Energy Efficiency Administrator Models

RELATIVE STRENGTHS AND IMPACT ON ENERGY EFFICIENCY PROGRAM SUCCESS

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Executive Summary

Background and Objective

Customer-sited energy efficiency is the nation's third-largest electricity resource, employing 2.3 million Americans and typically providing the lowest-cost way to meet customers' energy needs.[1,2] 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.[3] Many utilities are also making commitments to achieve significant greenhouse gas emissions reductions over the next couple of decades, and increased energy efficiency is a central part of many utilities' plans.[4]

At the same time, the electricity sector is going through an important transformation due to increasing levels of distributed generation and electrification. A different approach to EE and more innovative programs will therefore be required, targeting deeper savings and broader participation for all customers. There is also a need for a fresh look at the EE program administration and delivery steps; different models and incentives for entities undertaking these steps; and more broadly developing a coordinated approach for planning and integrating distributed energy resources, precisely because 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;[5] 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 move beyond these qualitative comparisons and undertake a quantitative regression analysis to gauge the effectiveness of these alternative EE administrator models in delivering successful EE outcomes. A key aspect of our methodology is to incorporate the effect of various regulatory incentive mechanisms available to utilities across the U.S. to address program cost recovery, lost fixed cost recovery, and performance incentives.

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1 National Association of State Energy Officials and Energy Futures Initiative, *The 2019 U.S. Energy and Employment Report*, 2019.

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

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

4 See SEPA's Utility Carbon Reduction Tracker: https://sepapower.org/utility-carbon-reduction-tracker/.

5 There are states, such as Connecticut and Massachusetts, which have the utility administrator model with an independent advisory board. We classify these states under the utility administrator model.

Review of each of the administrator models and their attributes, which are discussed in detail in Section II.C, reveals that there is no single administrator model that is superior to the others across all dimensions. Table ES-1 and Table ES-2 provide a comparative summary of potential strengths and weaknesses across the various administrator models. Note that the hybrid model will exhibit characteristics of the utility and either state or third-party models; although it may foster a greater diversity of approaches to EE, it may involve higher transaction costs than either of the separate component models mostly due to coordination requirements

Table ES-1 : Potential 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 and incorporate EE in resource planning	+		
Access to customer data and analytics	+		
Consolidate administrative functions across jurisdiction		+	+
Respond quickly to evolving industry/customer needs			+
Direct accountability/transparency	+		+
Ability to deliver comparable programs statewide		+	+

Table ES-2: Potential Program Administrator Weaknesses

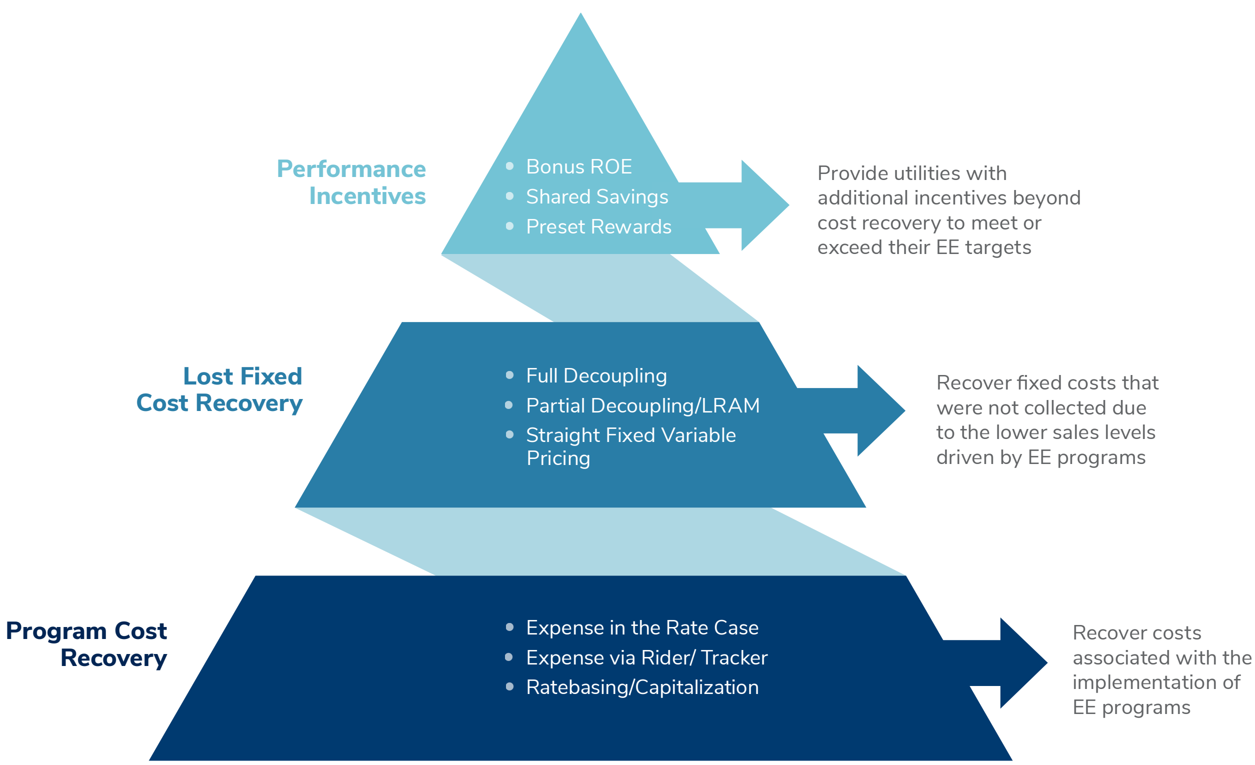
	Program Administrator		
Relative Weaknesses	Utility	State	Third Party
Lack of access to key customer and system data without data sharing agreements		–	–
Potentially misaligned incentives	–		
Limited ability to provide robust EE program infrastructure and retain staff		–	
Subject to political pressures and budget expropriation		–	
Higher transaction costs		–	–

Role of Long Term EE Targets and Incentive Mechanisms

Due to energy efficiency's increasingly important role in long-range utility plans and clean energy plans, many states have set long term energy efficiency targets or energy efficiency resource standards (EERS), and some states have instructed utilities to pursue all cost-effective energy efficiency. Moreover, the importance of energy efficiency 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. Nevertheless, these targets and aspirations are harder to achieve without properly constructed incentive mechanisms.

Utilities are important players in the EE ecosystem, with direct communication channels with customers and the best understanding of system needs. Their true buy-in for the EE programs is essential even when the utility is not itself the EE program administrator. Therefore, an exercise to explore the effectiveness of alternative EE administrator models would be incomplete if the presence or lack of incentives were not brought into the picture. For that reason, we review various regulatory incentive mechanisms available to utilities across the U.S. to address program cost recovery, lost fixed cost recovery, and performance incentives and incorporate these mechanisms into our quantitative analysis. Figure ES-1 presents the building blocks of an effective demand side management (DSM) policy.

