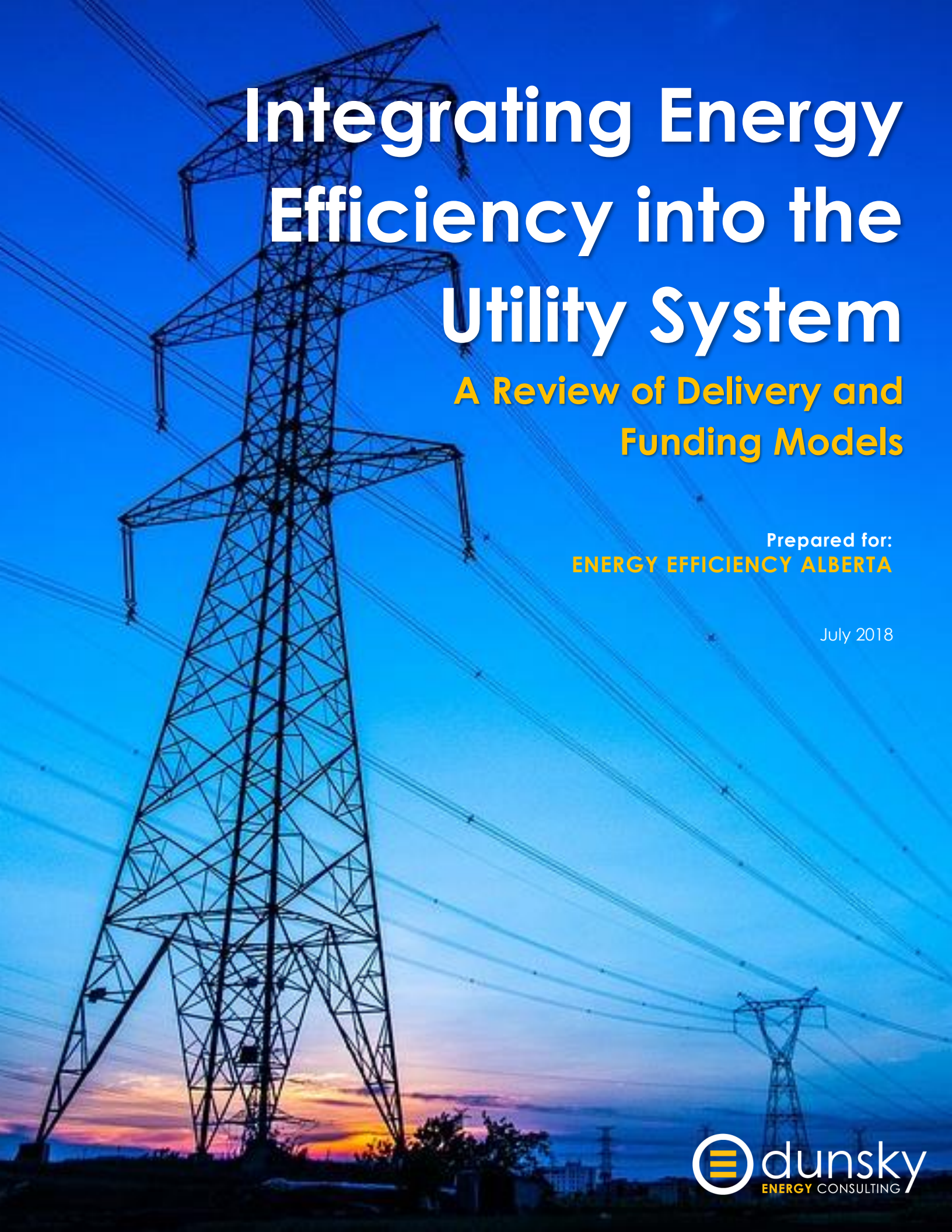

Integrating Energy Efficiency into the Utility System

A Review of Delivery and Funding Models

Prepared for:
ENERGY EFFICIENCY ALBERTA

July 2018

dunsky ENERGY CONSULTING

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ABOUT **DUNSKY**

Dunsky Energy, a leading clean energy advisory, provides strategic analysis and counsel in the areas of energy efficiency, distributed renewables and sustainable mobility. We support clients across North America through three services: we assess opportunities (technical, economic and market), design strategies (programs, plans and policies) and evaluate performance.

Dunsky's team of 20+ experts is wholly dedicated to helping our clients build a sustainable energy future.

EXECUTIVE SUMMARY

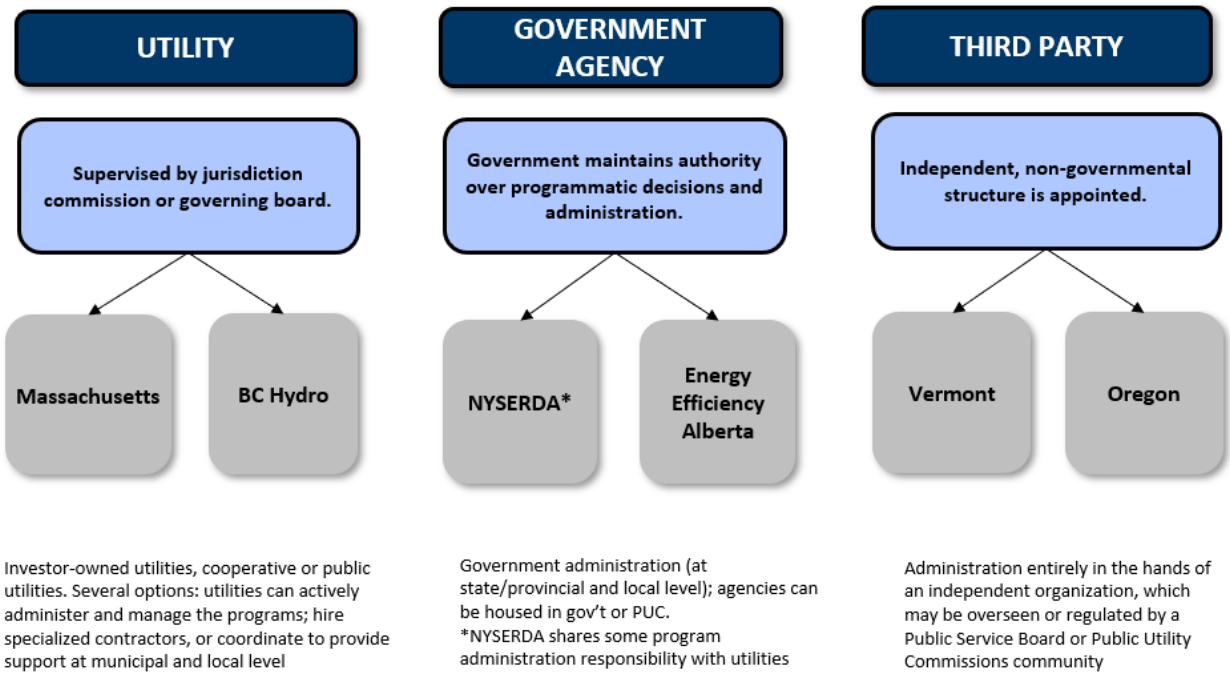
As a first step to understanding the factors that might motivate Energy Efficiency Alberta to engage in further integration with the province's utility system – and what form this integration may take – this paper provides information and analysis related to both energy efficiency program delivery models and program funding mechanisms.

A common thread that emerged through this work is that there is no "right" way to administer or fund energy efficiency programs – each jurisdiction approaches it differently and the result on the ground is a function of the that jurisdiction's political and regulatory history, among other factors. However, there are important themes and takeaways that emerge and can inform discussions around utility integration.

DELIVERY MODEL OPTIONS

There are three basic models of program delivery – utility, government agency, and third-party. In practice, these models are often subdivided (e.g. vertically-integrated utilities versus distribution utilities) and exist as hybrids (e.g. utilities and government agencies running EE programs in parallel).

Figure ES-1. EE Program Delivery Models



Investor-owned utilities, cooperative or public utilities. Several options: utilities can actively administer and manage the programs; hire specialized contractors, or coordinate to provide support at municipal and local level

Government administration (at state/provincial and local level); agencies can be housed in gov't or PUC.
*NYSERDA shares some program administration responsibility with utilities

Administration entirely in the hands of an independent organization, which may be overseen or regulated by a Public Service Board or Public Utility Commissions community

KEY TAKEAWAYS:

- **Each delivery model has its advantages, disadvantages, and there are strategies for overcoming those disadvantages (*see Part A of the report*).**
- **Actual strengths and weaknesses will vary by jurisdictions based on their individual contexts.**
- **Government-run models have tended to show the most instability in funding levels and operational sustainability.**

FUNDING MECHANISMS

Energy efficiency funding mechanisms include the "triggers" that allow/encourage/require investment in energy efficiency as well as the sources of funding for energy efficiency programs. Policy and regulatory triggers can be categorized as planning processes, procurement mandates, ratemaking directives, or climate and energy policy. Sources of funding are equally diverse but can be categorized as public sources, utility sources, and private sources.

Delivery models and funding sources are not directly linked – in fact, a jurisdiction may use a variety of funding sources, especially if it has aggressive goals and targets more than one fuel type. However, the type of delivery model does influence the funding sources that are typically used to fund energy efficiency programs.

Figure ES-2. Sources of Funding Currently used by Energy Efficiency Program Administrators

			DELIVERY MODELS		
			Government Agency	Utility	Third Party
FUNDING SOURCES	Public Sources	**General Revenue**	✓	✓	✓
		Carbon Markets	✓	✓	✓
	Utility Sources	**System Benefit Charge**		✓	✓
		Rate Base		✓	
	Private Sources	**Private Capital**	✓	✓	✓
		Capacity Market		✓	✓
		New Business Models	✓	✓	✓

In addition to the three funding sources presented in Figure 2 above, additional sources of revenue can be collected by the program administrator as a result of their energy efficiency activities. Examples of these sources include the selling of Energy Efficiency Resources Standards or offsets, or the aggregation and selling of loans offered through efficiency programming.

KEY TAKEAWAYS:

- **Each funding mechanisms has advantages and disadvantages (*see Part B of the report*).**
- **Actual strengths and weaknesses will vary by jurisdictions based on their individual contexts.**
- **Funding mechanisms are independent of delivery models; however, utilities and third-parties access the most diverse array of funding options, whereas government agencies will tend to rely on public sources, and to an increasing extent, private capital.**

VALUE PROPOSITION OF UTILITY INTEGRATION

What experience has shown is that, regardless of the specific model and funding mechanism selected, **a key requirement for any program administrator to get energy efficiency to scale is a sufficient and sustainable source of revenue for the programs.** This will become increasingly important as climate change mandates require increasing levels of clean energy resources in order to achieve GHG targets.

How does a jurisdiction ensure there is sufficient and sustainable funding for energy efficiency programs?

There is no one way to deliver and fund energy efficiency programs – each jurisdiction does it a little differently as a result of its legislative and regulatory history. However, based on our assessment, there is a case to be made for **enhanced utility integration** based on the following key takeaways that help bring energy efficiency to scale:

1. **Diversity of Funding**
2. **Stability of Administration (and Funding)**
3. **Expertise and Emerging Opportunities**

CONCLUSION & NEXT STEPS

While there is no "right way" to administer and fund energy efficiency programs, experience in other jurisdictions suggest that there is value in integrating energy efficiency in the utility system – from the perspective of program administration and also more structurally via planning and funding (i.e. procurement of the energy resource alongside supply options). This can help ensure that there is sufficient and sustainable funding to bring energy efficiency investment to scale.

This paper focuses on the evolution of energy efficiency delivery models and funding mechanisms in a general sense. Next steps in this exercise include an examination of what these differences and considerations mean in an Alberta context, including, but not limited to:

- What options are relevant to Alberta;
- How Alberta is unique;
- Where the various models and funding mechanisms fit given the existing make-up of the Alberta utility system; and
- What the trends and future opportunities mean for Alberta utilities and Energy Efficiency Alberta, among others.

TABLE OF CONTENTS

INTRODUCTION

CONTEXT

Across North America, energy efficiency has emerged as a valuable energy resource. As a result, those who administer energy efficiency programs have become an important component of the utility system. This integration may be direct wherein utilities fund and deliver programs, or via government or third-party program administrators and utilities working as partners to ensure a seamless customer experience.

While the degree to which utilities and non-utility program administrators collaborate on efficiency programing will vary by jurisdiction, integration may allow program administrators to benefit from the utility's existing relationships with their customers, access to customer data, relevant utility in-house expertise, and more. Importantly, integration of energy efficiency within the utility system helps to structurally change how the resource is viewed and used by utilities.

This integration is taking place within the context of significant disruptions and changes to North American utility systems, many of which impact energy efficiency. Some examples of how utilities are evolving include:

- The changing face of energy efficiency programs, including, but not limited to a reduction of lighting savings opportunities, increasing use of "smart" technology, a greater focus on multiple fuels, integration with financing programs, and others;
- Changing energy systems/grids with the introduction of smart grids, net metering, electric vehicles, and distributed energy resources; and
- Changing markets, including deregulation, capacity markets, and new business models.

These changes require innovative ways of integrating energy efficiency and Distributed Energy Resources (DERs) within utility systems to achieve maximum benefits and long-term sustainability. **By utility system integration, we are referring to an end result whereby energy efficiency becomes a fully integrated resource in utility (or broader energy system) planning and, all else being equal, demand- and supply-side resources both have the opportunity to compete on a level playing field.** In other words, energy efficiency shifts from "nice-to-have" to a key energy resource.

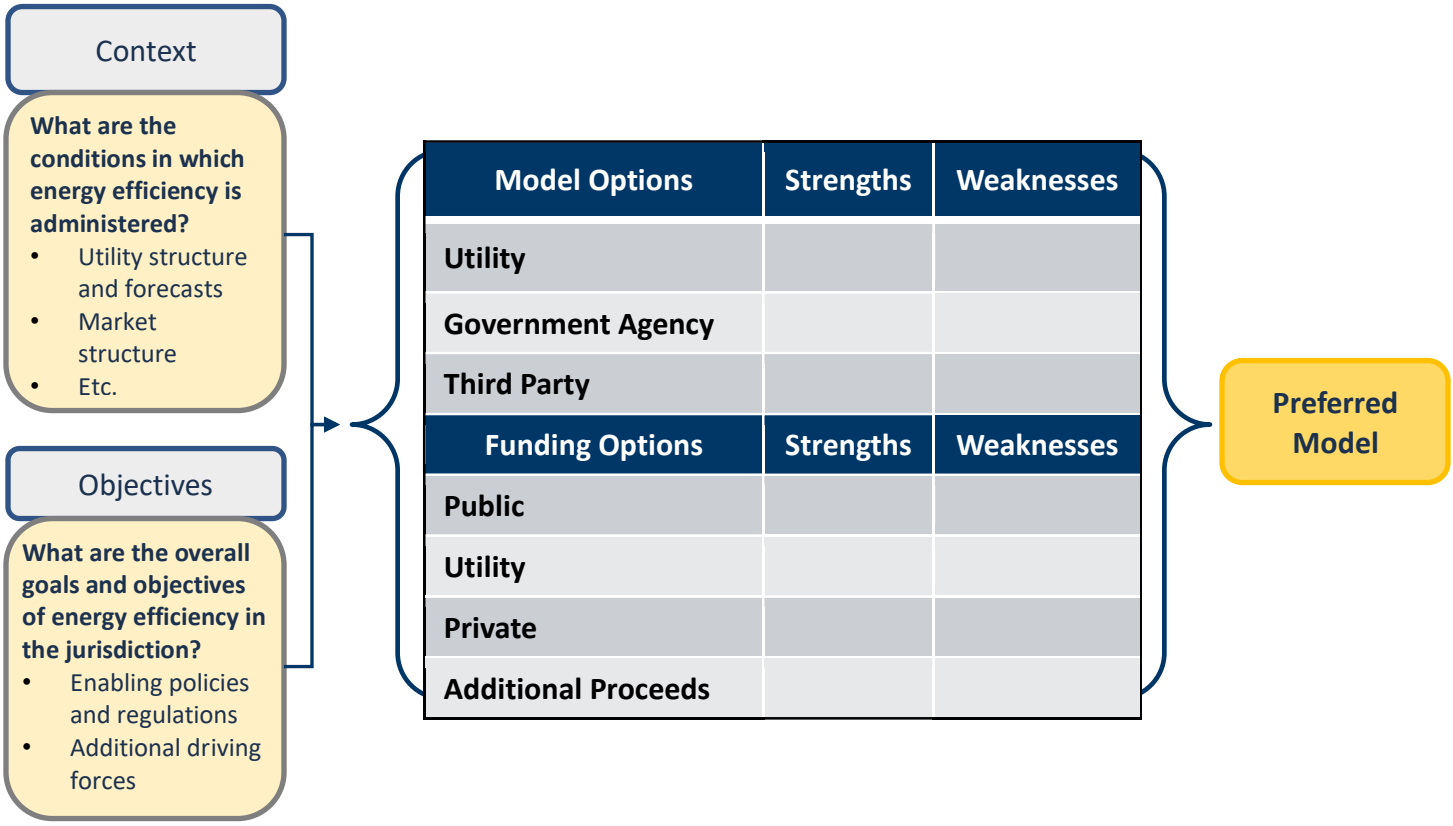
As a precursor to examining the potential ways in which energy efficiency could have greater integration within Alberta's utility system, the Dunsky team was asked to examine utility-energy efficiency integration within a small sample of jurisdictions across North America. To do so, this report examines two distinct, yet inter-related topics:

- Energy efficiency administration models, or the ways in which program administrators are structured to deliver energy efficiency; and
- Funding mechanisms, or the ways in which revenue is provided to program administrators to deliver programs.

