Successful Strategies for Energy Efficiency

A Review of Approaches in Other Jurisdictions and Recommendations for Canada

August 2006

REPORT

the PEMBINA institute
Sustainable Energy Solutions

Alison Bailie • Roger Peters
Matt Horne • Kristin Zarowny

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The Pembina Institute creates sustainable energy solutions through innovative research, education, consulting and advocacy. It promotes environmental, social and economic sustainability in the public interest by developing practical solutions for communities, individuals, governments and businesses. The Pembina Institute provides policy research leadership and education on climate change, energy issues, green economics, energy efficiency and conservation, renewable energy, and environmental governance. More information about the Pembina Institute is available at http://www.pembina.org or by contacting: info@pembina.org

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1. Introduction

Increased energy efficiency means producing goods and services—such as comfortable buildings, appropriate lighting, food, transport, and manufactured goods for domestic or export sale—with less energy. Improving the productivity of how we consume energy provides Canadians with many direct benefits such as

- lower expenditures on energy leading to overall cost savings,
- reduced environmental impact by avoiding greenhouse gas and local air emissions associated with energy production and consumption,
- increased local economic development opportunities and associated new jobs,
- enhanced reliability of energy system,
- improved energy supply security, and
- reduced uncertainty from fluctuating energy prices.

Many studies have shown a significant potential for gains in energy efficiency in Canada,[1] but harnessing the potential is challenging. Some of the many diverse barriers to improved energy efficiency, include the following:

- Achieving gains in energy efficiency requires co-ordination among diverse organizations and individuals—for example, traditional energy suppliers such as utilities, regulators, builders, developers, government (federal, provincial, municipal and First Nations), equipment suppliers (wholesale and retail), equipment purchasers (businesses, home owners and renters). Ideally these parties can work together, but in reality they often have conflicting goals that limit energy efficiency improvements.
- The benefits of energy efficiency, as noted above, are generally dispersed over individuals and time. However, the costs of developing and implementing energy efficiency programs are more concentrated.
- Individuals and businesses may not have time or resources to find out about energy efficiency options. This lack of information could be regarding available technologies, the amount of expected savings, or the reliability of the service of an innovative product.
- Individuals and businesses that have information on energy efficiency options may still purchase inefficient options because they don't have the money available (due to limited budgets or fiscal policies of the company) to cover any incremental initial costs or because the energy efficiency option is not available in their market area.

A recognition of both the benefits of and challenges to energy efficiency improvements has led policy makers to develop strategies aimed at reducing these barriers. As technologies and markets change, anyone involved in developing such strategies needs to be vigilant to ensure that their efforts are leading to the desired goals and remaining effective. Energy efficiency programs

[1] Recent studies include the following: National Roundtable on Energy and the Environment. 2006. *Advice on a long term strategy on energy and climate change;* Torrie, Ralph. 2002. *Kyoto and beyond: The low emission path to innovation and efficiency;* Polestar Communications. 2003. *BC Hydro Conservation potential review 2002, Summary report.* Submitted to BC Hydro*; Marbek Resource Consultants,Habart and Associates Innes Hood Consulting,*2006. Terasen Gas *Conservation potential review;* Winfield, Mark, Matt Horne, Roger Peters, Theresa McClenaghan. 2004. *Power for the future: Towards a sustainable electricity system for Ontario.* Pembina Institute.

have been implemented throughout the world in the last twenty or so years—some successfully and some not.

This research looks at recent strategies that have been successful in other jurisdictions to improve all aspects of energy efficiency in buildings.[2] Section 2 provides historical estimates of energy efficiency accomplishments in Canada. Section 3 describes the common elements resulting from our review of six jurisdictions that are successfully acquiring energy efficiency. Summaries of these approaches are included in Appendix A. Section 4 contains recommendations for Canadian governments, utilities, utilities commissions and other organizations on methods of harnessing energy efficiency resources based on our analysis of successful strategies. Section 5 provides further information.

[2] Buildings include homes and commercial, institutional and industrial buildings, lighting, appliances and all other building-related energy using equipment. Strategies for improved energy efficiency for industry processes and transportation were beyond the scope of this research.

2. Energy Efficiency Accomplishments in Canada

Prior to considering future directions, it is helpful to understand recent trends in energy efficiency in Canada. This section discusses estimates of energy efficiency in Canada from a couple of sources. As these sources indicate, there is reason for concern that Canada's historic gains in energy efficiency are not being maintained.

While the energy efficiency of a piece of equipment can often be measured directly, it is difficult to estimate energy efficiency of a country, a province or even an individual. Energy is consumed to produce the huge variety of products and services that we use within our lives. Calculating the energy efficiency of an individual is exceedingly complex and estimates across individuals and over time would be impossible. However, indicators of how efficiently an economy uses energy to produce goods (e.g., tonnes of product), services (households or floorspace), or economic output (GDP) have been developed and used to compare countries with each other and over time.

Energy intensity is one such indicator, and is calculated as energy used per unit output (e.g., per $GDP, per capita, per household, per tonne of paper manufactured in a particular plant). In the simplest case, energy intensity is measured at an aggregate level as total energy consumed in the economy divided by total GDP. This indicator is simple to calculate but often masks underlying reasons for changes in energy consumption. For example, a country's energy/GDP indicator could change due to changes in the types of goods and services it produces, without any change in the energy efficiency of producing these products. Analysts have accounted for this challenge by calculating changes in energy consumption over time, then *decomposing* this into changes due to activity (amount of people, goods or services), structure (types of goods and services), and energy intensity (amount of energy consumed per particular goods and services). This decomposition approach allows energy intensity comparisons across time and countries.

In their publication *Oil Crises and Climate Changes: 30 Years of Energy Use in IEA Countries*,[3] the International Energy Agency has used a decomposition approach to estimate the impact of energy intensity of 11 countries from 1973 through 1998. For this report, changes in energy intensity calculated independently of changes in activity (production of goods and services, accounting for population and economic growth) and changes in structure (the type of goods and services). In the period 1990 to 1998, Canada's energy intensity improved by 1.0% per year—greater than all but three countries listed in Table 1, below.

[3] International Energy Agency. 2004. *Oil crises and climate challenges: 30 years of energy use in IEA countries.* Paris: IEA.

Table 2.1 Decomposition of Changes in Energy Use, 1990–1998

Country	Energy Demand 1990– 1998	Activity 1990– 1998	Structure 1990– 1998	Intensity 1990– 1998–
Australia	1.8%	2.3%	0.1%	-0.4%
Canada[4]	**1.2%**	**2.2%**	**0.1%**	**-1.0%**
Denmark	1.0%	1.2%	0.2%	-0.3%
Finland	1.1%	2.2%	0.2%	-1.2%
France	0.8%	1.3%	0.4%	-0.8%
Germany	0.8%	0.9%	0.6%	-0.7%
Italy	0.6%	1.4%	0.4%	-1.1%
Japan	1.7%	0.8%	0.2%	0.9%
Netherlands	1.9%	1.7%	0.6%	-0.2%
Norway	1.0%	2.0%	0.5%	-1.2%
Sweden	0.4%	1.8%	-0.3%	-0.7%
United Kingdom	0.5%	0.9%	0.3%	-0.6%
United States	1.7%	2.5%	0.2%	-1.0%
IEA-11	1.4%	1.9%	0.3%	-0.7%

Source: International Energy Agency. 2004. *Oil crises and climate challenges: 30 years of energy use in IEA countries.* Paris: IEA

However, analyses by the Canadian government indicate that these improvements have declined in recent years. Natural Resources Canada (NRCan) also performs a decomposition analysis of energy trends in Canada[5] to separate the contribution of energy efficiency from activity, weather, structure and service level.[6] The information on changes due to energy efficiency[7] is shown in Figure 2.1. The cumulative impacts of energy efficiency in Canada have been relatively strong in the period 1990–2003. However, the annual contribution of energy efficiency to lowering total energy consumption has been variable and has been decreasing since 1997.[8] NRCan provides a number of suggestions for the reduced annual contribution of energy efficiency in recent years by looking at individual sectors, including

[4] The data reflect that, from 1990 to 1998, Canada's energy demand increased by an average of 1.2% per year. Increases in both population and production of goods and services, *without any change in types of goods and services produced or energy used for production*, would have led to an increase in energy demand of 2.2% per year. The change in the mix of goods and services from 1990 to 1998, *without any change in the amount produced or the energy used for production*, would have led to an increase in energy demand of 0.1% per year. This analysis indicates that energy efficiency (of production equipment or processes) in the entire Canadian economy *decreased* the energy demand in that period by 1% per year. Thus, increased energy productivity was able to counter about half of the energy increases needed for increased production.

[5] Natural Resources Canada. 2005. *Energy efficiency trends in Canada, 1990 to 2003.* Gatineau, QC: NRCan.

[6] Service level covers the level of auxiliary equipment (e.g., computers, fax machines, photocopiers) in the commercial and institutional sector.

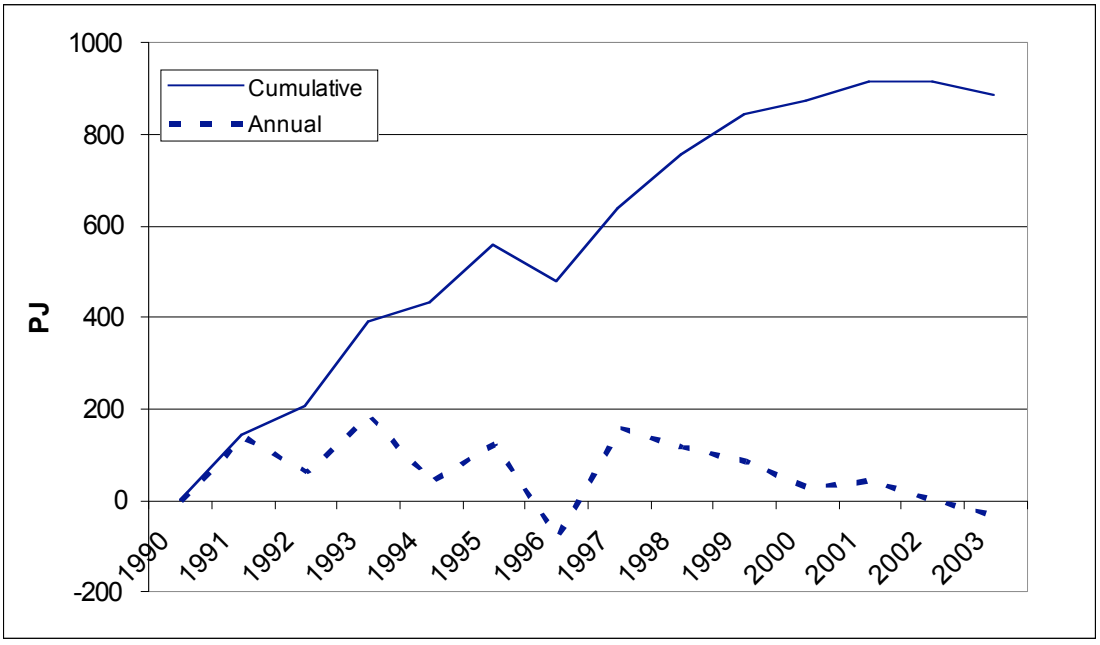
[7] NRCan uses the term "energy efficiency" in its report. In this context it is comparable to the term "energy intensity" in the IEA report. In both cases, energy efficiency/intensity encompasses changes due to fuel switching as well as due to more energy efficient production.

[8] The negative values for annual energy efficiency improvements in 1996 and 2003 indicate that more energy was consumed in those years to produce similar amounts of products and services, after accounting for changes in weather. This could be caused by use of less energy efficient equipment, such as larger cars.

- fuel switching in the commercial sector from natural gas to fuel oil (as natural gas prices spiked),
- decreased capacity utilization in the industrial sector and increases in energy intensity of particular industries (upstream mining and smelting and refining), and
- lack of improvements in fuel efficiency of new cars and light trucks since 1985 (this translates into the lack of improvements in energy consumption for all vehicles (new and old) since 1994).

Quantitative estimates of the contribution of each of these suggestions are not included in the NRCan analysis.

Figure 2.1 Energy Efficiency Improvements in Canada, 1990–2003, Cumulative and Annual



Source: Authors' calculation based on information from Natural Resources Canada. 2005. *Energy efficiency trends in Canada, 1990 to 2003*. Gatineau, QC: NRCan

NRCan does not separate the impacts of energy efficiency strategies in its analysis from other drivers of energy efficiency change. For example, a business might invest in a more efficient manufacturing process due to a change in its own fiscal policies or for some other reason not attributable to any external energy efficiency strategy. A full analysis of the components driving the year-by-year change in energy efficiency is beyond the scope of this paper. However, the trend of the decreasing contribution of energy efficiency in the Canadian economy combined with evidence of the significant energy savings that are possible[9] encouraged us to consider the motivations and approaches taken by other jurisdictions that are actively promoting energy efficiency.

[9] Recent studies include the following: National Roundtable on Energy and the Environment. 2006. *Advice on a long term strategy on energy and climate change;* Torrie, Ralph. 2002. *Kyoto and beyond: The low emission path to innovation and efficiency;* Polestar Communications. 2003. *BC Hydro Conservation potential review 2002, Summary report.* Submitted to BC Hydro*; Marbek Resource Consultants,Habart and Associates Innes Hood Consulting,*2006. Terasen Gas *Conservation potential review;* Winfield, Mark, Matt Horne, Roger Peters, Theresa McClenaghan. 2004. *Power for the future: Towards a sustainable electricity system for Ontario.* Pembina Institute.

3. Successful Strategies

For this paper, we reviewed a range of innovative approaches to increasing energy efficiency that have been undertaken by states, regions and other countries. Our choice of jurisdictions to include in this review was based on best practice evaluations and awards undertaken by organizations such as the American Council for an Energy Efficient Economy, the International Energy Agency, and various electricity and gas utility groups. Based on this, we looked at California, New York, the Pacific Northwest, Texas, Vermont, and the United Kingdom. Appendix A contains summaries for each of these regions providing more information on each region and how the strategies have been combined. Reviewing these successful energy efficiency strategies revealed the following common set of key elements:

- **Showing leadership in making energy efficiency a priority resource in energy policy.** Part of the challenge of increasing energy efficiency is developing co-operation among the many actors that are involved by addressing conflicts and building on synergies. A crucial step is leadership from high-level actors, including governments or planning agencies with wide impact. Jurisdictions that have undertaken successful energy efficiency strategies often have demonstrated long-term commitment by recognizing the many benefits of energy efficiency in broad-ranging energy planning and policy documents.
- **Setting legally binding targets for energy savings** (e.g., kWh or GJ saved each year). Setting annual targets for large natural gas and electric utilities is an underlying component of innovative programs in several regions. By setting targets, with strong financial disincentives for failing to meet the energy savings, regions are better able to track and measure success and adjust plans as needed. A few regions are now experimenting with improving the cost-effectiveness of meeting energy efficiency targets by using tradable certificates. These certificates allow utilities additional flexibility in meeting the targets and can also expand the market for delivering energy efficiency programs to non-utility providers.
- **Providing financial and institutional structures to deliver energy efficiency.** It often takes several years after the start-up of energy efficiency programs before significant energy savings are achieved. Additional time is required to ensure that future energy efficiency opportunities are identified and achieved. The most effective strategies have provided for, i) long-term funding, ii) institutional structure to deliver the energy savings, and iii) specified input processes and review cycles for future updates to building codes, appliance standards, utility efficiency programs and other strategies.
- **Developing comprehensive programs.** To counter the different market and non-market barriers experienced by the many groups that influence energy efficiency decisions, jurisdictions have established programs that deliver a wide variety of services to each sector. The coverage includes different types of policy institutions and incentives (financial incentives for customers, suppliers and developers; pro-active delivery to customers; training for operators and retailers), integration of natural gas and electricity programs, and funding research and development activities. The type of program(s) used in each situation is matched to the specific barrier to be addressed.
- **Establishing measurement and verification (M&V) protocols**. On a regular basis, the most successful strategies provide all players with information on guidelines for measuring

> energy savings (before and after program implementation), incorporate aspects of independent verification, and revise future actions and programming based on the information provided. Establishing accepted protocols for M&V helps improve confidence in future estimates of energy savings and allows utilities and other program providers to provide consistent savings estimates at a lower cost than by having each actor develop their own methods for measurement.

