STATE AND REGIONAL POLICIES THAT PROMOTE ENERGY EFFICIENCY PROGRAMS CARRIED OUT BY ELECTRIC AND GAS UTILITIES

A REPORT TO THE UNITED STATES CONGRESS PURSUANT TO SECTION 139 OF THE ENERGY POLICY ACT OF 2005

MARCH 2007

U.S. DEPARTMENT OF ENERGY

Sec. 139. Energy Efficient Electric and Natural Gas Utilities Study.

a) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Secretary, in consultation with the National Association of Regulatory Utility Commissioners and the National Association of State Energy Officials, shall conduct a study of State and regional policies that promote cost-effective programs to reduce energy consumption (including energy efficiency programs) that are carried out by—

(1) utilities that are subject to State regulation; and

(2) nonregulated utilities.

(b) CONSIDERATION.—In conducting the study under subsection (a), the Secretary shall take into consideration—

(1) performance standards for achieving energy use and demand reduction targets;

(2) funding sources, including rate surcharges;

(3) infrastructure planning approaches (including energy efficiency programs) and infrastructure improvements;

(4) the costs and benefits of consumer education programs conducted by State and local governments and local utilities to increase consumer awareness of energy efficiency technologies and measures; and

(5) methods of—

(A) removing disincentives for utilities to implement energy efficiency programs;

(B) encouraging utilities to undertake voluntary energy efficiency programs; and

(C) ensuring appropriate returns on energy efficiency programs.

(c) REPORT.—Not later than 1 year after the date of enactment of this Act, the Secretary shall submit to Congress a report that includes—

(1) the findings of the study; and

(2) any recommendations of the Secretary, including recommendations on model policies to promote energy efficiency programs.

SUMMARY

Energy efficiency—using less energy to accomplish the same level of economic activity or amenity—can provide significant economic, environmental and energy security benefits to the United States (U.S.) and its citizens at low cost. These benefits are broadly recognized and policies to support energy efficiency have been adopted by Federal, State and local governments across the U.S. since the 1970s.

The Energy Policy Act of 2005 (EPAct) includes a number of provisions that focus on energy efficiency, including national appliance efficiency standards, tax credits, and energy efficiency at Federal and other public agencies. Section 139 directed the Secretary of Energy, in consultation with the National Association of Regulatory Utility Commissioners (NARUC) and the National Association of State Energy Officials (NASEO), to conduct a study of State and regional policies that promote cost-effective programs to reduce energy consumption (including energy efficiency programs) that are carried out by electric and natural gas utilities and then submit a report to Congress one year after the enactment of EPAct on the findings of the study as well as any recommendations.[1]

The required DOE study was conducted by DOE's Office of Electricity Delivery and Energy Reliability, which engaged the National Council on Electricity Policy (the "National Council") to prepare a draft for its consideration in accordance with EPAct sections 139 (a) and (b).[2] This report summarizes the findings of the DOE study, and makes recommendations for State and regional policies.

This report also draws on the results of a related effort (facilitated by DOE and the U.S. Environmental Protection Agency) called the "National Action Plan for Energy Efficiency" ("Action Plan"), under which a group of leading electric and gas utilities, utility regulators, and related organizations call for increased energy efficiency as delivered by utilities and allied groups.[3]

The overarching conclusion, and thus finding of the DOE study, is that State and regional policies should capitalize on the opportunities to use low-cost energy efficiency, as delivered by electric and gas utilities and allied organizations, as a means to meet growing energy demands and enhance system reliability.

In this report to Congress, DOE provides the following ten (10) recommendations for regulators of investor-, publicly- and cooperatively-owned electric utilities and investor- and publicly-owned gas utilities[4] (hereafter referred to simply as "regulators" and

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[1] Appendix A of this report is the study.
[2] The National Council on Electricity Policy ("National Council") is a joint venture of NARUC, NASEO, the National Conference of State Legislatures (NCSL), and the National Governors Association (NGA). Thus the consultation requirements of EPACT section 139(a) have been met.
[3] Appendix B of this report contains the executive summary of the National Action Plan for Energy Efficiency report, which was released July 31, 2006, at the NARUC Summer Committee Meetings.
[4] "Regulators" of all three types of electric and gas utilities, depending on the State and ownership type of the utility, can be State public utility commissions, local governing boards (for publicly-owned electric and

"utilities"), recognizing that they may have already implemented some of these recommendations:[5]

1. Regulators should consider making a strong, long-term commitment to cost-effective energy efficiency as a resource.
2. Regulators should consider implementing electric and gas utility energy efficiency programs through a combination of:
   a. infrastructure planning that includes energy efficiency programs as a part of utility resource planning, regional planning and rate cases;
   b. establishing dedicated program funding sources and ensuring that utilities receive appropriate compensation for programs;
   c. energy efficiency performance requirements for utilities; and
   d. reporting resulting costs, savings, and other program performance indicators that lead to program improvements.
3. State energy agencies should consider adopting complementary policies to utility energy efficiency programs, such as appliance energy efficiency standards, building codes, and tax incentives.
4. Regulators should consider recognizing energy efficiency as a high-priority energy resource.
   a. Utilities and regulators should consider integrating energy efficiency and demand response into electric and natural gas system planning and resource procurement.
   b. Organizations and groups involved in regional power planning should consider demand-side resources, including energy efficiency, in regional resource adequacy assessments.
   c. States facing environmental constraints (e.g., Clean Air Act requirements) may find that energy efficiency offers an attractive option to achieve compliance, as compared to total reliance on power plant controls.
5. Regulators should consider establishing a formal evaluation framework for utility energy efficiency programs.
   a. States involved in regional planning may also want to move toward common evaluation protocols for energy efficiency programs.
6. Regulators should consider adopting an energy efficiency performance requirement or minimum energy savings targets for electric and natural gas utility end-use energy efficiency programs.
7. Regulators should consider promoting sufficient, timely, and stable program funding to deliver energy efficiency where cost-effective by:

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gas utilities and rural electric cooperatives), State legislatures when they consider pertinent legislation, and State officials when they serve on regional bodies.

[5] In such cases, DOE offers these recommendations to regulators of utilities for them to consider in improving existing energy efficiency policies and programs.

    a. selecting funding mechanisms for energy efficiency from the available options: rate-basing, rate surcharges, and emerging alternative funding sources; and
    b. establishing funding commitments for multiple-year periods.

8. Regulators should consider modifying policies to align utility incentives with the delivery of cost-effective energy efficiency by:
    a. addressing the typical utility throughput incentive and removing other regulatory and management disincentives to energy efficiency;
    b. providing incentives for the successful management of energy efficiency programs;
    c. providing sufficient certainty of cost recovery; and,
    d. entertaining the option of creating independent or State-administered energy efficiency programs.
9. Regulators should consider integrating customer education programs with utility energy efficiency programs.
10. Regulators should consider modifying ratemaking practices to promote energy efficiency among consumers, while recognizing that this goal must be balanced with other ratemaking objectives.

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ACRONYMS AND ABBREVIATIONS

Action Plan	National Action Plan on Energy Efficiency
DOE	U.S. Department of Energy
DSM	demand-side management
EPA	U.S. Environmental Protection Agency
EPAct	Energy Policy Act of 2005
ESCO	energy services company
ISO	independent system operator
LSE	load-serving entity
M&V	measurement and verification
NARUC	National Association of Regulatory Utility Commissioners
NASEO	National Association of State Energy Officials
National Council	National Council on Electricity Policy
NPCC	Northwest Power and Conservation Council
RTO	regional transmission organization
SBC	system benefit charge

SECTION 1. INTRODUCTION

Energy efficiency—using less energy in homes, buildings and industry by installing more efficient equipment, appliances, and measures to accomplish the same level of economic activity or amenity—can provide significant economic, environmental and energy security benefits to the United States (U.S.) and its citizens at low cost. These benefits are broadly recognized and policies to support energy efficiency have been adopted by Federal, State and local governments across the U.S. since the 1970s. Energy efficiency is a critical tool to helping the U.S. meet its energy supply needs, lessening our economic vulnerability.

The Energy Policy Act of 2005 (EPAct) recognizes energy efficiency as a high national priority as it includes a number of provisions that target energy efficiency, including national appliance efficiency standards, tax credits, and energy efficiency at Federal and other public agencies. In the area of utility energy efficiency programs, Congress directs DOE to conduct a study of State and regional policies and report back to Congress (see textbox):

- **EPAct Sec. 139 (a)** directs DOE to conduct the study in consultation with the National Association of Regulatory Utility Commissioners (NARUC) and the National Association of State Energy Officials (NASEO);
- **EPAct Sec. 139 (b)** provides a list of issues to consider in the study; and
- **EPAct Sec. 139 (c)** directs DOE to provide a report to Congress that includes the study's findings and any recommendations of the Secretary.

DOE has complied with the provisions of Section 139 by:

- preparing the study in accordance with EPACT sections 139 (a) and (b)[6]; and

EPAct 2005, SEC. 139.
ENERGY EFFICIENT ELECTRIC AND NATURAL GAS UTILITIES STUDY.