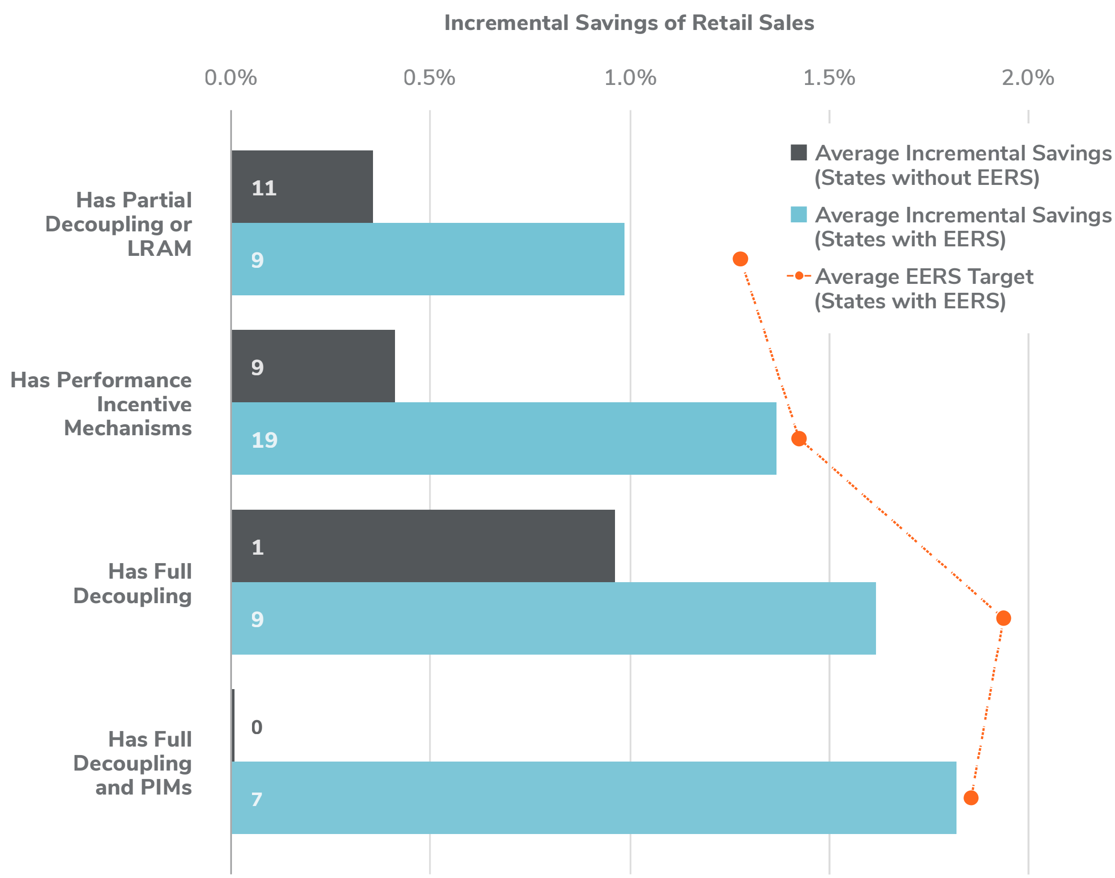
Figure ES-1: Building Blocks of an Effective DSM Policy



Source: The Brattle Group (2019).

Figure ES-2 compares the 2017 average incremental EE savings across states grouped by various incentive mechanisms. For each incentive mechanism, the gray bar represents the average savings for states that do not have an EERS; the teal bar represents the average savings for states that have an EERS, and the red dots represents the average EERS target (annual % savings goal) in those states that have an EERS. Based on this figure, 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 ES-2: 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).

Note: Out of the 26 states with EERS targets, seven states (CA, CT, ME, MA, RI, VT, and WA) have the requirement that the EE administrators achieve all cost effective energy efficiency.[6]

[6] ACEEE Policy Brief, *State Energy Efficiency Resource Standards (EERS)*, May 2019.

Quantitative Assessment of Different Models in Delivering Successful EE Outcomes

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. It is not possible to present all other drivers simultaneously 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 over 2012 through 2017 for the 50 states and the District of Columbia, including the impact of different EE administrator models on program success. We measure "EE performance" by using "annual EE savings as a percentage of total load served" as our dependent variable. For independent variables, we include categorical variables for administrator models and regulatory incentive mechanisms, and continuous variables to capture individual states' commitment to EE, such as the EERS goal and EE spending as percent of the total revenues. 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.

Our regression results indicate that none of the EE administrator models explain stronger EE performance in a statistically significant way, while other variables such as having an EERS goal, dedicated funds for EE programs and having regulatory incentive mechanisms such as full decoupling and performance incentive metrics, are all statistically significant and associated with stronger EE savings performance. Having an EERS goal and dedicated funds for EE, which collectively represent a long-term and credible commitment to energy efficiency, has the largest impact on the stronger EE performance; followed by having a full decoupling mechanism and performance incentives.

Our methodology, dataset, and results are discussed in detail in Section IV.

Key Takeaways

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 most cost-effective and sustainable framework for administering and delivering EE programs. The selected model should enable pursuit of more innovative programs targeting deeper savings.
- 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 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 play 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 opportunities to improve their earnings based on how well they meet certain targets.

- Our empirical results suggest that no single administrator model is associated with better EE performance, as measured by annual EE savings. What matters most is having a state level energy efficiency goal, dedicated EE funding, the availability of full decoupling, and performance incentive mechanisms. These four drivers collectively highlight the importance of a state's commitment to a long-term energy efficiency agenda and enabling utilities with the right incentives to help and be partners in achieving that agenda. While several studies highlighted the importance of these four drivers, we have empirically demonstrated that they are indeed the ones that matter the most.[7]
- 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 (IRPs) or distribution system plans.[8] However, these economically efficient outcomes will emerge only 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.

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7 See for example https://aceee.org/policies-matter-creating-foundation-energy

8 However, there are other alternative forms of ensuring this coordination in planning functions. Vermont System Planning Committee was formed in 2007 with a mission to facilitate a complete and timely consideration of cost-effective non-transmission alternatives to new transmission projects. The entity aims to achieve better coordination among Vermont's utilities, transparency to the public about planning activities, and structured mechanisms for public involvement. See: https://puc.vermont.gov/electric/vermont-system-planning-committee-vspc

I. Introduction

Energy efficiency (EE) 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. Meeting such goals will require improved coordination across the energy ecosystem, prompting a fresh look at the different models and incentive mechanisms for entities undertaking EE program administration and delivery steps. 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 making efforts to decarbonize other sectors of the economy).[9] Energy efficiency, being among one of the cleanest and least expensive alternatives to meet growing electricity demand, is becoming an essential means to reduce overall load growth and reduce peak demand.[10] Moreover, use of energy efficiency as an effective non-wires alternative (NWA) is gaining more traction to avoid or defer costly distribution system investments.[11]

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 to reducing energy consumption as well as to reducing costs for ratepayers even as infrastructure investments proceed under other aspects of the plan such as grid modernization.

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.[12] EPRI estimates 740,985 GWh of

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9 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.

