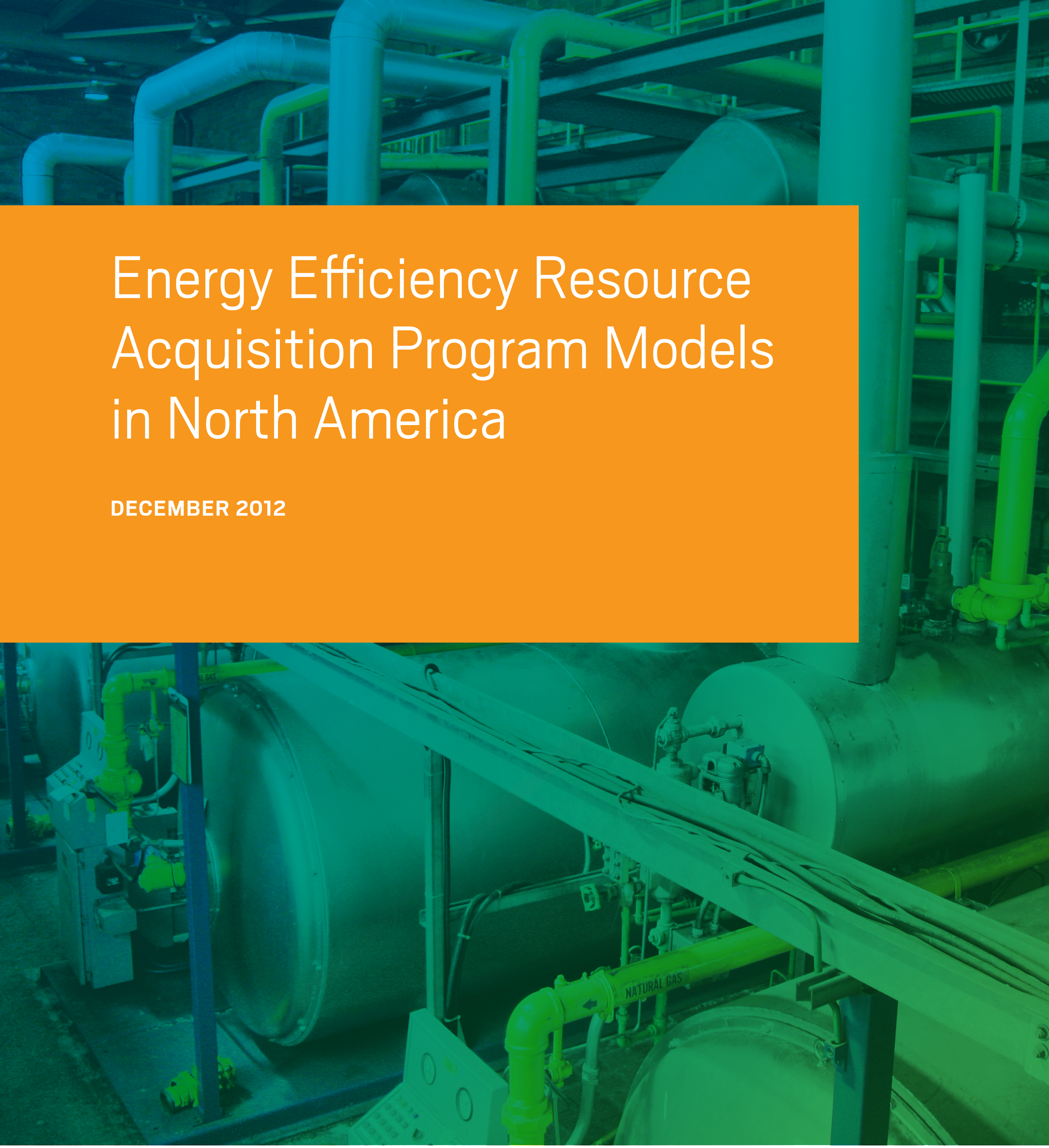

Energy Efficiency Resource Acquisition Program Models in North America

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Executive Summary

The primary purpose of this report is to provide an explanation of the different types of institutional delivery models used by North American states and provinces to acquire energy efficiency as a predictable and reliable resource for meeting existing and future energy demands. The second goal is to examine and compare them. Our analysis focuses on energy efficiency acquired through the provision of financial and technical assistance to the industrial sector, though the programs providing these services are almost always part of a larger effort serving all sectors. The focus on industrial energy efficiency is due to the growing number and size of programs serving this sector, the cost-effectiveness of these programs, and the potential for them to be replicated elsewhere.

There are many different models currently in use to acquire energy efficiency as a resource, each with its strengths and weaknesses. It cannot be overstated that the structure of each of these programs was highly influenced by the organizations involved. Initiatives of this significance usually involve the legislative and executive branches of government, regulatory and administrative agencies, and of course the utilities that provide electricity and natural gas. In any assembly of such interests, compromises must be made and less than ideal results accepted. Our comparison of models explains and highlights the different choices made regarding key program elements and explains the implications of those choices. In some cases, in order to satisfy divergent interests, it was necessary to create new energy efficiency service delivery models. Many of the programs examined in this report were the first of their kind and have been copied by other states and regions in the U.S. and Canada. Although there are many energy efficiency service delivery models, most services can be categorized as either long-term "market transformation" programs that achieve energy savings by focusing on changes to the products and practices used by energy consumers or short-term "resource acquisition" efforts that drive investments during the next twelve to twenty-four months. Both market transformation and resource acquisition efforts will have some mix of technical assistance that educates customers and financial assistance that influences investments.

Our comparison of models explains and highlights the different choices made regarding key program elements and explains the implications of those choices.

In recent years, there has been a trend to move administration of programs from utilities to third-party administrators; however, utilities still make up the bulk of energy efficiency program administrators across

North America, and even where third parties administer programs, utilities still play an important role, often by collecting the fees from the customers that fund energy efficiency efforts. Eight programs were selected for case study review, including two in Canada and six in the United States. The programs were selected not to identify best practices or common models, or to represent geographic diversity, but rather in an effort to provide a broad view of the different types of institutional models used across North America. Only programs with substantial industrial sector initiatives were selected. A few are well known and long-standing programs, whereas others are relatively new initiatives.

The report is based on research completed during January to June 2012, including literature and document review of case study programs and selected interviews of case study program participants. This report is presented in two parts. Part I gives an overview of resource acquisition programs, a brief history of energy efficiency programs in North America, and a comparative analysis of eight different North American energy efficiency resource acquisition programs. Part II contains detailed case studies of those eight programs. These case studies focus on the legal origin and institutional structure of those eight programs, but also contain details of program offerings, costs, and savings results.

The comparative analysis draws upon the case studies in Part II and is intended to provide the reader with an understanding of how the models differ and what trade-offs were made in their inception. The comparative analysis also seeks to highlight how innovative states and provinces have been in their attempts to satisfy what were certainly complex policy goals and market realities.

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Part I: A Comparison of Institutional Delivery Options

Introduction

This report is presented in two parts. Part I gives an overview of resource acquisition programs, a brief history of energy efficiency programs in North America, and a comparative analysis of eight different North American energy efficiency resource acquisition programs. Part II contains detailed case studies of those eight programs.

The main focus of this report is an investigation of the different types of institutional models used by various North American states and provinces to reduce energy consumption in the industrial sector. A comparison of the different models shows how different states and provinces made different choices regarding key elements, and explains some of the reasons for and implications of those choices. Analysis and comparison of the different programs also highlights many operational lessons that have emerged as many of these programs head into their second decade of operation. And though it is beyond the scope of this study to present those many lessons comprehensively, readers hopefully receive a useful introduction.

Eight programs were selected for case study review—two in Canada and six in the United States. The programs were selected not to identify best practices or common models, or to represent geographic diversity, but rather in an effort to provide an understanding of the different types of institutional models used across North America. The comparative analysis in the Delivery Options section draws heavily on the case studies in Part II. Case studies are cited in the text as "CS X," where "X" corresponds to case study numbering reflected below in the Case Studies section of this Introduction. These case studies focus on the legal origin, institutional structure, contractual relationships, measurement and verification, target setting, and funding of those eight programs. The comparative analysis in Part I concludes with a discussion of issues and recommendations for program developers and other energy efficiency stakeholders to consider. Although this study does not delve into the details of the various operational programs undertaken by energy efficiency acquisition entities, the study has sought to highlight many details of energy efficiency acquisition from the industrial sector. More importantly, the report introduces some of the innovative approaches recently undertaken for industrial energy users where energy efficiency program investments have been increasing sharply in recent years.

What Is Energy Efficiency Resource Acquisition?

Energy efficiency resource acquisition programs seek to purchase energy savings in the public interest, often through financial or technical assistance. Although the decision process for creating these programs varies and can include government, utilities, consumer groups, and other stakeholders, it is usually a government entity that gives final approval of the volume of energy savings to be acquired and how it will be funded. The government entity may also assign responsibility for delivering the energy savings to one or more institutions in some form of contractual arrangement and supervise the results.

In North America, the main driver over the past twenty years for energy efficiency resource acquisition programs has been a desire by government regulators to ensure that low-cost energy efficiency resources are delivered to meet electric power demand as an alternative to more costly supply resources. Energy efficiency resources are often significantly less expensive than new (or even existing) sources of electricity generation. Acquiring these less expensive resources reduces overall energy costs for consumers. As the concept and delivery mechanisms have evolved, other additional objectives have become important in many programs, such as environmental compliance and energy supply security. In addition to electricity, savings from other types of energy, such as natural gas, also are now being acquired.

Thinking about energy efficiency as a "resource" that can be purchased is a novel concept. Energy savings resulting from more efficient use of energy is indeed something that cannot be seen – it is energy that is not being consumed. However, it can be measured by comparing energy use before and after an energy efficiency measure is undertaken. Over thirty years of practical experience in energy efficiency resource acquisition have proven that energy efficiency resources can be calculated reasonably well and relied upon as a key resource to meet electricity system demands. Costs, resource characteristics, and availability over time can be analyzed and determined with reasonable certainty. As a result, to cite just one example, the four states of the U.S. Pacific Northwest are now relying with confidence on energy efficiency to meet 85% of their new demand for electricity over the next twenty years (CS 2).

Energy efficiency resource acquisition for the public interest is now a big business. Total expenditures on energy efficiency programs (of which resource acquisition is the dominant part) have been growing sharply in recent years. Expenditures in 2011 were US$7 billion in the United States[1] and US$1 billion in Canada.[2]

In both countries, programs are run at the sub-national level: by U.S. states and Canadian provinces. There are no national-level energy efficiency resource acquisition programs. Among the states and provinces there is great variation in how programs are constructed and operated. Public interest objectives vary. Methods for setting acquisition targets vary. Although it is most common to use electricity or natural gas utilities as the agents to acquire and deliver the ordered savings, government agencies or special, independent institutions also are used. Funding mechanisms vary, although funds come from explicit or implicit charges to consumers in most cases. Contracting varies from agreements imbedded in regulatory relationships between utility regulators and utilities to focused, commercial-style contracts between, for example, a utility and a third-party implementer with performance-based compensation. Arrangements and methodologies for verifying delivery of energy savings vary. Unsurprisingly, terminology varies between states and provinces, easily creating confusion.

The great variation among programs provides particularly rich experience and food for thought for those interested in creating or improving their own energy efficiency resource acquisition programs. All of the programs have key elements in common, but include major differences in the choices made on those elements. The common elements and some key questions to decide on for each include:

- Assignment of one or more entities to undertake the acquisition. What organizations can best arrange efficient delivery of the energy savings, preferably at lowest cost to the public?

- Designation of funding sources and amounts. What funds are to be used for the acquisition? How should funds be allocated for different parts of the program? Who decides this and how?

- A method and system for determining acquisition targets. How much energy savings should be acquired? Who decides that and how?

- Completion of performance targets and contractual arrangements. What is each delivery entity required to deliver, when, and at what cost? What are the consequences for over- or under-delivery? How can flexibility be introduced to accommodate changing circumstances?

- A system for evaluating, measuring, and verifying of energy saving results. What is the system for evaluating, reporting, and verifying the energy savings delivered? Who is responsible for what? What methodologies are used?

Much of the experience in the North American states and provinces on energy efficiency resource acquisition is also relevant for policy-makers and energy efficiency practitioners who may not be interested in developing North American style programs, but are nonetheless active in the energy efficiency field. Because energy efficiency resource acquisition is a business, with substantial amounts of money at stake, participants in successful programs often approach securing energy efficiency results from projects with a sharp degree of focus and a level of sophistication that are highly instructive.

Just a few of the topics with exceptionally rich experience include: (a) how to incorporate energy efficiency resource acquisition reliably in power system planning; (b) how to robustly assess costs of securing energy savings from different perspectives; (c) how to verify actual delivery of savings with sufficient integrity and accuracy while keeping verification costs reasonable; (d) how to devise detailed least-cost programs for delivery of energy savings in different markets; and (e) how to devise financial incentives or technical assistance to assure the greatest energy savings with the smallest financial investment.

A Brief History Of Energy Efficiency Resource Acquisition In North America

In the United States and Canada, most energy efficiency programs are administered through energy utilities on a state or provincial level. In both countries, the federal government is responsible for matters that cross national, state, or provincial borders, whereas most other energy utility regulatory authority

1 ACEEE. *The 2012 State Energy Efficiency Scorecard*. 2012. http://aceee.org/research-report/e12c.
2 CEE. *2011 Annual Industry Report*. 2012. http://www.cee1.org/ee-pe/2011AIR.php3.

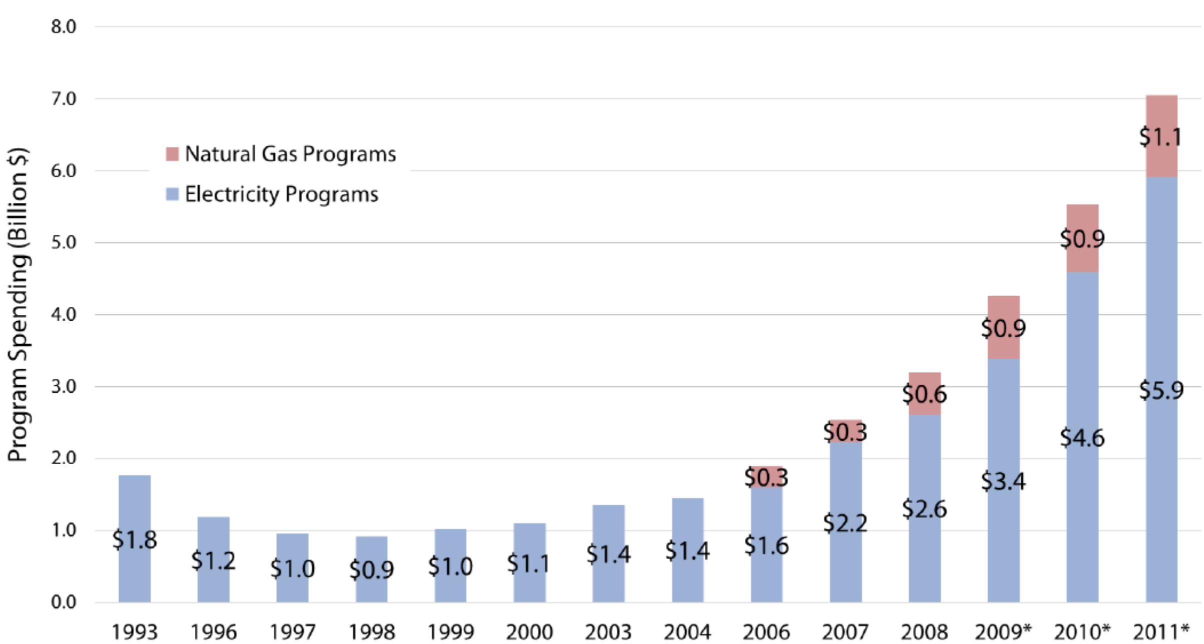
is a function of the state or provincial government, usually through a quasi-judicial entity. These entities vary by state and province, but they are most commonly referred to as a public utility commissions (PUC), public service commissions, energy boards, or utilities boards.[3] For simplicity, this report will usually refer to these regulatory arms of the state or provincial government as PUCs. Typically, PUCs oversee the rates utilities charge their customers (including any fees for energy efficiency programs), plans for building new generation, and energy efficiency resource acquisition programs run by utilities, among other duties.

3 For more information on the U.S. energy regulatory environment, see The Regulatory Assistance Project. *Electricity Regulation in the US: A Guide.* 2012. http://www.raponline.org/document/download/id/645; for Canada, see Blakes Lawyers. *Overview of Electricity Regulation in Canada*. 2008. http://www.blakes.com/english/legal_updates/reference_guides/Overview of Electricity in Canada.pdf.

Energy efficiency programs have been around in parts of North America since the 1970s.[4] Then, as now, energy utilities played a central role in delivering those programs. This was a time of rapidly growing demand for energy services, and electric utilities were focused primarily on new generation to meet that demand. There were some energy efficiency programs, but the main goal of these early programs was customer bill relief. In the 1980s, utilities began using integrated resource planning (IRP), which aimed to provide least-cost resources, including energy efficiency, to meet new electricity needs. This began an era of demand-side management (DSM) programs through the 1980s and early 1990s. DSM activities, which include both peak load management and energy efficiency, were focused on providing the utility the benefit of controlled load growth as

4 For a more detailed history, see York et al. *Three Decades and Counting*. ACEEE. 2012. http://aceee.org/research-report/u123.

FIGURE A: Electric and Natural Gas Energy Efficiency Program Budgets in the U.S.



* From 1993-2008, values respresent actual program spending (including customer-funded programs); from 2009 on, they represent program budgets. Natural gas spending is not available for the years 1993-2004. Sources: Nadel et al. (2000); York and Kushler (2002, 2005); Eldridge et al. (2008, 2009); Molina, Neubauer et al. (2010); Sciortino et al. (2011).

SOURCE: ACEEE. The 2012 State Energy Efficiency Scorecard. 2012.

opposed to the consumer the benefit of lower energy costs.[5] In the mid-1990s, many states began to restructure their electric utility system. This often meant moving away from a vertically integrated utility model, where a single utility had a regulated monopoly, serving a defined service territory and owning all of the generation, transmission, and distribution assets. Restructuring often shifted the model to one where the local utility only delivered electricity, buying electricity from a generation company. Splitting the delivery entity from the generating entity created new barriers to DSM programs. The incentive to pursue energy efficiency was lost between the new companies. Generation and distribution companies were both motivated to supply peak power because that power commanded the highest price. Insufficient generation or transmission only drove prices higher. These high prices were intended to drive consumers to invest in energy efficiency on their own. Due to this shift, utility spending on DSM programs in the U.S. fell from $1.8 billion in 1993 to $900 million in 1998.

However, some states recognized the value of energy efficiency for the customer, utility system, and the public-at-large. These state PUCs created a funding mechanism for energy efficiency that was paid for by customers through their energy bills. The fees were either built into the overall energy rate or as an itemized charge, often referred to as "public benefits fee" (PBF) or "system benefit charge" (SBC). As PBF-funded programs spread, total energy efficiency program budgets began growing again, particularly after 2006, as shown in Table 1. Publicly-funded natural gas conservation programs began to grow during this time period as well, though more slowly. Electric and natural gas programs in Canada showed similar growth during this period.

Many of these programs developed into the resource acquisition model examined in this report. Energy efficiency resource acquisition programs are characterized by short-term energy savings goals met through financial incentives and technical assistance to end-use customers. Resource acquisition program administration increasingly began to move from energy utilities to a variety of third parties (described later in this report).

5 Many of these programs are load curtailment programs: during periods of high demand, utilities can limit how much electricity large customers can draw. This is less expensive and risky for the utility than building new generation that may see only limited use or purchasing expensive power on the wholesale market during peak periods. There are energy savings and customer benefits, but the primary purpose is to limit a utility's capital and operational costs.

Utilities still make up the bulk of energy efficiency program administrators across North America, and even where third parties administer programs, the utilities still play an important role, often by collecting the PBF from the customers. Due to the focus on (often) annual energy savings targets and the increasing opportunity for contractual relationships with third parties, energy efficiency resource acquisition programs tend to be more business-oriented than the early DSM programs. The service delivery options outlined below examine this relationship further.

Although resource acquisition is the most common type of energy efficiency program, another important type is market transformation. Market transformation, unlike resource acquisition, has a much longer-term focus, and aims to address structural barriers to energy efficiency such as outdated building codes or lack of vendors offering an emerging technology. Its goal is to change marketplace behavior to increase acceptance of energy efficiency technologies and practices, but this can take time (often 5 to 15 years). Savings often grow slowly in early years, but when savings start to accrue, they are more likely to be persistent without relying on direct intervention like resource acquisition does.

Resource acquisition and market transformation take very different approaches, but they are also very complimentary.[6] Resource acquisition, by focusing on implementing energy efficiency projects, creates market demand for energy efficiency products and services, and capital flow to the manufacturers of those products. This can lower the price of the products, as well as convince retail entities to carry those products, thus achieving a market transformation goal. Conversely, successful market transformation programs increase education and awareness of the benefits of energy efficiency. A customer base that is knowledgeable about energy efficiency products and savings opportunities will be more likely to participate in a resource acquisition program offered by a local utility or third party.

Therefore, although this report focuses on energy efficiency resource acquisition programs, it recognizes that several of these programs are supported by effective market

6 Rosenburg and Hoefgen. *Market Effects and Market Transformation*. CIEE. 2009. http://uc-ciee.org/downloads/mrkt_effts_wp.pdf.

transformation activities as well. The network of programs in the U.S. Northwest (CS 2) and NSYERDA (CS 7) are good examples of this.

Case Studies

The main focus of this study was to investigate the different types of institutional delivery models used by various North American states and provinces for energy efficiency resource acquisition. Eight programs where selected for case study review — two in Canada and six in the United States. The programs were selected not to identify best practices or common models, or to represent geographic diversity, but rather in an effort to provide a broad view of the different types of institutional models used across North America. Only programs with substantial industrial sector initiatives were selected. A few are well-known and long-standing programs, whereas others are relatively new initiatives. The report is based on research completed during January to June 2012, including literature review and a document review of program case studies complemented by selected interviews of program participants.

These case studies focus on the legal origin and institutional structure (including contractual relationships, measurement and verification, target setting, and funding) and also contain details of program offerings, costs, and savings results. The comparative analysis in the Delivery Options section draws heavily on the case studies in Part II. Case studies are cited in the text as "CS X," where "X" corresponds to the following case study numbering.

The eight programs are:

1. **BC Hydro (British Columbia, Canada)**
2. **Northwest programs (Washington and Oregon, United States)**
3. **Energy Trust of Oregon (Oregon, United States)**
4. **Wisconsin Focus on Energy (Wisconsin, United States)**
5. **Detroit Edison (Michigan, United States)**
6. **Enbridge Gas Distribution (Ontario, Canada)**
7. **New York State Energy Research and Development Authority (NYSERDA) (New York, United States)**
8. **Efficiency Vermont (Vermont, United States)**

This report will discuss the various ways public authorities pursue energy efficiency resource acquisition and then detail five key choices that must be addressed when developing a resource acquisition program:

1. **What delivery institution should be used?**
2. **What funds should be used and how should they be managed?**
3. **What purchase targets will be set and through what process?**
4. **What type of contractual arrangements should be used?**
5. **What kind of measurement and verification processes should be used, and who should be responsible?**

The section on Delivery Options presents a comparison of the different approaches to the choices presented in the eight case studies examined in Part II. Part I concludes with some broad recommendations regarding these choices and some key lessons learned from the program case studies.

Why Pursue Energy Efficiency Resource Acquisition?

The main reasons that public authorities in North America encourage energy efficiency resource acquisition programs are to ensure least-cost resource development by energy utilities, reduce environmental damage from energy use, enhance energy supply security, and reduce consumer energy bills. The relative priority of these objectives varies and shapes how programs are developed and implemented. The first three, "societal" benefits, are discussed first below, followed by the consumer benefit. A final section provides thoughts on the role of resource acquisition programs among the suite of useful energy efficiency policy and programs.

Least-Cost Resource Development

Delivery of electricity efficiency resources costs dramatically less than incremental electricity supply resources. In most electric power systems, delivery of reliable energy efficiency resources to meet electrical energy demands (kWh) costs somewhere between 15–50% of the costs of new power supply sources, such as a new power generating plant.[1] Energy efficiency resources offer similar cost advantages for meeting power capacity (kW) needs. Costs of improvements in the efficiency of use of natural gas also are substantially lower than acquiring new natural gas resources over the medium term,[2] although gas industry structure and economics are different from those of the power sector.

With clarity on the major cost advantages of energy efficiency, especially in power systems, the question then becomes: "Why should society's resources and large amounts of consumer money be wasted pursuing higher cost solutions?" Prior to the 1970s, the concept of comparing energy efficiency resources with supply resources was largely unheard of. Utility regulation was premised on a business model of rapid customer demand growth and the need for large capital investments in new generation resources to meet that demand. In the past, many questioned the reliability of energy efficiency resources; however, with a decade of experience now in hand, most U.S. states and Canadian provinces have decided they must include all low-cost resource options — including energy efficiency. This may be the largest driving force behind the increasing adoption of energy efficiency resource acquisition programs in North America.

Environmental Benefits

Energy efficiency resources are arguably the cleanest energy resources from an environmental perspective. The unacceptable land footprint and ecological impacts, air and other local pollution impacts, and carbon emissions of many supply alternatives are avoided. In environmental analyses such as air quality improvement or carbon emission reduction plans, tapping into energy efficiency resources usually ranks at or near the top of the list of cost-effective measures.[3]

Environmental concerns also rank high among the reasons for adopting energy efficiency resource acquisition schemes in most states and provinces. Many states and provinces have adopted public goals to reduce energy consumption and/or carbon emissions over medium- or long-term time horizons (including most of the states and provinces reviewed in the case studies for this report). Energy efficiency resource acquisition figures prominently as one of the leading measures to achieve these goals.

Energy Security

Especially where delivered as a portfolio of measures with medium- and/or long-term reliability,[4] acquisition of energy efficiency resources can provide a valuable hedge against energy supply disruptions or shortages and energy price volatility, including price spikes. In the recent *Sixth Power Plan* for the U.S. Pacific Northwest (CS 2), for example, special attention

1 Figures vary substantially for different power systems and especially concerning how much of existing energy conservation potential is being included. Energy efficiency resource delivery has a unit cost curve, with costs rising as desired shares of the overall technical potential increase. See Lazard. *Levelized Cost Of Energy Analysis—Version 5.0*. 2011.

2 This remains true even in light of lower natural gas prices in North America due the shale gas boom. See Young et al. *Saving Money and Reducing Risk: How Energy Efficiency Enhances the Benefits of the Natural Gas Boom*. ACEEE. 2012. http://aceee.org/white-paper/saving-money-and-reducing-risk

3 See McKinsey and Company. 2009. *Pathways to a Low-Carbon Economy.*

4 See Choice 3 for a discussion on the persistence of energy savings.

is given to the role that energy efficiency resources can play in dealing with the risks of supply and price uncertainty.

Consumer Benefits

Implementation of cost-effective energy efficiency measures reduces the energy bills of consumers. Although returns vary, life-cycle returns on energy efficiency investments are generally robust, especially if other non-energy benefits are counted.[5] Including the cost of any price surcharges and the investment consumers make, minus incentives received, it often takes a few years at most before consumers are ahead.

Consumer bills also will be lower to some extent over the medium to long term due to avoiding utility rate increases that may be necessary under a no energy efficiency program scenario. By relying on least-cost energy efficiency resources, utilities are able to avoid more expensive supply resources. This eventually results in lower relative rates as capital costs of new generation do not need to be recovered in these rates. How fast rates may decline relative to the no energy efficiency scenario, and by how much, depends mainly on how fast the electricity load is growing and the differences between marginal costs for new supply and the marginal costs of energy efficiency resources. Generally speaking, however, a small rate increase in the near term (for energy efficiency program costs) results in holding rates at lower levels in the long term.

The Role Of Energy Efficiency Resource Acquisition Among Overall Energy Efficiency Efforts

Despite the solid financial returns of most energy efficiency projects, investments are still not undertaken at even close to the cost-effective potential under pure market conditions alone. This has been demonstrated in many countries and all sectors. To give an example from the industrial sector, it has long been understood that few corporations will undertake energy efficiency investments unless those investments break even in two years or less, regardless of high project life-cycle rates of return. During the recent economic downturn, many companies reduced this 'rule of thumb' to one year. This leaves a large number of highly cost-effective energy efficiency projects unimplemented. Some of the most often-cited reasons for the great number of unimplemented economically viable projects include:

1. Lack of information and/or high transaction costs to obtain suitable information;

2. Large numbers of scattered, relatively small projects, the individual net worth of which is small, even if returns are high;

3. Inability to put cost savings on par with increased revenue in some companies, due to organizational separation, accounting conventions, or bias towards generation of tangible fixed assets as opposed to less tangible "savings" assets;

4. Lack of understanding of performance risks;

5. Split incentives between market participants (such as building developers, owners, and occupants), undermining incentives for making investments;

6. Mismatch between energy efficiency program cycle time (often one to two years) and the time required for industrial project planning and implementation (often two years or more); and

7. Economic uncertainty, questionable demand for products being manufactured, and not knowing future product mix all limit the predictability of future equipment and energy needs.

A variety of policies and programs aim to expand the uptake of energy efficiency measures by eliminating or offsetting these problems. Some of the most common categories include:[6] (a) policies to adjust prices, such as energy taxation, various project input subsidies, or favorable tax treatment for energy conservation investments; (b) programs to improve information dissemination; and (c) institution of regulations requiring minimum energy efficiency performance (for new buildings, appliances, or vehicles, for example). Some of these measures may be packaged together as strategic "market transformation" initiatives, aimed at introducing new technologies or approaches into the market and promoting them until they have become market normality.

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5 Non-energy benefits can include increased safety, quality, production levels, and comfort, among others. For more information, see Chittum. *Meaningful Impact: Challenges and Opportunities in Industrial Energy Efficiency Program Evaluation*. ACEEE. 2012

6 For more information on industrial energy efficiency policy categorization, see Reinaud and Goldberg. *The Boardroom Perspective: How Does Energy Efficiency Policy Influence Decision Making In Industry?* IIP. 2011.

Another category of programs includes efforts to promote improved energy efficiency project financing mechanisms.[7] These efforts aim to tackle a number of the barriers that stymie project uptake directly through integrated project financing that can help overcome transaction cost, small size, technical performance concerns, and biases detracting from cost-saving investments by use of packaged approaches, integrating financing with technical solutions, and achieving scale and specialization. Two examples are the development of the energy performance contracting industry and the operation of sophisticated energy efficiency financing funds.

Energy efficiency resource acquisition programs have proven to be successful mechanisms for encouraging investments in energy efficiency. Their role in the market is to spur implementation of specific projects, including retrofit or new facility investment projects; improved management initiatives; and uptake of new, market-transforming technologies. Well-designed programs, such as those presented in the case studies, provide: (i) authoritative, centralized sources of practical information on energy efficiency measures and practices, disseminated to many end-users; (ii) prescriptive programs to promote implementation of small projects among numerous end-users, as well as programs to develop and implement customized projects; and (iii) combined packages of technical and financial support for project implementation. Particularly strong features of the North American programs include:

- Ability to bring often substantial financial incentives to the table, in essence reducing the payback periods faced by customers for cost-effective investments;
- Sustainable access to funds (in most cases); and
- Relatively large scale, with some state or province programs providing more than $100 million in financial incentives and technical support per year.

7 For further information and examples from a variety of countries, see R. Taylor et al. *Financing Energy Efficiency: Lessons from Brazil, China, India and Beyond.* World Bank. 2008.

Delivery Options

Table 1 provides an overview of the energy efficiency resource acquisition delivery models reviewed in this study's eight case studies. Most of the delivery models currently in use in North America are represented by these eight case studies.

Location

The cases reviewed include programs in the Pacific Northwest (including British Columbia in Canada, and Washington and Oregon in the U.S.), the Mid-Western part of the continent (including Ontario in Canada, and Wisconsin and Michigan in the U.S.) and the Northeast (including New Brunswick in Canada, and New York and Vermont in the U.S.). Electric power generation resources and availability of different fuel types vary somewhat across these regions, which has some impact on program focus and economics.

Utilities versus Non-Utilities

When developing its solution for acquiring energy efficiency resources, each state or province faced the issue of choosing an organization to deliver services. Utilities have existing relationships with customers, have significant staff and resources in place, and established mechanism for raising revenue and covering expenses. On the other hand, utilities historically have been in the business of selling energy and are generally rewarded for selling more. Asking a utility to work against what has been historically been in its financial interest requires the organization to redefine its purpose, as well as its mechanisms for cost recovery.

Further complicating delivery of uniform services across a state, as is likely to be the goal of the state public utility commission or legislature, is the fact that many states have several, if not dozens of utilities operating within their borders. As will be explained in the following sections, many states found it more advantageous to either take on these responsibilities or to create a new entity to be responsible for the delivery of energy efficiency services throughout all or a majority of the state. Since these entities work for one organization to provide services to a second organization, they are often referred to as a "third-party administrator."

Five of the case studies represent energy efficiency resource acquisition programs managed by non-utility entities, whereas the remaining four cases are programs directly administered by utilities. The governance, incentives, operational scope, and institutional culture of the utility and non-utility delivery entities are different in many ways, influencing how they approach program delivery.

The non-utility entities include two government agencies (Efficiency New Brunswick and the New York State Energy Research and Development Agency — NYSERDA), two independent nonprofit corporations (Efficiency Vermont and Energy Trust of Oregon), and the Statewide Energy Efficiency and Renewable Administration (SEERA) (together with its primary nonprofit corporation contractor), created by energy utilities in Wisconsin.

Among the non-utility entities, four of the cases studied were specially created for the purpose of acquiring energy efficiency resources (and, in some cases, renewable energy). The concentrated focus of these entities on energy efficiency resource acquisition and the lessons they have learned along the way are especially instructive. The fifth non-utility case study entity (NYSERDA) provides an example where funds collected from utility customers were provided to a well-established existing state agency to operate an energy efficiency resource acquisition program with those funds alongside its many other activities.

When a utility is tasked with acquiring energy efficiency, the challenge becomes how to provide it the same incentive to provide efficiency as to provide power. For example, in addition to earning a rate of return on energy provided, most regulated utilities in North American are also guaranteed a rate of return on all capital assets (power plants, transmission and distribution systems and other physical plant assets) too. This challenge has largely been overcome through various rate structures, the details of which are discussed later in this report, but it is important to understand that resolution of this fundamental issue was required by each state or province before energy efficiency could be pursued on scale.

TABLE A: Comparison Chart of Energy Efficiency Resource Acquisition Entities

Entity	Type of Entity	Program Launch	Supervising Entity	Clients	Target Setting	Main Funding Source	Fuels Included	M&V
BC Hydro (British Columbia)	Government-owned electric utility	1989	PUC and provincial government	All utility customers	PUC	Imbedded in consumer tarrifs	Electricity	Entity, reviewed by PUC
Bonneville Power Administration (Washington, Oregon, Montana, Idaho)	Government owned wholesale electric utility	1980	US Federal Government	Consumer-owned utilities	NW Power and Conservation Council	Imbedded in consumer tariffs	Electricity	Entity
Energy Trust of Oregon (Oregon)	Nonprofit corporation	2001	PUC	Consumers of 4 investor-owned utilities	PUC	System benefit charge, other utility revenue	electricity and natural gas	Entity, reviewed by PUC
Wisconsin Focus on Energy (Wisconsin)	Nonprofit corporation	1999	PUC	All consumers, except some rural cooperatives	State law (EERS), PUC	System benefit charge, other utility revenue	Electricity and natural gas	Entity-hired third parties, reviewed by PUC
Detroit Edison (Michigan)	Investor-owned utility	2008	PUC	All utility customers	State law (EERS), PUC	System benefit charge	Electricity	Entity/ Entity hired, reviewed by PUC
Enbridge gas (Ontario)	Investor-owned utility	1995	Ontario Energy Board (OEB)	All utility customers	OEB	Imbedded in consumer tariffs	Natural gas	Entity-hired third party, reviewed by PUC
NYSERDA (New York)	Public benefit corporation	1996	PUC	All utility customers, excluding LIPA and NYPA	PUC	Electricity and gas public benefit charges, others	Electricity and natural gas	Entity/ entity-hired, reviewed by PUC
Efficiency Vermont (Vermont)	Nonprofit corporation	1999	PUC	All utility customers excluding City of Burlington	PUC	Public benefit charge, other	Electricity, some fuels	Entity, reviewed by government department and PUC

NOTES: "PUC" denotes the relevant state provincial public utility commission. EERS denotes Energy Efficiency Resource Standard. A public benefit corporation is a government entity that operates with some independence of the government. LIPA is the Long Island Power Authority and NYPA is the New York Power Authority, public power utilities not under PUC jurisdiction.

Funding and Program Supervision

Although only four of the cases selected for study involve energy savings delivery directly by utilities, all of the models, with the exception of Efficiency New Brunswick, which is a government program funded from the government budget and run for all consumers, involve some level of participation by electricity and/or natural gas utilities,. All of the programs reviewed except for Efficiency New Brunswick are primarily funded with money collected by utilities from end-use consumers. These funds may be collected through a special system benefit charge, or as an imbedded part of overall tariffs. The ways that funds are compiled, disbursed, and accounted for varies substantially. In addition, legally speaking, the non-utility entities that manage energy savings delivery programs in Oregon, Wisconsin, Vermont, and New York do this "on behalf" of utilities, who are still obligated to pursue energy efficiency under longstanding laws or regulations. Thus all of the programs except for those of Efficiency New Brunswick and the Bonneville Power Administration (BPA)[1] are supervised by state- or provincial-level public utility regulatory authorities. In addition, however, other state or provincial government departments may be closely involved and responsible for aspects of oversight.

Different Utility Delivery Models

Among the four cases selected where energy utilities directly acquire energy efficiency resources, two utilities are owned by private investors and two utilities are publicly owned. The differences in utility ownership create differences in utility governance and regulation that have an important bearing on how the public-interest energy efficiency resource acquisition programs are organized and overseen. Among the investor-owned utility cases, one is an electricity utility and the other a natural gas utility. The fuel type has a substantial bearing on the economic framework of programs. Although only one example of an energy efficiency resource acquisition program operated by an investor-owned electricity utility and regulated by a public utility commission was included in this study (CS 5), it is important to understand that this is currently the most common model in the United States.[2]

Fuels Included

Energy efficiency resource acquisition programs began with electricity. Natural gas efficiency acquisition programs were later started in a number of states and provinces (most focusing initially on residential customers), and have been expanding. A few programs acquiring energy savings based on usage of other fuels such as coal and purchased steam also have been undertaken. Among the five non-utility delivery systems studied all of them cover both electricity and natural gas, and two include other fuels to some extent as well.

Evaluation, Measurement and Verification

Tracking, calculation and validation of energy savings delivered by assigned delivery entities is important for all programs in order to protect public funds. In all the case studies examined, tracking, calculations and compilation of results is first conducted by the delivery entities themselves and/or consultants they hire, typically applying methodologies agreed upon with supervising authorities. Methodologies vary substantially, however in almost all cases, supervising entities critically review reported savings amounts. In some cases, supervising entities rely on detailed review by others. The depth of review and the extent to which initially reported and subsequently validated savings differ vary substantially among programs.

The following sections delve into greater discussion of the difference among the models and reasons for those differences, organized around five basic choices that must be made in the creation and operation of an energy efficiency resource acquisition programs:

1. **Who shall be assigned responsibility for delivery?**
2. **What funds should be used and how shall they be managed?**
3. **How will targets be set and by whom?**

1 BPA operates across several states and is owned by and reports to the U.S. Federal Government. It primarily selss wholesale electricity to local utilities, but also serves some large retail customers.

2 Readers particularly interested in regulated investor-owned utility models may wish to review the quite extensive existing literature on that topic, and the longstanding history and sophisticated examples in California and other states and provinces such as Connecticut, Massachusetts, or Rhode Island.

4. What contractual arrangements shall be made between the "buyer" and the "deliverer"?

5. How shall the savings delivered be calculated and verified?

CHOICE 1: WHAT DELIVERY INSTITUTION TO USE?

In North America, and probably most other regions as well, the basic types of entities for government or public utility commission representatives to choose from to contract for delivery of energy savings include (i) energy utilities, (ii) government agencies, (iii) third-party institutions, or (iv) a mix of these. Examples of all are these are included in the case studies reviewed.

There are many factors to weigh in choosing which type of entity to use. Clearly there is no "best" solution for all cases; the best solution depends on program objectives and many local circumstances, particularly the current local regulatory structure. It also seems very difficult (if not impossible) to select an option that optimally addresses the different factors that need to be weighed — usually there are difficult tradeoffs.

The factors that seem to have a particularly strong bearing on choice of delivery entities include:

- **Fuel coverage**. Are acquisitions to be made of only electricity, only natural gas, both of these, or additional fuels as well?
- **Scale**. There are significant economies of scale from organization and operation of larger programs.
- **Consumer relations**. An entity should have the institutional capacity, contacts and good reputation to work directly with many end-users to acquire energy savings from them, or to effectively contract and supervise others to maintain those key relations.
- **Incentives**. Utilities, government agencies and third party entities typically face different incentives that affect their behavior. Ability to align and adjust incentives to meet the needs of energy efficiency resource acquisition are important. It is critical that the organization tasked with savings be given sufficient incentives to overcome any competing interest.
- **Technical and operational skill and program packaging abilities**. Delivery entities must have the skill to develop and deliver the energy savings from a combination of their own and contracted staff. The ability to integrate additional energy efficiency support initiatives into programs also can be a plus.

Current local legal and regulatory structures are important affect the choice of delivery institution. For example, creating state-wide energy efficiency implementation agency would be difficult in a state or province that has no history of statewide agencies of that kind. A state or province without a committed legislature and/or PUC may not be able to sustain a state-wide program.

Scale, incentives and program structure can all have an important bearing on the administrative and overhead costs associated with different delivery models (e.g., administrative cost per unit of delivered energy savings). The cost issue is discussed in more detail in the section on contractual arrangements (Choice 4).

Each of the five factors listed above impacts the choice of delivery entity and is discussed in detail below.

Fuel Coverage

Fuel coverage is a key concern when choosing between a utility delivery model and a non-utility delivery model. In most cases, energy utilities provide service for only one type of energy — electricity or natural gas — although a few do serve both markets. Where utilities provide single-fuel service, they can deliver energy savings only for that type of fuel. Of course, a province or state can create parallel energy efficiency acquisition programs in the same service area — one for electricity and one for natural gas, as do the provinces of British Columbia and Ontario (CS 1 and CS 6), and southern California. A drawback that must be weighed, however, is the difficulty of coordinating programs run by different institutions to provide integrated solutions. For residential or even commercial customers, dealing with two separate programs may be cumbersome, but manageable. For industrial customers, however, inability to easily receive cross-fuel integrated solutions from one institution is a common and often sharp complaint about dealing with single-fuel energy savings promotion programs.[3]

If savings are to be acquired from non-network fuels (e.g., petroleum fuels or solid fuels such as coal or biomass) or fully integrated solutions, the non-utility delivery entity is the only practical option. Efficiency New Brunswick (CS 9), operated by a government agency, is proud of its ability to offer one-stop integrated solutions to industrial energy users in particular. Vermont's statewide energy efficiency utility, Efficiency Vermont (CS 8), was recently directed to assume responsibilities to provide integrated solutions to help improve energy efficiency in 80,000 homes using non-utility fuels by 2020 in order to reduce spiraling home heating costs as well as to meet carbon emissions reduction goals. Given the mix of fuel oil, bottled gas, biomass, natural gas and electricity used in Vermont residences, this would not be possible with a single-fuel energy savings delivery model.

Where the main objective is to reduce the costs of securing new electricity by acquiring least-cost energy efficiency resources, use of electric utilities to undertake the single-fuel acquisition is a logical and efficient decision. In North America, such programs can build upon many years of mutual understanding and experience with integrated resource planning by regulators and utilities. Relatively simple programs for acquiring natural gas savings through natural gas utilities in order to reduce the overall natural gas bills of customers also have important roles. If cross-fuel and integrated solutions are judged necessary to meet environmental or other goals, however, non-utility delivery models have distinct advantages.

Scale

To be cost effective, have sufficient staff of requisite expertise, and broad programmatic offerings, a resource acquisition program must serve a large customer base. Economies of scale are not possible through isolated programs with small staffs. Moreover, for industrial or commercial customers with multiple facilities, it is confusing and complicated for them to deal with a number of utilities with inconsistent program offerings.

This is one reason why many states or provinces served by one or several large utilities have used those utilities to deliver energy savings. The large utilities can generally bring substantial resources to bear across a large territory with consistent program clarity. Oversight for the supervising entity may also be simpler. One good example of an effective "one-stop" utility delivery system is B.C. Hydro's Power Smart Program (CS 1), which acquires electricity savings through a range of programs operated among 95% of British Columbia's electricity users.

However, many states or provinces are served by a large number of independent utilities. In 1999, consumers in the small state of Vermont, with a population of just over 600,000 people, were served by 22 different electric distribution companies. A desire to consolidate energy efficiency resource acquisition programs into one statewide entity, as a one-stop shop for virtually everyone, was a key factor in the decision to create Efficiency Vermont (CS 8). Similar desires to consolidate energy efficiency resource acquisition efforts were key factors in decisions to create the Energy Trust of Oregon (CS 3) and Wisconsin's Focus on Energy (CS 4), and to request the services of NYSERDA in New York (CS 7).