(a) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Secretary, in consultation with the National Association of Regulatory Utility Commissioners and the National Association of State Energy Officials, shall conduct a study of State and regional policies that promote cost-effective programs to reduce energy consumption (including energy efficiency programs) that are carried out by—
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(1) performance standards for achieving energy use and demand reduction targets;
(2) funding sources, including rate surcharges;
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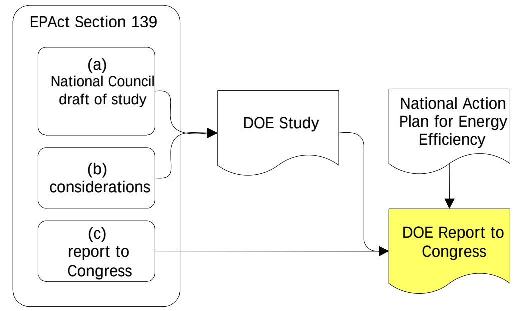
(4) the costs and benefits of consumer education programs conducted by State and local governments and local utilities to increase consumer awareness of energy efficiency technologies and measures; and
(5) methods of—
(A) removing disincentives for utilities to implement energy efficiency programs;
(B) encouraging utilities to undertake voluntary energy efficiency programs; and
(C) ensuring appropriate returns on energy efficiency programs.

(c) REPORT.—Not later than 1 year after the date of enactment of this Act, the Secretary shall submit to Congress a report that includes—
(1) the findings of the study; and
(2) any recommendations of the Secretary, including recommendations on model policies to promote energy efficiency programs.

[6] DOE engaged the National Council on Electricity Policy (the "National Council") to prepare a draft for its consideration in preparing the DOE study, thus fulfilling the consultation responsibilities under EPAct section 139. The DOE study is included as Appendix A of this report.

- preparing this report to Congress, which offers key findings of the study and recommendations for States and regulators to consider and satisfies EPAct section 139 (c).

DOE Response to EPAct Sec. 139



Working with the National Council on Electricity Policy provided an effective means to coordinate with NARUC and NASEO in conducting the study. The National Council on Electricity Policy was established in 1994 as a joint venture of NARUC, NASEO, the National Conference of State Legislatures (NCSL), and the National Governors Association (NGA) with initial funding from DOE.[7]

DOE also draws upon the results of the National Action Plan for Energy Efficiency ("Action Plan"), a concurrent process to create a sustainable, aggressive national commitment to energy efficiency through electric and natural gas utilities, utility regulators, and partner organizations across the United States. Action Plan participants are a "Leadership Group" of 50 private, public, and cooperatively-owned electric and gas utilities, utility regulators, State agencies, large end-users, consumers advocates, energy service providers, and environmental/energy efficiency organizations.[8] The Leadership Group released its National Action Plan for Energy Efficiency report and initial set of commitments to advance energy efficiency at the 2006 NARUC Summer Committee Meetings.[9] The executive summary of the report, which includes the Action Plan recommendations and possible actions for implementing them, is included as Appendix B of this report. DOE, with its partner EPA, intends on working with members of the Leadership Group as it seeks to increase energy efficiency by electric and gas utilities and partner organizations.

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[7] The National Council on Electricity Policy, www.ncouncil.org, receives annual funding from DOE and the U.S. Environmental Protection Agency (EPA) and was initially formed to assist State policymakers with the challenges posed by the dramatic changes brought about by the reexamination of the traditional franchise electric system. The current activities of the National Council have expanded to include the analysis and discussion of policy initiatives related to the reliability, efficiency, diversity, and financing of electricity systems. The National Council provides an opportunity for State legislators, regulators, and policymakers to work together in a national forum specifically focused on electricity policy.

[8] The Action Plan "Leadership Group" is co-chaired by Marsha H. Smith, Commissioner of the Idaho Public Utilities Commission and currently First Vice President of NARUC, and Jim Rogers, President and Chief Executive Officer of Duke Energy and currently Chairman of the Edison Electric Institute. DOE and EPA facilitate the work of the Leadership Group and Action Plan and provide technical assistance. See page A-2 of Appendix A for a complete list of Action Plan participants.

[9] The full Action Plan report and list of commitments is available at www.epa.gov/cleanrgy/eeactionplan.htm. The Action Plan was released on July 31, 2006, at the 2006 NARUC Summer Committee Meetings.

This report should be of interest to the following parties:

- investor-, publicly-, and cooperatively-owned electric utilities
- investor- and publicly-owned gas utilities
- other retail energy providers[10]
- State regulatory commissions, legislatures, and energy offices
- State and third-party energy efficiency program administrators
- independent system operators (ISOs) and regional transmission organizations (RTOs)
- others interested in energy efficiency.

Types of Utilities

U.S. electric and natural gas utilities operate under three primary ownership structures:

- *investor-owned* utilities are private (usually publicly-traded) companies that are regulated by State utility commissions
- *publicly-owned* utilities, "public power", are utilities operated by a State or a political subdivision of a State and are regulated by appointed or elected boards, though in a few States their retail rates are also regulated by a State public utility commission
- *cooperatively-owned* utilities (or co-ops), including rural electric cooperatives, are regulated by member-elected boards, though in a few States their retail rates are also regulated by a State public utility commission

Except where explicitly specified, the term "utilities" is used in this report to represent all types of electric and gas utilities.

The body of this report is organized around the topics and issues that Congress directed DOE to consider (under EPAct sec. 139(b)) in preparing the study on State and regional policies to promote cost-effective energy efficiency carried out by utilities.[11] Each set of recommendations is supported by a discussion of key findings, which are highlighted in text boxes. The structure of the report is summarized in the following roadmap graphic.

Roadmap to this Report
Summary
1. Introduction
2. Recommendations → organized by EPAct sec. 139 (b) considerations → recommendations in bulleted, **boldface** type → key findings in *italicized* text boxes
Appendix A. DOE study → key findings in chapter 10
Appendix B. Action Plan executive summary

[10] In States with retail competition, other entities besides electric and gas utilities may sell energy to end-use customers. The definition and terminology used to describe these retail entities varies somewhat by State: Energy Service Company (New York), Third Party Supplier (New Jersey), Electricity or Gas Supplier (Maryland), Alternate Retail Electric Suppliers (Illinois) and Electric Service Provider (California). In this report, they are collectively referred to as "retail energy providers."

[11] In this report, DOE does not include a comprehensive review of individual utility energy efficiency programs. Interested readers are directed toward the National Energy Efficiency Best Practices Study for an in-depth review of "best practices" in utility energy efficiency program design and delivery (see www.eebestpractices.com.)

SECTION 2. RECOMMENDATIONS

DOE has developed a series of recommendations for regulators of investor-, publicly- and cooperatively-owned electric and gas utilities to consider in an effort to encourage implementation of cost-effective energy efficiency programs and to address barriers to investment in energy efficiency. DOE's recommendations are based on the EPAct section 139 study (see Appendix A), the recently-completed National Action Plan for Energy Efficiency report (see Appendix B for its executive summary), and interactions and discussions with industry and market participants. The focus of these recommendations is on utility-administered energy efficiency programs, although other energy efficiency strategies that States and regulators may wish to adopt are discussed. DOE recognizes that regulators of utilities in a number of States have already implemented some of these recommendations.

The recommendations are grouped into several functional categories. *The first section includes several general policy recommendations for regulators. DOE then offers specific recommendations that pertain to the five considerations specified in EPAct section 139(b)*. Each recommendation is supported by a discussion that draws on key findings, which are highlighted in textboxes.

Types of Governing Structures

Depending on their ownership structure, U.S. electric and natural gas utilities may be regulated or governed by different bodies:

- *State public utility commissions* are typically responsible for regulating retail rates charged by investor-owned electric and gas utilities, though a few States also oversee rates for public power and co-ops.
- *Governing boards* typically oversee publicly-owned gas and electric utilities and cooperatively-owned electric utilities.

Except where explicitly specified, the term "regulators" is used in this report to refer to all types of entities (e.g. State PUCs, governing boards) that oversee the operations of their jurisdictional electric and gas utilities.

General Recommendation

- **Regulators should consider making a strong, long-term commitment to cost-effective energy efficiency as a resource.**

Greater investment in energy efficiency can be a cost-effective way to balance growing energy demands and enhance system reliability. Energy efficiency has the potential to provide a variety of benefits to consumers and society. Not only do the consumers who implement energy efficiency measures experience energy cost savings, but all energy consumers can benefit from their actions. These benefits include:

- Reduced energy costs—By improving the efficiency of energy usage, capital-intensive infrastructure investments can be avoided or delayed. Because the costs of new generation, transmission, and distribution assets are recovered in retail rates, energy efficiency can lower consumers' electric and

Energy efficiency provides significant benefits to consumers and society, including: reduced energy costs, energy price risk mitigation, improved reliability, and environmental and energy security benefits.

gas rates and utility bills by mitigating or postponing the need for new power system infrastructure.