Our review of the relatively small number of regions indicates that there is no single best approach. Most regions use a mix of some of the above characteristics plus adjustments to reflect differences in current markets, current legal requirements, particular environmental considerations, and each region's history. The following sections describe each of these elements in greater detail, provide examples of how these elements have been incorporated into existing programs in other regions, and offer warnings on how potential weaknesses could be exploited if not addressed early. Appendix A contains the summaries of the strategies used by region.

3.1 Leadership in Recognizing Energy Efficiency as a Priority Resource

A major goal of energy planning, particularly electricity planning, is ensuring that energy demand and supply are balanced. Imbalance can lead to high prices, lack of energy, and instability throughout the economy. During the late 1980s and early 1990s, energy efficiency was starting to be recognized as a key part of the planning process but this recognition decreased when states and provinces began to focus on deregulation.[10] Capturing the potential of energy efficiency in today's mix of regulated and unregulated markets means, first, recognizing its non-monetized benefits during energy planning and, second, ensuring that energy efficiency works in the current market environment. Many U.S. states and EU members have recognized this dynamic market and have made appropriate policy changes.

One key element of success of the energy efficiency strategies reviewed for this paper has been an overall recognition of the importance of energy efficiency as a significant resource. California, the Pacific Northwest, and the United Kingdom have all ruled energy efficiency as integral to meeting their energy system goals and helping overcome barriers. This recognition of energy efficiency is demonstrated in the following quotes from planning documents:

> Energy efficiency is the resource of first choice for meeting California's energy needs. Energy efficiency is the least cost, most reliable, and most environmentally-sensitive resource, and minimizes our contribution to climate change. California's energy efficiency programs are the most successful in the nation and we want to continue to build upon these successes.

[10] In anticipation of increased competition and recognizing the uncertainty of a de-regulated market, many electric utilities reduced discretionary spending, including energy efficiency programs. Also deregulation reduced or dropped requirements such as integrated resource planning or rate of return regulations, which had provided incentives for energy efficiency in the past. Greater reliance on the market for setting electricity prices led to increased incentives for utilities to seek profit by increasing electricity sales. (Gillingham, Kenneth, Richard Newell, and Karen Palmer. 2004. *Retrospective examination of demand-side energy efficiency policies*. Washington, DC: Resources for the Future.)

– California's Energy Action Plan II (2005), p. 3[11]

> The plan shall, as provided in this paragraph, give priority to resources that the Council determines to be cost-effective. Priority shall be given: first, to conservation; second, to renewable resources; third, to generating resources utilizing waste heat or generating resources of high fuel conversion efficiency; and fourth, to all other resources.
>
> – Pacific Northwest Electric Power Planning and Conservation Act (16 U.S.C. §§ 839-839h, December 5, 1980)[12]

> We have four goals for our energy policy:
>
> 1. To put ourselves on a path to cut the UK's carbon dioxide emissions— the main contributor to global warming—by some 60% by about 2050, as recommended by the RCEP, with real progress by 2020;
> 2. To maintain the reliability of energy supplies;
> 3. To promote competitive markets in the UK and beyond, helping to raise the rate of sustainable economic growth and to improve our productivity; and
> 4. To ensure that every home is adequately and affordably heated.
>
> Energy efficiency is likely to be the cheapest and safest way of addressing all four objectives, while also strengthening energy security and improving our industrial competitiveness as we develop cleaner technologies, products and processes.
>
> – United Kingdom White Paper on Energy[13]

These jurisdictions have then developed plans with specific energy efficiency goals and actions for meeting the goals.

In the US, utility-driven energy efficiency programs experienced a large drop in funding and achievements during the period when many states were deregulating the electricity sector (roughly 1995–2002). Recently, however, various electric and natural gas utilities, governments, and partner organizations have recognized a need for an aggressive new national commitment to energy efficiency. The Leadership Group, comprising over 60 leading gas and electric utilities, state agencies, energy consumers, energy service providers, and environmental/energy efficiency organizations are developing an Energy Efficiency Action Plan to achieve this goal.[14] One of the tasks of the Leadership Group was to review best practices of energy efficiency strategies at the institutional and program level. This group recognizes that different practices have led to

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[11] http://www.energy.ca.gov/energy_action_plan/2005-09-21_EAP2_FINAL.PDF, accessed April 2006

[12] http://www.nwcouncil.org/library/poweract/default.htm, accessed April 2006

[13] UK Energy White Paper. 2003. *Our energy future: Creating a low carbon economy.* http://www.dti.gov.uk/files/file10719.pdf, accessed June 2006.

[14] http://www.epa.gov/cleanenergy/eeactionplan.htm, accessed February 2006

different accomplishments—in terms of energy savings, cost effectiveness and public buy-in—and is striving to learn from these experiences in developing the Action Plan.

3.2 Legally Binding Energy Saving Targets

Legally binding targets for energy savings have been implemented in several jurisdictions to help ensure energy efficiency improvements. The targets are energy savings levels for the future for each energy utility and include some type of financial disincentives for failure to meet the target. The details of these programs vary widely—who sets the targets, how are they defined, what programs/activities qualify to meet the targets, who verifies energy savings, what are the incentives and disincentives. Although the definitions of different program types are not well established, we break the existing examples into two groups: (i) Energy Efficiency Targets for utility programs where each utility must meet the targets through energy savings from its own customers and (ii) Energy Efficiency Resource Standards for programs where a utility can meet its targets either by energy savings from its own customers or by purchasing energy savings credits from a market.

3.2.1 Energy Efficiency Targets by Utility

Typically these activities take the form of agencies, such as utilities commissions working with the utilities and the public, determining annual energy savings targets for the utilities for future years. The agencies develop guidelines for estimating the energy savings based on utility activity (self-reported and/or independently verified). The utilities or other energy efficiency delivery agency use the guidelines to report their energy savings. The utilities receive financial incentives if they exceed the targets and typically face financial penalties for not reaching the goals. These incentives and penalties can be worked into the rate calculation at regulatory hearings. The targets are reviewed and updated periodically (typically every three years). For the examples we reviewed here, the goals have been met or exceeded and targets have been increased in subsequent periods.

Texas was one of the first jurisdictions to introduce energy savings goals by utility. As part of the Texas Restructuring Act 1999, the state required electric utilities to meet 10% of their annual growth in demand through energy efficiency. The Public Utilities Commission of Texas was tasked with adopting rules and procedures and with ensuring the goals were met by January 2004. These goals were met by the utilities and discussions are underway to determine whether to increase the goal to 50% of annual growth.[15]

Other examples of mandated energy savings goals are as follows (further information is provided in Appendix A):

- California's requirements from Investor Owned Utilities starting in 2006
- United Kingdom's Energy Efficiency Commitment, which has met its goals for the 2002–2005 period and doubled these goals for the 2006–2008 period
- Vermont's *Efficiency Vermont*, which is an independent delivery agency for providing energy efficiency that is under contractual agreement to provide annual energy savings.

[15] Nadel, Steve. 2006. *Energy efficiency resource standards: experience and recommendations*. American Council for an Energy Efficient Economy. Washington, DC. ACEEE report E063.

Fortis BC, Terasen Gas in BC and Enbridge in Ontario are examples of this type of program in Canada.[16] Further analysis is required to compare the levels of financial incentives for these utilities and those in other jurisdictions. Initial indications are that the incentives for both Fortis BC and Terasen Gas are low.[17]

3.2.2 Energy Efficiency Resource Standards

Energy efficiency resource standards (EERS) are a new twist on energy efficiency targets. They include greater flexibility to meet energy savings targets at the least cost by using a market-based trading mechanism. Each participating utility has an energy efficiency target to meet; those utilities that exceed their targets are able to sell their excess "energy savings" to utilities that do not meet their targets. This flexibility allows greater potential for the market to determine the lowest cost savings and is based on the success of the SO_2 emissions trading program[18] in the U.S, and renewable energy certificate programs (RECs) issued to help meet renewable energy targets. The market for energy savings certificates could also include the voluntary market consisting of individuals, organizations and socially responsible corporations wishing to "green" their energy purchasing. Analysis of EERS programs based on empirical evidence is not available since most trading programs have only begun recently.

Regions to watch in the US include Pennsylvania, Hawaii and Nevada, where energy efficiency has been included in renewable portfolio standards.[19] New Jersey has developed conceptual drafts for energy savings requirements, which could include trading. In Europe, Italy has energy savings targets for gas and electric utilities[20] with provisions for trading in "white" energy efficiency certificates and expectations of a robust trading program. France has set three-year targets covering 2006–2008 and is working on developing a wide market for energy efficiency certificates. For example, French regulators are developing lists of actions by non-utility actors that can qualify for meeting the targets, including transport energy savings (even though transport fuel suppliers are not subject to the targets). The French regulators are also proposing to further encourage an active trading market for energy efficiency certificates by publishing the certificate prices and sellers.[21]

Jurisdictions interested in developing targets will need to consider a number of questions, among them the following:

- How will the targets be developed? What entities will be covered?
- What type of administration should be used?
- Should trading be included?
- How should savings be monitored and verified?
- How do targets for utilities relate to other energy efficiency policies?

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[16] Examples of DSM incentives in Canada are provided at http://www.pembina.org/pubs/pub.php?id=174

[17] Violette, D. and R. Sedano. 2005. *Demand side management: Determining appropriate spending levels and cost effectiveness testing*. *Appendix A.* Prepared for the Canadian Association of Members of Public Utility Tribunals. Also, Mark Hartman, personal communication, March 2006.

[18] See for example, Burtraw, Dallas. 1996. *Cost savings sans allowance trades? Evaluating the SO2 emisison trading program to date.* Resources for the Future. Washington, DC.

[19] Renewable portfolio standards (RPS) set minimum levels of renewable energy generation for each utility. Utilities are able to meet these minimum requirements through either their own renewable generation or purchasing renewable credits from utilities whose renewable generation exceeds the minimum. Twenty states currently have RPS in place.

[20] http://www.ewc.polimi.it/

[21] Nadel, Steve. 2006. *Energy efficiency resource standards: experience and recommendations*. American Council for an Energy Efficient Economy. Washington, DC. ACEEE report E063.

The recent paper from the American Council for an Energy Efficiency Economy, *Energy Efficiency Resource Standards: Experience and Recommendations*,[22] describes the concerns and potential answers associated with developing EERS. The crucial challenge of measuring and verifying energy savings is discussed further in section 3.4.

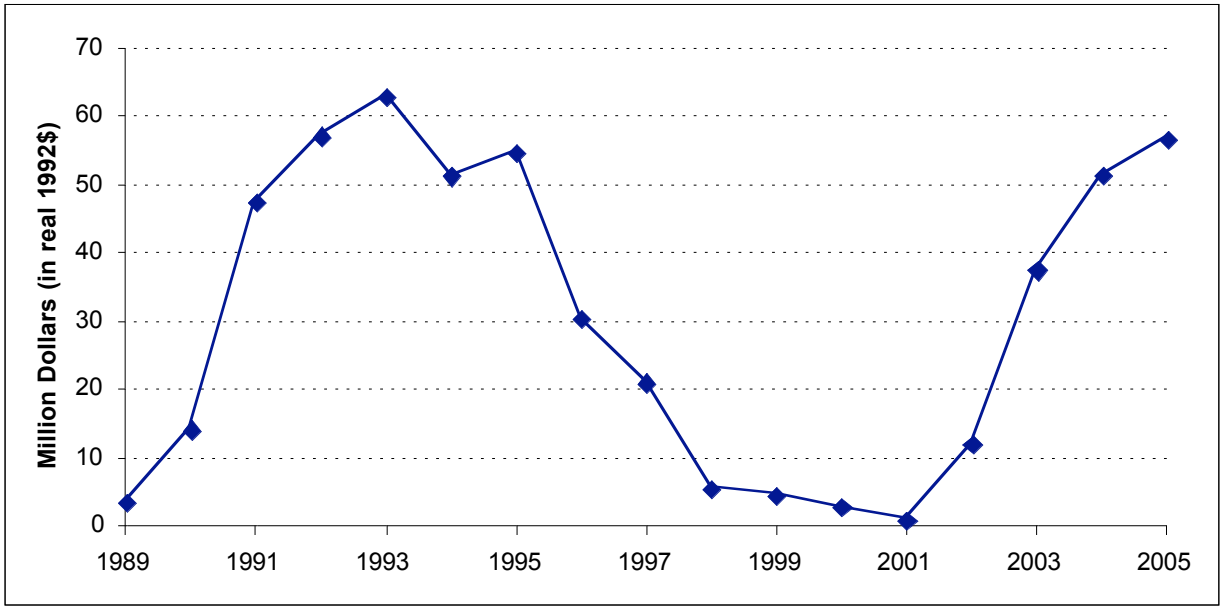
3.3 Financing and Institutional Structures for Energy Efficiency

Recognizing the potential for energy efficiency as a resource and setting targets for future energy savings are key steps, but effectively capturing the resource requires a specific funding and management infrastructure. Key components of the infrastructures used by successful programs are long-term funding, dedicated agencies for program delivery, and regular cycles to review the resource and update its contribution.

3.3.1 Long-term Funding

In the past, energy efficiency programs have suffered from inconsistent levels of attention, funding and resources.Figure 3.1 illustrates the significant inconsistency that BC Hydro's staff has faced in developing programs. This same fluctuating pattern has been faced by many other utilities in Canada and the U.S.

Figure 3.1 Expenditure on Demand Side Management by BC Hydro, 1989–2005



Source: BC Hydro Annual Reports, 1989–2005 as provided by Nic Rivers, MK Jaccard and Associates. Conversion to 1992 by authors based on BC Consumer Price Index reported on BC Public School Employers' Assocation[23]

[22] Nadel, Steve. 2006. *Energy efficiency resource standards: experience and recommendations*. American Council for an Energy Efficient Economy. Washington, DC. ACEEE report E063.

[23] http://www.bcpsea.bc.ca/public/research/research.html, accessed August 2006

Seventeen states in the U.S. have developed public benefits funds (PBFs, also called systems benefit charges or wires charges) to provide a consistent source of money for energy efficiency and renewable energy programs.[24] States were motivated to implement these funds by, among other issues, both the drop in funding for public benefits that was associated with electric sector deregulation and the large annual variation in funding for energy efficiency programs, when funded through electric utilities. A small adder is charged on consumers' electricity and/or gas bills; the charge is collected by the utilities for the government or other agency that has responsibility for allocating the funds. The annual amount collected is relatively consistent so that if the agency chooses to allocate the same amount to energy efficiency each year, a more consistent level of funding can be established.[25] This consistency can enable energy efficiency delivery agencies to hire and train staff and develop programs that require longer implementation times.