10 U.S. Environmental Protection Agency (EPA), *National Action Plan for Energy Efficiency Report*, July 2006, pp. 6–5.

11 The Brooklyn Queens Demand Management (BQDM) 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.

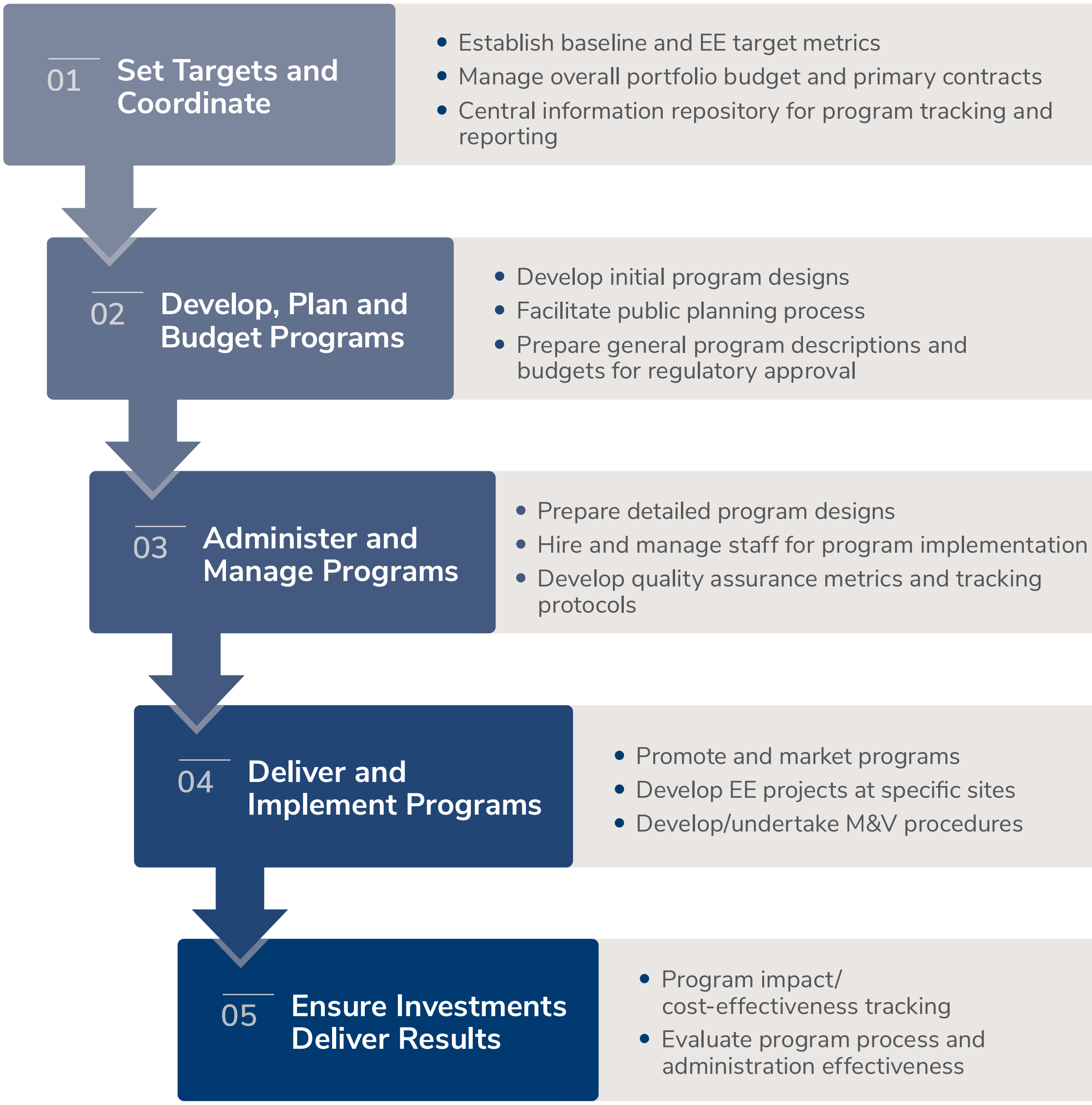
12 ACEEE, *35 Years of Energy Efficiency Progress, 35 More Years of Energy Efficiency Opportunity*, June 30, 2015.

cost-effective EE economic potential from 2016 to 2035, representing 16% of baseline retail sales in 2035.[13]

Given that the proliferation of clean energy plans are making EE an important instrument in their quest, while at the same time the electricity sector is going through an important transformation due to increasing levels of distributed generation and electrification, there is a need for a different approach to EE and more innovative programs targeting deeper savings and broader participation for all customers. 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 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.

13 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.

Figure 1: Elements of Energy Efficiency Program Administration and Delivery



Source: Based on C. Blumstein, C. Goldman, and G. Barbose, 2005. "Who Should Administer Energy Efficiency Programs?", *Energy Policy* 33(8), 1053–1067. LBNL-53597. May.

Energy efficiency administrators are primarily responsible for the proper use of the public and ratepayer funds supporting the EE programs and ensuring that these programs deliver outcomes that meet expectations. While they may 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.[14]

[14] C. Blumstein, C. Goldman, and G. Barbose, 2005. "Who Should Administer Energy Efficiency Programs?", *Energy Policy* 33(8), 1053–1067. LBNL-53597. May.

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;[15] 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 regression analysis to identify the factors that are associated with the success of EE programs implemented during 2012 through 2017 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 conclusions 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 evolving to take a more active role in their energy consumption choices (often with assistance from the utility or a third party). This study is timely in the sense that some jurisdictions (New Jersey, Washington DC, and California) are revisiting the role of the utilities in administering EE programs.

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 leads the area where their comparative advantage lies. For instance, there could be opportunities/roles for third-party 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.[16] Utilities may engage in the platform provider role and integrate services from other providers, as well as offer a broad range of EE services through a services and solutions market place.[17] Some of these innovations are currently happening in several jurisdictions such as California, Illinois, Texas, and New York but are still fairly limited in their scale and scope.

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15 There are states, such as Connecticut and Massachusetts, which have the utility administrator model with an independent advisory board. We classify these states under the utility administrator model.

16 Third-party EE providers may operate under different business models. They may gain business through direct relationships with customers, earn payments for aggregation services from wholesale electricity markets, or procure business from utilities through competitive solicitation process. For example, in Texas, utilities administer EE programs through project sponsors that customers themselves elect.

17 D. Cross-Call, R. Gold, L. Guccione, M. Henchen, and V. Lacy, *Reimagining the Utility: Evolving the Functions and Business Model of Utilities to Achieve a Low-Carbon Grid*, Rocky Mountain Institute, January 2018.

It is 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 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."[18] 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 environments.[19,20] States ultimately implemented a variety of models under which state agencies, non-profit corporations, or independent third-party agencies administer EE programs.

The decision to adopt one of these administrative structures has been driven mostly 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; and ii) those that facilitate market transformation.[21,22] Utilities in restructured states have traditionally been relying on energy efficiency as part of their integrated resource plans (IRPs) and there were concerns about how

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18 C. Blumstein, C. Goldman, and G. Barbose, 2005. "Who Should Administer Energy Efficiency Programs?" *Energy Policy* 33(8), 1053–1067. LBNL-53597. May.

19 J. Eto, C. Goldman, and S. Nadel, 1998. *Ratepayer-Funded Energy-Efficiency Programs in a Restructured Electricity Industry: Issues and Options for Regulators and Legislators*, LBNL-41479, May, p. 43–49.

20 R. Prahl, J. Schlegel, and C. Goldman, 1998. *Organizing for Market Transformation: Institutional Issues in the Creation of a New Energy Efficiency Policy Framework in California*, *Proceedings of the American Council for an Energy-Efficient Economy 1998 Summer Study on Energy Efficiency in Buildings*. LBNL-43834. August.

21 J. Eto, C. Goldman and S. Nadel, 1998. *Ratepayer-Funded Energy-Efficiency Programs in a Restructured Electricity Industry: Issues and Options for Regulators and Legislators*, LBNL-41479, May, p. 29–41.

22 R. Prahl, J. Schlegel and C. Goldman, 1998. *Organizing for Market Transformation: Institutional Issues in the Creation of a New Energy Efficiency Policy Framework in California*, *Proceedings of the American Council for an Energy-Efficient Economy 1998 Summer Study on Energy Efficiency in Buildings*. LBNL-43834. August.

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' rate-base growth and sales based business models. Despite mechanisms to align incentives (such as decoupling, performance incentive mechanisms, *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 the State Administrator, Third-Party Administrator, 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 observations.

B. Literature Review

According to Blumstein *et al.* (2005), "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."[23] 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."[24] 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.* (2005) 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.* (2005) 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."[25]

Harrington (2003) concludes 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

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[23] C. Blumstein, C. Goldman, and G. Barbose, 2005. "Who Should Administer Energy Efficiency Programs?" *Energy Policy* 33(8), 1053–1067. LBNL-53597. May.

[24] *Ibid.*

[25] C. Blumstein, C. Goldman, and G. Barbose, 2005. "Who Should Administer Energy Efficiency Programs?" *Energy Policy* 33(8), 1053–1067. LBNL-53597. May.

makers."[26] Both utility administrator and third-party administrator 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."[27] 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 models 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) indicates that there is a 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 both 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 demonstrate that a policy environment in which IOUs have EERs and LRAM is associated with a 4.2 percent reduction in residential electricity consumption per customer.[28] 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 note the importance of considering the political realities of each state and then planning how to work with stakeholders on key energy efficiency policies.

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26 Cheryl Harrington , *Who Should Deliver Ratepayer Funded Energy Efficiency: A Survey and Discussion Paper*, The Regulatory Assistance Project, May 2003.