It should be noted that while administration models and funding are related, the way in which energy efficiency is administered does not have a direct correlation to how it is funded – jurisdictions use different combinations resulting from their unique situation. In other words, there is no clear "winner" or best model for either an administrative entity *or* a funding mechanism. What is clear, however, is that the

context and objectives of any given jurisdiction needs to inform the preferred or appropriate model for that territory. Figure 1 below indicates what we mean by this.

Figure 1. Overview of preferred model decisions based on multiple considerations



The figure above is intended to illustrate how context and objectives should inform choices of model and funding options for any given jurisdiction. Simply choosing the options with the most strengths and/or fewest weaknesses does not address jurisdiction-specific considerations that will impact actual delivery and integration. Because of these considerations, it is important to understand the various models and options prior to developing a recommended course of action.

Thus, this report provides the following:

- A high-level overview of the ways in which program administrators' activities are delivered within the context of larger utility systems across North America;
- The trends that have emerged and that are evolving over time, in order to understand lessons learned from other jurisdictions and to take into account changing utility systems and considerations as new utility models and areas of focus emerge; and
- An appendix that includes three case studies of leading jurisdictions that represent different models and can illustrate additional details. These case studies should not be interpreted as providing details that would necessarily apply to other jurisdictions with the same models; rather, they are intended to illustrate variations on the general models outlined in this report.

The intent of the jurisdictional scan is not only to identify different utility integration models (the "what"), but also, to the extent possible, highlight how those models have developed over time (the linkages

between the systems in which they have developed and the models themselves). For this reason, **the report does not focus on how these models apply to Alberta or to Energy Efficiency Alberta's context. It also does not provide recommendations for which models could or should be applied to Alberta.** Rather, it is in an informational document designed to provide context and background information as Energy Efficiency Alberta seeks to understand its place in Alberta's utility system.

METHODOLOGY

To complete this work, Dunsky has:

- Leveraged internal staff knowledge on delivery models and funding mechanisms[1];
- Reviewed existing reports on energy efficiency delivery models;
- Researched funding mechanisms as required; and
- Conducted targeted follow-ups with select jurisdictions.

The jurisdictions reviewed were selected because they met the following criteria, which were designed to address diverse experiences and contexts but also be able to be applied to the Alberta context if required at a later stage. The jurisdictions selected were as follows:

Table 1. Selected Jurisdictions and Applicable Criteria

	EE Leader[2]	Significant Integration of Renewables	Varied Customer Classes	Significant Industrial Load	Deregulated/ Market-Based	Capacity Market	Innovation
California	✓	✓	✓		✓[3]		✓
Illinois	✓		✓	✓	✓	✓	?
Massachusetts	✓	✓	✓	✓	✓	✓	✓
New York	✓	✓	✓		✓		✓
Ontario (Electricity)		✓	✓	✓	✓[4]		
Vermont	✓	✓	✓			✓	✓

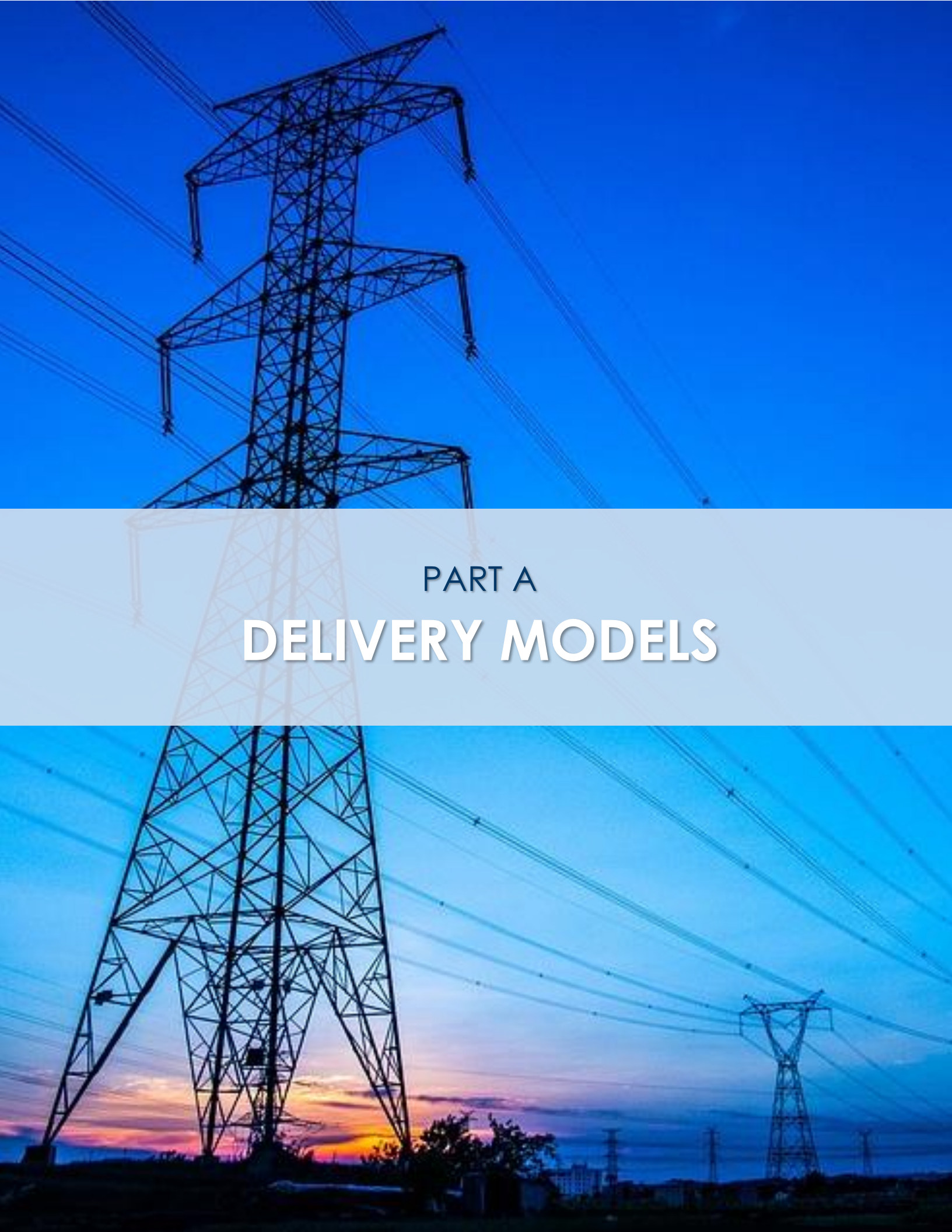
Examples from these jurisdictions are included throughout the report. In addition, three leading jurisdictions – Massachusetts, New York, and Vermont – are included as representative case studies as they also have at least some characteristics similar to Alberta's context—including integration of renewables, varied customer classes with a heavy industrial load, deregulated or capacity markets, and/or innovation in regulatory structures/EE program administration or results/utility practices.

[1] Members of the team have notably worked with or for leading independent entities like Efficiency Vermont, Efficiency Nova Scotia, and Energy Trust of Oregon; crown utilities such as BC Hydro, Hydro-Quebec, Manitoba Hydro, and NB Power; investor-owned utilities such as Pacific Gas & Electric, Northeast Utilities, Fortis BC, and Nova Scotia Power; government agencies such as the New York State Energy Research and Development Authority (NYSERDA), Efficiency New Brunswick (defunct), and Transition Énergétique Québec; hybrid organizations like the Northeast Energy Efficiency Partnership; and regulators such as the New Jersey Board of Public Utilities and the California Public Utilities Commission.

[2] For the U.S. jurisdictions, leadership is based on states consistently included in the top fifteen of the American Council for an Energy Efficient Economy's annual scorecard.

[3] California suspended electricity deregulation; however, there is currently limited retail electricity choice in Investor Owned Utilities' service territories through a lottery system.

[4] Ontario is exploring the move to a capacity market and has already undergone extensive stakeholder consultations.



PART A

DELIVERY MODELS

DELIVERY MODEL OPTIONS

One of the considerations that can impact how energy efficiency is delivered and integrated with the utility system in a jurisdiction is the type of organization responsible for programs. Three common energy efficiency delivery models include utilities, government agencies, and third-party organizations.

We begin the section by describing the key ingredients for effective program delivery, regardless of the model used. Next, we describe each of these models, inherent advantages and disadvantages of each type, and available strategies for overcoming the disadvantages. Each model includes jurisdictional experiences to illustrate key points.

We note that understanding energy efficiency delivery models is important for seeing the bigger picture of how energy efficiency can be integrated within utility systems. However, it is not the focus of this paper; thus, much of the information in this section is from an American Council for an Energy Efficiency Economy (ACEEE) paper by Dunsky and Lindberg (2010),[5] while our research focused more on funding mechanisms and analysis of how the two areas of focus intersect.

OVERVIEW

The structure and delivery of ratepayer-funded energy efficiency programs in North America have changed dramatically over the past three decades, mostly in conjunction with industry restructuring efforts. In the 1980s and 1990s, the vast majority of such programs were initiated, designed and administered by utilities, but efforts in the mid-1990s to restructure and deregulate electric utilities led many jurisdictions to create standalone funds for energy efficiency via 'public benefits charges'. These public benefits approaches established new structures and tasked utilities (or, in some jurisdictions, separate efficiency utilities or other third parties) with administering and delivering energy efficiency, renewable energy, and low-income programs.[6, 7]

While energy market restructuring is occurring less today than it was 30 years ago, states and provinces continue to consider alternative models for administering energy efficiency programs. Drivers for the consideration of alternatives vary by jurisdiction and may include a movement towards multi-fuel energy efficiency programs, an increased focus on climate change, political context or the desire to depoliticize energy efficiency, the arrival of multiple new funding sources (such as carbon tax/market revenues and forward capacity markets), and/or the desire to stimulate private sector investment.

[5] Dunsky, P. and J. Lindberg. 2010. Nobody's Perfect: Choosing (and Improving) Models for Program Administration. 2010 ACEEE Summer Study on Energy Efficiency in Buildings.
[6] Ibid.
[7] Berg, W. et al. 2017. The 2017 State Energy Efficiency Scorecard. Report U1710, American Council for an Energy-Efficient Economy (ACEEE).

Canadian examples of ongoing changes to energy efficiency delivery models:

- 2017/18: Government of Manitoba removes energy efficiency from Manitoba Hydro's mandate and creates a separate Crown Corporation to deliver programs.
- 2016/17: Creation of Energy Efficiency Alberta to support Alberta's *Climate Leadership Plan* efforts through energy efficiency.
- 2016: Creation of *Transition Énergétique Québec*, a public corporation to coordinate the implementation of all programs and measures required to meet Quebec's 2030 energy targets, including efficiency.
- 2014: Electricity Efficiency and Conservation Restructuring Act was passed in Nova Scotia, creating Canada's first energy efficiency utility, whereby government grants a franchise to an organization to supply the electric utility with energy efficiency.

As new drivers compel jurisdictions to consider program delivery options, **several key factors that are critical for success should be kept in mind, particularly with respect to utility integration**. The following section briefly reviews these success factors; it then explores the strengths and weaknesses associated with the basic categories of energy efficiency program delivery: the utility model, the government agency model, and the third-party model.

CRITICAL FACTORS FOR SUCCESS

Based on literature reviews and first-hand experience of Dunsky staff, there is a general consensus that no one model for energy efficiency program delivery is inherently preferable, although the government model may have greater inherent weaknesses than either utility or third-party administration. Ultimately, the model value will depend on local/regional context, as well as on the deployment of strategies to overcome any inherent weaknesses.

Within the context of utility integration, state and third-party models will need to partner with and/or leverage utilities to generate better outcomes for energy efficiency programs, given the increasingly critical role that new and emerging technologies will play in the energy efficiency space. In particular, appropriate integration with utilities would be needed in terms of:

- **Load management**: Options that allow consumers to reduce or shift their electricity usage (including during peak periods) are becoming increasingly important tools in the energy efficiency toolkit. Without direct access to customers and customer data, these technologies cannot be effectively leveraged[8], including:
    - ***Demand response***: allows consumers to reduce or shift their electricity usage in response to peak events using time-based rates or other forms of financial incentives (e.g. time-of-use pricing, critical peak pricing, variable peak pricing, real time pricing, or critical peak rebates).
    - ***Smart-grid technologies***: allows for the integration of technologies and systems (including electronics, communications, and information technology) to optimize grid operations in a dynamic manner. It can also incorporate demand response and consumer participation in system operations (for example, in-home displays or home-area-networks make it easier for

[8] US DOE. Demand Response. Available on-line at: https://www.energy.gov/oe/activities/technology-development/grid-modernization-and-smart-grid/demand-response.

consumers to changes their behaviour and reduce consumption at peak periods based on real-time information on their power consumption and costs.
    - ***Direct load control***: allows utilities to cycle plug-in loads (e.g. air conditioners, water heaters) on and off during periods of peak demand in exchange for a financial incentive and lower electric bills.
    - ***Demand control***: allows consumers to become involved in managing utility load by using more energy during off-peak times (generally in response to time-of-use rates). Unlike the technologies described above which aim to reduce energy consumption in response to peak events, demand control technologies serve to *avoid* peak events.

- **Electric vehicles (EVs):** The increasing adoption of EVs will have a significant impact on the grid and introduce new opportunities for efficiency savings. In particular, EV charging represents a particularly flexible load that can be optimized with time-of-use (TOU) rates or smart charging, and EVs can even potentially be a source of energy storage for the grid. Like the technologies listed above, not having direct access to EV customers and their associated data introduces challenges for maximizing such savings opportunities.
    - ***EV charging with TOU rates***: pricing that reflects the relative cost of delivering electricity depending on the time of day to encourage EV drivers to charge their vehicles during periods of relatively low demand on the grid. Additional metering equipment is needed if TOU rates apply only to the EV (not to the whole home/building).
    - ***Smart charging***: allows charging loads to respond more precisely to varying grid conditions (such as unexpected peak loads or variable renewables) than TOU rates by establishing communications between the EV or charging station and a centralized controller (e.g. a utility control center or a local load management system). More advanced TOU rate structures (e.g. Real Time Pricing) can be considered a form of smart charging.
    - ***Vehicle-to-grid***: allows EVs to provide power back to the grid by leveraging the vehicle's onboard battery as a form of energy storage for the grid and using similar communications capabilities as described for smart charging. This is particularly valuable in the context of resilience, where a vehicle can provide backup power to a home during power outages. A bidirectional charger must be integrated into either the EV or the charging station to allow the flow of power back to the grid.

- **Distributed energy resources/Demand-side renewable energy (RE) opportunities**: Collaboration between energy efficiency programs and emerging demand-side renewable energy opportunities (in particular, distributed solar power) will grow increasingly important over time. Net metering, along with mechanisms that compensate distributed energy resources based on when and where they provide electricity to the grid (e.g., NYSERDA's Value of Distributed Energy Resources (VDER)), will become critical for promoting the successful uptake of renewable energy.

- **Long-term planning and load forecasting:** Linkages between supply and demand as well as transmission and distribution are critical for capturing synergies between utilities' planning functions and EE program activities.

While the above challenges do not apply to the utility model, a different set of integration challenges are typically at play for utilities that are not issues for the government agency or third-party models. These integration challenges include:

- **Multi-fuel mandates**: Electricity, gas, oil, propane and wood efficiency efforts should be co-delivered or closely coordinated. Thus, for energy efficiency markets that encompass multiple energy sources, particularly for heating, utility models may face integration challenges. Generally single-fuel utilities limit their efficiency activities to single-fuel programs, however all other things being equal, a single program that can deal with all heating fuels will be more effective than multiple single-fuel programs.