- Energy price risk mitigation—Energy efficiency can reduce risk of exposure to energy price increases. Price increases are caused primarily by sudden changes in the balance of energy supply and demand and are exacerbated by transmission congestion. Energy efficiency moderates changes in demand, diminishing pressure on existing supplies to meet current needs. In electricity markets, it enables supply to more easily stay in balance over time, slowing the need for new power generation and creating a more stable signal for new generation construction. When deployed in load centers, energy efficiency can reduce transmission congestion by reducing the amount of expensive power that must be generated locally to meet reliability standards. Similarly, natural gas efficiency can ease tight gas markets by reducing the demand on current systems and supplies.[12] Electricity and gas prices have increased substantially in recent years, making the potential benefits of energy efficiency compelling, and motivating increasing interest by Federal, regional, State, and local policymakers in making cost-effective energy efficiency a high priority.[13]

The level and volatility of natural gas and electricity prices have increased significantly in the last decade.

- Improved reliability—Energy efficiency, which can reduce system demand during peak periods, can lessen constraints and congestion on the electric transmission and distribution system.[14]
- Environmental benefits—Energy efficiency also provides important environmental benefits. Most directly, it reduces pollutant emissions from fossil fuel burning power plants. To the extent that investments in new power plants can be avoided, the life-cycle environmental impacts of those new plants can also be avoided (e.g., resources used in constructing, operating, and decommissioning plants are saved and upstream impacts from fossil and nuclear fuel extraction, refining, and transportation are avoided).
- Energy security—Energy efficiency is a local resource, relying on engineers, architects, retailers, and contractors to design, sell, and install high-efficiency equipment and appliances. It may reduce dependence on foreign energy supplies.

Despite these potential benefits and savings, energy efficiency remains an under-utilized resource due to a number of market barriers. These barriers are well-documented in a

[12] A recent study by the American Council for an Energy-Efficient Economy (ACEEE) identifies the potential for natural gas efficiency to ease high prices and price volatility in natural gas markets (see Elliot, N., and A.M. Shipley, 2005, "Impacts of Energy Efficiency and Renewable Energy on Natural Gas Markets: Updated and Expanded Analysis," ACEEE: E052, available at www.aceee.org).
[13] For examples, see the Western Governors' Association (WGA), 2004, "WGA Policy Resolution 04-14: Clean and Diversified Energy Initiative for the West," Santa Fe, NM, June 22, www.westgov.org/wga/policy/04/clean-energy.pdf; and the California Public Utilities Commission and California Energy Commission 2005, *Energy Action Plan II*, October, www.cpuc.ca.gov/PUBLISHED/REPORT/51604.htm.
[14] The size of the reliability benefit depends on relative demand and capacity limits. To be most valuable, energy efficiency must lower demand in a system that otherwise would be near its capacity limits.

body of academic literature examining why societal investments in energy efficiency typically fall short of optimal investment levels.[15] Some of the more broadly accepted market barriers to energy efficiency include:

Energy efficiency is impeded by a number of market barriers, including high first costs, high information or search costs, and split incentives.

- High first costs—Energy-efficient equipment is often more expensive than conventional equipment. Although the lifetime cost of high-efficiency equipment (including operational costs) may be lower, consumers either do not understand this, or are unwilling or unable to make the initial, higher outlay.
- High information or search costs—Energy-efficient equipment may be difficult for consumers and businesses to locate, or information on the energy usage of specific pieces of equipment may be difficult to find due to limited market saturation and lack of emphasis on energy consumption by equipment marketers
- Split incentives—The individuals in a position to purchase energy-efficient equipment may not be those who would receive the benefits. For example, a landlord (or construction contractor) faces a disincentive to purchase energy-efficient appliances with higher initial costs because it is the tenant (or homeowner) who receives the benefit of lower utility bills.

Decades of experience across the U.S. has demonstrated that energy efficiency programs administered by utilities (or third-parties) that facilitate the installation of energy-saving measures at customers' sites through a combination of technical assistance, information, and financial incentives can be effective at overcoming these barriers.

[15] See Golove, W. and J. Eto, 1996, "Energy Efficiency, the Free Market and Rationales for Government Intervention," paper presented to (De)Regulation of Energy: Intersecting Business, Economics, and Policy Conference, Boston, MA, October 27-30; Jaffe, A. and R. Stavins, R., 1994, "The energy-efficiency gap: What does it mean?" *Energy Policy* 22(10), 804-810; Levine, M., J. Koomey, J. McMahon and A. Sanstad, 1995, "Energy efficiency policy and market failures," *Ann Rev Energy and Environment* 20**,** 535-555; and Sanstad, A. and R. Howarth, 1994, "'Normal' markets, market imperfections and energy efficiency," *Energy Policy* 22(10), 811-818.

However, electric industry restructuring and uncertainty about utilities' roles in newly-created markets led to a sharp decline in program spending in the mid-1990s (see Figure 1). In most States that restructured their electric markets, "system benefit charges" (SBC) were established to support ratepayer-funded energy efficiency programs.[16] These funds have made up for some of the decline in utility spending; nonetheless, funding has remained flat since the mid-1990s. Some observers expected that retail energy suppliers would provide energy efficiency and other value-added services in addition to electric commodity service. While a private-sector energy services (ESCO) industry does invest in energy efficiency at large customers' sites, it operates in a niche market.

Spending on electric utility energy efficiency programs declined significantly in the late 1990s and has remained flat, but increased spending on similar State public benefits-funded programs has replaced some of this investment.

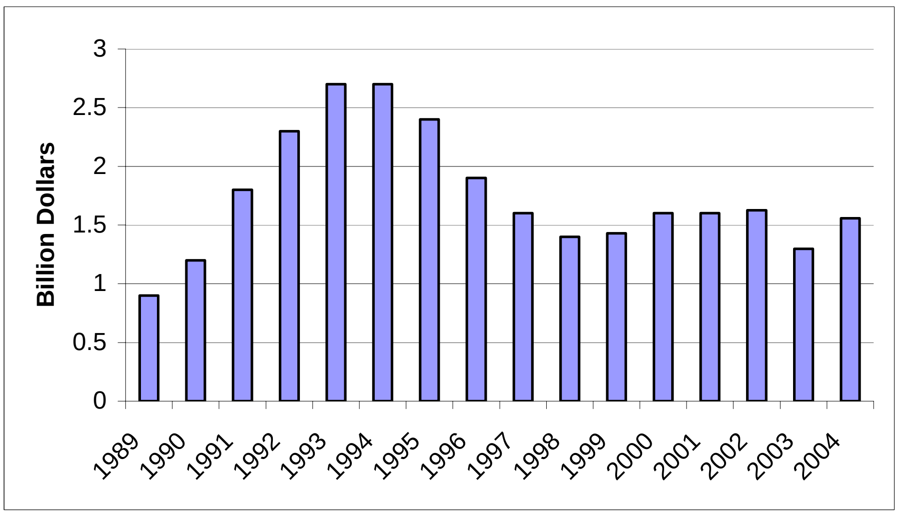

Figure 1. Electric Utility Demand-Side Management Spending (nominal $): 1989-2004

Sources: *Energy Information Administration*, Annual Energy Review 2004, Table 8.13 Electric Utility Demand-Side Management Programs, 1989-2003. Available at www.eia.doe.gov/emeu/aer/pdf/pages/sec8_49.pdf and *Energy Information Administration,* EIA Electric Power Report 2004: Table 9.7. Demand-Side Management Program Direct and Indirect Costs, 1993 through 2004. Available at www.eia.doe.gov/cneaf/electricity/epa/epa.pdf.

Gas utility spending on energy efficiency programs has also fluctuated over the last 20 years. In response to high gas prices in the 1970s and early 1980s, many gas utilities offered energy efficiency programs that included audits and financial incentives for residential customers to install high-efficiency equipment and weatherize their homes.

[16] SBCs, also referred to as "public benefit charges," appear as a line item on utility customers' bills (typically in States with restructured electric markets) that is designated for specified public purposes, including energy efficiency programs, low-income assistance and weatherization, energy research and development, and renewable energy. Prior to restructuring, the costs for these activities were typically bundled and included in the customers' utility rates. Some States that did not restructure their electric industry have continued to require ratepayer-funded energy efficiency programs, while utilities in other States have never offered significant energy efficiency programs.

Since then, natural gas efficiency investment has varied, with most remaining programs targeted at low-income customers.[17]

DOE recommends that regulators across the U.S. make strong commitments to energy efficiency where it is cost-effective. To maximize benefits, regulators should ensure that their commitments are long-term in nature to allow full development of energy efficiency policies and resources and capture as much cost-effective potential as possible.

General Recommendation

- **Regulators should consider implementing electric and gas utility energy efficiency programs through a combination of:**
    - **infrastructure planning that includes energy efficiency programs as a part of utility resource planning, regional planning, and rate cases;**
    - **establishing dedicated program funding sources and ensuring that utilities receive appropriate compensation for programs;**
    - **energy efficiency performance requirements for utilities; and**
    - **reporting resulting costs, savings, and other program performance indicators that lead to program improvements.**

Regulators can ensure that energy efficiency commitments are realized by implementing some combination of three high-level policy options: infrastructure planning, dedicated funding sources, and energy efficiency performance requirements. DOE provides specific recommendations on each of these options later in this section.