27 *Ibid.*

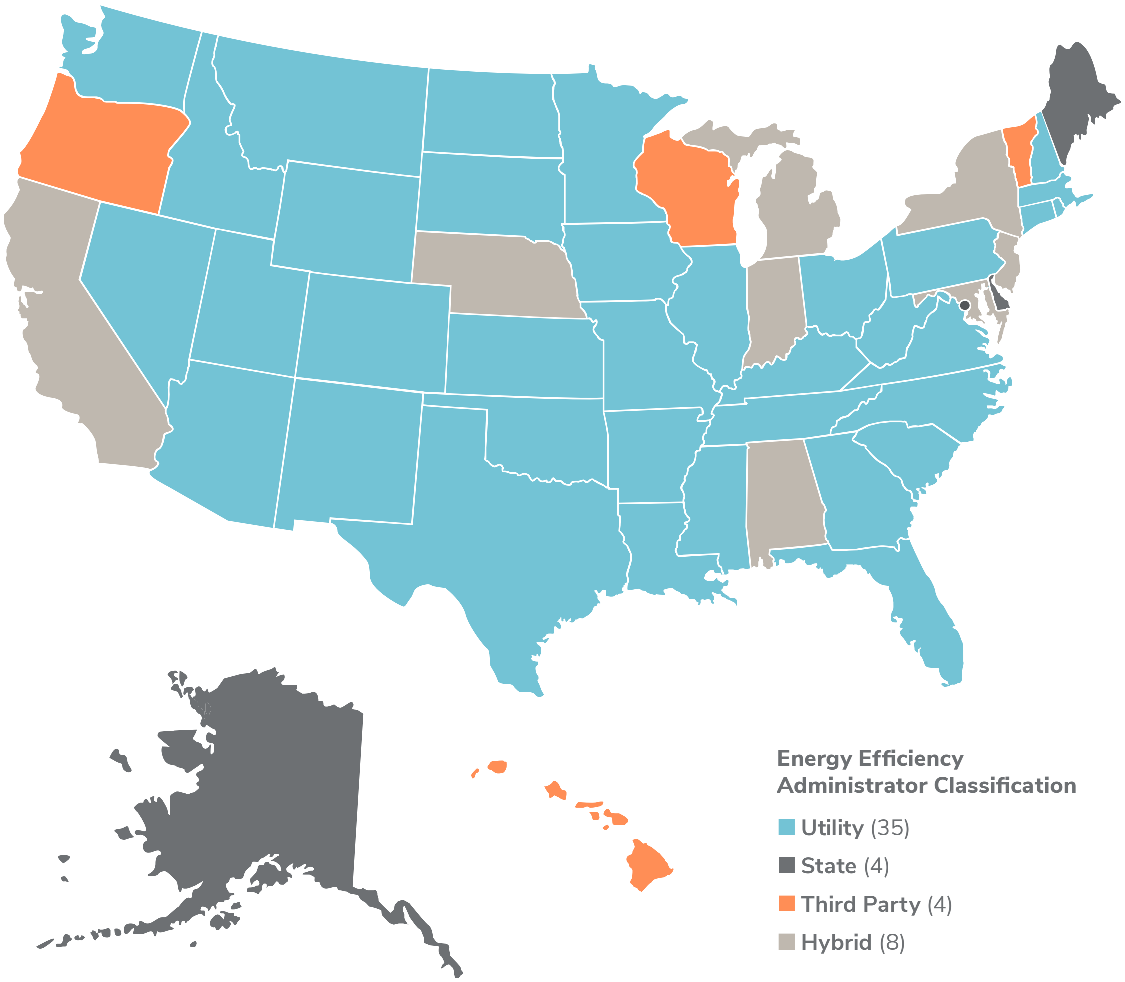
28 Shauna Theel and Andreas Westgaard, *Moving Toward Energy Efficiency: A Results-Driven Analysis of Utility-Based Energy Efficiency Policies*, Harvard Kennedy School, prepared for Opower, March 28, 2017.

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 under which they operate.

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 US landscape in terms of different EE administrator models adopted by individual states.

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 of ACEEE State Database.[29]

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

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[29] For states with very limited EE activity (states budgets less than 0.2% of revenues as of 2017), we have made the following designations based on the ACEEE database (https://database.aceee.org/):

- Alabama: hybrid administrator (most EE programs in Alabama are led by the state government, with some distribution utilities such as TVA also moving forward to implement and increase their own EE programs).
- Alaska: state administrator (although EE programs Alaska are extremely limited, any activity noted is through the state government).
- Kansas, Louisiana, North Dakota, and Virginia: utility administrator.

system makes them a logical choice for administering EE programs. Utilities can pursue EE programs within the context of broader integrated resource planning, and 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, the state regulatory commission typically approves and oversees all EE program design, budgets, and fund collection mechanisms. Budgets are usually set in the context of a regulatory proceeding, and the utility will design programs within this budget.[30] Savings targets are increasingly set based on jurisdictional policy goals at the state or city level. Some states have a statutory requirement that utilities acquire all cost-effective EE.[31] 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

In states where utilities are established 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.[32] They also typically have the benefit of being a "clear brand that is easily recognized and trusted" by the customers, which leads to a more effective customer acquisition process.[33,34]

Having direct 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.[35] More specifically, they can utilize advanced data analytics for more granular customer

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30 Ratepayer funding approved in such proceedings accounts for the vast majority of EE funding (close to 95% in the U.S. in 2018). Consortium for Energy Efficiency, *2018 State of the Efficiency Program Industry: Budgets, Expenditures, and Impacts*, May 2019, pp. 20, 25.

31 These states are: California, Connecticut, Maine, Massachusetts, Rhode Island, Vermont, and Washington. Annie Gilleo, *Picking All the Fruit: All Cost-Effective Energy Efficiency Mandates*, ACEEE, Summer 2014, pp. 8–76.

32 EPA, *National Action Plan for Energy Efficiency Report*, July 2006, pp. 6–32.

33 Innovation Electricity Efficiency (IEE), *Energy Efficiency: A Growing Utility-Business Solution to Reliability, Affordability, & Sustainability*, IEE Issue Brief September 2013, p. 2.

34 Survey work has indicated that "consumers' first instinct is to contact utilities/electricity providers for energy efficiency activities, but providers still need to build trust and credibility". See Accenture, *Understanding Consumer Preferences in Energy Efficiency: Accenture End-Consumer Observatory on Electricity Management 2010*, pp. 12–15.

35 It is important to note that theoretically all of this data can be provided by utilities to the other administrators, which would then have the same capabilities as the utilities. This would require robust data sharing agreements between utilities and third-party administrators, similar to those implemented in Vermont and Oregon.

segmentation, especially in jurisdictions where smart meters have been deployed.[36] While this is currently happening only at a very limited scale, the expectation is that more utilities will boost their data analytics capabilities and start leveraging their AMI data in ways to improve effectiveness of their customer outreach efforts.[37]

Utilities can 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. Optimal levels of EE would be different when it is co-optimized with other supply and demand side resources in a resource plan compared to a case in which the cost-effective amount of EE is determined outside the resource plan.[38] However, these economically efficient outcomes will emerge only 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 earnings. This incompatibility can be circumvented by policies such as reliable 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 address 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 compares the 2017 average incremental EE savings across states grouped by various incentive mechanisms. For each incentive mechanism, the gray bar represents the average savings for states that do not have an EERS; the teal bar represents the average savings for states that have an EERS, and the red dots represents the average EERS target (annual % savings goal) in those states that have an EERS. Based on this figure, 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.

