Public Comments to NJ BPU Draft Energy Master Plan

Martha Merrill, Uplight

September 16, 2019

The draft Energy Master Plan includes ambitious and worthy goals, but achieving them simply will not happen without a demonstrated commitment to applying the most state of the art technology and management. The draft EMP, and more specifically, the State's unwillingness to listen to the experience of DSM technology providers and inability to quickly act on 2018's clean energy legislation puts this commitment in doubt.

I represent Uplight, a technology company that enables utilities to deliver world class consumer engagement experiences to get the most out of grid modernization and behind the meter resources. Uplight is first and foremost dedicated to creating a more sustainable future. With over 85 utility clients serving 40 states and 5 nations, and reaching over 110 million residences and businesses, we are experts in deploying DSM technology to deliver an energy consumer action system. Our specific offerings include behavioral energy efficiency, personalized direct messages and consumer energy portals, customer marketplaces, demand response management systems, and energy analytics. These solutions engage, activate, and orchestrate consumer energy actions.

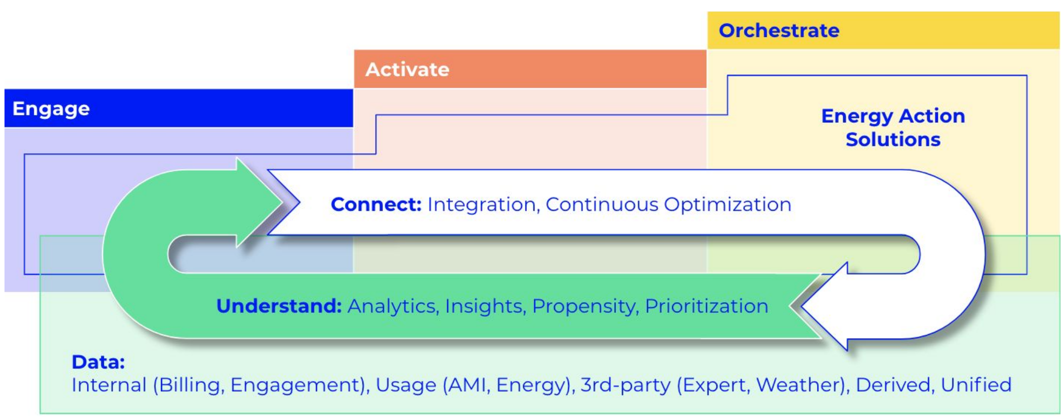

Figure 1. Best Practice for an Energy Action System (Source: Uplight)

Experts from ACEEE, EPRI, IEA, and McKinsey all agree 30 to 40% of carbon abatement will come from energy efficiency, with additional gains from demand flexibility and integrating renewables. New Jersey is well positioned to realize these reductions. The Legislature has provided the right legislation. The New Jersey utilities, including the largest in the state, demonstrated an unprecedented commitment to implementing it. Stakeholders including environmental advocates and technology solutions providers have stepped up to participate with public comments and private outreach.

But you're not going to achieve the goals laid out if the Plan ignores two critical points: (1) the opportunity from the integration of grid modernization, demand response, and energy efficiency and (2) the need for clarity on EE program administration.

(1) Integrate Grid Modernization, DR, and EE

Integrated energy efficiency and demand response programs take advantage of customer acquisition and operational synergies to reduce costs and speed up deployment of key distributed energy resources. BYOT programs reach 5% to 30% of available smart thermostats; Uplight's point of sale DR program enrollment rates are above 80%. AMI allows for more personalized and impactful behavioral energy efficiency programs through data analytics, and a better consumer experience. ACEEE's recent review of integrated EE/DR programs expands upon the benefits of integration and presents findings and recommendations that can help the BPU chart a path towards integration of these programs in New Jersey.

Figure 2. EE/DR Program Integration Provides Range of Benefits (Source: Uplight)

(2) Clarify EE Program Administration

Uplight recently commissioned the Brattle Group (see Attachment) to research and analyze the performance of various energy efficiency administration models. The working draft of this analysis shows the relative strengths of each model and finds that incentives like decoupling especially impact effectiveness of EE programs. Due to these findings, we suggest that the BPU implement utility-led programs incentivized by decoupling.

The BPU has the legislative direction, thanks in part by groups such as NRDC, Environmental Defense, and ACEEE, but has failed to approve PSE&G's proposal to implement this system, now 11-months old.

	Program Administrator		
Relative Strengths:	Utility	State	Third Party
Focus singularly on EE			✓
Align EE program with state policy goals		✓	✓
Integrate EE program with broader DER deployment	✓		
Acquire new customers at low cost	✓		
Design EE program to meet specific system needs	✓		
Independently compile customer data and analytics	✓		
Consolidate administrative functions across jurisdiction		✓	✓
Respond quickly to evolving industry/customer needs			✓
Direct accountability/transparency	✓		✓

Figure 3. Program Administrator Strengths (Source: The Brattle Group).

Now is the time to act. The climate crisis continues to march forward. Last week, we had an unprecedented 7 hour workshop with presidential candidates where 6 of those candidates discussed the benefits of energy efficiency. Clearly this is an urgent issue, and it's frankly unacceptable that we have no clarity a year after the largest utility filed its plans. New Jersey and the BPU have all of the pieces to achieve success, but you need to restructure this process to ensure that success.

We ask the BPU bring the most knowledgeable and innovative voices together across all the efforts to develop and execute plans for rapidly investing in greenhouse gas reductions - not only in offshore wind and solar, but also in EE, DR, and grid modernization. This needs to be done so that the rhetoric of the goals is matched by the reality of execution.

Thank you.

Public Comments to NJ BPU Draft Energy Master Plan
Martha Merrill, Uplight
September 16, 2019

Attachment: Energy Efficiency Administrator Models

uplight

Working Draft

Energy Efficiency Administrator Models

RELATIVE STRENGTHS AND IMPACT ON ENERGY EFFICIENCY PROGRAM SUCCESS

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September 16, 2019

THE Brattle GROUP

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- Authors are grateful for their discussions with Rachel Gold of ACEEE and the peer review of Drs. Ahmad Faruqui and Nicholas Powers of The Brattle Group. Authors also acknowledge the valuable research assistance support by Jesse Cohen, Kathryn Haderlein Sai Shetty and Matthew Witkin of The Brattle Group
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Executive Summary

Energy efficiency is the nation's third-largest electricity resource, employing 2.25 million Americans and typically providing the lowest-cost way to meet customers' energy needs.[1] Energy efficiency will be a vital component of the formula for success as more cities, states, and regions set increasingly ambitious clean energy goals and carbon reduction targets.[2] Given that low-hanging fruit has already been picked in terms of EE in many jurisdictions and the proliferation of clean energy plans that are making EE an important instrument in their quest, there is a need for a different approach to EE and more innovative programs targeting deeper savings. There is also a need for a fresh look at the EE program administration and delivery steps, different models and incentive mechanisms for entities undertaking these steps and more broadly developing a coordinated approach for planning and integrating distributed energy resources, as meeting ambitious clean energy goals will require improved coordination across the energy ecosystem.

In this report, we review four types of EE administrator models that have emerged across jurisdictions, with a focus on the relative merits and complementary aspects of these different models. These are: i) utility administrator model; ii) state/government administrator model; iii) third party administrator model; and iv) hybrid model. We discuss each model's structural advantages and limitations, as well as the experiences in various U.S. jurisdictions to date to provide some insight into the effectiveness of each administrator model. A brief summary, which we elaborate on in Section II.C, is as follows:

Utility Administrator Model

- Utilities have an established role as EE program administrators. Pre-existing relationships with EE industry contractors and customers, as well as access to detailed customer data on load and bills can benefit utilities when designing and implementing EE programs. Utilities can effectively integrate EE programs with broader DERs (including demand response, behind the meter generation and storage, and IoT device management) and grid modernization deployment and design the program to meet specific system needs.
- However, utilities may suffer from misaligned incentives. Our study shows that presence of conducive regulatory treatment, such as decoupling and performance incentive measures, is effective in addressing the incentive problem and improving EE savings performance.

1 EE has other key benefits such as improving air and water quality, strengthening grid resilience, promoting equity, and improving health and comfort.

2 As of May 2019, over 120 cities and 5 states have committed to 100% clean energy goals. See Sierra Club - 100 Percent Clean Energy: The New Normal.

Third Party Administrator Model

- Third parties have the unique advantage of being able to singularly focus on EE programs and outcomes. Their business model is designed to be compatible with public policy goals and they are potentially more flexible to meet evolving industry and customer needs. A single third party is typically responsible for statewide EE programs and achieve some efficiencies relative to separate utility administration.
- However, this comes at the potential expense of systemic synergies in branding, customer acquisition and engagement, data analytics, and across the meter integration, which are typically utility strengths.
- It may take time for a third party to build up industry and customer relationships previously cultivated by the utility, and even once the third party is established certain functions such as management of funds, other functions (such as measurement and verification) may need to remain with other entities to ensure proper treatment.

State/Government Administrator Model

- State/government administrators can integrate EE programs in context of other public policy goals such as decarbonization and bring spotlight to the EE programs, identifying best practice and providing room for innovative approaches, investing in workforce development, highlight economic development benefits, and educating consumers.
- State control of ratepayer funds intended for EE programs can be susceptible to redirection towards other state budgetary needs. The state may also have less existing expertise on EE program administration which takes time and resources to build up and maintain.
- State programs are the most difficult to integrate with utility programs, though it has been accomplished in a few jurisdictions after transition to the state administrator model.

Hybrid Administrator Model

- Hybrid models can leverage strengths of both utility and third-party or state entities, each of which can focus with greater clarity on its assigned responsibilities. Competition between entities can potentially lead to a greater diversity of approaches to EE.
- The arrangement does impose a greater administrative burden on the regulator and may be overall more costly to administrate given that two entities are working in parallel. Close coordination between administrators (either directly or through the commission) and a high level of collaboration between entities are key to reducing inefficiencies and enabling innovation in this model.

Table 1 and

Table 2 provide a preview of our comparative summary of strengths and weaknesses across the various administrator models.

Table 1: Program Administrator Strengths

Relative Strengths:	Program Administrator		
	Utility	State	Third Party
Focus singularly on EE			✓
Align EE program with state policy goals		✓	✓
Integrate EE program with broader DER deployment	✓		
Acquire new customers at low cost	✓		
Design EE program to meet specific system needs	✓		
Independently compile customer data and analytics	✓		
Consolidate administrative functions across jurisdiction		✓	✓
Respond quickly to evolving industry/customer needs			✓
Direct accountability/transparency	✓		✓

Table 2: Program Administrator Weaknesses

Relative Weaknesses:	Program Administrator		
	Utility	State	Third Party
Potentially misaligned incentives	×		
Inability to provide robust EE program infrastructure and retain staff		×	
Subject to political pressures and budget expropriation		×	
High transaction costs		×	×

Given that energy efficiency programs have a direct influence on utility revenues, it is important to ensure that utilities' incentives are aligned with the objectives of the EE programs. Being important players in the EE ecosystem and the ones with direct communication channels with the customers, utilities' true buy-in for the EE programs is essential. Therefore, an exercise to gauge the effectiveness of alternative EE administrator model would be incomplete if the presence or lack of incentives were not brought into the picture. For that reason, we review various regulatory inventive mechanisms available to utilities across the US to address program cost recovery, lost fixed cost recovery and performance incentives and incorporate these mechanisms into our quantitative analysis.