In addition, an important and easily overlooked aspect of successful energy efficiency programs is the reporting and evaluation of results.[18] States can better ensure that programs are responsive to local needs and opportunities if program results are regularly tracked and distributed for examination by regulators and other stakeholders. This makes program administrators explicitly accountable for their programs' performance. Another reason to encourage meaningful reporting is to stimulate improved programs over time and document successes and "best practices."

- **State regulators can adopt complementary policies to utility energy efficiency programs such as appliance energy efficiency standards, building codes, and tax incentives.**

[17] In part, this is because utilities, like customers, face disincentives to energy efficiency. These disincentives, and recommendations for overcoming them, are discussed in detail on pages 15-16.
[18] This is distinct from monitoring and verification, in which a reasonable level of precision on actual program performance is sought through specific measurement techniques.

States can implement a number of policy options, in addition to utility or third-party energy efficiency programs, to achieve energy efficiency in their jurisdictions.[19] States can adopt energy efficiency standards for appliances or other equipment that exceed Federal standards or for appliances that are not covered by Federal laws; 10 States have developed State standards for appliance and equipment efficiency.[20] States can also implement building codes for new construction and major renovations that specify design efficiency levels.[21] State tax incentives can also be effective at encouraging investments in energy efficiency.

EPAct 139(b)(3): Infrastructure planning approaches (including energy efficiency programs) and infrastructure improvements

- **Regulators should consider recognizing energy efficiency as a high-priority energy resource.**
    - **Utilities and regulators should consider integrating energy efficiency and demand response into electric and natural gas system planning and resource procurement.**
    - **Organizations and groups involved in regional power planning should consider demand-side resources, including energy efficiency, in regional resource adequacy assessments.**
    - **States facing environmental constraints (e.g., Clean Air Act requirements) may find that energy efficiency offers an attractive option to achieve compliance, as compared to total reliance on power plant controls**

One way of ensuring that energy efficiency commitments are realized is to integrate energy efficiency explicitly into electric (and gas) system resource planning and procurement processes. Treating energy efficiency as a resource entails comparing its costs and benefits on a comparable basis with supply-side assets such as power plants, transmission lines, or gas distribution system upgrades. This enables planners to include energy efficiency in the process of deciding which resources best meet important planning criteria such as cost-effectiveness, risk mitigation, or the resource portfolio's environmental footprint. Many States and utilities already have planning processes in place that consider and integrate a wide variety of supply- and demand-side options to meet future needs.[22]

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[19] The Federal government implements a number of these strategies. For example, EPACT 2005 provided Federal tax incentives and set new Federal efficiency standards for a number of products.
[20] The 10 States are: Arizona, California, Connecticut, Maryland, Massachusetts, New Jersey, New York, Oregon, Rhode Island, and Washington.
[21] Energy-efficient building codes typically specify minimum energy efficiency standards for homes and commercial buildings.
[22] States for their jurisdictional electric utilities, as well as non-State jurisdictional electric utilities (public power and rural electric cooperatives) above a certain size, were required to consider integrated resource planning under the Energy Policy Act of 1992.

DOE recommends that energy efficiency be recognized as a high-priority resource in three infrastructure-related forums:

- Resource planning and procurement—Energy efficiency should be included in the resource planning (and procurement) processes of utilities and States. Resource planning involves forecasting energy demand, assessing existing and prospective resource options, evaluating the system costs (and risks) associated with various portfolios of resources, and establishing a "preferred" portfolio that then guides utility investment decisions.[23] Not all States and utilities currently have a resource planning process in place. Those that do not may wish to consider adopting one; others may wish to pursue other options for ensuring that energy efficiency is implemented. For example, regulators should adopt policies that ensure that energy efficiency receives equal consideration in procurement processes. They may decide to designate energy efficiency resources as a high-priority resource in situations where local concerns or environmental impacts make siting of generation assets difficult or where market potential studies have demonstrated the magnitude of low-cost, energy efficiency resources.[24]

> *Energy efficiency may help offset the need for investments in generation, transmission and distribution systems.*

- Regional planning—Regional planners can offer guidance about system needs that energy efficiency can address. The extent and type of regional planning varies across the U.S. In some regions, regional transmission organizations (RTOs) assess whether adequate transmission and generation are in place to meet forecasted load and then suggest needed transmission upgrades. In others, regional reliability councils perform periodic resource assessments, driven primarily by resource adequacy considerations.[25] Energy efficiency can play an important role in addressing resource adequacy needs. For example, in the Pacific Northwest where energy efficiency has historically been an important resource, the Northwest Power and Conservation Council's (NPCC's) recent Fifth Power Plan sets a high-priority for energy efficiency to meet resource adequacy needs going forward (see Figure 2).

[23] For electric utilities, resource planning includes assessment of generation, transmission, and distribution system needs to meet demand; energy efficiency can be an important resource in meeting all three functions. For natural gas utilities, energy efficiency can be considered in developing procurement strategies for gas commodity and planning for gas pipeline and distribution system needs.

[24] California regulators have taken an aggressive approach in establishing demand-side measures as top priority resources. The California Public Utilities Commission has established a "loading order," in which utilities must first procure all cost-effective energy efficiency and demand response before looking to other resources to meet projected demand.

[25] Federal publicly-owned utilities, such as the Bonneville Power Administration and Tennessee Valley Authority, and multi-State generation and transmission ("G&T") electric cooperatives also have regional planning responsibilities. Utilities that are rural electrification borrowers or customers of Power Marketing Administrations are required to engage in coordinated planning that includes consideration of energy efficiency options. The Northwest Power and Conservation Council Plan, with its inclusion of energy conservation measures, is undertaken pursuant to a Federal statutory directive.

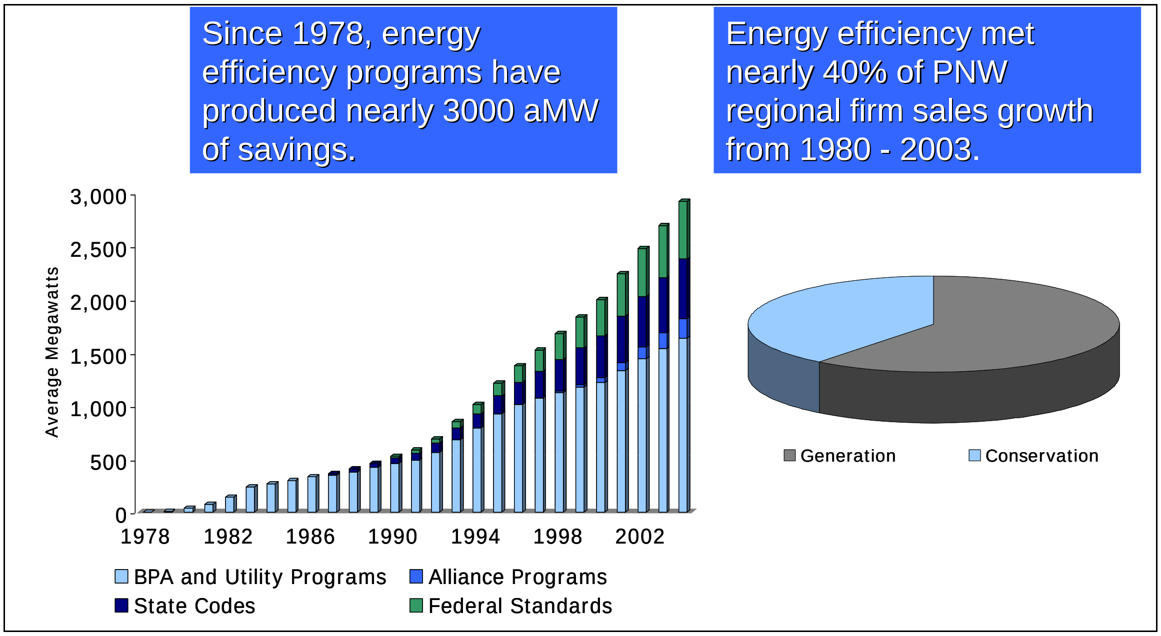

Figure 2. Energy Efficiency Has Been a Resource in the Pacific Northwest for the Past Two Decades
Source: Eckman, T. (2005, September 26). The Northwest Forecast: Energy Efficiency Dominates Resource Development. Paper presented at the ACEEE Energy Efficiency as a Resource Conference. (www.nwcouncil.org/energy/present/default.htm).

- Environmental compliance—The cleanest way to serve energy demand is by not generating the kWh or delivering the therm at all. With the potential for tighter limits on pollutants driven by the Clean Air Act, energy efficiency is likely to become a more integral part of economical and feasible compliance solutions. This is especially likely in light of forecasted increases in energy demand.