Both Vermont and New York have developed strong energy efficiency programs through public benefits funds. Vermont uses an independent delivery agency and is described in Section 3.3.2 below. New York established its PBF in 1996 with four goals: i) improve system reliability, ii) improve energy efficiency and access to energy services, iii) reduce environmental impacts, and iv) facilitate competition. The PBF helps fund the Energy $mart programs of the New York State Energy Research and Development Agency (NYSERDA). NYSERDA's evaluations of the programs indicate that they have

- reduced electricity use by about 1,340 GWh per year; annual savings are expected to reach 2,700 GWh annually when the program is fully implemented.
- generated $185 million in annual energy bill savings for participating customers, including electricity, oil and natural gas savings from energy efficiency and peak load management services.
- created 3,970 jobs annually; the average net gain is expected to reach 5,500 jobs per year during the eight years of program implementation from 1998 to 2006.
- reduced nitrogen oxide (NOx) emissions by 1,265 tons, sulphur dioxide (SO_2) emissions by 2,175 tons, and CO_2 emissions by 1 million tons (the equivalent amount of energy required to power about 850,000 homes) (NYSERDA, 2004).

California and Wisconsin are also examples of states with strong energy efficiency programs supported by PBFs.

3.3.2 Responsible Agency with Well-defined Mandate

Using PBFs has allowed states greater flexibility in the type of agency used to deliver energy efficiency programs. Rather than relying exclusively on utilities, several states have developed independent agencies dedicated to delivering energy efficiency. The Oregon Energy Trust[26]

[24] US EPA. 2006.***Clean Energy-Environment Guide to Action: Policies, Best Practices, and Action Steps for States.***

[25] Depending on the program design in a state, the money collected through a PBF could also fund other public benefits such as incentives for renewable energy, payment help for energy bills of low income earning households, or research and development funding.

[26] www.energytrust.org

(independent non-profit), Wisconsin's Focus on Energy[27] (private–public partnership), and NYSERDA[28] (state agency) are all examples of non-utility agencies used to implement energy efficiency. Dedicated agencies are able to provide a "one-stop shop" for energy efficiency program information and program delivery. An agency that is independent of the utility can also avoid any real or perceived conflicts of interest.[29] The key objective is to have an agency that can deliver comprehensive energy efficiency programs itself, coordinate the delivery by third parties, or oversee energy efficiency programming and planning.

Vermont developed an innovative approach to delivering energy efficiency through an independent "energy efficiency utility" funded by its public benefit charge. Efficiency Vermont has garnered awards and recognition from around the country, winning the prestigious Innovations in American Government Award from Harvard's Kennedy School of Government. In 1999, Vermont legislation gave the Public Services Board (PSB) the authority to create the nation's first "energy efficiency utility," an independent institution to provide energy efficiency services state-wide. The PSB created Efficiency Vermont and contracted Vermont Energy Investment Corporation (VEIC) to administer the utility. The contract with the PSB contains negotiated performance measures for the Efficiency Vermont contractor, and provides an incentive of 2.9% of the contract value if the contractor attains 100% of the performance results. The performance contract specifies 35 measures of performance including three types of performance indicators: program results, activity milestones, and market effects. Most of the incentive award is for electric energy savings and the economic value of all resource savings.

Building on the success of Efficiency Vermont, a bill was introduced to the Vermont legislature in 2006 to establish a universal thermal energy efficiency program for heating oil, based on the structure used for Efficiency Vermont. New Brunswick has recently developed an electricity efficiency utility, Efficiency New Brunswick, also based on the Vermont example, but without consistent funding through a PBF.

3.3.3 Specified Input Process and Review Cycles for Regulations

The most common regulations for energy efficiency are appliance standards and building codes that specify requirements such as maximum energy consumption for appliances or minimum insulation levels for buildings. While the responsibility of different actors is typically clearly defined in the final regulations, the responsibility of different actors in developing the codes and standards often varies across regions and can significantly impact the energy savings of the regulations. Successful strategies have well-defined processes for gathering input during regulation development, as well as specified review cycles. These two elements ensure that the most up-to-date information is collected from a range of energy efficiency stakeholders and fed into the development process for appliance standards and building codes. The same elements could also benefit other energy efficiency activities, such as binding targets for energy savings and other utility energy efficiency programs.

[27] www.focusonenergy.com

[28] www.nyserda.org

[29] Since a primary method for an energy utility to make money is by selling energy, there are concerns that successful energy efficiency programs would lead to lower energy sales thus leading to a conflict within the company.

The California Statewide Codes and Standards Advocacy program received Exemplary Program recognition from the American Council for an Energy Efficient Economy:

> This program provides an excellent example of encouraging the collaboration of utilities, standards setting agencies, private sector consultants, industry and environmental stakeholders. This program also shows how good building science research can influence public policy.[30]

As part of the program, utilities and local agencies have developed programs to encourage the use of more energy-efficient home design and appliances through financial incentives (e.g., ENERGY STAR homes). Through these regular review cycles and evaluations of existing regulations, utilities, government agencies, consultants and other interested parties are able to build on the previous experiences to determine appropriate technologies, design guidelines and timing for updates to building codes and appliance standards.

California's leadership in appliance standards has raised the bar for other states and the U.S. federal government. Connecticut, Maryland and New York are developing appliance standards that harmonize with those in California. According to the Appliance Standards Awareness Project website,

> Since 2004, ten states (Arizona, California, Connecticut, Massachusetts, Maryland, New Jersey, New York, Oregon, Rhode Island, and Washington) have established new energy-saving standards covering between five and thirty products, most through new state legislation. In August, 2005, Congress took its cue from the states and made 15 of these state standards federal law.[31]

Building Energy Codes in Canada and the United States

Canada and the U.S. differ significantly in their approaches to setting guidelines for energy efficiency requirements in building codes, and subsequently in the number of provinces or states that have updated building energy codes.

Only two Canadian provinces have energy efficiency requirements in their building codes: British Columbia and Ontario. Ontario released a code update in 2006 that includes greater energy efficiency requirements to be phased in between 2007 and 2012, but this is the first advancement to the energy efficiency portions since 1992. British Columbia's Building Code was updated in 1994 to include minimum insulation levels for residential buildings. British Columbia does not have energy provisions in the commercial building code and no further updates have been made to the residential building code. The Canadian Commission on Building and Fire Codes released the Model National Energy Code for Housing (MNECH) and the Model National Energy Code for Buildings (MNECB) in 1997. While these codes could provide a standard for provinces or municipalities that want to include energy efficiency requirements in building codes, they were developed in the early 1990s and have not been updated to reflect new technologies, construction practices and costs.

In contrast, most American states have state-wide building energy codes; only nine states do not have state-wide residential codes and only ten states do not have state-wide commercial codes. Residential building energy codes have been updated in the last three years in 17 states and commercial building

[30] York, Dan and Martin Kushler. 2003. *America's Best: Profiles of America's Leadnign Energy Efficiency Programs.* American Council for an Energy Efficient Economy. Washington, DC. www.aceee.org/utility/16acodesstdsca.pdf

[31] http://www.standardsasap.org/press21.htm

energy codes have been updated in the last three years in over 20 states.

Several states have followed California's lead and now specify review cycles for the codes. California, Washington, Oregon, Utah and Idaho, among others, have requirements to review their building codes every three years. The reviews and updates of almost all states are based on either the ASHRAE/IESNA Standard 90.1, jointly developed by the American Society of Heating, Refrigerating and Air-conditioning Engineers and the Illuminating Engineering Society (commercial energy code) or the International Energy Conservation Code (IECC – for residential), developed by the International Code Council. Both codes are regularly updated through processes that enable input from a wide stakeholder group. These standards provide a well-defined and accepted starting point for states that want to establish or update their own codes. Recent updates to both ASHRAE 90.1 and the IECC have aimed to increase compliance by simplifying the code. The US federal government provides further motivation to states: in 1992, amendments to the Federal Energy Conservation and Production Act (ECPA) required that the federal Department of Energy review the most recent version of the IECC or ASHRAE 90.1 to determine if it provides energy savings. If the DOE makes a positive determination, states must review and adopt that version of the IECC or ASHRAE 90.1 (the most recent version for with the Department of Energy has made a positive determination for energy savings, currently 1999), or provide reasons to the Secretary of Energy for not making the updates.

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Mike Wilson, Community Energy Associations, personal communication, July 2006

United States

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US EPA. 2006. *EPA Clean Energy-Environment Guide to Action*. http://epa.gov/cleanenergy/pdf/gta/guide_action_chap4_s3.pdf

3.4 Comprehensive Set of Efficiency Programs

Energy efficiency is a widely distributed resource with diverse barriers and benefits. For example, lack of information on energy efficient opportunities and the ability to actually make improvements are often greater barriers for small businesses or low-income earners than for those with more resources to access the information and technical assistance. However, energy efficiency may provide greater benefits to these small or low-income customers if the dollars saved are higher relative to the business revenue or disposable income. Programs that are successful for one segment of the market may be completely irrelevant to another segment due to different energy service needs or response to delivery methods. Additionally, programs that focus on financial incentives for particular technologies will fail if the technologies and services are not provided by trained, competent retailers and contractors. Similarly, programs that focus on consumer education will fail if the construction and installation industry are not also educated and ready to implement the technologies. To achieve long-term success, energy efficiency organizations will benefit from having a portfolio of programs that work in coordination. The portfolio of programs will depend on the characteristics of the region and the barriers to be

addressed. The following subsections provide examples of approaches that jurisdictions have taken to overcome energy efficiency barriers and increase the effectiveness of programs and the dispersion of energy efficiency benefits.

3.4.1 Market Transformation Programs

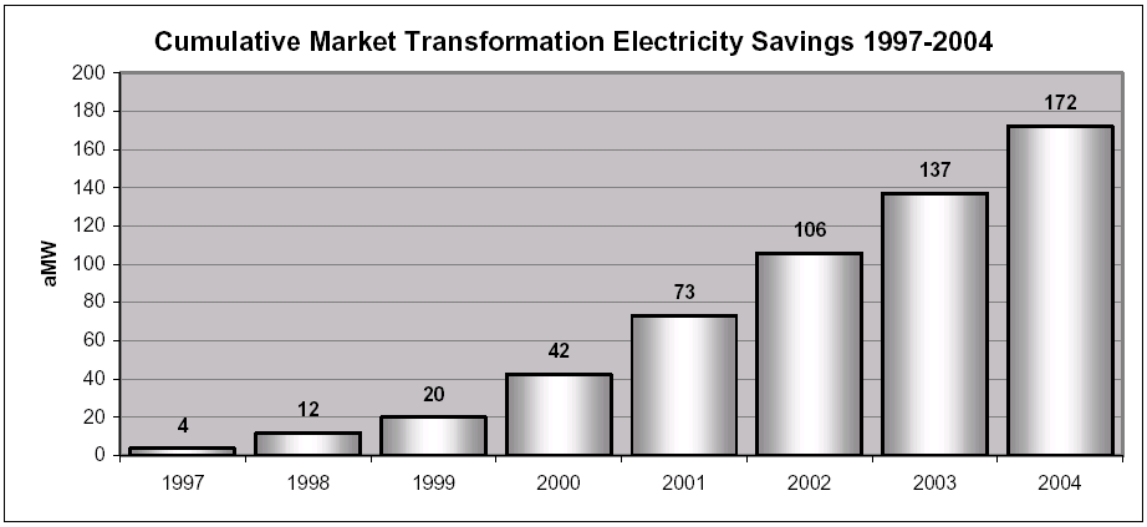
The term market transformation refers to increasing the market share of energy efficiency products or services to a point where they dominate the market. However, customers may often have the information and motivation to purchase more energy efficient equipment or select energy efficient options, but are unable to follow through due to retailers not carrying the equipment or building designers, builders, renovators and operators not being trained on the options. This barrier has been identified and addressed by many energy efficiency programs that focus on the supplier as well as or instead of the customer.

One of the most successful market transformation initiatives is the Northwest Energy Efficiency Alliance (NWAlliance), which has led to the development of the Midwest Energy Efficiency Alliance. Programs offered by NWAlliance include, but are not limited to, training for building operators, promotion of energy efficiency homes and appliances, training, information sharing demonstration projects for the industrial sector, and support for national appliance standards, state energy codes, and local government initiatives.

NWAlliance is a non-profit organization that receives its funding from electric utilities, public benefits providers, and state governments in Washington, Oregon, Idaho and Montana. NWAlliance is designed to complement, not replace, the energy efficiency programs provided by the states and local utilities. NWAlliance administers about 30 programs, which have saved about 0.25% of annual regional electricity use in 2004 at a cost of between US $0.08/kWh and US $0.012/kWh.[32] While many of the NWAlliance programs are designed to support and expand existing utility or government energy efficiency programs, the savings estimates exclude the activities of these other parties. Figure 3.2 shows that cumulative savings from NWAlliance programs have increased each year that the organization has been operating.

[32] WGA Energy Efficiency Task Force, 2005. *Western Governors' Association Clean and Diversified Energy Initiative, Energy Efficiency Task Force Report*

Figure 3.2 Cumulative Electricity Savings from Northwest Energy Efficiency Alliance Activities, 1997–2004



Source: Northwest Energy Efficiency Alliance, 2005.
Note: an average megawatt (aMW) is the amount of energy provided by one MW of power for one year, or 8,760 MWh

3.4.2 Pro-active Program Delivery

A challenge for energy efficiency programs is that they only capture the portion of the market that is aware of the program and the actions needed to participate. Not all customers have the same access to information on programs. Concern regarding hard–to-reach customers has been addressed through focused marketing and delivery of programs that use the appropriate instrument and incentive for each target group. The Energy Advice Centres of the Energy Service Trust of the UK are an example of this approach. The network of centres (52 centres throughout England, Scotland, Wales and Northern Ireland) provide free, expert impartial advice that is most relevant to the particular region. The centres can be accessed through a centralized toll-free number so that residents and small businesses can easily be connected with their local centre. Often the centres are housed and staffed by local non-governmental organizations, providing key network strength among the social and environmental institutions.

NYSERDA addresses the dual concerns of hard-to-reach customers and the high degree of differentiation among the best set of energy saving actions for different customers by focusing on audits and technical assistance. Over 50% of NYSERDA's is directed toward these activities that provide targeted delivery of programs to individual customers.[33]

3.4.3 Integration of Electricity and Natural Gas Energy Efficiency Programs

Another key issue for energy efficiency, particularly in buildings, is the competition between natural gas and electricity for providing space and water heating. Such competition can lead to the strategic use of energy efficiency programs by utilities. The particular strategies used are dictated by the market environment. For example, if an electric utility has excess capacity and

[33] Estimate based on 2005/06 funding for performance contracting and technical assistance as reported in NYSERDA 2005. *Toward a brighter energy future: A three-year strategic outlook 2005-2008.*

can export electricity to other regions at a price that is higher than sales in its own region, the utility could be motivated to encourage programs that lead to fuel switching away from electricity, such as financial incentives for high-efficiency natural gas furnaces. Alternatively, an electric utility that will benefit from increased local load would encourage fuel switching programs such as incentives for heat pumps, which may have relatively low cost-effectiveness. These types of programs may not be in the best interests of the region overall.

Integration of electric and natural gas programs can be achieved by including all energy efficiency programs under one agency, such as the Oregon Energy Trust which administers energy efficiency programs for both energy types and includes renewable energy programs as well. The conflict of interest is avoided when one utility provides both types of energy to customers (e.g., Pacific Gas and Electric in California).