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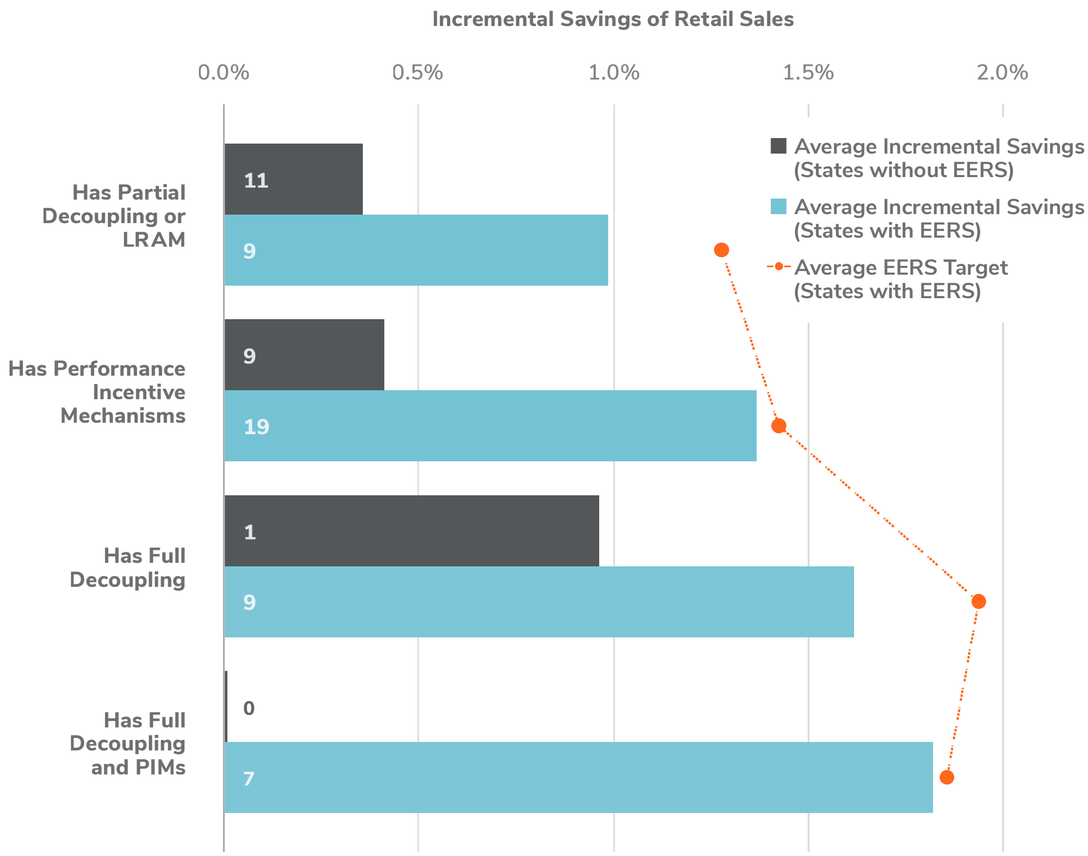
36 C. Holmes, K. Gomatom, and A. Chuang (EPRI), *Unlocking Customer Insights on Energy Savings and Behavior Through the Use of AMI Metering*, 2014 ACEEE Summer Study on Energy Efficiency in Buildings, pp. 11-193–11-194.

37 For specific examples of utilities leveraging AMI data for customer segmentation, see Advanced Grid Research (Office of Electricity, U.S. Department of Energy), *Voices of Experience: Leveraging AMI Networks and Data*, May 2019.

38 EPRI, Incorporating Distributed Energy Resources into Resource Planning: Energy Efficiency, Palo Alto, CA: 2019, 3002016493.

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).

Note: Out of the 26 states with EERS targets, seven states (CA, CT, ME, MA, RI, VT, and WA) have the requirement that the EE administrators achieve all cost effective energy efficiency.[39]

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). In addition, utility EE administrators are held accountable by statutes that could transfer administration to third parties or state in the case of poor performance.[40]

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39 ACEEE Policy Brief, *State Energy Efficiency Resource Standards (EERS)*, May 2019.

40 For example, Act 129 in Pennsylvania states that "If an electric distribution company fails to achieve the required reductions in consumption…responsibility to achieve the reductions in consumption shall be transferred to the commission. The commission shall…a) implement a plan to achieve the required reductions in consumption…or b) contract with conservation service providers as necessary to implement any portion of the plan." See Pennsylvania Public Utility Commission, *House Bill No. 2200, Session of 2008*, accessed October 29, 2019, p. 58.

Finally, utilities are regulated entities that have been set up with the mission of providing safe and reliable power. Pursuit of innovation, which is a requirement to be able to deliver more innovative programs targeting deeper savings, may not come naturally to them (although many utilities have recently been pursuing utility of the future initiatives, which have an innovation mindset at their core).[41] Relatedly, EE may be far down the list of priorities for many utilities, despite its potential to contribute to core utility missions (reliability, affordability, and emerging environmental goals).

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). While some states select a third-party administrator through a competitive RFP process, others create a new governance structure and designate a new organization as the third-party administrator. 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 has designated Energy Trust of Oregon (ETO) as an independent non-profit trust, responsible for administering EE programs.

a. Potential strengths of the third party administrator model

The third-party model exhibits essentially the flipside of the advantages and disadvantages of the 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.

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[41] For example, Green Mountain Power in Vermont has begun expanding its services to "market, finance, and facilitate installation of customer-sited batteries, appliances, and energy efficiency upgrades, while also managing demand-flexibility programs." Commonwealth Edison in Illinois has developed "a vision for a platform utility to integrate and coordinate DERs, including a four-layer structure for the system composed of 1) the physical asset base, 2) system operation and planning, 3) transactive commodity exchange, and 4) a services and solutions marketplace."

For further examples, see D. Cross-Call, R. Gold, L. Guccione, M. Henchen, and V. Lacy, *Reimagining the Utility: Evolving the Functions and Business Model of Utilities to Achieve a Low-Carbon Grid*, Rocky Mountain Institute, January 2018.

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 customer relationships and industry connections previously under the exclusive purview of the utility. As with states that have 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 or to another third party in the case of poor performance. Eventually giving more permanent responsibility to third-party administrators helps promote focus and coordination for long-term planning. 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.

However, it will likely still be essential for the utility to help support EE programs delivered by the third party, most obviously by providing data on customers.[42] The utility maintains a connection and relationship to its customers and can influence the effectiveness of EE programs. It is important to note that customer preferences around electricity service and new technologies have been evolving steadily with more customers expressing interest in green power, self-generation, and storage over time.[43] To the extent that customers work with other market players to meet these preferences, the coordination problem becomes multi-faceted.

As with the 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.

Another important consideration is the "contract structure" for the third-party administrator. While having a competitive procurement process and possibility of contract expiration in the event

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42 A good example to utility and third-party administrator partnership is the "Evolve Panton" project jointly pursued by Green Mountain Power and Efficiency Vermont. Under this project, both entities work with customers to determine their baseline usage data, educate them on cost and carbon implications, and offer technical assistance and financial incentives for deep energy retrofits as well as installation of innovative solutions such as battery storage and renewable distributed generation technologies. See: Green Mountain Power and Efficiency Vermont Announced Evolve Panton, August 22, 2016.

However, Efficiency Vermont has struggled with limited access to AMI data and is in the process of negotiating with electric distribution utilities with regard to sharing of those data going forward. See Efficiency Vermont, *Revised 2019 Update to the Triennial Plan 2018–2020*, prepared for the Vermont Public Utility Commission, April 2019, p. 16.

43 See FERC, *Distributed Energy Resources: Technical Considerations for the Bulk Power System*, Staff Report, Docket No. AD18-10-00, February 2018, p. 7 for recent historical trends in and projections of distributed self-generation and storage capacity.

of poor performance is effective for incentivizing the third-party administrator; limited contract duration may have adverse effects for the desire to undertake longer term projects with large savings materializing at the back-end. While it is beyond the scope of this study to analyze optimal contracting for a third-party administrator model, it should be studied carefully by the decision makers.

Finally, successful branding of the third-party administrator is an important consideration that directly affects the performance of a third-party administrator. The brand should be for the legal entity, and not for the franchise holder. In the event that the franchise holder's contract is not renewed or their contract is cancelled prematurely, the transition to a new franchise holder should be invisible from a customer experience perspective.

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 may move at least partially to a legislative committee.[44] 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 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 authority 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.[45]

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44 For example, in Maine the EE administrator must report to a "joint standing committee of the Legislature having jurisdiction over energy matters and approved by the Senate." That committee is given the opportunity to provide input on the administrator's triennial plan (prior to review by the commission). The administrator must also submit its annual update plans and semiannual budget updates to the legislative committee. See Maine Legislature, *Title 35-A, Chapter 97: Efficiency Maine Trust Act*, accessed October 29, 2019.