- **Market transformation initiatives**: Energy efficiency delivery benefits significantly from the integration of market transformation initiatives such as finance, codes and standards, and building labelling, which typically fall within government's domain, largely outside direct utility influence.

In addition to the above considerations, it is useful to clearly define other organizational factors that comprise an "effective" administrative structure for consideration across the delivery model types. We suggest that success depends upon the administrator having the following attributes:

1. **Effective oversight/strong accountability:** A single, separate body should be responsible for oversight, with significant independent evaluation, monitoring and verification capacity. If responsibility is divided between multiple organizations, parties can spend too much time assigning blame for ineffectiveness rather than striving for savings goals. The overseeing body must also have sufficient resources to evaluate and approve program plans in a timely fashion and provide enough flexibility to program administrators to allow them to respond quickly to market changes.

2. **Strong internal governance:** An independent Board of Directors and an organization with clear procedures/controls is important for ensuring the organization maintains credibility and accountability.

3. **Organizational focus on energy efficiency:** Clear, measurable and performance-based objectives around energy savings and other goals need to be set out by governing bodies. Ideally, objectives will be externally defined and both short- and long-term, which allows for flexibility in the short-term to adjust to market conditions while still meeting long-term targets. Flexibility to go beyond set targets is also ideal.

4. **Well-aligned incentives**: The administrator needs to be free of conflicts of interest (such as earning revenue from energy sales), and should have strong incentives (such as decoupling and incentives tied to efficiency performance) to achieve and exceed energy savings goals.

5. **Flexibility and responsiveness**: Efficiency programs intervene in real markets. The administrator needs to have the capacity to adjust program designs "on the fly" to respond to shifting markets and feedback from program experience. While long-term program-planning cycles are critical, annual adjustments must be made as evaluations, new data, and program insights are used to revise and enhance program offerings.

6. **Appropriate geographic scope**: The administrator's jurisdiction needs to fit the market and larger regulatory context. In practice, this means as close to state- or province-wide as possible. Market transformation initiatives (which focus on more than financial incentives and are designed to overcome market barriers that exist for products, technologies, and practices that yield higher energy efficiency) such as codes and standards, building labelling, performance specifications, marketing campaigns, midstream or upstream incentives, and training, can also require regional coordination.

7. **Long-term predictability**: The administrator must have the ability to make long-term plans. This requires a multi-year mandate, predictable financing, and a stable policy environment. From the market's perspective, the program's brand and offerings need to be relatively stable, reliable and predictable to ensure customers and market actors buy-in.

8. **Stakeholder consensus**: Broader consensus will lead to more successful programs and energy savings results, regardless of the delivery model selected.

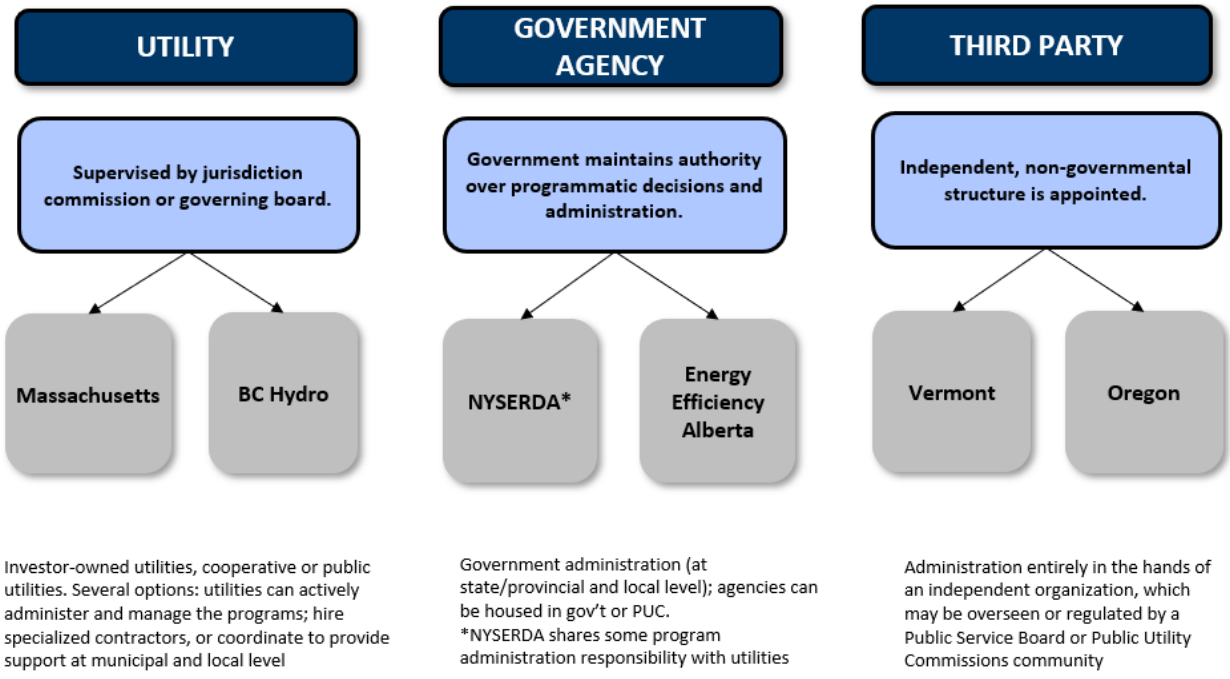
9. **Ability to innovate and take risks**: This includes initiatives that focus effort on fostering innovation, both in the types of services offered to the market, and in the promotion of innovative technologies and practices.

10. **Access to customer data and customer relationships**: Access to customers and customer data/ databases is critical for efficient program design and delivery, as well as communication and outreach opportunities (e.g. bill inserts, in-field account managers), and appropriate measurement and verification (based on customer consumption data).

BASIC MODELS

The three basic models of program delivery – utility, government agency, and third-party – are illustrated in Figure 2, with examples of jurisdictions highlighted for each. In practice, these models are often subdivided (e.g. vertically-integrated utilities versus distribution utilities) and exist as hybrids (e.g. utilities and government agencies running EE programs in parallel).

Figure 2. EE Program Delivery Models



The remainder of this section describes each of the three basic energy efficiency delivery models, as well as the advantages, disadvantages, and strategies for overcoming those disadvantages associated with each one. **As explained in the Introduction, actual strengths and weaknesses will vary by jurisdictions based on their individual contexts; however, this section highlights general considerations to provide some analysis on which to base decisions.** We also include a brief note addressing other actual or potential models in North America.

UTILITY MODEL

The utility model is the most common approach for energy efficiency administration in North America. Whether utilities operate as private entities or Crown corporations, vertically integrated, distribution-only, municipally-owned, or cooperatives, all have the fundamental task of operating the distribution system that connects customers to the grid, and all reach customers every day; as such, they offer inherent advantages for administering energy efficiency services as part of their scope (RAP 2011).[9] The utility model is used in many leading energy efficiency jurisdictions, such as Massachusetts and California, as well as others like Illinois and Ontario.

Advantages of the Utility Model

As described above, the utility model brings many advantages around integration that the other models do not inherently afford. These include:

- **Existing customer relationships and data**: Utilities have established relationships with their customers and have unique access to information such as billing data. This not only provides critical information and direct touch points, it also enables the use of new technologies to optimize energy efficiency opportunities.
- **Long-term planning**: Utilities can integrate efficiency into supply planning more easily, having control over the full spectrum of demand- and supply-side activities. Or, in the case of wires-only companies, transmissions and/or distribution system planning.

In addition to these advantages, the utility model also offers the following benefits:

- **Existing capacity**: Where strong utility efficiency programs exist, the utility will have substantial existing in-house expertise and infrastructure (analytical tools, marketing materials, contractor relationships, etc.). This existing capacity is a tremendous advantage.
- **Customer relationship incentive**: Utilities support efficiency for customer relations reasons.
- **Accountability**: Utilities' regulatory oversight provides high levels of accountability.

Disadvantages of the Utility Model

- **Single-fuel programs**: Single-fuel utilities generally run single-fuel programs.
- **Conflict of interest**: A major issue has been the conflict between an investor-owned utility's prime mandate – to increase profits – and the goal of efficiency programs – reduced use.
    - We note that while government-owned utilities do not face the profit driver, these utilities still provide revenue to provincial or state coffers and may face similar barriers.
- **Utility business culture**: Efficiency can be marginalized within utility corporate culture.
- **Redundancy between utilities**: Multiple utilities running separate programs can face:
    - **Administrative redundancy** leading to higher costs
    - **Confusion in the market place** among customers and market actors.
    - **Difficulty effectively targeting markets** larger in scale than utility territories.
- **Burden of litigated ratemaking**: Although regulatory oversight has many advantages (stakeholder involvement, high evaluation, measurement and verification (EM&V) standards), it is time-consuming and costly.

Overcoming Disadvantages of the Utility Model

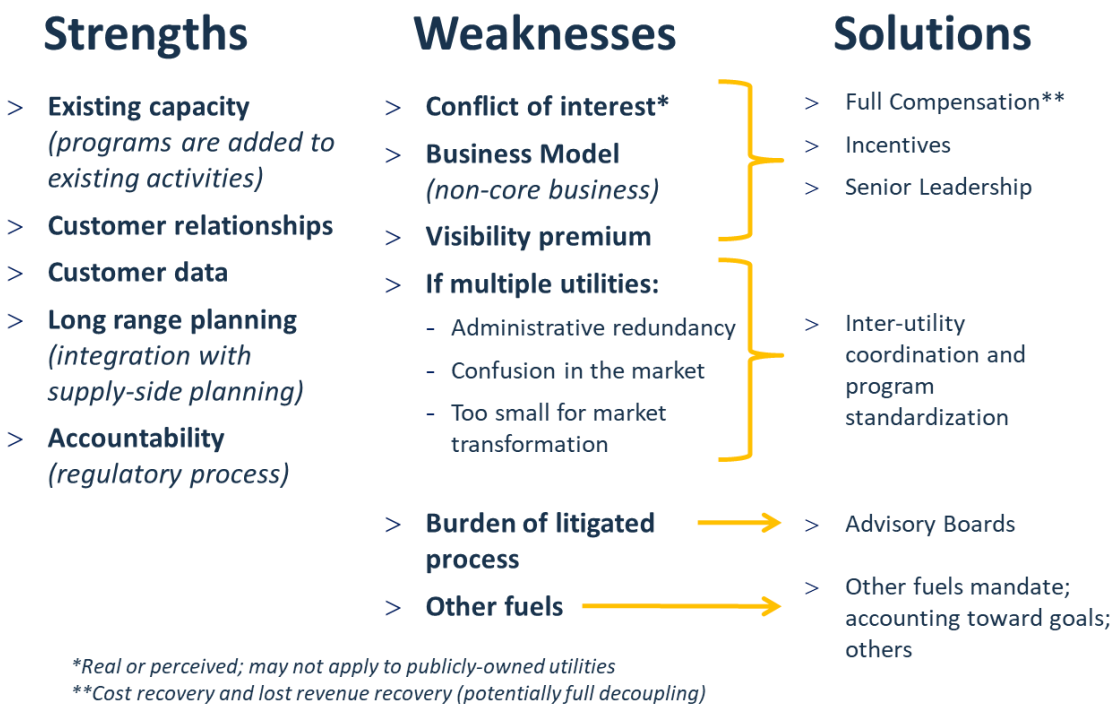
- **Other fuels mandates**: Governments can mandate and fund all-fuels efforts by utilities.

[9] Sedano, R. 2011. Who Should Deliver Ratepayer-Funded Energy Efficiency? A 2011 Update. Available on-line at: http://www.raponline.org/knowledge-center/who-should-deliver-ratepayer-funded-energy-efficiency-a-2011-update/.

- **Compensation and Incentives such as performance incentives (to incentivize a focus on EE) or lost revenue recovery mechanisms such as decoupling whereby the utility is kept "whole" and can recover revenue, or a portion thereof, lost through EE efforts:** Many regions have adopted one or more of these strategies to overcome the conflict of interest between a utility's primary driver (profit via sales) and efficiency.[10]
- **Senior Leadership**: Senior-level "champions" can overcome corporate culture barriers by prioritizing energy efficiency within strategic plans, etc.
- **Inter-utility coordination**: Coordination can reduce redundancy and market confusion.
- **Stakeholder Advisory Boards**: Effective stakeholder advisory boards operate 'upstream' of the regulatory process to allow stakeholders and utilities to develop an informal consensus that streamlines ratemaking. To be successful, a stakeholder board must have broad representation, sufficient funding and, in particular, access to expert council. This model has been used effectively in Massachusetts, where the distribution utilities that administer their own energy efficiency programs receive collaborative input and oversight from the Massachusetts Energy Efficiency Advisory Council, a stakeholder body chaired by the state Department of Energy Resources.

Figure 3, below, summarizes the utility model and how to address its weaknesses.

Figure 3. Utility Model: Strengths, Weaknesses and Solutions



GOVERNMENT AGENCY (EEA) MODEL

[10] Designing a regulatory structure that effectively aligns utility incentives with energy efficiency goals is, however, a difficult task, and some efforts have led to high administrative costs, utility 'gaming' and unintended negative consequences. (Kushler, Martin York, Dan and Patti Witte. 2006. Aligning Utility Interests with Energy Efficiency Objectives: A Review of Recent Efforts at Decoupling and Performance Incentives. Available online at: http://ceaa.gc.ca/050/documents/48651/48651E.pdf).

A few states and provinces have given responsibility for efficiency programs to a government agency in whole or in part. The difference between government administration and third-party administration can be a grey area, depending on the level of independence of the agency and its use of third-party implementation contractors. Many jurisdictions, such as New York, Alberta, and Manitoba, have or are developing utility-managed programs running in parallel with government-managed programs.

Advantages of the Government Agency Model

- **Reduced conflict of interest**: Government agencies do not face the profit-vs.-efficiency conflict.
- **Economies of scale**: Government agencies can avoid administrative redundancies.
- **Consistent programming**: Single, jurisdiction-wide programs reduce confusion in the market, making it easier for consumers and market actors to take part.
- **Market transformation**: Government-wide programs can tackle market transformation more easily.
- **Integration with related programs**: A government agency can integrate additional government objectives such as climate-change considerations or low-income support more easily into its programs than a regulated utility.

Disadvantages of the Government Agency Model

- **Lack of access to utility data and customer relations**: Utilities can be reluctant to share customer data, and non-utility administrators lack utility customer relationships.
- **Difficulty integrating efficiency into long-range planning**: Integrated resource planning can be more difficult when efficiency and generation planning responsibility is split.
- **Vulnerability to government appropriation of funds:** This is a potentially serious issue whenever the government handles or has access to efficiency funds directly; if government priorities change or other departments require additional revenue, then funding may be withdrawn, making for an unstable market presence. This issue has been faced by New Jersey, Connecticut, Rhode Island, and many other jurisdictions.
- **Vulnerability to political pressure**: Government agencies may be more directly vulnerable to political pressure than utilities or third parties under contract.
- **Lack of flexibility**: Government agencies can be less flexible than utilities or third-party contractors, either because of hiring and procurement policies or a bureaucratic culture.[11]
- **Lack of performance incentives**: Government agencies cannot be given financial incentives to ensure a focus on mandate is achieved.
- **Visibility premium**: Oversight bodies of government agencies may place an implicit premium on initiatives with high public (voter) visibility, potentially crowding out more effective -- but less visible -- approaches.
- **Government competition in market**: In some regions it may be problematic for a government agency to compete with other providers (i.e. utilities) in the open market.
- **Reduced oversight**: Where responsibility for program oversight and program delivery is shared, there can be possible conflict of interest (if perception is that results must be positive rather than accurate) or reduced evaluation efforts to avoid differences between tracked and evaluated results.
- **Conflicting objectives**: Where a government agency has multiple objectives beyond energy efficiency, there is potential for a conflict of interest or a lack of focus on efficiency.