In regions without a single energy efficiency agency and that have utilities providing their natural gas or electricity, not both, this issue has initially been considered by including energy efficiency targets for both types of energy. For example, California and the United Kingdom develop targets for energy efficiency for each utility. The utilities will compete against one another for customers but will also have to achieve energy savings regardless of that competition.

The most successful approach will depend on the structure of the energy providers and the market conditions, but any energy efficiency strategy needs to consider the impact of competition between fuels.

3.4.4 Research and Development (R&D)

Technologies and markets continually change and energy efficiency efforts often need to be quickly adjusted in terms of their focus and delivery. Both California (through the Public Interest Energy Research (PIER) department of the California Energy Commission) and New York (through NYSERDA) provide significant resources for research and development of energy efficiency equipment and practices. PIER provides about US $62 million for energy research through partnerships with individuals, businesses, utilities and research organizations.[34] As one example, PIER helped fund the software development of a tool that allows architects to design commercial buildings and get an instantaneous reading of energy performance. This software helped reduce the average time spent on energy planning in a commercial building from three weeks to ten days.[35] In New York NYSERDA claims, “Since 1990, NYSERDA has successfully developed and brought into use more than 170 innovative, energy-efficient, and environmentally beneficial products, processes, and services.”[36]

[34] http://www.energy.ca.gov/pier/index.html

[35] S. Hall, personal communication, May 2006.

[36] http://www.nyserda.org/About/default.asp

Smaller regions may benefit from combining research and development resources into institutions that cover multiple areas or by developing partnerships with academic or other existing research organizations.

3.5 Establishing Measurement and Verification (M&V) Protocols

A vital underlying component of all the above elements is a consistent and accurate means of measuring and verifying the savings from the activities aimed at increasing energy efficiency. For energy efficiency to be recognized as an energy resource, analysts and policy makers must have confidence in estimating its future costs and performance. The use of legally binding targets adds to the need for high levels of certainty in measurement of energy savings. All future resources are subject to uncertainty but developers strive to minimize or manage those aspects of uncertainty that can be estimated.

Inaccuracies or uncertainty in the estimates of energy savings from programs and activities have been the cause of many critiques of energy efficiency policies. The recent report from the International Energy Agency (IEA), *The Experience with Energy Efficiency Policies and Programmes in IEA Countries: Learning from the Critics*[37], describes some of these critiques and the steps that have been taken to address problems. The general approach has been to, i) develop measurement protocols for a suite of activities, with standard approaches for estimating future savings combined with follow-up analyses to test the standard approaches, ii) modify these approaches if needed, and, iii) adjust the projected savings to account for information from the follow-up verification. The protocols are also updated as more information becomes available.

California has developed a comprehensive set of guidelines for measuring energy efficiency programs. These were developed and continue to be modified by a collaborative group of state government staff, utilities, energy efficiency industry consultants, and other stakeholders. The guidelines provide approaches for estimating costs and savings prior to program implementation, which are often used to screen programs based on cost-effectiveness and other criteria. Other guidelines focus on evaluations during and after program implementation to verify expected savings, determine impacts beyond the program participants, and provide lessons for future programs.

All of these guidelines are the responsibility of the California Measurement and Advisory Council (CALMAC). They are periodically reviewed and revised by a CALMAC committee called the Market Assessment and Evaluation Statewide Team of Research Organizations (MAESTRO). This committee, consisting of representatives from all aspects of the energy efficiency industry, also maintain a database of the studies done on California's programs (www.calmac.org/maestro.asp), which is a valuable resource for developing programs in other regions.

One concern with M&V is that some consultants may be "rubber stamping" their evaluations to ensure that programs (and their associated evaluations) will continue to receive financing even if

[37] Geller, H and S. Attali. 2005. ***The Experience with Energy Efficiency Policies and Programmes in IEA Countries: Learning from the Critics.*** International Energy Agency.

they are not cost-effective.[38] A number of different approaches have been taken to measure and ensure the accuracy of the energy efficiency evaluation. The United Kingdom provided additional verification of savings by using its National Audit Office to report on the energy savings measurements provided by the national gas and electric regulator OFGEM, which is responsible for administering a range of energy efficiency programs. In 2002, the International Performance Measurement and Verification Protocol Inc. developed the Certified Measurement & Verification Professional (CMVP) program, in conjunction with the Association of Energy Engineers (AEE). This program works to raise the professional standards and improve the practice of those engaged in measurement and verification.[39] Analyses by academics whose funding is not directly linked to the energy efficiency industry also provide important contributions to addressing this concern.

Another concern with M&V is determining the appropriate level of resources that should be spent to evaluate the programs. In general, developing regional protocols and learning from the experiences of program evaluations in other regions helps improve the efficiency of M&V. Organizations such as CALMAC and International Performance Measurement and Verification Protocol Inc. are working to ensure that updates to M&V work are available publicly in a timely manner. California's guidelines also offer some interesting approaches to setting the level of effort invested in evaluation by providing several approved methods for each type of evaluation, each of which will provide a different level of accuracy. The exact approach a program delivery agent is required to follow is determined based on the uncertainty surrounding the costs and savings, the magnitude of the costs and savings, and the length of time since a similar type of program was evaluated.

[38] K. Tiedeman, BC Hydro, personal communication, June 2006.

[39] http://www.ipmvp.org/

4. Recommendations and Conclusions

While energy efficiency helps save money, limit environmental degradation, and reduce uncertainty of future costs of energy services, it appears that Canada's energy saving achievements have been decreasing. Much could be accomplished by adopting, modifying and building on the successful strategies reviewed in this report. The amount of energy savings that can be realized depends on the policy designs, resources, and time devoted to energy efficiency. However, estimates of energy savings in the Pacific Northwest indicate that energy efficiency programs (including utility programs, Northwest Alliance programs, State building codes and federal appliance standards) decreased growth in electricity demand by 59%, over the period 1990-2000.[40] Analysis by the Energy Efficiency Task Force of the Western Governor's Association Clean and Diversified Energy Advisory Committee estimated that widespread adoption of "best practice" policies and programs could reduce electricity consumption growth by about 75% over the period 2005-2020.[41] If Canada cut its growth in commercial and residential electricity demand by 60% over the period 2007 to 2020 it would result in cumulative energy bill savings of in the order of $1.6 billion.[42] Reducing growth in electricity demand by 75% in that time period would lead to cumulative energy bill savings in the order of $2 billion. Further energy bill savings from natural gas or heating oil savings would add to these cumulative amounts.

Section 3, above, outlines the common elements that appear to be key for successful implementation of energy efficiency programs, based on our review of energy efficiency policies in California, New York, the Pacific Northwest, Texas, Vermont, and the United Kingdom. Table 4.1, below, indicates the elements in energy efficiency strategies in each region that have been highlighted in this report as important for successfully achieving energy savings. Most elements are included in all regions but the elements listed appear to be particularly important in the regions indicated. The priorities of the various elements in each region depend, in part, on the history of energy efficiency programs, the current institutional design, and the goals of the region.

Table 4.1 Key Elements of Energy Policy by Region, Based on Examples Used in this Report

	CA	NY	PNW	TX	VT	UK
Showing leadership in making energy efficiency a priority in energy policy	X		X			X
Setting legally binding energy saving targets	X			X	X	X
Providing financial and institutional structures to		X			X	

[40] Estimate of savings based on cumulative energy savings reported in the Appendix compared to weather adjusted energy sales from Northwest Power and Conservation Council. 2005. *The Fifth Northwest Electric Power and Conservation Plan. Appendix A: Demand Forecast.*

[41] WGA Energy Efficiency Task Force, 2005. *Western Governors' Association Clean and Diversified Energy Initiative, Energy Efficiency Task Force Report*

[42] Future electricity growth from Analysis and Modeling Group, National Climate Change Process,Canada's Emission Outlook, an Update (1999). Natural Resources Canada. Prices based on estimate of $0.10/kWh for residential and $0.08/kWh for commercial, cumulative savings based on 5% discount rate and reported in real 2006$.

deliver energy efficiency						
Developing comprehensive programs	X	X	X			X
Establishing measurement and verification (M&V) protocols	X	X	X	X	X	X

We recommend that provincial and federal governments and other stakeholders interested in gaining the benefits of energy efficiency carefully consider how the successful elements identified in this report can strengthen their efforts. Each jurisdiction will need to determine the priority of the different elements given their specific opportunities for improvement and their experiences with different energy efficiency strategies. The recommendations below provide examples of specific actions that can be undertaken now to start developing an energy efficiency strategy built upon the elements of success that have been identified in this report. It is important to remember that an overall successful strategy that is capable of making significant gains towards improved energy efficiency is built upon a comprehensive and consistent set of actions that cut across all five key areas.

Show leadership in making energy efficiency a priority in energy policy

- Develop and implement **national or provincial energy efficiency strategies and action plans** that are based on sharing of best practices, individual and joint initiatives across provinces, and participation in international initiatives on energy efficiency. The strategy should contain energy saving targets and milestones.
- Treat energy efficiency as a resource and give it priority over supply resources. Use social, environmental and economic cost criteria to assess all resources.

Set legally binding targets for energy savings

- Consider instituting legal requirements for energy savings by using an Energy Efficiency Portfolio Standard and a tradable permit (white certificates) programs that clearly define the responsibilities of different stakeholders and government agencies.
- Provide incentive mechanisms for energy utilities to provide energy efficiency, technical support for smaller utilities, and coordination of energy efficiency programs across the provinces.
- Develop markets for the use of tradable energy efficiency permits.

Provide financial and institutional structures to deliver energy efficiency

- Clearly mandate responsibilities to an agency (or agencies) to coordinate and deliver energy efficiency programs and recommend policy changes.
- Establish permanent funding sources through the budget process to support a building code and equipment standard review cycle, and through a rate-based funding mechanism to finance energy efficiency programming.

Develop comprehensive programs

- Provide comprehensive energy efficiency programming that covers all sectors and geographic areas in the province.

- Make market transformation a key program objective, with targeted financial incentives to kick start programs, and target the whole supply chain—manufacturers/builders, suppliers, contractors, users/consumers.
- Establish a regular (e.g., three-year) review cycle of energy efficiency requirements in building codes and in minimum efficiency requirements for equipment. Involve all stakeholders in negotiations for changes in codes and standards and provide supportive incentives to builders and suppliers in the lead up to changes. Establish permanent **national review cycles** in cooperation with the provinces for the national model energy code for buildings.
- Support the building of an infrastructure to deliver energy efficiency products and services through training/certification of energy efficiency program managers, contractors, and building operators.
- Partner with municipalities and First Nations to develop community energy plans and deliver community-based energy efficiency programs. Municipalities and support organizations, such as the Federation of Canadian Municipalities, could explore innovative new concepts like financing efficiency improvements using local improvement charges. Special programs should be put in place to reduce energy costs and raise building standards for **First Nations communities and low income families**. "Energy poverty" has no place in Canada.

Establish Measurement and Verification (M&V) protocols

- Develop a stakeholder group to provide direction on establishing and continuously refining M&V protocols at the national level. Work with provinces to develop any regional specificity and to communicate any changes to protocols.

Further information is available for the above and other potential actions. Section 5 highlights key resources for decision makers to review. These resources include information on actions pursued by other jurisdictions, often including draft policy or legislative language that can be adapted to particular cases. Appendix A provides additional detail on the strategies reviewed for this paper.

5. Further Resources for Energy Efficiency Strategies

Successful energy efficiency strategies have typically combined many disparate elements to encompass the many parties that impact and are impacted by energy efficiency programs. While this paper points to several key elements for success, often "the devil is in the details." Appendix A provides more information on the six regions we researched in greater detail, including key contacts and references. In addition, the following recent reports provide further examples or discussion of key issues.

***Demand-Side Management: Determining Appropriate Spending Levels and Cost-Effectiveness Testing* (Violette, D. and R. Sedano, Summit Blue Consulting, 2006).**

This report, prepared for the Canadian Association of Members of Public Utility Tribunals, reviews DSM activities in 15 Canadian provinces and American states to provide insights and information for addressing the overall engagement objective: "What is the appropriate level of spending on DSM and what are the best mechanisms to ensure the testing of costs/benefits with a view to adopting guidelines for use by utilities and regulators?" A single best approach was not identified but the report includes an extensive review of activities and a number of recommendations.

***Clean Energy-Environment Guide to Action: Policies, Best Practices, and Action Steps for States* (US EPA, 2006).** http://www.epa.gov/cleanenergy/stateandlocal/guidetoaction.htm

The U.S. Environmental Protection Agency (EPA) developed the Clean Energy-Environment State Partnership Program to help states advance clean energy, including energy efficiency and renewable energy. It is a voluntary state–federal partnership that supports state efforts to increase the use of clean energy. The EPA provides access to a comprehensive package of planning, policy, technical, analytical, and information resources to help state partners establish and implement sound Clean Energy-Environment State Action Plans. The EPA's Clean Energy-Environment Guide to Action[43] describes 16 clean energy policies and strategies that states have used to achieve cost-effective clean energy. The EPA also documents and disseminates successful state clean energy policies and opportunities for training and peer exchange.

***Retrospective Examination of Demand-Side Energy Efficiency Policies* (Gillingham, Newell, and Palmer, 2004).** http://www.rff.org/Documents/RFF-DP-04-19REV.pdf

[43] http://www.epa.gov/cleanenergy/stateandlocal/guidetoaction.htm

A recent report by Resources for the Future reviews a huge body of studies on the accomplishments of energy efficiency in the U.S. over the past two decades. The authors conclude that

> The continued use of energy efficiency policies over more than two decades and the prospect of expanded and new policies on the horizon suggest that this approach to achieving energy and carbon reductions will have a lasting presence. This is particularly true if conservation programs have positive net benefits in their own right and thus yield emissions reductions at zero or negative net cost. Even if these estimates are overly optimistic, energy efficiency programs would likely be an important part of a relatively low-cost moderate climate policy, with the effect of existing efficiency programs being of a similar magnitude to what rough estimates suggest might come from a moderate carbon tax. While existing estimates indicate that the current impact of these policies is modest, it does appear that well-designed future programs have the potential to reduce energy and emissions, although the magnitude of potential reductions and the cost of achieving those reductions is an open question. (Gillingham, Newell, and Palmer, 2004, Executive Summary)

***The Experience with Energy Efficiency Policies and Programmes in IEA Countries: Learning from the Critics* (Geller and Attali, 2005).**
http://www.iea.org/Textbase/publications/free_new_Desc.asp?PUBS_ID=1567

This is an International Energy Agency (IEA) paper that compiles, categorizes and evaluates criticism of energy efficiency policies. The authors respond to each of nine criticisms. They provide suggestions for modifying policies when the criticisms are justified and offer reasons why other criticisms are unjustified.

US Energy Efficiency Action Plan. http://www.epa.gov/cleanrgy/eeactionplan.htm

This resource is a website that is currently being updated with several reports, rather than a single report. The website has been developed by a group, comprising gas and electric utilities, state agencies, energy consumers, energy service providers, and environmental/energy efficiency organizations, who are leading an effort to engage energy market leaders in the development of an energy efficiency action plan for the US. The reports include a review of best practices, development of tools for analysis, analysis of rate design and revenue requirements, developing the action plan, and providing a draft implementation strategy to help stakeholders take action and demonstrate leadership by implementing the *Energy Efficiency Action Plan* recommendations. All information is provided on the website.