45 See About NYSERDA.

b. *Potential weaknesses of the state administrator model*

The state administrator may lack the agility of a third-party or 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, contracting, and staffing 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 do not 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*

The utility and state/third-party hybrid model usually involves the entities working in parallel. 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 across market sectors (*e.g.*, non low income vs. low income) or type of program (*e.g.*, resource acquisition vs. market transformation). It is important to design a hybrid system in a way to minimize confusion for customers and trade allies. This is best done when distinct entities have distinct but complementary missions. While one can argue that competition between entities can potentially lead to a greater diversity of approaches to EE, it is more likely that it will lead to customer confusion.

b. *Potential weaknesses of the hybrid administrator model*

The disadvantage 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 critical to reduce frictions and prevent possible redundancies when it comes to targeting and marketing to the same customers.

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 1 and Table 2 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 models; although it may foster a greater diversity of approaches to EE, it may involve higher transaction costs than either of the separate component models mostly due to coordination requirements.

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 to leverage the comparative advantages of all involved entities and to integrate them seamlessly.

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 1: Potential 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 and incorporate EE in resource planning	⊕		
Access to customer data and analytics	⊕		
Consolidate administrative functions across jurisdiction		⊕	⊕
Respond quickly to evolving industry/customer needs			⊕
Direct accountability/transparency	⊕		⊕
Ability to deliver comparable programs statewide		⊕	⊕

Table 2: Potential Program Administrator Weaknesses

Relative Weaknesses	Program Administrator: Utility	State	Third Party
Lack of access to key customer and system data without data sharing agreements		–	–
Potentially misaligned incentives	–		
Limited ability to provide robust EE program infrastructure and retain staff		–	
Subject to political pressures and budget expropriation		–	
Higher transaction costs		–	–

III. How do the EE Targets and 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. Many states have set long-term targets for efficiency targets and others 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.[46] 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. However, these targets and aspirations are harder to achieve without properly constructed incentive mechanisms. Next, we discuss the role of EE targets and incentive mechanisms in designing and delivering successful EE programs.

A. EE Targets

An energy efficiency resource standard (EERS) establishes specific, long-term targets for energy savings that utilities or non-utility program administrators must meet through customer energy efficiency programs.[47] As of 2017, there were 26 states that set EERS targets, with seven of them requiring the states to achieve all cost effective energy efficiency.[48]

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46 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*, Summer 2014, p. 8-76.

47 See ACEEE, Energy Efficiency Resource Standards (EERS).

48 *Ibid.*

As previous research has shown (Sedano, 2011 and Harrington, 2003), having a clear long-term commitment to energy efficiency is one of the most important determinants of EE success in a state. This is because establishing these goals in the statute or regulatory rule making is a clear signal to the market participants that the state's interest in EE is sustained, encouraging large-scale projects that enable deep-saving opportunities. While the vast majority of the EERS are funded by rate payers, some states supplement this funding via additional payments from capacity markets and sale of greenhouse gas emission allowances.[49]

B. EE Incentive Mechanisms

While the energy efficiency administrator model plays an important role in meeting EE targets in terms of effective program budget setting, management, and in some cases execution, it is 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:[50]

i. **Need for certain and timely cost recovery:** utilities will not have an incentive to fully pursue DSM opportunities if cost recovery for prudent programs 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.

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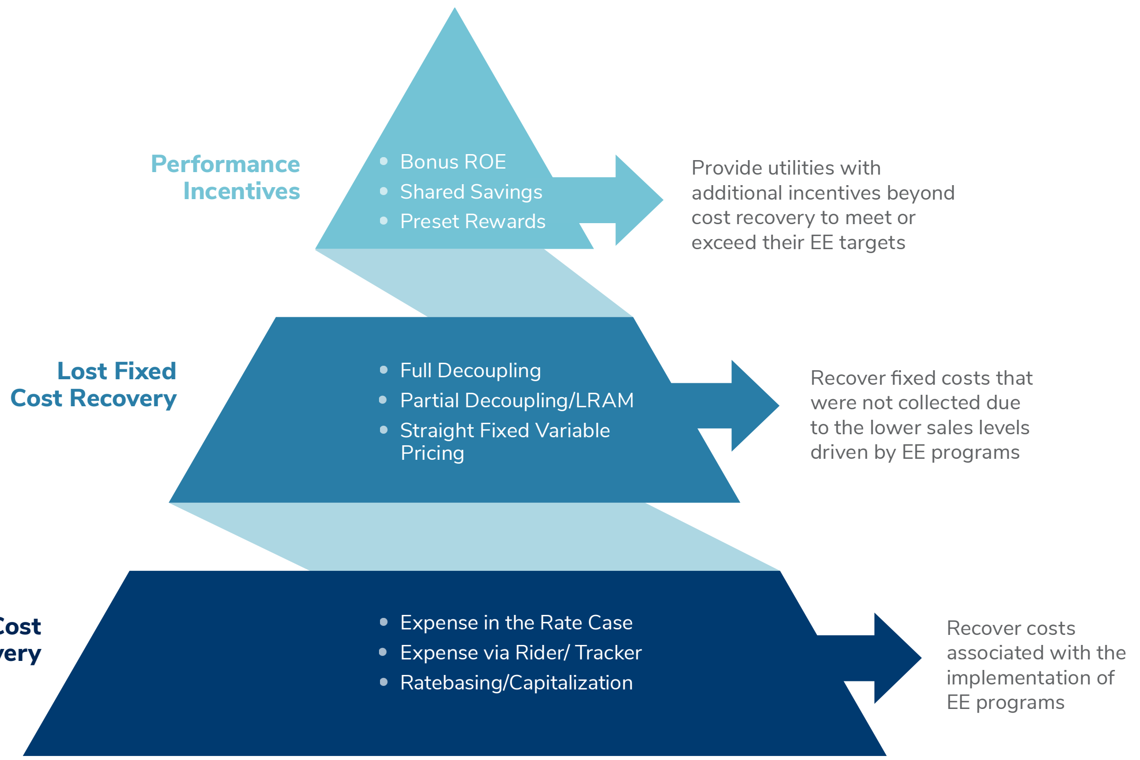
49 EPA, *Energy Efficiency Resource Standards: Background and Resources*, State Climate and Energy Program Technical Forum, January 19, 2010.

50 While these challenges mainly apply to the utility administrator model, they are 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.

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.[51]

Figure 4: Building Blocks of an Effective DSM Policy



Source: The Brattle Group (2019).

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. Program cost recovery typically addresses the return *of* energy efficiency related expenses. However, a small number of states allow ratebasing EE program costs, which provides both a return *of* and *on* the energy efficiency investments. This is a more favorable cost recovery mechanism from a utility perspective, however its application is currently limited, being allowed in only five states.[52]

Lost fixed cost recovery mechanisms are widely utilized across the US. Full decoupling breaks the link between utilities sales and revenues, and allows 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 that 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 does not fully address the throughput incentive (*i.e.*, utilities profits would

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51 See for a detailed discussion of these mechanisms: M. Cleveland, L. Dunning, and J. Heibel, *State Policies for Utility Investment in Energy Efficiency*, National Conference of State Legislatures, April 2019.

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

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. Implementations of EE PIMs vary widely across different jurisdictions, in terms of how the performance targets are set and the type of incentive payments (*i.e.*, shared savings, bonus ROE, preset rewards). While most jurisdictions reward only performance that exceeds established targets, others include both rewards and penalties (if the savings fall below targets).

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 an 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 a few limitations of our study. First, 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 Massachusetts), have a much longer history with and long-standing commitment to EE, our annual savings variable may be understating their true performance over the years.

Nevertheless, 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. Second, while five of the states have implemented ratebasing of the EE expenditures, they have mostly been implemented recently; therefore we were not able to observe their impact during our study time frame.

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 on reported energy savings for all 50 US states and the District of Columbia for the period from 2012 to 2017 (inclusive). Our data main data sources for energy efficiency savings and budgets are ACEEE Scorecards and EIA-861 data and represent data reported by the IOUs and municipal utilities. The dependent variable is EE savings, measured as a percent of annual utility retail sales.[53] 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 3 details the variable categories included in the regression model.