- **Regulators should consider establishing a formal evaluation framework for utility energy efficiency programs.**
  - **States involved in regional planning may also want to move toward common evaluation protocols for energy efficiency programs.**

Reliable, accepted, and widely understood techniques for evaluating the cost-effectiveness and performance of energy efficiency programs are critical to the success of energy efficiency initiatives, and in many States they form a key component of establishing and overseeing cost-effective utility programs. In developing energy efficiency as a resource, DOE strongly recommends that regulators who do not already have formal evaluation frameworks in place consider adopting them. This allows utilities, regulators, and other parties to gain confidence in the resource value of energy efficiency. States involved in regional planning may want to consider moving toward common evaluation frameworks to more seamlessly integrate energy efficiency into regional resource adequacy assessments.

Well-established and tested tools are available to assist utilities and regulators to develop evaluation frameworks:

- Cost-effectiveness—To compare the cost-effectiveness of potential programs, the most commonly used assessment tools are derived from the *California Standard Practice Manual* (SPM). The SPM includes five "stakeholder" tests to evaluate cost-effectiveness from different perspectives: participants, utilities, ratepayers, and society, as well as overall cost-effectiveness.
- Performance evaluation—In States with active utility-administered energy efficiency programs, utilities have developed methods and protocols to estimate annual and lifetime savings from specific energy efficiency measures that draw upon impact evaluations of actual programs and engineering analysis. Some program administrators and State policymakers have acknowledged a need for increased standardization in this area, driven in part by the emergence of regional energy, capacity, and emissions markets. These efforts can build on standard guidelines for measurement and verification (M&V) that have been codified in the International Performance Measurement and Verification Protocol (IPMVP) used by energy service companies (ESCOs) and some utilities as well as the existing guidelines and protocols used by States in their energy efficiency programs.[26]

> *Various tools and methods for evaluating the effectiveness of utility energy efficiency programs have emerged; when properly implemented, these tools and methods can be valuable in identifying cost-effective programs and program implementation issues.*

EPAct 139(b)(1): Performance standards for achieving energy use and demand reduction targets

- **Regulators should consider adopting an energy efficiency performance requirement or minimum energy savings targets for electric and natural gas utility end-use energy efficiency programs.**

One way for regulators to manage their jurisdictions' energy efficiency outcomes is to impose performance requirements on utilities and other load serving entities (LSEs). Energy efficiency performance requirements establish energy efficiency targets, usually expressed as a percentage of a utility or other LSE's load. The utility (or LSE) has flexibility in meeting the target: it can administer its own energy efficiency programs, hire a third party to implement programs on its behalf, or purchase credits for energy efficiency implemented by other entities (e.g., ESCOs or other LSEs). Especially where tradable credits are employed, a consistent method of verifying savings is important to support the policy and the commerce of credits.

An important reason to consider this approach is that it focuses on outcomes rather than the amount of money spent to procure savings. Performance requirements can be

[26] These guidelines are available at www.ipmvp.org. Examples of standardized savings estimates for energy efficiency include the California Database for Energy Efficiency Resources (see www.energy.ca.gov/deer/), and the NPCC Conservation Regional Technical Forum (see www.nwcouncil.org/comments/default.asp).

implemented independently or in conjunction with the integration of energy efficiency into resource planning or procurement (discussed above). They can be designed either as standalone requirements or as part of generation portfolio standards for renewable energy technologies or other supply-side resources.

Energy efficiency performance requirements are a relatively new approach, but are gaining traction in several States. Some examples include:

- The State of Texas has established a standard that requires that 10 percent of forecasted electricity growth will be met through energy efficiency savings.
- The States of Nevada, Pennsylvania, and Connecticut have adopted requirements that work more like renewable portfolio requirements, in which the utility must acquire energy efficiency savings credits equal to a certain percentage of actual sales. They can acquire the credits through energy efficiency they acquire themselves, or from other entities that deliver programs.

DOE recommends that regulators consider performance requirements if they are interested in enhancing their existing energy efficiency resources or if they require a different approach to ensuring that energy efficiency is implemented. Performance requirements may be less feasible for regulators that require greater control over how energy efficiency is implemented (e.g., targeting of energy efficiency to transmission-constrained areas where it is most valuable). To date, this method has been used only for electric utilities, though it could be feasible for natural gas providers as well.

EPAct 139(b)(2): Funding sources, including rate surcharges

- **Regulators should consider promoting sufficient, timely, and stable program funding to deliver energy efficiency where cost-effective by:**
  - **selecting funding mechanisms for energy efficiency from the available options: rate-basing, rate surcharges, and emerging alternative funding sources; and**
  - **establishing funding commitments for multiple-year periods.**

Stable and predictable funding is critical to the success of energy efficiency initiatives.

A third means to ensure that energy efficiency goals are realized is the establishment of funding mechanisms to pay for them. Years of experience have shown that successful programs rely on stable and predictable funding that signal a long-term, high-level commitment to customers, third-party implementers and utilities. Therefore, DOE recommends that regulators consider authorizing energy efficiency funding for multi-year periods.

The most common approaches to cost recovery are revenue requirement and rate surcharges:

- <u>Revenue requirement</u>—also known as “cost of service” or “resource procurement,” involves authorization of the recovery of utility spending on energy efficiency programs in a rate case or utility demand-side management (DSM) proceeding. If energy efficiency is treated as a resource option (described earlier in this section), this mechanism makes use of the existing cost-recovery infrastructure, comparable to supply-side resources.[27]

- Rate surcharges—separate, itemized charges on utility customers' bills--authorized by State legislatures or regulatory commissions--that fund energy efficiency and other public-interest programs. Rate surcharges are often called "system benefit" charges (SBCs) or "public benefit" charges in States with restructured electric industries.

In addition to these traditional funding sources, changes in electric markets and environmental regulation may enable new sources of compensation for energy efficiency value that States and/or regions may wish to consider:

- Capacity market payments—Most energy efficiency programs save energy at times of peak usage and some are especially designed for this purpose. Wholesale energy markets have generally not compensated energy efficiency investors for providing capacity resource value. In 2006, stakeholders in New England agreed to allow energy efficiency (and distributed generation) to join demand response as a capacity resource capable of bidding in a new, three-year "forward capacity market" designed to protect resource adequacy for New England. This system will generate new revenue that can support incremental energy efficiency programs, and may make peak-oriented programs more cost-effective. However, for efficiency programs to have capacity value, they must result in highly-reliable peak-load reductions. Therefore, States in a given market area or RTO interested in this approach should consider upgrading and standardizing their M&V practices.
- Revenue from environmental cap and trade allowance sales—Compliance with State environmental "cap and trade" regimes designed to reduce pollutant emissions from the electric power sector may provide significant new funding to augment energy efficiency programs. Under such systems, generators may purchase allowances from representatives of load. States can design enabling statutes and rules to limit the use of funds from these sales for energy efficiency or other clean energy purposes. Examples include the allocation of carbon allowances to representatives of load in the Regional Greenhouse Gas Initiative in the Northeast U.S., and deliberations on a carbon market in California and Oregon.

EPAct139(b)(5): Methods of— (A) removing disincentives for utilities to implement energy efficiency programs; (B) encouraging utilities to undertake voluntary energy efficiency programs; and (C) ensuring appropriate returns on energy efficiency programs

- **Regulators should consider modifying policies to align utility incentives with the delivery of cost-effective energy efficiency by:**

[27] In fact, rate-basing is always an option for utility program cost recovery, regardless of whether energy efficiency is integrated into the resource planning process.

- **addressing the typical utility throughput incentive and removing other regulatory and management disincentives to energy efficiency;**
- **providing incentives for the successful management of energy efficiency programs;**
- **providing sufficient certainty of cost recovery; and**
- **entertaining the option of creating independent or State-administered energy efficiency programs.**

Investor-owned electric and gas utilities may face a variety of disincentives to implementing energy efficiency programs rather than investing in physical assets such as power plants and transmission lines.[28] Under traditional ratemaking practices, retail rates are determined in periodic regulatory proceedings called "rate cases," based on a projection of utility operating costs and an allowable rate of return on investments. The incentives set up by this practice gives rise to some of these disincentives:

Utilities face several disincentives to implementing energy efficiency programs, including the impetus to increase sales throughput, the ability to earn a rate of return on physical assets, and cost recovery uncertainty.

- Throughput—Energy efficiency results in reduced sales for utilities compared to what they otherwise would sell. Under traditional ratemaking practices, utility revenues are directly linked to sales (between rate cases, utilities can earn greater profits if their sales increase because retail rates are fixed) so, in the short-term, energy efficiency can harm the utility financially.
- Comparable investment opportunities—Under traditional ratemaking practices, investor-owned utilities are allowed to pass through the variable costs of providing energy (e.g., fuel and plant operating costs) to ratepayers, but are allowed to earn a rate of return on physical assets (e.g., power plants). Because energy efficiency is not a physical asset, it typically does not earn a rate of return. Moreover, if energy efficiency successfully averts the need to construct new physical assets by reducing peak demand, the utility may have an even greater disincentive to implement energy efficiency.
- Cost recovery—Despite extensive experience in the evaluation of energy efficiency programs, determining program performance is often more difficult than establishing the value of physical assets. Utilities may be less inclined to pursue energy efficiency if they feel there is a greater risk that regulators will disallow program cost recovery.