There are also other ways to address the scale issue. The Bonneville Power Administration (BPA), which sells power and purchases electric efficiency resources across four states and a few additional areas in the U.S. Pacific Northwest, operates an effective two-level acquisition program together with 135 smaller utilities. BPA provides program design constructs, guidelines, manuals, substantial human technical support, measurement and verification protocols, as well as substantial financial assistance to the consumer-owned retail electricity distribution utilities in these states, many of which are quite small. These retail utilities purchase the energy savings from their customers (adding in their own talents and resources), and report the savings back to BPA for regional consolidation (CS 2). Contractual arrangements for this are discussed under Choice 4.

Some states also have adopted mixed approaches, relying on large utilities to deliver savings from their own energy efficiency acquisition programs, but organizing consolidated multi-utility acquisition programs for smaller utilities. One example is the State of Michigan (CS 5), a state of 9.9 million people where customers are served by over 60 utilities. For the 2009-2011

3 There are some energy efficiency programs run jointly by electric and natural gas utilities (e.g., in California, Connecticut, Massachusetts, and Utah).

period, 11 of the largest electricity utilities opted to operate their own programs. Eight small electric utilities chose to join together with four natural gas utilities under a state-sponsored consolidated energy efficiency resource acquisition program, Efficiency United. Most consumer-owned small utilities joined into one of three groups to develop their own plans.

Consumer Relations

Successful energy efficiency resource acquisition programs require extensive knowledge of energy users' energy use, patterns, attitudes, and problems; extensive outreach programs and excellent communications; substantial human interaction between consumers and the energy savings delivery entity; and mutual trust and understanding between consumers and the savings delivery entity. In the industrial sector, multi-year personal relationships between delivery entity staff (or long-term consultants) and company personnel have proved critical. Most successful industrial programs organize account managers to maintain such relationships and help identify and follow up on energy saving opportunities at industrial facilities.

Energy distribution utilities have a foundation of customer relations to build upon. They have access to extensive information on energy use patterns and business relationships with every customer. They are well known. Many utilities will have operated some type of energy efficiency programs previously and although problems or consumer relations difficulties may have surfaced in in the past, energy utilities often have an advantageous position in consumer relations that should be considered when weighing delivery entity options.

New non-utility entities usually face a challenge to effectively and quickly build up consumer relations. They need to develop extensive contacts and relationships with consumers, utilities and various equipment and technology suppliers. Access to the skills and knowledge of local utilities' workforce is important, as it allows the program to draw on existing experience and relationships. It is important to establish brand identity and a solid, reputation in the market. For these reasons, development of new non-utility entities must be seen as a long-term investment by governments and supervising entities. It takes much time and energy to develop the consumer relationships that are essential for effectiveness. Therefore, even though examples prove that it can work well, use of new non-utility entities is not a strong option if short-term results are a priority.

Incentives[4]

Non-Utility Single-Purpose Entities. A first consideration is selection between single-purpose and multiple-purpose (such as a utility) entity options. Non-utility single-purpose entities can provide concentrated focus on energy efficiency resource acquisition. Financial incentives to operate programs in line with program objectives can be specifically designed into contractual arrangements (see Choice Four). Of course energy efficiency resource acquisition can also work well with multiple-purpose entities, but energy efficiency acquisition objectives must be given suitable priority among all objectives, and should, at best, reinforce, but at least not run counter to other objectives. Sufficient incentives for effective and efficient energy efficiency acquisition then must back the program up. Although incentives for meeting targets are common, punishments (i.e., fines) are less so. In the case of some third party contracts, failing to meet targets could result in losing the contract.

The Utility Throughput Incentive Problem. Use of energy utilities as energy savings delivery entities under traditional utility regulation frameworks encounters serious incentives problems that must be addressed. Utility financial regulation in North America has traditionally focused on regulating power prices to meet operating cost and capital investment requirements and while achieving a reasonable rate of return. Once prices are determined, the more energy the utility sells the more revenue it collects and the more money it makes. Utilities then do not have an interest in energy efficiency because it reduces sales of the product they are selling and their profit from those sales. Generally speaking, energy efficiency constitutes a loss of revenue and profit.

In the case of publicly-owned utilities, the "throughput incentive" problem may be less straightforward. In the case of B.C. Hydro, for example, the utility is owned by the Provincial Government. The same government ministry that represents the government as the utility's shareholder, and follows the return on equity of its shares as determined through existing regulation, is the ministry that is responsible for execution on

4 For more details on incentive structures, see Kushler and York. 2011. *The Old Model Isn't Working: Creating the Energy Utility for the 21st Century.* ACEEE. http://aceee.org/white-paper/the-old-model-isnt-working.

the Provincial Government's aggressive energy efficiency plans. Still, however, the incentive conflict remains and the resolution is not perfect.[5]

A first requirement is to make sure that the costs of running an energy efficiency resource acquisition program can be recovered by the utility. Then the "loss of sales" disincentive needs to be addressed. Two general ways to achieve that in North America are to adjust the traditional regulation system to eliminate incentives for increasing sales revenue or to provide additional compensation to utilities to make energy efficiency equally valuable to them.

Decoupling Regulation. An increasingly popular approach to adjusting the traditional energy utility regulation involves the "decoupling" of how much energy a utility sells from how much revenue it collects. This reduces the utilities' incentives to increase sales (along with the disincentives to reduce sales). Regulators periodically set out total revenue caps and floors for the regulated utilities, in addition to regulating prices. Additional sales above the levels assumed in the regulated revenue amount will not result in increased allowable profit, whereas reductions in sales below assumed levels also will not result in less profit, as prices for following years will be adjusted to meet the expected profit margin. Profits can be increased, however, through improved control of costs (i.e., eliminating waste).[6]

By mid-2011, 22 states plus the District of Columbia had approved adoption of new decoupling regulation for electricity and/or natural gas utilities. Implementation was pending in about 10 additional states.[7] It should be noted, however, that decoupling regulation may not make energy efficiency programs attractive to utilities per se; it just removes one major barrier — the loss of sale disincentive.

Among the U.S. states reviewed in this study, all had some form of decoupling regulation. In Michigan, however, state courts recently disallowed the efforts of the PUC and Detroit Edison to implement decoupling regulation, ruling that existing laws allowed such regulation only for the state's natural gas utilities (CS 5).

Lost Revenue Adjustment Mechanisms and Shareholder Incentives. If decoupling is not an option, there are other compensation measures that aim to make energy efficiency more attractive to utilities, such as special "lost revenue adjustment mechanisms" which are applied when decoupling regulation is not in place, and a provision of special financial incentives for achieving or surpassing energy efficiency acquisition targets.

Lost revenue adjustment fees are mechanisms that allow utilities to recover revenues (and hence profits) that are "lost" from approved energy efficiency programs. Typically an evaluation is made of energy savings attributable to approved programs to establish the amount of lost sales. This is multiplied by an established amount to determine additional revenue that the utility is entitled to receive from customers through the power pricing system. As of mid-2011, 11 states had adopted such mechanisms, although the mechanism was new in 7 of those states. In addition, the same principle may be followed by some regulators as part of the overall electricity pricing review process, even if a specific adjustment mechanism is not agreed to. Although lost revenue adjustment mechanisms can eliminate disincentives to pursue energy efficiency due to lost sales, they still do not fully overcome the throughput incentive problem — utilities still have incentives to increase sales. Additional revenue issues include the provision of an asymmetrical upward adjustment to utility revenues (i.e., revenue is more likely to be increased in the utilities favor than decreased), the creation of various unintended perverse incentives, controversies leading to complex regulatory cases and others.[8]

Some 18 U.S. states have operated programs for at least a full year to provide additional financial incentives to investor-owned energy utilities for effective operation of energy efficiency programs. It should be noted that even though decoupling regulation and lost revenue adjustment mechanisms are designed to remove disincentives to pursuing energy efficiency, they do not, by themselves, provide incentives to undertake

5 If interests in maximizing sales (resulting in higher shareholder returns) and promoting energy efficiency are held by different people or different agencies, the problem for publicly owned utilities can easily be just as severe as under a regulated private investor utility model.

6 For more information see *The Regulatory Assistance Project. Revenue Regulation and Decoupling: A Guide to Theory and Application.* 2011.

7 ACEEE. *The 2012 State Energy Efficiency Scorecard.* 2012.

8 See ACEEE. *Balancing Interests: A Review of Lost Revenue Adjustment Mechanisms for Utility Energy Efficiency Programs.* 2011.

efficiency programs effectively. The additional financial incentives are designed to meet this need. States have shown a strong preference for incentive mechanisms that award an incentive based on cost-effective achievement (or over-achievement) of energy savings targets, rather than other metrics such as program spending. Michigan (CS 5) operates such a program.[9]

Government Agencies. In principle, the public-interest perspective of government entities may align well with energy efficiency objectives. Nevertheless, political, institutional protection and other incentives also are at play. In two of the cases studied, New York and New Brunswick opted for entities one step removed from government departments to operate energy efficiency resource acquisition programs — a public benefit corporation in the case of New York (NYSERDA, CS 7), and a Crown Corporation in the case of New Brunswick (CS 9). Compared with utility programs, one benefit of a government-run program is that they can combine multiple sources of funding. In NSYERDA's case, public benefit funds are augmented by greenhouse gas cap and trade funds available to the state to improve energy efficiency offerings. Even so, fostering the business oriented approach required to deal successfully with industry can be a management challenge in institutions remaining under the overall government umbrella.

Technical and Operational Skill and Program Packaging Abilities

All of the energy delivery entity types discussed must acquire the technical and operational skills needed to manage and deliver effective energy efficiency resource acquisition programs. Some energy utilities may have acquired some of these skills already from previous energy efficiency programs, but the skills needed to delivery energy efficiency programs are different from those needed for traditional energy supply utility operation.

In-House Staffing and Outsourcing. Technical and operational staff capacity can be maintained in-house or outsourced. In-house expert staffing offers stability and a concentration of core competence for long-term use. Outsourcing offers flexibility and the ability to obtain specialized skills relatively quickly. In cases where outsourced entities are used to deliver a substantial part of the program (typically including much of the end-use consumer contact), the delivery system essentially comprises two levels — the outsourced entity or entities performing detailed, day-to-day work and the delivery entity responsible for overall savings delivery and the use of funds. Where outsourcing is used to a large extent it is important that supervising authorities be clear with whom different responsibilities lie. A simple example would be an administrative agency that contracts all program implementation to a contractor, but it's also possible for the delivery entity to do some work in-house and outsource pieces or specific program areas.

Virtually all entities use some mix of in-house and outsourced expertise, but the balance between the two and arrangements vary a great deal. Some examples from the case studies, focusing especially on delivery of savings from industrial programs, include:

- B.C. Hydro (CS 1) relies heavily on in-house expertise, maintaining a staff of 66-69 people in its Power Smart program during 2009-2011. About 10 of these staff are industrial account managers who interact with industrial companies on energy efficiency projects daily.
- The Energy Trust of Oregon (CS 3) has an in-house staff of some 80-85 persons. The industry and agricultural program is delivered by about 5 professional staff that works with around 6 outsourced Program Delivery Contractors. These contractors assign 6-7 experts each for industrial/agricultural Energy Trust program delivery. Close contact with end-use customers is considered important for Energy Trust staff as well as contractors.
- Wisconsin Focus on Industry (CS 4) is administered by Shaw Environmental (contracted to SEERA and the PUC), and implemented by a number of contractors. Despite changes in program administration over the years, large energy users have always been served by a single, consistent contractor under the Focus on Energy brand.
- Detroit Edison (CS 5) hires contractors to implement each

9 For more information regarding U.S. state programs see ACEEE. *Carrots for Utilities: Providing Financial Returns for Utility Investments in Energy Efficiency.* 2011.

of its six energy efficiency programs. As is common in quite a few investor-owned utility cases, the commercial and industry program is implemented by one of these dedicated contractors.

- Efficiency Vermont (CS 8) has been run since inception by the Vermont Energy Investment Corporation (VEIC).VEIC relies heavily on in-house staff, including for most of its customer relations. About six dedicated account managers were covering large industrial customer relations and projects in early 2012.

Innovative Program Packaging. Some entities can bring special capabilities or possibilities for creating synergies with other programs into the picture for the benefit of energy efficiency resource acquisition. This may be an additional consideration when choosing a delivery entity.

One example is NYSERDA's operation of many programs dealing with energy efficiency technology development and dissemination (CS 7). These programs can provide additional opportunities for efficiency resource acquisition, and programs may be combined for the benefit of customers. Another example is B.C. Hydro's ability to intertwine design and implementation of its special energy conservation pricing system with its energy efficiency resource acquisition programs to obtain stronger results than would be possible with just the pricing system or the programs alone (CS 1).

CHOICE 2: HOW SHOULD FUNDS BE SOURCED AND MANAGED?

All programs reviewed used either public funds designated for public-interest use or funds collected from utility customers for their acquisition of energy efficiency resources. Efficiency New Brunswick is the only case study of a program that relies on allocation of public-interest government funds from the general government budget. The other cases rely primarily on funds collected by energy utilities from their customers as part of the energy prices (rates) that they pay ("ratepayer funds"). However, there are several examples where programs involve a mix of both ratepayer funds and an allocation of public funds collected by state or provincial governments through other programs. An example is the use of some Regional Greenhouse Gas Initiative (RGGI) funds allocated by the states of New York (CS 7) and Vermont (CS 8) for their energy efficiency acquisition programs.

Allocation of government budget funds has a potential advantage of aligning public benefit funding appropriation with the public interests of the acquisition programs. However, energy efficiency resource acquisition programs require continuity and stability over quite a few years to generate the best results. For this reason, it is highly recommended to consider some type of earmarked funding source when using public funds, which then can be relied on consistently over many years. Allocations from general annual budgets are likely to be subject to wide swings in funding levels, creating uncertainty and program instability.

The "Covenant" of Ratepayer Financed Energy Efficiency Resource Acquisition Programs

Although other options may work well in other countries, ratepayer funding is strongly preferred in North America. Funds may be collected from ratepayers in an implicit way as a cost imbedded in the overall prices that they pay, or they may be collected more explicitly through a special energy efficiency public benefit surcharge listed on ratepayer bills.

Collection of funds from rate-paying utility customers to finance energy efficiency acquisition from those same customers involves a type of covenant between the energy utilities, customers, and any third parties, usually overseen by public utility commissions. Customers pay extra money in their energy bills for the energy efficiency acquisition program. They then must be able to expect financial incentives and useful services in return to help with implementation of energy efficiency measures that benefit them. At first glance, some of the financial incentives levels provided to customers to support their implementation of energy efficiency projects might appear overly generous, amounting to 50% or even 100% of costs in various cases. However, these incentives are not gifts. Customers have already paid for the costs of what they receive — their money is just being returned to them in the form of energy efficiency incentives or services. The questions then become whether the programs that they have paid for are well designed and useful to them, and whether customers avail themselves of what they have already paid for.

Because properly targeted energy efficiency projects both save money for end users and are more cost-effective than most energy supply sources, rate-paying customers also should expect to receive other benefits from the energy efficiency resource acquisition programs they pay for, beyond direct support for implementing energy efficiency projects. As discussed in more detail above in the section on Why Pursue Energy Efficiency Resources Acquisition?, these generally include:

- When rate-paying customers pay into energy efficiency resource acquisition programs, they receive a service from the program (e.g., through incentives from the implementation agency). They also receive other benefits that accrue to all customers as a result of the system becoming more efficient and requiring fewer capital investments.

- Reductions in energy bills from their energy efficiency measures compared to no action. Most energy efficiency projects carry high life-cycle rates of return from saved energy costs.

- Potential reductions in energy supply prices over the medium term, compared to a no energy efficiency resource acquisition scenario, due to avoidance of utility arrangement of energy supply resources that are more expensive than energy efficiency resources.[10]

States and provinces enter into this covenant in order to overcome the market barriers and failures that stymie adoption of energy efficiency measures by end users on their own (see the section above on Why Pursue Energy Efficiency Resources Acquisition?).

The same type of "covenant," involving aggregation of special customer charges followed by a return of those aggregated funds to consumers in the form of energy conservation investment support, can in principle be used for any type of fuel, including coal or petroleum products.[11] Such programs could be and useful in other countries as well.

Methods of Collecting Funds from Ratepayers

As mentioned earlier, the two basic methods used in North America for collecting energy efficiency acquisition funds from ratepayers are implicit charges imbedded in overall rates and explicit charges in the form of public benefit surcharges.

Imbedding Funding in Overall Rates. In the "imbedded funding" model, energy efficiency targets, costs and budgets are usually considered as one element of larger PUC-utility hearings for the determination of electricity rates for a coming period of time.[12] The process is intertwined with consideration of base-case demand projections, integrated review of resource options for meeting new demands (including energy efficiency resources), all manner of costs, and finally revenue requirements and pricing. Pricing and revenue estimates for the future should allow utilities to cover the projected costs of energy efficiency acquisition. In some cases, this may include incorporation of lost revenue adjustments.[13]

Typically, utilities prepare analyses of their past energy efficiency resource acquisition program costs, budgets and results as a basis for proposed future acquisition targets and the budgets needed to achieve them. Hearing reviews involve some assessment and confirmation of utility savings claims and budget accounting review. The process of agreeing on energy efficiency acquisition budgets for the future then involves an intertwined process of target setting, cost-effectiveness analysis, and determination of annual budgets (see Choice 3). The rigor and focus of these reviews, however, varies substantially. The frequency of detailed review also varies substantially. In between reviews, utilities aim to follow the framework established in previous reviews, expecting that adjustments to conform to actual circumstances will then be

10 This depends, however, on load growth characteristics and marginal and average supply cost profiles.

11 Because these are tradable commodities, however, the design of surcharge systems may need to be different if it remains important for those who pay the surcharges to be the same as those eligible to reap support benefits. Experience with schemes used for carbon taxation which provide rebates if certain carbon emissions reduction measures are undertaken, as in the United Kingdom, may be instructive.

12 If "decoupling" regulation is being used, these hearings will also set revenue caps and floors.

13 See the "incentives" section under Choice 1.

part of the next review.

Public Benefit Charges for Energy Efficiency. Energy efficiency public benefit charges[14] are specific surcharges added to customer bills to fund energy efficiency activities in the public interest. The charges create a distinct flow of funds that may often be aggregated to form a special fund. One surcharge may be used for multiple program initiatives, including, for example, special programs for low-income consumers or renewable energy promotion programs, in addition to energy efficiency resource acquisition. Because they usually are visible on consumers' bills, consumers are likely to pay more attention to the use of the funds created, and benefits they may or may not receive from them, than is the case for imbedded funding models.

There are various choices to be made when considering an energy efficiency public benefit charge, including:

Legal foundation. Although the PUCs in some states have demonstrated authority to impose public benefit charges themselves (e.g., New York, CS 7), most states with public benefit charges have also sanctioned them in state law (see CS 3, CS 4, CS 5 and CS 8).

Coverage. Energy efficiency proponents usually seek coverage as wide as possible through "non-bypassable" surcharges,[15] considering this most efficient and fair. However, special arrangements may need to be considered for customers of publicly owned utilities, as these often do not fall under PUC jurisdiction. In addition, some states allow large customers to "opt out" of paying the surcharge, with the argument that such consumers will undertake energy efficiency efforts on their own. Although there are examples where customers are allowed to opt out of paying the surcharge without demonstrating energy efficiency investment and results, there are more cases where these customers are allowed to "self-direct" their own energy efficiency programs only under supervision of public authorities, with regulations about investment levels, results, measurement and verification, etc. Examples of industrial customer "self-direct" programs are briefly described in Case Studies 3, 4 and 5.[16]

Calculation methods. Some states levy public benefit charges as a percentage of kWh or kW consumed ("volumetric" basis, CS 3, CS 7, CS 8), while others levy charges on a "non-volumetric" basis, such as a fee per meter (CS 4, CS 5), with different arguments about which are fairer or more efficient.[17] Public benefit charges can be set at uniform rates for all customers in all regions, or they can be set at different rates for different customers and/or at different rates for different distribution utility service areas.

Ability and procedure for adjusting public benefit charge levels. There is substantial variation among states on the extent to which and how public benefit charge levels can be adjusted. If state law sets the charge level explicitly, as in Oregon (CS 3), presumably this can only be changed with another state law. In most cases, PUCs have some discretion to adjust surcharge levels, but often within prescribed frameworks. If substantial flexibility exists, this provides for a more iterative process for setting targets, public benefit charge levels, and budgets during PUC program review. If public benefit charge levels and then acquisition budgets are fixed, then targets and results can be expected to follow those levels, regardless of considerations of the cost-effectiveness of energy efficiency resource acquisition compared to other resources (see Choice 3 below).

Some examples from the case studies are summarized below:

- Vermont (CS 8). Vermont's Energy Efficiency Charge (EEC) was initiated by the PUC and confirmed in state law. All customers from all electricity utilities must pay; with the exception of large industries allowed to self-direct their own programs (only one customer has pursued this). Volumetric charges (per kWh) vary by both consumer class and utility. Overall EEC revenue requirements are set periodically by the PUC in order to meet statewide energy efficiency targets. Utilities determine exact rates in their service areas to meet those revenue requirements following PUC guidance.

14 Also called "system benefits charges" or "public benefit fees." Often abbreviated to SBC or PBF

15 Non-bypassable surcharges are charges that apply to all utility customers, regardless of the supplier (e.g., taxes that apply to electricity delivered by a local utility or an alternative supplier).

16 For a full discussion of self-directed industrial programs in various states, see ACEEE. *Follow the Leaders: Improving Large Customer Self-Direct Programs.* 2011.

17 See the Regulatory Assistance Project. "Systems Benefit Charge Issues Letter" (Nov. 1994) for an early introduction to the arguments on both sides.

- Oregon (CS 3). State law set a public purpose charge of 3% of customer electricity purchases from investor-owned utilities in 1999. Funds are used for both energy efficiency and renewable energy acquisition. All customers must pay the charge except for industries that opt to pursue self-directed programs overseen by the state government. The PUC sets overall targets and revenue requirements periodically, in consultation with Energy Trust of Oregon and utilities, using imbedded funding from the overall utility rate base when needed in addition to public purpose charge revenue.

- New York (CS 7). New York's volumetric system benefits charge to fund energy efficiency acquisition was instituted by the state PUC in 1998. There is no self-direct option for large consumers. New York is one of the few states that has a system benefits charge for natural gas as well as electricity. Imposition of the charge is renewed periodically by the PUC (every five years recently), and levels are adjusted based on revenue needs to meet targets.

- Michigan (CS 5). State law established Michigan's public benefit funds in 2008 as part of a new requirement for each utility to file "Energy Optimization Plans" (EOP) with the PUC. The EOPs detail both energy efficiency resource acquisition program details and surcharge levels to meet the state's overall energy efficiency portfolio standards. These funds are used for both overall energy efficiency resource acquisition and special energy efficiency programs for low-income customers. For Detroit Edison, the largest electric utility in the state, residential customers pay a volumetric charge, whereas other customers pay a charge per meter, fixed by voltage level and broad consumption category. Large customers are allowed to opt out of payment if they pursue self-directed programs by filing an EOP with the PUC (although they still pay into the low-income program fund). Because the public benefit fee is approved by the PUC, the PUC has the flexibility to increase public benefit charges as needed to meet energy savings targets.

- Wisconsin (CS 4). State law set Wisconsin's public benefits charge in 1999 for energy efficiency assistance for low-income households; customer sited renewable energy development, and broad electrical energy efficiency resource acquisition. In addition to investor-owned utilities, the law has required municipal electric utilities to charge the fee and use the funds to implement related programs. The original law required the fee to be assessed as a fixed cost by customer class, but a subsequent law changed this to allow for volumetric assessment. Large customers are allowed to opt out, with PUC approval, if they implement self-directed programs. Energy efficiency resource acquisition has used both public benefit charge revenue and imbedded funding from the overall utility rate base. Since 2006, the public benefits charge is being assessed only for low-income customer programs. Current energy efficiency and renewable energy programs are now paid for through the overall electric and natural gas rate structure.

Advantages and Disadvantages of the Two Ratepayer Funding Approaches. Opinions vary on the advisability of collecting funds through public benefit charges for energy efficiency versus fund collection imbedded in the overall utility rate setting process. In some case, both have been used (e.g., as in Oregon and Wisconsin above).

The explicit funding approach, with a surcharge visible on customer bills, is more transparent. It also invites public interaction that can be intense. The public scrutiny can be productive, helping to sharpen focus on achieving results. After all, it is the customers' money. Public visibility also usually increases accountability in fund management. However, customers often may be interested only in how the surcharge and energy efficiency acquisition incentives and services work out for their particular circumstances, especially over the short term, rather than what might be best for the program as a whole and over the long term. Imposition and maintenance of a visible surcharge may be politically challenging.

If a non-utility entity is being considered as the delivery agent for energy efficiency resource acquisition, funding through a distinct public benefit charge is likely to be most straightforward. (However, it is not impossible to fund non-utility delivery with funding collected by utilities imbedded in rates.)

Funding of energy efficiency resource acquisition with costs imbedded in overall utility rates may make it easier to adjust funding levels according to changing needs such as satisfying the interests of different regions and different customer classes. The process can be made transparent and open to the interested public through public notices and hearings before public utility commission. This funding method may be preferable if program priorities include flexibility in use of funds, administrative simplicity, and redefining the utility's role as a provider of not only energy, by energy services.

Managing Funds Collected from Ratepayers

Regardless of how funds are collected and used, separate and clear accounting and reporting of funds collected and spent for energy efficiency resource acquisition is essential. It is required for proper supervision of the use of funds entrusted by energy users and for assessment of program cost-effectiveness (see Choice 5).

Where funds collected by utilities are used by entities other than those utilities, the mechanisms used for transferring, managing and disbursing funds are also critical for the viability and sustainability of the energy efficiency resource acquisition program.

Fund Management by Collecting Utilities. Supervision of the disposition of increased revenue allowances for utility energy efficiency programs is part of the overall utility-regulation rate adjustment hearing process, as mentioned previously. The B.C. Hydro case study (CS 1, including footnoted references) provides an example of a reporting, review, and future planning process. A full accounting of funds spent on energy efficiency acquisition, by year and program, and relative to expenditures planned based on previous review guidance, is a key requirement.

Flows and Management of Funds Collected by Utilities but Disbursed by Others. Utilities may be required by state authorities to provide public benefit charge funds and/or funds from the overall tariff allocated for energy efficiency to a non-utility entity responsible for completing energy efficiency resource acquisition. Mechanisms to affect such transfers aim to be (i) efficient for all parties, (ii) transparent in the amounts of public money thus collected and disbursed, and (iii) predictable for all parties, especially entities charged with delivering energy savings from the funds. Because public benefit funds in particular are seen as a type of public fund, there also has been pressure from state government in some states at some times to appropriate these funds for other uses,[18] as was the case in Wisconsin (CS 4). If it is important for the public benefit funds to be used only for their intended purpose, design of fund transfer and management mechanisms also should consider this issue.

Examples from the case studies of three fund management arrangements involving utility-collected funds for use by non-utility entities include:

- Oregon (CS 3). Electricity public purpose charge funds and funds from the overall electricity and natural gas tariffs are paid by the energy supply utilities directly to the Energy Trust of Oregon, a nonprofit corporation, according to state laws and under the overall supervision of the PUC. The Energy Trust has fiduciary responsibility for the funds, management and use of which is reported to the PUC.

- Wisconsin (CS 4). Under a 1999 state law, public benefit fees were placed in a public benefit fund administered by a department of the state government. That department then contracted an umbrella entity to operate the state's Focus on Energy program, which delivered energy savings using the earmarked funds. On several occasions, however, the public benefit funds were redirected by the government to other uses, such that the ratepayer funds were not used to deliver energy savings as intended. Based on a new law in 2005, management of the public benefit funds was removed from the government and entrusted to the utilities to undertake jointly. The utilities created the nonprofit Statewide Energy Efficiency and Renewable Administration to consolidate their funds and undertake contracting for energy efficiency resource acquisition. This system now continues.

- Vermont (CS 8). Following arrangements established by the PUC in 1999, Energy Efficiency Charge (EEC) funds are deposited by the utilities with an independent Fiscal

18 Many U.S. state governments are required in their state constitutions to balance their fiscal budgets every year. If state revenues are lower than hoped, perhaps due to economic downturn or tax rate reductions, governments are under great pressure to find funds from other sources, including public benefit funds, to meet key expenditure needs. It is also useful to note that even utility-held public benefit funds, in addition to funds held outside of utilities, have been subject to such expropriations historically (e.g., in Connecticut). See the Regulatory Assistance Project. *Who Should Deliver Ratepayer Funded Energy Efficiency?* 2003, p.10

Agent appointed by the PUC. The Fiscal Agent manages the funds and disburses them to the two Energy Efficiency Utilities (EEUs — Efficiency Vermont, operated by a nonprofit corporation, and one smaller entity operating in Vermont's largest city). Disbursements are made against invoices submitted by the EEUs for eligible expenditures, which must be approved by the state government's Department of Public Service before payment by the Fiscal Agent.

CHOICE 3: WHAT ENERGY-SAVING TARGETS WILL BE SET, AND THROUGH WHAT PROCESS?

All energy efficiency resource acquisition programs need to determine how much energy savings to buy. These purchase orders come in the form of acquisition targets. For delivery entities to arrange purchases efficiently, it is important that public supervising authorities make target purchase orders clear. It also is important for target purchase orders to span a number of years. This is because efficient delivery requires much effort and human investment in market development, programming, and customer relations, which take time to develop. The well-established programs in North America usually define a broad long-term acquisition goal or horizon, and then define specific annual target figures in medium-term cycles of some 3-5 years.

Basic target-setting approaches in the cases studied for programs focusing on electricity or natural gas may be divided into two categories. The first is to define energy efficiency resource acquisition targets through periodic least-cost integrated resource planning activities, aiming to schedule purchase of as much cost-effective energy savings as is practical. The second is to define energy efficiency targets in terms of a percentage of annual sales. This second approach is commonly used in cases in the U.S. where states have adopted "energy efficiency resource standards" (EERS, also sometimes called "energy efficiency portfolio standards"[19]) requiring purchase of energy savings in utility service areas, analogous to renewable energy portfolio standards.[20] Of course there is conceptual overlap between the two approaches. For example, some type of assessment of the cost-effectiveness of energy efficiency resources compared with supply resources is needed to consider just what percentage of sales target should be adopted in the second approach.

Despite differences in approaches, the end result in all cases needs to be the same — clear definition of annual energy savings amounts to be contracted for delivery. Sections below describe methodologies and procedures for getting there. Before delving into those topics, however, there are choices that need to be considered on how to define the energy savings product to be purchased.

Defining Energy Savings

"Energy savings" from an energy conservation measure can be broadly defined as a reduction in energy use or cost compared to a baseline of "how much energy would have been used otherwise".[21] A simple savings estimation approach, used in some programs, is to estimate energy savings from an investment compared to the "without project" case during the first year of new asset operation. These savings are then counted as energy savings delivered that year. If the same type of investment is undertaken in many facilities, such estimated savings also can at times be "deemed" rather than measured based on coefficients available from actual measurement in a good sample of similar projects.

Many program administrators, however, may be concerned about the *causality*[22] of using program dollars in generating energy savings and/or in the persistence of the energy savings after the first year. Concerns about the extent to which program dollars actually resulted in the reported savings leads to consideration of "net" instead of only "gross" savings, as discussed below. Concerns about how many years an energy savings investment may continue to yield energy savings — to meet electricity system resource demands, environmental goals or energy security needs — leads to consideration of "energy

19 Using a broad definition, energy efficiency resource standards are now in place in 26 U.S. states. For further information see ACEEE. *Energy Efficiency Resource Standards — A Progress Report on State Experience.* 2011.

20 Generally, an EERS or RPS is a government policy tool, whereas energy efficiency resource acquisition is an activity used to meet an EERS or another policy goal.

21 See the Efficiency Valuation Organization. *International Performance Measurement and Verification Protocol.* 2007, Section 4, for more discussion.

22 "Causality" is used loosely here; most program evaluation distinguishes between gross and net saving (as discussed in this paper), but still relies on measurements against a baseline instead of showing direct causality. For a detailed discussion, see Rosenburg and Hoefgen. *Market Effects and Market Transformation.* CIEE. 2009. http://uc-ciee.org/downloads/mrkt_effts_wp.pdf

savings persistence" in how savings are reported or programs designed. This also is discussed below.

Estimation of Net Energy Savings. "Net energy savings" are estimates of energy savings that would not have occurred without the energy efficiency resource acquisition program. In essence, net energy savings are those savings that were caused by the program. Energy efficiency resource acquisition programs typically provide substantial financial incentives to energy-users for energy efficiency investments, as a means to acquire energy savings. It is difficult to avoid paying incentives to some energy-users who were planning to undertake the same investment anyway, without the incentive. If the number of such "free riders" is high for certain programs, the actual "net" energy savings acquired with program dollars compared to a "no program case" is substantially lower (and hence the unit cost of the actual net energy savings resulting from the program is higher). On the other hand, some end-users may see substantial energy cost-savings advantages from some of the investments or concepts being promoted in an energy efficiency resource acquisition program and decide to undertake measures themselves, without receiving any incentives or being otherwise involved with the program. This "spillover effect" can result in greater actual "net" savings acquired with program dollars (and lower unit energy savings costs).

If authorities overseeing an acquisition program are keen to obtain as much energy savings as possible using program funds, it is useful to consider net energy savings targeting, at least for programs where the number of 'free riders" are expected to be fairly high. If two alternative programs each cost 1 cent/kwh of life-cycle savings of public money for incentives, but one program has 50% free riders (net of spillover effects), and the other close to zero free riders, the unit cost of the first program is double the second. However, efforts to estimate free ridership and spillover effects are complicated and controversial. Based on surveys that request people to relate why they made energy conservation investments, it is difficult to make accurate estimates. Programs in Vermont, British Columbia, New York and Oregon use net savings estimates to report against targets for at least some of their specific acquisition programs. Studies by NYSERDA have found that for most (though not all) industrial energy efficiency delivery programs, "spillover" equals or exceeds "free riders."[23]

Energy Savings Capacity versus Energy Savings. An energy conservation measure yields an ability to save a certain amount of energy every year for as long as the asset produced continues to operate as designed. Although the term is not often used in North America, this ability to generate a stream of savings over the life of the asset can be defined as the "energy savings capacity" resulting from the measure. Energy savings capacity is measured in energy savings per year (e.g., kWh/year).[24] "Energy savings," then, is the total amount of energy saved from an energy conservation measure over its operational lifetime or for any specified sub-period (e.g., kWh). It is important to differentiate the two concepts clearly. When expressing unit costs, for example, the cost per unit of energy savings capacity (e.g., $/kWh/year) are usually much higher than the "lifecycle" cost per unit of energy savings (e.g., $/kWh).

Most North American energy efficiency resource acquisition programs set and report delivery on annual acquisition targets expressed in incremental "energy savings" added that year. In reality these figures refer to energy savings capacity generated. The results reported in that year will continue to yield energy savings well into the future (but the indicator alone provides no information about how long into the future these savings will continue). Therefore, when assessing program or project cost-effectiveness, the full multiple-year life-cycle energy savings from energy conservation measures are estimated to derive comparable "life-cycle costs of energy savings".

Consumption Reduction vs. Demand Reduction. Energy Savings Capacity and Energy Savings are both measures of energy consumption (usually expressed in kilowatt-hours or kWh), or energy used over time. Another goal of an energy efficiency program may be to reduce demand (measured in kilowatts or kW). Many of the early demand side management (DSM) programs focused on demand reduction during times of peak system demand. Many of these programs still exist in the form of preferential rates for electricity demand (kW) in exchange for the ability of the utility to curtail, or limit, the

23 See *New York's System Benefits Charge Programs Evaluation and Status Report*. NYSERDA. 2012

24 Although the word "capacity" is used to describe the potential of a supply-side resource (often in MW), this should not be confused with peak demand savings in kW or MW.

amount of power a customer can draw during system peaks. These programs may be part of an overall resource acquisition program portfolio as they enable the utility to forgo building generation capacity that will only be needed during times of peak system demand.

Accounting for Multiple-year Energy Savings Benefits and Savings Persistence. For authorities overseeing programs, energy savings capacity delivered that persists for only two years is definitely not as valuable as energy savings capacity that persists for twenty or more years, in terms of power system resource, environmental, and/or energy security benefits. Simply establishing annual "incremental energy savings" targets (energy savings capacity targets), and supervising annual delivery of those targets, then, is insufficient by itself.

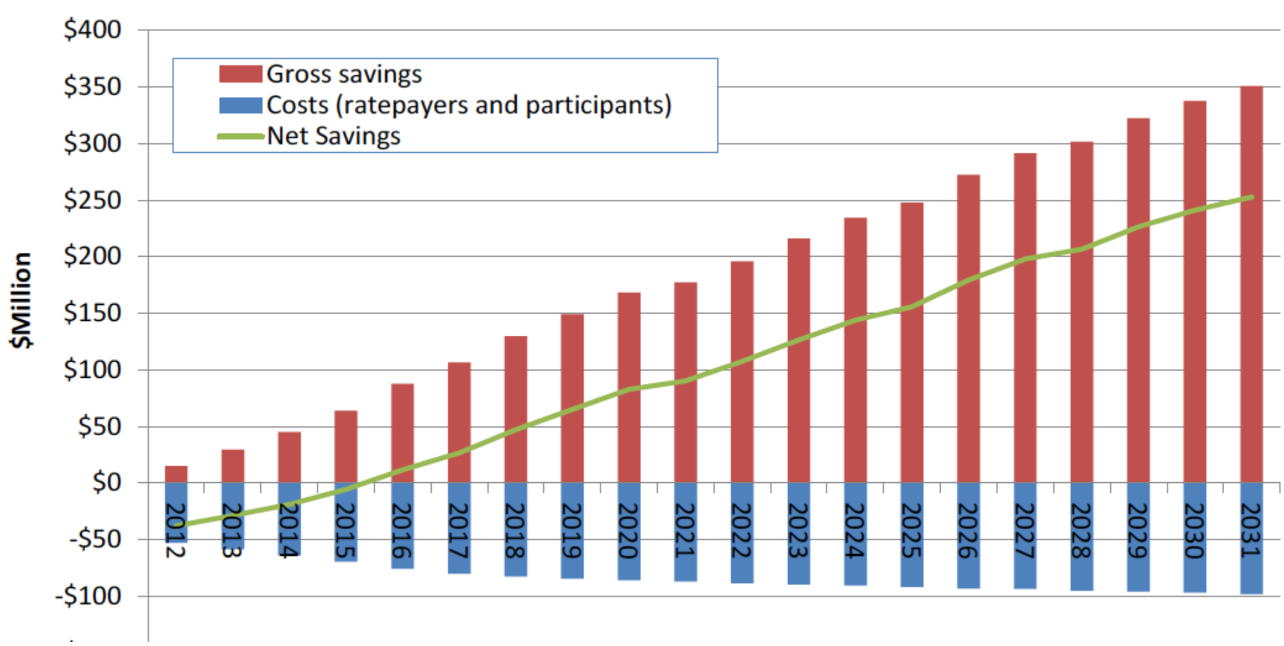
In most current North American programs, targeting is coupled with regulations requiring that programs and/or projects meet minimum cost-effectiveness criteria, and this helps introduce preference for projects that generate longer term savings. The cost-effectiveness indicators use life-cycle energy savings. Such indicators will show radically higher life-cycle unit energy saving costs for a project with a lifetime of only 2 years compared to a project of 20 years with the same investment.

There also are additional measures that can be considered by overseeing authorities to instill preference for savings persistence in the programs of delivery entities, including:

- *Approval of medium-term program portfolio plans in addition to annual savings targets.* The delivery entity submits a proposed portfolio of programs, together with cost-effectiveness analysis and a good assessment of long-term savings impacts from the portfolio as a whole, for review and approval by supervision entities. This is done in most of the programs described in the case studies, but not in all U.S. EERS programs.

- *Retroactive reviews of energy savings persistence.* Some entities, such as the Energy Trust of Oregon (CS 3), undertake "True Up" reviews of savings reported in the past which include reviewing persistence of savings from energy

FIGURE B: Efficiency Delivery Costs and Savings for High-Efficiency Scenario in Vermont (nominal $)



SOURCE: Vermont Department of Public Service. Comprehensive Energy Plan 2011, Appendix 4, Modeling Study. 2011.

savings capacity delivered in previous years — even five years previously.[25] This is used primarily for guidance on how long-term results might be improved in future years.

- *Use of cumulative energy savings targets and reporting.* B.C. Hydro's annual targets and reports on savings delivered are expressed in cumulative terms over a historical period. The figures presented for each year represent the actual energy savings achieved from all of the energy savings capacity installed over the historical period. If energy savings capacity installed in early years no longer persists, energy savings from that capacity is not counted. Thus the cumulative energy savings figure reported each year is a true representation of the actual energy savings resulting that year from all of the work over the period (see Figure 1-4, CS 1). This method of setting and reporting on savings targets may be worth consideration by others too.

Approaches and Procedures for Setting Targets

Well-conceived approaches to setting energy efficiency resource acquisition targets should consider three interrelated elements together: the acquisition target amounts, available budgets, and the unit costs of energy savings delivery. Most of the case study programs begin by determining desired cost-effective energy savings target levels first, and then work through what budget adjustments can practically be made to achieve those, using unit cost information (CS 1, CS 2, CS 3, CS 5, CS 6, CS 7, and CS 8). Some programs begin with the attainable budget envelope and then work through what energy savings acquisition targets can be reasonably delivered with such funds (CS 4).

Least-Cost Planning Approaches. Integrated resource plans for utility systems begin with a long-term base-case demand forecast, proceed with a review of all of the supply and energy efficiency resource options that can reasonably be developed and their costs, and conclude with a scheduling program for both supply and energy efficiency resource acquisition to meet the demand forecast at least cost. Medium-term operational programs of targets, costs, and budgets are then worked out to try to meet the least-cost plan but with consideration of shorter term implementation realities. Programs in the U.S. Pacific Northwest (CS 2 and CS 3), B.C. Hydro (CS 1) and Vermont (CS 8) follow this approach. In each case, government mandates to acquire "all cost-effective energy efficiency resources" support the programs. However, if the utilities and regulators are not committed to energy efficiency, it can still result in very low target and poor evaluation.

- U.S. Pacific Northwest (CS 2). With a federal government mandate, the Northwest Power and Conservation Council has been preparing detailed 20-year integrated resource plans for almost 30 years for the power sector of the Northwest, spanning four states (see CS 2 for details and reference material). Analysis and resource portfolio scheduling involving energy efficiency resources in these plans is arguably the most sophisticated in North America. Other energy efficiency measures, such as implementation of energy efficiency codes and standards and broad market transformation initiatives are included, as well as specific acquisition programs. The energy efficiency resource acquisition targets from the program are directly used by the Bonneville Power Administration in its implementation of energy efficiency programs with all of the region's consumer-owned utilities. The overall targets are also used as key guidance by the Energy Trust of Oregon (CS 3) in preparation of its three-year operation plans, as well as other investor-owned utility programs in the region. The record of achievement in the Northwest is strong: energy efficiency resources have met 48% of the total electricity demand increase in the Northwest from 1980-2008. The Region now aims for energy efficiency resources to meet 85% of new electricity demand between 2009 and 2030.

- B.C. Hydro (CS 1). In 2007, the provincial government of British Columbia set a goal for energy efficiency resource acquisition to account for at least 50% of the incremental power resources needed by 2020. In 2010 a new provincial law increased this to 66% of incremental power resources. B.C. Hydro prepared, and the provincial PUC approved, a full, 20-year Long-Term Acquisition Plan (LTAP) in 2008, which has guided budgets and program implementation in recent years. By mid-2012 BC Hydro had circulated a draft new plan for public comment to conform to requirements in the 2010 law. B.C. Hydro's plans consider impacts of implementation of codes and standards (although these are

25 These reviews also investigate possible partial deterioration in energy savings streams from original estimates, due to operational or other factors.

implemented by government), impact of the utility's energy conservation rate structure, and its Power Smart energy efficiency acquisition programs. Annual targets, program specifics, and budgets are approved in cycles of about three years and funded through the rate base.

- Vermont (CS 8). Under new arrangements adopted in 2010 for administration and oversight of Efficiency Vermont, new long-term Demand Resource Plans (DRPs) are being prepared and approved by the state PUC to establish the targets and budgets for energy efficiency resource acquisition. The DRPs include annual guidance targets and planned expenditures for electricity savings for 20 years (and heat and process fuels, on a provisional basis, for 10 years), as well as detailed annual performance targets and budgets for three-year cycles. The first DRP was completed and approved by the PUC in 2011. This DRP also benefited from analysis and findings in Vermont's new 2011 Comprehensive Energy Plan, prepared by the state government.

Percent of Sales Targets. In the cases below, an energy efficiency target defined in terms of percentage of energy use or utility sales is set through PUC order or state law or both, usually for a state or province as a whole for an extended period. Definition of medium-term annual targets is basically already set, and the planning process then focuses on budgeting for specific energy efficiency acquisition programs. Some examples from the case studies include:

- New York (CS 7). In 2008 the New York PUC, with subsequent State Governor endorsement, issued a target to achieve a 15% reduction in electricity consumption by 2015, based on a detailed study of energy efficiency potential. To achieve this goal, analysis was completed on the expected contributions of all existing programs, including codes and standards programs and others. An identified resulting gap was then used as the basis for setting new efficiency acquisition targets. Funding from electricity consumers was adjusted to realign budgets with the new targets. In 2009 a similar process was undertaken for natural gas, to achieve a 15% consumption reduction by 2020.

- Michigan (CS 5). A 2008 state law established an energy efficiency resource standard that all electricity and natural gas utilities in Michigan must meet. The standard ramps up to 1% of electricity sales and 0.75% of natural gas sales in 2012 and later. To meet these targets, utilities must submit "Energy Optimization Plans" for PUC approval, including specific energy efficiency acquisition targets, program plans for different customer classes, cost effectiveness estimates, budget requirements and funding arrangements, and plans for third-party savings verification.

