could resolve this issue by either removing customer costs from the BCA Framework or setting non-energy benefits at the same level as customer costs. *(See section 4.2.1 for further discussion)*

[91] Other members note that this tool may be limited in its usefulness, as utilities develop portfolios of EE and DERs that include multiple solutions in order to evaluate cost-effectiveness. Further, development of a program portfolio can be based on a variety of factors, including but not limited to, benefit cost analysis results. Also, the establishment of an "energy efficiency value" should be balanced with the need to foster a robust market with competitive pricing reflecting the true economic "hurdle" prices for various energy efficiency technologies.

These following recommendations refer to actions that move towards scaling up energy efficiency efforts, putting energy efficiency on a more level playing field with other distributed energy resources, establishing its value as a grid resource, and fostering investment in energy efficiency.

11. The PSC should consider evolving the regulatory treatment of the value of energy efficiency to be based on achieved savings to better reflect the measure or project life of various installations (e.g. 20 years for a new boiler) vs. first-year savings calculations when appropriate, which may better match long-term system needs. The PSC should also draw from utilities' efforts to establish more granular system values in other proceedings in order to reflect the fact that energy efficiency has different avoided distribution and capacity values depending on its associated system location and load shape.

12. We recommend that the PSC consider developing a clear framework for funding efficiency procurement that recognizes its value as an operational resource. Specifically, we recommend that it articulate general rules for cost recovery or value monetization in base rates, with clear direction as to when any deviations from this framework may take place in individual rate cases (i.e. a funding structure not dependent on specific rate cases). In addition, the PSC should send clearer market signals by establishing a centralized and unified framework to decide energy efficiency procurement funding rules, targets, and performance incentives out to 2030. Such a unified framework would be easier for market actors to follow, creating a simpler and clearer structure that would lower costs and enhance the success of all the procurement mechanisms we examined. *(See section 4.3 for further discussion)*

13. Some members of the Working Group stress that, consistent with Section 4.3's observation that any procurement mechanism ultimately requires a funding source to be implemented, the total dollar amount channeled towards energy efficiency investments is extremely important if New York wishes to cultivate a large and growing energy efficiency market. A cap on the amount of funds channeled towards energy efficiency threatens to arbitrarily limit New York's ability to scale up the energy efficiency market pursuant to its clean energy goals, particularly if such a cap prevents energy efficiency investments even where such investments are less costly than other utility investments and purchases that would otherwise have to be made. To that end, these members recommend that the PSC not provide any caps on energy efficiency investment ultimately included in rates, as long as this investment lowers customer bills on average.

EE Procurement and Markets Working Group Principles and Recommendations

Recommended Actions	Procurement and Markets Principles				
	Decrease energy consumption & emissions and improve system utilization	Competitive and cost-effective, relative to the value created	Minimize barriers for qualified market actors and new business models	Measurement is standardized to create market confidence	Stability and consistency, so market actors can understand and manage risk
The PSC should recognize the costs of inaction to society and the grid and consider directing utilities and NYSERDA to err on the side of action in moving to an efficiency procurement model based on robust third-party involvement and market prices based on the true value of the resource.	✓	✓	✓		✓
The PSC should consider directing utilities and NYSERDA to implement new approaches in tandem with existing models that have proven successful to prevent backsliding.	✓	✓			✓
Utilities should test new energy efficiency procurement mechanisms, such as auctions, utilizing assistance from NYSERDA when needed and appropriate.		✓	✓		✓
As utilities develop new procurement practices, they should work on a coordinated basis to standardize all such practices to the extent possible.			✓		✓
The PSC should not attempt to create an energy efficiency credit market at this time, given the central importance and administrative burden associated with verifying savings under energy efficiency credit markets and the ability for program loopholes to develop without robust regulatory oversight and proven M&V.				✓	✓
The PSC should consider directing utilities and NYSERDA to coordinate efforts to test Pay for Performance (P4P)-type program structures that use reviewable and replicable advanced M&V methods to estimate actual energy and/or demand savings.	✓	✓	✓	✓	✓
NYSERDA, DPS, and utility staff should become active participants in advanced M&V standardization efforts.				✓	✓
The PSC should prioritize finalizing privacy standards for aggregated whole-building energy usage data that is sufficiently anonymized to be shared with the public.	✓		✓	✓	✓
Some members of the Working Group stress the need for a transparent calculation of energy efficiency value (the "Benefit" part of BCA) to help guide market actors on whether a utility will accept or deny a proposal/bid. These members request that the PSC consider development of a public energy efficiency value calculation tool, consulting both utilities and market actors to ensure practicality, usability, and efficacy.	✓	✓	✓		✓
Business models that rely heavily on non-energy benefits to create value for customers are at a disadvantage with the current BCA Framework, because the full costs of improvements are included while non-energy benefits are not quantified. The PSC should review this issue and consider making changes or clarifications to the BCA Framework.	✓		✓		
The PSC should consider evolving the regulatory treatment of the value of energy efficiency to be based on achieved savings to better reflect the measure or project life of various installations (e.g. 20 years for a new boiler) vs. first-year savings calculations when appropriate, which may better match long-term system needs.	✓	✓			✓
We recommend that the PSC consider developing a clear framework for funding efficiency procurement that recognizes its value as an operational resource.	✓	✓		✓	✓
Some members of the Working Group stress that, consistent with Section 4.3's observation that any procurement mechanism ultimately requires a funding source to be implemented, the total dollar amount channeled towards energy efficiency investments is extremely important if New York wishes to cultivate a large and growing energy efficiency market.	✓	✓		✓	✓