Regulators may adopt a variety of methods to address these disincentives. DOE recommends considering the following:

[28] Not-for-profit utilities, i.e., rural electric cooperatives and publicly-owned electric and gas utilities, do not necessarily share the same disincentives (or incentives) to implementing energy efficiency programs as investor-owned utilities do. For example, not-for-profit utilities tend to be driven by cost minimization goals, rather than profit maximization.

- Revenue decoupling—One method of addressing the throughput incentive is to decouple utility revenues from sales. This can be accomplished by establishing fixed revenue targets that may vary with respect to certain external factors (e.g. growth in number of customers), but do not depend on sales. Then, rates are adjusted so that the utility receives the allowed revenue, but no more. If energy efficiency causes sales to decline, rates are adjusted upwards to meet the revenue target. In the short term, this can neutralize utilities' disincentives to implement energy efficiency programs.
- Performance-based incentives—Regulators may allow investor-owned utilities to earn a profit on energy efficiency programs that meet performance targets.[29] Conversely, programs that do not perform well can be denied full cost recovery. Credible M&V is necessary to support this option.
- Asset capitalization—A third option that some States have adopted is to create a "regulatory asset" in which energy efficiency is capitalized, typically over two to five years, and the investor-owned utility is allowed a rate of return on its investment in energy efficiency programs. This may be appropriate for utilities without previous program experience where including program costs in the rate base would be burdensome. It also addresses the rate-of-return disincentive. However, this method tends to reward spending rather than performance. Regulators should consider including a performance incentive in conjunction with asset capitalization.
- Providing sufficient certainty of cost recovery—Cost recovery risk can be addressed by establishing energy efficiency program design and appropriate M&V protocols in an open, inclusive process. Predictable, consistent and fair regulatory treatment, in which reasonable cost recovery is assured, will encourage utility support for energy efficiency programs.
- State or third-party implementation—States or utilities that want to make progress on energy efficiency, but do not want to make changes to regulatory practices or utility compensation methods, may consider relieving the utility of administering energy efficiency programs. Instead, a State agency can take on the task itself, or it can organize a third-party organization for this purpose. This disconnects the administration of energy efficiency from the utility financial incentive. A drawback to this approach is that the utility may not be encouraged to seek out opportunities for cost-effective energy efficiency beyond the independent administrator's programs.[30] Examples of both independent options can be found throughout the U.S.[31]

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[29] For example, Massachusetts and Rhode Island allow incentives of up to 5 percent of spending, in addition to cost recovery.

[30] The success of the independent administrator depends in part on cooperation from the utility in dealing with customers and customer information. Customers should receive coherent, helpful responses on energy efficiency regardless of who they contact first.

[31] Blumstein, C., C. Goldman, and G. Barbose, 2003, "Who Should Administer Energy Efficiency Programs," *Energy Policy* 33(8): 1053-1067.

EPAct 139(b)(4): The costs and benefits of consumer education programs conducted by State and local governments and local utilities to increase consumer awareness of energy efficiency technologies and measures

- **Regulators should consider integrating customer education programs with utility energy efficiency programs.**

Customer education programs can enhance the effectiveness of utility energy efficiency programs by communicating the benefits of and opportunities for energy efficiency. However, their cost-effectiveness is difficult to evaluate on a standalone basis, and thus they should not be offered in isolation from utility energy efficiency programs as a sole means to promote energy efficiency by the utility.

- **Regulators should consider modifying ratemaking practices to promote energy efficiency among consumers, while recognizing that this goal must be balanced with other ratemaking objectives.**

Electric and gas rates that provide incentives for conservation are market-oriented customer education approaches that can result in energy savings unto themselves. A variety of rate designs can encourage end-use energy efficiency,[32] such as:

- Inclining block rates—in which the price a utility customer pays increases as their volume of usage increases. This provides an overall conservation incentive.
- Time-of-use rates—in which the price of electricity varies by time of day and/or season, to better reflect differences in the cost of supplying energy at these times. Customers on time-of-use rates have an incentive to use less energy during peak periods (e.g., weekday afternoons).
- Dynamic pricing—in which retail prices vary in response to actual hourly system or wholesale market price conditions. Customers paying dynamic pricing rates have a strong incentive to reduce their energy consumption when prices are high.

[32] The results of studies demonstrating the energy-demand savings potential of time-of-use rates and dynamic pricing are summarized in "*Benefits of Demand Response in Electricity Markets and Recommendations for Achieving Them*," A Report to the United States Congress Pursuant To Section 1252 of the Energy Policy Act of 2005. United States Department of Energy, February 2006. Available at www.oe.energy.gov/DocumentsandMedia/congress_1252d.pdf

APPENDIX A

A STUDY OF STATE AND REGIONAL POLICIES THAT PROMOTE ELECTRIC & GAS UTILITY PROGRAMS TO REDUCE ENERGY CONSUMPTION

U.S. Department of Energy

March 2007

Background

The U.S. Department of Energy (DOE) prepared this study—*A Study of State and Regional Policies That Promote Electric and Gas Utility Programs to Reduce Energy Consumption*—pursuant to section 139(a) of the Energy Policy Act of 2005:

> ***Not later than 1 year after the date of enactment of this Act, the Secretary [of Energy], in consultation with the National Association of Regulatory Utility Commissioners and the National Association of State Energy Officials, shall conduct a study of State and regional policies that promote cost-effective programs to reduce energy consumption (including energy efficiency programs) that are carried out by —***
>
> ***(1) utilities that are subject to State regulation; and***
> ***(2) non-regulated utilities.***
>
> **--Sec. 139(a), the Energy Policy Act of 2005, August 8, 2005**

Section 139(c) of the Energy Policy Act of 2005 also requires DOE to submit a report to Congress by August 8, 2006:

> ***Not later than 1 year after the date of enactment of this Act, the Secretary [of Energy] shall submit to Congress a report that includes —***
>
> ***(1) the findings of the study; and***
> ***(2) any recommendations of the Secretary, including recommendations on model policies to promote energy efficiency programs.***
>
> **--Sec. 139(c), the Energy Policy Act of 2005, August 8, 2005**

Acknowledgments

The U.S. Department of Energy (DOE) engaged the National Council on Electricity Policy to prepare a draft for its consideration in preparing of this study. DOE greatly appreciates the work of the National Council on Electricity Policy and others who contributed to this study.

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Executive Summary

Energy Efficiency: America's Greatest Energy Resource

Energy efficiency is critical to helping energy supply meet demand, lessening our economic vulnerability. To run today's economy without the energy efficiency improvements that have taken place since 1973, we would need 43 percent more energy supplies than we use now—more energy than we get from any single source. A great savings potential remains—a 2000 study estimated that energy efficiency policies and programs could cost effectively reduce U.S. demand for electricity by 24 percent and demand for natural gas by 12 percent over a 20-year span. This is about half of the current projected increase in electricity and natural gas demand.

In many instances, energy efficiency is the quickest, cheapest, and cleanest energy resource and has many benefits:

- Economics: Reduced energy intensity provides competitive advantage and frees economic resources for investment in non-energy goods and services.
- Environment: Saving energy reduces air pollution, the degradation of natural resources, risks to public health, and global climate change.
- Infrastructure: Lower demand lessens constraints and congestion on the electric transmission and distribution systems.
- Security: Energy efficiency can lessen our vulnerability to events that cut off energy supplies.

Utility Energy Efficiency Programs

Utilities and their regulators began recognizing the potential benefits of reducing demand as an energy resource in the 1970s and 1980s. "Demand-side management" (DSM) approaches meet increased demands for electricity or natural gas by managing the demand on the customer's side of the meter rather than meeting the demand through the supply side of the meter. The demand can be managed by either shifting peak load to off-peak hours (i.e., "load management") or by reducing energy consumption through conservation or energy efficiency measures. Through "Least-cost Planning" or "Integrated Resource Planning," electric utilities examine multiple options for meeting customer demand, such as investing in DSM programs when they cost less than new power plants. Estimates of the cost of saved electricity vary widely, but often are around 3 to 4 cents per kilowatt-hour—lower than most supply-side options.

Spending on DSM programs grew rapidly, peaking at $2.7 billion in 1993 and 1994. At their greatest impact in 1996, electric utilities estimated that these programs reduced peak load by 30 gigawatts (the output of about 100 medium-sized power plants) and saved 62 million megawatt-hours. However, restructuring of the electric industry changed the regulatory structure that planned and funded these programs. The Federal government allowed wholesale competition, and 24 States and the District of Columbia allowed retail competition, although in these States most customers are still served by the "default service provider." Funding for electric utility energy efficiency programs was cut roughly in half in the late 1990s, but has partially recovered under new policies and funding mechanisms since then. In addition, similar programs administered by some States rather than by the utilities have been greatly expanded. The natural gas industry also was partially restructured, but fewer natural gas utilities ever established energy efficiency programs.