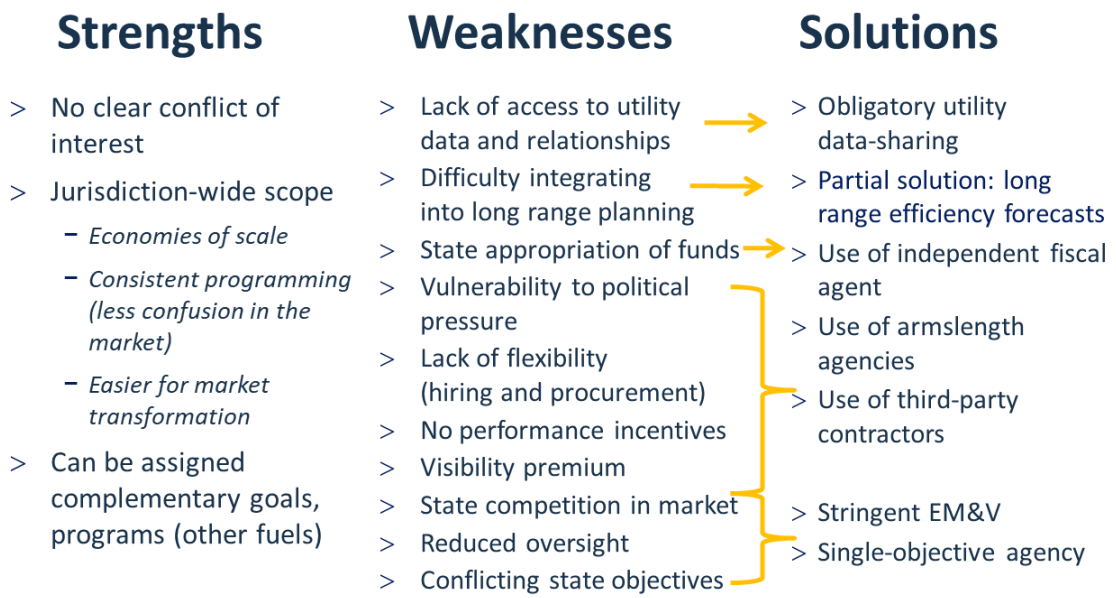
[11] However, the actual level of flexibility of a given program administrator will depend as much on organizational practices as the type of administrator (utility or state agency).

Overcoming Disadvantages of the Government Agency Model

- **Obligatory utility data-sharing**: This can be useful where utilities resist data sharing.
- **Long-range efficiency forecasts (partial solution)**: A long-range forecast allows utilities to integrate efficiency projections into their supply side planning to some extent.
- **Use of independent fiscal agents**: The use of an independent fiscal agent to collect, manage and disburse efficiency funds can protect funds from government appropriation.
- **Use of arm's-length agencies**: A relatively independent agency is insulated from political pressure and can have more flexible hiring and procurement practices. NYSERDA is an example of such an agency.
- **Use of third-party contractors**: Some government agencies rely heavily on third-party contractors to assist in program administration. Again, NYSERDA provides a good example of an agency that uses this strategy.
- **Stringent EM&V**: Rigorous independent evaluation requirements can ensure appropriate oversight levels.
- **Single-objective agency**: Conflicting objectives can be avoided simply by creating a dedicated, single-purpose agency.

Figure 4, below, summarizes the government agency model.

Figure 4. Government Model: Strengths, Weaknesses and Solutions



THIRD-PARTY MODEL

Some jurisdictions have developed an independent, non-governmental structure to administer energy efficiency programs. This is an organization separate from government or the utility, but one that generally liaises with both to ensure an integrated program delivery approach for customers. Vermont, a current leader in energy efficiency, was the first jurisdictions to adopt the third-party administration model for efficiency programs. Oregon has also had a long-standing independent administrator. Other jurisdictions have innovated on this model, including Maine and Nova Scotia.

Advantages of the Third-Party Model

- **Multiple fuels**: A third-party organization can be assigned responsibility for multiple fuels.
- **Focus on efficiency**: A dedicated third-party organization will not have the conflicts of interest faced by utilities or the multiple objectives faced by some government agencies.
- **Jurisdiction-wide scope**: A single organization can achieve administrative economies of scale, provide consistent programming and more easily target market transformation.
- **Flexibility**: A third-party organization can respond quickly to the market by hiring and implementing procurement and program design changes, if given sufficient flexibility.
- **Performance incentives**: Third-party entities can be given performance incentives.
- **Protected funds**: Third-party agency financing mechanisms can avoid government appropriation.
- **Competitive bidding**: This is especially effective when an agency is first created.

Disadvantages of the Third-Party Model

The third-party model shares two of the same disadvantages related to utility integration as the government model:

- **Lack of access to utility data;** and
- **Difficulty integrating into long range planning.**

Unlike the government model, the third-party model also faces two additional unique challenges:

- **Short term contracts:** To preserve the advantages of competitive bidding, contracts for third-party administration are often short. This makes long-term planning difficult for the administrator, and the selection process can be costly and time consuming.
- **Incumbent competitive advantage:** Once an incumbent organization has gained experience they have a strong competitive advantage in future bidding processes.

Overcoming Disadvantages of the Third-Party Model

Some of the same strategies used for overcoming disadvantages at the government level can be used for the third-party model:

- **Obligatory utility data sharing;** and
- **Long-range efficiency forecasts.**

Two strategies tailored to third-party administrators are:

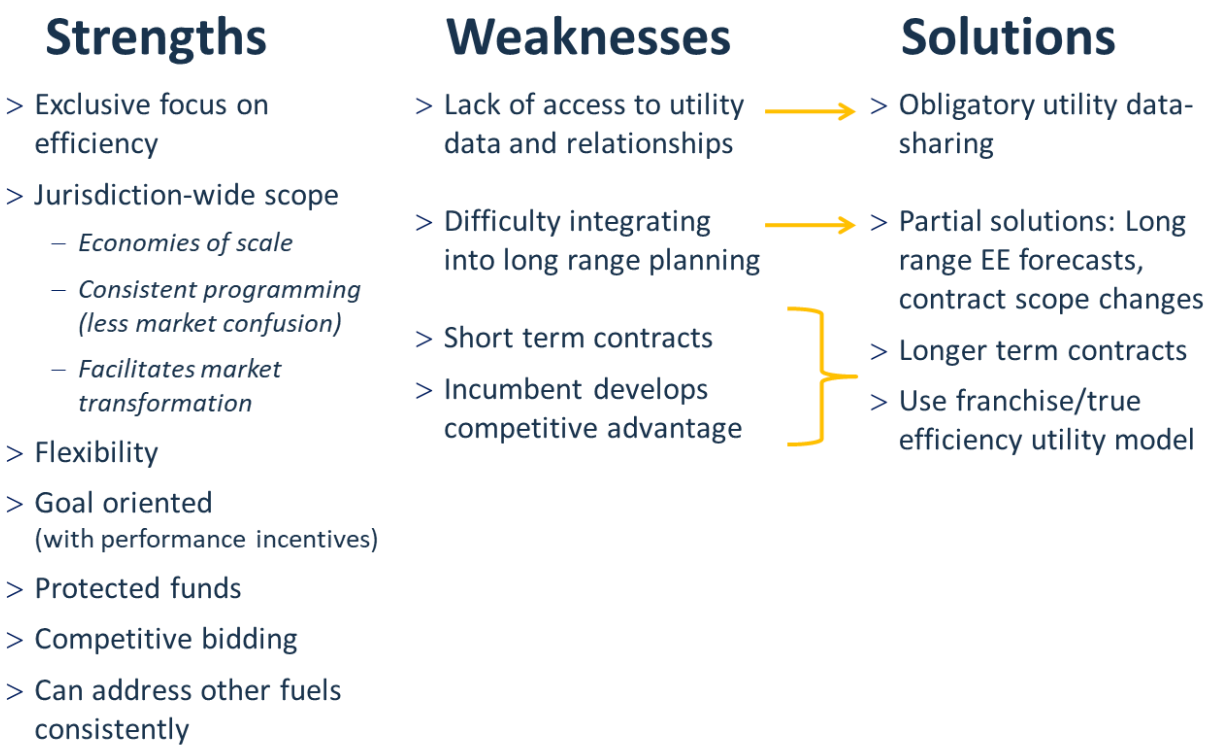
- **Longer term contracts**: longer terms (5 to 10 years or more) can facilitate long term planning and have the added benefit of reducing selection costs.[12]

[12] On the other hand, relatively regular competition arguably creates a strong incentive for the incumbent to remain effective and high performing.

- **Franchise/"efficiency utility" model**: A franchise model, such as that used by traditional investor-owned utilities and other industries such as the cable television industry, also allows longer-term planning and reduces selection costs. Under this type of approach, a public utilities board controls the franchise and can choose to review the franchisee's performance against targets after a period of time if necessary. This has been adopted in Vermont (see case study) and Nova Scotia.

Figure 5, below, summarizes the third-party model.

Figure 5. Third-Party Model: Strengths, Weaknesses and Solutions



OTHER MODELS

As previously noted, there are many variations from the traditional, simplified model distinctions presented above. Many of the jurisdictions cited above are in fact **hybrids**, with responsibility divided between two or more administrators. For example, the New York State Energy Research and Development Authority (NYSERDA) runs programs and focuses on policy and jurisdiction-wide initiatives, but utilities also run their own programs.

These "other" delivery models can be explored further during subsequent phases of this work.

KEY CONSIDERATIONS

This section outlines takeaways regarding energy efficiency delivery models, including benefits and drawbacks of the options presented in the previous section, as well as trends observed in the industry.

BENEFITS AND DRAWBACKS

Building on the specific strengths and weaknesses of the three basic program delivery models,

Table 2 below summarizes how each model generally performs relative to the key success factors noted at the start of this section. **We note that the summary focuses on the models in general; exceptions can be found for each factor and model in specific jurisdictions.** The intent is to provide an overview of considerations for each model rather than identify "better" or "worse" options. As noted, most of the inherent model weaknesses can be mitigated or even overcome through careful design, be it through regulation or otherwise.

Table 2: Summary of Basic Delivery Model Attributes

Key Factors for Utility Integration and Overall Success	Basic Delivery Model Options		
	Utility	Government Agency	Third Party
Utility Integration			
Demand control	●	◐	◐
Demand Response /smart grid	●	○	○
Electric vehicles	●	○	○
Demand-side RE options	●	◐	◐
IRP planning/load forecasting	●	○	○
Other Integration Factors			
Integration of multi-fuel mandates	○	●	●
Integration of market transformation initiatives	○	●	●
Organizational Factors			
Effective oversight/strong accountability	●	◐	●
Organizational focus on energy efficiency	○	●	●
Well-aligned performance incentives	●	◐	●
Long-term predictability	●	◐	◐
Appropriate geographic scope	○	●	●
Access to customer and customer data	●	○	○
Flexibility and responsiveness	◐	○	●
Ability to innovate and take risk	◐	○	●
Stakeholder consensus	◐	◐	●

● Strong attribute

◐ Potential weakness, can be mitigated relatively easily

○ Weakness

TRENDS

Energy efficiency programs, and how they were funded, were originally relatively standardized. This was due to the first programs being initiated and delivered by utilities. Over the past 30-40 years, however, programs have evolved to a myriad of delivery model options. In this section we outline some of the changes that have occurred over time with respect to energy efficiency program administration that are relevant to this discussion.

It would be overstating similarities in the energy efficiency industry to suggest there are specific trends in the delivery model. However, we offer the following notes about changes that have occurred over time.

- **Emergence of non-utility models:** Energy efficiency was originally delivered almost exclusively by utilities (at least on a large scale), but there has been a movement away from the utility-run model in recent years as governments and regulators have initiated government agencies or third-party administrators for various reasons, including considerations that do not easily fit into traditional utility models and mandates (such as climate change) as well as to avoid potential (or actual) conflicts of interest.
- **Instability in government-run models:** Government-run models have tended to show the most instability in funding levels and operational sustainability. One example of this is Efficiency New Brunswick, where funding fluctuations resulted from shifting government priorities over time.

These trends do not indicate cause-and-effect relationships of various models or considerations as we look to the future. **However, being aware of them is beneficial when examining the future of energy efficiency integration within utility systems**.

PART B

FUNDING MECHANISMS

FUNDING MECHANISMS

OVERVIEW

There are a number of ways in which energy efficiency programs can be funded. Some have been relied on for decades; others are emerging in response to an evolving energy system that must accommodate changes such as increased distributed energy resources.

Many factors influence the choice of funding mechanism in a jurisdiction. In many cases, multiple sources and triggers are used to fund energy efficiency programs. For example, three key sources of funding exist for energy efficiency activities in Massachusetts:

- Electric and natural gas distribution companies have an "all cost-effective" energy efficiency mandate, and funding for programs to fulfill this mandate is collected through a System Benefit Charge (SBC);
- Energy efficiency is also bid into the Forward Capacity Market of the Independent System Operator of New England (ISO-NE) as a capacity resource; and
- Funding from the Regional Greenhouse Gas Initiative (RGGI) cap-and-trade allowance auctions is partially used to fund energy efficiency programs.

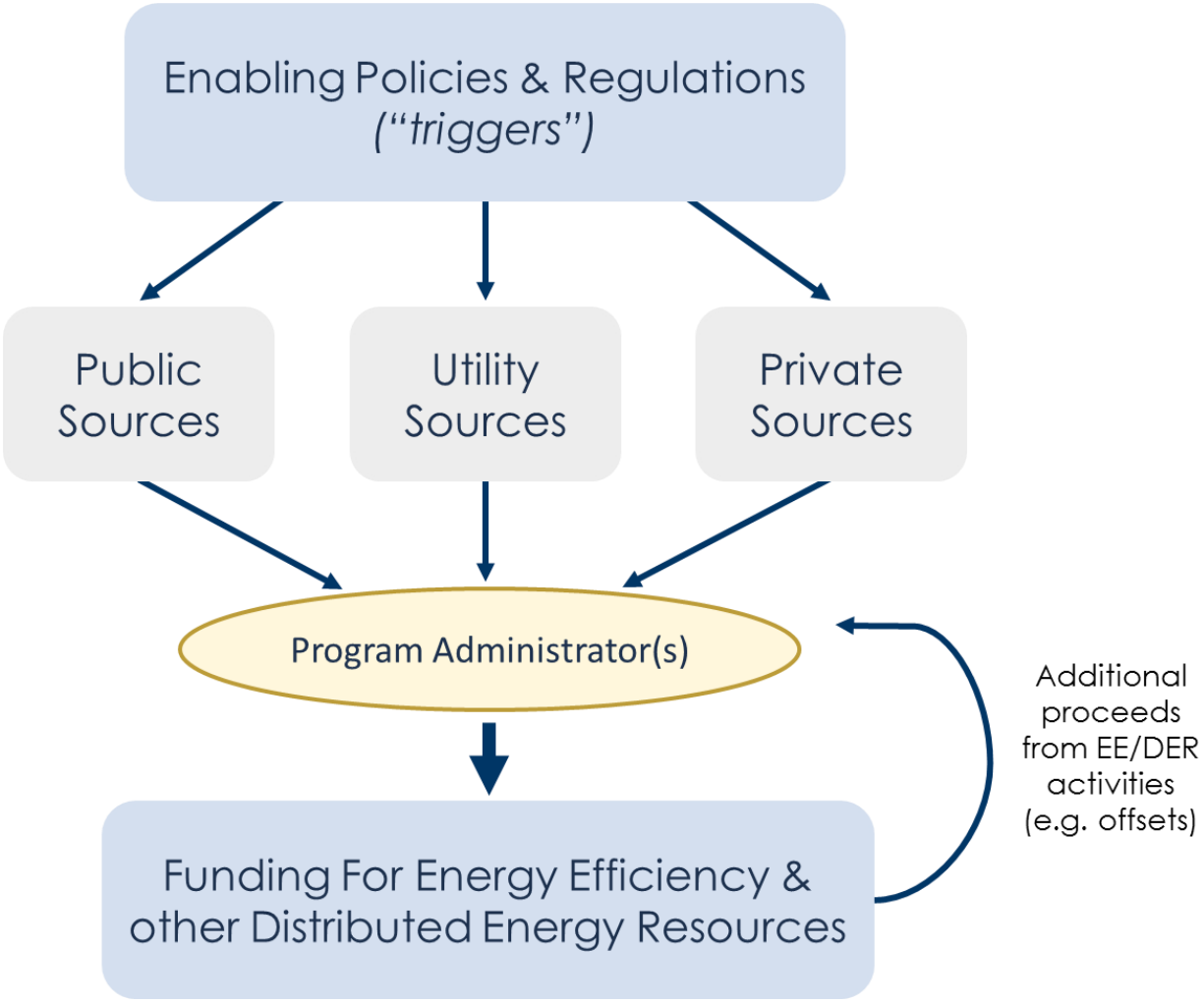
In addition to the sources listed above, state and federal dollars have also been allocated to efficiency.

In the last two decades – and especially today amid grid modernization and utility of the future discussions – energy efficiency is increasingly seen as a reliable and flexible energy resource that should be structurally integrated into planning and procurement processes. However, the policy triggers and funding mechanisms in place will dictate the sophistication and level to which energy efficiency is integrated within the energy system.