When exploring a complex phenomenon such as the effectiveness of EE administrator models on the EE program performance, data summaries and tabulations fall short in providing a complete picture. This is because it is not possible to present all other drivers that are also affecting the EE performance. Therefore, we have performed a regression analysis to properly account for all drivers of EE that are associated with the success of EE programs implemented during the past six years for the 50 states and the District of Columbia, including the impact of different EE administrator models on program success. ***Our findings indicate that it is not so much the administrator model but rather regulatory incentive mechanisms (specifically, decoupling and performance incentive mechanisms) that are associated with strong EE performance. Other drivers such as a long term and credible commitment to energy efficiency program pursuit by states, which manifest themselves in ambitious savings goals and dedicated funds for EE programs, also have a significant impact on state progress towards EE savings.***

A few of our key takeaways from the research and analysis undertaken in this study are:

- All administrator models have certain strengths and weaknesses. Each jurisdiction should weigh these strengths and weaknesses and decide which model is likely to yield the least-cost and most sustainable framework for administering and delivering EE programs.
- While energy efficiency administrators play an important role in effective program budget setting, management, and in some cases execution of the EE programs, utilities' full support and pursuit of these initiatives plays a key role in the success of these programs (even when the utility is not itself the EE program administrator). More specifically, utility incentives should be aligned with the goals of the EE programs by providing them with certain and timely program cost recovery, eliminating risk of lost revenue (decoupling), and providing ways to improve their earnings in the form of performance incentive mechanisms.
- Our results suggest that while energy efficiency model administrators are important for effective implementation of energy efficiency programs, no single model is associated with better EE performance, as measured by annual EE savings. What seems to matter most is the availability of full decoupling, performance incentive mechanisms, and having a state level energy efficiency goal. These three drivers collectively highlight the importance of a state's commitment to a long-term energy efficiency agenda and enabling utilities such that they have the right incentives to help and be partners in achieving that agenda.
- Given that incentives policies have more of an impact than the administrator model on EE program success, then perhaps it makes the most sense to leave EE administration functions with the "default" entity (the utility in most instances). At least in jurisdictions that have not already implemented a different model, it would require a significant amount of start-up cost and transition time to establish a new entity (third party or state administrator) that does not already deal with electricity customers.

I. Introduction

Energy efficiency is the nation's third-largest electricity resource, employing 2.25 million Americans and typically providing the lowest-cost way to meet customers' energy needs.[3] Energy efficiency will be a vital component of the formula for success as more cities, states, and regions set increasingly ambitious clean energy goals and carbon reduction targets.[4] Jurisdictions aiming for 100% clean electricity face a steep challenge in an environment of growing transportation and building electrification (especially if the same jurisdictions are also making efforts to decarbonize other sectors of the economy).[5] Energy efficiency, being among one of the least expensive alternatives to meet growing electricity demand, is also becoming an essential means to reduce overall load growth and reduce peak demand.[6] Moreover, use of energy efficiency as an effective non-wires alternative (NWA) is gaining more traction to avoid or defer costly distribution system investments.[7]

While some jurisdictions have established specific targets for reducing consumption, others assign a centerpiece role to energy efficiency in the context of broader Clean Energy Acts. For instance, New Jersey's recent Energy Master Plan is built around a suite of several overarching strategies such as accelerating renewable energy and distributed energy resource deployment; reduction of transportation sector energy consumption and emissions; maximizing energy efficiency and conservation and reducing peak demand. The plan emphasizes that energy efficiency targets are vital not only to reducing energy consumption but also to reducing costs for ratepayers even as infrastructure investments proceed under other aspects of the plan such as grid modernization. The New Jersey plan includes energy efficiency targets of at least 2% in the electric center and 0.75% in the natural gas sector by 2024.[8]

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3 EE has other key benefits such as improving air and water quality, strengthening grid resilience, promoting equity, and improving health and comfort.

4 As of May 2019, over 120 cities and 5 states have committed to 100% clean energy goals. See Sierra Club—100 Percent Clean Energy: The New Normal.

5 For estimates of the load growth implications from transportation and building electrification, see The Brattle Group, *Electrification: Emerging Opportunities for Utility Growth*, January 2017, p. 2.

6 EPA, *National Action Plan for Energy Efficiency Report*, July 2006, p. 6-5.

7 The Brooklyn Queens Demand Management (BDQM) Program was designed to address sub-transmission feeder overload projected at 69 MW by summer 2018. 52 MW of load reductions were to be achieved through non-traditional utility-side and customer-side solutions, including energy efficiency, demand response, and distributed generation technologies. Consolidated Edison Company of New York, *Brooklyn Queens Demand Management Program: Implementation and Outreach Plan*, January 29, 2018, p. 4.

8 *Draft 2019 New Jersey Energy Master Plan: Policy Vision to 2050*, June 10, 2019, p. 18.

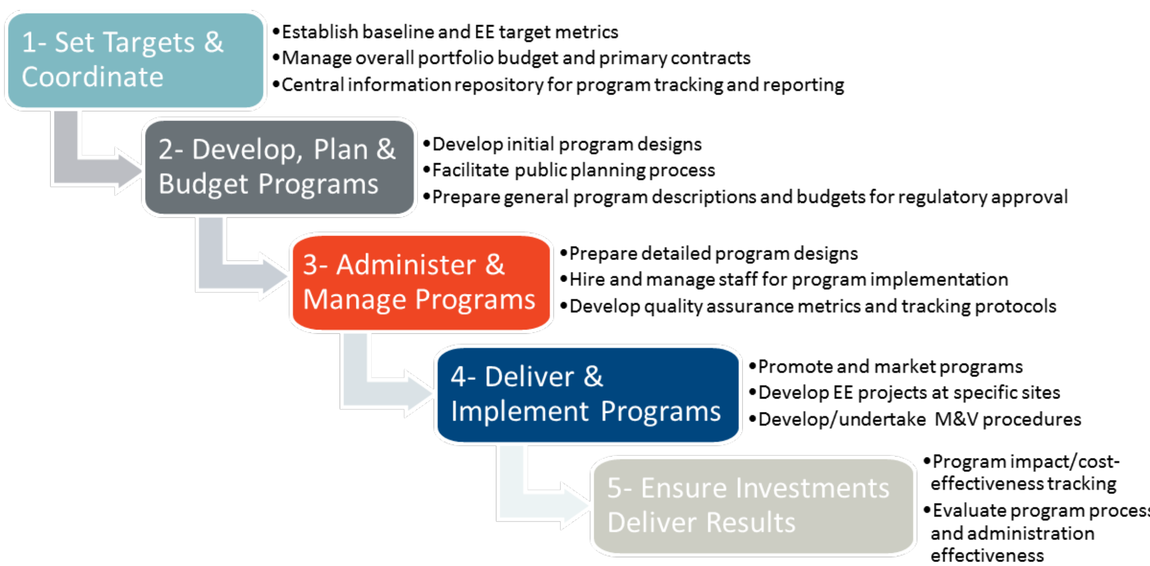
Continued on next page

The United States has a long history with energy efficiency: the energy intensity of the US economy decreased from 12.1 thousand Btu per dollar in 1980 to 6.1 as of 2014. ACEEE attributes about 60% of this improvement to increased energy efficiency.[9] EPRI estimates 740,985 GWh of cost-effective EE economic potential from 2016 to 2035, representing 16% of baseline retail sales in 2035.[10]

Historical achievements in conservation were mostly accomplished by market transformation, codes and standards and successful energy efficiency programs run by utilities, states and third party administrators. Given that low-hanging fruit has already been picked in terms of EE in many jurisdictions and the proliferation of clean energy plans that are making EE an important instrument in their quest, there is a need for a different approach to EE and more innovative programs targeting deeper savings.

There is also a need for a fresh look at the EE program administration and delivery steps, and different models for entities undertaking these steps. "Administering" energy efficiency programs is a multi-stage and multi-faceted undertaking (see Figure 1). While it is possible for an entity to carry out all steps of EE program administration, different entities may also play a role ranging from setting energy efficiency targets to designing and delivering those programs, and to measuring impacts. Figure 1 presents the steps involved in the administration and delivery of energy efficiency programs.

Figure 1: Elements of Energy Efficiency Program Administration and Delivery



Source: Based on Blumstein *et al.* (2003), p. 5.

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9 ACEEE, *35 Years of Energy Efficiency Progress, 35 More Years of Energy Efficiency Opportunity*, June 30, 2015.

10 EPRI, *State Level Electric Energy Efficiency Potential Estimates, Technical Update*, May 2017, p. 3-1. "Embedded" EE refers to anticipated savings from future energy efficiency programs and market-driven energy efficiency.

Continued on next page

Energy efficiency administrators are primarily responsible for the proper use of the public and ratepayer funds supporting the EE programs. While they may also undertake other functions in the EE program lifecycle described above, they typically do not undertake all of the functions and share responsibilities with the other entities based on the prescriptions of the policy makers.[11]

In this report, we review four types of EE administrator models that have emerged across jurisdictions, with a focus on the relative merits and complementary aspects of these different models. These are: i) utility administrator model; ii) state/government administrator model; iii) third party administrator model; and iv) hybrid model. We discuss each model's structural advantages and limitations, as well as the experiences in various U.S. jurisdictions to date to provide some insight into the effectiveness of each administrator model. We also undertake a quantitative analysis to identify the factors that are associated with the success of EE programs implemented during the past six years for the 50 states and the District of Columbia, including the impact of different EE administrator models on program success. While our dataset is limited to the 2012-2017 time period and does not encompass the complete history and evolution of EE programs in many states, our findings are still robust and consistent with our *a priori* expectations.

While other researchers have explored the similar questions in the past (see Section II.B for a literature review), revisiting them is warranted as many states and cities are making increased commitments to clean energy targets, including a central role to be played by energy efficiency. To reach these targets, it will be important for jurisdictions to develop a coordinated approach for planning and integrating distributed energy resources, especially as customers are also evolving to take a more active role in their energy consumption choices (often with assistance from the utility or a third party).

We note that the current set of business models does not necessarily circumscribe the full range of entities or interactions among entities that might be beneficial to the "energy efficiency ecosystem". It is quite plausible that the new energy era will require a model in which different entities jointly design, administer, and deliver energy efficiency programs and each lead the area where their comparative advantage lies. For instance, there could be opportunities/roles for merchant EE companies to share some of the program delivery functions with the utilities or third party administrators through an RFP process and meeting well-defined needs.[12] This is already happening in several jurisdictions such as Texas, New York, and California, but is still limited in its scale and scope.

It is also likely that the importance of the administrator model is over-shadowed by other important drivers such as a long term and credible commitment to energy efficiency program

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11 Carl Blumstein, *et al.*, "Who Should Administer Energy-Efficiency Programs?," Center for the Study of Energy Markets, University of California Energy Institute, August 2003.

12 We consider EE providers to be "merchant" if they gain business through direct relationships with customers, payments earned from wholesale electricity markets, or via competitive solicitation process. For example, in Texas, utilities administer EE programs through project sponsors that customers themselves elect.

pursuit by states, which manifest in ambitious savings goals, dedicated funds for EE programs and providing proper incentive mechanisms for the agents administering and/or delivering the EE programs. Section III will explore this hypothesis.

II. Energy Efficiency Administrator Models

A. Overview

Prior to restructuring, the administration, design, and delivery of ratepayer-funded energy-efficiency program activities were largely the responsibility of utilities, operating within the context of an Integrated Resource Planning process that was overseen and governed by state regulators."[13] Restructured states reconsidered prior models for energy efficiency (EE) administration and sought to find models better suited to the needs and requirements of new operating environment. Some states implemented alternative models in which state agencies, non-profit corporations, or independent third party agencies administer EE programs.

Decision to adopt one of these administrative structures has been mostly driven by the regulatory history of the state and perception towards utilities' incentives and commitments to pursue energy efficiency programs as effectively as their other core functions. Energy efficiency programs can largely be categorized into two groups: i) those directed towards maximizing near term savings and useful for resource acquisition perspective; ii) those that facilitate market transformation. Utilities in restructured states have traditionally been relying on energy efficiency as part of their integrated resource plans and there were concerns about how utility incentives would change towards energy efficiency once they do not have to implement IRPs anymore. Moreover, it was perceived that utilities were not able to internalize the benefits of market transformation related energy efficiency programs and would have muted incentives to pursue these programs as a result. Finally yet importantly, there was the longstanding incentive problem in which reducing sales is in conflict with utilities' growth and sales based business models. Despite mechanisms to align incentives (such as decoupling, rate basing of program expenses, etc.), these considerations led some states to question utilities' commitment to energy efficiency as a core function. This has brought about the search for alternatives such as State Administrator Model, Third Party Administrator Model and Hybrid Models.

The ever-growing importance of energy efficiency in the resource mix has led various researchers to investigate the relative effectiveness of each of these models in delivering effective and long-lived energy efficiency programs. Below, we review some of this literature and highlight important findings.

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13 Blumstein *et al.* (2003).