Utility energy efficiency programs are designed to overcome several barriers that prevent people from reaping the great potential savings from cost-effective energy efficiency measures. These barriers include lack of knowledge of energy-efficient products, lack of availability of those products, high initial costs, and split incentives when a builder or landlord pays for the energy-using products but a buyer or renter pays the energy bills. Utility programs to overcome these barriers include:

- Consumer education,
- Technical training,
- Energy audits,
- Rebates for efficient appliances, equipment, and buildings, and
- Financing of energy efficiency investments.

Often these programs are divided into two categories: 1) "resource acquisition" programs, which try to buy energy savings in the most cost-effective manner as an alternative to supply-side investments and 2) "market transformation" programs, which try to make a lasting increase in the market share of highly energy-efficient buildings or products. Utilities and their regulators also can encourage end-use energy efficiency through rate design: rates that are higher at higher usage levels and incentives to reduce energy use.

Evaluation and Cost-Effectiveness

A key issue for utilities that are relying on energy efficiency programs to meet customer demand and for regulators who must ensure the programs serve customers is measurement and verification of the program impacts. There is now extensive experience with these evaluations, although critics still question the effectiveness of these programs. There are several evaluation methods. Careful "impact evaluations" of resource acquisition programs are based on field measurements and detailed protocols. Simpler "deemed savings" evaluations estimate average savings and project lifetimes that are then used to calculate standard measures. It may be impossible to measure the savings from market transformation programs such as consumer education; these programs can be evaluated using "process evaluations" of program administrative efficiency and effectiveness and "market effects evaluations" that analyze the impacts of a portfolio of programs on an entire market sector.

A number of performance-based State policies require independent verification of energy savings and other program impacts using these methods. There are several different measures of cost effectiveness that consider the impacts on program participants, non-participants, the utility, all of the above, and society at large. A combination of these tests is often used in deciding whether to implement energy efficiency programs.

Infrastructure Planning and Improvements in Energy Efficiency

Investments in energy efficiency and other DSM programs can be used to delay or avoid costly investments in electric generation, transmission, and distribution facilities or natural gas drilling and pipelines. Energy efficiency programs can be implemented quickly. They are often cheaper than constructing expensive energy supply infrastructure. They are environmentally benign. And they often can be targeted more precisely than supply infrastructure in quantity, location, time, and load shape (peak vs. base load).

A number of States consider demand-side resources as an alternative to supply infrastructure investment in their planning processes. Many States with regulated utilities require the utility to implement a formal long-term infrastructure planning process called "integrated resource planning" (IRP). In an IRP process, a utility periodically forecasts customer demand in its service territory, investigates available demand-side and supply-side resources, and creates an integrated resource plan for the combination of resources it will use to meet the demand. This process can be used to compare efficiency with supply on a level playing field and has been a key force in the development of utility energy efficiency programs. However it can also be rigid, slow, and unfair. IRP was suspended in many States in the expectation of retail competition, but this or similar planning processes are reemerging where retail competition was not enacted. Publicly-owned and cooperatively-owned utilities often use demand-side resources similarly, but under different planning structures.

In States with restructured electricity sectors, the default service is still regulated, but other companies may provide generation and transmission. "Portfolio management" of default service considers a variety of power sources, contract lengths, and other options to reduce risk by using a broad portfolio of supply. Demand-side options can be considered in the mix, and can lower the cost of service.

A few States have set broad policies adopting energy efficiency as the preferred resource. California, in the wake of price spikes and blackouts in 2001, adopted a "loading order" with cost-effective energy efficiency as the priority resource, followed by renewable sources and then traditional sources. This principle was then translated into specific targets for each major investor-owned electric and natural gas utility (i.e., into "energy efficiency performance requirements," described after the next two sections) and incorporated in their portfolio plans.

Demand-side resources also can provide an alternative to transmission infrastructure investments, and compete to a limited extent in wholesale electricity markets. A few utilities, States, and regional transmission organizations (RTOs) have used efficiency programs in locations with severe transmission constraints, and a Vermont law requires consideration of energy efficiency in transmission planning. New England has proposed to give credit to measured energy savings for meeting capacity needs (capacity credits), which would provide a new revenue stream for utilities and other organizations that can reduce or shift demand. As a result of a 2006 FERC order, demand response in the PJM region can compete with generation resources in the reserves and regulations markets.

Funding Utility Energy Efficiency Programs

Of course utilities require funding in order to implement energy efficiency programs. They are much more likely to propose such programs, and to implement them aggressively, if they feel that demand-side investments are treated at least as well as supply-side investments, and that they are not financially harmed by successful programs. Thus States can avoid major barriers to utility energy efficiency programs by 1) allowing cost recovery for the programs, either through rates or dedicated funding sources, 2) allowing appropriate returns on the programs, and 3) ensuring utilities are not harmed by revenue loss due to reduced energy use.

For regulated utilities, State public utility commissions (PUCs) set rates in periodic "rate cases" at a level that covers operating expenses and a return on capital investments; except for fuel cost adjustments, which are typically fixed until the next rate case. In most States that include energy efficiency programs in utility planning, program costs are treated as operating expenses, and recovered in rates. In some States, the program costs can be treated as capital investments (like the costs of building generating plants), and allowed a return over time; in this way demand-side and supply-side investments have more similar financial implications for utilities and their customers. In either case, prior approval of energy efficiency programs and consistent regulatory treatment will assure utilities they will be compensated for reasonable costs.

Beyond simple cost recovery, utilities may be motivated by the opportunity to earn a return on energy efficiency programs. When program costs are treated as a capital expense, utilities are allowed a normal rate of return—Nevada allows a higher rate of return for energy efficiency programs to provide an additional incentive. Several States that treat energy efficiency programs as operating expenses allow performance incentives, with additional payments for programs that meet high performance targets, but less than full cost recovery for programs that do not perform well. Other States allow utilities "shared savings," to keep some of the savings from energy efficiency programs that they would otherwise pass on to customers in reduced rates.

Several of the States that restructured their electricity sectors have created a "systems benefit charge" (SBC) to fund energy efficiency programs in the absence of an IRP process and rate cases for retail service providers. An SBC or "public benefits fund" is a small surcharge on electric and/or natural gas bills that funds some combination of energy efficiency, renewable energy, clean energy research and development, and low-income assistance. A few States that have not restructured also find the SBC a useful funding tool. SBCs vary widely in funding level and purposes and may be administered by utilities, a government agency, other organizations, or a combination.

Rate Structures and Incentives for Utility Energy Efficiency Programs

Even if utilities are appropriately compensated for their investment in energy efficiency programs, they may be hurt financially because the programs lead to lower energy sales. If the lower sales were not forecasted when setting rates, they will reduce utility revenue until rates are adjusted in the next rate case. As utility costs are largely fixed in the short term (other than for fuel, which is usually handled separately), the energy efficiency programs can reduce projected utility profits. One way to address this barrier is to anticipate the sales impact of planned energy efficiency programs in rate cases. Some States also allow a targeted adjustment to rates between rate cases in order to compensate for sales losses from energy efficiency programs.

Another approach is to adjust rates in between rate cases in order to keep revenue at a targeted level, to "decouple" revenues from sales. The allowed revenue can be adjusted for a number of external factors that impact sales and costs, but a simple approach is to fix revenue per customer, so that revenues rise only with the number of customers. Depending on how decoupling is implemented, the utility can be compensated for revenue lost due to sales that are reduced for any reason, and thus is encouraged not only to implement its own energy efficiency programs but also to provide vital support for State energy efficiency policies and other programs. The revenue can also be fixed despite sales increases or decreases due to the economy, weather, and other factors; such an approach stabilizes utility revenue and overall customer energy bills, but makes customer rates fluctuate.

Policies that Promote Utility Energy Efficiency Programs

Barriers similar to those that block end-use energy efficiency also discourage utilities from using energy efficiency as a resource: lack of information on effective energy efficiency programs, split incentives when different companies provide the energy commodity and the delivery services, planning processes that do not incorporate demand-side options. In addition, because customers reap the energy savings from their energy efficiency programs, utilities can face additional financial barriers: uncertain recovery of program costs, sometimes lower returns than on supply-side investments, and loss of revenue from lower sales.

Several States have devised innovative policies to overcome these barriers and promote utility energy efficiency programs. Many of the newer policies are designed for restructured electric and natural gas industries. These policies:

- Incorporate DSM programs in utility long-term planning for infrastructure needs,
- Provide funding for utility energy efficiency programs through rates or dedicated funding sources, and allow utilities appropriate returns on demand-side investments, and
- Establish performance requirements for utility energy efficiency programs.