Figure 6 below summarizes funding mechanisms of energy efficiency and other Distributed Energy Resources (DERs). At a high-level, our analysis indicates the following:

- **Funding is triggered by enabling policies and regulations**. For example, an Energy Efficiency Resource Standard procurement mandate can require utilities to achieve a certain reduction in energy consumption in a given timeframe.
- **Enabling policies and regulations also establish how energy efficiency funding will be collected**. For example, utilities might implement a Systems Benefit Charge and collect funding from ratepayers.
- **These sources of funding are used by Program Administrators** to implement energy efficiency programs.
- Finally, the **impacts of the energy efficiency and other DER programs may be aggregated and monetized** (e.g. offsets, financing products), with the proceeds going back to Program Administrators as additional funding.

Figure 6. Overview of funding mechanisms for energy efficiency and other distributed energy resources



Additional information on 1) Enabling Policies & Regulations and 2) Funding Sources (public, utility, and private) are provided below, along with select examples.

ENABLING POLICIES & REGULATIONS ("TRIGGERS")

As mentioned above, funding for energy efficiency is triggered by enabling policies and regulations. Key triggers for energy efficiency funding, including planning processes, procurement mandates, climate and energy policy, and ratemaking directives, are outlined in this section.

Table 3. Energy Efficiency Trigger Categories and Examples

CATEGORY	KEY EXAMPLES
Climate & Energy Policy	• GHG reduction targets • Cap-and-trade • Carbon tax framework
Planning Processes	• Long-term planning requirements • Non-Wires Alternatives (NWA)
Procurement Mandates	• Energy Efficiency Resource Standard (EERS) • All Cost-Effective Procurement
Ratemaking Directives	• Performance incentives • Performance-based regulation • Rate design/reform

CLIMATE & ENERGY POLICY

Economic and environmental policy can directly or indirectly generate funding for energy efficiency and other DER programs. Many jurisdictions have adopted greenhouse gas (GHG) emissions reduction targets, and energy efficiency if often identified as one of the most cost-effective ways to meet their commitments. Legislation and regulations may specify that investing in energy efficiency will be a strategic tool – as is the case in the *Pan-Canadian Framework on Clean Growth and Climate Change* – and that revenues will be dedicated to energy efficiency programs, which is a commitment of states in the Regional Greenhouse Gas Initiative (RGGI).

PLANNING PROCESSES

Planning processes are avenues through which energy efficiency and other distributed energy resources can be incorporated into utility services by identifying resources that can cost-effectively and reliably meet the capacity and energy needs of a jurisdiction. Planning mandates may be established by legislation or regulation, or they may be ordered as a result of public utility commission proceedings. Typically, these processes are executed by utilities and reviewed and approved by regulators. While the compliance mandate is on the utility, these processes often involve significant stakeholder engagement. Plans become an investment roadmap for energy efficiency and other resources. Examples include:

- ***Integrated Resource Planning (IRP)*:** An IRP is a comprehensive planning process that outlines a utility's ability to meet peak and energy demand in its service territory through a combination of supply-side and demand-side resources, generally focusing on the least-cost

option. An IRP requires 1) forecasting loads; 2) identifying resource options; 3) determining the optimal mix; 4) incorporating stakeholder expertise; and 5) establishing a resource plan.[13]

- ***Non-Wire Alternatives (NWAs):*** NWAs are an emerging approach to utility planning wherein distributed energy resources – including energy efficiency, solar PV, energy storage, controls, etc.–are evaluated alongside more traditional "poles and wires" solutions to meet transmission and distribution (T&D) system needs. Various jurisdictions across the U.S. are engaging in NWA planning as part of grid modernization/utility of the future discussions; however, there is no standard model (see below for some examples). NWA solutions can offer load relief but are also a way to more holistically integrate distributed energy resources into the grid and broader energy system. (*See RI System Reliability Procurement Box, below.*)

Example: Rhode Island System Reliability Procurement

Rhode Island's "least-cost procurement" law includes a unique provision that requires utilities to file an annual **System Reliability Procurement (SRP) Plan**, which must "strategically consider an array of customer and utility-sited energy resources to maximize their benefit to Rhode Island's energy system." This has been interpreted to mean **"non-wires alternatives" (NWAs)**, **which include, but are not limited to, cost-effective energy efficiency, distributed generation at or near loads, and demand response measures that reduce peak demand**. The Energy Efficiency Resource Management Council has developed SRP Standards with National Grid that lay out the process for identifying and implementing NWAs.

Since 2012, National Grid has been conducting an SRP pilot in the towns of Tiverton and Little Compton called "DemandLink." The goal is to defer the need for a new substation feeder in the area by using targeted energy efficiency, demand response, and west-facing solar PV to achieve approximately 1 MW of load relief and approximately $2.9 million in deferred construction costs over four years. To date the pilot has been successful, but not without challenges such as customer enrollment and retention, as well as ensuring the proper and consistent use of the energy efficiency and demand response technologies.

NWA planning is gaining traction across the U.S. and will be an important part of evolving grid modernization/new utility business model discussions. For example, as part of the NY Reforming the Energy Vision (REV), utilities have jointly filed NWA Suitability Criteria in their Supplemental Distributed System Implementation Plans (SDSIP) – a key aspect of the utilities' planning regarding their evolving role toward Distributed System Platform providers.

Other notable NWA pilots currently underway include National Grid's Worcester Smart Energy Solutions in Massachusetts, the Boothbay Pilot in Maine, and Con Edison's Brooklyn Queens Demand Management Project in New York.

Sources:
http://www.energy.ri.gov/documents/siri/Systems%20Integration%20Rhode%20Island%20Vision%20Document%20January%2016%20FINAL.pdf
http://www.energy.ri.gov/electric-gas/future-grid/national-grid-system-reliability-procurement-pilot.php
http://www.neep.org/blog/look-inside-region%E2%80%99s-latest-non-wires-alternative-projects-and-policies
http://jointutilitiesofny.org/wp-content/uploads/2016/10/3A80BFC9-CBD4-4DFD-AE62-831271013816.pdf

[13] Regulatory Assistance Project (2013). *Best Practices in Electric Utility Integrated Resource Planning*. Available at: http://www.raponline.org/wp-content/uploads/2016/05/rapsynapse-wilsonbiewald-bestpracticesinirp-2013-jun-21.pdf

PROCUREMENT MANDATES

Procurement mandates establish an energy savings and/or renewable energy (installed capacity or generation) target that a jurisdiction must meet within a given timeframe. Targets may be a certain level of a given resource or a directive to procure, for example, all cost-effective energy efficiency before acquiring new supply. Utilities must establish programs, or engage third-party resources, to meet the targets.

- ***Energy Efficiency Resource Standards (EERS)***: Sometimes called Energy Efficiency Portfolio Standards (EEPS), an EERS is a policy that requires electric and/or natural gas utilities – or non-utility program administrators – to deliver a specified level of energy savings. They are typically long-term targets (e.g. to achieve savings equivalent to 20 percent of sales by 2030) but may also be an annual savings target over multiple years. Many EERSs only address energy efficiency, although some Renewable Portfolio Standards include efficiency along with the renewable energy standards.

- ***All Cost-Effective Energy Efficiency:*** "All Cost-Effective" is a policy mandate that requires utilities or non-utility program administrators to invest in all energy efficiency savings that have been identified as cost-effective. Procurement mandates can create a "loading order" – which establishes a priority resource or sequence of preferred resources – as is the case with Rhode Island's ***Least-Cost Procurement*** policy, which requires utilities in the state to invest in all energy efficiency that is cost-effective and cheaper than supply-side options before acquiring additional supply.

RATEMAKING MECHANISMS

Ratemaking is the regulatory process that establishes the rates that customers pay for the electricity and natural gas they consume. Ratemaking involves 1) establishing the utility's revenue requirement through a cost of service study; 2) assigning the costs to customer/rate classes within a jurisdiction; and 3) designing rates for each rate class. In other words, the process determines allowable costs and how utilities are able to recover them. Jurisdictional policy and regulations will dictate ratemaking, which in turn has important implications in terms of encouraging or discouraging energy efficiency, conservation, and/or demand response efforts.

In addition to how fixed and variable costs are recovered (addressed below), key elements include:

- ***Performance Incentives:*** Performance incentives – financial rewards or penalties for achieving a specified goal – can unlock funding for energy efficiency programs by introducing a reason for investing in a resource that otherwise reduces utility profits under traditional cost-of-service regulation. Performance incentives are common and have been traditionally utilized to encourage reliability, customer service, safety, and reliability but are now being used to incent energy efficiency activities or DER deployment (e.g. achieving or exceeding an energy savings goal or number of customers on time-of-use rates) and related network support services such as advanced metering.[14]

[14] Lowry, M. and T. Woolf (2016). Performance-Based Regulation in a High Distributed Energy Resources Future. Available on-line at: https://emp.lbl.gov/sites/all/files/lbnl-1004130_0.pdf

- ***Performance-Based Regulation:*** Cost-of-Service (COS) regulation has been the traditional paradigm of the electricity and natural gas sectors. However, in some cases, this approach can be at odds with increasing penetration of energy efficiency and other DERs in modernizing grids. An alternative to COS regulation is Performance-Based Regulation, which aims to strengthen or align a utility's performance with certain public policy and regulatory goals.[15] Performance-Based Regulation encapsulates a number of elements, including performance incentives (above) as well as revenue decoupling (unlinking a utility's profits from energy sales), multi-year rate plans (to stabilize rates and allow for EE planning), and other mechanisms.[16]

- ***Rate Design:*** Rates can impact how much electricity is consumed and when, making it a tool to encourage energy savings and peak demand reductions. Time-of-Use (TOU) pricing, dynamic pricing initiatives, and demand charges (that customers can respond to) fall under this category. For example, time-of-use pricing is currently used in Ontario to reduce peak loads.

[15] Ibid.
[16] Ibid.

FUNDING SOURCES

Enabling policies and regulations are the triggers that either allow, encourage, or require Program Administrators to invest in energy efficiency activities. However, revenue is required to actually implement them. Here, we discuss categories of funding sources being used for investment in energy efficiency.

Table 4. Categories and Examples of Funding Sources

CATEGORY	KEY EXAMPLES
Public Sources	• General revenue (federal, provincial, local) • Carbon market revenues
Utility Sources	• Recovery through rates • System Benefit Charges (SBCs)
Private Sources	• Private capital • Capacity market • New business models
Additional Proceeds	• Proceeds from monetization of Program Administrator's activities (e.g. offsets, environmental attributes, EERS credits, etc.); • Aggregating and selling loans, etc.

PUBLIC SOURCES

Federal, state/provincial, and local governments contribute funding for energy efficiency programs, which is used to provide incentives, financing, and/or program administration. Governments may implement a standalone energy efficiency program or support other initiatives (e.g. Green Banks). Currently, the primary sources of public funding for energy efficiency and other DERs are general revenues (budgets) and revenues collected by government from carbon markets.

- ***General Revenues:*** Governments may dedicate a portion of general revenue to energy efficiency and DER programs through budgets and discretionary funds. This support may be short-term (e.g. for a one year program) or a longer-term commitment (see example below).
- ***Carbon Markets*****:** Jurisdictions with carbon markets typically use a portion of the money collected from the sale of cap-and-trade allowances or through carbon levies to fund energy efficiency and other clean energy programs. This approach helps further the goals of the policies – to reduce greenhouse gas emissions – and is a program cost containment strategy. Energy efficiency funding from carbon markets may be used in government programs or by utility and non-utility energy efficiency program administrators. This is currently the case in Alberta as well as Ontario, where auction proceeds are directed toward the Green Ontario Fund, which administers energy efficiency activities in the province.

Example: Low Carbon Economy Fund

The Low Carbon Economy Fund is a $2 billion fund established by the Government of Canada to support the implementation of actions to meet Canada' the *Pan-Canadian Framework* and other climate change commitments like the Paris Agreement. Over the next five years, the Low Carbon Economy Fund will be used to leverage other investment and support the implementation of energy efficiency and other clean energy projects.

Provinces, territories, municipalities, Indigenous governments and organizations, businesses, and non-profit or for-profit organizations can access the funding. Energy efficiency is a key component of the *Pan-Canadian Framework* and therefore the Fund will be an important source of funding in Canada going forward.

UTILITY SOURCES

Utility or ratepayer-funded energy efficiency programs are common, but *how* utilities recover the costs they incur for energy efficiency activities varies between jurisdictions, and a combination of approaches may be used. Regardless of the approach, energy efficiency becomes part of the utility's revenue requirement and is recovered through rates.

In addition to program cost recovery, utilities may employ a Lost Revenue Adjustment Mechanism (LRAM) to compensate for estimated lost revenues associated with energy efficiency and other DER programs. Depending on how program costs are classified and recouped, utilities may also be allowed a Return on Equity (ROE) on energy efficiency program spending for their shareholders.

- ***Utility Expense:*** Energy efficiency program costs can be recovered in a number of ways. The most common approach is to treat energy efficiency as an expense and include program costs as part of a utility's revenue requirement in a future rate case or to collect funding for the programs through a System Benefit Charge (SBC) (an add-on to base rates) or tariff.

  To note, while an SBC is a common funding mechanism in jurisdictions that have a mandate to procure all cost-effective energy efficiency, it is not the only way to fund and meet the requirement. The fact that some jurisdictions do use an SBC as a means to procure all available cost-effective savings (e.g. Massachusetts and Rhode Island) is a product of their legislative and regulatory experience – and they supplement SBC funding with our sources. Other jurisdictions, such as New York, may prove that the market can deliver sufficient energy efficiency under the correct policy and price signals.

- ***Capital Cost:*** Another approach is to treat energy efficiency programs as a capital cost and include it in a utility's rate base. Whereas an SBC is added on to customer classes' existing (or separately calculated) rates, including energy efficiency costs within the rate base means a ROE is applied on these costs.

PRIVATE SOURCES

In addition to public (or taxpayer) and utility (or ratepayer) funding, private sources are becoming an increasingly important option for investing in energy efficiency. This is particularly the case in jurisdictions

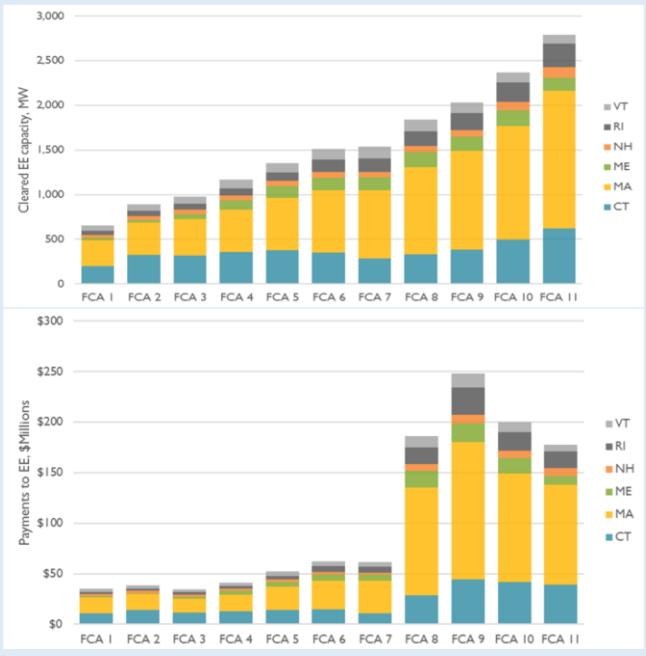
with aggressive climate targets since the amount of funding needed to bring projects to scale is significant. Three private sources are highlighted below.

- ***Private Capital:*** Capital from private sources (e.g. philanthropic, non-profit organizations) and lenders (e.g. banks, credits unions) can be used for energy efficiency rebates and/or financing. In terms of financing, traditional financing products (e.g. a home equity line of credit) or more innovative approaches (e.g. Property Assessed Clean Energy or PACE) may be used.

- ***Capacity Markets*:** Some deregulated jurisdictions have introduced capacity markets through which a mix of electricity generation units are chosen, and compensated, to ensure there is sufficient electricity available in the future to meet the needs of the electricity system. Generators bid their resources into an auction and successful resources are all paid at the market clearing price (which is the price of the most expensive option required to have enough supply to meet total system needs) in the relevant zone of the system. A number of deregulated jurisdictions have capacity markets, also known as ***Forward Capacity Markets*** – for example, New England, PJM (a regional transmission organization), New York, and Alberta[17]. A development in recent years has been to allow energy efficiency and demand response as biddable resources in capacity markets. (*See ISO-NE & PJM Forward Capacity Markets Box below.*)

Example: ISO-NE & PJM Forward Capacity Markets

Demand resources (demand response and energy efficiency) have been included in **ISO-NE's Forward Capacity Market (FCM)** since its inception, and there has been steady growth in the amount of demand resources that clear the auction. By 2020, energy efficiency will represent approximately 8 percent of the ISO-NE region's cleared capacity.