PUC Review Procedures. In North America, state or provincial PUC hearings are entered in the public record. Public involvement is typically encouraged, although the intensity of public involvement varies. In Vermont (CS 8), two different electricity savings scenarios were submitted to the PUC for its review of the 2011 Long-term Demand Resource Plan — one by a state government department and the other by the operator of Efficiency Vermont. The PUC convened a workshop of interested parties to jointly compare the scenarios and discuss the various issues involved before issuing its findings. In British Columbia (CS 1) any group or individual can register as an "intervener" and provide comments relevant to PUC hearings. Regulations allow interveners meeting certain criteria to qualify for financial support from BC Hydro for preparing their comments. Hundreds of written comments are registered for major filings, each of which must be answered.

Trade-Offs in Ratepayer Funding Levels and Savings Targets

As discussed in the section above on Why Pursue Energy Efficiency Resources Acquisition?, programs that add surcharges (either implicitly or explicitly) onto consumer utility bills, but return at least most of those funds to consumers in support for energy efficiency measures are a clear winner for consumers over the medium term as long as they are operated with reasonable efficiency. However, the fact remains that consumers must pay additional money upfront for benefits later. This can be contentious, especially during difficult economic times. As the Vermont PUC noted in a 2011 hearing, "Investing in efficiency is similar to investing in a retirement account — viewed from a long term perspective, the best approach is to invest today the maximum allowable; however, during difficult economic times many people cannot afford to do so."[26]

26 Vermont Public Service Board. *Order RE: Energy Efficiency Utility Electric Budgets for Demand Resources Plan.* August 1, 2011.

In a few cases where the marginal cost of new power resources is radically higher than current average costs, consumer funding for energy efficiency acquisition programs may result in a decline in electricity prices, relative to a "no efficiency" case in just a few years. B.C. Hydro recently estimated that in their case a ramped up ratepayer-funded energy efficiency acquisition effort would result in a decline in consumer electricity rates by 6% in just four years (Figure 1-2, CS 1). In their case, low-cost hydro is the main element in current average prices, whereas far more expensive alternatives underpin far higher marginal costs. Where marginal costs are only modestly higher than average costs and load growth is also modest, it may take several years for the combination of avoidance of higher cost supply and returns on energy efficiency projects to play out with good net benefits for the consumer. Eventually, however, the net benefits are robust. Figure below from Vermont (CS 8) provides a good illustration of long-term savings relative to costs.

Dealing with Multiple Objectives

Most energy efficiency resource acquisition programs include objectives additional to delivering a maximum amount of energy savings at a minimum cost. The most common include requirements for priority service for low-income households, and requirements to achieve a measure of balance between consumer categories and/or geographic areas. Without specification of any additional objectives, backed up with some type of performance metric in contracts, delivery entities can reasonably be expected to focus only on the most cost-effective projects, which may often be large industrial or commercial sector projects.

Special focus on low-income households. This is especially common in programs financed through visible public benefit charges. Funds may be collected and expensed separately (CS 4), or minimum low-income household program expenditure performance metrics may be added into contracts (CS 8).

Balancing ratepayer contributions and expenditures by ratepayer class or geographic area. Under the logic of the "covenant" of ratepayer-financed programs (see Choice 2), it can be argued that consumers should receive incentive and support benefits basically commensurate with what they contribute through higher prices, and that cross-subsidies should be minimized. Efforts to achieve some balance between contributions and expenditures can be undertaken by consumer category (e.g., residential, commercial, industrial, etc.), or by geographic area, or both (as in the case of Vermont CS 8). Balancing can be relatively strict, allowing minimal cross subsidy, or more flexible, allowing balancing to be more approximate. However, unit costs of delivering savings can be expected to rise with more boundaries and stricter balancing requirements. If delivery entities are relatively free to pursue whatever least-cost opportunities arise, unit costs should be relatively low. If delivery entities are tightly constrained where they can look for opportunities, higher costs can be expected.

Additional to these, quite a few programs have electricity peak load reduction objectives and performance metrics. Some have renewable energy support objectives as well.

CHOICE 4: WHAT TYPE OF CONTRACTUAL ARRANGEMENTS SHOULD BE USED?

A fourth major choice for an energy efficiency resource acquisition program concerns what type of contractual arrangement should be put in place between the public authority "buyer" and energy savings delivery entity "seller". A wide spectrum of contractual arrangements exist among the case studies, varying from understandings reached between PUCs and utilities in rate-making cases to competitively-bid contracts for energy savings delivery from commercial companies. In all cases, however, it is important to maintain a strict business perspective, with contractual clarity and focus on delivery of results with efficient use of funds.

Arrangements for regulated utility-delivered programs and for non-utility delivered programs are first separately discussed, followed by an introduction to the wholesale-retail utility contractual arrangement used by the Bonneville Power Administration. Subsequent sections cover contractual duration and review, supervision requirements, performance incentives, and administrative cost issues.

Overall Contractual Arrangements

Programs Delivered by Utilities. Even though the "contractual arrangements" for energy efficiency resource acquisition between a PUC and regulated energy supply utility are part of broader regulatory relationships, and often dealt with within the context of ratemaking cases, maintenance of a clear, well documented business understanding is important. Savings delivery, cost effectiveness and use of funds accounting also need to be rigorously reviewed. Legacies from the previous demand-side management activity era may still exist, including, for example, a history of reviewing energy efficiency budget expenditures rather than energy savings results and cost effectiveness. Such legacies need to be overcome to reinforce a stricter business approach to energy savings delivery.

Each retail utility-delivered program in the case studies includes PUC approval of some type of multi-year energy efficiency resource acquisition plan, creating a contractual understanding between the PUC and utility. For BC Hydro (CS 1) and Enbridge Gas (CS 6) acquisition targets, programs layouts to achieve them, and budgets are agreed to as part of major ratemaking reviews for periods of about three years. Detroit Edison's acquisition targets, programs and budgets are agreed with the Michigan PUC separately, as part of review and approval of its Energy Optimization Plan (CS 5).

Programs Delivered by Non-utility Entities. Non-government third party delivery entities must have distinct contractual arrangements. For the two government entities reviewed, NYSERDA (CS 7) and Efficiency New Brunswick (CS 9), the contractual arrangements between them and supervising entities which also are government-associated are somewhat less clear. For NYSERDA, however, a distinct relationship with the state PUC provides a foundation for generally clear understanding.

Among the three non-government third party delivery systems, contractual arrangements do vary, however:

- Energy Trust of Oregon (CS 3). The Energy Trust and the Oregon PUC have a Grant Agreement, executed at the Energy Trust's startup in 2002, which provides the legal foundation for their relationship. The Agreement is automatically extended every year unless either party has an objection. Both parties anticipate a continuing long-term arrangement. The Agreement sets out the obligations of the parties and basic accountabilities and oversight arrangements. The Energy Trust reports its energy savings delivery results and fund use to the PUC every year, benchmarked against a series of periodically revised performance metrics.
- Efficiency Vermont (CS 8). The Vermont Energy Investment Corporation (VEIC) operated Efficiency Vermont under three-year commercial contracts with the PUC from 2000-2011. The first three-year contract was awarded to VEIC through competitive procurement, with a PUC option to extend the contract for another three years. Following mutually agreed upon extension, the contract was rebid in 2006, and once again awarded to VEIC and further extended in 2009. In late 2010, however, the contractual arrangement was revised, and VEIC was appointed to operate Efficiency Vermont on a new 12-year Order of Appointment. The 12- year Appointment is reviewed mid-way, in six years. If reconfirmed then, the Appointment period is reset for another, new 12-year cycle. If not reconfirmed, the Appointment would then lapse after the final six years. VEIC also reports its energy savings delivery and fund use to the PUC every year, benchmarked against performance metrics established every three years.
- Wisconsin Focus on Energy (CS 4). During 2000-2010 Wisconsin's Focus on Energy energy efficiency resource acquisition program was operated by the nonprofit Wisconsin Energy Conservation Corporation (WECC). Up to 2005 WECC's contract was with the state's Department of Administration, and thereafter it was with the Statewide Energy Efficiency and Renewable Administration (SEERA), created by the energy utilities. In 2010 the contract for operation of Focus on Energy was rebid, and awarded to Shaw Environmental. However, both WECC and Shaw have relied primarily on other contractors to execute the specific energy savings delivery programs for different sectors. Science Applications International Corporation (SAIC), for example, has executed Focus on Energy's programs for commercial and industrial customers under subcontract first with WECC and now with Shaw.

Bonneville Power Administration's Energy Conservation Agreements with Retail Utilities. As described in CS 2, the Bonneville Power Administration (BPA), an interstate wholesale electric power utility, operates an energy efficiency resource acquisition program in partnership with 135 retail electricity utilities that sell its electricity. BPA has energy efficiency resource acquisition requirements mandated through the U.S. Federal Government. It allocates energy efficiency acquisition funding from its power sales revenues to provide both financial incentives and technical support to its retail utility customers, supporting them to complete savings acquisitions. Since October 2011, BPA has begun to implement a new system of agreements and budget management for energy efficiency delivery with its retail utility customers.

BPA signs a bilateral Energy Conservation Agreement with each retail utility interested in receiving the incentives and support (which they already have paid for in the prices they pay for BPA's electricity). The retail utility is then allocated a total energy efficiency incentive budget envelope, which can be used by the retail utility for eligible programs. Budget payments are then made upon delivery of savings confirmed by BPA. Utilities are allowed to pool their funds together with other utilities and implement joint initiatives, or transfer fund allocations among themselves. BPA provides technical support and operates a web-based planning, tracking and reporting system for use by all partners called "EE Central". Although new, it's possible such a model could also be used in other ratepayer-funded energy efficiency acquisition cases where there are many relatively small utilities. However, capacity in the central institution is critical. A key feature of the BPA system is the technical support that BPA can offer from decades of experience.

Specific Issues

In setting up contractual arrangements with either utilities or non-utilities there are a number of further choices that need to be made, including (at least) setups for contract duration and continuity, arrangements for contract and program supervision, use of performance incentives, and measures to control administrative costs.

Competitive Procurement and Contract Duration. Competitive awarding of contracts for operation of energy efficiency resource acquisition programs, or subprograms, has definite advantages at the outset of programs, in terms of obtaining the highest quality, least cost arrangement. As implementation proceeds, however, periodic change in delivery entities is likely to be hazardous, and should be approached judiciously unless the delivery entity is underperforming. Energy efficiency resource acquisition programs require major investments for startup, as well as significant continuing investments in market development, program design and adjustment to customer feedback, and technical skill. A long-term strategic focus also is important. The lessons learned in contracting for the operation of Efficiency Vermont may be instructive (CS 8). Uncertainty about contract continuation every three years posed limitations on both the attractiveness of long-term capacity or program development investments for VEIC and the types of programs that the PUC could ask Efficiency Vermont to implement. Hence, the recent change to a 12-year appointment was made.

In cases where the main energy efficiency resource acquisition entity subcontracts full sector programs out to other contractors, as in the case of many utility programs or Wisconsin's Focus on Energy, the same interests in program continuity are likely to apply, even though there may be somewhat more room for flexibility. If the main entity maintains some technical implementation capacity, or is interested in developing that, one approach to consider for subprogram delivery is a mix of in-house capacity with a number of contracted teams that undertake much of the day-to-day work. In such a case, there is more room for changing contractors based on needs and performance. The Energy Trust of Oregon's industrial program operates in such a way (CS 3).

Supervision Requirements. Capacity and time requirements for full supervision of energy efficiency resource acquisition programs by ordering authorities should not be underestimated. It is a specialized and evolving business, and many details are critical. It may be useful for PUCs to consider special arrangements. In New York and Vermont (and most likely many other cases), PUCs have specific arrangements for government public service departments to undertake significant parts of the review process or day-to-day program monitoring. A small portion of funding from public benefit charges may be earmarked to support such work. In the case of Vermont (CS 8), a special Contract Administrator also was engaged during 2000-2011 to oversee contractual details.

Performance Incentives. Performance incentives are often included in the more commercial-style contractual arrangements used for energy efficiency resource acquisition. The incentives provide increased compensation to delivery entities for delivery against targets or other performance metrics above specified minimum levels. Among the case study examples, contractual arrangements with NYSERDA, B.C Hydro, Energy Trust of Oregon, Efficiency New Brunswick, and

Bonneville Power Administration have no special performance incentives — these entities, generally closer to government, are expected to meet their obligations regardless. Arrangements for the two programs involving investor owned utilities — Enbridge and Detroit Edison — include performance incentives. Performance incentives also are included in VEIC's appointment for operation of Efficiency Vermont, and are allowed by the Wisconsin PUC under Shaw Environmental's contract with SEERA for administration of Focus on Energy.

As discussed under Choice 1, cost-recovery and decoupling regulation may remove disincentives for investor-owned utilities to pursue energy efficiency programs, but some type of shareholder incentive is usually advised to provide incentives for delivering strong results. The two approaches used in the case study programs are somewhat different:

- Enbridge Gas (CS 6). In addition to coverage of costs through approved natural gas rate structures, Enbridge Gas can begin to receive additional revenue adjustments if they meet 50% of their annual energy savings delivery target. Incremental amounts are added for further deliveries against targets up to a maximum of 150% of the target level. In 2012, Enbridge would be able to obtain a maximum of $10 million in additional revenue if they exceed their target by 150%.

- Detroit Edison (CS 5). The Michigan PUC provides for performance incentives if delivering utilities both exceed their targets and score above a minimum level (indexed at 1.0) against a cost-effectiveness indicator. The maximum incentive can be obtained by meeting 115% of contracted energy savings targets and achieving a cost-effectiveness score of 1.25. The maximum incentive is worth 15% of that year's energy efficiency program spending. In 2009 and 2010, Detroit Edison requested incentive payment of $3 million (11% of program spending) and $6 million (14% of program spending).

The current contractual arrangement between the Vermont PUC and the operating company for Efficiency Vermont, VEIC, includes a sophisticated "Performance Mechanism" that has a major bearing on VEIC's overall compensation for operating the program. The mechanism includes a set of seven "quantifiable performance indicators," which provide additional compensation once performance has met a minimum level, on a graded scale. The mechanism also includes seven "minimum performance requirements," which, if not met, nullify part or all of the performance compensation otherwise due. There is a cap on the total additional compensation that VEIC can receive. Details are provided in CS 8.

Controlling Administrative Costs

An important part of ensuring program cost-effectiveness is maintaining program administrative costs at reasonable levels. However, it is not easy to compare administrative costs as a share of total budgets or per unit energy savings delivered because budget reporting conventions vary among programs. In particular, accounting may vary on many activities that delivery entities need to undertake that are not specific resource acquisition incentives or technical assistance, such as general information dissemination, customer relations, evaluation, etc.

Supervising entities use various methods to review and control administrative costs. In Vermont (CS 8), the approach is to keep administration and operation fee levels at a bare minimum, and provide much of the operator's compensation through the Performance Mechanism. In Oregon (CS 3) the PUC sets a performance metric for the Energy Trust to maintain administrative and program support costs below a specified percentage of annual revenues. B.C. Hydro's non-program operating expenses for energy efficiency resource acquisition are reviewed and approved by the PUC as a line item in its overall budget (CS 1).

CHOICE 5: HOW SHOULD ENERGY SAVINGS RESULTS BE VERIFIED

Having decided how much energy savings to acquire, decided who should deliver that, secured necessary funds, and completed contractual arrangements, public entities acquiring energy efficiency resources then need to be sure that what was paid for was delivered as promised, just like any business. However, energy savings are not a physical commodity that can be seen. Energy savings can only be determined by comparing actual or estimated energy use before and after an energy efficiency measure is adopted. Methodologies to verify savings must be robust and flexible enough to cover a wide variety of energy efficiency measures, facility types, and load profiles. They must balance the needs for reasonably accurate assessments with needs to be practical and keep costs in bounds. Analysis should be performed by an organization that can be objective and satisfy ratepayer and stakeholder requirements for integrity. Moreover, there will likely be a requirement to report on various aspects relating to the measures undertaken, including causality, cost-effectiveness, savings persistence, etc. Much rides on the results of these evaluations — including not only the proof of the value of expenditure of large amounts of public-benefit funds, but often delivery entity performance-based compensation as well. Accordingly, the energy efficiency program and project evaluation practice has become a major and sophisticated industry in North America.

Details about evaluation methodologies can be found in a variety of reference materials. The following section provides a simple overview of the basic requirements that need to be met, an outline of current approaches and procedures, mainly from the case studies, and some examples of practice.

Measurement, Verification and Evaluation[27]

To properly evaluate the effectiveness of an energy efficiency resource acquisition program, there must be a mechanism for determining if (verification) and how much energy (measurement) has been saved in response to a program service, or incentive; and a process to evaluate the performance of the program as a whole at achieving targeted savings and the ability to do so within budget.

- *Project Verification:* At a minimum, project level evaluation should confirm the implementation and operation of the incented project. For common projects with predictable benefits, deemed savings values are often used. In these instances, little if any additional analysis is needed. For more complicated projects, more involved analysis may be required that compares the pre-project energy use baseline with post-project energy use. These measurements are quite time consuming and can only be conducted on a fraction of projects. As described earlier, a program may use a persistence of savings factor. If so, sporadic confirmation of the validity of such a value is warranted. Project evaluations when extrapolated and collated help form the program evaluation.

- *Program Evaluation:* At the minimum, evaluations must assess the extent to which contracted outputs have been delivered. For all energy efficiency resource acquisition programs, this includes confirmation of energy savings achieved and compliance with any cost-effectiveness requirements. Confirmation of energy savings achieved must be reported according to the definitions and requirements set in contractual arrangements—often including "net" savings, in addition to "gross" savings (see Choice 3 on targets).

Below, we will discuss the process for estimating and measuring energy savings from a project. Measurements gathered from project verification analyses form the basis for program evaluation, which is covered in the following section. Together, these activities ensure that utilities and commissions can rely on energy efficiency to meet present and future energy resource requirements.

Basic Processes for Estimating Project Energy Savings

Although assumptions, level of effort, extent of site visits, and methodological details vary substantially, efforts to assess energy savings from energy conservation measures supported through energy efficiency resource acquisition programs generally proceed through the following steps:[28]

- *Development of the Baseline.* The baseline is the facility's energy consumption that would have occurred absent implementation of the energy savings measure. It also may be called the "business as usual" or "without project" case.

- *Determining Gross Savings.* A variety of methods may be used, depending upon the measure. In some cases analysis of energy bills before and after a measure can play an important role, if there are not too many other factors influencing change in consumption as well. For simple projects involving

27 Both this section and the section immediately following draw heavily on two recent ACEEE reports, which provide more detailed information: ACEEE. *Meaningful Impact: Challenges and Opportunities in Industrial Energy Efficiency Program Evaluation.* 2012; and ACEEE. *A National Survey of State Policies and Practices for the Evaluation of Ratepayer-Funded Energy Efficiency Programs.* 2012.

28 Largely summarized from ACEEE. 2012. *Meaningful Impact: Challenges and Opportunities in Industrial Energy Efficiency Program Evaluation.* Chittum.

specific equipment or other straight-forward changes operating under specific conditions, "*deemed savings estimates*" may be used. Deemed savings are typically used for measures that are applied in a fairly consistent manner across many sites, such as adopting compact fluorescent lamps, for example. Use of demand savings calculations is most common for "prescriptive" programs, where delivery entities offer a pre-defined incentive for adoption of common, relatively simple technology measures. Deemed savings assumptions are developed from evaluations of past projects, and need to be updated periodically. In other cases, especially where projects are customized and involve many site-specific conditions, *measurement and verification (M&V) savings estimates* need to be used. An M&V plan is agreed between the delivery entity and the end user, including protocols and requirements for measurement before and after project execution. Reporting using this plan then forms the basis for the savings claims prepared by the delivery entity. Evaluators will typically then select a sample of these projects for detailed review of both M&V plan methodology and execution, often with site visits.

- *Adjusting Gross Savings.* Estimates of gross savings are sometimes adjusted during evaluation by a "realization rate" based on past experience comparing gross savings estimates prepared at project launch and true energy savings achieved over time across many projects. In many cases, calculation of a realization rate is part of net savings calculations (discussed below) and not a separate step. A realization rate of 0.9, for example, would discount initial gross savings estimates by 10%.

- *Determining Net Savings.* Where required, adjusted gross savings are then further adjusted to become net savings estimates by subtracting a share assessed to be "free riders," and adding additional savings due to "spillover" effects (see Choice 3). No estimates are perfect, given the difficult objective of trying to determine why an end-user adopted the energy conservation measure being studied. Evaluators will typically conduct interviews and surveys of both program participants and non-participants and at times will conduct market effects studies. In some cases, particularly for programs with many participants, net savings will be determined using an analysis of changes in the energy bills of participating customers, relative to changes in the energy bills of non-participants who serve as a control group.

Some programs use detailed technical manuals that provide guidance on energy savings estimation methodologies and assumptions for all current initiatives. These need to be updated periodically. The manuals set out where deemed savings may be used, and with what assumptions, as well as protocols for M&V savings estimation. Where such technical manuals are developed and agreed to by both the delivery entity and the entity supervising evaluation, this can greatly improve mutual understanding, reduce arguments, and help both delivery entity staff and evaluators meet expectations. In Bonneville Power's case (CS 2), their Energy Efficiency Implementation Manual, revised every six months, provides the details of all of its program offerings in one package — including technical information, incentives offered, approval procedures, and M&V requirements for each initiative.

Program Evaluation

The a minimum energy savings program impact evaluation determines gross energy savings through affirmation that claimed measures were indeed implemented and that the engineering analyses used to claim savings look reasonable. Many efforts also move on to assess net savings (which estimate how much savings was delivered relative to business as usual). Most efforts also review energy measurement data and detailed analysis of samples of projects. Reporting on compliance with cost-effectiveness metrics, such as minimum total resource benefit thresholds, is usually done for sub-programs, using methodologies and assumptions agreed to with the supervising entity.

In addition to reporting on performance against targets and compliance with contractual obligations, evaluations can help program delivery staff and management identify areas for improvement. Performance evaluation efforts may also include collection and analysis of data that enable the determination of the unit energy savings costs for each program element such as service delivery and administrative overhead. It is also useful to know "leveraging factors" that depict the share of financial incentives provided compared to the share of energy-user self-financing, and that represent the ratio of non-energy benefits from supported energy-saving projects. The latter is an especially important motivating factor for industrial energy users as non-energy benefits often exceed energy savings in value and therefore such companies may not need as much of an incentive as other businesses to drive investment.

Such information is critical for making the continuous adjustments in programs that are needed to get the best results, including adjustments in sub-program design, incentives levels and the spread of overall expenditures between sub-programs.

Finally, periodic broad evaluation exercises can assess the overall role of an energy efficiency resource acquisition program in meeting broad energy conservation and/or environmental goals in the state or province, including interactions and synergies between the project-delivery focused acquisition program and other energy conservation programs. Such evaluations can be critical for justification of program continuation or deliberations on adjusting a program's size.

To meet these various objectives, the energy efficiency program evaluation community often pursues three basic types of evaluations:[29]

- *Program Impact Evaluations.* These assess the actual impacts and benefits of an energy efficiency program, and represent the mainstay of energy efficiency resource acquisition evaluation work;
- *Process Evaluations.* These determine the efficiency and efficacy of an energy efficiency program delivery — which aspects are working well and which need improvement; and
- *Market Effects Evaluations.* These assess the extent to which a program is influencing the broad marketplace for various energy efficiency technologies or measures, resulting in market transformation impacts. Such impacts can be an important part of net savings.

Program Evaluation Options

There is great diversity among programs as to how evaluation is undertaken and who does it. A recent ACEEE survey of evaluation efforts for utility ratepayer financed energy efficiency programs in 44 U.S. states and the District of Columbia found that evaluation was mandated by state law in 45% of the cases, whereas PUCs issued mandates in another 45%. Although the bulk of data compilation necessarily falls to delivery entities, the survey also found that utilities administered the evaluation function in 37% of the states, PUCs or PUCs and utilities together administered the function in 36% of the states, and another government agency or third party administered the function in 27% of the states. Contractors are engaged for the bulk of the evaluation work in 79% of the states, although 21% relied primarily on utility or government agency staff.[30]

Arrangements also vary among the case study programs. Among the two electric utility-delivered programs, BC Hydro (CS 1) undertakes the evaluation effort itself which is then reviewed by the PUC, whereas Detroit Edison (CS 5) hires an independent contractor, as required by Michigan law, and the PUC reviews the results together with the utility. Among the non-utility delivered programs, (i) in the case of Efficiency Vermont (CS 8), the Department of Public Service of the state government uses consultant assistance to evaluate savings and other performance claims submitted by Vermont Energy Investment Corporation (VEIC), the contracted delivery entity, and submits its findings to the PUC; (ii) in the case of NYSERDA (CS 7), evaluation plans and guidelines are established by a separate group coordinated by the state government, completed by NYSERDA with staff coordinating the work of consultant contractors, and reviewed by the PUC; (iii) in Wisconsin (CS 4), SEERA, the overall program administrator set up by the utilities, hires an independent evaluator to evaluate the results of the Focus on Energy (delivered by a different contractor of SEERA) and submits the evaluation to the PUC for review; and (iv) in Oregon (CS 3), a special department in the Energy Trust undertakes evaluations, using consultants where necessary, and submits the findings to the Energy Trust's management and board (which also uses the findings for reporting to the PUC). All of these arrangements employ some type of check-and-balance mechanism to ensure and conflict of interest issues are prevented or at least minimized.

29 NAPEE (2007) as cited in ACEEE, November 2012

30 ACEEE. 2012. *A National Survey of State Policies and Practices for Evaluation of Ratepayer-Funded Efficiency Programs.*

Examples

Several examples of interesting approaches from among the case studies are described below.

- *BC Hydro (CS1).* BC Hydro's energy savings measurement and verification procedures may be fairly typical of electricity utilities that have been administering evaluation efforts for some time. Monthly energy savings and cost reports, comparing actuals with planned figures, are reported monthly by staff to program management. Quarterly reports are submitted to the utility's executives and Board of Directors. An annual report is submitted to the PUC. For specific industrial and commercial program investments, BC Hydro's measurement and verification procedures include (i) a technical review, including review both before and immediately after investment to ensure proper baseline definition and suitable savings calculations with documentation and referenced assumptions; (ii) site inspection of a sample of project to confirm project completion and operation as approved; and (iii) measurement and verification on a sample of projects to quantify individual project savings through analysis of actual project operation and performance data. In addition, BC Hydro undertakes or contracts program evaluation studies to determine the overall effects of specific programs (including its energy conservation rate structures).

- *Efficiency Vermont (CS 8)*. Vermont's Public Service Department (PSD) is responsible for evaluating the energy savings and other performance indicator claims of Efficiency Vermont. PSD uses consultants to measure and verify (M&V) energy savings, peak load reduction and total resource benefits. Procedures for M&V are laid out in the Procedure and Administration document.[31] The PSD is required to certify to the Public Service Board annual progress towards performance metrics relative to budget expenditures and to provide full assessments for each three-year cycle. The results of the PSD's evaluations impact the program operator's performance compensation, and internally, performance compensation for program staff. Close cooperation between the PSD and the program operator is important to maintain mutual understanding.

- *Energy Trust of Oregon (CS 3)*. Measurement and verification of savings is conducted by the Energy Trust's Planning and Evaluation Department, which is separate from the program delivery departments. A strong emphasis is placed on productive interaction with planning, aiming for future improvements. Evaluation is expected to focus on problem solving to improve results and to be dynamic, rather than provide only a static snapshot of short term results. Reviews include assessments of actual savings well after project implementation. For example, "True Up Reports" are prepared every year, systematically reviewing changes affecting actual performance from projects completed in previous years.

- *NYSERDA (CS 7)*. The state PUC has mandated that 5% of the energy efficiency resource acquisition budgets of NYSERDA and participating utilities must be allocated for evaluation. In NYSERDA's case, about 3% is used to finance external evaluation contractors and 2% is used for staff involved in evaluation. In the evaluation work on industrial and process efficiency sub-programs, about 80% of the funds are used for Program Impact Assessments, 9% for Process Evaluations aiming to improve program effectiveness and acceptance among energy users, and 11% for Market Characterization Assessments, completed every other year, to determine emerging market factors and help establish a baseline of technology and practice uptake.

31 Pages 10-13 in "Process and Administration of Energy Efficiency Utility Order of Appointment," approved by the Vermont PSB, December 10, 2010.

Conclusions And Recommendations

This section provides suggestions for consideration by energy efficiency practitioners resulting from the case studies and their comparison. A first section provides suggestions for those considering the adoption of energy efficiency acquisition programs or seeking to improve existing programs. A second section provides a list of specific topics where experience and knowledge gained in the energy efficiency acquisition business in North America might be instructive to energy efficiency practitioners in other countries.

Adopting And Improving Energy Efficiency Resource Acquisition Programs

Summary suggestions for weighing each of the five choices posed in the section above on Why Pursue Energy Efficiency Resource Aquisition? are outlined below. (Analysis and argumentation behind these suggestions is presented within the section on Delivery Options.) Some thoughts then are provided on the development of energy efficiency resource acquisition efforts in other countries without the ratepayer-financed and energy utility customer service framework most common in North America, but still relying on similar basic concepts.

Choice of Delivery Entity. Although final choice of the best type of energy savings delivery entity depends on local circumstance, non-utility energy savings delivery entities are certainly worth considering. Circumstances that especially favor this model include:

- Broad total energy efficiency objectives and desires for holistic, cross-fuel end-user solutions;
- Complications in local energy utility industry structures (e.g., a large number of utilities or utilities without a history of promoting energy efficiency);
- Desires to blend together a variety of funding sources, including non-ratepayer fund; and
- Lack of interest on the part of local utilities to run programs.

The challenges faced in setting up an effective new non-utility entity should not be underestimated, however, these include heavy start-up investments in developing a market presence and consumer relations in addition to acquiring programs and implementation capacity. A long-term commitment is necessary. A local non-utility entity with the management skills, staff, and flexible procedures would be preferred.

If energy supply utilities are the preferred choice, notwithstanding the benefit of strong customer knowledge and infrastructure, the "throughput incentive" problem must be dealt with through regulatory changes to overcome disincentives for promoting energy efficiency that exist under traditional ratemaking regulation. A preferred approach is adoption of decoupling regulation as well as some type of performance incentive.

If a government entity is the preferred choice, it is recommended that an entity one-step removed from government, be used or established, such as a publicly owned corporation. These entities have more flexibility and may have more market experience than a government department. Sustainable, earmarked funding sources are strongly preferred over annual budget appropriation.

Funding. Although many sources of funding are possible in principle, key requirements are sustainability in funding over the medium-to-long-term, and security and predictability in fund flow. Stops and starts in funding support make energy efficiency resource acquisition programs inefficient and almost unworkable, as these programs require a multiyear focus, in part to align programs to existing business decision making and investment cycles. Utility ratepayer financing has proved a good choice for many states and provinces. The choice between a system benefit charge and financing through overall utility revenues depends on local circumstances; both have been successfully used. If a non-utility is chosen as the savings delivery entity for a ratepayer financed effort, it is easier, but not necessary, to use a system benefit charge. In setting up system benefit charges, it is recommended to include provisions and procedures to allow for periodic adjustments as energy efficiency resource acquisition demands change.

Reporting on use of funds allocated for energy efficiency resource acquisition (in addition to energy savings results) should be detailed and rigorous for utilities and non-utility delivery entities alike. Where used, mechanisms for transfer of funds from utilities to non-utility delivery entities should be efficient, transparent and as secure as possible from appropriation for other uses. Predictability of fund flow is very important for all delivery entities to operate their businesses properly.

Targeting. At the heart of energy efficiency resource acquisition programs, clarity in setting acquisition orders (targets) and rigorous reporting on delivery are essential. The well-established programs include buyer and seller agreement on both a long-term view of acquisition requirements and on a detailed medium term program of targets and budgets (typically three years), against which annual energy efficiency resource delivery is reported and verified. Use of integrated supply and efficiency resource plans are the most elegant foundation for setting savings targets and budgets for utility-supplied energy, but this may not be practical in various cases, such as when utilities and regulators lack the skills or desire to do a solid credible analysis. Definition of percent of energy sales targets is a workable alternative. However, it may be useful to check prevailing percent of sales targets periodically with reviews of cost-effective energy-efficiency potential, including updates in avoided supply costs.

The energy savings product that is being acquired needs to be clearly defined. This includes clarity as to net or gross savings (and calculation methods) and some means to convey preference for persistence in energy savings. Targeting and reporting in net savings terms is especially important for programs where high incidence of 'free riders' or spillover is expected. Supervision entity approval of the planned medium-term acquisition program portfolios of delivery entities is recommended, in addition to targets, for a variety of reasons, including needs to consider savings persistence as a factor. Periodic surveys of the savings persistence of energy savings measures supported in previous years also are suggested, as is possible use of cumulative energy savings target reporting that takes persistence into account.

All programs must balance how much of the benefit of energy efficiency, which accrues largely over the medium and long term, can be afforded with funds that must be paid up front. From the delivery entity perspective, predictability is perhaps the most important point.

Many programs include objectives beyond delivery of as much energy savings as possible with allocated funds. For example, it is common to require some measure of balancing between ratepayer contributions and program incentive and support expenditures between customer classes or geographic areas. Although many of the additional objectives have strong rationale, caution is needed as increasing objectives and performance metrics increasingly compromise the ability of delivery entities to single-mindedly pursue the most cost-effective savings opportunities.

Contracting. Contracting arrangements between supervising entity "buyers" of savings and delivery entity "sellers" also need to be clear. Even though the "contracting" with utility delivery entities is often undertaken as part of larger regulatory proceedings, a strict contractual business approach is still needed. Targets, performance metrics, any performance incentives, detailed budgeting, cost-effectiveness indicators, and other operational topics need to be included and reported on. Non-utility entity contracts need at least as much detail. Experience also has led to longer contract durations (e.g., in Vermont), in the interests of program continuity and to encourage long-term strategic focus in program design and building up in-house capacity. Program continuity is very important, and changes in delivery contractors can prove disruptive, due in part to the importance of trust between particularly industrial customers and energy efficiency delivery contractors.

Supervision entities, such as PUCs, should consider how best to meet sizable supervision demands. If supervision is perfunctory, program quality suffers. A number of PUCs in the case studies make arrangements for outside assistance.

Contract performance incentives, resulting in performance-based delivery entity compensation, have proven useful. However, there is an art to design to provide sufficient incentives without increasing compensation excessively. Program administrative costs (including compensation) must be monitored effectively to ensure that the vast majority of ratepayer funds are returned to ratepayers in financial incentives and useful services.

Evaluation, Measurement and Verification (EM&V). Sound measurement and verification is a critical aspect of energy efficiency resource acquisition schemes, enabling buyers to be reasonably sure that they have purchased the product they ordered. Although delivery entities may undertake the bulk of the work as they complete their savings claims, some type of third party review is also recommended. Nevertheless, delivery entities need as much upfront clarity as possible as to how technicalities of energy savings calculations will be approached, to inform their programming and to maximize verified energy savings delivery. The measurement and verification technical manuals issued periodically in a number of the case study energy efficiency resource acquisition programs are a good mechanism to guide all of the parties involved.

Preliminary Thoughts on Additional Acquisition Models to Explore. The prevailing North American model that uses utility ratepayer funds to acquire energy savings with incentives and other services from amongst those same utility ratepayers may or may not blend well in other countries with differing approaches to promoting energy efficiency, or with the utility regulation practices or customer relationships in those countries. Even, where the ratepayer financing/utility customer service model is not considered optimal, however, energy efficiency resource acquisition programs can still be developed and applied. The issue is source of funds. As mentioned above, the key requirements for funding are sustainability over quite a few years and security and predictability in fund flow. In principle, a variety of earmarked funding sources can meet these requirements. Assignment of delivery entities, targeting, contracting, and savings verification can then all potentially proceed along similar principles to those that have been successful in North America.

One option that may be worth exploring is use of carbon emission or fossil fuel tax revenues. In this case there also may be potential for development of similar types of "covenants" with consumers used in the U.S. — consumers pay the taxes, but receive their funds back in the form of financial incentives and services.

Energy efficiency resource acquisition programs can be undertaken for certain market segments. Two possibilities include:

- Program application based on customer class: residential energy-users, large buildings (including either commercial buildings, public buildings or both), or small and medium-scale industrial enterprises.

- Blending of energy efficiency resource acquisition with current systems of industrial energy conservation agreements with the government. A delivery entity could provide financial incentives and support to companies with agreements, in exchange for delivery of verified energy savings, perhaps funded with carbon/fossil fuel tax revenues from those companies. Frameworks somewhat akin to this already exist in some European countries.

In exploring development of such programs, perhaps the most valuable experience that North American programs and entities have to offer concern the business aspects of energy efficiency resource acquisition — continual focus on achieving maximum verifiable savings with the limited public funds available.

Relevant Experience Useful To Practitioners In Other Countries

The following is a list of additional issues that energy efficiency practitioners may look to the North American energy efficiency acquisition experience for solutions.

- Mechanisms for collecting and efficiently applying utility ratepayer funds for consumer energy efficiency incentives;

- Practical experience in dealing effectively with the utility "throughput incentive problem" concerning energy efficiency;

- Refining definitions of "energy savings" to meet different needs;

- Methodologies and practice in incorporating energy efficiency resource delivery reliably in electric power system planning;

- Concepts and analysis of unit energy savings costs;

- Devising and implementing programs to deliver maximum savings with minimum public funds in different markets;

- Developing both prescriptive and customized energy saving project programs for different markets, and the operational capacities needed to deliver such programs; and

- Practical measurement and verification approaches and practices, and preparation and use of measurement and verification technical manuals.

This list is by no means comprehensive, but is intended to identify some of common issues that are likely to be shared in other venues and to direct the reader to consider examples contained in this report.

The North American electric and natural gas systems are two of the largest and most complicated utility systems in the world. The jurisdictional, regulatory, and operational complexities of these systems are even greater than the technical complexities, and they, more than any of the other variables, influence the acquisition of energy efficiency resources. Through the examination and comparison of a small sampling of case studies, this part of the report has attempted to explain how several models have evolved to make energy efficiency a competitive option for regions to consider in meeting their energy resources needs. In Part II of this report, each of these case studies is explained and examined in detail.

Part II: Program Case Studies

Institute for Industrial Productivity

Energy Efficiency Resource Acquisition Program Models in North America
Case Study: BC Hydro

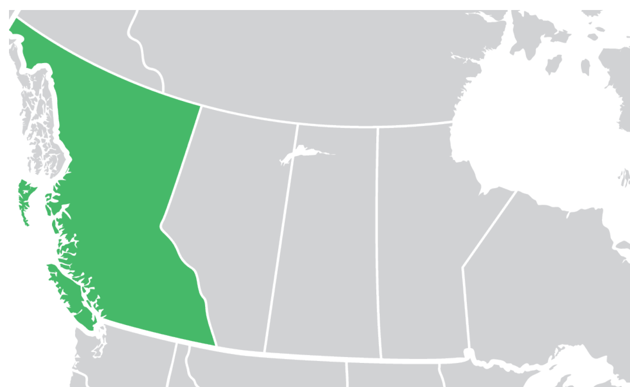
TYPE OF ENTITY	CLIENTS	SUPERVISING ENTITY
Government-owned electric utility State/Province: British Columbia · Program Launch: 1989	All utility customers	Public utility commission and provincial government

BC Hydro's demand-side management (DSM) program provides an example of a long-standing electricity efficiency acquisition effort operated entirely by an electricity supply utility. However, BC Hydro is fully owned by the provincial government, who also sets BC Hydro's overall acquisition requirements and allows the acquisition costs to be rolled into electricity prices.

Similar to the U.S. Pacific Northwest (CS 2), British Columbia faces long-run marginal costs for new power supply resources that are far higher than current low average costs based on existing hydroelectric power. This has been an important factor underlying the drive of the provincial government to acquire inexpensive and clean energy efficiency resources through its power supply utility.

BC Hydro is known in North America as a longstanding presence and innovator in electricity efficiency acquisition. Its energy conservation rate structure is particularly novel. The utility also has adopted innovative approaches and has strong experience in acquiring electricity efficiency from industry. Although the share of large industry fell to around 26% of BC Hydro's sales in the province during fiscal years 2010-2011 from the 31-32% level of 2005-6, industrial demand is expected to pick up in the future with new project development.

Legal and Institutional Structure Founded in 1961, BC Hydro is a commercial Crown Corporation owned by the Province of British Columbia. As a Crown Corporation, it operates as a commercial entity separate from the Provincial Government, but reports to the government, its sole shareholder, through its Responsible

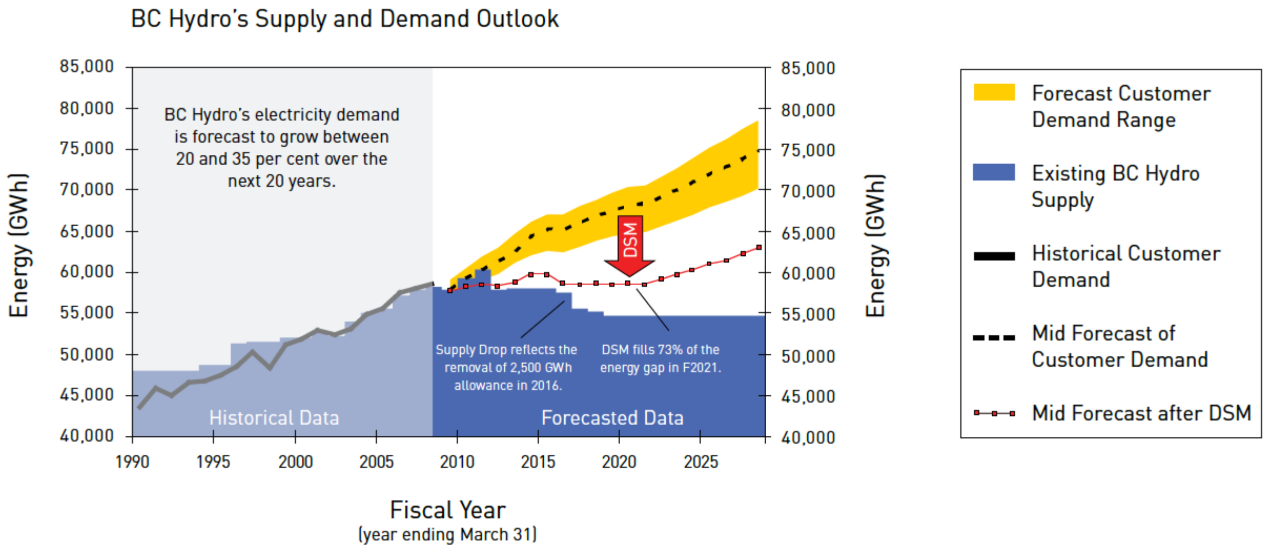


Minister, the Minister of Energy, Mines and Petroleum Resources. The Provincial Government Cabinet appoints BC Hydro's Board of Directors, to whom BC Hydro's President and CEO is accountable.

BC Hydro's purpose is to provide "reliable electric power, at low cost, for generations." The company served about 1.85 million B.C. customers in fiscal year 2011, accounting for 95% of B.C.'s population, with sales to them of about 51 GWh of electricity. BC Hydro is essentially the sole supplier of electricity to grid-connected customers.

BC Hydro receives government shareholder policy guidance through the Ministry of Energy Mines. Guidance is articulated in the Province's energy plans and legislation, including the 2007 BC Energy Plan and the 2010 BC Clean Energy Act. The Ministry also issues Shareholder's Letters of Expectations.

FIGURE 1-1: The Role of DSM in Meeting BC Hydro's Electricity Demand



SOURCE: BC Hydro, *BC Hydro's Electricity Conservation Report* (2009).

BC Hydro also is regulated as a public utility by the British Columbia Utilities Commission (BCUC), who is charged with government authority to ensure that BC Hydro customers receive safe, reliable and non-discriminatory energy services at fair rates, and that the competitive interests of B.C. businesses are not frustrated. BCUC is also responsible for ensuring that utility shareholders earn a fair return on their invested capital. BCUC regulates BC Hydro's electricity tariffs considering overall revenues, expenditures, and rates of return needs, balanced against needs to keep prices as competitive and least burdensome as possible. It also approves BC Hydro's regular service plans, including plans to acquire electricity resources from new generation, conservation and wholesale power purchases. In a 2008 Amendment to the Utilities Commission Act, BCUC also is required to consider needs to meet provincial greenhouse gas emissions reduction goals and to pursue energy conservation and efficiency, and other clean energy concerns.