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WGA Energy Efficiency Task Force. 2005. *Western Governors' Association Clean and Diversified Energy Initiative, Energy Efficiency Task Force Report*

Appendix A

Jurisdiction	California
Key elements	• Showing leadership in making energy efficiency a priority in energy policy • Setting legally binding targets for energy savings • Developing comprehensive programs • Establishing measurement and verification (M&V) protocols
Summary	• California has a strong commitment to energy efficiency written into its overall energy plan. • Long-term goals are set out and backed up by short-term targets and funding. • Stakeholder input is encouraged through public process and dedicated funding for interveners. The collaboration between groups has allowed California to successfully move forward on strong efficiency goals. • The plan includes evaluation criteria and the regular review and upgrade of targets and programs.
EE policy statement / strategy	California's *Energy Action Plan II*, released in 2005, establishes energy efficiency as the state's top priority procurement resource and is endorsed by the Governor, California Public Utilities Commission (CPUC) and California Energy Commission (CEC). This new administrative structure calls for utilities to invest in energy efficiency whenever it is cheaper than power plants. Through partnerships and competitive solicitations administered by the utilities and overseen by the CPUC, energy efficiency programs are implemented by a wide range of groups including private companies, local governments, non-profit organizations, utilities, future community choice aggregators and community-based organizations. The plan and its financial backing are recognized as "the most ambitious energy efficiency and conservation campaign in the history of the utility industry in the U.S."[44]
EE targets and milestones	CEC developed the following statewide goals: • *Electricity reductions*: 30,000 gigawatt hours (GWh) in 2013, from programs operated from 2004–2013. These 10-year goals represent

[44] www.cpuc.ca.gov/PUBLISHED/News_release/49757.htm

	about 10% of predicted 2013 electricity use and is equivalent to avoiding the construction of 14 new 500MW power plants (assuming a power plant capacity factor of 0.5). • *Utility demand side management (DSM)*: Based on the CEC goals and input from the public process, the CPUC developed targets for each of the largest investor-owned utilities.[45] In 2013, these targets total 23,183 GWh and 444 million therms of natural gas. Each utility then submitted plans on how it would meet its 2006–2008 goals. These plans, including proposed budgets, received significant stakeholder input during development and review. The CPUC held hearings on the plans and accepted them in September 2005. To accommodate new information and experience, the utilities have some discretion to modify their plans and budgets without CPUC approval. California's municipal utilities are also investing in energy efficiency, but at a lower level, and they are in the process of working with the CEC to establish goals and programs. • *Building codes*: *Energy Action Plan II* directs the Energy Commission to adopt new building standards for implementation in 2008 that include, in addition to new energy efficiency measures, cost-effective demand response technologies (such as programmable communicating thermostats) and provisions for including photovoltaic systems as part of an alternative approach to meeting codes. • *Green Building Initiative:* In December 2004, the Governor issued Executive Order S-20-04, the Green Building Initiative, which commits the State to a series of actions that will result in a 20% reduction in the energy use of state-owned buildings by 2015 and calls for a 20% reduction in the energy use of privately-owned commercial buildings.
Primary sectors targeted	All sectors, natural gas and electricity
Types of policies and programs	• *Appliance Standards*: California passed legislation in 2002 to create energy efficiency standards for 11 different products (special legislation to AB970). The California Energy Commission established energy efficiency standards for 19 other products on December 15, 2004. The new standards took effect January, 2006. • *Utility DSM*: Programs are administered by electricity and natural gas utilities. CPUC establishes energy savings goals with input from interveners for the large investor-owned utilities. • *Building codes*: California's state-developed residential code, found in the California Code of Regulations (Title 24, Part 6) exceeds 2000

[45] Pacific Gas and Electric (PGE), San Diego Gas and Electric (SDGE) and Southern California Edison (SCE).

IECC, and is mandatory statewide. California's state-developed commercial code, also found in the California Code of Regulations (Title 24, Part 6) meets or exceeds ASHRAE/IESNA 90.1–1999 and is mandatory statewide.

Financing mechanism and annual allocation / budget

Funding for 2004–2005 Energy Efficiency Programs Totals $823 Million

Funding Sources	Millions
Electric Public Goods Charge (PGC)	$460
Procurement Funds	$245
AB 1002 Gas Surcharge	$91
Unspent/Uncommitted PGC & Gas Funds (1998-2003	$24
Interest for PGC & Gas Funds	$3
Total	**$823**

Source: CPUC, www.cpuc.ca.gov/static/energy/eep/funding.htm

Funding levels will increase during the next three years. In September 2005, the CPUC authorized energy efficiency plans and $2 billion in funding for 2006–2008 for the state's utilities. Approximately $300 million will be invested in natural gas efficiency programs, equivalent to approximately 1% of natural gas utility revenues; $1.7 billion will be invested in electric efficiency programs, equivalent to approximately 3% of electric utility revenues.

More than half of the funding for the 2006–2008 utility DSM plans will come from utility resource procurement budgets (money that would otherwise have been spent on power plant investment), with the remainder coming from the *Public Goods Charge*.

Additionally, *California's Energy Efficiency Financing Program* offers loans to public schools, public hospitals, cities, counties, special districts and public care institutions. Eligible projects are those with proven energy savings, such as lighting and HVAC efficiency improvements. The Program has a $40 million endowment, with a maximum loan of $3 million per application. There is no minimum loan amount. To be eligible, projects must be technically and economically feasible and have a simple payback of 9.8 years or less, based on energy savings.

Staffing

- CPUC, energy efficiency: 4–6 people
- CEC, energy efficiency: ~100 people
- Utilities: PGE has about 200 staff working on energy efficiency (or 1% of the workforce, 20–25 per utility)
- Consulting firms, measurement and verification (M&V): ~100 people

	• *Flex Your Power* (information and education): ~12 • Public Interest Energy Research: 50–60 • Community-based organizations also receive funding to deliver programs, but the number of staff there is uncertain.
Coordinating agents	Many actors are involved in determining the goals for utility DSM programs. The CEC provided state-wide goals for 2013. The CPUC used these goals to determine energy savings targets for each of the investor-owned utilities, and the utilities came up with plans (that include programs and budgets) to meet the targets in 2006–2008. Other people and organizations were involved in stakeholder meetings and commission hearings. The building and appliance standards also involve many institutions. While the CEC sets the standards, its choice of them is influenced by input from others. The *California Codes and Standards Advocacy Program* is a collaboration between utilities, standards-setting agencies, private sector consultants, industry and environmental stakeholders. Utilities provide technology and methodology assessments and proposals for standards, often based on the utilities' experiences with market-transformation programs. California and national NGOs have played a strong role in advocating policies that promote increased energy efficiency.
Delivery agents	Utilities administer and in many cases deliver the DSM programs, and they also fund community-based organizations to deliver programs (20% of PGC must be directed to third-party initiatives, usually community based organizations). Berkeley, Davis and Santa Cruz are the top three communities with non-profit organizations: in Berkeley, the non-profit Community Energy Services Corporation (CESC) delivers programs under the sponsorship of a municipality; in Davis, the Valley Energy Corporation gets funding from the municipality. Non-community-based groups, such as Energy Service Companies (ESCOs) and industrial groups, can also apply for this money.[46] California's Building Standards Commission (BSC), an independent commission within the State and Consumer Services Agency, is responsible for administering California's building codes**.** The BSC administers the process and decisions on Title 24; the local government handles permits and enforcement; and CEC trains local building inspectors. *Flex Your Power* is an energy efficiency marketing and outreach program funded primarily by the PGC. It is a state-wide partnership of utilities, residents, businesses, institutions, non-profit organizations and government agencies. The *Flex Your Power* campaign includes a

[46] S. Hall, Stephen F. Hall and Associates, personal communication, May 2006.

	comprehensive electronic newsletter, a website, retail promotions, educational materials and advertising. The Public Interest Energy Research (PIER) department of the California Energy Commission provides significant resources for research and development of energy efficiency equipment and practices. PIER makes about $62 million available for energy research through partnerships with individuals, businesses, utilities and research organizations.[47] The research and development areas funded by PIER include building energy efficiency, energy-related environmental research, energy systems integration, water energy efficiency and renewable energy technology. Funding is available for both "hard" technologies and supporting technologies, such as software to improve planning processes.
Performance measurement and verification	Utility DSM programs will be evaluated by independent consultants, hired by the CPUC, using measurement and verification protocols that the CPUC is now developing. The CPUC is also establishing financial rewards and penalties for utilities that exceed or fail to meet their energy savings goals. As long as they do meet their goals, utilities will receive a share of the net benefits.[48] The California Measurement Advisory Committee (CALMAC) was established in 1998 to provide a forum for the development, implementation, presentation, discussion and review of market-assessment and evaluation (MA&E) studies for energy efficiency programs in California. The studies include both evaluation reports and recommendations for approaches for evaluating programs—with a focus on increasing confidence that energy savings goals are being met and that programs and incentives are effective and efficient. CALMAC, which meets monthly, has representatives from a wide range of parties and maintains a website of reports, www.calmac.org The PIER program is evaluated by a panel of experts who make up the Independent Review Panel. Its evaluations include a review of the public value of the PIER programs as well as the benefits of providing funds for technology development that otherwise would not be funded.
Review and upgrade	The California Building Code (Title 24) is updated every three years. This regular review cycle provides opportunity for other state agencies, utilities and other interested parties to plan their input into the update process. Utilities and community-based organizations have been offering financial incentives for ENERGY STAR qualifying homes—those that are 15% more energy efficient than code. As more of these homes have been built and tested in the market, Title 24 has been

[47] www.energy.ca.gov/pier/index.html

[48] Nadel, Steve. 2006. *Energy efficiency resource standards: experience and recommendations.* American Council for an Energy Efficient Economy. Washington, DC. ACEEE report E063.

updated to reflect their energy savings components. This process has led to strong synergies between the energy efficiency programs and the state regulations.

Success stories

Energy Efficiency Programs Savings Achievement

Savings	2001	2002	2003	2004*
Electricity (GWh)	1,600	1,200	1,300	1,900
Natural Gas (Therms)	17 million	20 million	34 million	39 million
Demand Reduction (MW)	436	355	291	375

Source: CPUC, www.cpuc.ca.gov/static/energy/eep/savings.htm

The savings in 2004 are equivalent to 0.75% of total electricity sales in California and 0.2% of state-wide natural gas sales to consumers.

The estimated impact of the 2005 residential and non-residential building standards is a 478.5 GWh electricity reduction per year and 8.8 million therms of natural gas.

The estimated annual savings from the 2001 appliance standards was 217 GWh and 6.5 million therms per year. Savings from the 2006/2007 appliance standards are estimated at 526 GWh and 6.6 million therms per year.

Recognition

ACEEE has recognized the *California Codes and Standards Advocacy Program* as an exemplary program: "This program provides an excellent example of encouraging the collaboration of utilities, standards setting agencies, private sector consultants, industry and environmental stakeholders. The program also shows how good building science can influence public policy."[49]

Flex Your Power has received national and international recognition, including an ENERGY STAR award for excellence.

Contacts

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Information sources

Impact Analysis of Building Codes:

http://energy.ca.gov/title24/2005standards/archive/rulemaking/documents/2003-07-11_400-03-014.PDF

California Energy Commission: www.energy.ca.gov

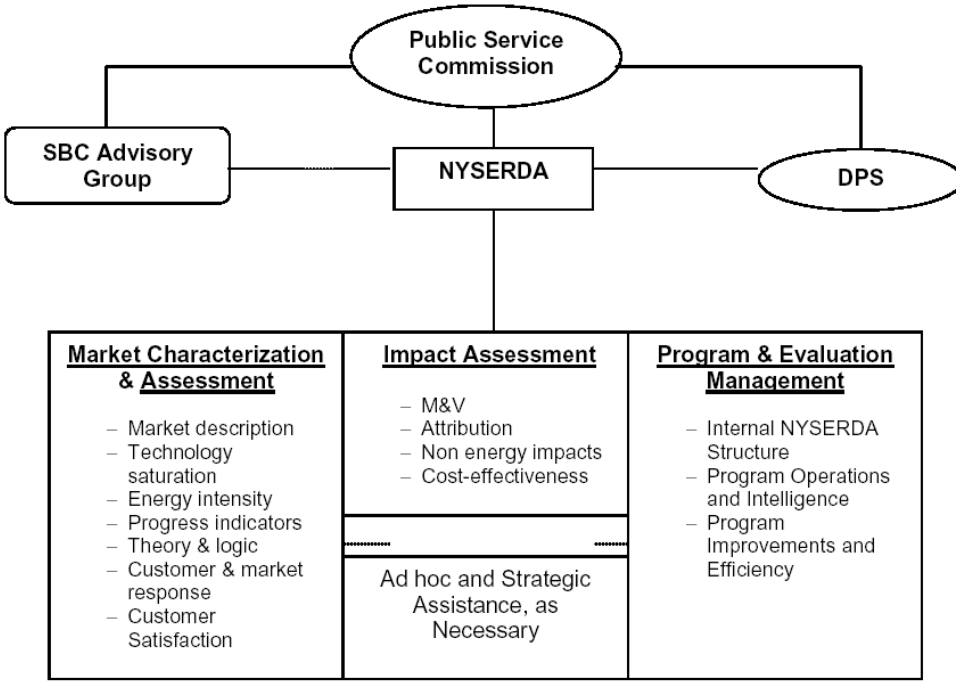
[49] www.aceee.org/utility/16acodesstdsca.pdf

	CALMAC: www.calmac.org California Public Utilities Commission: www.cpuc.ca.gov *Flex Your Power*: www.fypower.com/

Jurisdiction	New York State
Key elements	• Providing the financial and institutional structures for energy efficiency • Developing comprehensive programs • Establishing measurement and verification (M&V) protocols
Summary	New York has developed a *State Energy Plan* with a specific goal to reduce primary energy. The plan is supported by a number of policies and programs: • *New York Energy $mart*—a comprehensive program that covers energy efficiency, research and development, low-income and environmental disclosure funding and education to assist consumers as the regulated electricity market moves to more open competition • Stable funding through a systems benefit charge • Building codes and advanced appliance standards • Strong research and development programs and measurement and verification protocols.
EE policy statement/ strategy	In 2002, New York developed a *State Energy Plan* which includes a goal to reduce primary energy use per unit gross state product (GSP) to 25% below 1990 levels by 2010. In 1996, the state initiated the systems benefit charge (SBC) to fund energy efficiency, energy-related research and development, and programs to help low-income customers. While the SBC was introduced in response to concerns about the impact of competitive electricity markets, the energy intensity goal was implemented to help decrease both power plant emissions and energy price fluctuations. The SBC does not cover fossil fuel efficiency, but utility programs have been developed at Con Edison and National Grid through rate cases. • *Building codes*: Both commercial and residential building energy codes are mandatory statewide, based on the IECC 2000 model with 2001 supplements. • *Appliance standards*: New York set minimum efficiency standards for 13 types of equipment in June 2005. According to the Appliance