That system operators are increasingly relying on demand resources to meet future system capacity needs is telling; in New England, energy efficiency and demand response are considered alongside supply-side resources in critical system planning and procurement processes (*Left: Cleared energy efficiency capacity in FCM auctions 1-11 by state*).

It is important to note that funding for energy efficiency through capacity markets will vary depending on market conditions, both in terms of the amount of energy efficiency that clears, and the auction clearing price, which has ranged in New England from $2.95 to $17.73 per kW-month (*Left: Payments to energy efficiency resources in FCM auctions 1-11 by state*).

To note, the Pennsylvania, Jersey, Maryland (PJM) power pool also includes energy efficiency in its capacity market, but it has not resulted in as much uptake as the ISO-NE market. By 2020, energy efficiency will only represent approximately 1 percent of the PJM's cleared capacity. One of the critiques of PJM's approach is that it only pays energy efficiency providers for four years, whereas power plants receive capacity payments for their entire useful life.

Sources:
http://www.synapse-energy.com/sites/default/files/EE-Alberta-Capacity-Market.pdf
https://www.iso-ne.com/markets-operations/markets/forward-capacity-market/

[17] The Alberta Forward Capacity Markets is still under development.

- ***New Business Models*** are being contemplated as public policy directives and "disruptive" technologies such as solar photovoltaics and other distributed energy resources are forcing a conversation about the role of the utility and makeup of the energy system in the future. Grid modernization and new utility business model discussions are playing out in jurisdictions such as New York, California, Hawaii, Minnesota, Massachusetts, Rhode Island, and New Brunswick. Under consideration are many existing market-related elements (e.g. decoupling, Time of Use rates, performance-based regulation), as well as new or evolving ideas (e.g. dynamic pricing, non-wires alternatives planning, market animation). Utilities of the future may transition to wires-only companies that have a monopoly function over the grid while others supply energy and services (i.e. "smart integrators"); or, at the other end of the spectrum, they may become energy services utilities, owning and operating all aspects of the system (i.e. "orchestrators").[18] Regardless, new market-driven approaches will introduce new funding triggers and sources for energy efficiency and other clean energy resources. (*See New York Reforming the Energy Vision Box on the following page*.)

ADDITIONAL PROCEEDS

An emerging funding opportunity is the revenue stream that can be generated by a Program Administrator's own activities; for example, the aggregation and monetization of the energy and/or capacity savings from an energy efficiency program or the clean energy generated by, for example, a solar PV system.

There are numerous ways in which Program Administrators can "close the loop" and use additional proceeds to fund their programs, such as becoming a participant in a capacity market and bidding in energy efficiency/demand response alongside utilities and other market participants; aggregating and selling a portfolio of efficiency loans to third parties, using any returns to fund additional loans; and/or (provided a Program Administrator is allowed, and a market exists), selling the environmental attributes associated with energy savings and/or renewable energy as an offset or credit.

[18] America's Power Plan. *New Utility Business Models: Utility and Regulatory Models for the Modern Era*. Available online at: http://americaspowerplan.com/utility-business-models/

Example: New York Reforming the Energy Vision (REV)

> *"The electric industry is in transition. Climate change mitigation is a global priority. Renewable energy resources cost less than ever before. Energy innovation is growing by leaps and bounds. Yet energy infrastructure is aging, extreme weather is more frequent, and the energy industry is still based on a 20th century model."*

In 2014, New York launched Reforming the Energy Vision (REV) to coordinate and spur innovation and enable the state to achieve its GHG reduction target of an 80 percent reduction by 2050, while building a more affordable energy system (REV 2030 goals include a 40 percent reduction in GHG emissions, 50 percent of electricity from renewables, and 600 trillion Btu in energy savings). **The REV framework is threefold: 1) regulatory reform, 2) market animation, and 3) government leading by example.**

REV has initiated a number of proceedings, which are advancing in two tracks: Track One focuses on the role of utilities in promoting Distributed Energy Resources (DERs) and Track Two examines the regulatory changes needed to align utility interests with the REV vision.

Related to Track One, the NY Public Service Commission has established a vision for a dynamic and integrated **Distribution System Platform (DSP)**, which focuses on an evolving role for utilities – transitioning from service provider to market coordinator. In this new role, utilities are expected to create a system that encourages, accommodates, and hosts DERs. In response, the utilities have filed **Distributed System Implementation Plans (DSIPs)** and a joint Supplemental DSIP. These plans address issues such as forecasting, DER integration planning, NWAs, etc.

Track Two has initiated the **Value of Distributed Energy Resources (or Value of DER) proceeding**. This will have important implications on how DERs are valued and compensated for the costs and benefits they provide as well as the signals that are sent to the market to optimize, for example, the location of resources. Effectively, it is how the state is transitioning away from net metering to a more sophisticated instrument for compensating DER.

The value-based compensation approach is known as LMP+D+E in New York, which refers to Locational Marginal Price *plus* the value to the distribution system *plus* the external societal value. Utilities and stakeholders are currently developing the "Value Stack" that will be used. To note, non-generation DERS, such as energy efficiency, as well as larger generators are excluded from Phase One VDER tariffs due to Phase One time constraints. Final Phase One rate design proposals are expected to be approved and implemented in summer 2018.

Sources:
https://rev.ny.gov/
http://acadiacenter.org/wp-content/uploads/2017/06/DSIP-Summary-and-Analysis_20170621_FINAL.pdf
http://www3.dps.ny.gov/W/PSCWeb.nsf/All/8A5F3592472A270C8525808800517BDD?OpenDocument

For a visual that illustrates this approach, see the PSC's 2016 staff white paper:
https://s3.amazonaws.com/dive_static/editorial/Staff+Report+and+Recommendations+10-27+(1).pdf

BENEFITS & DRAWBACKS

The following table includes high-level considerations with respect to the benefits and drawbacks of each of the **funding sources** described in the previous section.

Table 5. Benefits and drawbacks of various energy efficiency funding mechanisms

Funding Source	Benefits	Drawbacks
PUBLIC SOURCES		
General Revenue	• Relatively straightforward source of funding • May be a significant resource, depending on jurisdiction and priorities • Long track record of governments supporting energy efficiency • Governments can address multiple public policy goals and/or fuels	• Uncertainty regarding availability of funding going forward (governments and/or priorities may change) • Accessing funding and reporting requirements may be onerous • May include restrictions on how funding can be used • Limited pool of money and competing priorities • Funding may need to be continually secured (i.e. each budget cycle)
Carbon Markets	1. Potential to be a large source of funding 2. Using carbon market proceeds for EE can be a cost containment mechanism for cap-and-trade and carbon tax programs, especially to mitigate impact on vulnerable populations 3. Depending on the policy/program, may be used for multiple fuels and measures 4. Using carbon market proceeds for EE helps build constituencies of support for the carbon market mechanism (i.e. there are tangible benefits)	5. Uncertainty regarding availability of funding going forward (governments and/or priorities may change) 6. Funding could be "scooped" into general revenues and not used for energy efficiency and DER programs 7. If carbon market is limited to one fuel-type, may restrict how funding can be used 8. Amount of funding will depend on market conditions (and will go down as EE and RE penetration increases)
UTILITY SOURCES		
System Benefit Charge	• Relatively simple and predictable level of funding • Proven track record (i.e. proof of concept) • Volumetric charge is relatively low, but overall funding can be significant • Helps integrate EE into utility planning and procurement	• SBC funds are susceptible to budget raids (occurred in the past and on the rise again) • Customer/stakeholder challenges when SBC is presented as a separate line item (seen as an "add-on" or tax) rather than an alternative to purchasing supply • Aggressive EE targets can lead to pushback from stakeholders and SBC caps
Rate Base	• ROE on EE/DER programs is an incentive for utilities to support the programs • Simple and predictable level of funding • Helps integrate EE into utility planning and procurement	• EE and DER programs can be more expensive because utilities typically have lost revenue adjustment mechanisms and return on equity on top of program costs • May discourage investment in non-capital intensive and riskier (innovative) projects

Funding Source	Benefits	Drawbacks
PRIVATE SOURCES		
Private Capital	• Potential to be a significant source of funding for DERs • Financing, depending on program terms, can help unlock larger (and potentially innovative) projects and deeper savings • Financing, depending on program terms, can help increase access and equity • Other sources of funding can be used to leverage private capital	• Can be an expensive funding option • Can be complicated for participants, contractors, and/or administrators to navigate processes • Uncertainty, including about project performance, is at odds with lenders' focus on risk avoidance
Capacity Market	• Increased confidence in EE/DR/RE as resources when grid operators include as capacity resources (further institutionalizes resources) • Good potential source of funding as EE is low cost and more flexible so may be a priority • Good potential source of funding as energy systems are more focused on integrating distributed resources (and thus load management)	• Actual funding is depended on market conditions (i.e. difficult to plan for) • Capacity market rules and processes can be complex to navigate and therefore additional support/expertise may be needed • Existing market rules may introduce barriers (e.g. heavy discounts on EE and intermittent RE) • Policy decisions could limit a program administrator's opportunity to participate (e.g. can only bid in passive demand resources) • Not an appropriate stand-alone source or revenue; will need other revenue to ramp up to a sufficient level of savings that can be aggregated and bid into capacity markets.
New Business Models	9. Unlocks new funding streams for DERs and has the potential to positively impact the way the resources are valued 10. Market-based transactions favour lower-cost options like energy efficiency 11. Helps integrate EE into utility (and energy system) planning and procurement	12. Complex and time consuming to navigate all the necessary regulatory changes, etc. 13. Early days/work-in-progress 14. If done incorrectly, could create a disincentive for certain resources

It should be noted that Additional Proceeds – which encompasses a range of potential revenue sources for program administrators – is not included in the above table, in part because some of the sources (e.g. capacity market revenue) are already included above.

TRENDS

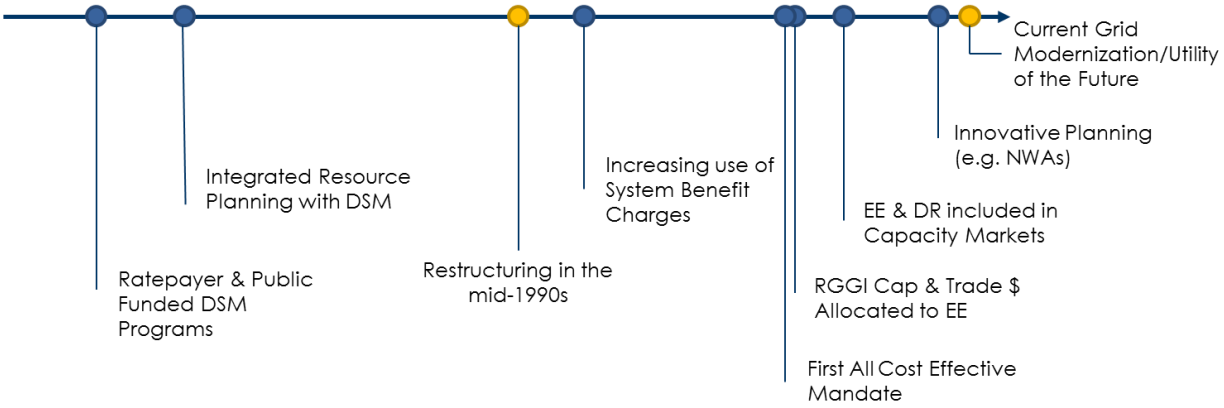
Energy efficiency programs have been offered since the 1970s and were **initially funded by both public and ratepayer dollars**. From the late 1970s to early 1990s, **Integrated Resource Planning** (IRP) emerged in a number of jurisdictions and there was growth in the number of ratepayer-funded programs.

With the introduction of electricity system restructuring in the mid-1990s, there was a precipitous drop in energy efficiency programs across North America. Public funding continued to be directed toward energy efficiency, and in the 1990s and 2000s, **System Benefit Charges (SBCs)** were introduced and increasingly used to fund utility and non-utility energy efficiency programs.

As energy efficiency funding evolved, **Energy Efficiency Resource Standards** became more popular as a means of ensuring a specified level of energy savings would be achieved in a jurisdiction. Both because of aging infrastructure and the need for extensive infrastructure investment, and because of an increased focus on environmental issues, the benefits of energy efficiency were increasingly recognized and new mechanisms, such as **performance incentives** and revenue decoupling, were introduced to help facilitate investment in energy efficiency as a resource. In 2009, the first **all cost-effective energy efficiency mandate** was introduced in Rhode Island, establishing energy efficiency as the first resource in the state.

Since then, energy efficiency has been, and is expected increasingly to be, integrated in wholesale energy and **capacity markets**. Climate policy and **carbon markets** are also providing new sources of revenue, and **innovative planning and procurement mandates** have become a focus of current grid modernization and utility of the future discussions. See Figure 7 for an over of the general timing of this history.

Figure 7. Energy Efficiency Funding Mechanism Development Timeline in North America



What these trends show is that funding for energy efficiency has historically been a combination of public and utility-based sources, with an increasing focus on private sources in recent years, particularly as energy efficiency is increasingly valued as a cost-effective, reliable, and flexible resource.

What does this mean for the funding of energy efficiency as we look to the future? Over time, we have seen a trend toward funding mechanisms that help embed energy efficiency into utility planning and procurement processes and level the playing field to promote utility integration. We can only expect this trend to continue. In particular, an increased focus on energy efficiency as an integral, core element of energy systems, as well as increasing complexity of the systems themselves (due to integration of smart technology, electric vehicles, distributed and renewable/variable energy resources, among others) will

require even greater alignment between energy efficiency Program Administrators and energy systems, from system planning, to program implementation, to real-time adjustments.

When we also consider today's increased focus on climate change and the environment, which is not typically a domain of utilities, a range of funding mechanisms (beyond traditional ratepayer-funded) is likely to be required into the future. This means that examining **how** various EE activities are funded, and **who** (or which type of entity) is able to deliver them, is critical for anticipating future changes and the sustainability of impactful investment in energy efficiency. This is what we explore in the following section.

PART C

VALUE PROPOSITION OF UTILITY INTEGRATION

VALUE PROPOSITION OF UTILITY INTEGRATION

Throughout this paper, we have explored how energy efficiency is delivered in various jurisdictions and factors that lead to successful administration, as well as how these activities are funded. What experience has shown is that, regardless of the specific model and funding mechanism selected, **a key requirement for any program administrator to get energy efficiency to scale is a sufficient and sustainable source of revenue for the programs.** This will become increasingly important as climate change mandates require increasing levels of clean energy resources in order to achieve GHG targets.

How does a jurisdiction ensure there is sufficient and sustainable funding for energy efficiency programs?

There is no one way to deliver and fund energy efficiency programs – each jurisdiction does it a little differently as a result of its legislative and regulatory history. However, based on our assessment, there is a case to be made for **enhanced utility integration** based on the following key takeaways that help bring energy efficiency to scale:

4. **Diversity of Funding**
5. **Stability of Administration (and Funding)**
6. **Expertise and Emerging Opportunities**

DIVERSITY OF FUNDING

Leading jurisdictions do not rely on a single source of funding for energy efficiency programs. In reality, procuring cost-effective energy efficiency across multiple fuels and achieving climate change targets requires significant funding and jurisdictions have had to incorporate many sources of funding into energy efficiency program budgets. Diversity of funding also has the advantage of improving long-term sustainability as the programs are not solely reliant on a source. That said, jurisdictions do rely heavily on rate-payer funding. Utility integration can help improve the diversity of funding, as utilities typically access more sources of funding for energy efficiency than a government agency or even a third-party (see Figure 8, below).

We caution that this information should not be taken to mean that every utility or third-party administrator uses every, or even most, funding mechanisms available to them. Similarly, **Error! Reference source not found.** should not be interpreted as suggesting that government agencies are not *able* to take advantage of additional sources of revenue to deliver on their mandates. However, it does reflect the potentially broader range of options that can allow utilities and third parties to deliver on their mandates in cost-effective ways. Government agencies may not access these funding sources not because they are not technically able to, but rather because of legislative or regulatory barriers, risk aversion, or lack of need.