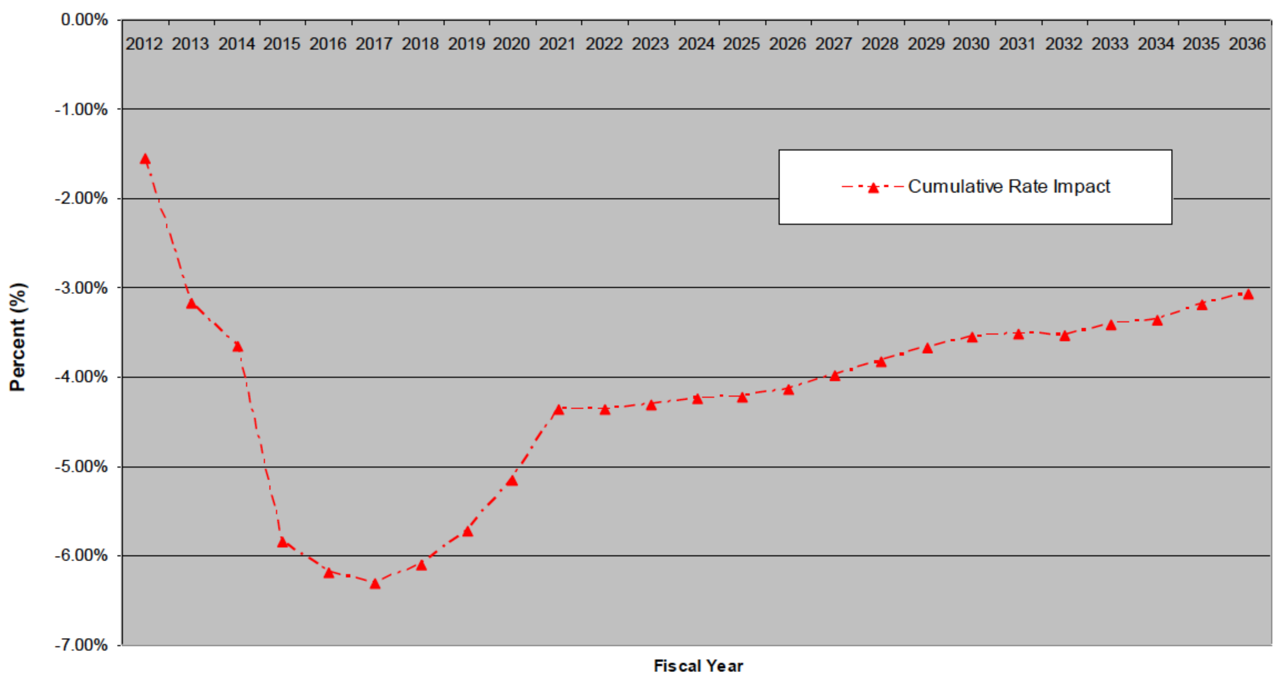
Economic and Institutional Setting of BC Hydro's Demand-Side Management Program BC Hydro launched its "Power Smart" electricity demand-side management program in 1989. After a productive period, program funding was reduced during the mid-1990s as was also the case for many demand-side management programs in North America. Power Smart was revitalized in Fiscal Year 2002, with the first year of revitalized "Power Smart 2" operation in FY2003.[1] The program was renewed amid concerns about future power supply availability and costs. Following the success of the second program and increasing government desires to promote aggressive energy efficiency acquisition, Power Smart 3 was launched in FY2008, based on a new 20-year DSM plan.

Acquisition of energy efficiency resources has become a clear pillar of the Provincial Government's energy policy. The Government's BC Energy Plan of 2007 established several key goals for electric power development in the province: (i) the province should become self-sufficient in electricity supply by 2016, (ii) clean and renewable power[2] should continue to account for 90% of BC's power, as in previous years, and no nuclear power should be development, and (iii) acquisition of electricity efficiency resources should account for at least 50% of the incremental power resources to be obtained by the year 2020. In 2010, the Provincial Government built on this policy framework, enacting the BC Clean Energy Act. This Act further increased electricity energy efficiency acquisition goals to 66% of the incremental power resources to be obtained by 2020, and

1 Government fiscal years in British Columbia are from April 1-March 31. For example, Fiscal year 2002 ended March 31, 2002.

2 This includes electricity from hydropower, solar, wind, ocean, biomass, biogas and geothermal resources.

FIGURE 1-2: **Electricity Rate Impact of BC Hydro's Updated DSM Plan**



SOURCE: BC Hydro, *F2012-2014 Amended Revenue Requirement Application, Appendix II*, February 2012

increased the mandatory share of clean and renewable energy from 90% to 93%.

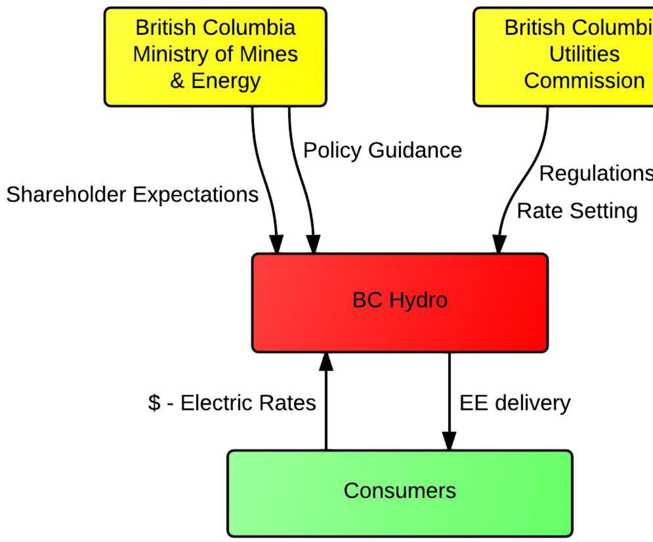
Figure 1-1 above provides a picture of the critical role that BC Hydro's DSM program plays in British Columbia's overall electricity supply and demand outlook. Electricity supply from existing hydro plants is expected to fall slightly. Customer demand for electricity services is expected to grow, however. Although there are some options for further development of clean power at reasonable costs, the marginal costs of new power generation are generally far higher than current average costs. Therefore, electricity efficiency resource acquisition is relied on as the key means to meet incremental demand, especially as much potential remains for acquisition at costs lower than the currently low average costs

Although the costs of BC Hydro's DSM program are paid for by ratepayers, who provide the required financing through the power tariff, the DSM program actually results in a substantial reduction in overall power prices, as the costs of electricity efficiency gains are well below both average and especially marginal supply costs. Figure 1-2 shows forecasts of the overall electricity rate impact of BC Hydro's Updated DSM Plan for the next 24 years. In 2016-2018, average power rates are expected to be reduced by over 6%, relative to a no-DSM scenario. In addition to lower prices, consumers also gain cost savings through lowered consumption from efficiency gains.

The Government's electricity efficiency acquisition requirement, together with policies on self-sufficient and clean/renewable supply, are key elements in the operating framework for BC Hydro. In addition to policies set out in provincial legislation, the Government has further instructed BCUC to ensure that the Government's requirements are met in BCUC's more detailed regulation of BC Hydro's operations and revenue collection.

With over 20 years of experience in designing and implementing Power Smart DSM programs, BC Hydro has a level of expertise and a track record of success that few other electricity utilities its size can match. BC Hydro issued a 20-year energy-focused DSM program as part of its 2008 Long-term (Resource) Acquisition Plan (LTAP), designed to meet the Government's 2007 policy requirements. Filed with BCUC in June 2008, the BCUC approved the LTAP with some revisions 13 months later, follow-

FIGURE 1-3: BC Hydro Organizational Structure



ing three rounds of submission and replies on written comments from BCUC staff and a wider range of public groups, as well as oral meetings overseen by BCUC. The newer Clean Energy Act of 2010, then, specifically requires BC Hydro to submit a long-term Integrated Resource Plan (IRP) to the Ministry (as well as the BCUC) by the end of 2012. Full drafts have already been prepared and circulated. The Act also requires new IRPs to be submitted to the Ministry at least every five years after 2012.

BC Hydro's filings with BCUC are subject to substantial public review and input. Any group or individual can register as an "intervener" and provide comments. Major interveners qualify for financial support from BC Hydro, according to regulations, for preparing their comments. Hundreds of written comments are registered for major filings, each of which must be answered.

Within the overall long-term acquisition requirements set in legislation, therefore, BC Hydro maps out detailed targets for acquisition in its long-term plans, which are subsequently subject to BCUC review and approval, with substantial public input. The costs of BC Hydro's efficiency resource acquisition are included in BC Hydro's overall resource acquisition and operating budget envelop, also approved by BCUC. Although specific reviews are at times undertaken on the costs and deliveries of BC Hydro's Power Smart program, program costs are still discussed and approved as part of the overall expenditure and revenue assessment framework conducted by BCUC. Within that discussion, there are no explicit provisions for recovering portions of "lost revenue" due to electricity efficiency gains.

The Power Smart program is administered and implemented by a team of dedicated staff, using independent contractors for detailed work where needed. BC Hydro's DSM operations staff totaled 66-69 staff members during the F2009-2011 period.[3] Power Smart is administered under Customer and Corporate Services, a business group headed by an Executive Vice President and deputy CEO. Power Smart is combined together with Customer Care in this overall business grouping, which also includes integrated resource planning, smart metering and infrastructure, economic and business development, aboriginal relations and negotiations, and safety, health and environment.

Funding and Expenditures There is no energy efficiency or DSM "public purpose" surcharge in BC Hydro's electricity tariff. BCUC allows BC Hydro to roll the costs of Power Smart into its operating costs, which then must be recovered with tariff revenue

3 BC Hydro F2012 to F2014 Amended Revenue Requirements Application (Revision 1, February 28, 2012), Appendix II – F2012-F2013 Demand-side Management Expenditures (hereafter referred to as "F2012-4 RRA Appendix II."

from ratepayers. BC Hydro submits schedules of its actual and planned DSM expenditures for BCUC approval. BCUC formally approves expenditure schedules periodically and usually in the context of an overall, multi-year plan. BC Hydro's DSM program operates on "place holding" expenditure schedules between the periodic reviews

Table 1-1 shows BC Hydro's expenditures on DSM activities during F2009-2011. As described in a separate section below, these activities include administration and support of its energy conservation electricity pricing rate structures, incentive and technical support programs for customers in different sub-sectors, and supporting initiatives such as public awareness, technical innovation, and various other enabling activities. Expenditures averaged about $125 million per year over this period. This was significantly below levels planned in 2008[4] primarily due to the recent economic downturn and a slower uptake of large projects due to difficult operating and financial circumstances among some customers. Expenditures on industrial sector programs were 60% of amounts originally planned. Total DSM expenditures are expected to pick up by some 40% during F2012 and F2013, however. It is anticipated that industrial incentives can reach the $60-70 million dollar per year level, based in part on project commitments already made but previously delayed.

BC Hydro's operating expenditures to plan, develop, administer and supervise its DSM activities was $2.5 million during F2009, as the new Power Smart 3 program began to ramp up, but then fell to $1.3 million in F2010 and just under $800,000 in F2011. Labor costs, including consulting services, comprised an average of about 80% of operating expenditures.[5]

Target Setting BC Hydro and the Government of British Columbia set BC Hydro's electricity efficiency acquisition targets and report on actual savings achieved in "cumulative GWh per year" for the target year. Savings are cumulative over all the years in the relevant program cycle. The concept can also be described as cumulative electricity savings capacity delivered and still effective by the target year. For example, in F2008, the first year of the Power Smart 3 Program, the cumulative GWh/year savings target was the same as the annual GWh savings target — 295 GWh for the year. In F2009, the second year of the Program, the cumulative GWh/year savings target was 761 GWh/year. To meet this target, BC Hydro needed to add incremental savings capacity of 466 GWh or more during F2009, to add to amounts of the 295 GWh savings capacity created the previous year that still persisted, for a total savings capacity of 761 GWh. It is important to note that BC Hydro needs to calculate the "persistence" of savings capacity created in previous years, based on the estimated lifetime of the savings capacity created through the various main measures. If the lifetime of capacity has expired, it must be subtracted from cumulative savings, as that capacity that had been created no longer persists. Thus cumulative energy savings (capacity) will be increasingly smaller than the sum of incremental energy savings (capacity) achieved each year as programs continue.

The cumulative electricity savings reported each year provides a convenient snapshot of the total savings capacity delivered

TABLE 1-1: BC Hydro DSM Expenditures, Fiscal Years 2009-11 (C$ million)

Category	F2009	F2010	F2011
Rate Structure Administration	6.6	6.0	7.2
Power Smart Programs:			
Residential	21.5	29.9	27.7
Commercial	31.9	45.0	47.7
Industrial	14.7	25.1	23.3
Total Programs	68.1	100.0	98.7
Supporting Initiatives	30.1	28.8	28.5
Total	**104.8**	**134.8**	**134.4**

SOURCE: BC Hydro's Annual DSM Reports, as attached to the F2012-4 RRA Appendix II

4 Actual expenditures were 77% of planned expenditures, using annual DSM expenditure reports criteria, and 87% of planned expenditures using the somewhat narrower definitions of expenditures used in BC Hydro's DSM Expenditure Schedules.

5 F2009-11 Annual DSM Expenditure Reports, as attached to the F2012-4 RRA Appendix II

by BC Hydro that remains effective in reducing system demand. In its annual reports to BCUC, however, BC Hydro also reports incremental electricity savings capacity delivered, which is more convenient for assessing annual performance, especially relative to annual expenditures.

BC Hydro's electricity efficiency acquisition targets are set within the long-term resource acquisition plan/IRP studies mentioned earlier, which in turn are framed by the Government's energy policy directives. During F2008-2012, annual targets are set based on the 2008 LTAP. The 2008 LTAP was a comprehensive study, reviewing long-term system demand and analyzing all available resources to meet that demand. Determination of the DSM component of resource acquisition began with an assessment of the total economic potential for improving electricity efficiency, followed by an assessment of what could be practically achieved during the time frame and the delivery risks posed by different types of measures.

TABLE 1-2: BC Hydro's Planned Electricity Efficiency Acquisition, F2008-2021

(Cumulative GWh per year new savings capacity by the year 2020)

	Codes & Standards	Rate Structures	Programs	Total
Residential	2,760	980	1,070	4,810
Commercial	500	390	1,480	2,370
Industrial	110	730	2,590	3,430
Total	**3,370**	**2,090**	**5,150**	**10,610**

SOURCE: BC Hydro *2008 Long-Term Acquisition Plan* (LTAP), Annex

The final 2008 LTAP plan targets for 2020 are shown in Table 1 2. The plan aims for savings capacity totaling over 10 TWh to be put in place by 2020, beginning in 2008. This accounts for well over the minimum of 50% of total incremental supply and demand resource acquisition called for in the Government's 2007 BC Energy Plan. The totals and matrix of sectors and initiative categories provides the basic framework for setting and reporting on annual plans. Savings from sector specific incentives and direct support programs comprise almost half of the total expected savings. Among the sectors, industry accounts for about a third of the targeted savings, and direct programs are expected to produce some 75% of total savings in the case of industry.

In early 2012 BC Hydro circulated a draft of its new 2012 Integrated Resource Plan (IRP), which responds to new policies in the 2010 Clean Energy Act, as well as both realities from the recent economic downturn and some important new prospects for economic growth. Although BC Hydro's DSM program has historically focus primarily on energy savings, the new DSM part of the IRP also includes specific targets and measures for peak load reduction for the first time. The DSM options analysis includes five fully-costed options and weighs them against each other. The analysis included new calculations of "net" DSM costs; other non-DSM benefits are subtracted from the total cost of delivery, including deemed natural gas savings benefits spilling over from electricity savings initiatives (such strategic energy management initiatives, for example), and deemed non-energy savings benefits such as productivity improvements. In the DSM option recommended for implementation, total "gross" utility costs for delivery of the targeted electricity savings averages about 4 cents/kWh, but once co-benefits are subtracted out, "net" costs amount to only about 1 cent/kWh. This compares with new electricity supply benchmarked at an average of 12.9 cents/kWh.[6]

Total Utility Cost (Gross)	$0.04/kWh
Co-Benefits	$0.03/kWh
Net Costs	$0.01/kWh
Benchmark Price	$0.129/kWh

The draft 2012 IRP, which remains to be fully discussed and approved, recommends an increase in the F2013-2021 DSM goal from the current goal of 8800 cumulative GWh/year by 2020

6 This analysis is summarized on page 6-31 of Chapter 6 of the draft 2012 IRP, available on BC Hydro's website.

to 9800 cumulative GWh/year by 2020, with a significant increase in expenditures accordingly.

Program Offerings and Implementation BC Hydro's DSM initiatives include support for implementation of energy efficiency codes and standards, implementation of energy conservation electricity rates, direct incentive and support programs for consumers, and broad initiatives in support of these.

- Promulgation of *energy efficiency codes and standards* is the responsibility of the government; BC Hydro's efforts in this area are focused on support and relevant consumer interaction.
- BC Hydro's energy conservation rate system is particularly novel. Two blocks or tiers of electricity rates are applied to key consumer categories, including a first block where prices are lower than provided in the original tariff, and a second block where prices are substantially higher. Baselines for maximum consumption of lower-priced electricity are set, and all incremental consumption above that baseline is then charged at the higher, second block rate.[7] This provides a strong incentive for minimizing incremental consumption.
- *Power Smart Programs* are specific incentive and support programs for residential, commercial or industrial programs. They include various energy assessment activities, energy management assistance, and specific cash incentives for different types of projects, including custom-designed projects. Details of current program offerings, including incentive amounts, are provided on BC Hydro's website.
- Finally, BC Hydro undertakes a series of *Supporting Initiatives* that serve all types of customers, including activities on public awareness and education, community engagement, technology innovation and information technology.[8]

7 For example, before the energy conservation rate was introduced for residential customers in April 2009, all consumption was being priced at 6.55 cents/kWh. The new rate included a price of 5.91 cents/kWh for "Step 1" block consumption of up to 1350 KWh per 2-month billing cycle, and a price of 8.27 cents/kWh for "Step 2" consumption over 1,350 kWh per billing cycle. See BC Hydro's *Electricity Conservation Report* (2009), available on its website.

8 Codes and standards support is also expensed under Supporting Initiatives.

With responsibilities to implement all of these initiatives within the Power Smart Group, BC Hydro aims for integration and synergy among the different activities to provide the best overall savings results. For example, industrial Power Smart programs are designed to help enable consumers to achieve good outcomes in their management of energy conservation rate blocks. One such enabling effort is assistance in energy management. Or, in some cases, project incentives for customized industrial energy efficiency projects are designed to encourage customers to dig deeper into potential longer-term savings than they might have if only managing consumption with a view towards saving money from the energy conservation rate structure. As a result of such useful integration, however, sophisticated definition of the energy savings causality of specific programs is difficult.

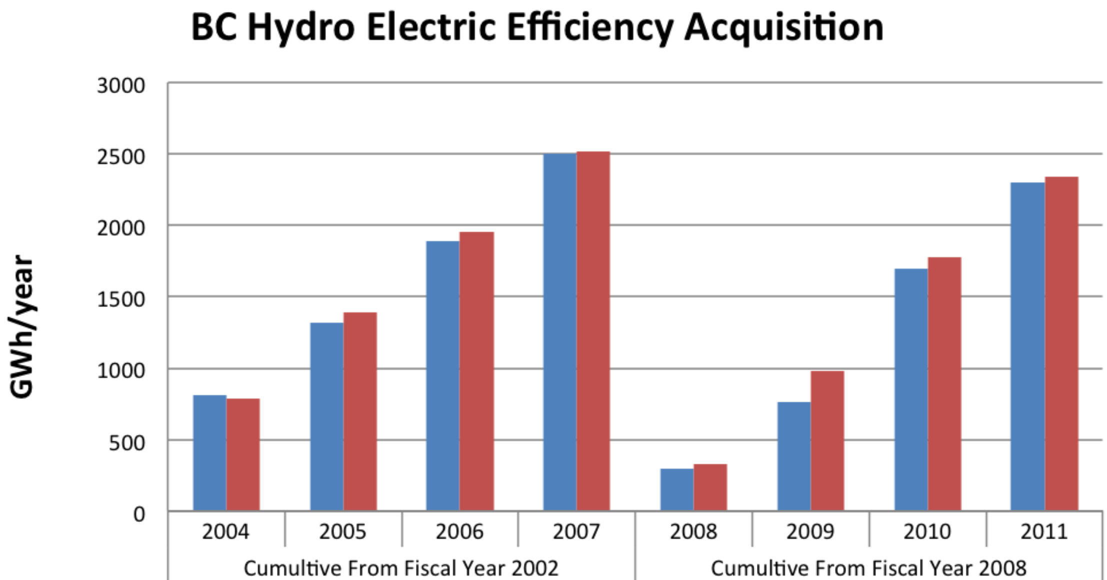
INDUSTRIAL ENERGY CONSERVATION RATES

BC Hydro's energy conservation rate structure efforts began in April 2006 with the introduction of a two-tiered rate for large industrial customers served at transmission voltage levels, called the Transmission Service Rate (TSR). The Tier 1 lower rate was applied to 90% of each large customer's consumption benchmark, while the Tier 2 higher rates were applied to the remaining 10% and any incremental consumption. The consumption benchmark was set at the consumer 2005 electricity consumption levels. During F2007-8, Tier 1 prices were set at about 2.5 cents/kWh, while Tier 2 price levels were more than double that at 5.4 cents/kWh. The Tier levels were designed to maintain revenue-neutral weighted average prices. In F2009 the differential was widened further to 2.3 cents/kWh for Tier 1 and 7.4 cents/KWh for Tier 2. Goals of the program included encouragement of self-generation where cost-competitive with Tier 2 rates as well as industrial plant electricity efficiency improvements.[9]

Ensuing debates with customers have centered especially on the setting of baseline levels, as this level has significant financial repercussions. Some customers noted various special circumstances relating to their 2005 consumption, arguing that it was atypically low and deserved adjustment. Others complained that the new rate structure was flatly "anti-development." For various reasons, including emerging policies to reduce baselines in cases where financial incentives had been used to implement energy conservation projects, procedures have been developed for adop-

9 More information is provided in BC Hydro's *Transmission Service Rate Three-year Summary Report* (September 2009).

FIGURE 1-4: BC Hydro Electricity Targets and Savings



	2004	2005	2006	2007	2008	2009	2010	2011
	Cumultive From Fiscal Year 2002				Cumultive From Fiscal Year 2008			
Savings Target	810	1315	1886	2500	295	761	1700	2300
Actual Savings	784	1388	1957	2518	326	983	1778	2338

NOTE: For 2011, BC Hydro's 2011 Annual Report shows a target of 2300 GWh, whereas the 2012-4 RRA Appendix II shows an original 2008 LTAP target of 2639 GWh and revised target of 2349 GWh. For 2011 actuals, the F2012-4 RRA Appendix II figure is used.

SOURCE: BC Hydro's *Electricity Conservation Report* (2009) and BC Hydro 2010 and 2011 Annual Reports

tion of rolling baselines incorporating periodic adjustments.[10]

On the whole, the industrial energy conservation rate program has been judged a success by the government and utility. Energy conservation rates became effective for residential customers in October 2008, for large general service customers (commercial and small industry) in January 2011, and the first group of medium general service customers in 2012.[11]

INDUSTRIAL PROGRAMS

BC Hydro developed a series of support and cash incentive programs for industrial customers during Power Smart 2 (F2003-7). With the introduction of the TSR, however, incentives programs were discontinued for large customers and industrial program activities for them were geared primarily to "enabling activities," especially support for strategic energy management. Industrial incentives programs focused on non-TSR customers. In more recent years, however, some specific incentives have been reintroduced for TSR customers as well.[12]

A central part of the industrial program is the Power Smart Partners Program, which is available to commercial, government and institutional customers as well. In the industry sector, the Partners Program includes different program offerings for transmission-voltage level customers and distribution-voltage level customers. Key components of the Program are energy management assessments for industrial sites, development of strategic energy management plans, funding and support for placement of energy managers by the enterprises, energy study funding,

10 Personal communication with Power Smart staff.
11 2010 and 2011 BC Hydro Annual Reports.
12 BC Hydro's websites describes current incentive offerings.

project implementation incentives, technology demonstration project funding, workplace conservation awareness, training and educational workshops and seminars, and public and peer recognition. Power Smart has been a leader in supporting adoption of strategic energy management in industries, and has supported placement of over 40 enterprise energy managers.[13]

Additional industrial programs include over a major program to identification and adoption of efficient design options for new plants (either new facilities or expansion of current facilities), a special program for mechanical pulping in the pulp and paper industry, and a number of specialized project incentive programs for either customized projects or standard projects, such as adoption of more efficient air compression systems. Financial incentives are not provided without a letter of credit, to help minimize incentive investment where financial conditions may jeopardize realization of savings.

Power Smart has about 10 account managers interacting with industrial customers on these programs on a daily basis. The remuneration of account managers depends in part on their performance in terms of delivery of electricity savings.

Monitoring, Reporting and Verifying Savings BC Hydro conducts its own monitoring and verification of electricity savings from its various program investments, as well as evaluation of the overall electricity savings impacts of it programs. The results of both its monitoring and verification activities and its program evaluations are summarized and reported to BCUC, and are one aspect of its discussion with BCUC on DSM programming, targeting and expenditures.

For specific Power Smart program investments, BC Hydro's monitoring and verification procedures include:

- Technical review, which includes reviews before or immediately after investment for industrial and commercial activities to ensure proper baseline and system boundary definition, suitable engineering calculations of savings, and documented and referenced assumptions in line with common industry standards and practice;
- Site inspection on a sample of projects to confirm project completion and functioning as approved; and
- Measure and verification on a sample of projects to quantify individual project savings through analysis of actual project operating and performance data. On-site measurement and data collection, utility billing data and computer modeling may be used. M&V results are used in project and contract management to ensure that BC Hydro receives the expected project benefits for its incentive payments.

Program evaluation includes studies and aimed at determining the effects of specific DSM programs, rate structures or other initiatives. BC Hydro's Power Smart staff includes staff specializing in evaluation. Studies are reviewed by external DSM evaluation advisors and approved by a cross-BC Hydro committee.[14]

Delivered Savings and Results During the last few years BC Hydro's overall electricity demand in the province fell substantially, mainly due to general economic difficulties, making it more difficult to generate additional savings. In 2011, BC Hydro's sales in the province were just 80% of sales levels in F2006. However, BC Hydro has been able to generate savings at close to target levels in spite of the difficult environment.

Figure 1-4 shows the actual delivery of electricity efficiency by BC Hydro during F2004-F2011 compared to targets set out with BCUC. As mentioned previously, the cumulative savings calculations were reset for Power Smart 3 from the calculations for Power Smart 2. BC Hydro met the agreed targets for the Power Smart 2 program. For Power Smart 3, there was strong performance during the first two years, and especially in F2009. With weakening in the economy, however, incremental savings slowed in 2010. In 2011, performance was somewhat disappointing, especially in the industry program. Although BC Hydro met the revised target described in its 2011 Annual Report, cumulative savings by the end of F2011 were only 89% of the original target for that year set forth in the 2008 LTAP. Within the industrial program, savings generated from TSR customers slowed in particular, with two plant shutdowns, reductions in self-generation, commissioning of new energy efficiency projects, and less-than hoped persistence of savings from previous years. Expectations for the immediate future, however, are

13 In 2012, Power Smart was supporting 60-75% of salary funding for 2 years for new energy managers, depending upon the level of enterprise program commitment, as well as funding for training, coaching, one-site energy management assessments, and other activities.

14 This section draws on the main report of Appendix II of the FY2012-4 RRA.

strong, as more projects are expected to close. Over the medium term, both BC Hydro and the Government expect savings generated through the DSM program to be the strongest yet.

With cumulative Power Smart 3 savings of 2.4 TWh in F2011, BC Hydro developed persistent electricity savings capacity over four years equal to about 4.6% of total electricity demand.

Table 1-3 shows BC Hydro's average levelized costs for delivery of the electricity efficiency savings during the same four years. These are gross costs from which co-benefits are not subtracted. The cost effectiveness of the program overall has been strong at 2 cents/kWh. The industrial program provided savings at 1.5 cents/kWh, including just 1 cent per kWh for TSR customers, where savings resulted from the energy conservation rate, enabling activities and certain incentives.

TABLE 1-3: Utility Costs for BC Hydro's Electricity Savings, F2008-F2011

Initiative	Levelized Cost (cents/kWh)
Rate Structures	0.8
Residential Programs	3.1
Commercial Programs	4.1
Industrial Sector (total):	1.5
Power Smart Partner-Transmission	1.0
Power Smart Partner-Distribution	4.0
New Plant Design	1.0
Total Programs	**2.6**
TOTAL DSM	**2.0**

SOURCE: BC Hydro, "Report on Demand-side Management Activities for Fiscal 2011 (Sept 21, 2011), p. 15, in F2012-4 RRA Appendix II.

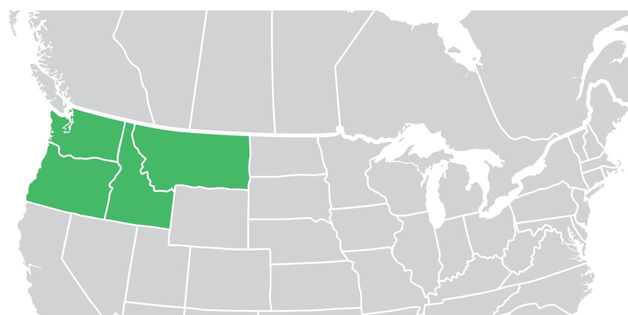
Institute for **Industrial Productivity**

Energy Efficiency Resource Acquisition Program Models in North America
Case Study: Northwest Programs

TYPE OF ENTITY	CLIENTS	SUPERVISING ENTITY
Government-owned wholesale electric utility State/Province: Washington, Oregon, Montana, Idaho Program Launch: 1980	Consumer-owned utilities	US federal government

The states of the northwestern corner of the contiguous U.S. have operated a coordinated system for acquiring electricity efficiency for over thirty years. The arrangement came about in part due to the existing relationships in place as a result of the federal government, through the Bonneville Power Administration, supplying much of the region's electricity needs with hydropower. This pre-existing arrangement enabled cross jurisdictional coordination unlike anywhere else in the country. In spite of, or perhaps because of its complexity, this regional initiative can be instructive to others interested in collaborative, multi-jurisdictional, energy efficiency acquisition efforts. Aspects of particular significance include:

- Experience gained from a long-term and steady focus on efficiency acquisition as the priority for meeting new electricity demand;
- Deployment of sophisticated energy efficiency acquisition planning and targeting imbedded in overall power system planning in the region,
- Implementation of different types of electric utility efficiency acquisition programs catering to differences among the states and utilities in the region, including operation of efficiency acquisition "wholesaling" programs for smaller utilities, and
- Joint and stable engagement of a third party expert entity to develop and try out innovative market-transformation initiatives for the benefit of the various participants in the coordinated effort.



In addition, as discussed in the final section of the case study, the coordinated electricity efficiency acquisition program operated in the Pacific Northwest has been one of the most successful in the United States.

THE NORTHWEST ELECTRIC POWER SYSTEM AND ECONOMIC SETTING

The Pacific Northwest region includes the states of Oregon and Washington; the parts of Idaho and Montana west of the Continental Divide; and those portions of Nevada, Utah and Wyoming that are within the Columbia River Basin.[1] The region consumed about 19,000 average MW,[2] or 166 TWh of electricity in 2007.

1 As defined in the Northwest Power Act. The region also includes any contiguous areas not more than 75 miles from the listed areas that are part of the service area of a rural electric cooperative served by BPA on the effective date of the Act and whose distribution system serves both within and outside of the region.

2 Northwest Power and Conservation Council (NWPCC), *Sixth Northwest Conservation and Electric Power Plan* (February 2010), p. 3-1. One average

The states of Washington and Oregon accounted for some 80% of the regional power system's electricity consumption in 2010.[3]

The Federal Columbia River Power System (FCRPS), consisting primarily of a series of hydroelectric power plants built many years ago in the Columbia River Basin, provides almost one-half of the electric power consumed in the Pacific Northwest power system. The FCRPS is operated by the Bonneville Power Administration (BPA) on behalf of the U.S. Federal Government. Hydropower accounts for 90% of the power generated by the FCRPS. The annual contribution of the FCRPS to the overall system varies due to changes in water flow.[4]

The hydropower of the Columbia River Basin provided development benefits for the region for decades, but proved insufficient. By the 1970s, the hydropower potential had largely been developed and new sources of power were needed to meet electricity demand. Initial investments in nuclear power proved costly. At the same time, many decried the greatly inadequate management of the impact of the dams on the Columbia River Basin's previously abundant fish and wildlife resources. In 1980 the Federal Government passed landmark legislation aimed at addressing the fish and wildlife management and new electricity acquisition needs of the four states primarily involved. Backed up with new institutional arrangements and new accountabilities for BPA (see below), the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (the "1980 Power Act"), among many things, required that first priority among all potential new power resources be given to acquiring cost-effective electricity efficiency resources. This codification of energy efficiency as a real electricity resource, like hydropower or any other generation resource, was a novel and largely untried concept at the time.[5]

From the beginning, a key driver for acquisition of efficiency

MW is defined as 8760 MWh.

3 Estimate, based on U.S. Energy Information Agency state electricity consumption 2010 data

4 Total power generation of the federal system averaged 79 TWh during FY2008-2011, with the highest generation being 93 TWh in FY2011 and the lowest being 70 TWh in FY 2010. See "BPA Facts," various years, available on the BPA website.

5 For a well-presented history of the energy efficiency story in the Pacific Northwest see, NWPCC, *Energy Efficiency — 30 years of Smart Energy Choices* (Council Document 2010-03).

resources has been the low cost of efficiency resources compared to the alternatives of new sources of electricity supply. The region has long been accustomed to relatively low electricity prices. In fiscal year 2011[6] BPA was selling Columbia River Basin legacy hydropower at its costs of about 3 cents/kWh wholesale, excluding transmission and distribution.[7] Averaging in all current sources of power, average retail prices then amount to some 6-8 cents/kWh for residential and commercial customers and some 5 cents/kWh for industrial customers. Average retail prices in the region in 2007 were only about two-thirds of the U.S. average.[8] However, the cost for additional supply of electricity from new sources is substantially higher than current average prices. The Sixth Northwest Conservation and Power Plan, issued in 2010, estimates the long-run averaged levelized cost of new electricity from natural gas-fired combined-cycle power plants to be about 9.2 cents/kWh, and the cost of Columbia Basin wind power to be about 10.4 cents/kWh. Compared to this, the average levelized cost of securing the Plan's aggressive portfolio of energy efficiency resources over 2010-2029 is 3.6 cents/kWh, including consumer costs.[9] Acquisition of efficiency resources to meet additional electricity demand is far cheaper than developing new generation, and can help moderate increases in consumer prices.

The wide differences between retail prices and marginal costs in the Pacific Northwest, especially for consumers who enjoy high allocations of low-cost legacy hydropower, has meant that specific efficiency acquisition initiatives are required to realize the potential marginal cost advantages of energy efficiency. Marginal cost savings are very compelling for meeting new demand from the system perspective for consumers as a whole. However, the benefits of investing individually in energy efficiency may not be very compelling for individual consumers who enjoy low electricity prices and do not individually see high marginal costs for new consumption. Energy efficiency acquisition programs can help better align individual consumer incentives with the overall system perspective for the benefit of consumers overall.

6 The U.S. Federal Government fiscal year begins on October 1 and ends September 30. Hence FY2011 runs from October 2010 through September 2011.

7 BPA Facts 2011.

8 See NWPCC, *Sixth Power Plan* (2010), p. 2-16.

9 NWPCC, *Sixth Power Plan* (2010), p 10-6. Supply and efficiency costs estimates are in comparable terms.

Another benefit from efficiency resource acquisition learned through experience in the Northwest is the important role that lining up energy efficiency resources can play as a hedge against energy price and/or sudden supply shortage risks. Unit energy efficiency resource costs are relatively stable compared to energy prices. Acquisition also involves different arrangements and time horizon considerations compared to lining up new generation sources. Following the experience of energy price ups and downs in the 1990s and early 2000s and the California electricity crisis, power system planning is the Northwest has included special attention to analyzing the best mixes of electricity supply and energy efficiency to deal with potential price and supply shortfall risks. Portfolio and scenario analysis looks not only at the average or "expected" cost of different strategies, but also at the degree of risk — essentially the costs that might be incurred under the most expensive scenarios.[10]

Energy efficiency resources met 48% of the electricity demand increase in the Northwest power system from 1980 to 2008. The Sixth Power Plan advises that energy efficiency resources can and should meet 85% of the electricity demand increase from 2009 to 2030. Electricity demand in the system is expected to increase by some 7000 average MW (10.1 TWh), or an average of about 1.4% per year without energy efficiency gains. Derivation and analysis of cost curves for a variety of measures and in all sectors concludes that nearly 6000 average MW (8.6 TWh) are available from measures costing under 10 cents/kWh (in 2006 constant prices), and over 4000 average MW (5.8 TWh) are available at a cost of less than 4 cents/kWh. The available cost-effective energy efficiency includes efficiency gained through application of new or upgraded codes and standards and through market transformation measures, as well as through utility efficiency acquisition programs. The Plan concludes that "if developed aggressively, this conservation, combined with the region's past successful development of energy efficiency could constitute a resource comparable in size to the Northwest federal hydroelectric system."[11]

It is important to note that the identified cost-effective potential for energy efficiency has increased substantially from the potential identified in the Plan prepared almost six years earlier, even though large amounts of the previously identified energy efficiency already has been acquired and hence is not included in the recent estimates. This is due to advancing technology, reduced cost, and inclusion of estimates in a few new areas. The cost-effectiveness of the analyzed technologies also has increased significantly because avoided costs of new power supply have doubled and carbon-cost risks are higher.

Estimated potential for cost-effective energy efficiency in the industrial sector, in particular, has increased, more than doubling from about 350 average MW in the 20-year Fifth Plan period to 800 average MW (1.2 TWh) in the 20-year Sixth Plan. Industrial savings are low cost. Nearly all of the savings have levelized costs of less than 5 cents/kWh, and almost half of the savings cost 2 cents/kWh or less. The identified savings measures include an array of efficient equipment, improved operations and maintenance, demand reduction, system sizing, system optimization and improvement business management practices.[12]

THE LEGAL AND INSTITUTIONAL SETTING

The 1980 Power Act enacted by the U.S. Federal Government included the following key provisions that have shaped the institutional structure of the Pacific Northwest's electricity efficiency acquisition system:

1. The states of Idaho, Montana, Oregon and Washington were authorized to form the Northwest Power and Conservation Council. The Council was directed to draw up 20-year plan for meeting the electrical needs of the region at lowest possible cost. The plan must give highest priority to cost-effective conservation to meet future electricity demand. The plan is revised periodically.
2. The plans adopted by the Council are designated as the basis for BPA's actions in meeting the electric power loads of its customers. This has a major effect on the region as a whole because BPA provides close to half of the region's electricity. The U.S. Congress exercises budget review of all proposed BPA expenditures. If BPA decides to acquire resources not consistent with the Council's plan, specific Congressional approval is required.
3. Preference for supply of the low-cost electricity from the federal power system enjoyed by consumer-owned utilities is protected and enhanced in the Act. BPA was given the responsibility of meeting the full future requirement of

10 See NWPCC, "Energy Efficiency — 30 years of Smart Energy Choices," and NWPCC, *Sixth Power Plan* (2010), Chapters 9 and 10.
11 NWPCC, *Sixth Power Plan* (2010), Executive Summary.
12 NWPCC, *Sixth Power Plan* (2010), pp. 4-11 to 4-12.

TABLE 2-1: Role of Different Types of Electric Supply Utilities in Washington and Oregon, 2010

		Consumer-Owned Utilities				
	Investor-Owned Utilities	PUDs *	Cooperatives	Total	Other	Total Electric Utilities**
Electric Utilities:						
Washington	3	40	18	58	5	66
Oregon	3	18	19	37	4	44
2010 Electric Customers ('000):						
Washington	1,440	1,603	164	1,767	***	3,207
	44.9%	50.0%	5.1%	55.1%		100%
Oregon	1,396	294	200	494	***	1,890
	73.9%	15.6%	10.6%	26.2%		100%
Two State Total	**2,836**	**1,897**	**364**	**2,261**	*******	**5,097**
	55.6%	37.2%	7.1%	44.3%		100%
2010 Electricity Sales (TWh):						
Washington	30.4	47.0	4.0	51.0	9.0	90.4
	33.6%	52.0%	4.4%	56.4%	10.0%	100%
Oregon	31.0	8.9	4.6	13.5	1.5	46.0
	67.4%	19.3%	10.0%	29.3%	3.3%	100%
Two State Total	**61.4**	**55.9**	**8.6**	**64.5**	**10.5**	**136.4**
	45.0%	41.0%	6.3%	47.3%	7.7%	100%

SOURCE: Authors, based on U.S. Energy Information Agency data.
*Public utility districts and municipal utilities.
**Excludes delivery providers
***Only a few customers are served by other utilities.

preference customers, predominantly consumer-owned utilities, if they requested, which BPA was previously not authorized to do.[13]

4. The Act provides for incentives financed from BPA's revenues to be given to BPA's utility customers for them to implement energy conservation actions and develop renewable energy.

The Northwest Power and Conservation Council Following authorization to form the Council in the 1980 Power Act, the Council was approved by the legislatures of all four participating states. Each state governor appoints two members to the Council. The Council's core costs are funded by BPA as part of BPA's budget submission for federal government approval. In addition to its power system planning function, the Council is responsible for developing fish and wildlife management programs and involving the public in key decision-making processes. The Council produced its first 20-year power plan in 1983, and its sixth in 2010.

The electricity efficiency resource analysis and recommendations of the Council's 20-year plans are both comprehensive and detailed. They include assessment of potential savings through implementation of codes and standards (e.g., for appliances, new building construction, etc.) and through market transformation initiatives, in addition to savings through utility acquisition. Although only BPA is required to pursue resource acquisition consistent with the Council's plan (unless it requests a special Congressional approval), the plan also has become a benchmarked against which the resource acquisition plans of other utilities are measured.[14] A state public utility commission, for example, may ask utilities to explain variations with Council methodologies or resource assessments when they submit integrated resource plans for commission approval.

Bonneville Power Administration (BPA) BPA is a federal agency first created in 1937 to deliver and sell electric power from Bonneville Dam. It subsequently was also given responsibility to sell and deliver power from more federal dams in the Columbia Basin. BPA is now a fairly large agency with an annual operating budget of $2.9 billion in FY2011.

From its inception, BPA was encouraged to give preference and priority to publicly owned utilities and cooperatives in its sale of federal hydropower.[15] In the 1980 Power Act its responsibilities to provide power to these consumer-owned utilities were increased to include arrangement of power resources to meet all load demands requested by these utilities. Since then BPA has built energy efficiency acquisition into its bulk power sales relationship with its consumer-owned utility customers. BPA delivers on its responsibilities for efficiency resource acquisition defined in the overall power system plan through its utility customers (and a few large direct customers), providing technical support and financial incentives in exchange for delivery of savings through those utilities. This system is described in a section further below.

Electricity Supply Utilities As in most parts of the United States, almost all consumers in the Pacific Northwest are served by electric utilities that fall within two categories: investor-owned utilities that are privately owned and operated for profit, and consumer-owned utilities. Consumer-owned utilities, then, also include several types. One type is "public power utilities," often also called "municipal utilities," "public utility districts" or "public utility departments". These utilities are owned by local governments to provide not-for-profit electricity service.[16] The other main type is "electric cooperatives". The cooperatives are private, not-for-profit businesses governed by their consumers (known as "consumer-members"). Many electric cooperatives were created during the national rural electrification drive of the 1930s.[17]

Governance and regulation of the utilities, and hence, oversight over resource acquisition, is different for the different types of utilities. The investor owned utilities are governed by private investors. State public utility commissions (PUC's) regulate their

13 In addition, residential and farm customers of investor-owned utilities received rate relief. The utilities sell BPA an amount of electricity equal to their residential and farm loads at their cost. In return, BPA sell to them enough energy from the federal system to cover these residential and farm loads. The rate advantages must be passed on directly to the customers. Provisions are also made for BPA sales to its few direct industrial customers.

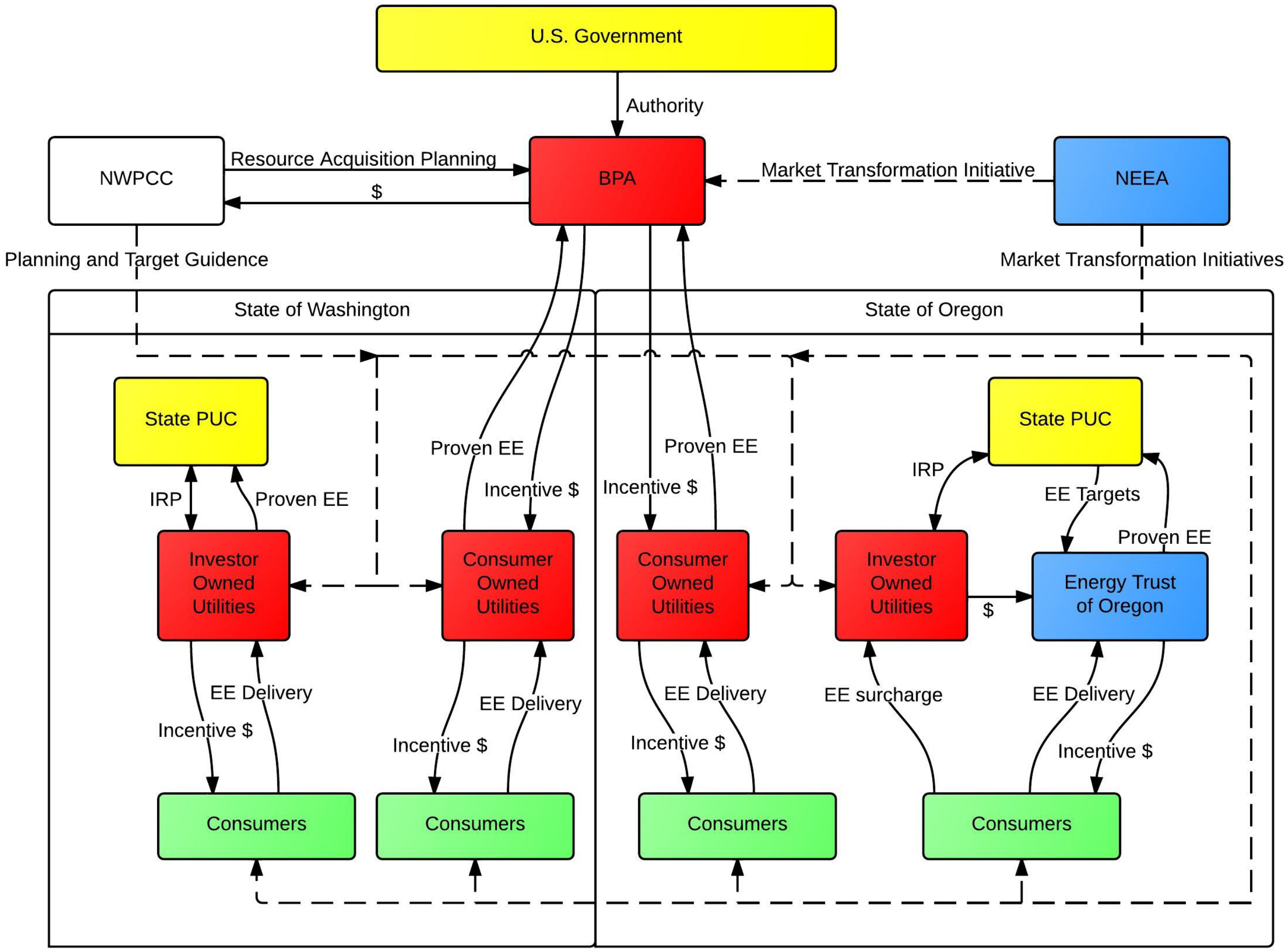
14 See NWPCC, *Energy Efficiency – 30 years of Smart Energy Choices*, p. 4

15 This preference was written into the Bonneville Project Act. A short history of public power utilities in the Pacific Northwest is available on the Public Power Council's website.