B. Literature Review

According to Blumstein *et al.* (2003), "no single administrative structure for energy-efficiency programs has yet emerged in the US that is clearly superior to all of the other alternatives," and "this is not likely to happen soon for several reasons." This is partially because policy environments differ widely between states, and the "structure and regulations of the electric utility industry differs among the regions of the US."[14] State policy environments both define EE administrators' capabilities and affect the perceived and actual financial disincentives of utilities to promote energy efficiency. As Blumstein *et al.* (2003) notes, large utilities are well-suited to EE program administration if resource acquisition becomes a primary strategy because they have easy access to both customers and suppliers. However, if market transformation is a primary objective, "the targets are not customers but are suppliers like appliance or equipment manufacturers or intermediaries like lenders and retail product distributors." Blumstein *et al.* indicates that if the joint pursuit of resource acquisition and market transformation become exceedingly important, there may be more arrangements where "a single-purpose regional agency administers market transformation programs and utilities or non-utility entities (either state agencies or non-profit corporations) administer resource acquisition programs."[15]

Harrington (2003) finds that "the more robust ratepayer funded efficiency programs are less the result of administrative structure *per se*, than the clear and consistent commitment of policy makers."[16] Both utility administer and third party administer models can work well, and it is most important to consider "responsiveness to PUC direction, regulatory performance incentives that are property constructed and implemented, staff competency, sustainability of the institution and its budget sources, and, link to system planning decisions."[17] However, Harrington (2003) does state that the state administrator model is a "weaker third choice" as state agencies are less likely to be able to maintain the required flexibility to be effective efficiency entrepreneurs, especially for market transformation programs. Additionally, state-run programs are more susceptible to political pressures that are unrelated to EE goals.

Sedano (2011) has found that more robust rate-payer funded efficiency programs result from a clear and consistent commitment of policy makers to the energy efficiency goals instead of resulting from one particular type of administrator model. The study indicates that utility administrator model and third party administrator models can work equally well in most jurisdictions provided that the system is set up well, incentives are aligned, and there is strong commitment to an objective. They also indicate that state administrator model is a weaker third choice mostly due to state government agencies' vulnerability to external events that might shift the focus away from the energy efficiency programs. Sedano (2011) also indicate that there is a

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14 *Ibid.*

15 *Ibid.*

16 Cheryl Harrington (The Regulatory Assistance Project), *Who Should Deliver Ratepayer Funded Energy Efficiency*, May 2003.

17 *Ibid.*

need for a reliable academic study that gauges the effectiveness of different models in delivering robust EE savings. In terms of the qualitative factors to consider when comparing the success of alternative administrator models, they identified the following factors: ability to focus on markets and customers; staff competency; sustainability of the institution and its funding; properly constructed incentives that align objectives with actions; ability to support the market/adapt to changing market conditions and link to system planning and investment decisions.

In an evaluation of state EE programs targeted at utilities, Theel and Westgaard (2017) recommended several key actions for successful EE programs. Firstly, they recommend a combination of decoupling and Energy Efficiency Resource Standards (EERS) policies. They found that a policy environment in which IOUs have EERS and decoupling is associated with a 9.7 percent reduction in residential electricity consumption per customer. A combination of EERS and lost-revenue adjustment mechanism ("LRAM") is a "second-best policy option"; they find policy environment in which IOUs have EERs and LRAM is associated with a 4.2 percent reduction in residential electricity consumption per customer.[18] Additionally, Theel and Westgaard (2017) advocate for a more accurate reporting of utility energy savings and additional empirical research on EE policies and best practices. They also note the importance of considering the political realities of each state and then planning how to work with stakeholders on key energy efficiency policies.

C. Alternative EE Administrator Models

The energy efficiency administrator model in effect in any given state is determined by legislative and/or state regulatory commission decisions. No single administrator model is necessarily superior to the others in all aspects of the EE deployment. There are potential strengths and weaknesses for each of these models, and idiosyncrasies of administrators among states likely have a great deal of impact beyond the administrator model they operate under.

We discuss each of the administrator models in turn (utility, third-party, state, and hybrid), focusing on potentials strengths and weaknesses with each one. We also provide a few examples of each model in the Appendix that provide color to the manner in which different jurisdictions operate under these models and the progress that each jurisdiction has made towards its EE targets. Figure 2 presents the U.S. landscape in terms of different EE administrator models adopted by individual states.

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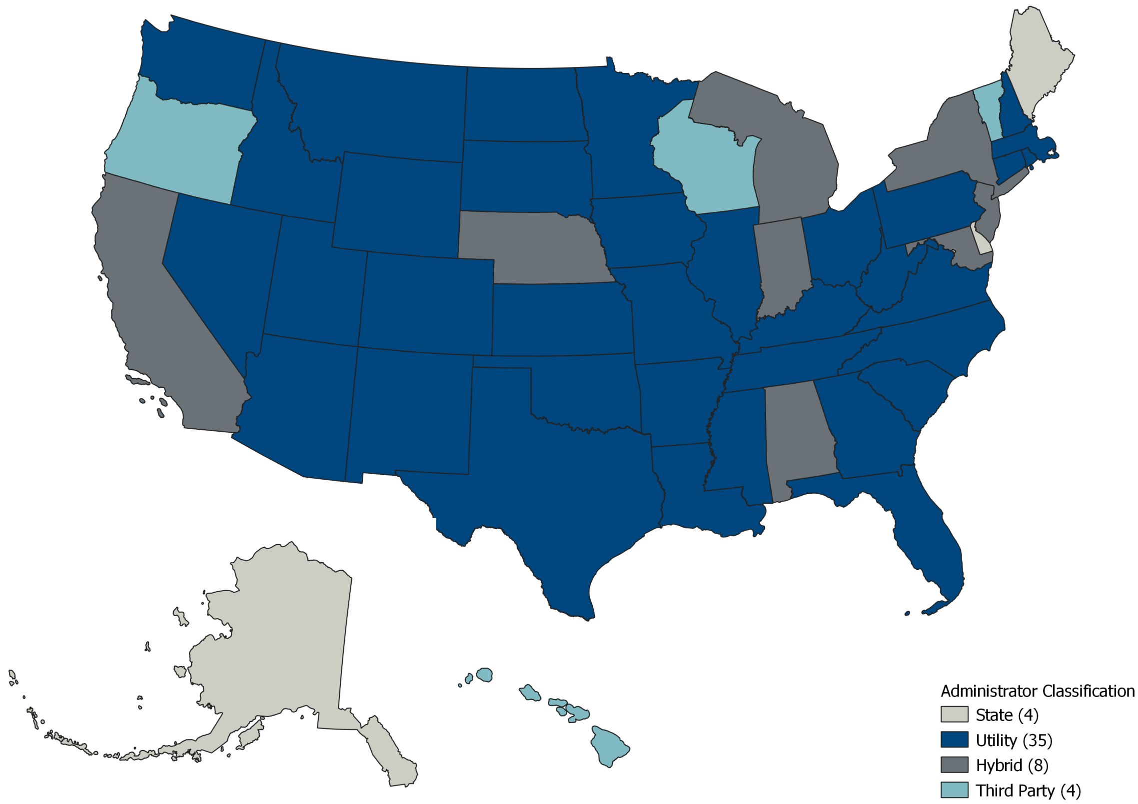
[18] Shauna Theel and Andreas Westgaard, *Moving Toward Energy Efficiency: A Results-Driven Analysis of Utility-Based Energy Efficiency Policies*, Harvard Kennedy School, prepared for Opower, March 28, 2017.

Figure 2: Energy Efficiency Administrator Models, by State



Source: The Brattle Group. Based on Richard Sedano, *Who Should Deliver Ratepayer-Funded Energy Efficiency? A 2011 Update*, RAP (2011); with verification and adjustment based on review by ACEEE subject matter expert.

1. Utility Administrator Model

In 35 states, the utility serves as the energy efficiency program administrator. Utilities' existing relationship with customers based on their fundamental role of operating the electric distribution system makes them a logical choice for administering EE programs. Utilities can also pursue EE programs within the context of broader integrated resource planning, evaluating EE against supply-side generation alternatives. For states with unbundled utilities, cost-effectiveness tests to screen EE programs for system benefits can still be applied. Under both models, utilities collect EE program funding from ratepayers through customer bills.

While the utility is responsible for administering, designing and delivering the programs, state regulatory commission typically approves and oversees all EE program design, budgets, and fund collection mechanisms. Budgets are usually set by statute, and the utility will design programs within this budget. Savings targets are also increasingly set based on jurisdictional policy goals at the state or city level. The utility may be required to deliver annual reports to the state regarding their EE program activities and achievements.

a. Potential strengths of the utility administrator model

Given utilities' established role as EE program administrators, they have the benefit of having well-developed infrastructure, staff, and industry connections (*e.g.*, with contractors) for being able to design and deliver EE programs. They also typically have the benefit of being a "trusted brand" by the customers, which leads to a more effective customer acquisition process.

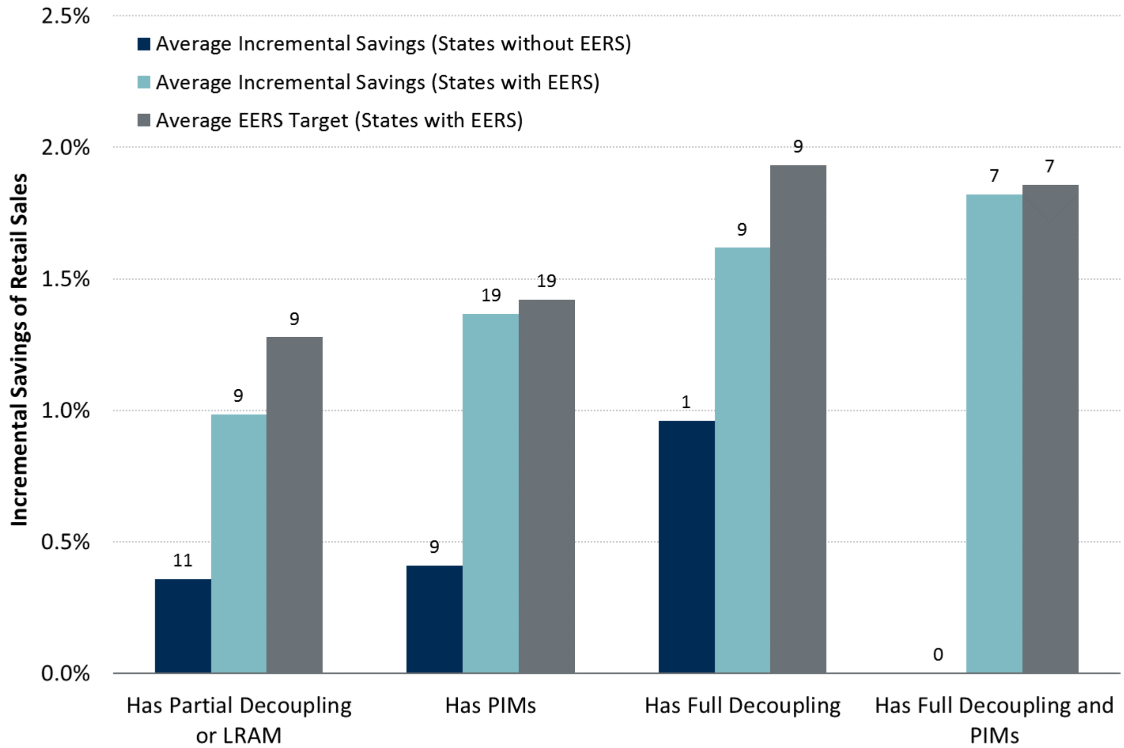
Having access to detailed information on customer usage profiles, utilities can use their funds to design more cost effective programs by targeting customers with the largest potential to deliver savings. More specifically, they can utilize advanced data analytics for more granular customer segmentation, especially in jurisdictions where AMI has been deployed.

Utilities can also design and deliver targeted EE programs that address local system needs by avoiding or deferring investments. Moreover, since utilities are responsible for system planning functions (integrated resource plans or distribution system plans), they can effectively integrate EE programs with broader DERs (including demand response, behind the meter generation and storage, and IoT device management) and grid modernization efforts. However, these economically efficient outcomes will only emerge if incentives for the utility are properly structured.

b. Potential weaknesses of the utility administrator model

The main concern around utility administration of EE programs is that reduction of electricity sales and required infrastructure buildout is at fundamental odds with the utility business model under traditional regulation: EE programs threaten utility revenues. This incompatibility can be circumvented by policies such as program cost recovery, partial or full decoupling and performance incentive mechanisms (PIMs). Program cost recovery is the minimum condition for a utility's pursuit of energy efficiency. Partial decoupling allows the recovery of revenues that were lost but specifically as result of energy efficiency programs while full decoupling dissociates sales from revenues regardless of the source of the driver. While program cost recovery and decoupling addresses the "disincentive" to pursue energy efficiency programs, PIMs provide the "incentive" to deliver successful energy efficiency programs by rewarding (or sometimes penalizing) utilities based on how well they meet certain targets. Figure 3 shows that the best savings performance is achieved by states that have both full decoupling and PIMs, and that the presence of PIMs seems to have moved achieved savings closer to the EERS targets.