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53 It is important to note that using annual savings may produce particularly strong results in states with a focus on behavioral and other short-term measures and these may not necessarily align with climate or resource planning outcomes that would require a long view of the saving impact. However, we selected annual percent EE savings as our dependent variable because it is the most commonly reported and easily comparable method of benchmarking savings across states. See more on this issue: R. Gold and S. Nowak, *Energy Efficiency Over Time: Measuring and Valuing Lifetime Energy Savings in Policy and Planning*, Report U1902, February 2019.

Table 3: Regression Variables

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

Sources & Notes:
[a]: Report EE Savings—ACEEE State Energy Efficiency Scorecard (2013–2018); 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 (2013–2018).
[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.*

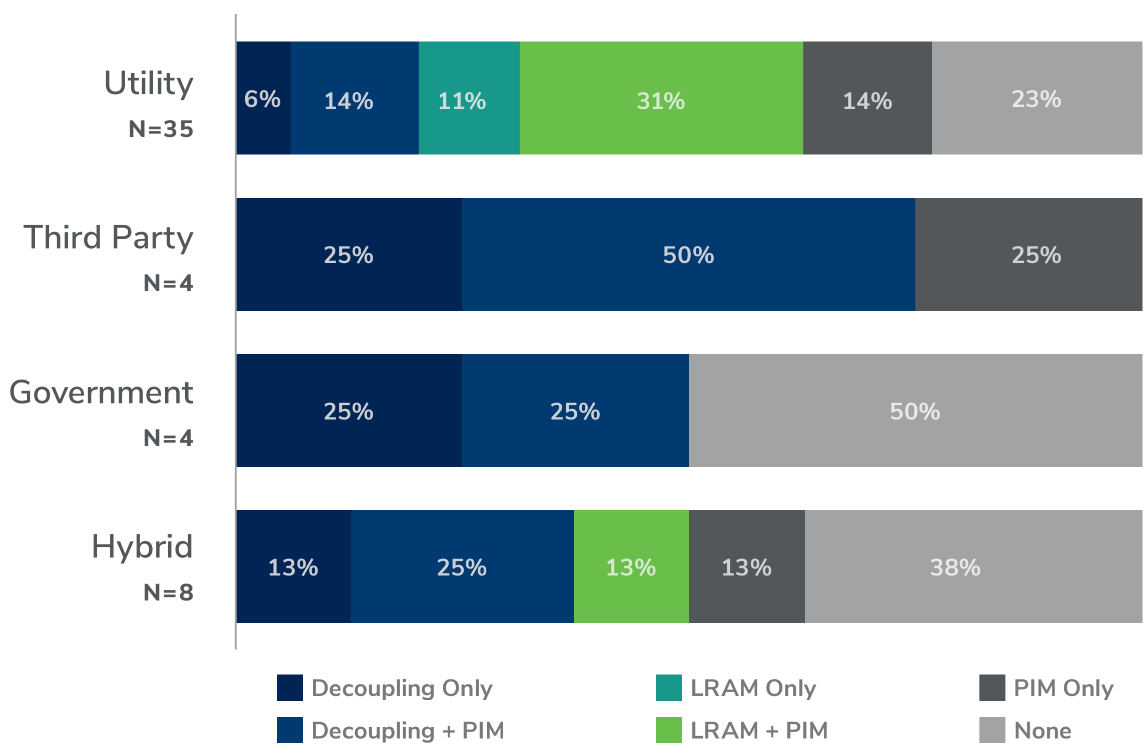
1. **EE Savings**: The dependent variable in our regression model is defined as the ratio of annual energy savings in a state to the total energy sales in that state for a given year. We define this as a percentage to allow for comparison among states with different levels of sales.
2. **EE Administrator 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 average electricity price as higher prices are associated with improved incentives to conserve and shorten customer payback for EE investments, all else equal.
6. **Other**: The 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 us 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 provides a breakdown of different administrator types with respect to incentive mechanisms present in their jurisdictions.

Figure 5: Incentive Mechanisms Present, by EE Administrator Model



It is clear from Figure 5 that an examination of the EE administrator models would be incomplete without taking into account the regulatory incentive model. 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 most states 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.[54]

B. Results

Table 4 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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[54] See Jeffrey M. Wooldridge, *Cluster-Sample Methods in Applied Econometrics: An Extended Analysis*, June 2006 for more detail on fixed vs. random effects models.

Table 4: Regression Results from Alternative Specifications

	MODEL 1			MODEL 2			MODEL 3		
Variable	Estimate	Pr(>|t|)		Estimate	Pr(>|t|)		Estimate	Pr(>|t|)	
Intercept	0.348	0.138		–0.555	0.035	*	–0.388	0.104	
EERS Goal (% of sales)	-	-		0.200	0.003	**	0.181	0.007	**
Full Decoupling (binary)	-	-		-	-		0.132	0.038	*
LRAM (binary)	-	-		-	-		–0.035	0.451	
PIM (binary)	-	-		-	-		0.111	0.016	*
Restructured State (binary)	-	-		0.066	0.458		0.043	0.596	
Electricity Price (¢/kWh)	-	-		0.039	0.002	**	0.033	0.003	**
Utility Administrator (binary)	0.216	0.398		0.275	0.101		0.196	0.204	
Third Party Administrator (binary)	0.961	0.009	**	0.324	0.060		0.186	0.197	
Hybrid Administrator (binary)	0.336	0.242		0.231	0.180		0.138	0.370	
EE Spending (% of revenue)	-	-		0.195	0.000	***	0.186	0.000	***
Year Trend (yr since 2011)	0.030	0.004	**	0.018	0.039	*	0.021	0.032	*
State GDP per Capita	-	-		1.386	0.377		–0.144	0.917	
R^2	0.119			0.844			0.855		

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 associated with higher savings compared to the state administrator model, these impacts are not statistically significant at the 5% level.

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 no longer explain the variation in the annual EE savings. However, increased EERS target and increased EE budget are each associated with 0.18 percentage point (pp) increase in the annual EE savings. Having full decoupling is associated with 0.13 pp increase while having a PIM is associated with 0.11 pp increase in annual EE savings, compared to states without such mechanisms. The LRAM variable impact is negative but insignificant, meaning that LRAM does not seem to have an impact on annual EE savings. Electricity price and trend variables continue to be positive and statistically 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 looked at the characteristics of top 10 and bottom 10 performer states ranked by their average annual savings in the 2015–2017 timeframe. Table 5 provides additional perspective on the regression model results. Of the top ten performers, eight of them have decoupling and nine of them have a performance incentive mechanism. Interestingly, none of the bottom ten performers has a decoupling mechanism in place and only two have 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 5: Top and Bottom 10 Performing States with Respect to Average Annual EE Savings (%)

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

Notes and sources: Admin type: 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 of ACEEE State Database. EE savings and max. EERS goal: ACEEE State Energy Efficiency Scorecard (2012–2017). Incentive types: analysis of the ACEEE State Energy Efficiency Scorecard (2016–2017) and SNL RRA Regulatory Focus (2016–2017).

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 most cost-effective and sustainable framework for administering and delivering EE programs. The selected model should enable pursuit of more innovative programs targeting deeper savings.
- 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 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 opportunities to improve their earnings based on how well they meet certain targets.
- Based on a literature review, the consensus is that no single administrator model is clearly superior to any 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 policymakers to the energy efficiency goals", which does not necessarily result from one particular type of administrator model.[55]
- 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.

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55 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 matters most is having a state level energy efficiency goal, dedicated EE funding, the availability of full decoupling, and performance incentive mechanisms. These four 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.
- 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.[56] However, these economically efficient outcomes will emerge only 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.

56 However, there are other alternative forms of ensuring this coordination in planning functions. Vermont System Planning Committee has been formed in 2007 with a mission to facilitate a complete and timely consideration of cost-effective non-transmission alternatives to new transmission projects. The entity aims to achieve better coordination among Vermont's utilities, transparency to the public about planning activities, and structured mechanisms for public involvement. See: https://puc.vermont.gov/electric/vermont-system-planning-committee-vspc

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 US.