	Standards Awareness Project, the minimum efficiency standards in the Federal Energy Bill of August 2005 followed the lead of the appliance standards legislation in many states, including New York.[50] From 2000 to 2004, New York offered an income tax credit to owners and tenants of "green buildings"—new construction as well as retrofits to existing buildings. Until June 2006, the New York Energy $mart Loan Fund offered low-interest loans to facilities installing energy efficient technologies.
EE targets and milestones	To reduce primary energy use per unit GSP to 25% below 1990 levels by 2010.
Types of policies and programs	• Financial incentives to customers • Loans • Tax incentives • Building energy code and appliance standards
Financing mechanism and annual allocation/ budget	$165 million for SBC programs for 2005/2006, including $61 million for energy efficiency programs; $67 million for research, development and demonstration; and $38 million for low-income programs. On December 14, 2005, a PSC Order extended SBC funding for another five years (2006–2011) and increased the level to $175 million annually.
Staffing	NYSERDA - 21 members of Energy Analysis group - 41 members of EnergyEfficiency Services group from NYSERDA website NYSERDA works with the SBC Advisory Group of about 24 electric utility experts and energy consultants.
Co-ordinating agents	The New York State Energy Research and Development Agency (NYSERDA) administers the SBC, which is collected by electric utilities. The SBC Advisory Board, an independent group of electric utility experts and energy consultants, work with NYSERDA to establish program priorities and evaluate progress. Northeast Energy Efficiency Partnerships Inc. (NEEP) is a non-profit regional organization that was founded in 1996 to increase and co-ordinate energy efficiency efforts in New England, New York and the mid-Atlantic region. NEEP works in these areas: • regional initiatives to increase the availability and adoption of quality energy efficiency technologies and practices;

[50] www.standardsasap.org/press21.htm

	• energy efficiency policy; • outreach and communication, especially about energy efficiency standards; and • training and education programs (for building operators on high performance schools and building energy codes).
Delivery agents	Project design and implementation occurs mostly through competitive bids. NYSERDA puts out requests for proposals for the range of energy savings programs it seeks to offer, and then the parties, usually utilities or independent consultants, submit bids.
Performance measurement and verification	NYSERDA, with guidance from the Department of Public Service, uses a combination of internal expertise and competitively selected consultants to measure and verify the impacts of its programs and then reports them to the SBC advisory group. These are the key components of the evaluation framework:  Source: *Systems Benefit Charge, Proposed Plan for the New York Energy $mart Programs, 2006 –2011,, (*2006 update). www.nyserda.org/publications/sbcOperatingPlan2006.pdf Measurements for the initial three-year funding period will be expanded to include the following: • load reduction by sector and service area • energy savings by sector and service area • environmental impacts

	• economic impacts • distribution of benefits by utility service area • cost-effectiveness of programs.
Success stories	By September 2004, the SBC program[51] had achieved a number of successes: • Reduced electricity use by about 1,340 GWh per year. Annual savings are expected to reach 2,700 GWh annually when the program is fully implemented. • Generated $185 million in annual energy bill savings for participating customers, including electricity, oil and natural gas savings from energy efficiency and peak-load management services. • Created 3,970 jobs annually and is expected to generate an average net gain of 5,500 jobs per year during the eight years of program implementation from 1998–2006. • Reduced nitrogen oxide (NOx) emissions by 1,265 tons, sulfur-dioxide (SO_2) emissions by 2,175 tons, and carbon dioxide (CO_2) emissions by one million tons—the equivalent amount of energy required to power about 850,000 homes. The *Keep Cool* program provided financial incentives for over 141,000 units for the replacement of inefficient room air conditioners with energy-efficient ENERGY STAR replacements. More than 18% of new residential homes are being built to ENERGY STAR specifications.
Recognition	The Association of Energy Services Professionals (AESP) is a national, member-driven organization that addresses the most pressing issues facing the energy services field. In 2006, AESP awarded NYSERDA's New York Energy $mart Commercial/Industrial Performance Program (CIPP) first place in the Achievement in Energy Services Programs category. The Peak Load Management Alliance (PLMA)—an organization formed to promote the concepts and technologies of reducing demand for electricity, natural gas and oil—awarded NYSERDA's New York Energy $mart Peak-Load Reduction Program (PLRP) the Outstanding Outreach Award for its 2005 program. As reported in *America's Best: Profiles of America's Leading Energy Efficiency Programs*,[52] programs administered by NYSERDA received

[51] NYSERDA, 2004. New York Energy $mart Programs Quarterly Evaluation and Status Report: Quarterly report to the department of Public Service. Quarter ending September 30, 2004. www.nyserda.org/Energy_Information/SBC/sbcsept2004.pdf

	ACEEE awards in the following categories: • Residential Low-Income Program: Honorable Mention for Assisted Multi-Family Building Program • Residential Air-Conditioning Programs: Exemplary Program for Keep Cool, New York • Residential Comprehensive: Honorable Mention for Home Performance with ENERGY STAR • Commercial/Industrial Standard Offer Programs: Exemplary Program for New York Energy $mart Commercial/Industrial Performance Program • Professional Education: Exemplary Program for New York Energy $mart FlexTech Program Research, Development, and Demonstration Programs: Honorable Mention for NYSERDA's Research and Development Program
Contacts	Public Service Commission, Department of Public Service Bill Saxonis, Senior Analyst 518.486.1610 William.Saxonis@dps.state.ny
Information sources	Violette, D and R. Sedano. 2006. *Demand-Side Management: Determining appropriate spending levels and cost-effectiveness testing. Appendix A: Summaries by Jurisdiction.* Prepared for Canadian Association of Members of Public Utility Tribunals (CAMPUT) www.nyserda.org www.aceee.org

[52] York, Dan and Martin Kushler. 2003. *America's Best: Profiles of America's Leading Energy Efficiency Programs*. American Council for an Energy Efficient Economy. Report U032. http://www.aceee.org/utility/u032.pdf

Jurisdiction	Pacific Northwest— Washington, Oregon, Idaho, Montana
Key elements	• Showing leadership in making energy efficiency a priority in energy policy • Developing comprehensive programs • Establishing measurement and verification (M&V) protocols
Summary	The Pacific Northwest has demonstrated the benefits of energy efficiency through its long history of support. Since 1980, the region has given energy efficiency top priority as a resource for meeting its needs. Each state pursues its own building codes, appliance standards and tax credits, and most utilities design and deliver their own energy efficiency programs. Regional co-ordination and synergy are promoted through the Northwest Power Planning and Conservation Council and the Northwest Energy Efficiency Alliance.
EE policy statement / strategy	The Pacific Northwest has a long history of promoting energy conservation, with initial interest developing from concerns about the impact of the region's hydro-electric dams on fish and wildlife. In 1980, The Northwest Power and Conservation Council (NWPCC) was established under the Pacific Northwest Electric Power Planning and Conservation Act.[53] This act establishes that the council must prepare, adopt and transmit a regional conservation and electric plan that will be reviewed at least every five years. The act gives highest priority to energy conservation: *The plan shall . . . give priority to resources which the Council determines to be cost-effective. Priority shall be given: first, to conservation; second, to renewable resources; third, to generating resources utilizing waste heat or generating resources of high fuel conversion efficiency; and fourth, to all other resources.*[54] In 1996, after over a decade of experience in obtaining energy efficiency through traditional utility programs, the region decided to form the Northwest Energy Efficiency Alliance (NW Alliance)—a non-profit corporation that works to create long-term lasting acceptance of energy-saving products and services in the existing marketplace. NW Alliance is supported by Bonneville Power Administration, electric utilities, public fund administers, state governments, public interest groups and energy

[53] December 5, 1980. 16 U.S.C. §§ 839-839h.

[54] Northwest Power Act, §4(e)(1), 94 Stat. 2705., paragraph 839b(e)(1).

	efficiency industry representatives. It works with manufacturers, retailers, building developers and operators to ensure energy-saving products are available, proper training is provided, and innovative products and building designs are brought to market. Washington and Oregon both passed energy efficiency legislation for appliances in 2005. Washington also passed legislation in 2006 to cover additional appliances. All four states have mandatory energy codes for both residential and commercial buildings. The 1999 energy restructuring law in Oregon also dedicated a separate portion of the public-purpose funding to energy conservation efforts in low-income housing energy assistance and K–12 schools. The Energy Trust of Oregon began operation in 2002 as a result of Oregon's 1999 energy restructuring law. This law requires the two largest investor-owned utilities to collect a public purposes charge from their customers. The Oregon Public Utilities Commission was authorized to guide funds through a non-governmental organization to invest in energy conservation. The agreement between the Energy Trust and OPUC was developed through extensive public input and has been amended several times. Since 2004, the Energy Trust also administers gas conservation for residential and commercial customers of NW Natural. The 1977 Oregon Legislature initiated the residential energy credit and introduced it to the public in January 1978. The 1979 Oregon Legislature created the business energy credit and made it available to consumers in January 1980. Oregon also runs the *State Energy Loan Programs*. Idaho administers the *Idaho Energy Conservation Loan Program*. Montana offers loans to state agencies through the *Montana State Buildings Energy Conservation Program*. Montana also offers residential tax credits for improved insulation, windows, programmable thermostats and light fixtures.
EE targets and milestones	The conservation target of the *Fifth Plan* from the Northwest Power and Conservation Council is 700 average Megawatts of conservation acquisitions from 2005 to 2009—about 1230 GWh per year on average, equivalent to about 0.65% of load. This target is to be met through a mix of utility programs, market transformation, building codes, appliance standards and other actions. The *Fifth Plan* identifies specific actions for meeting this target: • Increase budgets for energy conservation • Develop a strategic plan for conservation acquisition • Expand market-transformation initiatives • Establish a mechanism and funding for annual reporting and tracking

	of regional conservation investments and accomplishments • Revise and adopt state and federal energy codes and efficiency standards that capture regionally cost-effective savings. The following savings targets are encompassed in the NW Council's target but provide direction to the other organizations: • save at least 20 average Megawatts of electricity at a levelized cost of no more than 2 cents per kilowatt hour • save at least 700,000 therms of natural gas at a levelized cost of no more than 30 cents per therm.
Primary sectors targeted	All sectors are covered but by different delivery mechanisms.
Types of policies and programs	• Financial incentives including tax credits • Low-interest loans • Information and training • Support for pilot projects • State building codes and appliance standards
Financing mechanism and annual allocation / budget	The NWPCC claims that "aggregate utility system annual investment of between $200 and $260 million, excluding market transformation and regional co-ordination and acquisition, will be needed to achieve the 700 average megawatt target over the next five years."[55] The NWPCC estimates that the Bonneville Power Administration and utilities invested just over $200 million (in year 2000 dollars) in conservation in 2002. Oregon electric utilities collect a public purpose charge (PPC) from their customers of 3% on retail electricity sales. Energy Trust of Oregon receives 73% of the funds from the electric utilities: 17% for renewable energy and 56% for energy conservation. The other funds are shared between the Education Service Districts (10% of PPC funds) and Oregon Housing and Community Services (16% of PPC funds). Oregon collected about $130 million from January 1, 2003 to December 31, 2004—or $65 million per year.[56] Public utilities that purchase power from Bonneville Power Administration (BPA) also collect a charge from customers of 0.05 cents per kilowatt-hours (kWh) to fund energy conservation programs. NW Alliance is funded by electric utilities, public benefits administrators

[55] NW Council, 2005. *The Fifth Northwest Electric Power and Conservation Plan. Volume 2: Action Plan* (action CNSV-4)

[56] ECONorthwest 2005. *Report to Legislative Assembly on Public Purpose Expenditures.* Prepared for the Oregon Department of Energy and the Oregon Public Utility Commission.

	and the BPA. These funding sources provided $165 million for the NW Alliance from 1996–2004 and have pledged $20 million per year from 2005–2009.
Staffing	• Northwest Power and Conservation Council – 2 staff for energy conservation planning • Northwest Energy Efficiency Alliance – about 30 staff • Energy Trust of Oregon – about 75 staff
Co-ordinating agents	The Northwest Power and Conservation Council (NWPCC) develops an electric power and conservation plan for the region at least every five years. BPA actions must be consistent with the plan, or provide an explanation for any inconsistency. Utilities that purchase power from BPA must meet its requirements, such as charging customers an extra 0.05 cents per kWh and investing the money collected into energy conservation. These utilities report their expenditures and energy savings accomplishments to BPA. Each investor-owned utility negotiates energy savings targets and incentives with its respective utility commission. The Oregon Public Utilities Commission has set up the Energy Trust of Oregon (ETO) as the primary organization for delivering energy savings. The ETO is funded by a public benefits fund—3% of retail rates for the two largest investor-owned electric utilities and 1.25% of retail rates for the largest gas utility. In 1997 Montana passed restructuring legislation, extended through 2009 in 2005, that created an electric universal systems benefits charge. Utilities are required to put 2.4% of their retail sales revenues towards energy efficiency and renewable energy projects and low-income energy assistance. At least 17% of the money (about $2.3 million per year) must go to low-income projects, including weatherization. There is also a parallel systems benefits charge for the gas industry.
Delivery agents	The utilities deliver programs in Washington, Idaho and Montana while Oregon has created the Energy Trust of Oregon (ETO) to develop and implement energy conservation programs for its largest utilities. ETO uses third-party contractors for most of the energy efficiency program implementation. NW Alliance is an independent non-profit organization that delivers market-transformation programs that are designed to supplement and accelerate, but not replace, the electric utilities' conservation efforts. The Oregon State Department of Energy administers the State Energy Loan Program (SELP) and its Residential and Business Energy Tax Credits.

Performance measurement and verification

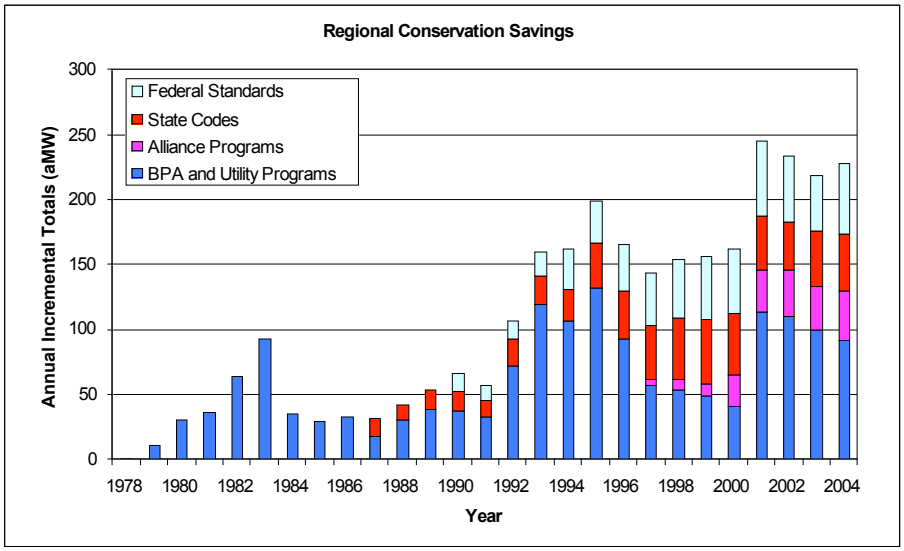
The Regional Technical Forum (RTF) of the NWPCC conducts regional studies that assign deemed savings to certain efficiency measures. Deemed savings are the basis for measuring the outcome of certain programs with "prescriptive measures," such as CFL rebates. For customized applications, engineering estimates of savings are developed on a case-by-case basis, along with tracking and reporting systems that monitor program performance. Anticipated savings, either calculated or based on the RTF's deemed savings, can be compared with actual savings on customers' bills. Process evaluations are also done to determine whether measures effectively satisfy customers' needs and to identify opportunities for improving program delivery or cost-effectiveness.

NWPPC does not evaluate program achievements; instead, it relies on information provided by utilities, BPA, the ETO and the NW Alliance. Utilities with their own DSM programs have developed their own protocols for evaluation. The ETO has evaluation plans and tracking systems for each program, including impact and process evaluations plus spot checks for quality assurance.

NW Alliance has developed and implemented an evaluation procedure to estimate the savings from its programs with careful avoidance of double-counting savings from programs implemented by other agencies. Most of the evaluation projects are carried out by third-party consultants.

Success stories

The NWPPC estimated the following savings from energy efficiency programs in the Northwest, from 1980 to present.