Figure 3: 2017 Average Incremental Savings by Incentive Mechanism



Source: The Brattle Group. Analysis of the ACEEE State Energy Efficiency Scorecard (2016–2017) and SNL RRA Regulatory Focus (2016–2017)

Another potential drawback for utility administrators is that utilities are under a great deal of pressure and scrutiny to use consumer dollars carefully, and may not be as flexible to respond to changing markets, technologies, and best practices as other administrators. As with the incentive issue discussed above, such challenges can potentially be addressed through innovative regulatory treatments that allow utilities more flexibility in their spending while being held to performance metrics and associated revenues/penalties (*e.g.*, achieved EE savings).

2. Third-Party Administrator Model

Some states have chosen to transfer the administration of ratepayer-funded EE programs to independent entities on the basis that these entities focus more directly on energy efficiency than utilities are able to. Third-party administrators are well established at this point in a few states, although the model differs somewhat from state to state (see case studies in the Appendix for more detail). For example, in Vermont the state has transferred the responsibility of energy efficiency administration to Efficiency Vermont, an "energy efficiency utility" (EEU), through a long-term franchise model, whereas Oregon's Energy Trust of Oregon (ETO) is an independent non-profit trust.

a. Potential strengths of the third party administrator model

The third-party model exhibits essentially the flipside of the advantages and disadvantages of utility model discussed above: the main strength of third-party administrators is the compatibility of their business model with broader public policy goals. In the cases of Oregon and Vermont, the desire to eliminate utilities' mixed financial incentives drove the creation of a separate entity whose sole business would be energy efficiency.

Another strength of the third-party administrator model is that a single entity can take responsibility for EE programs statewide, rather than leaving it to a few/several utilities working separately. The third party can thereby help achieve certain organizational and administrative efficiencies and take a larger portfolio approach when administering, designing and deploying EE programs. As the power sector and its customers continue to evolve, the focused business model and greater flexibility that third parties have relative to utility administrators may allow them to respond to changing needs and opportunities to realize all cost-effective EE savings.

b. Potential weaknesses of the third party administrator model

If EE program administration were transferred to an independent third-party entity in any jurisdiction, it would require the new administrator to build up customer relationships and industry connections previously under the exclusive purview of the utility. As with states that have already transitioned to third parties, there might be some period of hybrid operation or trial period during which the third party is wholly responsible but understands that EE administration could be transferred back to the utilities in the case of poor performance. Eventually giving more permanent responsibility to third-party administrators help promote focus and coordination for long-term planning. However, it will likely still be important for the utility to help support EE programs delivered by the third party, possibly by providing data on customers. The utility maintains a connection and relationship to its customers and can influence the effectiveness of EE programs. The electric utility's resource planning may be done in conjunction with the third party administrator, as part of an iterative process where EE deployment plans and system planning are developed together.

As with utility administrator model, the third party is typically held accountable to the state commission for reporting and performance. Measurement and verification processes may be undertaken by another separate entity to ensure objective performance reporting. Management of funds collected from ratepayers and expended by the third party administrator may also go through a separate fiscal agent—the intent with such a construct is to keep the funds within the utility system and under supervision of the regulator rather than in the hands of an independent entity. If the third party does not have full access to customer usage information, they will be at a disadvantage to the utility when administering EE programs.

3. State Administrator Model

In the state administrator model, the state agency, energy office, public utility commission, or an entity out of a state agency administers EE programs directly. Generally, the programs are created as part of a single- or multi-year strategic plan that the utility commission approves. State agencies then deliver the EE program services themselves, through utilities or through contractors. The regulator plays a smaller role for state administrators than it does for utilities or third parties—the EE program oversight function moves at least partially to a legislative committee. The state administrator may still maintain some accountability to the state utility commission for effective program performance.

a. Potential strengths of the state administrator model

As many EE policy goals are developed at the state level, state EE administrators are in principle ideologically aligned with achieving state energy policy goals. The state government can help pursue the energy efficiency-related goals in context of broader energy policy objectives such as decarbonization, as well as other customer-focused and state economic goals (*e.g.*, reducing electric bills, serving low-income customer segments, etc.). State administrators could also be very effective in undertaking several other EE functions such as benchmarking, dissemination of information, workforce development and development of high-risk high-value projects that may not be compatible for utilities' preferred risk profiles. The New York State Energy Research and Development Authority (NYSERDA) is a great example for a state agency playing this role. NYSERDA offers information and analysis, programs, technical expertise, and funding aimed at helping New Yorkers increase energy efficiency, save money, use renewable energy, and reduce their reliance on fossil fuels.

b. Potential weaknesses of the state administrator model

However, certain jurisdictions that have relied on the state administrator model have become skeptical of it because of conflict over the use of ratepayer funds. Statutes can be laid out to reduce the risk, but the reassignment of energy efficiency funds to cover deficits existing elsewhere within the state budget is a significant concern when the funds are managed through a state-held account.

The state administrator may also lack the agility of a third-party or an utility administrator. Especially in an age of rapidly evolving markets, the state may have less insight into customers' needs and demands around energy usage than do other administrators. To some extent this can be mitigated through the creation of a separate agency subject to different procurement rules than other state entities as for example in Maine, discussed in the Appendix. Moreover, accountability for program success is less likely to be a driving factor for state administrator models as state agencies typically don't have explicit performance targets or revenues at risk that may result from poor performance.

4. Hybrid Administrator Model

Some states have chosen to implement hybrid models, under which there is a role both for the utility and for the government or a third-party entity in administering energy efficiency programs. Each jurisdiction's hybrid model is somewhat different, but in general the intent of the split responsibility is to assign certain customer segments or aspects of EE program administration to the entity deemed better-positioned to address them. For example, in Maryland, Illinois, and Michigan, low-income energy efficiency programs are assigned to just one administrator type (state administrator in MD and IL, third party in MI), and utilities administer other programs. The commission still typically provides oversight in terms of approving program plans and holding each of the administrators accountable for achieving EE savings targets.

For each of the individual entities involved in EE program administration, the same advantages and drawbacks discussed above still apply. However, the hybrid model introduces another layer of potential benefits and concerns that arise as the different administrators work in parallel or in competition with each other.

a. Potential strengths of the hybrid administrator model

A key benefit of the hybrid model is that each administrator can focus with more clarity on the subset of EE program scope that it has been assigned. This is particularly important for programs that apply to customer segments with distinct needs, such as low-income customers. The utility and state/third party hybrid model usually involves the entities working in parallel, but can also put them in competition with each other. When they compete with each other, a benefit of the hybrid model is that it fosters a diversity of approaches to energy efficiency by allowing more than one entity to develop and implement programs.

b. Potential weaknesses of the hybrid administrator model

The flipside of allowing more than one EE program administrator is the potential for their approaches to be at odds with or not fully complementary to each other. Overlapping administrators can create an extra burden for the commission to coordinate. In general, the model is more administratively intensive than any of the models with responsibility assigned to a single entity, because each administrator must develop and implement its own programs, while both potentially coordinating with the other administrator and being held separately accountable to the commission. Communication between the two administrators is also important to reduce frictions and possible redundancies.

5. Comparative Summary

Review of each of the administrator models and their attributes indicate that there is no single administrator model that is superior to the others in all dimensions. Table 3 and Table 4 outline the relative strengths and weaknesses, respectively, of the utility, state, and third party administrator models. The hybrid model will exhibit characteristics of the utility and either state or third-party model; although it may also foster a greater diversity of approaches to EE, it is likely more costly than either of the separate component models.

Given that each model has its own strengths and weaknesses, we consider it useful to analyze actual energy efficiency performance data, and assess whether any of the administrator models are associated with stronger EE savings performance compared to the other models. We undertake this analysis in Section IV.

Table 3: Program Administrator Strengths

	Program Administrator		
Relative Strengths:	Utility	State	Third Party
Focus singularly on EE			✓
Align EE program with state policy goals		✓	✓
Integrate EE program with broader DER deployment	✓		
Acquire new customers at low cost	✓		
Design EE program to meet specific system needs	✓		
Independently compile customer data and analytics	✓		
Consolidate administrative functions across jurisdiction		✓	✓
Respond quickly to evolving industry/customer needs			✓
Direct accountability/transparency	✓		✓

Table 4: Program Administrator Weaknesses

	Program Administrator		
Relative Weaknesses:	Utility	State	Third Party
Potentially misaligned incentives	×		
Inability to provide robust EE program infrastructure and retain staff		×	
Subject to political pressures and budget expropriation		×	
High transaction costs		×	×

III. How do the Energy Efficiency Incentive Mechanisms Fit in?

As we discussed previously, energy efficiency has become an important resource in utilities' resource mix and is playing an increasingly important role in long-range utility plans. Several states have instructed utilities to pursue all cost-effective energy efficiency, after developing energy efficiency potential studies and defining multi-year savings targets to achieve the identified potential over a defined time period.[19] Moreover, its importance is expected to increase further, as many states are encouraging utilities to rely more heavily on distributed energy resources and non-wires alternatives. All of these efforts intend to moderate rate increases in the long term by focusing on lower cost solutions, lead to more environmentally responsible outcomes, and provide customers with more choice.

While the energy efficiency administrator model plays an important role in meeting these targets in terms of effective program budget setting, management, and in some cases execution, it is also important to have utilities' full backing for these initiatives (even when the utility is not itself the EE program administrator). Gaining this support depends on fair/incentivizing policies and ratemaking mechanisms. More specifically, there are three challenges raised by the traditional cost-of service model that need to be addressed in order to align utility incentives for more effective implementation of energy efficiency programs:[20]

i. **Need for certain and timely cost recovery:** utilities will not have an incentive to fully pursue DSM opportunities if cost recovery is uncertain or delayed, which would have a negative impact on earnings.

ii. **Risk of lost revenue:** an effective DSM portfolio would reduce the sales below the levels used to calculate the revenue requirement. This implies that the collected revenues would not be able to cover both the fixed costs and give the utility a reasonable opportunity to earn its allowed returns. This is sometimes called "throughput incentive" because utilities traditionally increase their earnings by selling more electricity.

iii. **Providing ways to improve earnings:** cost recovery is the minimum condition, but not sufficient for the full pursuit of DSM opportunities. DSM investments should provide additional earning opportunities tied to performance, similar to supply side investments.

Fortunately, there are well-established mechanisms to mitigate each of these challenges and they are presented in Figure 4, as the building blocks of an effective DSM policy.[21]

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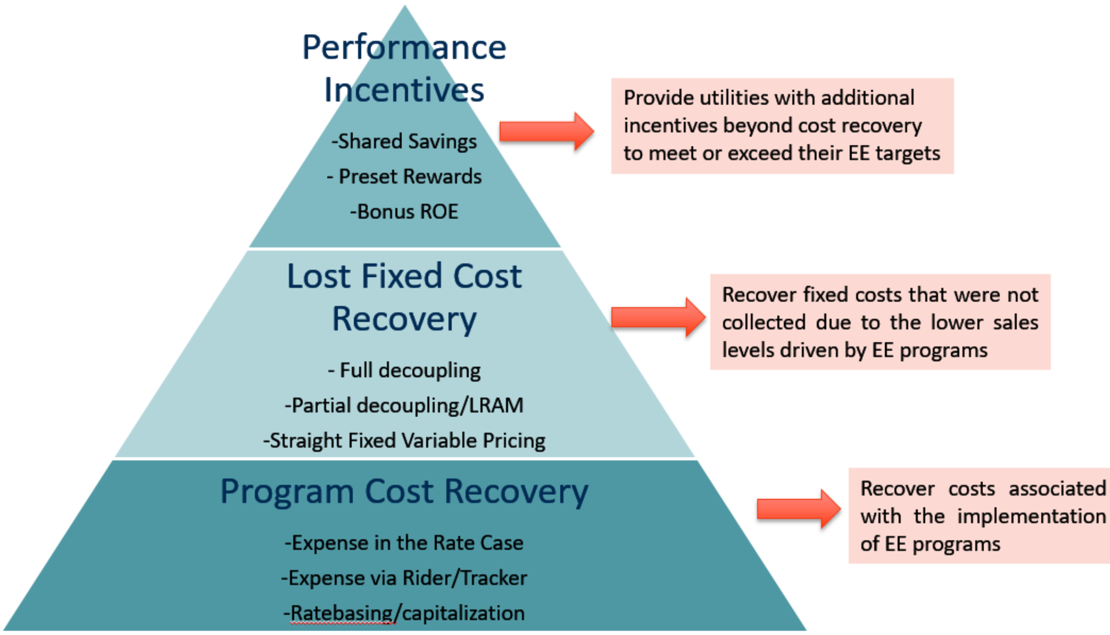
[19] These states are: California, Connecticut, Maine, Massachusetts, Rhode Island, Vermont, and Washington. Gilleo, Annie (ACEEE), *Picking All the Fruit: All Cost-Effective Energy Efficiency Mandates*, Sumer 2014, p. 8-76.