16 For more background information on public power utilities see the American Public Power Association's website.

17 For more background information on electric cooperatives see the National Rural Electric Cooperative Association's (NRECA) website.

FIGURE 2-1 The Coordinated System for Electricity efficiency Acquisition in the U.S. Pacific Northwest



Note: Among the three interstate agencies, only BPA reports to the U.S. Government. The states of Idaho and Montana are also part of the system, although only Washington and Oregon are pictured here. NEEA's costs are paid by BPA, ETO and distribution utilities, excepting special projects.

activities in their states to ensure that the public's interests are adhered to. PUC's usually have regulatory authority only over investor owned utilities. Public power utilities are governed and operated under arrangements set by the community that owns them (as long as relevant state and federal laws are adhered to). Most are governed by a city council, but some are overseen by an independently elected or appointed board. Electric cooperatives are accountable to their consumer-members, but must adhere to federal regulations to retain their cooperative status.[18]

In Washington and Oregon consumers receive their power from one of about 110 power distribution companies. These include five investor-owned utilities, who serviced 56% of the customers in these two states, accounting for 45% of electricity use in 2010. Most of the remaining 55% of electricity use in the two states is supplied by consumer-owned public utilities districts or municipal utilities, or electricity cooperatives (see Table 2 1). These range from large (Seattle City Light serves over 330,000 customers) to very small. The role of the consumer-owned utili-

18 For example, two federal requirements are democratic governance and operation at cost. See the NRECA website.

ties is particularly high in Washington State, where they sell over half of the electricity used.

Electricity efficiency acquisition requirements, support and reporting for the different types of utilities in Washington and Oregon are as follows (see also Figure 2 1):

1. Consumer-owned utilities in both states develop their own goals and plans for supporting energy efficiency among their customers. They can avail themselves of technical and financial support for their efforts from BPA, the cost of which is in effect rolled into the pricing that these utilities pay for bulk power from BPA whether or not they avail themselves of the services (see also below). In Washington State, the largest consumer-owned utilities also must submit energy efficiency acquisition targets and plans in integrated resource plans (IRPs) to the state government for review and approval, to show compliance with the state's 2006 Energy Independence Act.
2. Investor-owned utilities in Washington State include energy efficiency acquisition targets, implementation plans and costing in their IRPs submitted to the Washington Utilities and Transportation Commission (the state's PUC) for approval. The IRPs must conform to requirements in the state's 2006 Act.
3. Although the two main investor-owned electric utilities in Oregon also submit IRPs to the state PUC for approval, the ratepayer funds they collect for efficiency acquisition are passed to the Energy Trust of Oregon, who undertakes the efficiency acquisition according to targets and budgeting directed by the PUC (see Case Study 3).

The Northwest Energy Efficiency Alliance (NEEA) NEEA is a regional nonprofit institution dedicated solely to promoting energy efficiency. Formed in 1996 following a series of meetings among the key players convened by the Council, NEEA was tasked to undertake energy efficiency market transformation initiatives throughout the region in support of both the utility efficiency acquisition programs and the energy efficiency agenda overall. Described further below, NEEA's market transformation initiatives involve identifying promising technologies and developing and implementing programs that allow them to be effectively picked up in the marketplace sustainably. In addition, NEEA also undertakes various other tasks that the individual players operating within their separate territories cannot undertake themselves easily, in effect helping to provide additional coherence to the system.

NEEA's Board of Directors includes representatives from Northwest utilities, public interest groups, energy service professionals and industry associations. Its budget, totaling about $36 million in 2011, is paid for primarily from contributions from BPA, the Energy Trust of Oregon (ETO) and the region's investor-owned and consumer-owned utilities. About three-quarters of its expenses are for direct project costs. NEEA rigorously tracks the energy savings resulting from its various initiatives, which include both savings from acquisition programs of the utilities or ETO that build directly from NEEA's innovations, as well as savings directly from market penetration.[19]

Figure 2-1 shows how the three interstate entities — the Council, BPA and NEEA — interact with agencies, utilities and customers in the states of Washington and Oregon to acquire electricity efficiency. Although many players are involved, the focus on obtaining results among each of the key players is exceptional — with efficiency acquisition now the dominant resource for power system development, firm and reliable results must be delivered or the power system cannot meet load.

THE BPA CONSUMER-OWNED UTILITY ENERGY EFFICIENCY ACQUISITION SYSTEM

BPA has been in the business of acquiring energy efficiency to meet targets defined by the Council for about 30 years. Although it also supports broad market transformation and other "non-programmatic" energy efficiency initiatives, its main method of efficiency acquisition is through a variety of program offerings delivered and marketed by the roughly 135 consumer-owned utilities that BPA sells bulk power to. BPA provides program guidance, necessary tools, technical support and substantial financial support to its customer utilities to enable them to successfully acquire energy efficiency resources from their end-use customers. BPA's costs to provide the services and financial incentives for efficiency acquisition programs are rolled into the bulk electricity rates it charges the utilities. In exchange for utilizing BPA's services and funds, the utilities must provide documentation of savings tracked and verified according to BPA's regulations. The consumer-owned utilities are free to de-

19 NEEA, *2011 Annual Report*.

cide whether or not to avail themselves of BPA energy efficiency services and financial incentives. However, they have effectively paid for them in their power rates whether they use them or not.

BPA's customer utilities may implement programs independently, add their own incentives or services to BPA's offerings, and/or use third-party contractors to manage and administer programs. A group of representatives from a sample of BPA customer utilities, called the Utility Sounding Board, provides input on energy efficiency program concepts and strategies from the perspective of their diverse needs.

BPA's Current Efficiency Acquisition System Consistently over the years the relationship between BPA and its customer utilities has included (i) preference sale by BPA of low-cost FCRPS power to consumer-owned utilities; (ii) a fundamental responsibility for BPA to serve the loads of qualifying consumer-owned utilities should they choose to place that load with BPA; and (iii) a need for BPA to ensure its share of acquisition of energy efficiency (and renewable resources) identified in the Council's power plans. However the way that BPA carries out its responsibilities has changed in recent years.

Following proposals from among its customer utilities and several years of discussion, BPA adopted a new "Regional Dialogue Policy" in July 2007. Under this policy, BPA signed new 20-year contracts with all of its consumer-owned utility customers in 2008. These included a new tiered rate structure. FCRPS power is charged at BPA's lowest Tier 1 rate. Each contract defines a "High-Water Mark" (a type of quota) that defines the maximum amount of a customer utility's load that can be served with FCRPS power at the Tier 1 rate. To meet additional load, utilities are free to purchase additional power from BPA at its significantly higher Tier 2 rate, reflecting BPA's marginal supply costs, or they can purchase from other sources of their choosing, or a mix of these two.

Under this system BPA's utility customers receive clear signals as to the higher cost of marginal supply compared to the low costs of legacy hydropower. In addition, some utilities now avail themselves of opportunities to arrange much of their non-Tier 1 priced power themselves. Others, with limited capacity to secure the best arrangements, continue to rely on BPA to provide their additional power needs.

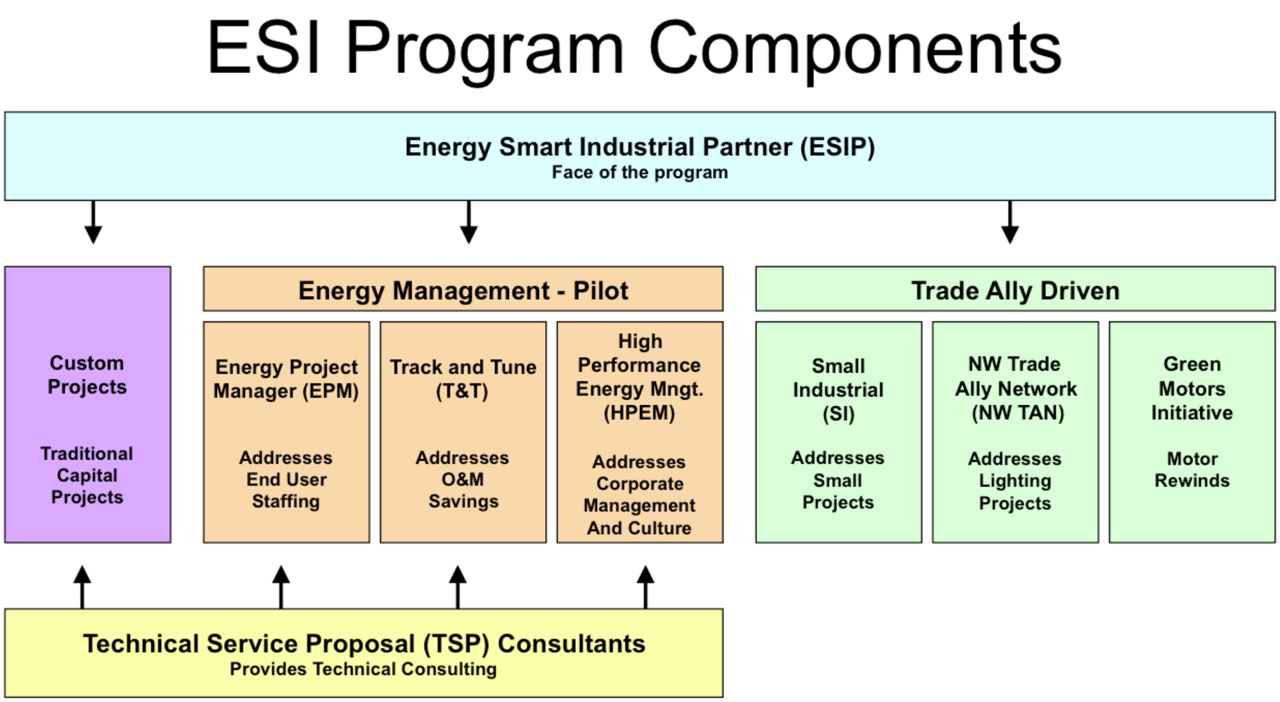
Utilities facing strong load growth are now likely to have yet higher interest in acquiring low-cost energy efficiency resources, as a way to "stretch out" the use of their low-cost Tier 1 power, to avoid high marginal cost supply resources as much as possible, and to keep retail prices lower than they would otherwise be. However (as before), for distribution utilities facing no load growth, and perhaps even declining load, energy efficiency remains financially unattractive, and may result in needs to increase retail prices. This is because the highest cost faced by such utilities — debt service for the high fixed-costs of distributions systems — remains unchanged, but must be paid for from even fewer kilowatt-hours of power sales.

Although BPA's responsibility for ensuring that energy conservation goals are met remained unchanged, BPA now expects these goals to be met to a more significant degree by programs initiated and funded by its consumer-owned utility customers, with BPA supplementing and facilitating these initiatives. BPA plans to acquire 75% of the energy efficiency target with its funds, and expects self-funding of 25%, on average, from the consumer-owned utilities. In addition, the mechanisms for providing funding have changed. Beginning in FY2010, BPA and its customer utilities began to sign Energy Conservation Agreements that laid out mutually agreed bilateral plans for efficiency acquisition and the necessary budgeting. Beginning October 1, 2011, a new mechanism for BPA's energy efficiency financial support to the utilities was introduced into the Agreements, include the following key changes:

- Each consumer-owned utility is allocated an Implementation Budget in its Energy Conservation Agreement, funded through BPA's new Energy Efficiency Incentive (EEI). The EEI was established within BPA's capital budget. Allocations to the utilities are set based on the amount of load served by BPA at BPA's low-cost Tier 1 rates. This provides for equity among the utilities, but may also lead to less flexibility for targeting funds to areas with the highest energy conservation demand or greatest low-cost energy savings opportunities.

- BPA now disburses Implementation Budget funds only after BPA's acceptance of the utilities' documentation that eligible energy savings have been achieved. Previously BPA provided energy efficiency financial support with an "Energy Conservation Rate Credit," in effect providing a discount

FIGURE 2-2 BPA's Energy Smart Industrial Program Components



SOURCE: Jennifer Eskil, BPA Energy Efficiency, "Industrial Energy Management Assistance" (December 9, 2011 presentation)

in the electricity rate charged the utilities commensurate with energy savings expected to be delivered. Typically that rate credit was provided in advance of achieving savings (although the credit was still ultimately contingent upon eventual satisfactory documentation of savings).

- BPA allows considerable flexibility in how its customer utilities manage the agreed Implementation Budget. For example, utilities can pool their funds together with other utilities and implement joint initiatives, or transfer funds among themselves.

BPA maintains an Energy Efficiency Implementation Manual, revised every six months, which provides details of all of its programs offerings for customer utilities, and procedures for approvals, payment, monitoring and verification, etc.[20] BPA insists on relatively rigorous measurement and verification (M&V) of savings claimed for acquisition, using agreed and published sets of M&V protocols.[21] The program offering amounts and details, and the M&V protocols, are developed by BPA staff and/or staff from the Regional Technical Forum, a technical group formed in 1999 and appointed by the Council.

BPA also operates "EE Central," a web-based planning, tracking and reporting system that customer utilities, BPA and some third parties use to monitor, document and report on savings, as well as exchange many types of program operational information.

20 The October 1, 2011 version was available on BPA's website at the time of this drafting.

21 A guide for practitioners on how to select of appropriate M&V BPA protocols for different projects can be found on BPA's website, as BPA, *Measurement and Verification (M&V) Protocol Selection Guide and Example M&V Plan* (May 2012). Much information about BPA's M&V Protocols and recommendations for their improvement also can be found in Research into Action, Inc. *Research Supporting an Update of BPA's Measurement and Verification Protocols*, (April 2, 2010), available on the Regional Technical Forum's website.

BPA's Current Energy Efficiency Acquisition Targets and Budgets BPA successfully acquired a total of about 310 aMW (about 2.7 TWh) of energy efficiency from 2005 to 2009 (equivalent to about double that acquired by the Oregon Energy Trust, which serves a smaller customer base). The Council's Sixth Power Plan calls for acquisition of a total of 1200 aMW of efficiency by all parties in the Region between 2010 and 2014. The share allocated to BPA and the consumer-owned utilities of that target amounts to 504 aMW (some 42%), which is substantially higher than during the previous five year period. BPA prepared a new five-year action plan to achieve the higher savings, and progress during 2010 and 2011 has been strong. With savings higher and unit costs lower than originally foreseen, budgets were subsequently modified downwards for the following three years, with the expectation that the Council target could still be reliably met but with somewhat less resources than originally expected.[22] Table 2-2 shows savings from recent years and future energy savings targets.

TABLE 2-2: Summary of BPA's Energy Savings Achievement and Targets, 2010-2014

Program Savings (aMW annual saving capacity)	2010 Actual Achieved	2011 Estimated Achieved	2010-2014 Total Target
BPA	57	105	289
Utility self-funded	23	2	68
Other	26	25	147
TOTAL	106	132	504

SOURCE: BPA 2012 Action Plan Update

As shown in Table 2-3, offerings of technical and financial support for specific programs implemented in collaboration with the consumer-owned utilities account for about 357 aMW of the total 2010-2014 acquisition target (over 70%). The remaining energy savings planned for includes market transformation results (with NEEA), electricity distribution system efficiency initiatives, initiatives with federal customers, and other types of non-programmatic activities.

TABLE 2-3: BPA and Northwest Consumer-Owned Utility Efficiency Acquisition Programs: Achievements, Targets, Budgets and Unit Costs, 2010-2014

ENERGY SAVINGS (average MW/yr of capacity)	2010 Actual Achieved	2011 Estimated Achieved	2010-2014 Total Target
Residential	31	39	143
Commercial	24	26	94
Industrial	14	30	67
Other	11	12	52
TOTAL	80	107	356

BUDGETS and COSTS	2010 Actual (million $)	2011 Estimated (million $)	2010-2014 Total Target (million $)	2010-2014 Capacity Cost (cents/kWh/yr)	2010-2014 levelized cost (cents/kWh)
Residential	47.8	76.4	314.6	21	5
Commercial	43.5	34.6	157	20	1.8
Industrial	30.4	35.1	115	24	2.9
Other	15.7	17.4	74.8		
TOTAL	137.4	163.5	661.4	21	3.7

SOURCE: BPA *2012 Action Plan Update*

OVERVIEW OF BPA'S ENERGY SMART INDUSTRIAL

22 Information in this section is drawn from BPA, *2012 Update to the 2010-2-14 Action Plan for Energy Efficiency*, (March 1, 2012)

FIGURE 2-3: NEEA's Approach to Market Transformation

- **Identify Market Barriers.** NEEA scans the horizon for emerging technologies and identifies barriers to market adoption of energy-efficient products, services and practices. NEEA evaluates high-potential technologies and examines impediments that may include product availability, quality or price; lack of financing; insufficient technical capability or tools; and low awareness of business benefits.
- **Assess Opportunities and Leverage Points.** NEEA identifies potential market partners that can influence supply and demand of market-ready, energy-efficient products, services or practices. NEEA also explores opportunities to lock in savings through higher energy codes and standards.
- **Develop and Implement Market Interventions.** NEEA develops comprehensive strategies to overcome identified market barriers through opportunities and leverage points. NEEA collaborates with partners in utilities, industry, research and non-profits to implement initiatives that accelerate market adoption.
- **Evaluate and Adapt Initiatives.** Working with third-party evaluators, NEEA reviews current and previously funded initiatives to assess market progress, validate savings, and identify and respond to improvement opportunities.

SOURCE: NEEA *2010 Annual Report*

(ESI) PROGRAM

BPA launched a new "Energy Smart Industrial" program in 2009 for FY2010 and FY2011, with a new approach to its efficiency acquisition efforts in the industrial sector. In 2011 the program successfully delivered over three times the savings capacity delivered from BPA industrial programs during 2007–9.[23]

The ESI Program is managed by BPA staff but implemented by a program partner who is the face of the program to the customer utilities and industrial end users.[24] The Program includes a stronger emphasis on developing energy efficiency programs with key industrial clients, but also maintains support for small projects packaged by BPA trade ally partners. Traditional focus on providing technical and financial support for implementation of customized, relatively large projects is retained. However, a new key energy management program component has been added. As shown in Figure 2 2, this includes three interrelated new initiatives: (i) financial and technical support for placement of Energy Project Managers in key enterprises, (ii) the Track and Tune program, and (iii) the High Performance Energy Management (HPEM) program.

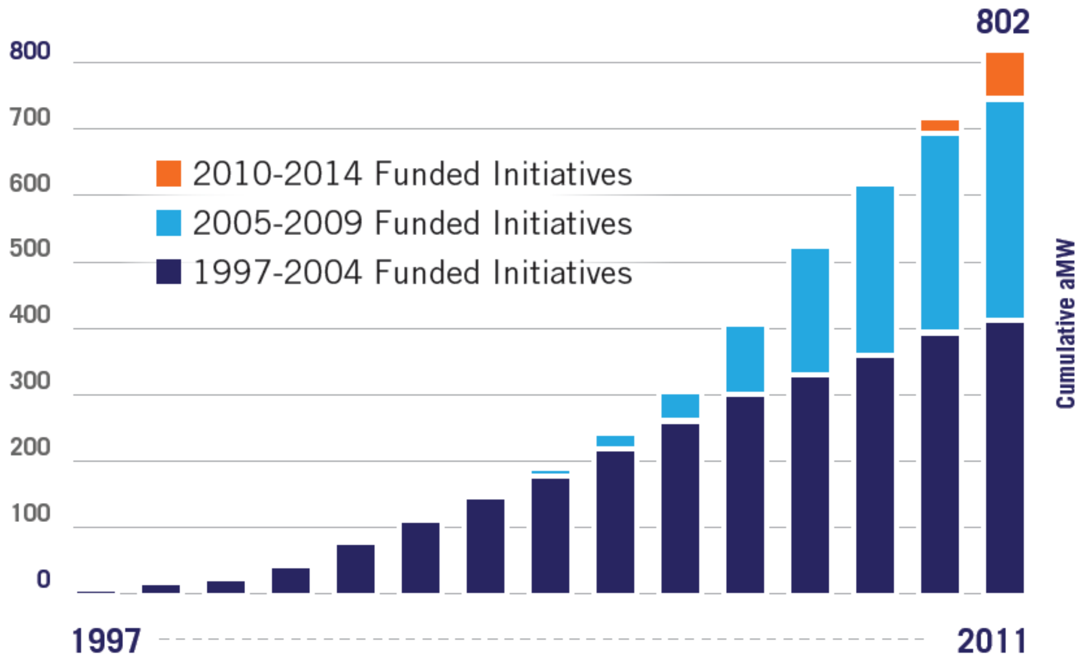
The ESI program had placed 23 Energy Project Managers working in 32 separate industrial facilities by the end of FY2011.[25] The Energy Project Managers are employees of the industrial companies. They work with ESI program support to help their

23 This section draws primarily from BPA's *Energy Smart Industrial Fact Sheet for Utilities* (October 2010), BPA's Energy Smart *Industrial Fact Sheet for Industrial Facilities* (October 2011), and presentations made by Jennifer Eskil, BPA's Industrial Sector Lead, of March 1, 2011 and December 9, 2011. Additional detailed information on ESI can be found in BPA's *Energy Smart Industrial Program Delivery Manual* (revised September 29, 2009).

24 BPA selected Cascade Energy Engineering as the program partner in June 2009. Cascade subcontracts with Evergreen Consulting and Strategic Energy Group for additional technical support.

25 Some Energy Project Managers work in multiple sites.

FIGURE 2-4 Cumulative Total Regional Savings (aMW) from NEEA Initiatives, 1997-2011



SOURCE: NEEA *2011 Annual Report*

facilities develop their own new energy savings goals. The ESI program co-funds their salaries, but after the first year, ESI funding is dependent on the facility's achievement of their previous year's goals. During FY2010 and FY2011, the Energy Project Managers had identified and delivered energy savings capacity totaling a remarkable 10.9 aMW, and additional projects are in the pipeline. Many of the projects are customized projects that are then supported through BPA's specific program for those projects.

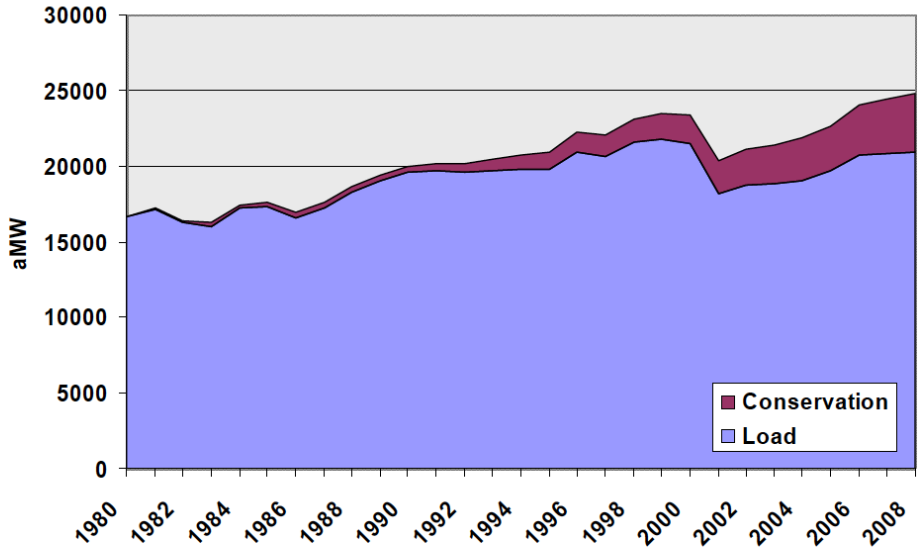
Track and Tune is designed to financially and technically help Industrial energy users to "do the little things well," as well as to install a system that tracks and performance and savings over multiple years. The program's system can be applied to an entire facility or targeted sub-systems. BPA/consumer-owned utility co-financing also can be provided for action items identified through the system.

The HPEM program provides training and support to end-users for implementation of continuous-improvement energy management into their core business practices. A group of 14 end users with 31 aMW of load in southwestern Washington State (spanning five consumer-owned utilities) were the first to participate in the program. A second cohort of 13 end-users then joined with 75 aMW of load in the Puget Sound part of Washington State, covered by Seattle City Light and Tacoma Power.

ESI program management emphasizes that the ESI program must be viewed as a complete package, as the different elements feed off of each other. For example, it may take HPEM engagement to get an energy project manager in place to make projects happen. It may take a small industrial project compressed air ally vendor to introduce a skeptical end user to consider energy efficiency. It may take a simple "no brainer" customized project to generate the trust necessary for a facility to try some of ESI's energy management components.

Whereas BPA's industrial energy savings targets of 10 aMW each year during FY2007-9 were never fully met, the new ESI Program delivered an estimated 13.4 aMW of savings capacity in FY2010, above the annual target set at 13 aMW. In FY2011 ESI delivered estimated savings capacity of at least 28.1 aMW, almost twice the annual target set at 15 aMW.

FIGURE 2-5: **Effects of Conservation on Growth of Electricity Demand in the Pacific Northwest, 1980-2008**



SOURCE: NWPCC's *Sixth Power Plan,* p. 1-10.

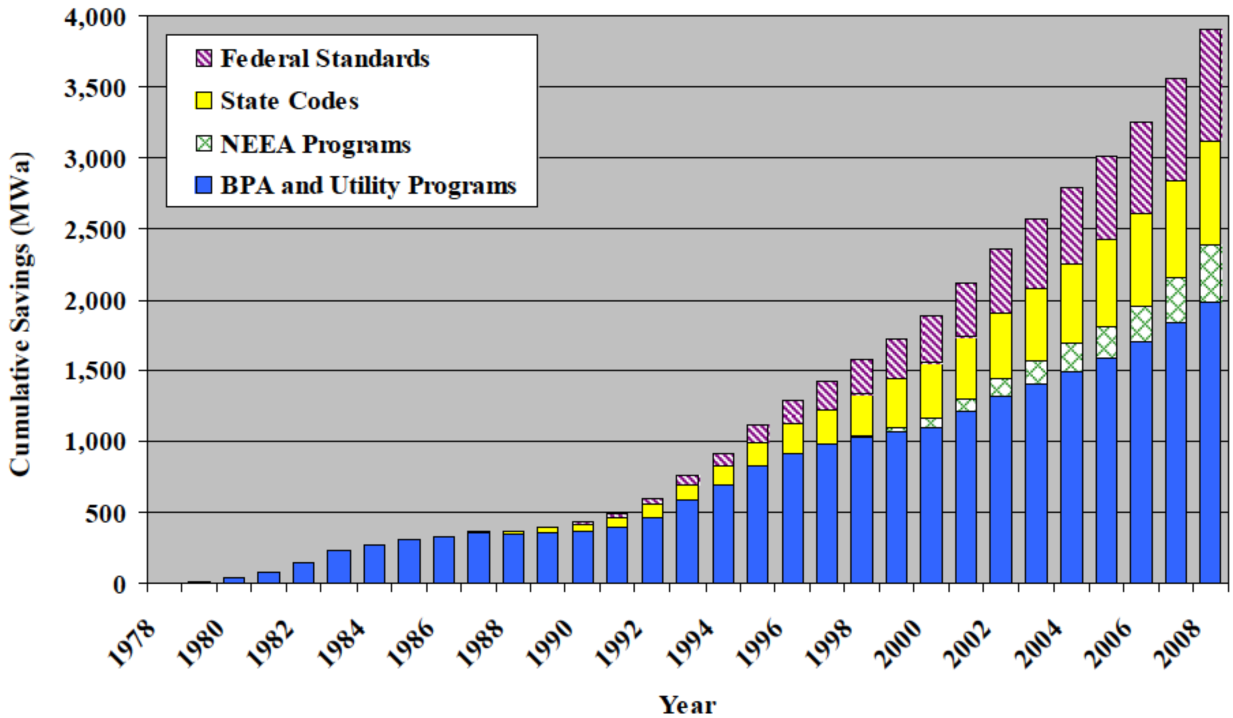
The PUC-Investor-Owned Utility Energy Efficiency Acquisition System As outlined previously, the region's investor-owned utilities operate electricity efficiency acquisition programs completely separate from the BPA and consumer-owned utility system. These relatively large private utility companies have been operating electricity conservation programs for many years, following regulation by the public utility commissions (PUCs) of the various states. In Oregon, the two large investor-owned electricity supply utilities remain under Oregon Public Utility Commission regulations to pursue least-cost energy efficiency resources, but responsibilities and programs for delivery of savings have been shifted to the Energy Trust of Oregon. This system is the subject of a separate case study. In Washington State, however, the more traditional efficiency resource acquisition institutional framework remains in place, with the Washington Utilities and Transportation Commission (WUTC, Washington State's PUC) overseeing the public's interest in utility purchase of least-cost energy efficiency resources and the utilities implementing their own efficiency acquisition programs aligned to the regulator's requirements.

Washington's three investor-owned utilities each instituted their own electricity rate surcharges quite a few years ago, with WUTC approval, to fund their efficiency acquisition programs. These utilities are Avista (adopting its surcharge in 1995), Puget Sound Energy (1997), and Pacific Power (2000). The companies have long experience in operating such programs. In 2011 annual plan data collected by WUTC, Puget Sound Energy's program was identified as the largest, with plans to acquire 38.8 aMW of energy efficiency resources with a budget of about $91 million in 2011. This accounts for about 78% of the targeted savings of the three companies combined.[26]

Demanded by voters in an all-state referendum, Washington's government enacted the state's Energy Independence Act (commonly known as I-937) in 2006. The law requires all state electric utilities service 25,000 or more customers to obtain 15% of their electricity from new renewable resources by 2020 and to undertake all achievable cost-effective energy conservation. Currently, 17 of Washington's 62 utilities qualify, representing about 81% of Washington's electricity loan. These include the three investor-owned utilities, and 14 consumer-owned utilities. To comply with the law, the utilities must submit integrated resource plans (IRPs) incorporating electricity efficiency resource acquisition planning that uses "methodologies consistent with" the conservation planning methodology used by the Northwest Power and Conservation Council. They then must implement

26 WUTC website.

FIGURE 2-6: Cumulative Energy Savings Achievement in the Pacific Northwest, 1978-2008



SOURCE: NWPCC, *Sixth Power Plan*, p. 4-16

their IRPs with periodic WUTC supervision.

The Role of the Northwest Energy Efficiency Alliance Figure 2-3 shows NEEA's approach to identification, development and implementation of market transformation activities for new technologies and practices. The objective of these activities is long-term energy-efficiency gains for the region, to be achieved in part by developing initiatives that the utilities can pick up for support in their local energy acquisition programs.

The initial phases of the process involve significant investments of time and effort to identify promising technologies and ideas, and develop and test operational approaches to promote them. This type of effort is difficult for the energy efficiency acquisition entities or other players in the coordinated system to do themselves, and costs are high for initial savings return. However, when an idea takes off, savings can materialize quickly, especially if energy efficiency acquisition entities, such as the Energy Trust of Oregon (ETO) or the utilities, provide program support, pushing market transformation yet higher and faster than would otherwise be the case. Eventually, then, savings for developed and successful initiatives then begin to slow, as market penetration begins to level off and the market transformation is completed.

An early example of this process was the promotion of compact fluorescent lamps (CFLs) in the region. By 2001, NEEA had been working for several years to increase awareness of this technology, to develop partnerships with manufacturers and retailers and to develop approaches to increase market penetration. When the electricity supply crisis associated with California's power market hit, NEEA worked with BPA and the utilities to provide coupons to customers to purchase CFLs. The program took off through 2001-7, such that CFL penetration in the Northwest region moved four times higher than the U.S. national average.[27]

A more recent successful example in the industrial sector has been the promotion of enterprise energy management systems (EnMS) designed to provide continuous improvement energy efficiency using systematic, factory-wide "plan-do-act-check" approaches.[28] Although promotion of continuous energy improvement in industry was not a new idea, development of EnMS program as a way to acquire verifiable energy efficiency gains was a new concept. NEEA served an incubator for the new initiative, and after invested time and energy to assess energy savings potential, barriers to acceptance, and delivery options, NEEA conducted a field trial with twenty-four food processing plants during 2006-2009 period. Eighteen of these graduated from the program, and 14 continue their EnMS programs (some factories ran into economic difficulties). NEEA used the data and experience from this effort to develop a Continuous Energy Improvement (CEI) Playbook. NEEA also developed statistical regression tool for assessing and attributing energy savings from EnMS adoption, in support of efforts to develop EnMS promotion programs for verifiable efficiency acquisition. Independent evaluation of the program with food processor industries showed persistent, behavior-related energy savings of about 3 percent annually.

Playing an "early adaptor" role, ETO, which had been closely involved in NEEA's work, engaged one of NEEA's primary CEI contractors to assist with an efficiency acquisition pilot in 2008. Utilizing NEEA's CEI Playbook, ETO moved further to roll out a new Industrial Energy Improvement program to acquire energy efficiency through EnMS promotion, including cash incentives, support for energy tracking and information systems, and training support. The program has included support for 2 cohorts of 10 clients each, and has played an important part in ETO's delivery of energy efficiency in the industrial sector during the last three years.

Playing an "early follower/market influencer" role, BPA rolled out its High Performance Energy Management (HPEM) program, building on the results of NEEA's work and ETO's pilots to scale up CEI energy savings across the region. BPA is projecting an aggregate first-year savings rate of 2.5 percent from its first cohort of 13 companies, with annual savings from improved management and operation and maintenance projected to increase to 6.7 percent over the duration of the five-year HPEM initiatives. Although the main object of HPEM is achievement of savings through improved management and O&M practices, HPEM participants also are equipped to identify cost-effective capital project opportunities in their multi-year energy plans development under HPEM.

Building on the program "incubated" by NEEA, ETO had developed EnMS in 27 diverse large industrial plants and BPA had brought 14 industrial companies into their HPEM program prior to the summer of 2011.[29]

Figure 2-4 shows the cumulative total savings achieved by NEEA from its inception through 2011, including savings in local utility programs co-developed with NEEA as well as additional market transformation savings.[30] It is important to note that the market transformation efforts all of NEEA's initiatives continued to generate substantial savings through market forces long after investments have been completed. This is one of the great advantages of successful market transformation investment.

Delivered Savings and Results Since the Council issued its first power plan, energy efficiency initiatives promoted throughout the region had reduced demand for electricity 6th Plan by approximately 4000 average MW through the end of 2009 (see Figure 2-5). Results have been particularly strong during the more recent years. The Fifth Plan called for delivery of at least 700 average MW of annual energy-efficiency savings capacity from 2005 through the end of 2009. The Sixth Plan reported that delivered energy savings during 2005-9 was substantially higher, at least 875 average MW.[31]

Average levelized costs for energy efficiency have also been

27 See NWPCC, *Energy Efficiency — 30 years of Smart Energy Choices,* p. 17

28 Although various continuous energy improvement initiatives in the region have different names — energy management systems (EnMS), strategic energy management (SEM), industrial energy improvement (IEI, the term used by the Energy Trust of Oregon), or high-performance energy management (HPEM, used by BPA), the principles and basic scope are similar.

29 This section draws heavily on Ted Jones, Kim Crossman, Jennifer Eskil, and John Wallner, "The Evolution of Continuous Energy Improvement Programs in the Northwest: An Example of Regional Collaboration," in *Proceedings of the 2011 ACEEE Summer Study on Energy Efficiency in Industry,* as well as personal communications with NEEA staff.

30 Calculations are well explained in NEEA's annual reports.

31 NWPCC, *August 2010 Briefing Book,* pp. 20-21.

quite attractive, at a little over 2 cents/kWh, including all direct costs.[32]

Figure 2-6 shows the main contributions to the overall energy efficiency achievement over the last 30 years. It includes the efficiency gains from federal and state codes and standards, the gains of NEEA's market transformation initiatives which are not co-delivered with the utilities, and the efficiency acquisition of ETO, BPA and the various local utilities.

The success of the coordinated effort over the last thirty years has generated the confidence to rely on further energy efficiency gains to meet 85% of incremental electricity demand over the next twenty years. Clearly the continued close coordination and cooperation between the parties will be critical. In addition, the Council and chief players emphasize that they found it a mistake in the past to ramp energy-efficiency investments up and down in response to relatively short-term ups and downs in the wholesale market price of electric power. Steady investment and a long-term view are necessary to realize the dual advantages of stable annual resource contributions and a hedge against market and supply risks on the supply side.

32 NWPCC, *Energy Efficiency – 30 years of Smart Energy Choices*, p. 1

Institute for Industrial Productivity

Energy Efficiency Resource Acquisition Program Models in North America

Case Study: Energy Trust of Oregon

TYPE OF ENTITY	CLIENTS	SUPERVISING ENTITY
Nonprofit corporation State/Province: Oregon ·Program Launch: 2001	Consumers of 4 investor-owned utilities	Public utility commission

Located on the West Coast of the U.S., north of California, the State of Oregon is one of four states that are the main U.S. beneficiaries of large-scale hydroelectric power of the Pacific Northwest, developed in large part by the Bonneville Power Administration. As described in Case Study 2, past hydropower development brought relatively inexpensive electricity to the region, but now resources to meet new demands consist of fossil fuels and non-hydro renewable energy, with costs on the order of double the current average power costs in the region. This creates a favorable economic environment for energy efficiency, as a far lower cost resource than the new power generations sources. In addition, in Oregon (and also Washington State), the state government has placed strong emphasis on reducing total greenhouse gas emissions in the future, with legislation enacted in 2009 to reduce greenhouse gas emissions by 2020 to 10 percent below 1990 levels and 15% below 2005 levels. Energy efficiency gains also are critical for these goals to be met.

Final energy consumption in Oregon stood at just over 1000 TJ in 2010, including losses in electric power generation and delivery. Of this, electricity amounted to about 48%. Coal and hydropower generation now account for almost a third of power supply each, whereas gas accounts for 29% and wind power about 7%. The industrial sector accounted for 24% of total final energy use in 2010, and 25.4% of electricity consumption.[1]

Launched in 2002, the Energy Trust of Oregon is the entity

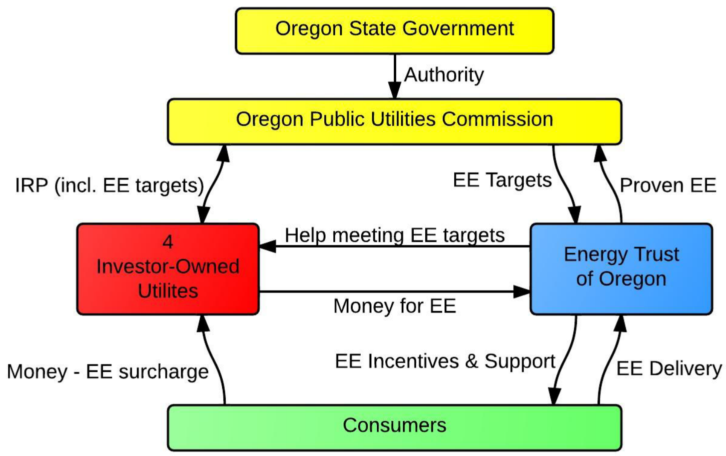
entrusted by the state government with the acquisition of energy efficiency resources on the state's behalf from the customers of the state's four large investor-owned energy supply utilities. The Energy Trust provides an example where energy efficiency acquisition previously undertaken by the supply utilities was entrusted to a third-party entity, solely focused on administering that job and the government's renewable energy incentive programs. The Trust is known for its dedication to the mission of energy efficiency acquisition, including a history of innovation, including in the industrial sector. It is also known for its success, even during difficult economic times.

LEGAL AND INSTITUTIONAL SETTING

The State of Oregon has a history of over forty years of funding energy conservation and renewable energy programs with funds from utility ratepayers. In 1999 a new state energy restructuring law (SB 1149) restructured the prevailing programs administered by energy supply utilities by establishing a new public purpose charge of 3% on retail electricity sales of investor-owned electricity supply

1 Energy consumption figures are from the U.S. Energy Information Agency, and electricity generation shares are from the Oregon Department of Energy.

FIGURE 3-1: **Energy Trust of Oregon Institutional Structure**



companies in the state. The law also provided the Oregon Public Utility Commission (OPUC) — a state agency with responsibility for regulating the operation of investor-owned public utilities — with authority to direct these funds to a non-governmental entity to administer energy conservation and renewable energy programs in the public interest. The Energy Trust of Oregon was incorporated in 2001 as a new nonprofit corporation to serve this function. The Energy Trust signed a Grant Agreement with the OPUC in March 2002, charged by the OPUC to utilize most of the public purpose funds collected to (a) invest in cost-effective energy efficiency, (b) help pay the above market costs of renewable energy resources, and (c) deliver such services with low administrative and program support costs and maintaining high levels of customer satisfaction.[2]

The Energy Trust of Oregon provides services only to customers of four investor-owned energy supply companies. This includes customers of the state's two investor-owned electricity supply companies, Portland General Electric (PGE) and Pacific Power (PP). These two companies supplied 66% of Oregon's electricity in 2010, whereas consumer-owned power districts provided most the balance (see CS 2 for a discussion of consumer-owned utilities).[3] Also included are customers of the state's two largest natural gas supply companies, as further directed by OPUC, using funds from those ratepayers. The Energy Trust began administering programs for Northwest Natural Gas customers in 2003 and for Cascade Natural Gas in 2006.[4]

In essence, the Energy Trust of Oregon is one corner of a triangle of three institutions responsible for the overall delivery of cost-effective energy savings among customers of the four investor-owned utilities who pay the public purpose charge (see Figure 3-1). The OPUC is the operational face of the state government, setting energy savings targets, allocating funds, and monitoring and supervising the overall program to ensure that state laws and regulations are met. The OPUC must report on results and use of the public purpose funds to the state legislature. In essence, the OPUC is the purchaser of energy efficiency resources on behalf of the public. The four utilities have longstanding obligations to deliver cost effective energy savings

2 The Energy Trust receives 73.8 % of the public purpose charge funds, whereas the balance is directed to two public entities to undertake energy efficiency in schools and low-income housing construction, renovation and weatherization programs.

3 Data from the Oregon Department of Energy. Energy efficiency programs in the consumer-owned power districts are delivered separately by those utilities, with support from the Bonneville Power Administration. See the separate, broader case study on Energy Efficiency Acquisition in the Pacific Northwest States.

4 In 2009 the Energy Trust also began serving customers of NW Natural in neighboring Washington State, through an agreement with that company and the Washington State Utilities and Transportation Commission.

TABLE 3-1: OPUC Performance Metrics and 2010 Performance of the Energy Trust of Oregon

OPUC REQUIREMENTS	ENERGY TRUST 2010 PERFORMANCE RESULTS
Electric Efficiency (3-year average)	
31 aMW	35 aMW ('08–'10 average)
Electric Efficiency (average levelized life-cycle cost)	
< 3.5 cents/kWh	2.5 cents/kWh ('10)
Natural Gas Efficiency (3-year average)	
1.8 million annual therms saved	3.3 million annual therms saved ('08–'10 average)
Natural Gas Efficiency (average levelized life-cycle cost)	
< 60 cents/annual therm	32 cents/annual therm ('10)
Renewable Resource Development (3-year average)	
3 aMW	3 aMW ('08–'10)
Financial Integrity	
Unqualified financial audit opinion	Unqualified financial audit opinion
Program Delivery Efficiency (Admin & Support cost)	
< 11% of annual revenues	5% of annual revenues
Customer Satisfaction	
Reasonable customer satisfaction rates	Documented high levels of customer satisfaction
Benefit/Cost Ratios	
Value of energy saved must exceed cost	Value of energy saved exceeded cost

NOTE: **An average MW (aMW) is a unit of energy equivalent to 8760 kWh.**
Source: Energy Trust of Oregon website

as part of their operating requirement to provide energy service in the most cost effective manner. The OPUC is the investor-owned utility regulatory body of the state, with the authority to ensure that the utilities meet their energy savings requirements, as well as the many other operating requirements of the state. The Energy Trust is the entity charged with operational delivery of the energy savings requirements on behalf of the utilities. In essence, the Energy Trust is the deliverer of the energy savings ordered to be procured by the OPUC. The Energy Trust's operations are overseen by the OPUC, who directly provides its funding and approves its program. At the same time, however, the Trust must work in close concert with the utilities, whose customers it serves. All three corners of the triangle are essential for the system to function.