Source: C Grist NWPPC, May 2006.

According to a report to the legislature by ECONorthwest, ETO programs in 2004—using the electricity PPC only—will save at least 339 GWh of electricity, not counting transmission and distribution (T&D) savings. It will also save more than one million MMBTUs at a levelized

	cost of about 2 cents per kWh and less than $6 per therm.[57]
Best Practices	In 1984, the U.S. Department of Energy awarded the Oregon Department of Energy its Special Award for Energy Innovation for creating the Energy Loan Program.
Contacts	Ken Keating, Bonneville Power Administration Charlie Grist, Northwest Power and Conservation Council Suzanne C. Dillard, Oregon Department of Energy Manager, Conservation Services
Information sources	www.nwcouncil.org/library/poweract/summary.htm www.nwalliance.org/aboutus/index.asp www.energytrust.org/Frames/Frameset.html?mainFrame=http%3A// www.energytrust.org/Pages/about/index.html www.energytrust.org/Pages/about/library/opuc_docs/Performance_measures_2006.pdf www.ase.org/content/article/detail/2356 ECONorthwest 2005. *Report to Legislative Assembly on Public Purpose Expenditures.* Prepared for the Oregon Department of Energy and the Oregon Public Utility Commission. www.egov.oregon.gov/PUC/electric_restruc/public_purpose_report_030305.pdf Violette, D and R. Sedano. 2006. *Demand-Side Management: Determining appropriate spending levels and cost-effectiveness testing. Appendix A: Summaries by Jurisdiction.* Prepared for Canadian Association of Members of Public Utility Tribunals (CAMPUT) Oregon Department of Energy, tax credits and energy loan program: www.oregon.gov/ENERGY/CONS/RES/RETC.shtml www.oregon.gov/ENERGY/CONS/BUS/BETC.shtml www.oregon.gov/ENERGY/LOANS/selphm.shtml

[57] ECONorthwest 2005. *Report to Legislative Assembly on Public Purpose Expenditures.* Prepared for the Oregon Department of Energy and the Oregon Public Utility Commission.

Jurisdiction	Texas
Key elements	• Setting legally binding targets for energy savings • Establishing measurement and verification (M&V) protocols
Summary	Texas was one of the first states to use legislation to set energy efficiency goals for investor-owned utilities. The State met its initial goals cost-effectively and is considering increasing its energy savings goals.
EE policy statement/strategy	Texas state legislation incorporates energy efficiency through *Senate Bill 7* (76th legislature) and *Senate Bill 5* (77th legislature). *Senate Bill No. 7*, the Texas Restructuring Act, eliminated integrated resource planning. However, it added modest goals for energy efficiency—10% of annual growth in demand—to be provided by electric utilities with funding from a small systems benefit charge: 0.050–0.065 mills per kWh.[58] It directed the Public Utilities Commission of Texas (PUCT) to provide oversight and adopt rules and procedures, as necessary, to ensure that the goals were met by January 1, 2004. *GOAL FOR ENERGY EFFICIENCY* *(a) It is the goal of the legislature that:* *(1) electric utilities will administer energy savings incentive programs in a market-neutral, nondiscriminatory manner but will not offer underlying competitive services;* *(2) all customers, in all customer classes, have a choice of and access to energy efficiency alternatives and other choices from the market that allow each customer to reduce energy consumption and reduce energy costs; and each electric utility will provide, through market-based standard offer programs or limited, targeted, market-transformation programs, incentives sufficient for retail electric providers and competitive energy service providers to acquire additional cost-effective energy efficiency equivalent to at least 10 percent of the electric utility's annual growth in demand.*[59] In 2001, *Senate Bill 5* was enacted, with the goal of assisting the state in meeting the Federal Clean Air Act. The bill focuses on the affected counties—those that do not attain the air quality measures in the Federal Clean Air Act. The 41 non-attainment counties in Texas represent 15.7 million people, or 71% of the Texan population. *Senate Bill 5* stipulates what each political subdivision in these counties is required to do: • Establish a goal to reduce electric consumption by 5% per year for five years beginning January 1, 2002.

[58] Senate Bill 7, Section 39.905.

[59] Senate Bill 7, Section 39.905.

	• Implement all cost-effective energy efficiency measures in existing facilities to reduce consumption. • Report to the State Energy Conservation Office (SECO) annually regarding efforts and progress, and, if goals are not met, provide justification that all available measures have been implemented.[60] This bill also includes mandatory state-wide building codes for both residential and commercial buildings, equivalent to 2001 IECC. In addition, state-funded buildings must meet higher standards: IECC 2003 for state-funded residential buildings, and ASHRAE/IESNA 90.1-2004 for state-funded commercial buildings (effective September 1, 2005).
EE targets and milestones	For investor-owned electric utilities, meet at least 10% of annual load growth through energy efficiency by 2004, and each year thereafter[61]. Texas utilities easily surpassed these goals in 2003 and 2004, leading to reports of a growing consensus among key parties to increase the goal to 50% of load growth in 2007, with mechanisms or incentives in the package so that utility profits do not suffer as a result of target increases.[62] For political subdivisions in 41 non-attainment counties, reduce electric consumption by 5% per year for five years, from 2002–2007[63].
Primary sectors targeted	The PUCT developed templates for programs that can be offered by the utilities[64]: • Commercial and Industrial Standard Offer • Residential and Small Commercial Standard Offer • ENERGY STAR Homes Market Transformation • Residential ENERGY STAR Windows Market Transformation • Load Management Standard Offer • Hard-to-Reach Customer Standard Offer • Air-Conditioner Distributor Market Transformation • Air-Conditioner Installation Information and Training Market Transformation The state focuses on energy savings in residential, commercial and municipal buildings and on other municipal energy efficiency projects[65].
Types of policies and programs	• Utility DSM programs with specific energy efficiency goals, funded by

[60] Senate Bill 5,Legislative Session 77(R) Section 388.005. http://tlo2.tlc.state.tx.us/cgi-bin/tlo/textframe.cmd?LEG=77&SESS=R&CHAMBER=S&BILLTYPE=B&BILLSUFFIX=00005&VERSION=5&TYPE=B

[61] Senate Bill 7, Legislative Session 76(R) http://www.opc.state.tx.us/SBill7.htm

[62] Nadel, Steve. 2006. *Energy efficiency resource standards: experience and recommendations.* American Council for an Energy Efficient Economy. Washington, DC. ACEEE report E063.

[63] Senate Bill 5,Legislative Session 77(R)

[64] Senate Bill 7, Legislative Session 76(R)

[65] Senate Bill 5,Legislative Session 77(R)

	utilities. These programs are designed by the PUCT with guidelines on cost and delivery. They are either standard offer, with incentives, rebates, information, and so on for specific products and markets, or they are market-transformation programs such as ENERGY STAR homes and air-conditioning. • Energy efficiency grants with specific goals • Building codes
Financing mechanism and annual allocation/budget	Individual distribution utilities collect funds through bills for provision of DSM programs: the PUCT oversees the amounts collected and verifies savings. *System Benefits Fund*[66] - a charge applied to electricity sales, at 0.050-0.065 mills per kWh the amount is small compared to other states The Texas Emission Reduction Program (TERP) Fund[67] provides grants to utilities to develop and administer energy efficiency programs. Utilities are required to show that the disbursement of grants leads to measurable reductions in emissions. The fund comes from surcharges and fees on motor vehicle registration, construction equipment sales, leases and rentals, and the sale and lease of certain motor vehicles. Energy efficiency grants are allocated as 7.5% of TERP Fund revenues, estimated at $10 million for 2002. Programs funded by TERP totaled $134 million in 2002 and are increasing to an expected $165 million in 2006. The Texas *LoanSTAR Revolving Loan Program*, founded in 1989, offers loans to state agencies, institutions of higher learning, school districts and local governments for energy efficiency retrofits. The LoanSTAR endowment is $98 million and comes from the 1976 oil overcharge funds. It provides loans between $10,000 and $5 million with a maximum payback period of ten years. Distribution utilities spent $87 million on energy efficiency programs in 2004. This is equivalent to about 0.3% of the total revenue from the electric industry in Texas.[68]
Staffing	A staff of 20 in the State Energy Conservation Office
Co-ordinating agents	Participating utilities administer the funds allocated by the PUCT to the grant program under Senate Bill 5. The PUCT administers the system benefit fund created under Senate Bill 7.

[66] Senate Bill 7, Legislative Session 76(R)

[67] Senate Bill 5, Legislative Session 77(R)

[68] www.eia.doe.gov/cneaf/electricity/esr/esr_tabs.html

[69] www.seco.cpa.state.tx.us/sb5compliance.htm

	The State Energy Conservation Office administers and delivers a number of energy efficiency programs including LoanSTAR, Texas Energy Partnerships (working with municipalities to meet Senate Bill 5 targets),[69] codes and standards education and outreach, and programs focused on energy efficiency at state agencies and public education.
Delivery agents	Energy Efficiency Service Companies and Retail Electric Providers are selected by utilities through competitive bids.
Performance measurement and verification	Deemed savings estimates approved by the PUCT and in-field measurements in accordance with International Measurement and Verification protocol.[70] [71]
Success stories	In 2004, the investor-owned utilities in Texas exceeded their statewide goals for energy efficiency once again[72]. 192 MW of peak demand reduction was achieved—36% above the goal of 142 MW. In addition, 430 GWh of demand reduction was achieved.[73] 430 GWh is equivalent to about 0.13% of total electric consumption. According to the 2005 SECO report[74], • 247 political subdivisions have established the annual 5% reduction goal. • 111 political subdivisions have reported electricity consumption for 2004. • Electricity consumption has been reduced by over 76 GWh by jurisdictions reporting 2001 and 2004 data. While this is only a 2% reduction over the three years (and not the targeted 6%) and not all jurisdictions have reported, 31 jurisdictions reported energy savings of over 10% with several exceeding 20% reductions.
Recognition	Austin Energy's Home Performance with ENERGY STAR was recognized as one of the best in the nation and named an ENERGY STAR 2006 Partner of the Year for program delivery. The Austin Energy press release dated March 8, 2006 explains: *This is the second year of the Home Performance with ENERGY STAR program at Austin Energy, and its second national award—winning the ENERGY STAR award for Excellence in Home Improvement in 2005. However, Austin Energy has had a comprehensive energy efficiency program in place for more than*

[70] www.ipmvp.org

[71] Senate Bill 7, Legislative Session 76(R)

[72] Senate Bill 7, Legislative Session 76(R)

[73] www.texasefficiency.com/2004_EUMMOT_Summary.pdf

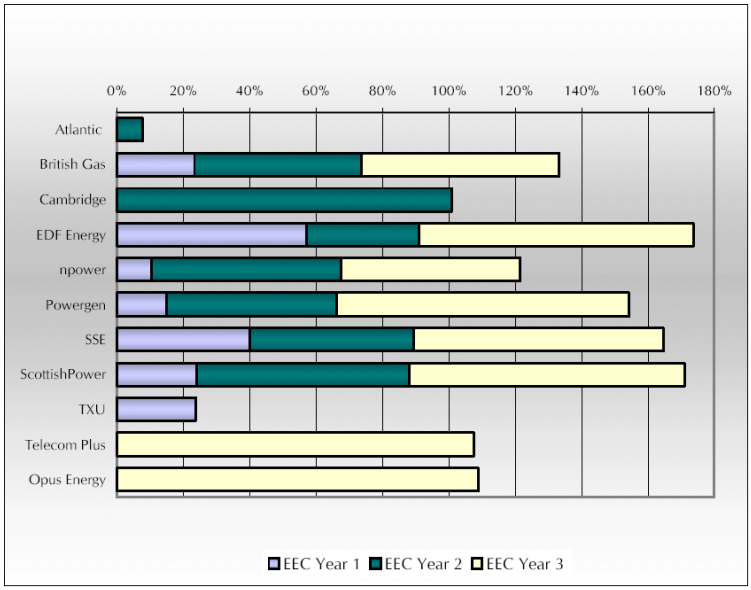
[74] Senate Bill 5, Legislative Session 77(R)

	20 years. Since 1982, the Utility's energy-efficiency programs have cumulatively offset the need for a 650 megawatt power plant.[75] *America's Best: Profiles of America's Leading Energy Efficiency Programs* (2003) awarded Exemplary Program recognition for Residential New Construction Programs to: • Texas ENERGY STAR Homes Program by CenterPoint Energy and Oncor • Green Building Program by Austin Energy
Contacts	Dub Taylor, Director State Energy Conservation Office Texas Comptroller of Public Accounts 512.463.1931 Senate Bill 5 Administrator Theresa Gross 512.936.7367, theresa.gross@puc.state.tx.us Alfred Reyes Air Quality Planning, SIP development team 512.239.5375 Senate Bill 7 Administrator Nieves Lopez 512.936.7307, nieves.lopez@puc.state.tx.us
Information sources	www.repp.org/articles/static/1/1024479645_1023962558.html Senate Bill 7 www.opc.state.tx.us/DSM.htm www.puc.state.tx.us/rules/rulemake/21074/21074.cfm www.centerpointefficiency.com/about/ www.texasefficiency.com/2004_EUMMOT_Summary.pdf Senate Bill 5 www.seco.cpa.state.texas.us Senate Bill 5 (May 2001) Subchapter E details the Energy Efficiency Grant Program (Sections 386.200-386.205) www.capitol.state.tx.us/data/docmodel/77r/billtext/rtf/SB00005F.RTF www.repp.org/articles/static/1/1024479645_1023962558.html

[75] www.austinenergy.com/About%20Us/Newsroom/Press%20Releases/2006/energyStarAward06.htm

Jurisdiction	United Kingdom
Key elements	• Showing leadership in making energy efficiency a priority in energy policy • Setting legally binding targets for energy savings • Developing comprehensive programs • Establishing measurement and verification (M&V) protocols
Summary	In 2003, the United Kingdom developed an energy plan with a strong commitment to reducing greenhouse gas emissions. This plan states that energy efficiency is likely the cheapest and safest way to meet its goals. The government has set energy efficiency targets for energy suppliers in three-year time periods. Suppliers surpassed targets in the 2002–2005 time period, partly in anticipation of higher targets in 2005–2008. The measures that qualify for the energy efficiency targets are developed in co-ordination with other programs such as building energy codes. Suppliers receive extra points for measures and programs that are innovative and designed to help push the energy efficiency market. While this program focuses on residential buildings, other programs cover the commercial and industrial sectors.
EE policy statement/strategy	In February 2003, the Energy White Paper, *Our energy future: Creating a low carbon economy,* set energy efficiency at the heart of UK energy policy. The paper sets out four objectives: namely, reducing CO_2 emissions, maintaining reliability, promoting competitive markets with sustainable economic growth, and ensuring adequate and affordable home heating. The paper states that "Energy efficiency is likely to be the cheapest and safest way of addressing all four of these objectives."[76] In 2004, the UK released *Energy Efficiency: The Government's Plan for Action* to detail how the energy efficiency strategy will be implemented. In response to Section 81 of the Energy Act of 2004, which requires the government to report annually on its progress in achieving energy efficiency aims, the Department of Trade and Industry (DTI) has published the *First Annual Report on Implementation of the Energy White Paper* (2004) and *Second Annual Report on Implementation of the Energy White Paper* (2005). Using the Energy Efficiency Commitment (EEC), the UK requires electricity and gas utilities to achieve energy saving targets by promoting improvements in energy efficiency in the household sector. Targets are set individually for each utility, and from 2005–2011, the overall targets are expected to double. At least 50% of energy savings must be met by helping low-income consumers.