[20] While these challenged mainly apply to utility administrator model, they are also applicable to other administrator models where the utilities are involved in the design or delivery of the EE programs. Even in the case of a third party model, utilities can improve or decrease the effectiveness of EE programs based on how much information they share regarding their customers and how much friction they might create in the absence of properly structured incentives.

[21] See for a detailed discussion of these mechanisms: Cleveland, Dunning and Heibel, "State Policies for Utility Investment in Energy Efficiency," April 2019, National Conference of State Legislatures.

Figure 4: Building Blocks of an Effective DSM Policy



Source: The Brattle Group (2018).

Program cost recovery is the foundational block and a necessary mechanism for utilities to recover costs that are associated with supporting, administering, and/or delivering EE programs. Ratebasing EE program costs is a more favorable cost recovery mechanism, however its application is currently limited, only being allowed in five states.[22]

Lost fixed cost recovery mechanisms are widely utilized across the U.S. Full decoupling breaks the link between utilities sales and revenues, and allow the rates to be adjusted up or down to ensure that the utility earns its approved revenue requirement. Full decoupling does not investigate the cause of the gap between actual and allowed revenues, and adjusts for all potential factors such as economy, weather and DSM initiatives. On the other hand, lost revenue adjustment mechanism (LRAM), is one form of partial decoupling which adjusts utility revenues only for the reduced sales due specifically to energy efficiency programs. While LRAM addresses utilities' concerns about lost sales due to EE, it doesn't fully address the throughput incentive (*i.e.*, utilities profits would still increase with higher sales). This feature of LRAM differs from full decoupling: under full decoupling, the utility would return the excess revenues (beyond the approved revenues) to the customers, in the form of lower rates.

Performance incentives tie rewards and/or penalties to specific areas of utility performance, such as energy efficiency program outcomes. Unlike the other two mechanisms discussed, which are developed to address disincentives, performance incentives actually provide incentives for utilities to improve their EE program implementation performance.

22 These states are Illinois, Maryland, New Jersey, New York, and Utah.

Given that energy efficiency programs have a direct influence on utility revenues, it is important to ensure that utilities' incentives are aligned with the objectives of the EE programs, even when they are not the administrators of these programs. Being important players in the EE ecosystem and the ones with direct communication channels with the customers, utilities' true buy-in for the EE programs is essential. Therefore, an exercise to gauge the effectiveness of alternative EE administrator model would be incomplete if the presence or lack of incentives were not brought into the picture. In the next section, we investigate the impact of alternative EE administrator models on EE program performance, taking into account various incentives that might accompany these administrator models.

IV. Quantifying the Effectiveness of Different Models in Delivering Successful EE Outcomes

In this section, we undertake a regression analysis to determine whether any of the administrator models adopted in US states are associated with stronger EE performance. We measure "EE performance" by using "annual EE savings as a percentage of total load served". After considering other alternatives such as budget spending per MWh saved; percent achieved of State's EE goal and a few others, we eventually decided that annual savings variable represents the "yield" of managing/administering EE funds effectively. There are of course many other factors explaining annual EE savings achieved in a given state other than its administrator model. This is precisely why we decided to undertake a regression analysis as opposed to just presenting various cross tabulations of the data with respect to administrator models. By running a regression model, we are able to control for the influence of the other important factors explaining EE performance and isolate the impact of administrator models. These other factors, along with the details of our dataset will be explained below.

It is important to note that what we are capturing with our regression analysis is a six year snapshot in the EE journeys of various states. Given that some states (such as California), has a much longer history with and long-standing commitment to EE, our annual savings variable may be understating their true performance over the years. However, based on our sensitivity analyses, these states still stand out in terms of their EE performance and continue to serve as relevant observations for the study.

In order to undertake this analysis, we built a comprehensive dataset for each of the US states and over the 2012-2017 time frame. We present this dataset below.

A. Data and Methodology

In order to study the impact that various administrator models may have on EE savings, we compiled a panel data set containing state-level information for all 50 US states and the District of

Columbia for the period from 2012 to 2017 (inclusive). The dependent variable is EE savings, measured as a percent of annual utility retail sales. For independent variables, we include categorical variables for administrator models and regulatory incentive mechanisms, and continuous variables to capture individual states' commitment to EE. We also include variables to control for the impacts on the dependent variable from state economic activity, electricity price, restructuring status, and a time trend.

Table 5 details the six categories of variables included in the regression model:

Table 5: Regression Variables

	Variable Category		Variable(s)	Variable Type
[1]	Dependent Variable	[a]	EE Savings %	Continuous
[2]	EE Administrator Models	[b]	Utility	Binary
		[c]	Government	Binary
		[d]	Hybrid Model	Binary
		[e]	Third Party	Binary
[3]	EE Incentive Mechanisms	[f]	Decoupling	Binary
		[g]	LRAM	Binary
		[h]	PIM	Binary
[4]	EE Commitment	[i]	EE Spending (as % of revenue)	Continuous
		[j]	EERS Goal %	Continuous
[5]	State Level Economic Activity	[k]	GDP Per Capita	Continuous
		[l]	Electricity Price	Continuous
[6]	Other	[m]	Restructuring Status	Binary
		[n]	Year Trend	Discrete

Sources & Notes:

[a]: Report EE Savings - ACEEE State Energy Efficiency Scorecard (2012 - 2017); State Energy Sales—US Energy Information Agency Form EIA-861.

[b]–[e]: Richard Sedano, Who Should Deliver Ratepayer-Funded Energy Efficiency? A 2011 Update, RAP (2011).

[f]–[j]: ACEEE State Energy Efficiency Scorecard (2012 - 2017).

[k]: State GDP from US Department of Commerce/Bureau of Economic Analysis; state Population from US 2010 Census.

[l]: US Energy Information Agency Form EIA-861.

[m]: US Energy Information Agency. See http://www.eia.gov/electricity/policies/restructuring/restructure_elect.html from December, 2016.

[n]: Indicates progression of years, *i.e.*, 2012 is 1, 2013 is 2, *etc.*

1. **EE Savings**: The dependent variable in our regression model is defined as the ratio of annual energy savings in a state to the total energy sales in that state for a given year. We define this as a percentage to allow for comparison among states with different levels of sales.
2. **EE Administrator Model**: Our primary variable of interest in this quantitative exercise, this indicates the type of administrator model in use in a given state.

3. **EE Incentive Mechanisms:** These (binary) variables indicate which regulatory incentive mechanisms exist in a given state to align utility incentives with program implementation. Different mechanisms may come into effect over time, so we flag each state's status with regard to active incentive mechanisms on a year-by-year basis.
4. **EE Commitment**: Each state sets a budget that is dedicated to EE funding, while the EERS determines a predetermined target chosen by the state to achieve EE savings. Both variables provide some indication of each state's commitment to EE.
5. **State Level Economic Activity**: We control for two variables which could potentially affect incentives of the market players in the state towards EE programs. We use state-level GDP per capita, to control for the impact of economic activity on EE and control for electricity price as higher prices are associated with improved incentives to conserve, all else equal.
6. **Other**: Last two variables we account for in the regression model are yearly trend and the restructuring status of each state. Including yearly trends in the model allows to account for any implicit trends EE savings show with time. Restructuring status accounts for the states with retail competition and is included to gauge whether EE performance vary by the retail competition status

We first undertook a preliminary analysis of the data to explore overall trends and to situate the regression analysis. Figure 5 shows a simple comparison of average annual EE savings by administrator type (*i.e.*, average across states with each administrator type) from 2012 to 2017. Based on this chart, third party model seems to be associated with the highest savings, followed by hybrid, utility, and state models. However, as discussed above, we expect that regulatory incentive mechanisms also play an important role. Figure 6 shows average annual EE savings across states with each type of incentive mechanism and/or EERS goal.[23] We observe the highest savings in states with decoupling policies, followed by EERS goal, performance incentive mechanisms, and LRAM. The total count of states across categories in Figure 6 is greater than 51 due to the presence of multiple incentives, or the presence of an EERS goal plus incentive(s) in some states. Figure 7 provides a breakdown of different administrator types with respect to incentive mechanisms present in their jurisdictions.

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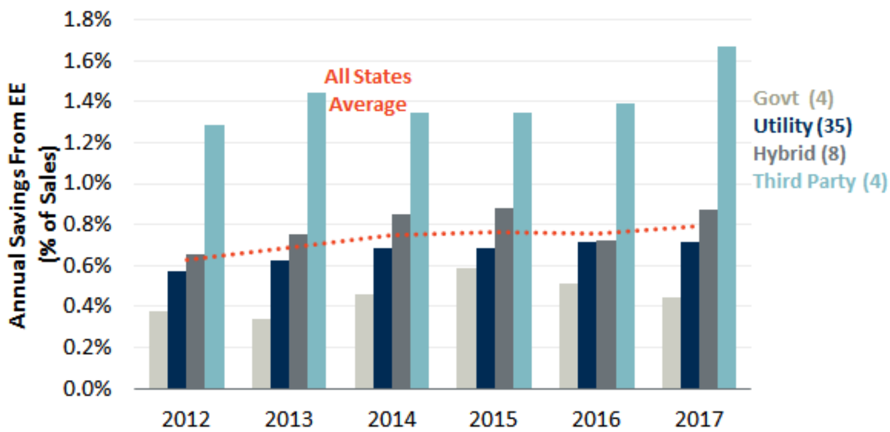
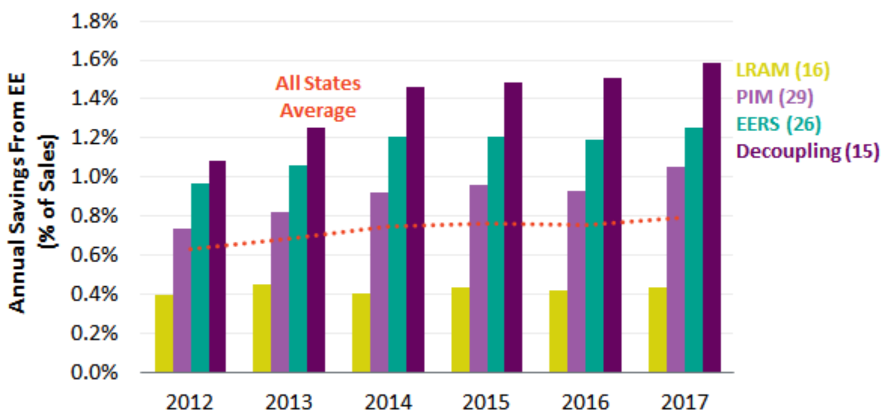
23 As of May 2019, 27 states have an Energy Efficiency Resource Standard (EERS) in place. The strongest EERS requirements are in Arizona, Massachusetts, and Rhode Island, which require at least 2.5% new savings annually. See ACEEE, *Policy Brief - State Energy Efficiency Resource Standards (EERS)*, May 13, 2019.