One key feature of the Energy Trust of Oregon is its singleness of purpose. Its staff and programs are focused exclusively on delivery of energy savings and renewable energy against the energy and cost effectiveness targets set by OPUC. Another key characteristic of the Trust is that it takes a relatively long-term view towards fulfilling its mandate, planning its programs for multi-year delivery of results. Although the Trust's appointment by OPUC can in principle be terminated, the expectation of the parties is that the relationship be continued over the long term. Finally, although the Trust collaborates with the supply utilities, it maintains its own direct service relationships with its customers. In the industrial program, in particular, the Trust prides itself on maintaining strong, mutually beneficial relationships with its customers.

In 2010-11 the Energy Trust had dedicated staff of about 80-85 persons, including interns. The staff is led by an Executive Director who reports to the Energy Trust's Board of Directors. The Board of Directors is comprised of volunteers who do not represent the Trust's stakeholders. However a representative from OPUC is an ex-officio board member, and there is an Oregon Department of Energy special advisor to the Board.

CONTRACTUAL RELATIONSHIP BETWEEN THE ENERGY TRUST AND OPUC

The Grant Agreement between the Energy Trust of Oregon and OPUC provides the legal foundation for their relationship. The Energy Trust provides annual reports to the OPUC and the public. OPUC holds occasional Public Meetings on the Energy Trust's program, at which OPUC provides overall guidance and sets performance metrics for the Energy Trust. These meeting are open for public participation, and various groups typically file opinions.

OPUC periodically sets the performance metrics against which the Energy Trust's performance is evaluated. The performance metrics set in October 2008 which were still in force in 2011 are shown in Table 3 1. The performance metrics were set by OPUC order in response to proposals from staff of the Energy Trust, and with consideration of opinions expressed in the Public Meeting of the same month. Table 3-1 also shows the 2010 reported performance results of the Energy Trust against those metrics.

The performance metrics provide generally conservative expectations for the Energy Trust's delivery of energy savings and renewable energy delivery, in rolling three-year averages. Energy efficiency acquisition targets are defined in terms of annual energy savings capacity delivered — that is, the amount of energy savings that can be expected each year over the lifetime of the savings capacity put in place. Another key target is the maximum levelized life-cycle cost per unit of energy saved.[5] In force for 2011 was a the maximum average cost for delivery of electricity savings of 3.5 cents/kilowatt-hour, which is less than a third of the long-run marginal cost of supply in the Northwest U.S. system. In 2010, the average cost actually achieved by the Energy Trust was 2.5 cents/kWh. A third key metric is the maximum share of the Energy Trust's revenues that can be used for administrative and program support costs. The current maximum is set at 11%. This is especially important because the concept of the public purpose charge is for the funds to be largely returned to the customer base that pays it, in the form of energy efficiency investment support and service. In other words, 89% of the revenue of the Energy Trust should be returned directly to the ratepayers in incentives or direct service. In 2010, 95% actually was returned.

If Energy Trust's performance metrics are not met, OPUC may issue a "Notice of Concern." In principle, if issues raised in Notices of Concern are not addressed, OPUC can cancel its appointment of the Energy Trust.

5 Calculation of performance against this metric, therefore, requires assumptions concerning the lifetime and performance of the energy savings capacity created.

TABLE 3-2: **Revenues and Expenditures of the Energy Trust of Oregon, 2010 (million $)**

Service Territory	Revenue	Expenditures
Portland General Electric	56.8	61.6
Pacific Power	39.7	41.8
NW Natural	26.9	18.2
Cascade Natural Gas	1.4	1.4
Other Sources	0.5	0
Total	125.3	122.9

Expenditures by Type	
Energy Efficiency	99.7
Renewable Energy	19.1
Administration	4.1
Total	122.9

SOURCE: Energy Trust of Oregon *2010 Annual Report*

FUNDING AND EXPENDITURES

The three performance metric targets discussed above — delivery targets, maximum unit costs and maximum administrative and support costs — interactively define basic requirements for (and are constrained by) the Energy Trust's budget resources. Initially, the fixed 3% level of the public purpose charge and the size of the electricity load provided defining parameters for the Energy Trust's revenue and budget. However, the natural gas efficiency acquisition business of the Energy Trust was added in without an explicitly defined charge on customers but, rather, an allocation of funds from overall ratepayer revenues with OPUC allowing the utilities to recover the amounts of funds provided to the Energy Trust for energy efficiency acquisition through top-ups in tariff levels. Furthermore, the state legislature passed an additional law in 2007 (SB 838) allowing the investor-owned utilities to collect in tariffs additional money to fund all achievable cost-effective energy efficiency, with both savings delivery and administration of the new funds also to be administered by the Energy Trust. As a result, both the potential budget resources and potential associated delivery requirements of the Energy Trust increased. At this point, probably the main drivers defining the budget envelope for energy efficiency for the Energy Trust to be collected from ratepayers are decisions on how much of the total cost-effective energy efficiency potential "apple" to attempt to "bite off" over the short term (see the section on Target Setting below) and practical considerations on tariff levels.[6]

As shown in Table 3-2, the Energy Trust's total expenditures in 2010 amounted to about $123 million — a large program for a state with a total population of about 3.8 million people. About $100 million was spent on acquiring energy efficiency resources, accounting for 81% of expenditures. Electricity customers of PGE and Pacific Power provided 77% of the Energy Trust's total revenue. Revenues and expenditures need not match perfectly between utility service areas from year to year.

TARGET SETTING

As described in Case Study 2, the Northwest Power and Conservation Council's conservation and electric power plans for the overall Northwest Region provide a rigorous analytical framework that provides guidance to electrical utilities of the region as they prepare integrated resources plans (IRPs) to submit to state PUCs for approval. Although the Council's plans provide only guidance for the determination of targets by the OPUC, working with the two investor-owned utilities and the Energy Trust, its plans are highly respected and provide a key foundation for the

6 Note that although investment in energy conservation at recent unit costs will place downward pressure on electricity prices compared to a less investment baseline over the long run, high investment levels in energy conservation can place upward pressure on electricity prices over the short run because the investment costs are upfront and it takes time for the unit cost advantage compared to supply to pay off.

Energy Trust's energy efficiency acquisition planning. In its Sixth Plan (2010), the Council reaffirmed previous conclusions that energy efficiency represented the top priority electricity resource for future development, finding that sufficient cost-effective energy efficiency could be acquired to meet 85% of the region's load growth over the next 20 years. As with other large utilities in the region, PGE's 2009 IRP also placed heavy priority on energy efficiency, with plans to capture all cost-effective energy efficiency measures identified as achievable by the Energy Trust of Oregon in order to meet nearly half of PGE's loan growth through 2020.[7]

The Energy Trust's long term goal is to deliver as much of the cost-effective energy efficiency potential as possible. The Energy Trust has been gradually working up the energy efficiency supply chain.[8] The average annual levelized cost ceiling set by OPUC increased from 2 cents/kWh in the early years to 3.5 cents/kWh in 2008-2011. The actual average annual levelized cost of the Energy Trust's energy efficiency acquisitions has increased from 1.4 cents/kWh in 2007 to 2.5 cents/kWh in 2010 and 2.9 cents/kWh in 2011. Targets for delivering electricity efficiency have risen as well, from a three year rolling average of at least 20 aMW effective in 2007 to an average of at least 31 aMW in 2008-2011. Actual electricity efficiency delivery by the Energy Trust has increased from 34 aMW reported in 2007 to over 45 aMW in both 2010 and 2011.[9]

OPUC sets the minimum targets for the Energy Trust's delivery of energy efficiency and renewable energy as three-year rolling averages. This smoothes the effects of the economy and the impact of large industrial projects. However the Trust's annual performance is also reviewed.

OPUC sets minimum targets for the Energy Trust's natural gas efficiency acquisition in a manner similar to that for electricity efficiency. Target setting considers a ceiling average levelized cost, funding constraints from the tariff system, and prior years of actual performance. In 2008, the ceiling average annual levelized cost was adjusted upwards from 40 cents/therm to 60 cents/therm. The three-year rolling average minimum efficiency delivery target was increased from 700,000 therms to 1.8 million therms.

In addition to OPUC's performance metric targets, the Energy Trust of Oregon also has developed long-term Strategic Plan, approved in 2009. More aggressive than the minimum targets currently set by OPUC, the strategic plan calls for delivery of a total of 256 aMW of electricity savings capacity and 22.5 million annual therms of natural gas savings capacity by between 2010 and 2014. Closer in line with these long-term targets, then, the Energy Trust also sets annual "stretch targets" for itself, also at levels substantially higher than the minimum levels set by OPUC.

PROGRAM OFFERINGS AND IMPLEMENTATION

The Energy Trust of Oregon offers energy efficiency programs for the residential, commercial and industrial/agricultural sectors. Its programs provide technical assistance support and substantial financial incentives to energy users to implement energy efficiency projects. The mainstay of its energy efficiency programs are incentives for investments in energy efficiency capacity. Incentives are typically defined for specific measures — such as specific weatherization measures for existing homes, for example. The incentives programs define dollar amounts per measure or per unit energy saved, and/or a maximum share of total investment costs, generally set at 50%. However, technical assistance also is offered, especially for reviews of energy efficiency potential at customer sites.

Industrial energy efficiency makes up by far the greatest portion of the industrial and agricultural sector efficiency program, often also called the production efficiency program. Industrial sector programs have accounted for 25-35% of the total electricity efficiency capacity delivered each year by the Energy Trust during 2006-2011. Industrial natural gas efficiency programs began in earnest in only 2009, but have grown sharply to 19% of the total gas efficiency capacity delivered in 2011.[10]

The Energy Trust of Oregon offers a matrix of industrial energy efficiency programs for different industrial customer categories

7 Portland General Electric, *Issues in Perspective: PGE Integrated Resource Plan — Laying the Groundwork for Oregon's Energy Future* (November 2009).

8 The energy efficiency supply chain, however, is dynamic and constantly shifting, with changes in energy efficiency potential arising, often unpredictably, from economic and technical development.

9 This section draws on OPUC Order No. 08-529 (November 2008), and Energy Trust of Oregon Annual Reports of 2010 and 2011.

10 Energy Trust of Oregon, *2012-2012 Proposed Final Action Plan and Budget* (December 16, 2011), Energy Trust of Oregon, *2011 Annual Report to the Oregon Public Utility Commission* (April 16, 2012).

(including large industry, manufacturing and small industry, food processing, high tech, wood products, cold storage, wineries and other industries in 2012), and different program offerings (including, depending upon the customer category, technical support and incentives for customized project solutions, operations and maintenance improvements , and specific technology adoption programs for compressed air systems, motors and drives, lighting and lighting controls, heating and cooling and a few others in 2012). Specific incentives offered for the given year are listed for each program for each customer category on the Energy Trust's website. In 2012, the Energy Trust was offering cash incentives of up to 25 cents per kWh of annual electricity saving capacity, or $2.00/therm of annual gas savings capacity for customized project investments, up to 50 percent of eligible project costs. In addition, the Energy Trust's industrial program included many "standard" incentives for specific measures. A random example of a standard incentive offered in 2012 is provision of $60 each for zero-loss condensate drains on compressed air systems.

In its earlier years, the Energy Trust relied very heavily on customized capital investment projects for energy efficiency delivery in industry. These projects are developed by individual industrial customers working with the Energy Trust's Program Delivery Contractors and can be quite large. Incentives are paid after project commissioning. In 2007, such customized capital investment projects accounted for 86% of the Energy Trust's industrial electrical savings delivery. However, the industrial program diversified substantially during 2008-2011, with the share of customized capital investment projects falling every year in favor of other programs. Although the share of standard incentive projects has increased, the rise of energy efficiency acquisition from strategic energy management and customized operations and maintenance projects has been particularly noteworthy. The share of verifiable energy efficiency delivered from the Energy Trust's strategic energy management program (termed by others as continuous improvement or enterprise energy management) rose from zero in 2008 to 17% of industrial electricity savings capacity in 2010 and 20% in 2011. Its share in industrial natural gas savings capacity rose to 12% in 2011.[11] The share of verifiable energy efficiency delivered from the Energy Trust's customized operations and maintenance improvement program rose from zero in 2008 to 13% of industrial electricity savings capacity in 2010 and 10% in 2011. In 2011, customized capital projects remained important, providing 35% of electricity savings and 43% of natural gas savings capacity delivered in industry.[12] However the program was far more diversified.[13]

Energy Trust of Oregon's industrial and agricultural program is delivered by about 5 professional staff, working with about 6 Program Delivery Contractors. The Program Delivery Contractors have assignments for different program elements in different parts of the state. These contractors typically have 6-7 expert staff working on Energy Trust assignments. Engagement of the contractors and their assignment configurations has changed over time. Maintenance of close, multi-year relationships with industrial clients is considered critical, both for Energy Trust staff and Program Delivery Contractors.

When the public purpose charge was enacted, large industries were given a choice to design and implement their own energy efficiency programs ("self-direct") and receive credit on their power bill against the public purpose charge for eligible investments. Such self-directed programs and their eligibility for receiving public purpose charge credit are overseen by the Oregon Department of Energy. Although many industries initially signaled their intention to self-direct their programs independent of the Energy Trust, far fewer have actually done that. The Energy Trust provides a convenient package of technical support with its incentives that many industries have found attractive.

PROCEDURES FOR MONITORING AND VERIFYING SAVINGS

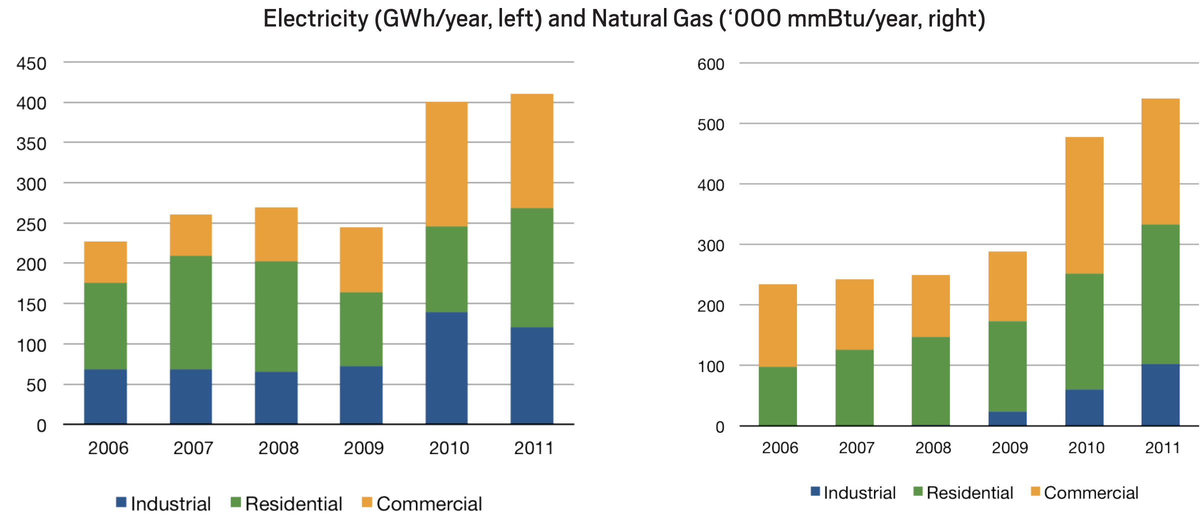
Monitoring and verification of savings is conducted within the Energy Trust by its Planning and Evaluation Department. This department is separate from the program departments and includes an Evaluation Manager and team. Energy Trust staff report an advantage of this system is that the evaluation process has a productive interaction with planning for future

11 In 2012 the Energy Trust was offering 2 cents/annual kWh savings capacity and 20 cents/annual therm savings capacity for strategic energy management practice implementation.

12 In 2012 the Energy Trust was offering 8 cents/annual kWh savings capacity or 40 cents/annual therm savings capacity for operations and maintenance efficiency improvements, up to 50 percent of eligible project costs or up to 90 percent if completed within 90 days.

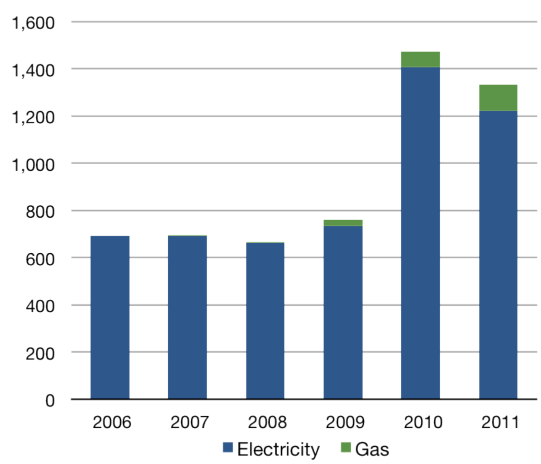
13 See Ted Light and Kim Crossman, Energy Trust of Oregon, "Weathering Economic Downturns with Program Diversification," In *Proceedings of the ACEEE 2011 Summer Study on Energy Efficiency in Industry* for more information. 2011 figures are from the Energy Trust's *2011 Annual Report.*

FIGURE 3-2: **Energy Trust of Oregon Savings Capacity**



SOURCE: Energy Trust of Oregon annual reports

FIGURE 3-3: **Energy Trust of Oregon Total Industrial Energy Savings Capacity Delivered, 2006-2011**



SOURCE: Energy Trust of Oregon annual reports

improvements. Evaluation tends to be focus on problem solving to improve results and is dynamic, rather focused on providing a static snapshot of short-term results.

An interesting feature of the Energy Trust's monitoring and verification of savings is that it includes review of actual savings achieved well after commissioning, and not just verification of first-year savings capacity generation. At times, the evaluation process may be similar to a project re-commissioning exercise. Industrial programs staff feel that the monitoring of continuing actual savings results from past projects is important, especially for the Energy Trust's strategic energy management and improved operations and maintenance programs (to check that programs continue to function properly), but also for retrofit projects where savings may be affected by various operational changes.

The Energy Trust prepares a "True Up Report" every year, with systematically prepared adjustments to savings reported in previous years. Adjustments include mathematical corrections, adjustments based on new data, anticipated evaluation results (for years and programs where an evaluation has not yet been completed), and evaluation results. Adjustments are often significant. In the 2011 True Up, for example, total electricity savings for 2002-2010 were adjusted downwards by 5% and gas savings were decreased by about 2%. The largest factors underlying these changes were (a) increases in estimates of "free riders"[14]

14 In energy savings verification analysis, a "free rider" is a program participant who would have implemented the program measure or practice in the absence of the program. For more information see the U.S. Environmen-

in one of the building energy efficiency programs, (b) a large reduction in the savings estimates for a major pulp and paper industrial energy efficiency project completed in 2007, and (c) updates for savings estimates for Northwest Energy Efficiency Alliance programs associated with the Energy Trust.[15]

DELIVERED SAVINGS AND RESULTS

The years 2010 and 2011 were strong years for savings delivery for the Energy Trust, attaining new highs (see Figure 3-2, which report post-true up savings results). Electricity savings capacity delivered in 2010 amounted to 45.65 aMW, and further increased to 46.9 aMW in 2011, both compared to OPUC target of 31 aMW and the Energy Trust's stretch goals of 45 and 44 aMW, respectively.[16] Natural gas savings capacity delivered also were record highs these two years, with 4.6 million therms delivered in 2010 and 5.4 million therms delivered in 2011.[17]

Industrial programs have consistently delivered 25-35% of the total electricity savings of the Energy Trust during 2007-2011, with the year 2010 being the highest at 35%. Industrial programs in gas are relatively new, but have grown from close to zero in 2008 to 19% in 2011. When the two types of energy are added, the industrial programs contributed to 29% of the Energy Trust's total savings in 2010, and 27% in 2011. Especially if electricity generation and delivery losses are included in the value of electricity saved, electricity savings account for the lion's share of the total industrial energy savings, even in 2011 (see Figure 3-2).

The Energy Trust kept average levelized costs for savings delivery well below OPUC ceilings, even as costs increased modestly in 2011 (see Table 3-3). Average industrial savings costs continue to be the lowest of the major sectors, at 2.5 cents/kWh and $1.90 per therm in 2011. In the coming years, however, the natural gas program may be challenged by the sharp drop in natural gas supply prices across the U.S. with the advent of shale-gas supplies.

TABLE 3-3: **Energy Trust of Oregon Average Levelized Cost**

Program Sectors	Electricity (cents/kWh)		Natural Gas ($/mmBtu)	
	2010	2011	2010	2011
Residential	3.5	3.2	4	4.4
Commercial	2.2	2.9	2.7	3.2
Industrial	2.2	2.5	2.2	1.9
TOTAL	**2.5**	**2.9**	**3.2**	**3.5**

SOURCE: Energy Trust of Oregon annual reports

tal Protection Agency's *Model Energy Efficiency Program Impact Evaluation Guide* (2007).

15 Annual True Up Reports are available on the Energy Trust's website.

16 An aMW is equivalent to 8760 GWh.

17 One therm equals 100,000 BTU.

Institute for Industrial Productivity

Energy Efficiency Resource Acquisition Program Models in North America

Case Study: Wisconsin Focus on Energy

TYPE OF ENTITY	CLIENTS	SUPERVISING ENTITY
Nonprofit corporation State/Province: Wisconsin · Program Launch: 1999	All conumers, except some rural cooperatives	Public utility commission

Wisconsin is an upper Midwestern state with a population of just under 6 million. The state consumes about 70 billion kWh, with about a third of that going to the industrial sector. Similarly, just over a third of the state's total natural gas consumption of 333 BBtu goes to industry.

Wisconsin has over 100 different electric and natural gas utilities, including investor-owned, municipal, and rural cooperative utilities, that pay into the statewide Focus on Energy program. These utilities represent about 98% of the electric and natural gas load in the state.

Wisconsin's Focus on Energy Program is a statewide energy efficiency effort that runs programs for nearly the entire state, covering both electricity and natural gas. Its restructuring in the mid 2000's is a success story for keeping dedicated rate payer energy efficiency funds out of government coffers.

LEGAL AND INSTITUTIONAL STRUCTURE

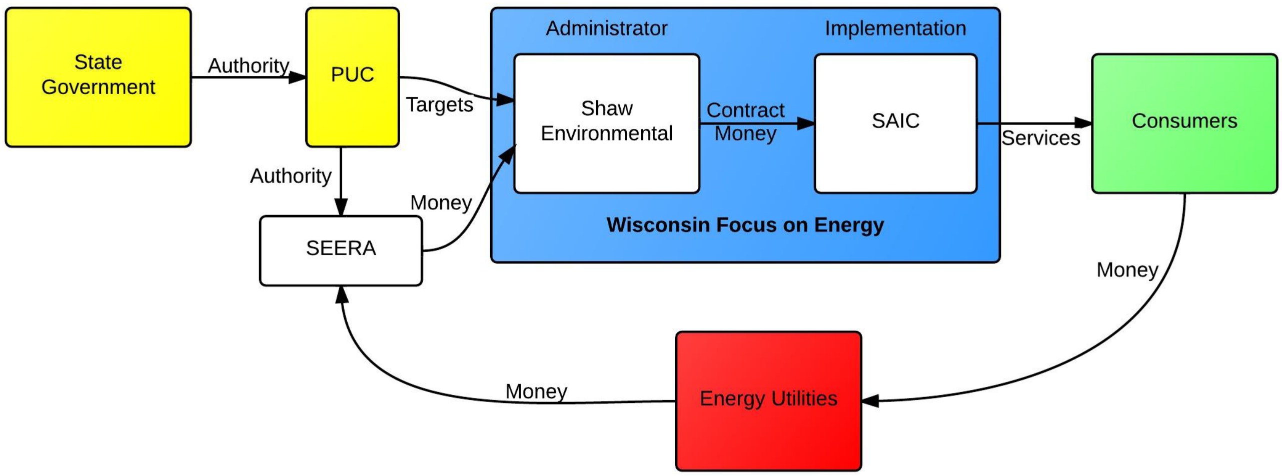
Statewide action to promote energy efficiency in Wisconsin dates back to 1993, when the state government passed Wisconsin Act 414. This act made energy efficiency and renewable energy a priority for the Public Service Commission when making energy-related decisions. At this time, the Public Service Commission required large electric and natural gas utilities to spend at least 0.5% of their revenues on energy efficiency and renewable energy.

Act 9 and Public Benefit Fees In 1999, the Wisconsin State Legislature passed Wisconsin Act 9, which first established the

public benefits fee (PBF) and a statewide energy efficiency and renewable energy program. The Act designated that about half the PBF was to be used for low-income assistance through weatherization and other programs, and about half for energy efficiency and customer-sited renewable energy. The energy efficiency programs were directed to "give priority to proposals directed at the sectors of energy conservation or efficiency markets that are least competitive and at promoting environmental protection, electric system reliability or rural economic development" (Act 9). In addition to the mandatory PBF charge, the Act mandated that electric utilities add to each customer's bill an option to designate voluntary donations to the PBF fund, and allow the customer to choose to give money to low-income assistance, energy efficiency, or renewable energy.

The PBF was to be paid by all electric consumers through as a fixed (non-volumetric) cost by customer class (although 2005's Act 141 later removed this requirement). Although the rate could be different between customer classes, the rate could not vary within a class. The Act in fact specified that the PBF may *not* be

FIGURE 4-1: Wisconsin Focus on Energy Program Structure



based on the total number of kilowatt-hours consumed. Instead each utility had to spread out the necessary fees equally across the customers in each class. It also stated that 70% of the PBF should be collected from the residential class, and 30% from other classes, including commercial and industrial customers.

All electric utilities except municipal utilities were required to pay the entire PBF into the statewide program. Although municipal utilities were required to collect public benefit fees, they were allowed to either run their own programs or buy into the statewide programs for either low income programs or energy efficiency and renewable energy programs (spending half the PBF money on each program). Municipal utilities were allowed to charge different amounts for different classes, but the average PBF collected had to be $16 per meter. In 2010, every municipal utility the state, as half of the 24 rural cooperative utilities, participate in the statewide program (SEERA 2010).

For all utilities, the PBF charge was not allowed to increase a customer's monthly bill by more than 3% or above a $750 ceiling (whichever is less). Utilities' final PBF plans must be approved by the Public Service Commission (PSC). Utilities were required to report annually to consumers about how much was collected and how it was used.

PBF money was collected from the utilities and placed in a public benefit fund by the state's Department of Administration (DOA), which administered the programs. The DOA used money from the fund to contract the program implementation to a nonprofit organization through competitive bid process (the low-income and EE/RE programs were bid separately). DOA contracted to the nonprofit Wisconsin Energy Conservation Corporation (WECC) to implement the program. The statewide program, which came to be known to consumers as Focus on Energy, offered energy efficiency and renewable energy services through a number of programs. The implementation of the individual program offerings were subcontracted by WECC to a number of other firms, such as Science Applications International Corporation (SAIC), who ran the industrial programs.

Act 141 and Third Party Implementation Due to a need to fine-tune some of the program implementation, and in response to the state government on several occasions redirecting money from the public benefit fund into the state government's general fund, a new law was passed in 2005 — Act 141. Among other things, Act 141 moved the Focus on Energy program out of the Department of Administration and ordered the utilities to administer the program jointly. To accomplish this, the utilities created the Statewide Energy Efficiency and Renewable Administration (SEERA), a panel comprised of utility and government representatives whose only responsibility is to collect the public benefit fees from the utilities and contract with a program administrator to oversee Focus on Energy's statewide programs. By moving the Focus on Energy program oversight from the Department of Administration to SEERA, ACT 141 removed the public benefit fees from government control while retaining the Focus on Energy brand and contractors (since SEERA selected the same implementation contractors). Although the program administrator is now contracted to SEERA, the PSC retains regulatory oversight of the program administrator and must approve the contract.

Act 141 also altered the program funding model as well. Under the new scheme, utilities are required to spend 1.2% of their revenue on energy efficiency and renewable energy programs. This cost is recovered through rates (as approved by the PSC) and not visible on utility bills, instead of a more transparent PBF fee. The PBF charge as described in Act 9 was renamed "low-income assistance fees" and still funds low-income programs. The majority of the 1.2% requirement cost pays for the statewide energy efficiency and renewable energy program run by Focus on Energy. The balance covers programs run by the utility, administrative costs incurred by the PSC, and the cost of annual impact evaluations. In order to avoid large swings in funding levels, every year each utility is invoiced for 1.2% of its average revenue over the last three years. This money is then put in a private account managed through SEERA.

Act 141 allows, but forbids the PSC from requiring, utilities to administer programs in addition to the statewide efforts. Utilities may, with PSC approval, direct PBF money to programs targeting large commercial, industrial, institutional, or agricultural customers. Utilities may also elect to administer programs for other customers, but must raise additional money through PSC-approved rates.

In 2010, SEERA put the program administration for Focus on Energy up to competitive bid, and a new organization, Shaw Environmental, was selected. Shaw then contracted parts of the implementation out to other organizations. SAIC, who had been running the industrial programs since 1999, was selected to run the new "business" program, which includes both industrial and large commercial. A schematic showing the key organizations involved in funding, overseeing, and implementing the Focus on Energy program is shown in Figure 4-1.

The PSC, in consultation with Focus on Energy, utilities, consumer groups and other stakeholders, sets energy savings targets for Focus on Energy. Target levels are largely based on previously determined funding levels, not vice versa. The PSC places the obligation to achieve savings on the Focus on Energy program administrator, not SEERA or the energy utilities.

Energy Efficiency Resource Standard In 2010, the PSC adopted the state's first energy efficiency resource standard (EERS) with a four year goal (to coincide with a quadrennial review of state energy planning). The electricity targets were initially set to ramp up from 0.75% to 1.5% per year of total consumption and peak demand. Natural gas targets were set to ramp up from 0.5% to 1% per year. The PSC approved increased funding to meet these goals.

However, in 2011 the state legislature passed a law limiting Focus on Energy to the 1.2% of utility revenues. This led the PSC to revise the EERS goals down to 0.75% per year for electricity and 0.5% per year for natural gas.

PROGRAM FUNDING

In 2010, funding for Focus on Energy was $96.9 million, up from about $82 million in 2010. However, due to legislation restricting funding to the program, funding is expected to remain near $100 million per year through 2012. Over 95% of the funds are supplied by the state's six largest investor-owned utilities (Legislative Audit Bureau 2011).

Act 141 froze the amount large energy consumers (those with over $60,000 in monthly utility bills) contribute to the Focus on Energy program (with annual adjustments based on the lesser of inflation or increases in utility revenue). In order for utilities to pay 1.2% of their revenue to energy efficiency programs, other customers would have to pay higher rates.

In 2010, Focus on Energy programs represented about 1% of residential customers' energy bills, adding about $1 per month on electricity bills and about $0.60 on natural gas bills. Contributions from business and industrial customers have varied much more widely, particularly between utilities. Non-residential customers paid between $0.0010/kWh and $0.0018/kWh on electric bills and between $0.0029/therm and $0.0176/therm on natural gas bills.

Tables 4-1 and 4-2 show how Focus on Energy's expenditures split between program and other costs, as well as how program costs break down into incentives, delivery, and other expenses.

TABLE 4-1: **Focus on Energy 2010 Total Program Expenditures**

	Expenditures ($million)	Percentage
Energy-Savings Programs	$86.979	94.4%
Program Oversight	$2.431	2.6%
R&D Program	$1.736	1.9%
Fiscal Agent	$0.230	0.2%
Other	$0.802	0.9%
Total	$92.179	100%

SOURCE: Legislative Audit Bureau 2011

TABLE 4-2: **Focus on Energy 2010 Program Expenditures**

	Amount ($million)	Percentage
Incentives	$58.591	67.4%
Program Delivery	$21.388	24.6%
Subtotal	$79.979	92%
Administration	$5.218	6.0%
Marketing	$1.782	2.0%
Total	$86.979	100%

SOURCE: Legislative Audit Bureau 2011

PROGRAM OFFERINGS AND IMPLEMENTATION

Focus on Energy delivers energy efficiency programs to residential, commercial, and industrial customers, and also works on renewable energy deployment. In 2010, non-residential customers received more than $33.4 million in incentives for energy-efficient products and services, and residential customers received $16.2 million. An additional $9.0 million in incentives supported renewable energy projects. Table 4 3 below shows the incentive amounts and number of customers in different non-residential classes.

TABLE 4-3: **Business Incentive Distribution**

Sector	Number of Customers	Amount ($million)	Percentage of Amount
Industrial	4,567	$12.752	38.1%
Commercial	21,904	$11.385	34.1%
Schools and Government	4,220	$7.191	21.5%
Agriculture	11,817	$2.103	6.3%
Total	42,508	$33.431	100%

SOURCE: Legislative Audit Bureau 2011

Focus on Energy's large energy users program offers assistance aimed at both large and small industrial customers. For small customers, they offer a free energy assessment with a series of prescriptive offerings either for free or at low cost. For larger customers with over $60,000 in monthly bills, Focus on Energy has an energy management program that works with the customer to establish a baseline, develop energy savings goals, and start up energy teams to achieve the goals.

Before 2010, Focus on Energy had a successful program targeting specific industries such as food processors, pulp & paper makers, and plastics manufacturers. By working closely with each industry, Focus on Energy was able to offer process-specific expertise and build a relationship with the consumer.

MEASUREMENT AND VERIFICATION

As part of the Focus on Energy program, SEERA also hires an M&V contractor to evaluate the program. The contractor conducts an analysis of program impacts every year to submit to the PSC. They analyze several types of savings:

- Gross reported savings: Unverified savings reported by the administrator
- Verified net savings: Evaluated by third party and adjusted for free riders
- Lifecycle savings: Verified savings (either gross or net) that incorporate measure life
- Lifetime savings: Verified savings (either gross or net) that are still active
- Persistent savings: Lifecycle impacts that fade out energy savings past the measure life

Table 4-4 shows how total savings were adjusted by some of the above factors in 2010.

TABLE 4-4: **Focus on Energy Net and Gross Frist Year Savings (2010)**

	Gross	Verified Gross	Verified Net
kWh	599,327,206	590,640,200	355,418,737
kW	107,657	106,657	63,089
Therms	25,959,170	23,640,237	11,638,677

SOURCE: Focus on Energy. 2011. *Focus on Energy Evaluation Annual Report (2010)*. April 11, 2011. Public Service Commission of Wisconsin.

SAVINGS AND RESULTS

Wisconsin utilities and the Focus on Energy program reported a combined electric efficiency annual energy savings of 583,506 MWh in 2009. Table 4-5 shows the gross savings from the Focus on Energy program in 2010.

TABLE 4-5: **Focus on Energy First Year Verified Gross Savings (2010)**

Annual Savings	Total Saved	Business	Residential
Verified kWh Saved	590,640,200	470,987,177	119,653,022
Verified kW Saved	106,657	90,344	16,312
Verified Therms Saved	23,640,237	20,041,916	3,598,320
$ Value Energy Saved	$75,411,087	$56,396,192	$19,014,894

SOURCE: Focus on Energy. 2011. *Focus on Energy Evaluation Annual Report (2010)*. April 11, 2011. Public Service Commission of Wisconsin.

SELF-DIRECT

Self-direct options are a growing trend in North American ratepayer funded industrial energy efficiency programs. These programs allow large industrial customers to either "opt out" of paying for energy efficiency programs, or it lets them recover the money they pay into it and "self-direct" those funds for energy efficiency as they see fit.

Act 141 allows large energy customers, with PSC approval, to fund and implement their own energy savings projects. These large customers can then deduct the amount spent from what they owe in public benefits fees. The utility's obligation to the statewide program is also decreased by this amount. Large energy customers are defined as having a monthly energy bill of over $60,000 and monthly demand of over 1,000 kW or 10,000 therms of natural gas. Self-direct applications, including estimates of savings and any measurement and verification, must be approved by the PSC.

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Institute for **Industrial Productivity**

Energy Efficiency Resource Acquisition Program Models in North America
Case Study: Detroit Edison

TYPE OF ENTITY	CLIENTS	SUPERVISING ENTITY
Nonprofit Corporation State/Province: Michigan Program Launch: 2008	All utility customers	Public utility commission

One of the most common models of industrial energy efficiency programs at the state level involves the state government imposing energy savings targets on the energy utilities, which are then legally obligated to achieve those savings. As shown in the other case studies, several states and provinces have unique programs set up to coordinate activities across the state. However, it is more common for each utility is left to develop and administer its own program using guidance and rules from the state utility commission. Some, such as Enbridge Gas Distribution in Ontario, Canada, retain experts on staff to run the program; others, like Detroit Edison, contract the work out to third parties.

Detroit Edison is an investor-owned, regulated electric utility in the Midwestern state of Michigan (population ~10 million), serving about 2.1 million customers in the southeast portion of the state. Michigan is a moderately heavy industrial state, ranking 10th in the nation in manufacturing energy use. The city of Detroit is the largest city in Michigan and is the hub of North America's auto industry, home to the "Big Three" automakers in the U.S.: General Motors, Ford, and Chrysler.

Detroit Edison provides about 42 TWh of electricity, which is about 40% of the state's total electricity load. It is owned by DTE Energy,[1] which also owns MichCon Gas, a large natural gas utility in Michigan. This case study will examine the 2008 which restarted energy efficiency programs in Michigan and how it shaped the energy efficiency offerings of DTE and other state utilities.

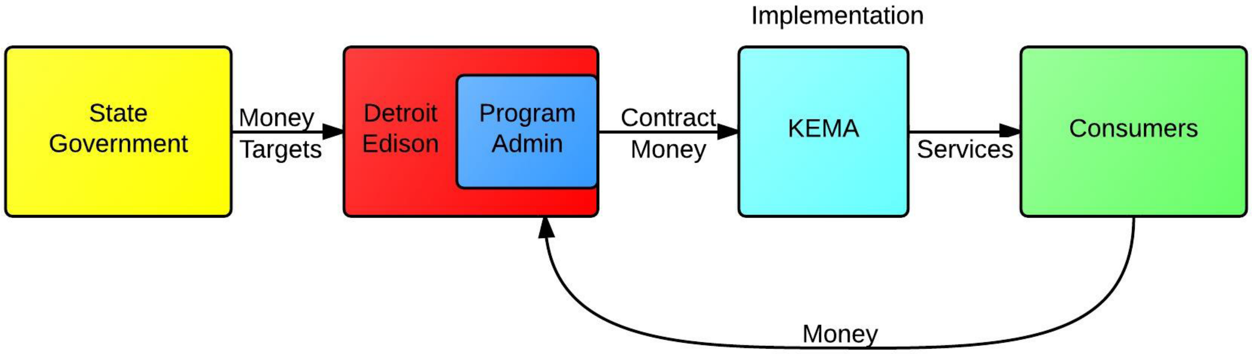
1 Although DTE Energy is the owner of both Detroit Edison and MichCon Gas, this report uses DTE as shorthand to refer to the electric utility Detroit Edison.

LEGAL AND INSTITUTIONAL STRUCTURE

Before 1995 Detroit Edison and other Michigan utilities had fairly aggressive energy efficiency programs in place. Those programs, along with other demand-side management and integrated resource planning activities, fell by the wayside during restructuring, which introduced regional wholesale energy markets and allowed consumer choice among electric generation. Efficiency programs lagged until Public Act 295 (PA 295) was passed in 2008. PA 295 grew out of a 2007 report by the Michigan Public Service Commission (MPSC) called "Michigan's 21st Century Electric Energy Plan." As part of a call for increased planning for capacity and reliability, this plan found that energy efficiency was a cost-effective and underutilized resource and urged the state to take action to ensure that utilities take advantage of this resource for the benefits of ratepayers.

At the time, Michigan was facing a need for new base load genera-

FIGURE 5-1: DTE Program Structure



tion. Because the price of natural was seen as too volatile and regulatory hurdles and major cost overruns had stopped any major nuclear power plants from being approved in the U.S. in the past 30 years, coal was seen as the best option for new generation. Although the cost of electricity from a new coal plant would likely be between 10.7 and 13.3 ¢/kWh [LARA 2012], the cost of delivering energy efficiency is substantially lower, at 1.6 ¢/kWh. For reference, Michigan's average cost of electricity of 9.94 ¢/kWh (7.25 ¢/kWh for industry) [EIA 2012].

PA 295 established an energy efficiency resource standard (EERS) for Michigan's electric and natural gas utilities. An EERS requires every electric and natural gas utility to meet a certain percentage of its load (based on prior years' sales) through energy efficiency savings. Utilities have the option of using the prior year's sales adjusted for weather or the average of the prior three years. The targets set in PA 295 for electric utilities are annual savings of 0.3% in 2009, ramping up to 1% in 2012 and later. Natural gas utility targets are annual savings of 0.1% in 2009, ramping up to 0.75% in 2012 and later.

To meet these targets, each utility is required to file an "Energy Optimization" (EO) plan to the MPSC. Each plan must lay out the following: the programs the utility plans to offer to each customer class (including low income residential), the amount of funding and how the utility plans on recovering those funds, that the programs are sufficient to meet the energy efficiency targets, that the savings will be cost effective, and that the utility has hired an independent third-party to verify the savings.

Cost effectiveness is defined using the "utility system resource cost test" (USRCT). The USRCT is a standard cost effectiveness test designed to show whether the total cost of running an energy efficiency program costs less than the total cost to the utility for energy generation, transmission, distribution, or other costs. A measure or program is deemed cost effective if the USRCT is greater than one. All energy efficiency programs except low-income residential are required to meet this cost effectiveness test.

Because Michigan has over 60 energy utilities (including investor-owned, municipality-owned, and cooperative utilities), PA 295 authorized a state-selected program administer that utilities could rely on for energy efficiency program administration and implementation. Through a competitive bidding process, the State of Michigan chose Efficiency United as the state-selected program administrator. For the 2009-2011 period, DTE and 10 other electric utilities representing 83% of the state electric load) chose to administer their own programs. A group of 8 small electric utilities representing only 8% of the state load chose to use Efficiency United, and the rest of the utilities, comprised of small municipal and cooperative utilities, joined into three groups to submit plans. Not included in the above numbers are the 6 natural gas only investor-owned utilities: 4 joined with Efficiency United and 2 filed individual plans.

In order to encourage utilities to exceed their targets, the MPSC instituted a financial incentive mechanism. In order to receive the incentive, a utility has to not only exceed the target, but also score higher than 1.0 using the USRCT. The full incentive can be claimed for savings 115% of its target at a USRCT score of 1.25. The full incentive is worth 15% of that year's program spending, and partial incentives are awarded using a linear calculation of savings and cost effectiveness. In the first two years of the program, DTE and 3 other utilities were eligible for the incentive. In 2009 and 2010, DTE requested $3 million (11% of program spending) and $6 million (14%) in incentives, respectively.

As part of PA 295, the MPSC now allows revenue decoupling mechanisms for natural gas utilities. Revenue decoupling refers to removing a utility's revenue from its energy sales, which is a significant barrier to energy efficiency. Three natural gas utilities (including DTE's sister company MichCon) are currently running pilot programs for revenue decoupling using several different methods. Pilot programs for several electric utilities (including DTE) were initiated through the MPSC but rejected by the Michigan court system.

Figure 5-1 gives an overview of Detroit Edison's program structure.

PROGRAM FUNDING

Detroit Edison's Energy Optimization program is funded through public benefit funds (PBF). PBFs appear as a line item on the customer's bill. There are two components to the PBF. The first goes toward the general EO fund which DTE uses to run the efficiency programs for retail customers. The second portion goes to fund energy efficiency programs for low-income residential customers. As noted later in this case study, large customers may opt-out of paying into the general fund by submitting a self-direct plan, but they are still required to pay for low-income programs (low income programs are exempt from the cost effectiveness test). To the extent feasible, the utilities must use the charges collected from each customer rate class to fund efficiency programs for that rate class.

Although the PBF charge for residential customers is a small per kilowatt-hour fee ($0.002664 /kWh), commercial, industrial, and government customers pay a fee based on the number of meters supplying service to the customer. This is an uncommon method for setting surcharges and was likely chosen to lower the burden on large energy users. The fee is based on voltage type (primary vs. secondary),[2] monthly consumption, and whether the customer has submitted a self-direct plan. Table 5 1 below shows DTE's PBF rates for commercial, industrial, and government customers:

Table 5-1: **DTE Energy Optimization Surcharge**

		Energy Optimization Surcharge for Customers:	
Voltage	Monthly Consumption	Without Self Directed Plans	With Self Directed Plans
Secondary	0 – 850 kWh	$0.48/meter/month	$0.04/meter/month
Secondary	851 – 1,650 kWh	$2.83/meter/month	$0.24/meter/month
Secondary	Above 1,650 kWh	$12.21/meter/month	$1.09/meter/month
Primary	0 – 11,500 kWh	$46.09/meter/month	$4.20/meter/month
Primary	Above 11,500 kWh	$478.09/meter/month	$39.38/meter/month

SOURCE: Detroit Edison Company. 2009. *Rate Book for Electric Service.* M.P.S.C. No. 10.

PA 295 sets a cap on what a utility may charge customers for energy efficiency programs. For large customers, this cap is 1.7% of the customer's bill. Rates for smaller customers can be up to 2.2%. There is also a total program cost cap of 2% of utility sales revenue. This cap covers all program spending, including administration, incentives, and funding for low income programs.

For smaller utilities taking advantage of the state-selected energy efficiency program administrator (Efficiency United), they are required to pay the administrator directly for its services.

2 Primary customers receive power at distribution level voltage, usually higher than 4kV, with further transformers on the customer side of the meter. Secondary customers typically receive power at 120 V or 240 V.

Utilities taking advantage of the Efficiency United are required to pay the 2% of their sales revenue to the administrator. Any unspent money is carried forward for the following year. In 2011, Efficiency United received about $15 million from utilities for its services.