Figure 8. Sources of Funding Currently used by Energy Efficiency Program Administrators

			DELIVERY MODELS		
			Government Agency	Utility	Third Party
FUNDING SOURCES	Public Sources	**General Revenue**	✓	✓	✓
		Carbon Markets	✓	✓	✓
	Utility Sources	**System Benefit Charge**		✓	✓
		Rate Base		✓	
	Private Sources	**Private Capital**	✓	✓	✓
		Capacity Market		✓	✓
		New Business Models	✓	✓	✓

STABILITY OF ADMINISTRATION (AND FUNDING)

Leading jurisdictions have established relatively stable program administration and funding structures, which helps programs ramp up and establish an industry around them – for example contractors and ESCOs. While each administration model is vulnerable to changing political and regulatory priorities, one of the key weaknesses of the government agency model, which we have seen in practice, is that the agency itself – as well as its funding – is subject to government policy priorities. Another weakness is that governments can be slow moving, which can be disruptive to program administrators, participants, and energy efficiency goods and service providers.

Utility integration is not a magic bullet solution; utility energy efficiency budgets have been "raided" in numerous jurisdictions. However, utility participation and buy-in that helps to structurally embed energy efficiency into the utility system could enhance the long-term stability of energy efficiency programs, and thus facilitate an additional and potentially more reliable and funding.

RELATIONSHIPS & EXPERTISE

Utilities can be valuable partners when it comes to energy efficiency for a number of reasons, including:

- **Relationships with Customers** – Utilities have existing relationships with customers and can interact with them regularly. They also have access to valuable customer data and information that can be used to design and deliver programs.
- **Industry Expertise** – Utilities have in-depth knowledge about energy systems and the industry as a whole, which can be harnessed to the benefit of energy efficiency and DER programs. Utilities could play a key role in promoting advanced energy efficiency measures such as smart (wifi-enabled) thermostats, remote data collection and data analytics that identify EE opportunities, and home/facility energy systems that link to utility accounts and systems and **enable** new customer-focused and tailored energy efficiency options.

  In addition, emerging opportunities around electrification, smart grids and smart meters, variable forms of renewable energy such as wind and solar, demand-response and demand-control initiatives, and electric vehicles will **require** more integrated planning, tailored implementation of energy efficiency programs, and real-time adjustments that utilities could support.

While there is no "right way" to administer and fund energy efficiency programs, experience in other jurisdictions suggest that there is value in integrating energy efficiency in the utility system – from the perspective of program administration and also more structurally via planning and funding (i.e. procurement of the energy resource alongside supply options). This can help ensure that there is sufficient and sustainable funding to bring energy efficiency investment to scale.

PART D

CONCLUSION

CONCLUSION

This paper is intended as an introduction to concepts related to energy efficiency's integration into utility systems. As such, it examines how various delivery models and funding mechanisms impact utility integration opportunities.

By examining how each of these discrete considerations are related to utility integration, it provides a broad overview of linkages and considerations when beginning to examine how energy efficiency program administration can and should be integrated within utility systems, in particular as these systems evolve into the future to address disruptions to the traditional utility model.

Thus, if we come back to our original visual of the considerations that are key when determining an appropriate model for energy efficiency to be integrated within utility systems, some key areas can be filled in:

Context

What are the conditions in which energy efficiency is administered?

- Utility structure and forecasts
- Market structure
- Etc.

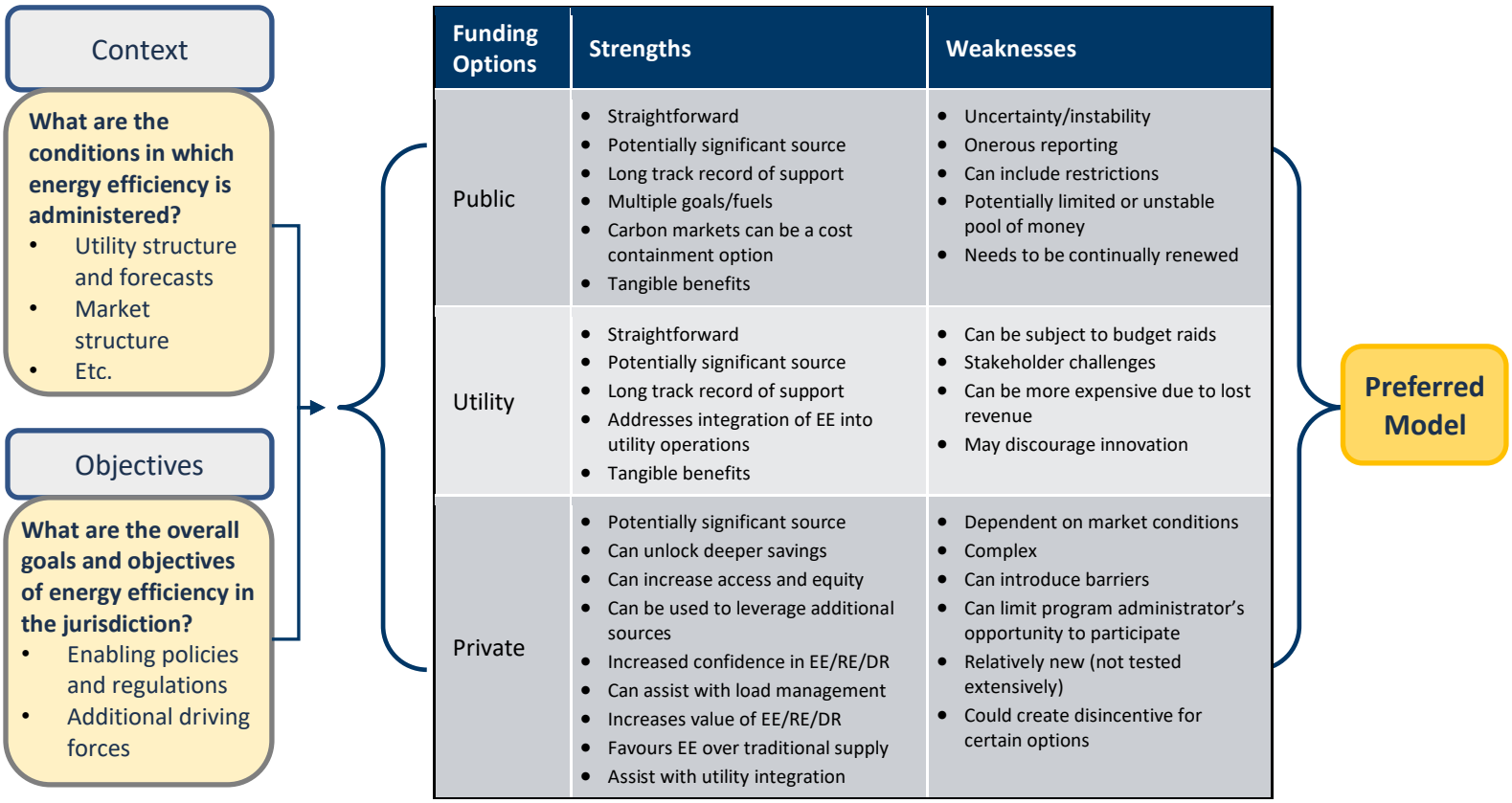
Objectives

What are the overall goals and objectives of energy efficiency in the jurisdiction?

- Enabling policies and regulations
- Additional driving forces

Model Options	Strengths	Weaknesses
Utility	• Demand control • Demand response • EVs • Renewables • IRP planning/ load forecasting • Effective oversight/accountability • Well-aligned performance incentives • Stability • Access to customers and data	• Multi-fuel mandate • Market transformation • Organizational focus on EE • Appropriate geographic scope *Ability to mitigate:* • Flexibility • Innovation • Stakeholders
Gov. Agency	• Multi-fuel mandate • Market transformation • Organizational focus on EE • Appropriate geographic scope	• Demand response • EVs • IRP planning/ load forecasting • Access to customers and data • Flexibility • Innovation *Ability to mitigate:* • Demand control • Renewables • Effective oversight/accountability • Well-aligned performance incentives • Stability • Stakeholders
Third Party	• Multi-fuel mandate • Market transformation • Effective oversight/accountability • Organizational focus on EE • Well-aligned performance incentives • Appropriate geographic scope • Flexibility • Innovation • Stakeholders	• Demand response • EVs • IRP planning/ load forecasting • Access to customers and data • Flexibility • Innovation *Ability to mitigate:* • Demand control • Renewables • Stability

Preferred Model



This report focuses on understanding the linkages, benefits, and drawbacks of various models. It is these inputs that are the first key step in understanding how energy efficiency could potentially be integrated within the utility system in Alberta. The next steps in the process our outlined below but, at a high level, focus on understanding Alberta's unique context within the parameters of utility integration (the Context and Objectives section in the figure above).

NEXT STEPS

This paper focuses on the evolution of energy efficiency delivery models and funding mechanisms in a general sense. Next steps in this exercise include an examination of what these differences and considerations mean in an Alberta context, including, but not limited to:

- What options are relevant to Alberta;
- How Alberta is unique;
- Where the various models and funding mechanisms fit given the existing make-up of the Alberta utility system; and
- What the trends and future opportunities mean for Alberta utilities and Energy Efficiency Alberta, among others.

APPENDICES

APPENDIX A: CASE STUDIES

This section presents case studies representing each of the three delivery models: Massachusetts (utility model), New York State Research and Development Authority or NYSERDA (state agency model), and Vermont (third-party model).

MASSACHUSETTS (UTILITY MODEL)

OVERVIEW OF ENERGY MARKET

Massachusetts has a restructured utility industry with a competitive retail electricity market. The ability to purchase competitively priced natural gas is limited to large industrial and commercial users who purchase and ship gas on the pipeline system.[19,20]

POLICY CONTEXT

Massachusetts is a leading state with a long, successful record of implementing energy efficiency programs dating back to 1997, when the state created an aggressive funding mechanism and required electric utilities to provide energy efficiency programs. In the late 1980s, the natural gas utilities in the state also began offering energy efficiency programs.[19]

In 2008, the governor signed Chapter 169 of the *Green Communities Act* (GCA), which aimed to significantly reform the state's energy policy, making large new commitments to electric and natural gas energy efficiency programs, renewables, and efficient fossil fuels such as combined heat and power. The GCA requires that the state's investor-owned utilities (and Cape Light Compact) prepare energy efficiency plans that will "provide for the acquisition of all available energy efficiency and demand reduction resources that are cost-effective or less expensive than supply." In addition, the GCA directed the Department of Public Utilities (DPU) to appoint and convene an Energy Efficiency Advisory Council (EEAC),[21] a stakeholder body whose members play a key role in designing, approving, and monitoring the energy efficiency programs of Massachusetts' investor-owned utilities.[19,22]

PROGRAM DELIVERY MODEL

The state's distribution companies (utilities) are required to offer energy efficiency and other demand-side management programs, which they administer with collaborative input and oversight from the EEAC. A variety of electric and gas efficiency programs are also offered directly through investor-owned and municipal utilities.[23]

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[19] https://database.aceee.org/state/massachusetts.

[20] https://www.resausa.org/states/massachusetts.

[21] The EEAC stakeholder body is chaired by the state Department of Energy Resources (DOER) with the primary mandate of achieving the goals outlined in the Green Communities Act and developing long-term vision, including recommendations concerning studies and research to achieve the goals of acquiring all cost-effective efficiency that is less than the cost of generation, and maximizing economic and environmental benefits that can be realized through increased energy efficiency. The DPU appoints council members who serve for five-year terms and represent a diverse array of stakeholders, including Associated Industries of Massachusetts, the Low-Income Energy Affordability Network, and Commonwealth cities and towns. (https://www.mass.gov/service-details/energy-efficiency-advisory-council-eeac).

[22] https://www.mass.gov/service-details/energy-efficiency-advisory-council-eeac.

[23] https://database.aceee.org/state/massachusetts.

One unique feature of program delivery in Massachusetts is the MassSave collaborative, a brand that serves as the umbrella trademark for all program offerings. Sponsored by Massachusetts' natural gas and electric utilities and energy efficiency service providers (including Berkshire Gas, Blackstone Gas Company, Cape Light Compact, Columbia Gas of Massachusetts, Eversource, Liberty Utilities, National Grid and Unitil), MassSave offers the benefits of statewide program coordination while allowing for individual utilities to administer programs. More specifically, the brand is used to synchronize (to the extent possible) program offerings, delivery models, applications forms, and marketing plans, although each utility sets its own incentive levels and detailed program components.

FUNDING

Funding for energy efficiency programs includes charges on ratepayer bills, carbon allowance auction proceeds from the Regional Greenhouse Gas Initiative (RGGI), and regional energy market revenues.[24]

FINANCIAL COMPENSATION MECHANISMS

The GCA, in its directives on the three-year statewide plans, calls for a proposed mechanism to provide performance incentives to the companies based on their success in meeting or exceeding the goals in the plan. There are two components to the program administrator performance incentives in Massachusetts:[25]

- **Savings component:** this component is aimed at maximizing savings and benefits, which rewards utilities for acquiring additional lifetime energy and demand savings and project-associated other energy and non-energy benefits.
- **Value component:** this component is aimed at maximizing value and net benefits, which rewards utilities for seeking additional cost-effective savings and non-energy benefits, and doing so cost-efficiently.

CRITICAL SUCCESS FEATURES

Massachusetts ranks first according to the 2017 ACEEE State Scorecard, demonstrating that distribution only, investor-owned utilities in restructured states can be highly successful at implementing energy efficiency programs. Some notable features of this success include:

- ***Strong incentives*** in place for electric and gas utilities. The shareholder incentive provides performance incentives for IOUs to earn a return (depending on performance against planned metrics) on the 3-year plan spending for meeting program goals. The incentive is based on a combination of elements including energy savings, benefit-cost analysis, and market transformation results.[23]
- ***Collaborative processes*** through the EEAC, which provides a forum to discuss changes in energy efficiency markets and effectiveness of program strategies in real time, creating a community obligation to improve programs with agility, rather than rely solely on after-the-fact reviews

[24] DOER. "Energy Efficiency in Massachusetts: Our First Fuel". Available at http://www.mass.gov/eea/docs/doer/energy-efficiency/ee-story-booklet-web.pdf.

[25] "Massachusetts Energy Efficiency Performance Incentive Mechanism", Jointly presented by PAs and Council Consultants, August 17, 2016. Available at https://www.puc.nh.gov/EESE%20Board/EERS_WG/eeac_performance_incentive_mechanism_presentation.pdf.

with inevitable opportunities for second guessing and exposure to disallowances.[26] Members of the EEAC represent a diverse array of important stakeholders, including Associated Industries of Massachusetts, the Low-Income Energy Affordability Network, and Commonwealth cities and towns.[27]

- ***Program coordination and branding through MassSave.*** As the number of PAs grew and savings goals increased over time, it became clear that a collaborative approach was needed not only with the individual gas and electric programs, but across the state, among all PAs, and between both the gas and electric programs. This was crucial to maximize the savings with each customer, capture economies of scale, minimize customer confusion, and meet the goals of the GCA. It was incumbent on everyone in the energy efficiency industry in Massachusetts to move forward with one common message and one call to action, regardless of utility provider. This was the driving force behind the creation of MassSave.[28]
- ***Mixture of funding sources.*** Massachusetts incorporates both System Benefit Charge (SBC) and Regional Greenhouse Gas Initiative (RGGI) proceeds, as well as energy efficiency bidding into a forward-capacity market, solar Renewable Energy Credits (RECS) offered to utilities, and a pilot on non-wire planning.

[26] Regulatory Assistance Project (RAP). 2011. Who Should Deliver Ratepayer-Funded Energy Efficiency? A 2011 Update. based on work for the Colorado Public Utilities Commission, updating a 2003 report by RAP. Author Richard Sedano. Available on-line at http://www.raponline.org/knowledge-center/who-should-deliver-ratepayer-funded-energy-efficiency-a-2011-update/.

[27] https://www.mass.gov/service-details/energy-efficiency-advisory-council-eeac.

[28] https://aceee.org/files/proceedings/2012/data/papers/0193-000169.pdf.