Figure 5: Annual EE Savings by Administrator Type



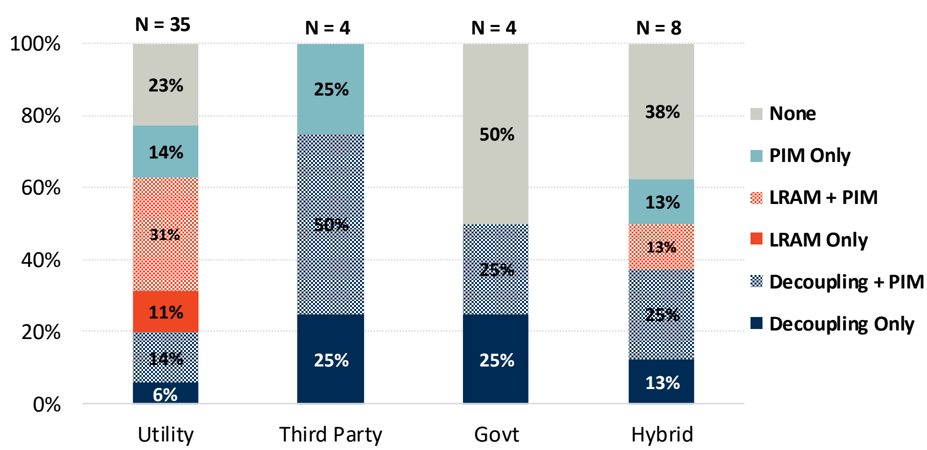
Note: Average annual EE savings across states with each administrator model.

Figure 6: Annual EE Savings by Incentive Mechanisms



Note: Average annual EE savings across states with each type of incentive mechanism.

Figure 7: Incentive Mechanisms Present, by EE Administrator Model



While these cuts of the data are helpful in understanding of the distribution of the impacts across different dimensions, such as administrator models or regulatory incentive methods, they can't be used for casual inferences as the influence of other factors cannot be eliminated. Below, we estimate a regression model to explain the variation in the annual EE savings by simultaneously accounting for all potential influencers, including administrator models and incentives, and gauge the relative effectiveness of the administrator models.

Our dataset is a panel data set covering two dimensions: geographical units (states), and time. The panel nature of the data dictates the type of regression model that can best explain the relationship between administrator type and EE performance. When dealing with panel data, two methods are most widely used—fixed effects and random effects. These models help account for inherent differences at the state level that are not observable and hence, not recorded in a quantitative way. Our primary variable of interest here, the administrator type, is time invariant, or in other words, does not vary for a given state between 2012 and 2017. This implies that a random effects model is a more suitable model than fixed effects for our purposes in this study.[24]

B. Results

Table 6 presents the results from our regression model.

Model 1: represents the naïve view of the world and explains the variation in the EE savings only by the variation in the administrator model.

Model 2: starts with the naïve model and includes several key variables that might help explain the variation in the a such as EERS Goal, Restructuring Status, Average Electricity Price, Annual EE Spending and State GDP Per Capita.

Model 3: starts with Model 2 and adds incentive variables: full decoupling, LRAM and PIMs.

In all three models, states with state administrator model are the omitted category.

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24 See Wooldridge, Jeffrey M., *Cluster-Sample Methods in Applied Econometrics: An Extended Analysis*, June 2006 for more detail on fixed vs. random effects models.

Table 6: Regression Results from Alternative Specifications

	Model 1		Model 2		Model 3	
Variable	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)
Intercept	0.35%	0.14	-0.55%	0.03 *	-0.39%	0.10
EERS Goal (% of sales)	-	-	0.20%	0.00 **	0.18%	0.01 **
Full Decoupling (binary)	-	-	-	-	0.13%	0.04 *
LRAM (binary)	-	-	-	-	-0.04%	0.45
PIM (binary)	-	-	-	-	0.11%	0.02 *
Restructured State (binary)	-	-	0.07%	0.46	0.04%	0.60
Electricity Price (c/kWh)	-	-	0.04%	0.00 **	0.03%	0.00 **
Utility Administrator (binary)	0.22%	0.40	0.27%	0.10	0.20%	0.20
Third Party Administrator (binary)	0.96%	0.01 **	0.32%	0.06	0.19%	0.20
Hybrid Administrator (binary)	0.34%	0.24	0.23%	0.18	0.14%	0.37
EE Spending (% of Revenue)	-	-	0.20%	0.00 ***	0.19%	0.00 ***
Year Trend (yr since 2011)	0.03%	0.00 **	0.02%	0.04 *	0.02%	0.03 *
State GDP per Capita	-	-	1.39%	0.38	-0.14%	0.92
R^2	11.90%		84.35%		85.48%	

Notes: * Pr (>|t|) < 0.05, ** Pr (>|t|) < 0.01, *** Pr (>|t|) < 0.001

A random effects specification has been used to be able to observe the effect of the time invariant variables, namely, administrator type. Standard errors are robust and clustered at the state level.

Model 1 indicates that on average third party administrators are associated with the highest savings compared to the other models. This impact is statistically significant at the 1% level. While the other two administrator models, utility and hybrid, are also associated with higher savings compared to the state administrator model, these impacts are not statistically significant at the 5% level. The results from Model 1 are consistent with those from Figure 5.

In Model 2, the third party model is associated with higher savings compared to the state model, but is now significant at the 6 percent level. Hybrid and utility models continue to have higher savings compared to the state model, but are insignificant. EERS goal, electricity price and EE spending variables are all positive and statically significant at the 1% level.

Model 3 indicates that after the inclusion of the incentive mechanism variables, none of the administrator models are now statistically significant, meaning that they do not explain the variation in the annual EE savings anymore. However, full decoupling and PIM variables are positive and statistically significant, meaning that states with full decoupling or PIM mechanisms are associated with higher EE savings, compared to states without such mechanisms. The LRAM variable impact is negative but is insignificant, meaning that LRAM does not seem to have an impact on annual EE savings. EERS goal, electricity price and EE spending variables continue to be positive and statically significant at the 1% level. This implies that the model is robust to the inclusion of new variables.

These results collectively indicate that none of the EE administrator models explain stronger EE performance, while other variables such as having an EERS goal, and having regulatory incentive mechanisms such as full decoupling and performance incentive metrics are all associated with stronger EE savings performance.

In addition to the regression results, we also looked at the characteristics of top 10 and bottom 10 performer states ranked by their average annual savings in the 2015–2017 timeframe. Table 7 provides additional perspective on the regression model results. Of the top ten performers, eight of them has decoupling and nine of them has a performance incentive mechanism. Interestingly, none of the bottom ten performers has a decoupling mechanism in place and only two has a performance incentive mechanism. This tabulation confirms the results we have seen in the regression analysis. It is important to note that utility administrators make up the majority in both the top ten and bottom 10 list, however it is difficult to derive any conclusions from this observation as utility administrators represent the majority of all administrators in the US (35 out of 51).

Table 7: Top and Bottom 10 Performing States with Respect to Average Annual EE Savings (%)

Rank	State	Admin Type	Average EE Savings %	Max. EERS Goal (%)	2017 Incentive Types			
					Decoupling	PIM	LRAM	None
	Top 10 Performers							
1	Rhode Island	Utility	3.0%	2.6%	✓	✓		
2	Massachusetts	Utility	2.7%	2.9%	✓	✓		
3	Vermont	Third Party	2.6%	2.2%	✓	✓		
4	California	Hybrid	1.8%	1.2%	✓	✓		
5	Connecticut	Utility	1.6%	1.5%	✓	✓		
6	Hawaii	Third Party	1.4%	2.0%	✓	✓		
7	Washington	Utility	1.4%	1.5%	✓	✓		
8	Arizona	Utility	1.3%	2.5%		✓	✓	
9	Michigan	Hybrid	1.3%	1.0%		✓		
10	Maine	Govt	1.3%	2.4%	✓			
	Bottom 10 Performers							
42	Tennessee	Utility	0.2%	0.0%				✓
43	Texas	Utility	0.2%	0.1%		✓		
44	Delaware	Govt	0.1%	0.0%				✓
45	Florida	Utility	0.1%	0.0%				✓
46	Virginia	Utility	0.1%	0.0%			✓	
47	Louisiana	Utility	0.1%	0.0%		✓	✓	
48	Alabama	Hybrid	0.1%	0.0%				✓
49	North Dakota	Utility	0.0%	0.0%				✓
50	Alaska	Govt	0.0%	0.0%				✓
51	Kansas	Utility	0.0%	0.0%			✓	

V. Conclusions

- All administrator models have certain strengths and weaknesses. Each jurisdiction should weigh these strengths and weaknesses and decide which model is likely to yield the least-cost and most sustainable framework for administering and delivering EE programs.
- Administration and delivery of energy efficiency programs is a complex, multi-step process. Given that the energy efficiency sector is a large ecosystem made up of a multitude of players including regulators, utilities, and third party providers, one of the most important roles of an administrator is be to leverage comparative advantages of all involved entities and to integrate them seamlessly.
- While energy efficiency administrators play an important role in effective program budget setting, management, and in some cases execution of the EE programs, utilities' full support and pursuit of these initiatives plays a key role in the success of these programs (even when the utility is not itself the EE program administrator). More specifically, utility incentives should be aligned with the goals of the EE programs by providing them with certain and timely program cost recovery, eliminating risk of lost revenue (decoupling), and providing ways to improve their earnings in the form of performance incentive mechanisms.
- Based on a literature review, the consensus is that no single administrator model is clearly superior to all of the other alternatives and no universally preferred model is expected to emerge soon because priorities, structure and regulations of each jurisdiction are different. What seems to matter most is "robust rate-payer funded efficiency programs resulting from a clear and consistent commitment of policy makers to the energy efficiency goals", which does not necessarily result from one particular type of administrator model.[25]
- Sedano (2011) indicates that there is a need for a reliable academic study that gauges the effectiveness of different models in delivering robust EE savings. We have made an effort to undertake such an academic study in this report. By using a comprehensive dataset over the 2012–2017 time frame for 50 states and DC, we quantitatively assessed whether there is a statistically significant association with any of the EE administrator models and better EE performance, after accounting for various incentive mechanisms and other confounding factors.
- We found that none of the administrator model variables are statistically significant, meaning that none of them are associated with higher EE savings compared to the others. However, full decoupling and PIM variables are positive and statistically significant, meaning that states with full decoupling or PIMs are associated with higher EE savings, compared to those without these mechanisms. In addition, EERS target, electricity price and EE spending variables are all positive and statically significant at the 1% level, consistent with our expectations.

25 Richard Sedano, *Who Should Deliver Ratepayer Funded Energy Efficiency? A 2011 Update*, The Regulatory Assistance Project, November 2011.

- These results suggest that while energy efficiency model administrators are important for effective implementation of energy efficiency programs, no single model is associated with better EE performance, as measured by annual EE savings. What seems to matter most is the availability of full decoupling, performance incentive mechanisms, and having a state level energy efficiency goal. These three variables collectively highlight the importance of a state's commitment to a long-term energy efficiency agenda and enabling utilities such that they have the right incentives to help and be partners in achieving that agenda.
- Given that regulatory incentive mechanisms have more of an impact than the administrator model on EE program success, then perhaps it makes the most sense to leave EE administration functions with the "default" entity (the utility). At least in jurisdictions that have not already implemented a different model, it would require a significant amount of start-up cost and transition time to establish a new entity (third party or state administrator) that does not already deal with electricity customers.
- Utilities are well positioned to integrate EE programs with broader DERs (including demand response, behind the meter generation, storage, and IoT device management) and to reduce overall cost to serve customers. This is because they are typically responsible for system planning functions such as undertaking integrated resource plans or distribution system plans. However, these economically efficient outcomes will only emerge if demand side resources are put on equal footing with conventional generation resources on the supply side and capital investments on the distribution grid. If utility demand side investments are not associated with similar earning opportunities, utilities will naturally prioritize capital intensive grid projects over demand side investments, potentially at the expense of achieving a lower cost resource mix.

Appendix

A. Utility Administrator Model Case Studies

We have selected three states that use the utility administrator model as case studies: Connecticut, Texas, and Massachusetts. We have selected Massachusetts and Connecticut as they have been consistent top performers in the ACEEE's Statewide Energy Efficiency Scorecard; Texas was selected because it has one of the most robust competitive retail markets across the U.S.