PROGRAM STRUCTURE AND OFFERINGS

Detroit Edison offers a number of different programs in the residential, commercial, and industrial sectors. DTE hires different contractors to implement each of those programs, as shown in Figure 5 2. DTE's commercial and industrial program is designed and run by KEMA, a global private consulting firm.

As with most new energy efficiency programs, DTE's program offerings to the industrial sector are fairly basic, and doesn't distinguish between commercial and industrial facilities. The bulk of DTE's savings in the commercial and industrial sector come from prescriptive and custom rebates, with prescriptive rebates responsible for about twice the savings as custom.

There are six categories of prescriptive rebates: lighting, HVAC, water heating, motors and drives, food service, and miscellaneous. Custom incentives are available for projects outside the scope of prescriptive measures. Incentives are paid on a $/kWh basis for one year of energy savings. Savings for both custom and prescriptive measures in 2010 were evaluated by an independent third party who verified 99% of the claimed savings.

MEASUREMENT AND VERIFICATION

PA 295 requires each utility filing a plan to hire an independent expert to evaluate the results of its programs. DTE has retained Opinion Dynamics Corporation for this end. The MPSC reviews all verification reports.

The M&V expert reviews incentive applications and conducts on-site surveys to determine if DTE's claimed savings were accurate.

SAVINGS AND RESULTS

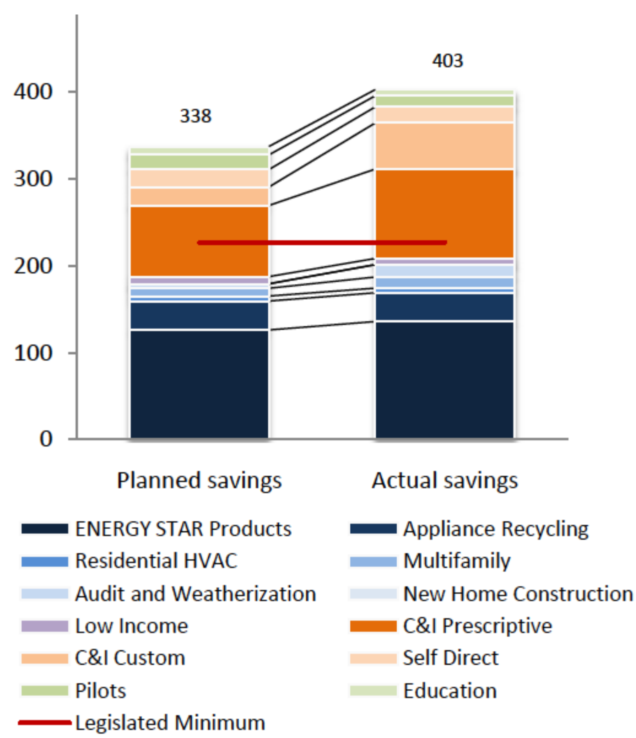
DTE and other Michigan electric utilities are required to save 1% of the previous year's sales through energy efficiency from 2012 onward. In the first three program years, the savings targets ramped up from 0.3% in 2009 to 0.75% in 2011. Table 5 2 below shows DTE's targets, incremental achieved savings, and spending for the first three program years.

TABLE 5-2: DTE Program Savings and Spending

Year	Target (GWh)	Savings (GWh)	Achieved (%)	Spending ($million)
2009	160	203	127%	$26.70
2010	227	403	177%	$44.10
2011	339			$58.10
2009-2011	726			$129.00

SOURCE: Department of Licensing and Regulatory Affairs. 2011. *Report on the Implementation of P.A. 295 Utility Energy Optimization Programs.* Appendix C-1. November 30, 2011.

FIGURE 5-2: DTE Savings Plan 2010



SOURCE: DTE Energy. Energy Optimization 2010 Annual Report. Presented to M.P.S.C. Case No.: U-16359 Exhibit: A-7. April 15, 2011.

Most other Michigan utilities also surpassed their targets. The MPSC estimated that for every dollar utility energy efficiency programs spent in 2010, customers saved $4.88, for a total lifetime savings of $554 million. Figure 5-2 shows a breakdown of planned and achieved savings from 2010.

This shows most programs meeting their planned savings, with particularly large increases in savings from commercial and industrial (C&I) custom and prescriptive measures. Figure 5-4 shows DTE's spending and estimated savings for 2011 through 2015.

In 2012, the first year with a 1% savings target, DTE is planning on spending $75 million on energy efficiency programs, with similar amounts in the following year.

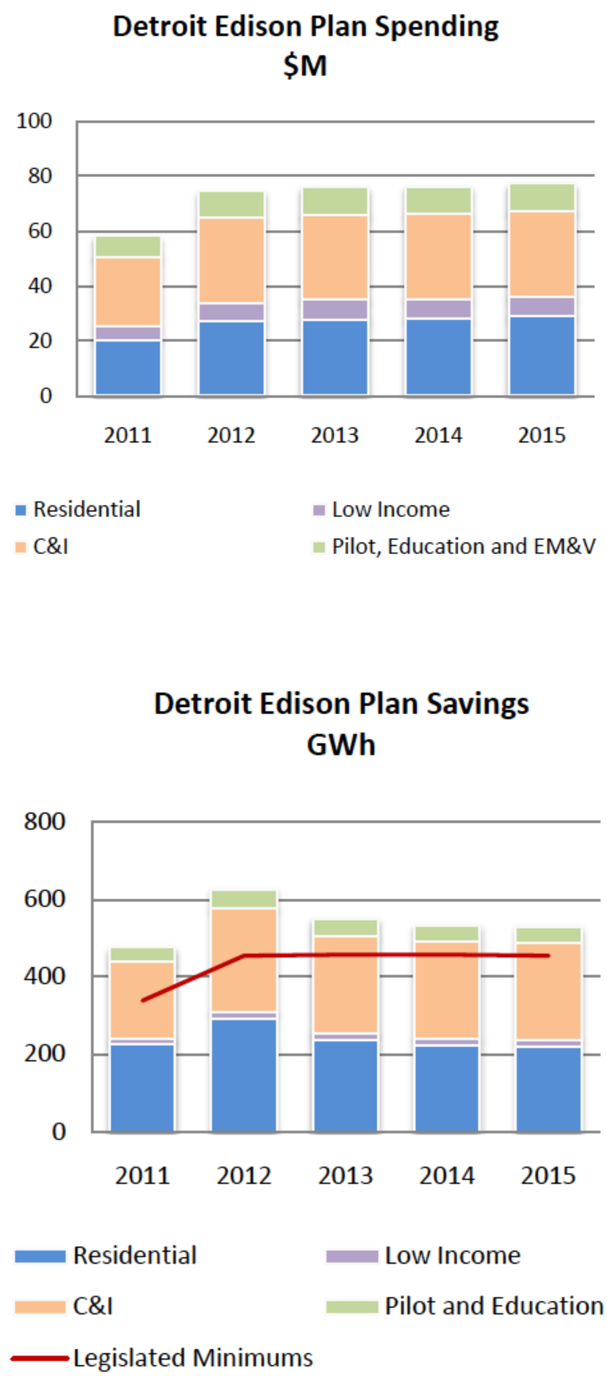
SELF-DIRECT

Self-direct options are a growing trend in North American ratepayer funded industrial energy efficiency programs. These programs allow large industrial customers to either "opt out" of paying for energy efficiency programs, or it lets them recover the money they pay into it and "self-direct" those funds for energy efficiency as they see fit. In the first year of PA 295 implementation (2009), the self-direct option was made available only to large customers, with at least 2 MW of peak demand (or 10 MW peak demand for aggregate sites). This threshold gets small until 2014 and later, when any customer with at least 1 MW aggregate peak demand in one or more sites is able to take advantage of the self-direct option. Self-direct customers still have to pay the portion of the public benefit fee that funds programs for low-income consumers, but don't pay into the general energy efficiency fund.

PA295 specifies that self-direct customers must hire an energy efficiency service company to develop an Energy Optimization plan, which sets annual energy savings targets based on the previous year's energy consumption, factoring out changes in business activity, energy required for pollution control equipment, and weather normalization (as an alternation to normalizing for weather, the self-directing company can choose to base savings off of a three year average annual demand for all retail customers in the state). Very large customers (over 2 MW per site or 10 MW in aggregate are not required to hire an energy efficiency services company.

Every year, the self-direct customer must submit a report detailing the energy savings projects and estimates of energy savings. The

FIGURE 5-3: DTE Projected Spending and Savings



SOURCE: DTE Energy. *Energy Optimization 2010 Annual Report.* Presented to M.P.S.C. Case No.: U-16359 Exhibit: A-7. April 15, 2011.

third-party energy efficiency service company hired by the company is responsible for notifying the utility if the targets are not being met. If the targets are not met, the self-direct customer must pay the utility a portion of the avoided public benefit fee proportional to the percentage by which it missed the target. If the company exceeds their goal, excess savings may be applied to the following year's goal.

For 2009 and 2010, 26 DTE customers took advantage of the self-direct option, though DTE has reported that several customers may opt back in to DTE's efficiency program due to low surcharges.

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2011 Report on the implementation of p.a. 295 utility energy optimization programs (EO legislature report 2011 369985_7)

Institute for Industrial Productivity

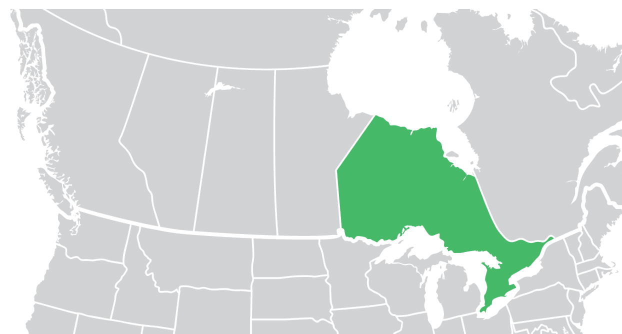
Energy Efficiency Resource Acquisition Program Models in North America
Case Study: Enbridge

TYPE OF ENTITY	CLIENTS	SUPERVISING ENTITY
Investor-owned utility State/Province: Ontario Program Launch: 1995	All utility customers	Ontario Energy Board (OEB)

Enbridge Gas Distribution is a natural gas distribution company that operates primarily in Ontario, Canada. As a regulated utility, their energy efficiency programs, rates, and cost recovery are negotiated with the Ontario Energy Board (OEB). Enbridge serves approximately two million customers, and about 20% of sales are to the industrial sector. Natural gas accounts for 35% of end-use energy consumption in Ontario.

In 1995, Enbridge Gas's industrial energy efficiency program began operating as a third party obligation (or resource acquisition) program. The OEB requires energy savings and Enbridge works with manufacturing customers to identify and implement projects to achieve those savings. Program costs are recovered from customers through natural gas rates. Enbridge is entitled to additional revenue adjustment by meeting or exceeding annual targets.

Enbridge has met or exceeded each of its industrial energy efficiency targets. In 2009, Enbridge saved 804 billion Btus of natural gas, or about 1% of total industrial demand. The program pays part of the cost of energy audits, and provides financial incentives for implementation of projects that reduce natural gas usage. For large customers, they will help pay for an on-site energy manager for the facility. Enbridge uses in-house staff to work with its customers. Enbridge programs have historically covered only natural gas usage. Recently, however, the utility has starting to work with electric utilities to create more comprehensive delivery models.

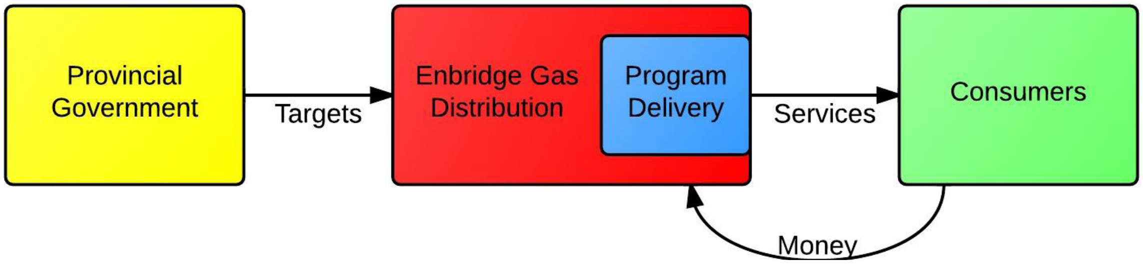


LEGAL AND INSTITUTIONAL STRUCTURE

Natural gas conservation and demand-side management programs in Ontario are overseen by the Ontario Energy Board (OEB). The OEB is an independent, quasi-judicial regulatory agency of the Ontario government. Created by the Ontario ministry of Energy, the OEB has regulatory oversight of both natural gas and electricity matters in the province. Although the government of Ontario does not mandate energy conservation standards for natural gas, since the mid-1990s the Ministry of Energy has directed the Ontario Energy Board to work with the natural gas distribution companies to develop targets in public hearings. The two major distribution companies in Ontario, Enbridge Gas and Union Gas, are financially rewarded by meeting or exceeding those targets.

The efficiency targets for each year are negotiated in a public hearing annually with input from the gas distribution companies, the OEB, and consumer advocate groups. Every three years, the Enbridge proposes a framework for its energy programs. This framework details what kind of programs Enbridge will offer, along with

FIGURE 6-1: Enbridge Gas Program Structure



funding levels, how each will contribute to the overall target, and cost recovery. Consumer groups are allowed to offer further input into the processes, and the OEB then modifies or approves Enbridge's proposal. Rates and targets can be changed each year and overall goals and program structure is approved three years at a time.

The Ontario Energy Board approves natural gas rate structures, which recover the expected costs of running the energy efficiency program. In addition, if Enbridge meets their targets, they can receive revenue adjustments. They can begin receiving revenue adjustments when they hit 50% of their target, and can continue to earn revenues by achieving up to 150% of their target. In 2012, Enbridge can receive a maximum of about $10 million in revenues by exceeding their established targets. Figure 6-1 gives an overview of Enbridge's program structure.

PROGRAM OFFERINGS AND IMPLEMENTATION

Enbridge offers a wide variety of program offerings for the industrial sector, ranging from trainings to energy assessments to implementation incentives. Enbridge uses in-house staff to identify opportunities for energy savings at customer sites, then provides incentives to those customers to purchase an energy assessment from a third party, as well as grants for implementation.

As a longer term measures, they offer student sponsorships to encourage university students to gain skills in industrial energy efficiency. More immediately, Enbridge will pay half the cost (up to $10,000) for detailed energy assessments or will help pay for an on-site energy engineer. For large customers, Enbridge offers incentives on measurement and quantification equipment to track large projects. They offer detailed support for engineering analyses, including technical assistance, pilot projects, and on-site testing. Finally, Enbridge offers implementation incentives for both custom and prescriptive projects. The incentive is $0.10/m3 for custom and $0.20/m3 for prescriptive projects, up to $100,000.

MEASUREMENT AND VERIFICATION

Savings are "deemed" based on calculations, which are periodically reviewed by a third party (hired by Enbridge). This third party does not collect new energy consumption data, but verifies the calculations and installation through plant visits. Enbridge is required to hire a third party consultant to audit the program to verify the program methodology and assumptions and ensure all savings goals are being met.

Another third party is hired to conduct a study on free ridership every few years. This study which looks at the proven success rates of other industrial energy efficiency programs to determine the likelihood of customers accepting incentives for projects they would have completed without the program.

SAVINGS AND RESULTS

Enbridge has met or modestly exceeded its industrial energy efficiency targets for the last several years. In 2009, Enbridge saved 804 billion Btu of natural gas, or a little less than 1% of total industrial demand, at an average cost saved of energy of about $9.50/mmBtu. The program accounts for non-energy or "co-benefits" such as electricity and water savings, but no information was available for the industrial sector.

The 2012 goal is 550 billion Btu, with expected cumulative natural gas savings of 9,900 billion Btu, or over 10% of the 2012 load forecast. The 2012 budget is just over $5 million.

SELF-DIRECT

Self-direct options are a growing trend in North American ratepayer funded industrial energy efficiency programs. These programs allow large industrial customers to either "opt out" of paying for energy efficiency programs, or it lets them recover the money they pay into it and "self-direct" those funds for energy efficiency as they see fit. However, there is no ability for Enbridge customers to self-direct their energy efficiency funds. Enbridge decides, through the rate cases, how much money goes to each customer class, but there is a cap on spending in each sector so no sector carries an undue burden on their rates for energy efficiency programs.

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Institute for Industrial Productivity

Energy Efficiency Resource Acquisition Program Models in North America
Case Study: NYSERDA

TYPE OF ENTITY	CLIENTS	SUPERVISING ENTITY
Public Benefit Corporation State/Province: New York · Program Launch: 1996	All utility customers, excluding LIPA and NYPA	Public utility commission

New York has one of the largest state-run energy efficiency programs in North America. Created in 1975 as a public benefit corporation to focus on energy-related research and development, New York State Energy Research and Development Authority (NYSERDA) has taken on many additional responsibilities over the years including management of the state's energy efficiency and renewable energy programs. NYSERDA is also the state energy office (SEO) for New York with responsibilities for managing federal energy grants and serving as a public resource.

NYSERDA has numerous funding sources including state, regional, and federal funds, and Public Service Commission authorized fees assessed on intrastate sales of electricity and natural gas by New York State utilities. NYSERDA programs cover all fuels, including a ratepayer-funded electricity and natural gas efficiency program portfolio. NYSERDA is a well-established state agency that serves as a model for government-administered energy efficiency.

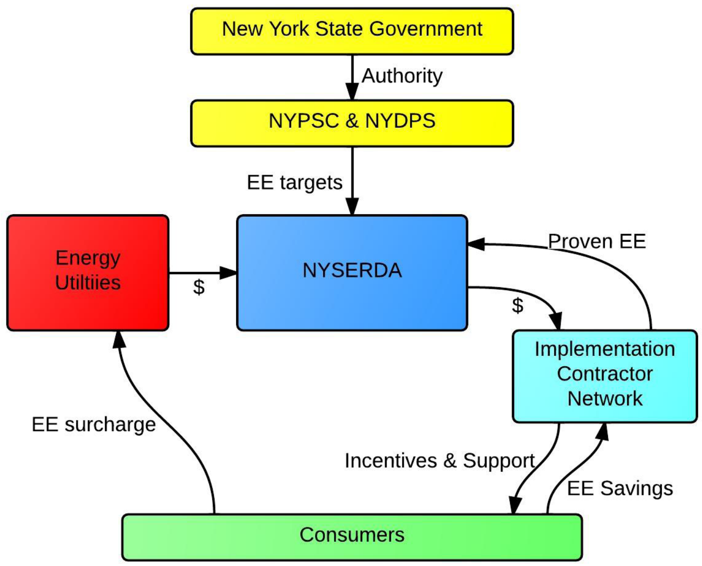
INSTITUTIONAL AND LEGAL FRAMEWORK

Oversight — the New York Public Service Commission NYSERDA and the private energy utilities operating in the state are regulated by the Public Service Commission (PSC). The PSC oversees all private utilities in New York, including those providing electricity and natural gas. It is also oversees NYSERDA's management of statewide energy efficiency and renewable energy programs. The PSC is a quasi-judicial board consisting of 5 commissioners appointed by the governor and confirmed by the state senate. The PSC makes the final decisions on rules affecting NYSERDA and the utilities. It is supported by staff from the Department of Public Service (DPS), which is part of the executive branch of the government. In effect, the PSC and DPS work together as one unit. For example: when NYSERDA files an operating plan. It is analyzed by DPS staff. After a public hearing process, the PSC makes a ruling on the plan. During the public hearing, the PSC considers input from the utilities, NYSERDA, consumer groups, efficiency advocates, DPS staff, and any other interested stakeholders.

The PSC is charged with ensuring safe, secure, and reliable access to energy at just and reasonable rates. As part of this broad mandate it has promulgated rules to encourage energy efficiency. New York is unique in that most energy efficiency directives are made directly through the PSC, not the state government. And most cases of government involvement come from the governor, not the legislature.

Outside the jurisdiction of the PSC are two state-owned power authorities: the New York Power Authority (NYPA) and the Long

FIGURE 7-1: NYSERDA Program Structure



NOTE: Does not reflect EE activities by utilities or public power authorities

Island Power Authority (LIPA). NYPA is primarily a wholesale electric generator, owning several generating sources, including the two large hydropower sites at Niagara Falls and St. Lawrence/ Massena. NYPA sells electricity wholesale to utilities, large business, industrial customers, government agencies, and nonprofit organizations throughout the state. Unlike a conventional utility, NYPA does not have a specified service territory. LIPA directly serves customers only on Long Island. NYPA and LIPA account for about 11% and 14% of New York's electric load, respectively. This leaves about 75% of the state's electric load under the jurisdiction of the PSC.

Funding Energy Efficiency — Public Benefits Charge PSC rulings encouraging energy efficiency go back many years, but the current scheme began to take form in the mid-1990s. At the time, New York was undergoing electric utility deregulation, which is a move from full integrated utilities with regional monopolies to competitive markets for generation, transmission and retail services. During this transition, there was concern that certain activities previously mandated to the utilities would be dropped, such as energy efficiency activities and low-income bill assistance. In 1996, the PSC called for the creation of a system benefits charge (SBC) to pay for energy efficiency and other public benefit programs not expected to be willfully provided by participants in a competitive market (PSC 1996). An SBC is a fee assessed on electricity and/or natural gas sales that funds one or more public benefit programs such as energy efficiency or low-income customer assistance. The fee may show up as a line item on customer utility bills or be a component of an overall rate.

Program Structure for Acquiring Energy Efficiency Resources

In 1998, the PSC issued rules and funding levels for the SBC (PSC 1998). PSC weighed the benefits of a statewide program versus separate utility programs and decided to accommodate a hybrid approach, making an effort to reduce duplication and excessive overhead. One of the primary reasons given for this approach was the scale of the energy efficiency targets proposed. It was the opinion of the PSC that it would be difficult for a single administrator in a given territory to ramp up programs quickly enough that addressed all market segments. The PSC noted several benefits of the hybrid approach: a statewide energy efficiency provider would offer administrative simplicity, reliability and economies of scale, while individual utility programs enable benefits such as aligning utility financial interests with energy efficiency, use of on-bill financing, knowledge of local customer base, and competitive efficiency from a diversity of approaches (PSC 2008). The PSC chose NYSERDA as the third-party administrator for all state-wide energy efficiency initiatives, due to its experience with statewide energy programs and its status as a nonprofit government body, which allows it to administer the SBC funds in a neutral manner (PSC 1998).

The 1998 rule, which was in effect for 3 years, was renewed in 2001 for 5 years and again in 2006 for another 5 years. Each renewal of funds is differentiated by Roman numeral, starting with SBC I and with SBC IV being most recent charge. In June 2008, the PSC established the State's Energy Efficiency Portfolio Standard (EEPS) and approved a subset of "Fast Track" programs to commence immediately.[1] The PSC also called for an increase in SBC collections and a ramp up of program efforts by NYSERDA and the State's six investor-owned electricity transmission and distribution (T&D) utilities to meet the State's "15-by-15" electricity reduction goal (the "15-by-15" goal referred to a 15% reduction in electricity use from 2015 forecast levels.) set by the Governor in and later adopted by the PSC in 2008.

A series of other PSC Orders issued during the latter half of 2009 and early 2010 authorized NYSERDA to further expand and add to its programs. In addition to the electric SBC, the PSC commenced collection of a natural gas SBC in order to allow NYSERDA and other program administrators to broaden or begin offering services for gas efficiency measures.

In total, the additional NYSERDA program approvals constitute $447 million in funding through 2011 to support electric and natural gas programs. In addition to the NYSERDA SBC funded programs, the PSC also provided funding for New York utilities to administer EEPS programs. Furthermore, the New York Power Authority (NYPA) and Long Island Power Authority (LIPA) each offer complementary public benefits programs. The three authorities coordinate program design and delivery wherever practicable to maximize the use of public funds and to ensure a coordinated statewide effort to meet public policy goals.

FUNDING AND SPENDING

Funding Streams New York funds much of their energy efficiency programs through system benefits charges (SBC) authorized by the New York State Public Service Commission (PSC). As mentioned above, an SBC, sometimes referred to as a public benefit charge, is a common way to pay for energy efficiency or renewable energy activities. It is a specific line-item added to the electric or natural gas bills paid by all consumers within one or more customer classes. Fees are usually assessed on a volumetric basis such as $/kWh. A state may have one or more SBCs and each one is likely to target a specific policy goal such as increasing deployment of renewable energy, or market acceptance of energy efficiency. New York utilities collect four separate SBC charges from their customers, each of which is kept in a separate account and then utilized by the utilities and NYSERDA to administer specific programs. At no point are the funds under control of the state legislature.

NYSERDA receives funds from several other sources. As the state energy office, it receives an associated federal grant from the U.S. Department of Energy and funds from the state. It also applies to competitive federal solicitations to fund research, development and deployment projects and programs. But the majority of its revenues come from the four system benefit charges (Renewable Portfolio Standard (RPS), Energy Efficiency Portfolio Standard (EEPS), Technology & Market Development (T&MD) and the Statutory R&D). Another major source of funding is the Regional Greenhouse Gas Initiative (RGGI) which is an emission allowance trading market (NYSERDA 2012).

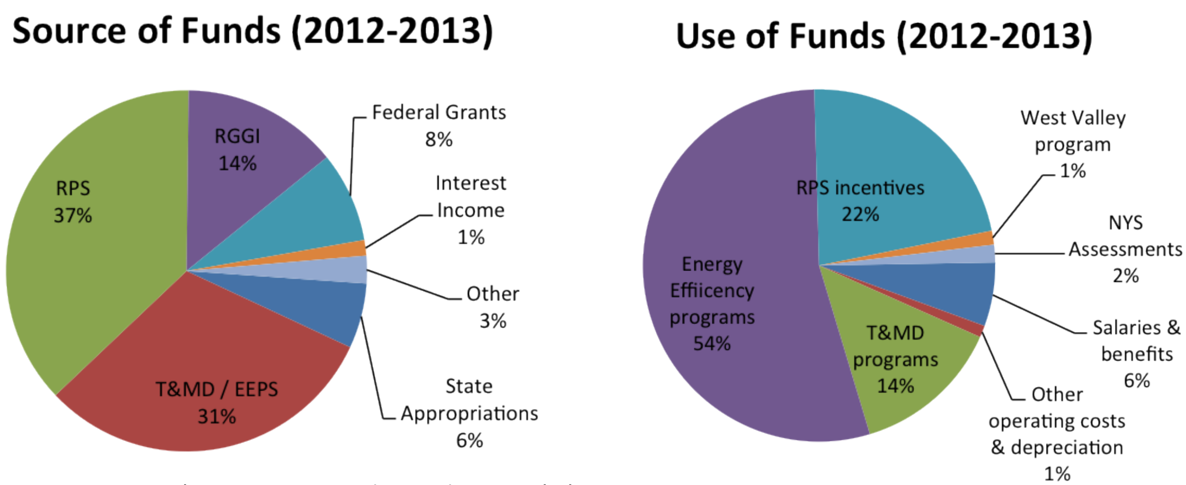
Renewable Portfolio Standard (RPS) These funds are focused on acquiring renewable energy and growing the renewable energy supply chain, workforce, and demand markets. These funds are approved by the PSC under a variety of Commission Orders and derived from an assessment on the intrastate sales of electricity by New York State utilities.

Energy Efficiency Portfolio Standard (EEPS) These funds are focused on acquiring energy efficiency savings and helping New York achieve its "15 by 15" energy efficiency target. Collection and use of these funds is approved by PSC and derived from an assessment on the intrastate sales of electricity and gas by New York State utilities.

Statutory Research & Development (R&D) These funds are focused on energy technology development and demonstration. These funds are approved by the PSC under a variety of Commission Orders and derived from an assessment on the intrastate sales of electricity by New York State utilities and collected

1 Case 07-M-0548, Proceeding on Motion of the PSC Regarding an Energy Efficiency Portfolio Standard, *Order Establishing Energy Efficiency Portfolio Standard and Approving Programs*, issued and effective June 23, 2008.

FIGURE 7-2: NYSERDA Funding Sources and Expenditures



SOURCE: NYSERDA. Fiscal Year 2012-13 Budget and Financial Plan. 2012.

by DPS.

Technology & Technology Development Program (T&MD) These funds are focused on technology and market development. These funds are approved by the PSC under a variety of Commission Orders and derived from an assessment on the intrastate sales of electricity by New York State utilities.

Regional Greenhouse Gas Initiative (RGGI)[2] RGGI is a cap and trade style program to reduce greenhouse gas emissions in the Northeast and Mid-Atlantic States. Currently 9 states take part in the program. Money is raised by auctioning CO2 "credits" for large emitters. Revenue from the program is given to the states, which use it to further encourage emissions reductions.

Figure 7-2 shows NYSERDA's funding and expenditures for the 2012-2013 fiscal year.

Budgeted Spending Each funding source has specific purposes and associated allowable uses. The RPS funds are intended to increase deployment of renewable energy systems and grow the renewable energy market in New York. Likewise, EEPS funds are intended to increase market adoption and implementation of energy efficiency. EEPS charges flow to resource acquisition programs administered by NYSERDA or the utilities. R&D and T&MD funds flow to the R&D Technology & Market Development programs which are administered by NYSERDA.

2 For more information on RGII, see www.rggi.org/.

TABLE 7-1: Allocation of Funds to NYSERDA Program Areas

	Research and Analysis	Technology Development & Demonstration	Business & Market Development	Market Adoption & Expansion	Standard Practice
Statutory	■	■			
T&MD	■	■	■	■	■
EEPS				■	
RPS				■	
RGGI	■	■	■	■	

Shaded areas indicated which programs are funded by each funding source

SOURCE: NYSERDA. Fiscal Year 2012-13 Budget and Financial Plan. 2012.

TABLE 7-2: NYSERDA Program Budgets, 2012-2015 ($million)

Program Budget	2012	2013	2014	2015	2012-2015	%
Elec C&I ($million)	$102.5	$102.5	$107.1	$109.9	$422.1	56%
Elec Total ($million)	$184.4	$184.4	$189.8	$193.1	$751.7	-
NG C&I ($million)	$8.7	$10.5	$11.4	$11.9	$42.5	11%
NG total ($million)	$91.3	$93.4	$94.4	$94.9	$374.0	-

SOURCE: NYSERDA. Energy Efficiency Portfolio Standard: Supplemental Revision to the Systems Benefit Charge (SBD) Operating Plan (2012-2015). December 22, 2011.

The use of SBC money is strictly overseen by the PSC and every EEPS program measure must be deemed cost effective (with the exception of low-income programs) based on electricity or natural gas savings. SBC funded T&MD activities do not necessarily need to be cost-effective. RGGI money has somewhat looser terms, and can be used to address energy savings from sources other than electricity and natural gas. This gives NYSERDA a bit more flexibility in those program offerings.

The PSC's July 2, 1998 Order, approved, with modifications, NYSERDA's SBC Operating Plan. Three-year funding for the SBC was established at $234.3 million (or $78 million/year). The funding was divided among the following program areas:

- Energy efficiency programs — $162 million
- Energy related R&D — about $41 million
- Energy programs targeted at low income customers — $29 million
- Environmental disclosure activities — $3 million

Of the $234.3 million total, $172 million — about three-quarters of the total — was allocated to the NYSERDA-operated statewide program. Remaining SBC funds were allocated to the utilities to continue low-income programs and to meet certain previously-incurred demand-side management (DSM) and R&D obligations.

The PSC reauthorized the SBC and EEPS funds several times, with significant funding increases over the years. The table below shows planned funding levels approved by the PSC for NYSERDA's total and commercial and industrial (C&I) electric and natural gas programs. Expected budgets for 2012 through 2015 are shown in Table 7-2.

Program Offering As described in Table 7-2 above, NYSERDA groups its program offerings into the following categories: Research & Development, Technology Development & Demonstration, Business and Market Development, Market Adoption and Expansion, Standard Practice. Each of these categories has programs that address the needs of the industrial sector, though the greatest concentration of funding targeted at helping industrial facilities to become more energy efficiency is Market Adoption and Expansion.

NYSERDA administers many of its programs under the New York Energy $martSM brand, and works with a network of contractors to implement the programs. NYSERDA offers several programs for its large commercial and industrial customers.

- Existing Facilities Program: Offers a portfolio of prescriptive and custom financial incentives to offset the cost of energy improvements in existing commercial and industrial facilities across New York State.
- Industrial and Process Efficiency (IPE): Provides performance-based incentives to manufacturers and data centers

implementing energy efficiency and process improvements to reduce costs.

- FlexTech Program: Provides commercial, industrial, institutional, government, and not-for-profit sectors with objective and customized information to help make informed energy decisions.

Most programs that target industry also are intended for the commercial sector. Custom incentives in the Existing Facilities program range from 12 cents to 16 cents/kWh, depending upon location of customer. Under the IPE program, industrial process improvements are eligible for the same 12 to 16 cents/kWh incentive. NYSERDA also offers incentives for natural gas projects and specifically targets Combined Heat and Power (CHP) systems for assistance.

In order to fully support the complex needs of large industrial and data center customers, NYSERDA has implemented a Key Account Manager strategy that assigns a dedicated project manager to be the main point of contact and develop a long term relationship with the customer. These relationships allow the NYSERDA project manager to work with the industrial site to identify the energy efficiency component of a process improvement project when funding for the next cycle is being considered.

Setting Energy Savings Targets In 2008, in response to the Governor's advocacy and prioritizing of initiatives to advance energy efficiency, the PSC issued a ruling adopting the goal of reducing projected electricity consumption by 15% statewide by 2015 (PSC 2008). As justification for this new action, the PSC cited a variety of benefits from energy efficiency, including forestalling the building of new generation, reducing use of finite fossil fuels, reducing customers' energy bills, reducing the state's energy imports, mitigating the environmental impacts of fossil fuel energy (including greenhouse gas emissions), and encouraging economic development and job growth (PSC 2007). The Governor's initiative became known as the "15 by 15" plan and was later paired with an increase in New York's renewable portfolio standard to create a "45 by 15" plan to make New York a leader in clean energy. Funding from the EEPS would be used for energy efficiency resource acquisition while T&MD and R&D funds where to be used by NYSERDA to fund technology and market development portfolio.

The PSC's 2008 order established an energy efficiency portfolio standard (EEPS; also known as an energy efficiency resource standard or EERS). An EERS is a policy that sets energy efficiency targets in a state. The mandate is usually placed on the energy utilities, often with incentives or penalties for exceeding or not meeting the target. For the New York EEPS, the PSC determined a baseline electricity forecast through 2015, and set a goal[3] of 15% cumulative energy savings based on the baseline. The PSC then calculated the expected contributions from electric load outside its jurisdiction, efficiency programs already funded through the SBC, other existing utility programs, building codes and appliance standards, and improvements in transmission and distribution (T&D). The total goal remaining after subtracting those savings was called the "Jurisdictional Gap," and was used to set targets for individual utilities and NYSERDA. Table 7-3 shows how the PSC expects the 15 by 15 goal of 24,937,042 MWh to be met.

TABLE 7-3: New York "15 by 15" Electric Efficiency Targets

	2015 (MWh)	%
LIPA	2,167,035	9%
NYPA	1,756,426	7%
State Agencies	790,718	3%
SBC III (NYSERDA)	3,499,995	14%
Utilities	353,806	1%
Codes & Standards	7,947,588	32%
T&D	724,379	3%
Jurisdictional GAP	7,687,095	31%
TOTAL	**24,927,042**	**100%**

SOURCE: PSC 2008

3 In NY PSC cases, "goal" refers generally to the statewide "15 by 15" efficiency effort, while "target" refers to the amount of the overall goal that a utility or program is responsible for.

TABLE 7-5: **Estimated NYSERDA Program Savings, 2012–2015**

Program Savings	2012	2013	2014	2015	2012-2015	%
Elec C&I (MWh)	393,108	661,796	846,630	874,860	2,776,394	59%
Elec Total (MWh)	798,724	1,162,572	1,347,406	1,375,636	4,684,338	–
NG C&I (mmBtu)	987,525	1,049,091	1,153,698	1,264,426	4,454,740	57%
NG total (mmBtu)	1,842,404	1,903,970	2,008,577	2,119,305	7,874,256	–

SOURCE: Energy Efficiency Portfolio Standard: Supplemental Revision to the Systems Benefit Charge (SBC) Operating Plan (2012–2015). December 22, 2011.

While LIPA and NYPA do not contribute to the SBC or EEPS, they do fund and administer their own energy efficiency programs and are expected to contribute to the "15 by 15" plan.

In 2009, the PSC issued a ruling establishing energy savings targets for natural gas. A goal of 14.7% cumulative reduction by 2020 was set. As with electricity savings goals, the PSC set savings targets for NYSERDA and the natural gas utilities. The table below shows the total cumulative natural gas savings goal (in billions of cubic feet) by 2020, as well as the contributions from LIPA and NYPA and expected savings from existing programs run by state agencies (DHCR) and NYSERDA. New programs approved by the PSC would need to save 44 bcf of natural gas.

While the justification for the natural gas EEPS was initially the same as the electric EEPS laid out in the 2008 order, the 2009 order specifically stated the goal was to increase the efficient use of natural gas, not to decrease total gas use. This change was the result of the importance of natural gas to industry in light of the economic downturn that had occurred since the 2008 order.

TABLE 7-4: **New York "15 by 15" Natural Gas Efficiency Targets**

	2020 (bcf)	%
LIPA/NYPA	9	8%
SBC III	9	8%
DHCR programs	3	3%
Codes/Strds	37	33%
NYSERDA Elec.	10	9%
NYSERDA Stimulus	1	1%
New PSC Programs	44	39%
TOTAL	112	100%

SOURCE: PSC 2009

MEASUREMENT, VALIDATION, AND EVALUATION

Measurement and Verification NYSERDA has stringent technical analysis and measurement and verification requirements for its programs. They ensure credibility of results for the project sites and for ratepayer investment. Performance-based incentive payments are only provided on a verified kWh or mmBtu energy-saved basis.

NYSERDA uses two cost effectiveness tests for its programs. The total resource cost (TRC) test presents the ratio of the present value of benefits to total program and implementation costs. The program administrators cost (PAC) test is similar to the TRC, but uses only the costs to the Program Administrator. Both tests can be evaluated considering a variety of benefits. The base benefit is avoided resource cost (the cost to generate the avoided energy), but the test can also include non-energy benefits (such as comfort, safety, and productivity), and macro-economic benefits due to energy bill savings being spent elsewhere in the State economy (NYSERDA 2009).

NYSERDA has a long history of evaluating its ratepayer funded programs. With the establishment of the statewide EERS, the PSC also directed NYSERDA and all utilities running energy efficiency programs allocate 5% of their respective budgets to measurement and verification of savings. While NYSERDA has programs that span the residential, commercial, and industrial sectors, they have one group that coordinates M&V across all their programs. NYSERDA uses in-houses staff to coordinate the M&V activities but hires contractors to do the actual verification.

Program Evaluation M&V work at NSYERDA and the utilities is overseen by the Evaluation Advisory Group (EAG), which reviews plans for the various energy efficiency programs. The EAG's mission is to advise the PSC and DPS staff on statewide evaluation and reporting standards and protocols. The EAG is coordinated by DPS and is comprised of experts and stakeholders representing DPS, NSYERDA, New York Power Authority, and other utilities, among others. It encourages communication and cooperation among these stakeholders by creating forum where members can discuss concerns, share ideas, and solve problems.

NYSERDA's evaluation work for Industrial and Process Efficiency is split into three categories: Market Characterization & Assessment, Impact Assessment, and Process Evaluation. The bulk of the evaluation funds are spent on Impact Assessments.

Performed about every other year, NYSERDA's Market Characterization & Assessment evaluation activities help develop a comprehensive understanding of current and emerging markets; provide baseline and background information required by NYSERDA to define and deliver the program to target markets; and track changes in the market over time with a specific focus on market indicators that are likely to be impacted by program offerings. This activity is estimated to account for about 11% of the evaluation budget.

The Impact Evaluation activities seek to establish rigorous and defensible estimates of the energy savings that can be attributed to the program. This involves visiting sites of large energy efficiency projects and taking measurements and conducting analyses to determine the actual savings achieved compared to what was calculated. This "realization rate" is then applied to the Program's estimated savings to determine actual energy savings achieved. Impact evaluation also addresses issues such as projects that lead to higher energy use through increased production even at lower energy intensities and how to quantify behavior modifications efforts. Impact Assessments account for about 80% of the evaluation budget.

The Process Evaluation plan seeks to examine and document program progress and make recommendations for program improvement; assess the effectiveness of the program outreach, marketing and education efforts; and identify reasons for participation and for measure implementation. These activities account for the final 9% of the budget.

SAVINGS AND RESULTS

Table 7-5 shows estimated savings based on planned spending for NYSERDA's electric and natural gas resource acquisition programs through 2015.

SELF-DIRECT

Self-direct options are a growing trend in North American ratepayer funded industrial energy efficiency programs. These programs allow large industrial customers to either "opt out" of paying for energy efficiency programs, or it lets them recover the money they pay into it and "self-direct" those funds for energy efficiency as they see fit. The PSC has not approved any options for large industrial customers to self-direct their energy efficiency funds.

REFERENCES

[PSC 1996] Case Nos. 94-E-0952, et al., Opinion No. 96-12, issued May 20, 1996

[PSC 1998] Case Nos. 94-E-0952, et al, Opinion No. 98-3, issued January 30, 1998

[PSC 2008] CASE 07-M-0548, issued June 23, 2008

[NYSERDA 2009] Energy Efficiency Assessment. New York State Energy Plan 2009

[RGGI] Regional Greenhouse Gas Initiative. http://www.rggi.org/

http://www.dps.ny.gov/EEPS_Evaluation.html

http://www.nysenergyplan.com/2009stateenergyplan.html

http://www.nysenergyplan.com/final/Energy_Efficiency.pdf

http://www.governor.ny.gov/archive/paterson/executiveorders/eo_2.html (don't need)

07-M-0548: Energy Efficiency Portfolio Standard

http://www3.dps.ny.gov/W/PSCWeb.nsf/All/06F2FEE55575BD8A852576E4006F9AF7?OpenDocument

10-M-0457 and 05-M-0090: System Benefits Charge http://www3.dps.ny.gov/W/PSCWeb.nsf/All/58290EDB9AE5A89085257687006F38D1?OpenDocument

NYSERDA 2012, *Toward a Clean Energy Future: A Three-Year Strategic Outlook 2012–2015*, New York State Energy Research and Development Authority. Albany, NY July 2012

Institute for Industrial Productivity

Energy Efficiency Resource Acquisition Program Models in North America
Case Study: Efficiency Vermont

TYPE OF ENTITY	CLIENTS	SUPERVISING ENTITY
Nonprofit Corporation State/Province: Vermont Program Launch: 1999	All utility customers excluding City of Burlington	Public utility commission

Efficiency Vermont was the first statewide energy efficiency utility established in North America, using a third party to undertake energy efficiency acquisition for the state. Its evolution over time plus the experience it has gained in a decade of operation are especially informative for others interested in pursuing this model or part of it. Principles used for Efficiency Vermont might be applicable in different settings, including economies that contain a higher industrial market share than Vermont's.

Of particular interest might be the arrangements put in place by the various parties to develop detailed targets and budgets, to hold the assigned operator for Efficiency Vermont accountable for target achievement, and to use a performance-based compensation system used for the operator.

ECONOMIC, LEGAL, AND INSTITUTIONAL SETTING

Located in New England, in the northeastern corner of the U.S., Vermont is a small, largely mountainous state with a population of some 626,000 in 2011. Its electricity needs of approximately 5.5 TWh (in 2009) have been met primarily through long-term contracts among the state's current 20 electricity distribution companies, including contracts with Hydro Quebec and the Vermont Yankee nuclear power plant that together have been providing about two-thirds of the state's electricity. Average retail electricity prices were about 12.7 cents/kWh in 2009 — significantly higher than in many other states, but lower than the any of the other 5 states in New England.[1] Average retail prices in New England were 16.1 cents/kWh in 2008.

Vermont's history of promoting electricity efficiency resource acquisition has been driven especially by the attractive cost effectiveness of investment in efficiency compared to prevailing electricity supply costs. But it has also been driven by environmental concerns, and desires to avoid or defray expensive new transmission system investments, particularly in certain parts of the state. A current, additional important driver is a desire to secure reliable energy efficiency resources to help contribute cost-effectively to the future electricity supply mix. Key long-term supply agreements are coming to a close, and electricity efficiency resources provide an attractive hedge against the volatility of prices for power supply obtained through the Independent System Operator New England (ISO New England).[2]

1 See the Vermont Department of Public Service, "2011 Utility Facts" (March 2011). In 2008, average retail consumer prices by end-use sector in Vermont were 14.5 cents/kWh for residential customers, 12.5 cents/kWh for commercial customers, and 9.2 cents/kWh for industrial customers.

2 Avoided (marginal) electricity supply costs used to compare with energy

Vermont's residential and commercial sectors accounted respectively for 29% and 19% of total final energy use in 2010, whereas industry accounted for 16% and transportation 36%.[3] Home and business building space heating is a key energy use in this northern state. Natural gas service is limited to a few relatively flat areas of dense population, and natural gas accounts for about 5% of total energy consumption. Fuel oil, liquefied petroleum gas (LPG) remain important heating sources, together with electricity and some biomass. With the rise in petroleum fuel costs in recent years and the increasingly heavy burden of heating costs on families, businesses, and public institutions, improving the efficiency of heat use in buildings has become a key energy issue in the state. Securing cost-effective electricity resources (including acquisition of electricity efficiency from all sectors), improving overall building energy efficiency, dealing with transportation energy issues, and substantially reducing the state's carbon footprint are all central issues in the new 2011 *Vermont Comprehensive Energy Plan*, led by the state government's Department of Public Service at the request of the Governor.[4]

Electricity efficiency acquisition has been consolidated in one large, statewide energy efficiency utility (EEU), Efficiency Vermont, and one smaller EEU, operated by the Burlington Electricity Department (BED), since 1999. In September 1999, Vermont's Public Service Board (PSB), which regulates all utilities in the state, created the new statewide EEU in a settlement among all Vermont electric utilities, the Department of Public Service of the state government, and other interested parties. Earlier that year the state government had approved legislation confirming the PSB's authority to appoint one or more entities to deliver energy efficiency services in the state, and to set relevant funding levels and electricity rate requirements.[5] Whereas the various utilities had been required previously to use ratepayer funds to undertake demand-side management (DSM) activities, that system had not worked as well as intended for two reasons, as described on the PSB's website: "First, those utilities that are 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. Second, it was administratively inefficient for each of Vermont's 22[6] electric utilities to provide their own energy efficiency programs."