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."[57] 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.[58] 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.[59] 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.[60]

The EEB estimates that utility-led energy efficiency measures saved $56.88 million in 2018, and have saved over $673 million in their lifetime.[61] These efforts reduced over 1.8 billion MMBtus, resulting in a reduction of over 150,000 tons of CO_2 in 2018. The EEB does acknowledge that much

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

58 See www.energizect.com

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

60 See www.ctgreenbank.com.

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

of the public funding allocation to energy efficiency was raided, resulting in only $10 million of the originally $117 allocated for 2018 and 2019.[62]

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.[63] 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.[64] 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.[65] The charge 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.[66] Utilities do often exceed their goals and are able to take advantage of these performance bonuses.

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.[67] The energy efficiency goal was again updated in 2011, with Senate Bill 1125, to establish that once the 30% threshold was met, utilities must ensure that energy efficiency is at least 0.4% of their overall peak demand.[68] Texas utilities have consistently met or exceeded these goals, achieving 595 GWh of energy savings and 408 MW of peak demand reduction in 2016.[69]

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62 *Id*, p. 2.

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

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

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

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

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

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

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

3) Massachusetts

Massachusetts leverages a utility administrator model to have the highest ranked energy efficiency programs in the country.[70] In Massachusetts, distribution utilities administer their own energy efficiency programs and have partnered together to sponsor the Mass Save program.[71] 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.[72] The council was created by the Green Communities Act, which establishes energy efficiency targets set through three-year planning cycles.[73]

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.[74] The importance of energy efficiency is stressed by the highest elected officials in Massachusetts, with Governor Charlie Baker stating the "Three-Year Energy Efficiency Plan is a critical element of Massachusetts' strategy to meet climate goals," and that "energy efficiency is the most cost-effective way to achieve environmental benefits while lowering energy costs."[75]

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.[76] 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.[77]

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.

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

71 See: www.masssave.com

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

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

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

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

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

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

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.[78] Recently, Efficiency Vermont has recognized the growing importance of supply chain partnering activities to provide customer with efficient goods and high-performance buildings.[79]

Act 56 of 2015 created a Renewable Energy Standard in Vermont that took effect in 2017, requiring distribution utilities to achieve fossil fuel savings from energy transformation projects.[80] 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."[81] 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).[82]

Efficiency Vermont operates on a three-year budget cycle, with its compensation linked to specific state-mandated performance goals. In 2018, the administrator had 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).[83]

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.[84]

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

79 Efficiency Vermont, 2018 Savings Claim Summary, April 1, 2019, pp. 1, 11–12.

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

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

82 *Id.,* p. 17.

83 Efficiency Vermont, 2018 Savings Claim Summary, April 1, 2019, pp. 1–2, 28.

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

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.[85] 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.[86] 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).[87]

C. State Administrator Model Case Studies

We provide some detail on each of the US jurisdictions that use the state administrator model: Maine, Delaware, and Washington, DC.

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".[88] 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.[89] The financial incentives often take the form of direct rebates.[90] Customers are able to work with Qualified 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.[91]

Efficiency Maine receives funding from a number of public and private sources, which it then invests in energy efficiency efforts. While the utility customers 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

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

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

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

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

89 Efficiency Maine, *About*, accessed August 2019.

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

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

Program settlement, capacity revenues from ISO-NE, and a long-term contract with Maine utilities.[92]

Efficiency Maine achieved 139 GWh of savings in 2018, and 1,735 GWh since its inception in 2009.[93] 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.[94]

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.[95] 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.[96] 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.[97] 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.[98]

DC exceeded its energy savings goals in 2018, reducing electricity consumption levels by over 135,000 MWh, achieving 157% of its goal.[99]

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

93 *Ibid.*

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

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

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

97 *Ibid.*

98 See Clean Energy DC Omnibus Amendment Act of 2018.

99 DCSEU, *2018 Annual Report*.

3) Delaware

Delaware's state-administered energy efficiency model relies on an 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."[100] The SEU operates Energize Delaware, which operates as a "one-stop resource…to help residents and businesses save money through clean energy and efficiency."[101] 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.[102]

The SEU is primarily funded through revenues from the Regional Green House Gas Initiative (RGGI), receiving 65 percent of annual RGGI funds in Delaware.[103] 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.[104] 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.[105]

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.[106] However, Delaware is falling considerably short of their initial goals due to slower than expected implementation.[107]

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

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

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

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

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

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

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

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

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

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.[108] Such projects must ultimately be approved by the Public Service Commission (PSC). 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.[109] 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.[110]

Funding for EmPOWER is largely through specific energy efficiency charges on customer bills.[111] 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.[112]

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. [113]

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,

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

109 See: EmPOWER Maryland Low Income Energy Efficiency Program

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

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

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

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

establishing key policies and guidelines, setting program goals, and approving spending levels.[114] 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.[115]

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.[116] 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.[117]

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.[118] 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."[119] 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.[120] These targets are captured in Figure A-1, which shows that California will need additional effort to reach its targets under current projections.

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

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

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

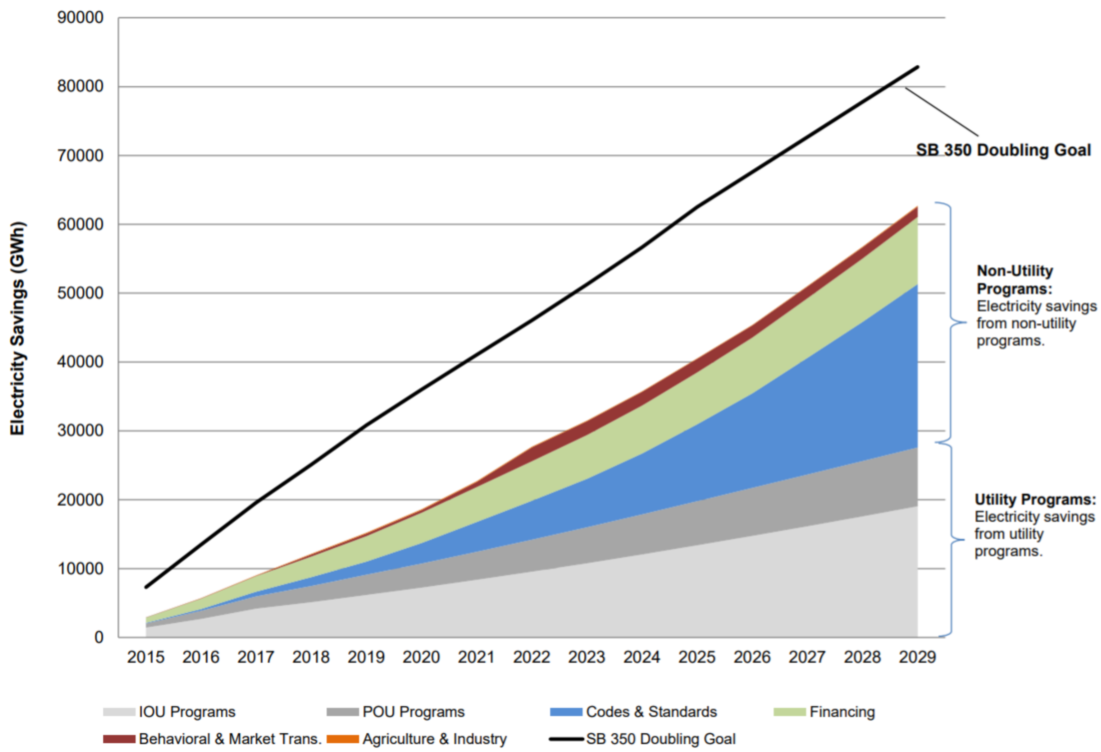
117 Better Buildings Initiative (U.S. DOE), *Energy Leader Partnership*, accessed August 2019.

118 Melissa Jones, 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.

119 *Id.*, p. 1.

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

Figure A-1: California Energy Efficiency Goal and Projections



Source: Melissa Jones, 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.