1) Connecticut

Utilities in Connecticut are required by state legislation to provide conservation and load management programs for all customers. Under the governing legislation, *An Act Concerning Connecticut's Energy Future (Public Act 18-50)*, utilities must submit three-year plans to the Connecticut Energy Efficiency Board (EEB) to "implement cost-effective energy conservation programs, demand management, and market transformation initiatives."[26] The act was most recently updated in 2018 and provides goals for 2019–2021, over which time period utilities must achieve energy efficiency reductions equal to 1.11% of sales (843 GWh). The EEB may advise and assist on the development of the utility plans before eventually transmitting them to the Commissioner of Energy and Environmental Protection for approval. The legislation emphasizes that all options should be considered in an integrated planning framework, and should be competitive or less expensive with the acquisition of equivalent supply.

In Connecticut, energy efficiency programs are marketed under a statewide brand, "Energize CT", and provided by the local energy utilities.[27] Energize CT provides rebates, financing, and services to help customers install energy efficiency and clean energy improvements. The utilities are largely responsible for funding the initiative through a conservation adjustment mechanism on customer bills: the rider cannot exceed $0.006/kWh of electricity sold to each end use customer.[28] Energy efficiency initiatives are also partially funded by the Connecticut Green Bank, which is a quasi-public agency that leverages public and private funds to accelerate the growth of green energy in Connecticut.[29]

The EEB estimates that utility-led energy efficiency measures saved $56.88 million in 2018, and have saved over $673 million in their lifetime.[30] These efforts also reduced over 1.8 billion MMBTus, resulting in a reduction of over 150,000 tons of CO2 in 2018. The EEB does acknowledge

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26 Connecticut State Senate, Public Act No. 18-50 An Act Concerning Connecticut's Energy Future, p. 27.

27 See www.energizect.com

28 Connecticut State Senate, Public Act No. 18-50 An Act Concerning Connecticut's Energy Future, p. 28.

29 See www.ctgreenbank.com.

30 Connecticut Energy Efficiency Board, *Energy Efficiency Board 2018 Programs and Operations Report*, March 1, 2019, p. 6.

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that much of the public funding allocation to energy efficiency was raided, resulting in only $10 million of the originally $117 allocated for 2018 and 2019.[31]

2) Texas

Texas provides an interesting example of competitive provision of EE services. While the Texas legislature requires utilities to meet certain EE goals, it does not allow them to directly perform EE services.[32] Thus, a quasi-merchant model has emerged, where utilities provide incentive payments to third-party providers ("project sponsors"), who then liaise with customers directly and provide them with EE services, much like merchant providers. These project sponsors may be air conditioning contractors, insulation installers, retail electricity providers, and other energy service companies.[33] Under this structure, customers can select their preferred project sponsor and decide on the scope of work. The project sponsors are fully responsible for determining pricing, warranty, and other characteristics of the energy efficiency measure.

The project sponsors then apply to the utilities for rebates, which are funded up to a cap. The utilities are able to recover costs for energy efficiency efforts through the Energy Efficiency Cost Recovery Factor (EECRF) charge applied on customer bills.[34] The charge also includes performance bonuses where a utility can recover one percent of the net benefits with each two percent by which it exceeds its performance goals, up to a maximum of ten percent of the utility's total net benefit.[35] Utilities do often exceed their goals and are able to take advantage of these performance bonuses. For example, Xcel Energy funded EE projects yielding 7,750 kW of peak demand savings in 2017 (or 141% of the statutory goal).[36]

Texas was the first state to establish energy efficiency resource standards in the United States, originally calling for investor owned utilities (IOUs) to meet 10% of their annual electricity demand growth through energy efficiency. This target was updated in 2010 to be 20% in 2011, 25% in 2012 and 30% in 2013.[37] The energy efficiency goal was again updated in 2011, with Senate Bill 1125, to establish that once the 30% threshold was met, utilities must also ensure that energy efficiency is at least 0.4% of their overall peak demand.[38] Texas utilities have consistently met or

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31 *Ibid*, p. 2.

32 Public Utility Commission of Texas, Substantive Rule §25.181.

33 For example, see here for a list of Xcel Energy's project sponsors.

34 DSIRE, *Required Energy Efficiency Goals*, accessed August 2019.

35 Public Utility Commission of Texas, Substantive Rule §25.181, p. 253.

36 Xcel Energy, *Amended 2018 EE Plan and Report*, May 2018, p. 21.

37 American Council for an Energy-Efficiency Economy, *Energy Efficiency Resource Standards*, accessed August 2019.

38 DSIRE, *Required Energy Efficiency Goals*, accessed August 2019.

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exceeded these goals, achieving 595 GWh of energy savings and 408 MW of peak demand reduction in 2016.[39]

3) Massachusetts

Massachusetts leverages a utility administrator model to have the highest ranked energy efficiency programs in the country.[40] In Massachusetts, distribution utilities administer their own energy efficiency programs and have partnered together to sponsor the Mass Save program.[41] Additionally, the Massachusetts Energy Efficiency Advisory Council, a stakeholder body chaired by the state Department of Energy Resources (DOER), helps to design, approve, and monitor the implementation of utility energy efficiency measures.[42] The council was created by the Green Communities Act, which also establishes energy efficiency targets set through three-year planning cycles.[43]

Massachusetts recently passed its fourth three-year energy efficiency plan, setting savings targets for 2019–2021. The plan aims to save 3,461 annual GWh of electricity by 2021, averaging 2.7% of sales.[44] The importance of energy efficiency is stressed by the highest elected officials in Massachusetts, with Governor Charlie Baker calling the "Three-Year Energy Efficiency Plan is a critical element of Massachusetts' strategy to meet climate goals," and saying that "energy efficiency is the most cost-effective way to achieve environmental benefits while lowering energy costs."[45]

Massachusetts has decoupling in place for all of its electric utilities, allowing utilities to actively promote energy efficiency without sacrificing profits. Under this construct, Massachusetts determines the target revenues on a utility-wide basis, allowing for adjustments due to inflation and capital spending requirements.[46] Additionally, there are performance incentives for utilities to earn a greater return based on a combination of elements including energy savings, benefit-cost analysis, and market transformation results.[47]

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39 Frontier Associates LLC, *Energy Efficiency Accomplishments of Texas Investor-Owned Utilities Calendar Year 2016*, accessed August 2019.

40 See American Council for an Energy-Efficiency Economy, *State Scorecard Rank*, accessed August 2019.

41 See: www.masssave.com

42 Massachusetts Energy Efficiency Advisory Council, About the Council, accessed August 2019.

43 An Act Relative to Green Communities, Massachusetts Session Laws Website (passed July 2, 2008).

44 American Council for an Energy-Efficiency Economy, *Energy Efficiency Resource Standards*, accessed August 2019.

45 Executive Office of Energy and Environmental Affairs, Press Release: Press Release Massachusetts' Nation-Leading Three-Year Energy Efficiency Plan Approved, January 30, 2019.

46 Center for Climate and Energy Solutions, Decoupling Policies, accessed August 2019.

47 American Council for an Energy-Efficiency Economy, *Massachusetts*, accessed August 2019.

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B. Third-Party Administrator Model Case Studies

We have selected two states that use the third-party administrator model: Vermont and Oregon. Each of these states has implemented a different model with unique characteristics worth highlighting.

1) Vermont

The Vermont Public Utility Commission and state legislature created Efficiency Vermont in 2000 as the nation's first energy efficiency utility, operating under a long-term franchise model. This not-for-profit organization is overseen by the Vermont Public Utility Commission, and is mainly funded through a charge on customers' bills. Efficiency Vermont helps electricity customers find ways to cut their electricity consumption by providing them with free technical advice or by subsidizing the purchase of energy-efficiency products like lightbulbs or boilers.[48] Recently, Efficiency Vermont has also recognized the growing importance of supply chain partnering activities to provide customer with efficient goods and high-performance buildings.[49]

Act 56 of 2015 created a Renewable Energy Standard in Vermont which took effect in 2017, requiring distribution utilities to achieve fossil fuel savings from energy transformation projects.[50] Such projects may include home weatherization or other thermal efficiency measures and high efficiency heating systems, and to meet the requirements retail electricity providers were directed to "jointly propose with an energy efficiency entity […] an energy transformation project or group of projects."[51] The required savings are 2% of each retail electricity provider's annual sales for 2017, rising to 12% for 2032 and onward (with the exception of small municipal utilities).[52]

Efficiency Vermont operates on a three-year budget cycle, with its compensation linked to specific state-mandated performance goals. In 2018, the administrator had already achieved about 40% of its 2018–2020 budget and performance indicator targets for energy reduction (leaving 60% for the remaining 2019–2020 period). Its programs achieve significant energy and peak savings: more than 143 GWh and $220 million of savings are expected over the lifetime of investments made in 2018, as well as an additional 12.1 MW of new capacity savings (resulting in a cumulative portfolio of 107 MW peak reduction that makes Efficiency Vermont the single largest participant in ISO-NE's forward capacity market).[53]

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48 IEEE, *The Rise of the Energy Efficiency Utility*, May 2008.

49 Efficiency Vermont, 2018 Savings Claim Summary, April 1, 2019, pp. 1, 11-12.

50 https://publicservice.vermont.gov/renewable_energy/state_goals

51 General Assembly of the State of Vermont, No. 56 An Act Relating to Establishing a Renewable Energy Standard, 2015, pp. 5, 10.

52 *Id.,* p. 17.

53 Efficiency Vermont, 2018 Savings Claim Summary, April 1, 2019, pp. 1-2, 28.

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2) Oregon

Oregon created an independent non-profit trust called the Energy Trust of Oregon (ETO) in 2002 in the context of state restructuring proceedings. Oregon law initially provided the ETO with a 10-year funding mechanism through 2012, and in 2007 the mechanism was extended to 2026.[54] The funding comes through Oregon's public purpose charge (3% of the total revenues collected by the utilities from customer electric bills), which provides roughly $60 million per year to support energy efficiency, renewable energy, and low-income programs in Oregon.[55] The ETO contracts with a variety of firms, individuals, institutions and organizations for program management, program delivery, engineering, evaluation, technical, and other professional services.

As part of its oversight of ETO, the Oregon Public Utility Commission defines metrics against which to benchmark ETO's performance. They cover categories including electric and natural gas efficiency, renewable energy, financial integrity, program delivery efficiency, staffing, customer satisfaction, and benefit/cost ratios.[56] These metrics are typically updated annually and are meant to serve as minimum expectations, not targets or goals. Since its creation, the ETO has invested $1.8 billion and saved customers $7.7 billion on utility bills (across electric and gas functions).[57]

C. State Administrator Model Case Studies

We provide some detail on each of the U.S. jurisdictions that use the state administrator model: Maine, Delaware, and Washington, D.C.

1) Maine

In 2009, the Maine legislature established the Efficiency Maine Trust, a quasi-state agency that is governed by a board of directors and has oversight from the Maine Public Utilities Commission, to "design, coordinate, and integrate energy efficiency, weatherization, and clean energy programs for all energy consumers in Maine".[58] It achieves its goals largely through placing financial incentives on the purchase of high-efficiency equipment or changes to operations that help customers reduce their consumption, as long as they meet cost-effectiveness tests.[59] The financial incentives often take the form of direct rebates.[60] Customers are able to work with Qualified

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54 Richard Sedano, *Who Should Deliver Ratepayer Funded Energy Efficiency? A 2011 Update*, The Regulatory Assistance Project, November 2011.

55 https://database.aceee.org/state/customer-energy-efficiency-programs

56 https://www.energytrust.org/wp-content/uploads/2019/03/2019-Oregon-Public-Utility-Commission-Performance-Measures-for-Energy-Trust-of-Oregon-Inc..pdf

57 https://www.energytrust.org/wp-content/uploads/2019/07/AnnualReport_2018.pdf

58 Natural Resources Council of Maine, *Efficiency Maine Trust*, accessed February 2019, p. 2.

59 *Ibid*; Efficiency Maine, *About*, accessed August 2019.