The new statewide EEU assumed responsibilities from the existing utilities for acquiring electricity efficiency resources from all electricity customers, with the exception of those in BED's service area.[7] The PSB sets the efficiency acquisition targets and budgets for the EEU for three-year periods. At the outset, the distribution utilities fixed the necessary price surcharges to their customers to provide the revenue required by the PSB for the EEU's acquisition efforts. The PSB subsequently issued regulations effective in March 2005 requiring the Energy Efficiency Charge (EEC) to fund the approved statewide EEU budget to be calculated according to a uniform methodology based on sales data, even though the exact amounts continue to vary by major customer category and distribution utility.[8] The calculated rates are subject to PSB final approval. The EEC must be clearly visible and designated as such on consumer bills.

All electricity customers outside BED's service area must pay the EEC, with the exception of large customers that choose to "self-manage" their own energy efficiency programs (a provision that began in 2009). Eligible large consumers can be exempted from paying the EEC provided they can demonstrate that they have a suitable energy management system in place and commit to spending at least $3 million on energy efficiency investments per three-year period. Such customers are then not eligible for any EEU services. The government's Public Service Department oversees the program. One large customer was approved for participation in the self-managed program in 2009: a second large customer was approved in August 2012 for the Customer Credit Program, which allows the customer to use most of its EEC to implement energy savings measures

efficiency resource acquisition costs were 14-15 cents/kWh in 2008-10. (Vermont PSB, "Order RE: Energy Efficiency Utility Electricity Budgets for Demand Resources Plan" (August 1, 2011), p.22). For the future, marginal costs might be somewhat lower over the shorter term due to generation capacity surplus in the ISO-NE dispatched system and low prices of natural gas for power plant use; marginal supply costs over the longer term are unclear.

3 U.S. Energy Information Agency, State Energy Data 2010.

4 The two-volume plan and its appendixes are available on the web.

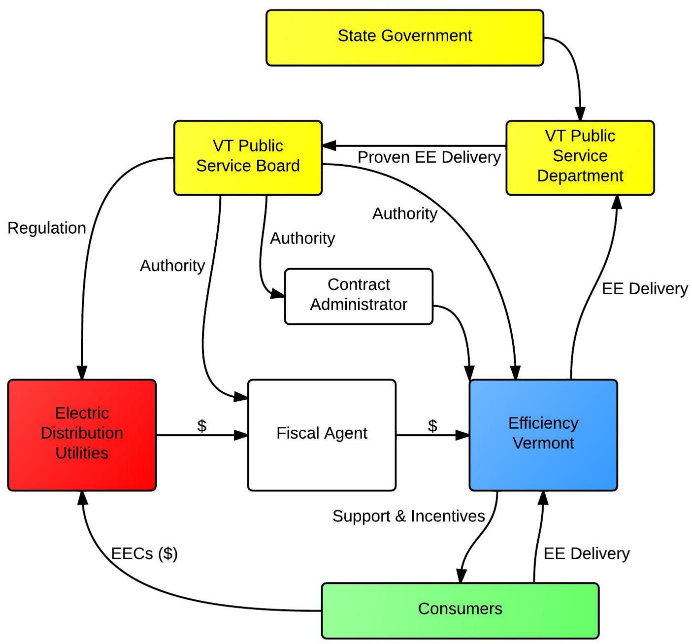
5 1999 VT Law No 60, which amended the relevant Title 30 statutes governing the operation of the PSB.

6 The number is now 20 as Central Vermont Public Service (CVPS) purchased Vermont Marble Power in 2010 and CVPS merged with Green Mountain Power in 2012.

7 BED, a municipal utility, had previously issued a bond for financing energy efficiency acquisition efforts, and entered into an agreement with the PSB to provide EEU services to its customers itself.

8 Vermont PSB Rule 5.300.

Figure 8-1: Efficiency Vermont Institutional Operating Structure, 2000-2010



of their own as a substitute for participation in the system-wide programs of the EEU.[9]

EFFICIENCY VERMONT'S LEGAL AND INSTITUTIONAL STRUCTURE, 2000-2010

Vermont's statewide Energy Efficiency Utility is called Efficiency Vermont. Efficiency Vermont is operated by an independent non-profit entity, the Vermont Energy Investment Corporation (VEIC). This entity was contracted following competitive procedures. In 2010, however, the contractual relationship between VEIC and the PSB was revised to a long-term appointment, following a Board Order in late 2009 establishing the appointment structure both for FEIC and later, in 2011, for BED.[10]

9 The Self-Managed Energy Efficiency Program (SMEEP) was instituted by PSB order on December 28, 2009.

10 Vermont Public Service Board website: http://psb.vermont.gov/utilityindustries/eeu/generalinfo/creationsand structure; the Customer Credit program was instituted at the inception of the EEU in 1999, and has been modified twice since that time. The Board Order enabling the addition of the large energy user to the Customer Credit Program was EEU-2012-01, entered August 24, 2012.

Although the PSB is responsible for the oversight of Efficiency Vermont, the PSB is a quasi-judicial three-member board, appointed to staggered six-year terms by the Governor, with limited staff. At the outset of the energy efficiency utility in 1999, the PSB needed to contract three entities, through competitive solicitation, to operate the new statewide EEU program. The first entity was the operator for Efficiency Vermont, to acquire energy efficiency resources from electricity customers. The second entity was a Contract Administrator to help the PSB administer the contract with the Efficiency Vermont operator. The Contract Administrator tracked the operator's compliance with contract terms, and mediating any disputes relating to the EEU. The third entity was a Fiscal Agent, to collect and manage the Energy Efficiency Charge funds collected by the distribution utilities and disburse these funds to the EEU. The Fiscal Agent also disbursed funds to other budgeted entities with assignments relating to the EEU program (e.g., the Contract Administrator and the Public Service Department). These relationships are shown in Figure 8 1.

In addition to the PSB and contracted entities, Vermont's Public Service Department (PSD) also plays a key role in the system.

An agency within the executive branch of the Vermont state government, the PSD is responsible for monitoring and evaluating Efficiency Vermont's service offerings. It also represents the public interest at PSB hearings, oversees long-term energy planning for the state, and administers federal energy programs.

The original framework surrounding Efficiency Vermont also included an Advisory Committee made up of electric utility, public interest, and other representatives appointed by the PSB. Its purpose was to provide advice to the parties, and it had no authority over Efficiency Vermont.[11]

VEIC's contract, awarded at the outset of the program, was for three years (2000-2002), with a PSB option to renew the contract once for another three years. The PSB renewed the contract for 2003-2005. It was required for the Efficiency Vermont contract to then be rebid. VEIC won this second solicitation as well, and entered into another three-year contract (2006-2008), also renewed once for another three years (2009-2011).

Accordingly, Efficiency Vermont has been managed in three-year cycles, each involving at least one major hearing before the PSB. Each cycle has included evaluation of past performance and final determination of performance-based compensation for the previous cycle, and determination of quantifiable targets, determination of detailed budgets, and agreement on the main service programs for the new cycle.

Historically, the acquisition of electricity savings through statewide programs has been the focus of Efficiency Vermont's efforts, however, over the years additional objectives have been added by the PSB and government. One is the addition of "Geographic Targeting" initiatives which began in 2007, and have continued successfully thereafter. In collaboration with the state's electricity transmission authorities and distribution utilities, and with PSB approval, Efficiency Vermont undertakes especially intense efficiency acquisition and peak load reduction activities in designated localities suffering from transmission and distribution system congestion. For example, Efficiency Vermont might offer especially generous incentives or roll out specific programs in these areas, in order to relieve local power supply pressure and help defer or avoid needs for new transmission or distribution system investments. Local distribution utilities can add "EEC adders" to cover the costs, again with PSB approval.

In 2008, Vermont's legislature enacted a series of statues to create new fuel energy efficiency programs for heating and process fuels. Efficiency Vermont was asked to play a central part in implementing these programs. It essentially acquired fuel savings in addition to electricity savings with funds provided by the state, including revenue from Vermont's participation in the ISO New England Forward Capacity Market[12] and the Regional Greenhouse Gas Initiative (RGGI).[13]

About VEIC. The Vermont Energy Investment Corporation, which has operated Efficiency Vermont from its inception, is a nonprofit organization that specialized in reducing the economic and environmental costs of energy consumption. VEIC had assisted Vermont utilities in implementing DSM measures before the EEU was created. In addition to operating Efficiency Vermont, VEIC has consulting assignments in other regions, most of which are outside Vermont. VEIC operates Efficiency Smart, the energy efficiency program for 49 utilities of American Municipal Power, primarily in Ohio. VEIC also is the lead partner in operating the new District of Columbia Sustainable Energy Utility. For both of these disparate markets — ranging from predominant commercial and industrial customers to low-income multifamily customers, VEIC has used many of the principles, practices, and experience gained from Efficiency Vermont.

EFFICIENCY VERMONT'S CURRENT APPOINTMENT FRAMEWORK

After considerable deliberation, the PSB issued an order in late 2009 determining that the EEU program structure should be altered from a contract-based model to an appointment model. In December 2010, VEIC was appointed to operate Efficiency Vermont with a new 12-year rolling Order of Appointment that provides greater program stability (BED also was appointed to provide EEU services in its service territory the following

11 The above paragraphs in this section draw from the PSB and PSD's websites.

12 ISO-NE's Forward Capacity Market facilitates sales and purchases of reliable power capacity in New England for future years at competitive prices, now with participation of all resources, both new and existing, and both qualified and certified demand reduction resources as well as supply resources.

13 RGGI is a thermal power plant greenhouse gas emission cap and trade initiative operating in 10 northeastern and mid-Atlantic states, from which, among other things, participating states receive revenues from the initiative's sale of emission allowances.

spring.) Although the PSB concluded that the previous contract system had served ratepayers well, the longer-term model better accommodated the increasing responsibilities assigned to Efficiency Vermont. For VEIC, the new model facilitates longer-term planning and strategic focus. The Order of Appointment was put in effect January 2012, and in the interim period between the December 2010 Order and 2012, Efficiency Vermont was operated under a Transition Plan.

Although now framed on a long-term foundation, the operational relationship between Efficiency Vermont and the PSB and government still retains many of the elements of the contractual relationship of the previous decade. The program is still operated within a more commercial construct than most other energy efficiency acquisition programs. Three-year and annual targets are cleared defined, and budgets are methodically determined, accordingly. VEIC's compensation retains a heavy performance-based component, with clear linkage to performance against the targets. Performance is assessed by a third party — the PSD. Unlike many other budget and target-setting public utility commission hearings, the Vermont PSB has requested and received different Efficiency Vermont target and budget proposals from the PSD, VEIC, and other parties, which are then weighed against each other during the hearing procedures.[14] Furthermore, once budgets and targets are set, EEC funds that finance Efficiency Vermont's energy efficiency acquisition work are still retained by the Fiscal Agent, an agent of the PSB. VEIC must invoice its expenses, and the PSD must approve the invoices, before the Fiscal Agent disburses the funds to VEIC.

Institutional reporting changes in the new construct are fairly minor. The Contract Administrator has been eliminated, as no longer required, and the Advisory Committee also is considered no longer necessary. However, the new arrangement recognizes increased responsibilities for Efficiency Vermont. It also has provided greater transparency in proceedings and additional periodic, public reviews.

In its statewide electricity efficiency acquisition and heating and process fuel efficiency delivery work, Efficiency Vermont must not only seek to maximize its delivery of energy efficiency, but also must do so in ways that meet additional, broader objectives. These include: (a) maximizing net resource benefits for all consumers, (b) reducing electricity system peak loads, (c) pursuing market transformation strategies, (d) striving to provide comprehensive services to customers, (e) seeking to maximize and facilitate customer contributions, (f) meeting goals for expenditures on low-income customers, and (g) achieving basic equity between the different counties in the state as to revenues received and net resource benefits delivered.[15] To this, then, is added Efficiency Vermont's responsibility and work on Geographic Targeting (see above), as directed by state authorities and in collaboration with the electricity supply utilities.

VEIC also now has responsibilities additional to energy efficiency acquisition in its functions the operator for Efficiency Vermont. Some of these responsibilities are: (a) participation in the ISO New England Forward Capacity Market to secure benefits for Vermont ratepayers, (b) participation in electricity system planning exercises, (c) technical support and training on state energy codes and standards, and (d) assisting customers in finding additional energy efficiency financing.

The new Appointment model retains the three-year cycle for setting targets, budgets and performance indicators used during the previous decade. These were discussed and agreed to during public hearings at the PSB. Within each three-year cycle, both BED and VEIC must submit monthly, quarterly, and annual reports. A new exercise added into the three-year cycle process, however, is an assessment of each EEU's performance relative to the performance of other entities conducting similar efficiency resource acquisition efforts in other jurisdictions (e.g., outside Vermont). These Benchmarking Reviews are the responsibility of the PSD. In addition, an Overall Performance Assessment is to be undertaken at least every six years, as a major exercise with public participation. Among many things, this Assessment will determine whether there is cause for changing Appointments. If it is assessed that existing Appointments should continue, Orders of Appointment will be re-issued for a further 11 years (hence, the concept of "rolling 12-year appointments").

An informative and comprehensive "Process and Administration of an Energy Efficiency Utility Order of Appointment" (Process and Administration Document) was developed as part of the

14 See, for example, the PSB's "Order RE: Energy Efficiency Utility Electric Budgets for Demand Resources Plan," August 1, 2011, available on the PSB's website.

15 Author's summary from review of the PSB's Order of Appointment for VEIC (December 2010) and VEIC's target performance indicators and minimum performance standards.

TABLE 8-1: **Efficiency Vermont's Scalable Performance Indicators for 2012-2014**

Performance Indicator	Metric (3-year total)	Description
Electric Efficiency Savings — Total Annual MWh Savings	320,000 MWh	Savings that reduce Vermont's electric supply requirements
Total Resource Benefits (2011$)	$271,088,000	Estimated lifetime values of economic benefits that result from the avoided costs of electricity, fossil fuels, and water usage
Summer Peak kW Savings	60,800 kW	Reductions in summer peak electricity capacity needs. By reducing peak electric demand, the reliability of Vermont's electric supply system increases and the supply costs decrease.
Summer Peak kW Savings in Specific Geographic Targeting Areas	to be determined	Focuses resources on specific areas in Vermont to help avoid or delay expensive electric systems
Business Comprehensiveness	to be determined	Indicator intended to ensure that Efficiency Vermont utilizes a comprehensive approach in business program delivery
Market Transformation: Residential	40%	Indicators to encourage Efficiency Vermont to design and implement programs that maximize the long-term effect on the building and equipment stock in Vermont
Market Transformation: Business	7,360	

SOURCE: Efficiency Vermont's Annual Plan 2012 (December 2011).

process of moving to the new arrangements. Approved by the PSB in December 2010, this document is expected to be kept up-to-date with revisions as the new program proceeds over the years.

Quantifiable Performance Indicators and Performance-based Compensation. The agreed and approved three-year programs set detailed budgets, targets broken down into Quantifiable Performance Indicators (QPIs), and amounts for VEIC's potential performance awards for the operation of Efficiency Vermont. These three are all interrelated. They can be adjusted if funding or responsibility assignments change according to procedures outlined in the Process and Administration Document.

A substantial portion of VEIC's compensation above its documented reimbursement for the specific costs for acquiring energy efficiency or undertaking other activities requested by the PSB is paid under the EEU Performance Mechanism. VEIC's Efficiency Vermont budget also includes a line-item for its operating fees, an amount that is not tied specifically to performance. VEIC's performance-tied compensation that is calculated under the Performance Mechanism is substantially larger. In 2009-2011, VEIC was eligible to receive a maximum of $2.7 million in performance-tied compensation, amounting to about 75% of its operating fees plus performance-fee-estimated compensation in that three-year budget. In the approved 2012-2014 budget, VEIC is eligible to receive a maximum of $3.275 million in performance-tied compensation, amounting to about 60% of its operating fees plus performance-fee-estimated compensation for those years.

Performance-tied compensation is awarded for VEIC's performance on QPIs, according to detailed calculation methods. QPIs for 2012-2014 are shown in Tables 8 1 and 8-2. As during the

TABLE 8-2: Efficiency Vermont's Minimum Performance Requirements, 2012-2014

Minimum Performance Requirement	Minimum Standard	Description
Factor of Gross Electric Benefits-to-Spending	1.2	Compares ratepayer economic benefits to Energy Efficiency Charge collected
2012-2014 Spending for Residential Customers	$22,000,000	Ensures a minimum amount of spending will be focused on Vermont residential customers
2012-2014 Spending for Low-Income Customers	$7,500,000	Ensures a minimum amount of spending will be focused on Vermont low-income customers
Number of Small Business Customers Served	1,950	Ensures small business customers will be equitably served
Geographic Equity	Specific minimums for each county	The Geographic Equity QPI is structured to ensure that energy efficiency benefits are geographically distributed across the state.
Administrative Efficiency — Management Span of Control	Supervisor-to-staff FTE ratio of 8.5-to-1 or greater	These indicators ensure VEIC will continually assess operations and service delivery in order to deliver maximum value to Vermont's ratepayers.
Administrative Efficiency — Key Process Improvements	Meet all pre-determined milestones on schedule	

SOURCE: Efficiency Vermont's Annual Plan 2012 (December 2011).

2009-2011 period as well, there are two types of QPI Scaled Performance Indicators and Minimum Performance Requirements. Scaled Performance Indicators applicable for 2012-2014 are shown in Table 8 1, whereas Minimum Performance Requirements for the same period are shown in Table 8 2.

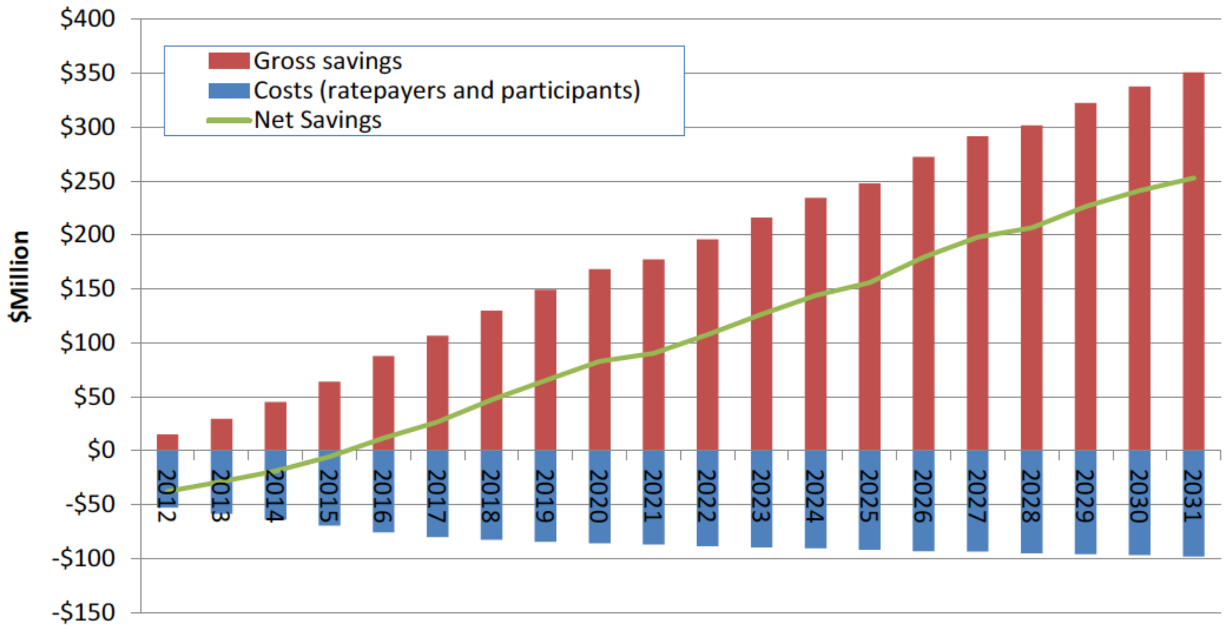
The approved budget sets a total cap on the potential amount of performance-tied compensation that VEIC can receive for electricity efficiency acquisition, and for heating and fuel efficiency acquisition, during the relevant three-year period (e.g., $ 2.18 million was the maximum set for electricity acquisition performance awards during 2009-2011). For each Scaled Performance Indicator, then, the parties agree on a percentage "weight" figure of the total maximum potential performance compensation that can be awarded for 100% achievement of that indicator. For example, during 2009-2011, it was agreed that full achievement of the electricity efficiency acquisition target would result in payment of 33% of the maximum electricity performance award funds ($719,400). Full achievement of the total resource benefit indicator was assigned a weight of 25%; full achievement of the summer peak demand target was assigned a weight of 12%, and so forth. Furthermore, performance award levels can be scaled to match performance relative to the target. A threshold for each indicator is set, below which no performance-tied compensation will be paid. For electricity efficiency acquisition, for example, the 2009-2011 threshold was fixed at 80% of the three-year target of 359,700 MWh (287,760 MWh). If VEIC acquires less than 287,760 MWh in electricity savings, it receives none of the $719,400 potential performance-tied compensation for this indicator. However, the

TABLE 8-3: **Efficiency Vermont Budget for 2012-2014 ($million)**

	2012	2013	2014	2012-2014
RESOURCE ACQUISITION				
Electric Efficiency Funds Activities				
Business Sector	$22.80	$24.36	$25.42	$72.58
Residential Sector	$9.68	$10.35	$11.97	$32.00
Total Electric Efficiency Funds Activities	**$32.48**	**$34.71**	**$37.39**	**$104.58**
Heating and Process Fuels Funds Activities				
Business Sector	$0.82	$0.91	$1.04	$2.77
Residential Sector	$2.46	$2.74	$3.12	$8.31
Total Heating and Process Fuels Funds Activities	**$3.28**	**$3.65**	**$4.16**	**$11.08**
Total Resource Acquisition	**$35.76**	**$38.35**	**$41.55**	**$115.66**
NON-RESOURCE ACQUISITION				
Education and Training	$0.79	$0.81	$0.88	$2.48
Applied Research and Development	$0.48	$0.40	$0.42	$1.31
Planning and Reporting	$0.28	$0.48	$0.56	$1.32
Evaluation	$0.82	$0.85	$0.89	$2.56
Policy and Public Affairs	$0.34	$0.35	$0.37	$1.06
Information Technology	$0.82	$0.84	$0.89	$2.54
General Administration	$0.24	$0.25	$0.27	$0.76
Total Non-Resource Acquisition	**$3.77**	**$3.99**	**$4.26**	**$12.03**
Operations Fee	$0.68	$0.72	$0.78	$2.18
Sub-Total Prior to Performance Based Fee	**$40.21**	**$43.07**	**$46.59**	**$129.87**
Performance Based Fee	$1.01	$1.09	$1.17	$3.28
Total Estimated Costs	**$41.22**	**$44.16**	**$47.77**	**$133.15**

SOURCE: Efficiency Vermont's Annual Plan 2012 (December 2011).

FIGURE 8-2: **Efficiency Vermont Costs and Savings, High Efficiency Case 2012-31 (Current $)**



SOURCE: Vermont Department of Public Service, *Vermont Comprehensive Energy Plan 2011*, Appendix 4, Modeling Study (December 2011).

parties agree on a formula for calculating less than maximum performance-tied compensation for achievement of 80-99% of the target. VEIC also can receive greater than the earmarked maximum for a specific indicator if it exceeds a target, up to the total performance-tied compensation cap.

A second part of the Performance Mechanism, however, describes how VEIC's eligibility to earn full or partial performance awards is contingent on meeting specified Minimum Performance requirements. If these are not met, VEIC's performance-tied compensation will be partly or fully reduced. These requirements are to ensure that benefits to ratepayers meet minimum levels, expenditures on residential customers (where electricity efficiency acquisition costs tend to be higher than among others) meet minimum levels, expenditures for low-income customers meet minimum levels, a minimum number of small business consumers are served, that specific minimum total resource benefits per county in the state are provided, to ensure basic geographic program equity, and that certain management indicators are met. In the 2009-2011 cycle, a minimum total resource benefit requirement was stipulated (akin in some respects to the benefits-to-spending requirement for 2012-2014) with the provision that if that minimum was not met, VEIC would not qualify for any electricity efficiency acquisition performance compensation at all. Failure to meet other minimum requirements resulted in percentage reductions in overall performance compensation.[16]

Staff report that the performance-tied compensation has a significant impact on VEIC's management of its operations. Progress toward QPIs is tracked monthly, and corresponding adjustments made in work priorities and approaches. Performance delivery towards QPI has an impact on the individual compensation of program managers and some other staff.

16 The performance-tied compensation scheme for VEIC during 2009-2011 is described in full detail in Attachment A to the Annex A Transition Period Plan, the "Transition Period Performance Mechanism," of the PSB's December 2010 Order of Appointment for VEIC.

The financial consequences of progress toward QPI also mean that monitoring and evaluation of quantitative performance is taken seriously. As part of the annual savings verification process (see below), the PSD annually certifies if VEIC has succeeded in or made appropriate interim progress towards achieving QPIs, and whether or not VEIC's performance relative to its QPIs is consistent with the portion of the three-year budget that has been spent. At the end of each three-year cycle the PSD makes recommendations to the PSB concerning VEIC's claims of performance against current QPIs. The PSB makes a final determination of the extent of achievement of QPIs and amounts of any held-back compensation that should be disbursed to VEIC.[17]

FUNDING AND EXPENDITURES

As mentioned previously, Efficiency Vermont's budget is set by PSB order every three years, following public hearings. Table 8 3 shows VEIC's budget for operation of Efficiency Vermont during 2012–2014, incorporating budget determinations by the PSB on electricity efficiency acquisition in the PSB's major review of the long-term Development Resource Plan concluded in August 2011.[18]

The total cost of Efficiency Vermont in 2012 is budgeted at about $41 million, equivalent to about $65 per person in the state. The budget rises to almost $48 million in 2014. The Energy Efficiency Charge, which finances the electricity aspects, was approved by the PSB to rise by about 4.2percent in 2012, 6.7% in 2013, and 7.2 percent in 2014.[19]

About 96% of Efficiency Vermont expenditures are for reimbursement of program costs, whereas the remaining 4% includes VEIC's operating fees and maximum performance-tied compensation. Almost 91% of Efficiency Vermont's program costs are for efficiency resource acquisition, and the remaining 9% is for non-resource acquisition programs and costs as listed. Within energy efficiency resource acquisition, then, electricity efficiency acquisition accounts for 90% whereas heating and process fuel acquisition amounts to 10%. The share of business customers in electricity efficiency acquisition is particularly large in this three-year cycle, representing $73 million of the total $105 million three-year electricity efficiency acquisition budget.

Although the electricity-related budgets are firm, as they are financed with the EEC, the heating and fuel-related budgets are somewhat less so, as they are financed with estimated revenues from sale of demand resources to the ISO New England Forward Capacity Market and from RGGI.

TARGET SETTING

The new Appointment model includes a new foundation for setting targets and budgets for both of Vermont's EEUs — the Long-term Demand Resource Plan (DRP). The first DRP was undertaken and approved by the PSB in 2011. Key elements of the DRP are annual electricity efficiency acquisition goals and budgets for a 20-year period, annual provisional heating and process fuels efficiency goals and budgets for a 10-year period, and performance indicators, budgets and compensation structures for the EEUs for the upcoming three years. Vermont law requires that EEU budgets (and, implicitly, associated targets) funded via the Energy Efficiency Charge be set at a level that would realize "all reasonably available, cost-effective energy efficiency."

Two studies of the potential electricity savings to the year 2031 were submitted for discussion at the workshop hosted by the PSB on the DRP. The study, prepared by the PSD, estimated the statewide technical potential for electricity savings by 2031 at 31.7% of sales, the economic potential at 29.2% and the maximum achievable potential at 25.4%. VEIC's estimates were somewhat higher, but the assumptions varied between the two. Different budget and savings targets proposals were prepared by PSD, VEIC, and another group: additional groups also weighed in with opinions and proposals.[20] Workshop participants and the PSB weighed all of these before reaching conclusions.

The PSB concluded that the reasonably available cost-effective energy efficiency potential is higher than that which could be acquired by the current electric EEU budget level, and that the budget level should therefore be increased. However, the PSB noted concerns that it takes time to ramp up programs cost-effectively and thoughtfully. It especially noted concerns that increases in the EEC would provide hardships for Vermont businesses and low-income residents during a difficult economic

17 These procedures are described in the Process and Administration of an EEU Order of Appointment, December 20, 2010.

18 Vermont PSB, "Order RE: Energy Efficiency Utility Electric Budgets for Demand Resources Plan," August 1, 2011, available on the PSB's website.

19 Ibid. page 4.

20 Page 20 of the PSB's August 2011 "Order RE: Energy Efficiency Utility Electric Budgets for Demand Resources Plan," compares the different proposals.

period. As shown in Figure 8 2, an expanding energy efficiency acquisition program usually involves increasing ratepayer and participant costs over the short-term, to cover upfront investment costs, albeit with a strong, long-term net payback in reduced electricity costs from both lower-than-base-case tariffs and good returns on participant investments. As described in the PSB Order, "In this respect, investing in efficiency is similar to investing in a retirement account — viewed from a long-term perspective, the best approach is to invest today the maximum amount allowable; however, during difficult economic times many people cannot afford to do so." Accordingly, the budgets of VEIC and BED were increased significantly (see Table 8-3), but less than desired by some participants.

PROGRAM OFFERINGS AND IMPLEMENTATION

Efficiency Vermont divides its program offerings into the residential and business sectors. The business sector includes both commercial and industrial businesses. Efficiency Vermont programs provide financial incentives and technical assistance, with an emphasis on cost sharing. Programs contain initiatives to assist customers in the design of more efficient new facilities (especially homes and commercial buildings), but programs to support energy conservation retrofitting or adoption of more efficient appliances and products or equipment are dominant. Efficiency Vermont has programs with trade allies, to promote large-scale market penetration of efficient technologies. Electricity efficiency acquisition programs remain the mainstay at Efficiency Vermont. However, the new heat and process fuel efficiency efforts are growing, and include offerings for both businesses and residences, albeit with far more limited resources.

Programs for businesses have contributed over half of the electricity efficiency acquired during 2009-2011, and have accounted for about two-thirds of program costs.[21] Programs for existing facilities accounted for almost 85% of reported electricity savings and over 90% of program costs during 2009-2011, whereas the programs for new construction accounted for the balance.

Industrial Programs. Efficiency Vermont's programs for industrial customers include technical assistance for auditing, project development, energy management, and employee energy efficiency awareness, as well as financial incentives for customized energy efficiency projects and for prescriptive, common-technology applications. Customized projects are by far the dominant source of efficiency acquisition, accounting for perhaps 90% of the industrial project total. Efficiency Vermont's experience in assigning account managers to large customers has been very favorable. Approximately six account managers currently cover large industrial customers, developing multi-year assistance relationships with their clients, and providing skills in areas such as finance and business, as well as technical expertise for addressing complex projects and challenges. Account managers are at liberty to negotiate financial incentive and cost-sharing levels. A key emphasis is to partner with customers to create a portfolio of opportunities that can be incorporated into industry planning processes. Account managers may also engage consultants for specific technical tasks, for which costs may be shared with clients.[22]

Efficiency Vermont launched an Energy Leadership Challenge in July 2011. Under this challenge, customers are asked to commit to saving 7.5% of their energy use over a two-year period.[23] Efficiency Vermont provides special technical assistance to these customers, especially on energy management and employee engagement, with a view to generating continuous improvement programs that can be synchronized with ISO 50001 in the future. More than 60 of the top 300 large energy users in the state signed up in the first six months.[24]

MONITORING AND VERIFYING SAVINGS

Monitoring and verification of energy savings, peak load reduction, and total resource benefits have been key mandated parts of Vermont's EEU program, to ensure accountability, allow adequate planning, and as a requirement for the EEU performance-tied compensation system. Vermont law requires the PSB to provide for the independent evaluation of programs delivered by the EEUs funded through the EEC. The PSB appointed the state government's Public Service Department (PSD) to undertake this function. The PSD has evaluated the achievement on performance indicators of the EEUs from 2000-2008, using consul-

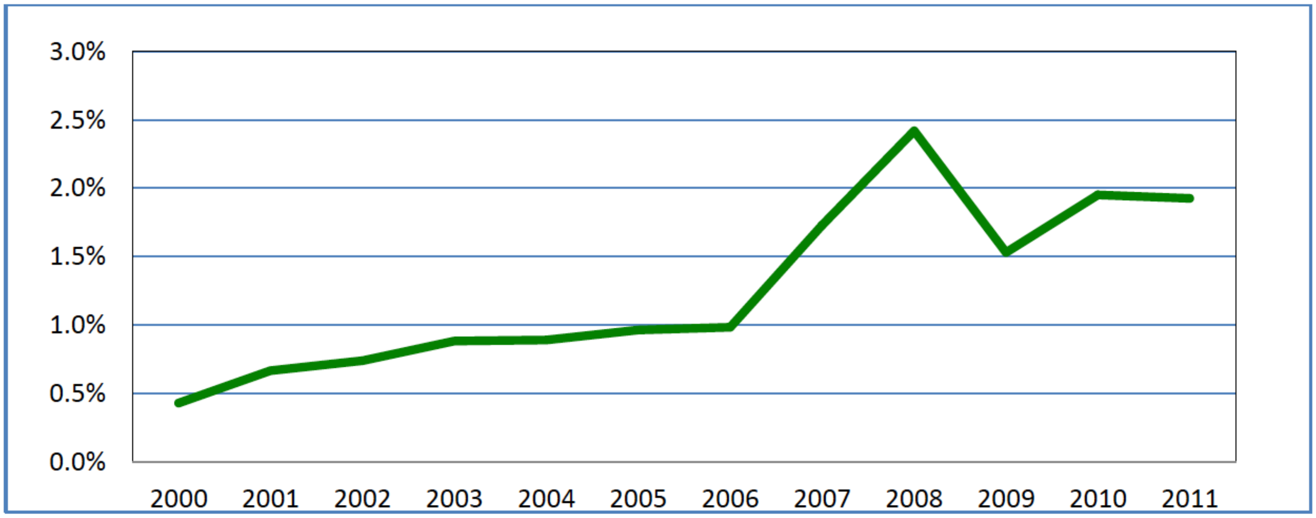
21 The original plan for 2009-11 was for business programs to contribute 63% of electricity savings, but the economic downturn made it more difficult to book savings. VEIC's (unconfirmed) savings claims for 2009-11 are provided in its 2011 Savings Claim Report (April 2012).

22 Efficiency Vermont Annual Plan 2011, personal communication with VEIC staff.

23 Savings rates of 2-2.5% have been more typical for large Efficiency Vermont customers in the past.

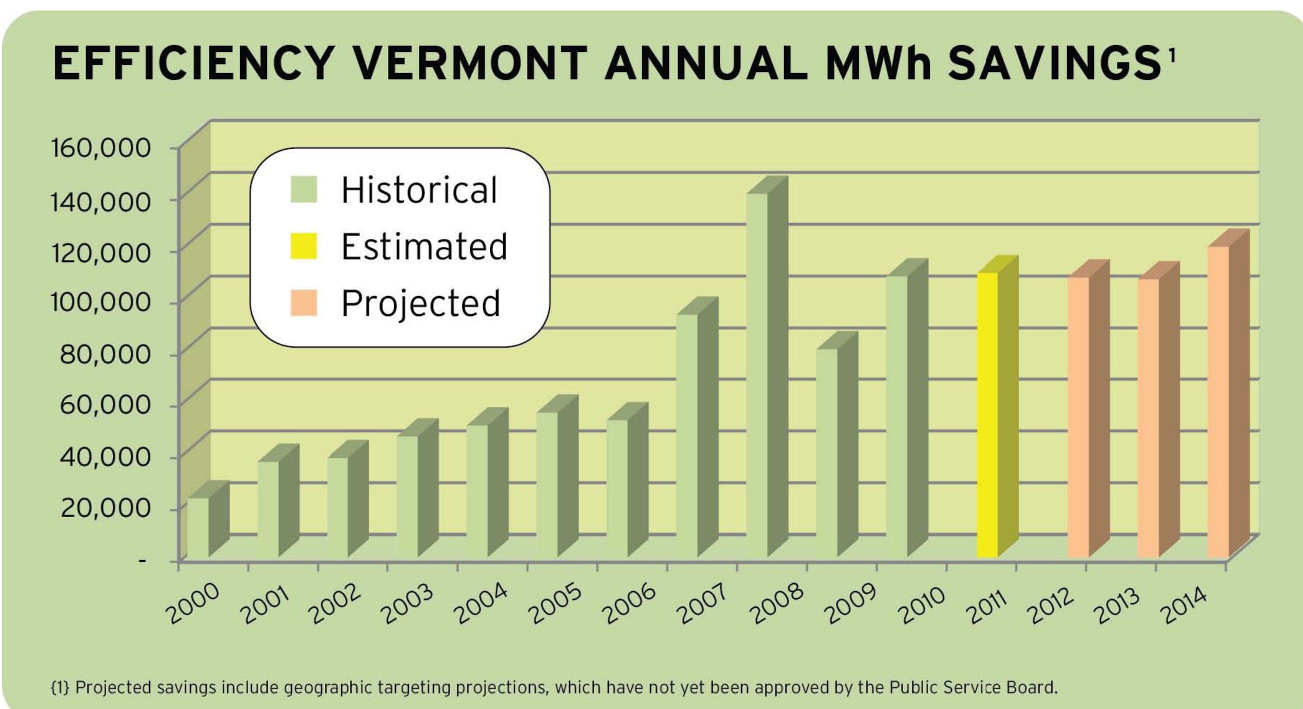
24 Efficiency Vermont website, personal communication with VEIC staff.

FIGURE 8-3: Efficiency Vermont's Electricity Efficiency Acquisition Compared to State-Wide Electricity Resource Requirements, 2000-2011



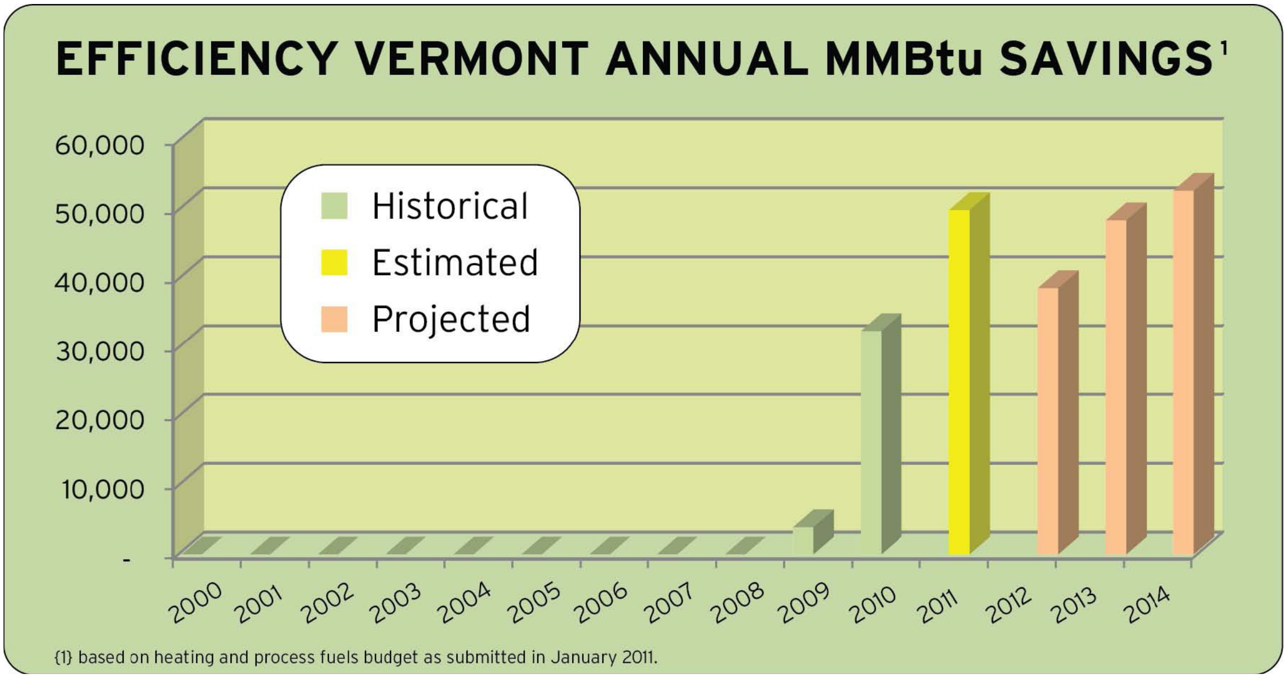
SOURCE: Efficiency Vermont, 2011 Savings Claim (April 1, 2012)

FIGURE 8-4: Efficiency Vermont Annual MWh Savings



SOURCE: Efficiency Vermont 2012 Annual Plan

FIGURE 8-5: Efficiency Vermont Annual mmBtu Savings



SOURCE: Efficiency Vermont 2012 Annual Plan

tant assistance. The DPS also has prepared for the evaluation of the 2009-2011 program cycle, with full details described in its 2009-2011 Electric Energy Efficiency Evaluation Plan.

The evaluation of VEIC's claimed savings and performance by the PSD is by no means perfunctory. As just one example, the Department's verification activity for 2008 resulted in numerous adjustments to original claims, both upward and downward. The result in that case was a reduction in electricity savings claims by 4.3% and of coincident peak savings in winter and summer of 6.8% and 6.4%, respectively. Reported performance in Efficiency Vermont's 2008 Annual Report was adjusted accordingly.[25]

Monitoring and verification procedures for the new Appointment arrangement are laid out in the Procedure and Administration document.[26] The PSD is required to certify to the Board annual progress toward QPIs and EEU performance relative to budget expenditures, and to provide full assessments for each three-year cycle. The EEUs are required to establish and maintain a Technical Reference Manual (TRM) that provides up-to-date documentation on all measure and program assumptions and algorithms used to calculate savings for prescriptive energy savings measures.[27] For customized measures or projects, EEUs are required to keep careful documentation. The PSD reviews, via on-site sampling, Efficiency Vermont projects it chooses randomly to inspect. The customized project monitoring and verification procedures (including metering installed by Efficiency Vermont) also must meet requirements for continued participation in the ISO New England Forward Capacity Market, in order for those demand resources to be bid by VEIC into the market.

DELIVERED SAVINGS AND RESULTS

As shown in Figure 8-3, Efficiency Vermont's electricity efficiency acquisition efforts recently have averaged about 2% of the state's total electricity resource needs each year. In 2011, Ef-

25 Vermont Department of Public Service, "Final Report to the Energy Efficiency Utility Contract Administrator on Verification of EVT 2008 Claimed Annual MWh Savings, Coincident Summer and Winter Peak Savings and Total Resource Benefit" (June 12, 2009).

26 Pages 10-13 in "Process and Administration of an Energy Efficiency Utility Order of Appointment," approved by the Vermont PSB, December 10, 2010

27 These manuals are available to the public on the Vermont PSD website.

ficiency Vermont added savings equivalent to 1.9% of electricity resource needs. Cumulatively, Efficiency Vermont has provided 11% of the state's electricity needs since 2000 — in other words, electricity supply requirements would have been 11% higher in 2011 than they actually were, due to the EEU's efforts.[28]

Efficiency Vermont reports its electricity savings in incremental electricity savings capacity delivered per year (see Figure 8 4). In recent years it has also reported heating and process fuel savings capacity delivered per year (Figure 8 5). The EEU also reports its performance on peak load, total resource benefits, and other performance indicators. The key cost-effectiveness metric is total resource benefits, which includes estimates of avoided costs to the utilities, using methods and parameters approved by the PSB for the gross benefits, minus Efficiency Vermont and customer costs. Efficiency Vermont's average levelized cost for electricity efficiency delivered was about 3.1cents/kWh in 2008. This figure increased modestly to 3.8 cents/kWh in 2009 and 4.1 cents/kWh in 2010.[29]

During the 2003–2005 cycle, Efficiency Vermont delivered electricity efficiency savings of 153 GWh per year over the three years, equivalent to 128% of its target. During 2006–2008 the EEU delivered savings of 287 GWh per year, equivalent to 110% of its target. Based on its unverified savings claims for 2009–2011, Efficiency Vermont reports delivered savings of 304 GWh, attaining of 83% of its original target. The recent shortfall against target is due to unforeseen effects of the economic downturn, which had a major impact on savings delivery in 2009. Savings delivery from the industrial program, in particular, fell short with the economic downturn. Progress in 2010 and 2011, however, showed improvement.[30]

28 Efficiency Vermont 2011 Savings Claim.
29 Vermont PSB, Order RE: EEU Electric Budgets for Demand Resources Plan, August 1, 2011, p. 22.
30 See Efficiency Vermont, Savings Claim 2011 (April 1, 2012), Excluding the consumer credit program, which was not applicable for the savings target, total savings during 2009–11 was 299 GWh.

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