NEW YORK (STATE AGENCY MODEL)

OVERVIEW OF ENERGY MARKET

New York state's power market has consistently been cited among the leading competitive energy markets in the United States, with customer retail competition for both electricity and natural gas.[29] New York electricity generators include both regulated electric utilities and independent power producers with diverse energy sources of generation.[30]

POLICY CONTEXT

New York is a leading state on utility-sector energy efficiency programs, with SBC-funded programs dating back to 1998.[31] While energy efficiency programs have a long history in the state, today they are guided by Governor Cuomo's signature energy policy launched in 2014, *Reforming the Energy Vision* (REV). REV aims to build an integrated energy network to harness the combined benefits of the central grid with clean, locally generated power. The 2015 State Energy Plan serves as a roadmap for REV, which calls on public-private partnerships to achieve a healthier and stronger New York economy.[32]

The initiatives outlined in the State Energy Plan, along with private sector innovation and investment fueled by REV, are designed to put New York State on a path to achieving the following clean energy goals:

- 40% reduction in greenhouse gas emissions from 1990 levels
- 50% electricity will come from renewable energy resources
- 600 trillion Btu increase in statewide energy efficiency

REV is centered on three pillars that, together with the 2015 State Energy Plan, will drive the State's shift to a more market-driven clean energy future and allow for a reduction in ratepayer collections:[33]

1. **Regulatory reform**—the New York State Public Service Commission (PSC) will align markets and the regulatory landscape to promote more efficient use of energy, deeper penetration of renewable energy resources such as wind and solar, wider deployment of distributed energy resources such as micro grids, roof-top solar and other on-site power supplies, and storage. It will also promote markets to achieve greater use of advanced energy management products to enhance demand elasticity and efficiencies.
2. **Market activation**—through NYSERDA's $5 billion USD, 10-year Clean Energy Fund (CEF), resources will be focused on reducing multiple barriers to uptake and adoption, stimulating private investment, and influencing policy, codes, and regulation. The CEF will also provide targeted support to low- to moderate-income (LMI) and rural communities that may not be reached by markets on their own.
3. **Leading by example**—through the New York Power Authority's (NYPA)'s leading by example initiative with investments in innovative solutions.

[29] https://www.resausa.org/states/new-york.
[30] https://www.eia.gov/state/analysis.php?sid=NY.
[31] https://database.aceee.org/state/new-york.
[32] https://www3.dps.ny.gov/W/PSCWeb.nsf/PFPage/7F2ADCCA8DC5A01A85257FC7006AE86E?OpenDocument
[33] Sources: https://www.ny.gov/sites/ny.gov/files/atoms/files/WhitePaperREVMarch2016.pdf and http://www3.dps.ny.gov/W/PSCWeb.nsf/All/CC4F2EFA3A23551585257DEA007DCFE2?OpenDocument.

PROGRAM DELIVERY MODEL

New York is one of the most experienced users of the state model for energy efficiency program delivery, having transferred administration in 1998 to the New York State Energy Research and Development Agency (NYSERDA)—a state-chartered corporation with a Board of Directors appointed by the Governor. That said, New York has granted increasing program administration responsibilities to utilities over time, so the state's delivery model also shares features with utility-administered programs.

The shift to increasing utility responsibility was aimed at meeting more aggressive savings goals and addressing energy sources beyond electricity and gas. This hybrid approach was also aimed at fostering a diversity of approaches to energy efficiency, while creating more accountability for the use of consumer dollars through its oversight of the utility administrators.[34]

Specifically, New York's energy efficiency efforts were historically focused under the Energy Efficiency Portfolio Standard (EEPS)[35]—traditional resource acquisition initiatives for which both NYSERDA and the utilities chased the same programs with split shares of the energy efficiency targets. But the Commission has moved away from this type of approach, with new project commitments under the EEPS stopping at the end of 2015 (and project implementation of past commitments ending in late February 2020).

Today, the state's main energy efficiency activities include:

- NYSERDA's Clean Energy Fund (CEF);
- The utilities' energy efficiency portfolios, both at the Long Island Power Authority (LIPA) and at the investor-owned utilities; and
- The leadership role of the New York Power Authority (NYPA) through operations and programs aimed at improving the energy performance of State-owned buildings.

The CEF is a 10-year, $6.5 billion (CAD) fund to support clean energy market development and innovation, which began operation in 2016. Under the CEF, NYSERDA's strategic priorities are focused in the energy marketplace through the deployment of new and redesigned programs and initiatives in four distinct portfolios:

- *Market Development*: $3.5 billion (CAD) to reduce costs and accelerate customer demand for energy efficiency and other behind-the-meter clean energy solutions and increase private investment.
- *NY-Sun*: $1.2 billion (CAD) to provide long-term certainty to New York's growing solar market and to lower the costs for homeowners and businesses investing in solar power.
- *NY Green Bank*: $1 billion (CAD) to partner with private financial institutions to accelerate and expand the availability of capital for clean energy projects.
- *Innovation and Research*: $924 million (CAD) to invest in cutting edge technologies that will meet increasing demand for clean energy.

In terms of the energy efficiency programs of investor-owned utilities, REV has granted utilities increased flexibility and responsibility for administration and design and has provided direction to begin a gradual evolution of those programs to align with REV approaches. This includes a mandate for

[34] Regulatory Assistance Project (RAP). 2011. Who Should Deliver Ratepayer-Funded Energy Efficiency? A 2011 Update. based on work for the Colorado Public Utilities Commission, updating a 2003 report by RAP. Author Richard Sedano. Available on-line at http://www.raponline.org/knowledge-center/who-should-deliver-ratepayer-funded-energy-efficiency-a-2011-update/.

[35] The EEPS was established on June 23, 2008 by the Public Service Commission as part of a statewide program to reduce New Yorkers' electricity usage 15% of forecast levels by the year 2015, with comparable results in natural gas conservation. The State's utilities were required to file energy efficiency programs, and NYSERDA, as well as independent parties, were invited to submit energy efficiency program proposals for Commission approval. NYSERDA is one of 12 EEPS Program Administrators.

additional offerings, such as midstream market strategies, behavioral programs, online marketplaces/customer engagement platforms, coordination of energy efficiency with demand reduction programs and strategies to more closely align and complement NYSERDA's efforts. It also includes the promotion of energy efficiency "as a business and as a path to shared savings" through the promotion of large-scale and distributed renewable generation, energy efficiency, demand response, electric vehicles (EVs) and associated infrastructure, storage, microgrids, and heat pump and other renewable heating, ventilation, and HVAC solutions.[36]

Finally, NYPA is financing energy efficiency projects for State agencies and other municipal and institutional customers to improve the energy performance of State-owned buildings.[37]

FUNDING

NYSERDA is primarily funded by State ratepayers through the System Benefits Charge (SBC) on participating utility bills[38] and proceeds from auctions through the Regional Greenhouse Gas Initiative (RGGI).[39,40] The RGGI funds are focused on energy efficiency, renewable energy and carbon abatement projects in the State; thus, the revenue available is dependent on the auction prices for the allowances, which are variable.

These funds are allocated to the Clean Energy Fund (CEF) and Renewable Portfolio Standard for energy-efficiency programs, research and development initiatives, and other clean energy activities.[41]

FINANCIAL COMPENSATION MECHANISMS

Of course, as a state-funded agency, NYSERDA does not have organizational financial compensation mechanisms. However, earnings adjustment mechanisms have been developed for investor-owned utilities to provide a performance-based incentive for utilities measured both on a programmatic basis, as well as testing the concept of outcome-oriented metrics. Energy efficiency will increasingly be treated as a system resource by utilities—accounted for in traditional cost recovery or rate-based approaches and integrated into Distributed System Implementation Plans (DSIPs), which document a utility's integrated approach to planning, investment and operations.[42]

[36] New York State, NYSERDA, and Department of Public Service. "New Efficiency: New York". April 2018. Available at https://www.nyserda.ny.gov/-/media/Files/Publications/New-Efficiency-New-York.pdf.
[37] Ibid.
[38] The SBC is a non-bypassable charge paid by customers on their utility bills, applied to all customer bills whether they receive service from a local utility or from a competitive supplier (ACEEE State and Local Policy Database 2017).
[39] RGGI is the first market-based, mandatory cap-and-trade program in the U.S. to reduce greenhouse gas emissions, and New York State participates along with eight other Northeast and Mid-Atlantic states.
[40] Ibid.
[41] NYSERDA website: https://www.nyserda.ny.gov/About/Funding.
[42] New York State, NYSERDA, and Department of Public Service. "New Efficiency: New York". April 2018. Available at https://www.nyserda.ny.gov/-/media/Files/Publications/New-Efficiency-New-York.pdf.

CRITICAL SUCCESS FEATURES

- The New York Public Service Commission has taken on a significant task in the New York hybrid model to manage overlapping administrators that in some ways operate in parallel and in other ways operate in competition.[43]
- Provisions in New York allowing alternative providers to propose and manage efficiency programs have harnessed innovative ideas and have developed market capacity.
- The use of a stakeholder advisory board in New York has enabled value-added proposals, increased stakeholder consensus, and reduced regulatory costs.

[43] Regulatory Assistance Project (RAP). 2011. Who Should Deliver Ratepayer-Funded Energy Efficiency? A 2011 Update. based on work for the Colorado Public Utilities Commission, updating a 2003 report by RAP. Author Richard Sedano. Available on-line at http://www.raponline.org/knowledge-center/who-should-deliver-ratepayer-funded-energy-efficiency-a-2011-update/.

VERMONT (THIRD-PARTY "FRANCHISE" MODEL)

OVERVIEW OF ENERGY MARKET

Vermont is the only New England state that has chosen not to restructure its electricity system. The state has one investor-owned distribution utility, fourteen municipal utilities, and two cooperative utilities. The investor-owned utility, which serves about three-fourths of all Vermont consumers, is a subsidiary of the Canadian firm that also owns the state's sole natural gas utility. In 1956, Vermont's electric utilities pooled their transmission systems to connect with hydroelectric generators in New York and Canada, so all wholesale transmission in the state is operated by a single entity.[44]

POLICY CONTEXT

Expanding upon the statutory goal of 25% renewable by 2025, Vermont's 2016 Comprehensive Energy Plan (CEP) establishes the following set of goals:[45]

- Reduce total energy consumption per capita by 15% by 2025, and by more than one third by 2050.
- Meet 25% of the remaining energy need from renewable sources by 2025, 40% by 2035, and 90% by 2050.
- Three end-use sector goals for 2025: 10% renewable transportation, 30% renewable buildings, and 67% renewable electric power.

The 2016 CEP also establishes two goals for reduction in greenhouse gas (GHG) emissions from Vermont's energy use, both of which are consistent with the renewable energy and energy use goals: 40% reduction below 1990 levels by 2030, and 80-95% reduction below 1990 levels by 2050. To meet these goals, the Plan calls for reducing total energy use without compromising energy service by:

1. Continuing improvements in demand-side thermal and electric efficiency and conservation (e.g. improvements in building shells).
2. Fuel switching away from combustion technologies to more efficient electric-powered technologies (e.g. heat pump and electric vehicle technology).
3. Declining source energy requirements of electricity generation.

The 2016 CEP calls for four general types of policies that work together to drive this change: (1) market-based policies, (2) information and access, (3) strategic investment, and (4) codes and standards.

PROGRAM DELIVERY MODEL

Vermont is and has been among the leading U.S. states for utility energy efficiency for many years—currently ranked fourth by the ACEEE State Scorecard (2017)—and was the first to create a statewide "Energy Efficiency Utility" (EEU) program, approved in 1999. In creating the EEU, Vermont was one of the first states to identify energy efficiency as a major tool for achieving both energy independence and major cost savings (Efficiency Vermont 2017).[46] Since 1999, the structure of the EEU program was modified to ensure effectiveness amid changing market conditions (see text box, below).

[44] https://www.eia.gov/state/analysis.php?sid=VT

[45] https://legislature.vermont.gov/assets/Legislative-Reports/Executive-summary-for-web.pdf.

[46] Efficiency Vermont. "Keeping Vermont's Efficiency Standards High", July 11, 2017. https://www.efficiencyvermont.com/news-blog/blog/keeping-vermont-s-efficiency-standards-high.

Vermont's EEU Program provides energy efficiency services to residential and business electricity, natural gas, and thermal-energy-and-process-fuel consumers throughout Vermont. The Vermont Public Utility Commission (Commission) appointed three EEUs to deliver such services:[47]

- *Efficiency Vermont* - delivers energy efficiency services throughout most of the state.
- *City of Burlington Electric Department (BED)* - provides energy efficiency services in its service territory
- *Vermont Gas Systems, Inc. (VGS)* - provides natural gas energy efficiency services in its service territory.

Vermont law requires program administrators to set budgets at a level that would realize "all reasonably available, cost-effective energy efficiency."[48])

As the central EEU, Efficiency Vermont is administered by the Vermont Energy Investment Corporation (VEIC), an independent non-profit energy services organization under an appointment issued by the Commission. Efficiency Vermont's programs undergo review and verification through an independent financial audit, a savings verification process conducted by the Vermont Public Service Department (PSD), and a triennial independent audit mandated by the Vermont Legislature.[49] Of note, Efficiency Vermont has recently moved toward greater levels of collaboration with the state's largest distributor, with a view toward leveraging their existing customer relationships.[50]

Changes Behind Program Delivery in Vermont

Originally, Vermont's 22 electric utilities were required to deliver comprehensive energy efficiency programs to their customers. The EEU model was introduced to ensure more effective delivery of energy efficiency services for two reasons: (1) those utilities that were investor-owned had mixed incentives – their profits increased when they sold more electricity, yet they were expected to promote investments that would reduce their sales of electricity; (2) it was administratively inefficient for each of Vermont's 22 electric utilities to provide their own energy efficiency programs. (Commission website)

In 2009, additional modifications were made to the EEU program structure to further improve effectiveness. Specifically, the structure was changed from a contract-based model to an Order of Appointment model for several reasons, including:

- Energy efficiency service delivery in Vermont was becoming **more complex**, e.g. with EEU being directed to focus on statewide and geographically-targeted demand savings. The EEU was also participating on behalf of the State in the ISO-NE Forward Capacity Market and it forecasts 20 years of electric efficiency savings. Pursuant to legislative direction, the EEU was offering efficiency services for unregulated fuels such as fuel oil, kerosene, and propane.
- Efficiency **markets had changed** as consumers became more aware of energy efficiency through sustained program, government, and advocacy efforts. New and emerging technologies in some instances had become standard practice, and new building energy codes had taken effect or have been updated.
- An increase in EEU **stability was seen as valuable** to both the program administrator and the ratepayer as it could minimize uncertainty and allow for appropriate long-term planning and investments.

Source: Docket No. 7466- Investigation into Petition Filed by Vermont Department of Public Service Re: Energy Efficiency Utility Structure, Available at http://puc.vermont.gov/sites/psbnew/files/doc_library/7466-eeu-restructure.pdf

In December 2010, the Efficiency Vermont contract structure with both Vermont Energy Investment Corporation and Burlington Electric Department was replaced with a franchise-like "Order of Appointment" structure with a duration of 12 years (see text box, previous page).

[47] http://puc.vermont.gov/energy-efficiency-utility-program
[48] https://database.aceee.org/state/vermont
[49] https://www.energy.gov/savings/efficiency-vermont.
[50] Efficiency Vermont's 2015 Savings Claim Summary, April 1, 2016. Available at http://puc.vermont.gov/document/efficiency-vermont-savings-claim-summary.

FUNDING

The EEU program is funded through a volumetric charge known as an "Energy Efficiency Charge (EEC)" on electric customer bills. In addition to providing electric energy efficiency services, the EEU program also provides thermal energy-and-process-fuel ("TEPF") efficiency services. These services are funded through a combination of proceeds from Vermont's participation in the Regional Greenhouse Gas Initiative (RGGI) and participation in ISO New England Forward Capacity Market.[51]

FINANCIAL COMPENSATION MECHANISMS

Under VEIC's Order of Appointment, performance compensation is to be paid based on the attainment of three-year performance targets. At the end of each three-year performance period, the Commission makes a final determination regarding VEIC's achievement with respect to the performance goals for the recently completed performance period and makes a determination regarding any associated performance awards to be provided to VEIC.[52]

Under their respective Orders of Appointment, three-year performance targets are determined for Burlington Electric Department (BED) and Vermont Gas Systems, Inc. (VGS). There are no performance incentive payments associated with achieving these performance targets at this time.[53]

CRITICAL SUCCESS FEATURES

- Strong but flexible oversight has been credited for contributing to success.
- The use of an independent fiscal agent to collect, manage and disburse efficiency funds has protected funds from state appropriation.[54]

[51] http://puc.vermont.gov/sites/psbnew/files/doc_library/EEUReportToLegislature2015%28Jan2017%29.pdf; https://www.energy.gov/savings/efficiency-vermont.

[52] http://puc.vermont.gov/energy-efficiency-utility-program/eeu-verification-and-evaluation.

[53] Ibid.

[54] "Nobody's Perfect: Choosing (and Improving) Models for Program Administration" by Philippe Dunsky and Jeff Lindberg, Dunsky Energy Consulting. 2010 ACEEE Summer Study on Energy Efficiency in Buildings.


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