[76] UK Energy White Paper. 2003. *Our energy future: Creating a low carbon economy*, p. 11.

	The UK also has mandatory building energy regulations that were increased in 2006 to improve energy efficiency by 40%. All new and existing homes must be labeled with energy efficiency ratings prior to sale to give owners more information about the operating costs of their homes. These ratings will also help form the basis of the next wave of improvements to building regulations. *Climate Change Agreements*[77] allow eligible businesses to secure an 80% discount from the *Climate Change Levy*[78] in return for meeting targets to reduce energy consumption and carbon emissions; Government and private sector funding of *The Carbon Trust*[79] and *Energy Saving Trust*[80] provides effective energy management to households, businesses and the public sector.
EE targets and milestones	The energy efficiency commitment for 2002–2005 was 62 terawatt hour (TWh) (or the equivalent amount of coal, natural gas or oil).[81] The total energy savings over the three years was 86.8 TWh, with 10 of the 12 suppliers surpassing their savings goals as indicated in the table below. The two suppliers that did not meet their targets went into receivership during the three-year period. Six of the suppliers chose to carry over their excess energy savings to the next period, 2006–2008. As a result, the overall energy savings that counted toward the 2002–2005 target was 61 TWh. 

[77] www.defra.gov.uk/environment/ccl/index.htm

[78] www.defra.gov.uk/environment/climatechange/uk/business/ccl-cca.htm

[79] www.carbontrust.co.uk/default.ct

[80] www.est.org.uk/

[81] The EEC are measured as lifetime savings of measures installed over the three years.

	Source: OFGEM 2005. *A Review of the Energy Efficiency Commitment 2002-2005*. The energy efficiency commitment for 2005–2008 is 130 TWh. The average annual savings from this goal is equivalent to about 0.7% of electricity sales per year. The government has committed to maintaining the program through 2011, subject to a review in 2007. The UK's *Climate Change Programme* identifies how energy efficiency will save 10.2 million tonnes of carbon (MtC) per year by 2010: these savings will be split between the business sector (5.1 MtC), the household sector (4.8 MtC), and the public sector (0.3 MtC).
Primary sectors targeted	The UK has targeted residential buildings, with an expected 50% of savings from low-income homes. Small commercial buildings may be included in the 2008–2011 targets. Large commercial and industrial sectors are included in other programs related to reducing greenhouse gas emissions.
Types of policies and programs	• DSM programs funded by systems benefit fund, with performance indicators and provided by an independent (non-utility, non-government) entity • Building codes
Financing mechanism and annual allocation/budget	• *Climate change levy* - The climate change levy is a tax on the use of energy in industry, commerce and the public sector, with offsetting cuts in employers' National Insurance Contributions. The levy provides additional support for energy efficiency schemes and renewable sources of energy. • *Carbon Trust* – This independent company funded by government offers a wide range of services to UK organisations to support their reduction of carbon emissions. The Carbon Trust's annual funding is in excess of £69m in grants from the Department for Environment, Food and Rural Affairs (Defra), the Scottish Executive, the Welsh Assembly Government and Invest NI. • *Energy Savings Trust* – This non-profit organization, funded by governments and the private sector, has an annual budget of about £70 million and covers all sectors including transportation and industry.
Staffing	• *Carbon Trust* – 12 full-time Directors plus junior and support staff, 17 Board Members • Department for Environment, Food and Rural Affairs (Defra) – 5 Ministers/Secretaries, 3-4 full-time staff • *Energy Savings Trust* – 160 staff
Co-ordinating agents	• The Department for Environment, Food and Rural Affairs (Defra) sets the overall energy savings targets.

	• The Office of Gas and Electricity Markets (Ofgem) allocates targets to 12 energy suppliers, develops procedures for assessing suppliers' energy efficiency schemes, and oversees progress and compliance against the targets. • The Energy Action Grants Agency (Eaga) Group provides services, products and solutions that address the social, environmental and energy efficiency objectives of government and the private sector throughout the UK. • Utilities
Delivery agents	The gas and electricity regulator Ofgem is responsible for administering the EEC.
Performance measurement and verification	The UK government reports annually on its progress toward carbon savings targets. It also reports on the progress of energy suppliers in meeting their energy efficiency goals. Ofgem has developed an EEC Scheme Spreadsheet that details the energy savings attributable to standard energy efficiency measures. Suppliers were accredited with energy savings for their schemes on an ex-ante basis. The methodology for determining the energy savings attributed to measures corresponded to Defra's EEC target-setting model. The energy savings were, where possible, taken from recognized sources such as the Building Research Establishment and the Energy Saving Trust. Ofgem has also appointed technical advisory agents to assist it in its role as administrator. In July 2004, the National Audit Office published a report on Ofgem's energy efficiency work in relation to the EEC. The report states that "in administering the EEC, Ofgem has established robust arrangements for checking suppliers' schemes and obtaining reliable data."[82]
Success stories	Between 2002-2005, the energy retail industry achieved £1000 million worth of energy saving measures (61TWh per year) through the first Energy Efficiency Commitment (EEC1). This is equal to a 1% annual reduction in domestic carbon dioxide emissions. Ofgem estimates that this has avoided 15.5 million tones of carbon emissions. Between 2005-2008, the energy retail industry aims to achieve a further £700 million worth of energy saving measures per year (1301TWh) through the second Energy Efficiency Commitment target. The energy savings achieved under EEC1 equate to £350m per year based on current wholesale electricity prices.

[82] National Audit Office. 2004. Ofgem Social Action Plan and Household Energy Efficiency, July 2004, Report by the Comptroller and Auditor General. HC 878, July 2004. www.nao.org.uk/publications/nao_reports/03-04/0304878.pdf

	Analysis by the Energy Savings Trust indicates that the EEC might have had an even greater effect than the results suggest. For example, the energy suppliers managed to promote nearly 6 million A-rated white appliances from 2002–2005. However, over 12 million A-rated appliances were sold during that period. The reason for sales exceeding the schemes run by the suppliers is not clear, but it may have resulted from the retailers not involved in EEC activity ensuring that their product range was of the same quality as those of their competitors.
Information sources	Building regulations www.odpm.gov.uk/index.asp?id=1002882&PressNoticeID=2093 White Paper www.dti.gov.uk/energy/sepn/secondannualreport.pdf www.defra.gov.uk/environment/energy/review/index.htm Evaluation of 2002-2005 EEC www.ofgem.gov.uk/temp/ofgem/cache/cmsattach/12015_18105.pdf?wtfrom=/ofgem/work/index.jsp&section=/areasofwork/energyefficiency

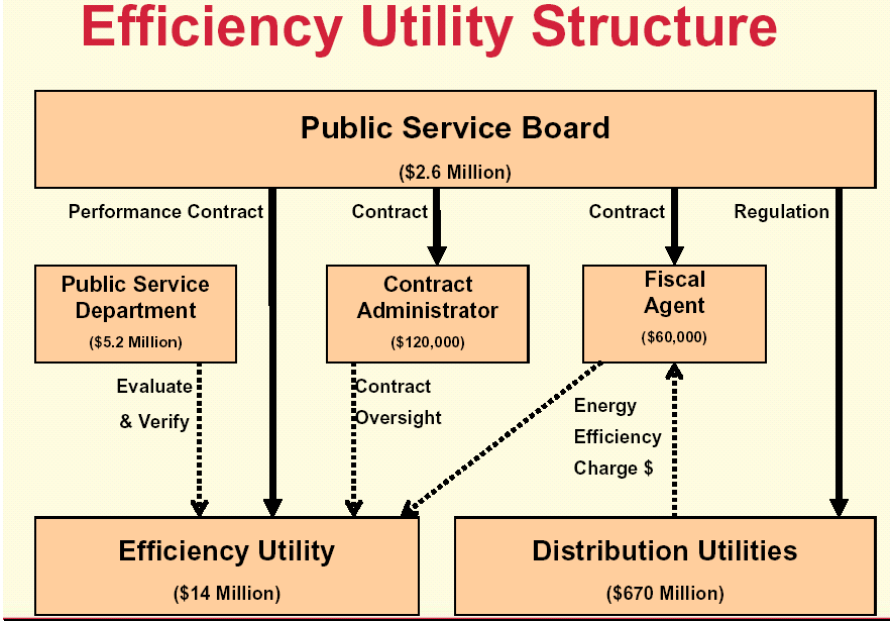
Jurisdiction	**Vermont**
Key elements	• Providing financial and institutional structure for energy efficiency • Establishing measurement and verification (M&V) protocols
Summary	*Efficiency Vermont* is Vermont's "energy efficiency utility"—its single source for the majority of electricity efficiency programs in the state. *Efficiency Vermont* has been recognized for its innovation in using a set of performance measures to determine financial incentives and disincentives for the institution delivering energy efficiency.
EE policy statement/strategy	Vermont developed an innovative approach to delivering energy efficiency state-wide through an independent utility funded by a systems benefit charge. In 1999, Vermont legislation gave the Public Services Board (PSB) the authority to create Efficiency Vermont, and PSB contracted Vermont Energy Investment Corporation (VEIC) to administer it. Vermont's *State Energy Plan* strongly features energy efficiency and demand side management. It requires: *. . . to the greatest extent practicable, that Vermont . . . meet its energy service needs in a manner that is adequate, reliable, secure and sustainable; that assures affordability and encourages the state's*

	economic vitality, the efficient use of energy resources and cost effective demand side management; and that is environmentally sound.[83] Vermont backs these goals with actions such as state building energy codes and proposed appliance codes. The PSB contract with VEIC contains negotiated performance measures for the Efficiency Vermont contractor, and provides an incentive of 2.9% of the contract value if the contractor attains 100% of the performance results. The performance contract has 35 specified measures of performance including three types of performance indicators: program results, activity milestones, and market effects. Most of the incentive award is for electric energy savings and the economic value of all resource savings. The initial contract was for a three-year period and has been renewed with VEIC. Vermont also has state-specific energy building codes, which were revised in 2004 and came into effect January 1, 2005. The state's mandatory residential code is as stringent as the 2000 International Energy Conservation Code on which it is based. The voluntary commercial code is more stringent than ASHRAE 90.1-99: the code is based on IECC 2000 with amendments to include ASHRAE 90.1-99. The commercial code is mandatory for new state-funded buildings and ACT 250 buildings. Efforts are underway to implement a commercial building energy standard across the state. In July 2006, Vermont enacted into law an act setting minimum energy efficiency standards for appliances.[84] In 2006, a bill was introduced to establish a universal thermal energy efficiency program funded by a systems benefit charge on heating oil and kerosene. The program, to be developed in conjunction with the Office of the State Treasurer, would receive up-front capitalization from the state pension fund, assuming the fund could be assured a market rate of return. The establishment and administration of the program would be financed by a gross receipts tax of 0.05% on the retail sale of heating oil and kerosene that is not used to propel a motor vehicle as well as on propane and coal. The program would only tax the sellers who receive more than $10,000 annually for the sale of those fuels. Vermont is currently developing a comprehensive energy plan to replace its 1998 plan. In 2005, Vermont released the *Vermont Twenty Year Electric Plan*, which reaffirms that electrical energy policy be based on the lowest present value life-cycle costs, including environmental and economic costs.
EE targets and	*Efficiency Vermont* has successfully exceeded performance targets,

[83] State of Vermont. 2005. *Vermont State Agency Energy Plan for State Government*. http://www.bgs.state.vt.us/pdf/VTStateEnergyPlan.pdf

[84] http://www.leg.state.vt.us/docs/legdoc.cfm?URL=/docs/2006/acts/ACT152SUM.HTM, accessed July 2006.

milestones	including its electricity savings goals. For 2000–2002, the contract with VEIC was to provide • $36,162,000 of Total Resource Benefits, three-year cumulative target • 84,603 MWh annualized energy savings, three-year cumulative target These two performance indicators received the greatest weight in determining the contractor's incentive: 35% and 40% respectively. However, other performance indicators covered a range of aspects such as peak summer savings, equity by county, and business and residential new construction indicators. *Efficiency Vermont* exceeded its 2000–2002 energy savings commitments by 17%.
Types of policies and programs	• DSM programs funded by a systems benefit fund, with performance indicators, are provided by an independent (non-utility and non-government) entity. • Building codes
Financing mechanism and annual allocation/budget	• System Benefits Fund is charged to customers at a rate of 2.9 mills per kWh, equivalent to about 2–3% of bills • Annual allocation: Not to exceed $17,500,000 per year for all energy efficiency programs. The estimated budget for 2000–2002 was $27.8 million. Actual expenditures were $5.4 million in 2000 and $8.5 million in 2001.
Staffing	Vermont Energy Investment Corporation which delivers Vermont's statewide energy efficiency utility, *Efficiency Vermont*, is an organization of over 100 employees with expertise in residential, commercial, and industrial energy efficiency, building science, engineering, renewable energy, and database management.

Co-ordinating agents	 Source: Presentation by Ann Bishop. 2005. Vermont's Energy Efficiency Utility. Vermont Public Service Board[85]
Delivery agents	Independent contractors are selected through competitive bid based on their performance to run the efficiency utilities. Utilities still provide some DSM.
Performance measurement and verification	An independent contractor provides an annual evaluation of the program; the Public Service Department reviews and verifies the evaluation.
Success stories	In 2002, *Efficiency Vermont* helped 32,306 electricity customers complete efficiency investments that saved 38,369,000 kWh of energy annually. This is equivalent to approximately 0.7% of annual sales in 2002. Efficiency Vermont surpassed its 2002 annual energy savings target by 59% and its three-year target by 17%. These measures eliminated 411,000 tons of greenhouse gas emissions that would have been generated from conventional energy sources. Vermont leads the nation in ENERGY STAR qualified room air conditioners as a percentage of sales and ranks third in the country for the percentage of homes built to ENERGY STAR requirements. *Efficiency Vermont* served 67,846 unique customers—20.4% of all eligible customers—between 2000 and 2002. By comparison, the participation rates for Vermont's two largest utilities in 1998 and 1999 were less than 5%.
Recognition	In addition to these impressive statistics, *Efficiency Vermont* has garnered

[85] http://www.narucpartnerships.org/Presentations/Macedonia/May05/PSB/Vermonts_Energy_Efficiency_Utility_AnnBishop.pdf

	awards and recognition from around the country, winning the prestigious Innovations in American Government Award from Harvard's Kennedy School of Government. *Efficiency Vermont* received exemplary program ratings for its Multifamily Low Income Program and ENERGY STAR Homes Program, as reviewed by the American Council for an Energy Efficient Economy in *America's Best: Profiles of America's Leading Energy Efficiency Programs* (2003).
Contacts	Kelly Launder, Energy Efficiency Specialist Energy Efficiency Division, Vermont Department of Public Service 802.828.4039
Information sources	State Electricity Plan: www.publicservice.vermont.gov/pub/state-plans/state-plan-electric2005.pdf Harvard's Innovation in American Government Award: www.innovations.harvard.edu/awards.html?id=3664 Evaluation of Efficiency Vermont , 2002-2005: www.publicservice.vermont.gov/energy-www.efficiency/ee_files/efficiency/eval/eeu_2002report/app3.pdf Description of Efficiency Vermont: www.eere.energy.gov/state_energy_program/feature_detail_info.cfm/fid=23 www.repp.org/articles/static/1/1024479002_1023962558.html aceee.org/utility/bestpractoc.pdf Thermal efficiency bill: www.leg.state.vt.us/docs/legdoc.cfm?URL=/docs/2006/bills/intro/H-722.HTM