60 Efficiency Maine, *At Home*, accessed August 2019.

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Partners (*i.e.*, experienced vendors, contractors, suppliers, and energy professionals who have been vetted by Efficiency Maine to receive cash incentives) to install energy efficiency measures.[61]

Efficiency Maine receives funding from a number of public and private sources which it then invests in energy efficiency efforts. While the utilities are the primary source of funding, there are other sources that contribute to the Trust. In FY2018, the Trust received funds from: utility ratepayers, the Regional Greenhouse Gas Initiative (RGGI), the Maine Power Reliability Program settlement, capacity revenues from ISO-NE, and a long-term contract with Maine utilities.[62]

Efficiency Maine achieved 139 GWh of savings in 2018, and 1,735 GWh since its inception in 2009.[63] While Maine does not have established annual reduction targets, it did establish a goal of 20% energy reduction from 2007 levels by 2020. However, Efficiency Maine does not expect to reach that target, forecasting that it will achieve 60% of its targeted reductions. Similarly, they do not expect to reach a target of 300 MW of peak load reduction by 2020, falling roughly 100 MW short.[64]

2) Washington, DC

In the District of Columbia (DC), the Sustainable Energy Utility (DCSEU) is the one-stop resource for energy efficiency and renewable energy services for District residents and businesses.[65] Since its inception in 2011, the DCSEU has provided financial incentives, technical assistance, and information to help DC residents use less energy and save money.[66] These efforts are often in the form of rebates for energy efficiency upgrades, but the DCSEU also connects customers with contractors and can provide additional guidance to customers as they undertake energy efficiency efforts.

The DCSEU is funded by the Sustainable Energy Trust Fund (SETF), which is in turn funded by a surcharge on customer bills. In 2018, the SETF collected $20 million per year, through a charge of $0.001612/kWh.[67] However, the SETF is set to expand after DC passed the Clean Energy DC Omnibus Amendment Act of 2018, allowing funds from the SETF to be used as part of a new Green Finance Authority and will cause the customer efficiency charge to initially double, before decreasing back to its initial level over 12 years.[68]

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61 Efficiency Maine, *Qualified Partners*, accessed February 2019.

62 Efficiency Maine, *FY2018 Annual Report*, November 2018.

63 *Ibid.*

64 Efficiency Maine, *Triennial Plan for Fiscal Years 2020-2022: Appendix A: Long-Term Target Results*, October 22, 2018.

65 DC Department of Energy & Environment, *DC Sustainable Energy Utility (DCSEU)*, accessed August 2019.

66 DCSEU, *About the DCSEU*, accessed August 2019.

67 *Ibid.*

68 See Clean Energy DC Omnibus Amendment Act of 2018.

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DC exceeded its energy savings goals in 2018, reducing electricity consumption levels by over 135,000 MWh, achieving 157% of its goal.[69]

3) Delaware

Delaware's state-administered energy efficiency model relies on a Sustainable Energy Utility (SEU) entity similar to Washington DC's DCSEU. In 2007, the Delaware passed legislation creating a nonprofit corporation titled the Sustainable Energy Utility (SEU) to "design and deliver comprehensive end-user energy efficiency and customer-sited renewable energy services to Delaware's households and businesses."[70] The SEU operates Energize Delaware, which operates as a "one-stop resource… to help residents and businesses save money through clean energy and efficiency."[71] The SEU offers the Revolving Loan Fund Objective to encourage the adoption and installation of energy efficiency projects to larger customers, such as businesses or governmental buildings.[72]

The SEU is primarily funded through revenues from the Regional Green House Gas Initiative (RGGI), receiving 65 percent of annual RGGI funds in Delaware.[73] As an additional source of funding, the SEU pioneered the use of energy efficiency bonds to support investments in larger scale buildings upgrades, with the savings from the projects paying back the bond.[74] While the effectiveness of such bonds has previously been drawn into question, they seem to be an effective tool to allow the state to continue funding energy efficiency upgrades.[75]

Delaware does not have mandatory energy efficiency goals, but the Delaware Energy Efficiency Advisory Council has set targets. They have established incremental energy efficiency goals at 0.4% in 2016/17, 0.7% in 2018, and 1.0% in 2019.[76] However, Delaware is falling considerably short of their initial goals due to slower than expected implementation.[77]

D. Hybrid Administrator Case Studies

We have selected California and Maryland as two representative jurisdictions with hybrid administrator models. California's model is interesting because the utilities work together with

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69 DCSEU, *2018 Annual Report*.

70 Delaware State Senate 144th General Assembly, *Senate Bill 18, Substitute Number 1*, 2007.

71 See: https://www.energizedelaware.org/home/deseu/

72 OpenEI, Sustainable Energy Utility (SEU) - Revolving Loan Fund (Delaware), accessed August 2019.

73 The Regional Greenhouse Gas Initiative, *The Investment of RGGI Proceeds in 2016*, September 2018.

74 Center for Social Inclusion, Delaware Sustainable Energy Utility, accessed August 2019.

75 Jeff Murdock and Scott Goss, Auditor calls state energy efficiency program 'inadequate', The News Journal, January 12, 2016.

76 Delaware Energy Efficiency Advisory Council, Proposed Energy Savings Goals, August 16, 2015.

77 Delaware Energy Efficiency Advisory Council, Annual Report: 2017.

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individual local communities to administer energy efficiency programs. Maryland provides an example where low-income energy efficiency programs are administered separately.

1) Maryland

In Maryland, utilities manage and implement energy efficiency programs for most customers, while a state agency manages programs for low-income customers. The EmPOWER Maryland Energy Efficiency Act, passed in 2008, set aggressive energy efficiency goals and laid the groundwork for the energy efficiency initiatives in the state. It established the EmPOWER programs, which are managed by the electric utilities in Maryland and include residential rebates for lighting, appliances, and home improvements (*e.g.*, insulation and air sealing), commercial rebates, and energy efficiency services for industrial facilities.[78] Such projects must ultimately be approved by the Public Service Commission. The Department of Housing and Community Development offers funding for energy efficiency projects specifically for low income customers through the Maryland Low Income Energy Efficiency Program (LIEEP), as well as for all residential customers through other rebates and resources.[79] From its inception in 2008 through 2015, EmPOWER saved over 51 million MWh, equivalent to electricity used by 850,000 customers over five years and lowered demand by 2,000 MW, equivalent to four large power plants.[80]

Funding for EmPOWER is largely through specific energy efficiency charges on customer bills.[81] Additionally, utilities are able to bid demand response and energy efficiency resources into PJM's capacity market to offset the costs of these programs. Some Maryland utilities have decoupling, which allows utilities to not lose revenue from lower sales due to energy efficiency. Additionally, utilities can earn a rate of return on energy efficiency programs, similar to other physical investments.[82]

Maryland utilities must increase incremental energy savings targets by 0.2% per year, until leveling out at 2.0%. These targets were initially approved by the Maryland PSC, and later codified through legislation. Maryland utilities achieved their initial goals set in 2008, reducing per capita energy use by 15% by 2015. [83]

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78 Maryland Energy Administration, EmPOWER Maryland, accessed August 2019.

79 See: EmPOWER Maryland Low Income Energy Efficiency Program

80 Baatz, Brendon and James Barrett, *Maryland Benefits: Examining the Results of EmPOWER Maryland through 2015*, American Council for an Energy-Efficiency Economy, January 2017.

81 American Council for an Energy-Efficiency Economy, *Customer Energy Efficiency Programs*, accessed August 2019.

82 Cleveland, Megan, Logan Dunning and Jesse Heibel, *State Policies for Utility Investment in Energy Efficiency*, National Conference of State Legislatures, April 2019.

83 American Council for an Energy-Efficiency Economy, *Energy Efficiency Resource Standards*, accessed August 2019.

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2) California

Energy efficiency efforts in California are largely administered by the state's investor-owned and publicly-owned utilities. The California Public Utilities Commission (CPUC) provides oversight, establishing key policies and guidelines, setting program goals, and approving spending levels.[84] California utilities are largely able to recover their costs of energy efficiency programs through rate cases brought before the CPUC. Energy efficiency programs are also funded in part by revenue from its cap and trade program, where emitters of greenhouse gases, such as oil refineries, electricity power plants, and cement plants must pay for emissions over their assigned cap.[85]

The other side of the hybrid model is community-administered: communities can collaborate with the larger utilities to offer local energy efficiency programs. For example, the city of Pleasanton partnered with Pacific Gas and Electric to offer businesses with free audits, payback analyses, and information on rebates and incentives resulting in annual savings of over one megawatt.[86] Southern California Edison offers the Energy Leader Partnership where they have helped support 112 cities and counties to promote energy efficiency and sustainability throughout planning and outreach efforts.[87]

California Senate Bill 350 called for the California Energy Commission to establish targets that achieve a doubling of projected cumulative energy efficiency savings and demand reductions by 2030.[88] The Commission referred to these targets as "ambitious" and acknowledged that "meeting the targets will require the collective effort of many entities, including state and local governments, utilities, program deliverers, private lenders, market participants, and end-use customers."[89] To meet these ambitious targets, large utilities are required to develop and submit integrated resource plans to optimize supply and demand-side resources over a 20-year planning horizon that reflect policy goals and grid operational constraints.[90] These targets are captured in Figure 8, which shows that California will need additional effort to reach its targets under current projections.

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84 American Council for an Energy-Efficiency Economy, *Customer Energy Efficiency Programs*, accessed August 2019.

85 American Council for an Energy-Efficiency Economy, *Customer Energy Efficiency Programs*, accessed August 2019.

86 Buckley, Lindsay, *Spotlighting Energy Efficiency in California Communities*, Western City, July 1 2012.

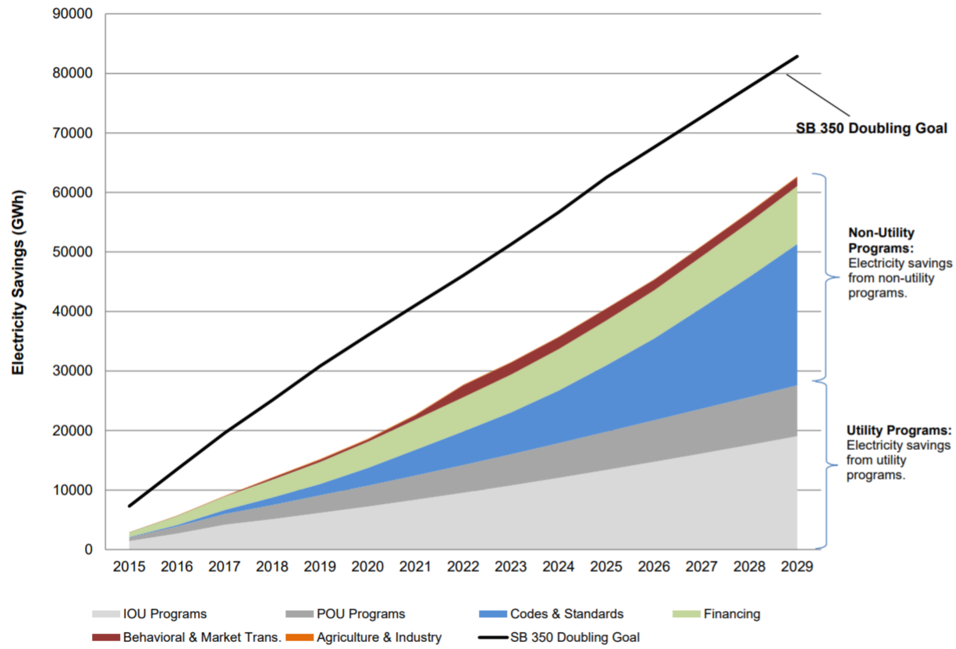
87 Better Buildings Initiative (U.S. DOE), *Energy Leader Partnership*, accessed August 2019.

88 Jones, Melissa, Michael Jaske, Michael Kenney, Brian Samuelson, Cynthia Rogers, Elena Giyenko, and Manjit Ahuja, *Senate Bill 350: Doubling Energy Efficiency Savings by 2030, California Energy Commission*, 2017, Publication Number: CEC-400-2017-010-CMD.

89 Jones, Melissa, Michael Jaske, Michael Kenney, Brian Samuelson, Cynthia Rogers, Elena Giyenko, and Manjit Ahuja, *Senate Bill 350: Doubling Energy Efficiency Savings by 2030, California Energy Commission*, 2017, Publication Number: CEC-400-2017-010-CMD, p. 1.

90 California Energy Commission staff. 2017. *2017 Integrated Energy Policy Report. California Energy Commission*. Publication Number: CEC-100-2017-001-CMF.pp. 38-43.

Figure 8: California Energy Efficiency Goal and Projections



Source: Jones, Melissa, Michael Jaske, Michael Kenney, Brian Samuelson, Cynthia Rogers, Elena Giyenko, and Manjit Ahuja, Senate Bill 350: Doubling Energy Efficiency Savings by 2030, California Energy Commission, 2017, Publication Number: CEC-400-2017-010-CMD, p. 2.