Energy Efficiency Performance Requirements

A few States have recently implemented performance requirements for utility energy efficiency programs. An "energy efficiency performance standard" (EEPS) or resource standard requires utilities to implement energy efficiency programs sufficient to save a specified amount of energy or reduce peak electric load by a specified amount. This is not a direct limit on utility sales but a requirement that utilities implement programs that are evaluated as achieving the specified savings. Utilities are given broad flexibility about how and where to achieve the savings, in keeping with the performance-based regulatory approach. They may contract with other organizations to implement the programs or, if credit trading is established, pay other utilities to achieve the savings. An EEPS can be applied to regulated utilities or to retail service providers in a competitive market (or in principle to publicly-owned or cooperatively-owned utilities). Texas created the first EEPS in its electric restructuring legislation, requiring electric utilities to avoid 10 percent of peak demand growth through energy efficiency programs. Other States have added energy efficiency resources to an analogous "renewable portfolio standard" (RPS) or broader alternative energy portfolio standard. Connecticut recently added a third category to its RPS, requiring new combined heat and power systems and conservation and load management programs in commercial and industrial facilities to account for one percent of electricity output per year for four years. Hawaii, Pennsylvania, and Nevada also set combined requirements for a broad array of energy efficiency and alternative energy resources.

Other States have set energy efficiency performance requirements administratively. The California PUC established goals for annual and cumulative electricity and natural gas savings and cumulative peak electricity demand savings for its four major investor-owned electric and natural gas utilities. These goals were based on detailed energy efficiency potential studies. Vermont contracts with a single "energy efficiency utility" to implement programs funded by its SBC; contract payments depend on meeting performance targets for electricity use and peak demand reductions.

Complementary State and Federal Policies

While this study focuses on policies to promote utility energy efficiency programs, there are a number of other existing State and Federal (e.g. EPAct 2005 and other existing laws) policy approaches to target energy efficiency by electricity and natural gas end-users. These include (among others):

- Appliance energy standards: minimum efficiency levels for residential and commercial equipment;
- Building energy codes: minimum efficiency levels for residential and commercial buildings; and
- Tax incentives: reduced individual or business income taxes, or sales taxes, for efficient buildings, equipment, and vehicles.

Utilities leverage these policies to increase the impact of their own energy efficiency programs, for example, by conducting consumer education on tax incentives, or perhaps adding their own rebates. Regulators should therefore be aware of these complementary State and Federal policies when considering policies and programs for utility energy efficiency experts.

Conclusions

Energy efficiency is a valuable and underutilized resource available to State energy regulators, planners, and policymakers.[1] Greater investment in energy efficiency is a cost-effective way to balance growing energy demands in an era of diminishing and costly energy supplies.

The overarching conclusion of this study is that State policies should capitalize on the opportunities to use low-cost energy efficiency as a means to meet growing energy demands and enhance system reliability.

States can ensure energy efficiency programs are implemented through some combination of:

- ***Infrastructure planning that includes energy efficiency programs as a part of rate cases, utility resource planning, and regional planning***
- ***Dedicated funding sources for the programs, and ensuring that utilities receive appropriate compensation for the programs, and***
- ***Performance requirement for utility energy efficiency programs.***

[1] Conclusions in this study at the State level apply as well to non-State-regulated utilities (i.e., most publicly-owned electric and gas utilities and rural electric cooperatives) and their governing boards.

The following are more detailed conclusions under five topical areas:

Evaluation

- Regulators should consider establishing a formal evaluation framework for utility energy efficiency programs in order to generate reliable, consistent, and transparent data measuring the energy savings of energy efficiency projects. The framework should use simplified techniques when applicable, such as deemed savings or benchmarking for appliance upgrades.
- States involved in regional planning may want to design common evaluation protocols that produce reliable and consistent results. Because energy efficiency programs vary State-by-State, M&V protocols adopted by each State should account for these differences.

Planning

- Utilities, States, and other parties should consider integrating energy efficiency and demand response into electric and natural gas system planning, rather than expecting that cost-effective energy efficiency will happen independently of infrastructure planning and investment.
- As part of the State permitting or resource procurement process, States should consider requiring the consideration of energy efficiency as a resource. Utilities can be asked to demonstrate that cost-effective energy efficiency programs have been fully utilized prior to the decision to build or purchase additional generation or transmission resources.
- Organizations and groups involved in regional power planning should consider demand resources, including energy efficiency, as part of their assessment of loads and resources within their respective systems.

Funding

- States without a source of funds dedicated to implementing electric and natural gas energy efficiency should consider, through legislation or regulatory proceedings, determining the preferred mechanism for funding energy efficiency programs.
- States should consider conducting a study of the energy efficiency potential in the State and/or region in order to better determine potential cost-effective and achievable energy savings and the appropriate level of funding needed to meet these goals.

Rate Structures and Incentives

- Regulators should consider reviewing and assessing existing rate structures to ensure they provide utilities full cost recovery for approved and effective energy efficiency programs.
- Regulators should consider allowing utilities' returns at least as great from prudent investments in energy efficiency as from supply-side investments. States should also consider capitalizing energy efficiency program costs to reduce the initial impact on rates and to facilitate appropriate investment.
- Regulators should consider rate structures under which utilities' profits are not hurt by programs that save energy and thus reduce their sales. Several different approaches

are available that differ in ease of implementation and stability of rates, bills, and utility revenues.

- Regulators and utilities should consider establishing rate designs and alternative financing options (as well as programs) that encourage end-use energy efficiency, such as inclining tier block rates, rate discounts for energy efficiency, benefit sharing, and on-bill financing (pay-as-you-save).

Energy Efficiency Performance Requirements

- States should consider adopting performance requirements or minimum energy savings targets for electric and natural gas utility end-use energy efficiency programs. An energy efficiency performance requirement can complement or be made part of generation portfolio standards for renewables or other supply-side resources.

1. Introduction

1.1 Objective of Study

Overview

Section 139 of the Energy Policy Act of 2005 (EPAct 2005) required that the U.S. Department of Energy (DOE), in consultation with National Association of State Energy Officials (NASEO) and the National Association of Regulatory Utility Commissioners (NARUC), conduct a study of State and regional policies that encourage regulated and non-regulated utilities to initiate cost-effective electric and natural gas energy efficiency programs. According to EPAct (see sidebar), this study was to consider information on performance standards, program funding, infrastructure planning, and the costs and benefits of consumer education programs. It was to consider methods that 1) encourage utilities to voluntarily undertake energy efficiency programs, 2) remove disincentives to these programs, and 3) assure that utilities gain an appropriate return on energy efficiency investments. DOE was to provide Congress with the findings of this study by August 8, 2006.

In conducting the study, DOE engaged the National Council on Electricity Policy (National Council) to prepare a draft study. DOE then took the draft study into consideration as it prepared this DOE study needed to satisfy Sec. 139(a) and (b). The study and the conclusions in this study do reflect the input of the members of the National Council, which includes representatives from both NASEO and NARUC. As shown in the following diagram, Chapters 4 through 9 address each of the topics referenced under section 139 of EPAct 2005. In addition to satisfying the requirements of EPAct, this study is intended to be a useful resource to State policymakers as well as by non-State jurisdictional utilities (i.e., publicly-owned electric and gas utilities and rural electric cooperatives and their respective governing boards) who are

ENERGY POLICY ACT 2005
SEC. 139. ENERGY EFFICIENT ELECTRIC AND NATURAL GAS UTILITIES STUDY

(a) IN GENERAL — Not later than 1 year after the date of enactment of this Act, the Secretary, in consultation with the National Association of Regulatory Utility Commissioners and the National Association of State Energy Officials, shall conduct a study of State and regional policies that promote cost-effective programs to reduce energy consumption (including energy efficiency programs) that are carried out by —

(1) utilities that are subject to State regulation; and
(2) non-regulated utilities.

(b) CONSIDERATION — In conducting the study under subsection (a) the Secretary shall take into consideration —

(1) performance standards for achieving energy use and demand reduction targets;
(2) funding sources, including rate surcharges;
(3) infrastructure planning approaches (including energy efficiency programs) and infrastructure improvements;
(4) the costs and benefits of consumer education programs conducted by State and local governments and local utilities to increase consumer awareness of energy efficiency technologies and measures; and
(5) methods of —
(A) removing disincentives for utilities to implement energy efficiency programs;
(B) encouraging utilities to undertake voluntary energy efficiency programs; and
(C) ensuring appropriate returns on energy efficiency programs.

(c) REPORT — Not later than 1 year after the date of enactment of this Act, the Secretary shall submit to Congress a report that includes —
(1) the findings of the study; and
(2) any recommendations of the Secretary, including recommendations on model policies to promote energy efficiency programs.

considering the benefits of utility energy efficiency programs.

Study Focus

Energy efficiency and conservation are considered "demand-side management (DSM)" approaches. These approaches are used to help meet increases in demand for electricity or natural gas by managing the demand on the customer's side of the meter, rather than on the supply side. DSM is a broad term that traditionally includes the planning, implementation, and evaluation of programs, technologies, and strategies that reduce energy consumption through conservation or energy efficiency measures and/or shift the load of peak demand to off-peak hours (i.e., "load management").

DOCUMENT MAP

Specific EPAct Requirements		**Where Located in Study**
Section 139		
(b)(1) Performance Standards	→	**Chapter 8. *Energy Efficiency Performance Requirements***
(b)(2) Funding Sources	→	**Chapter 6. *Funding Utility Energy Efficiency Programs***
(b)(3) Infrastructure Planning	→	**Chapter 5. *Infrastructure Planning and Energy Efficiency***
(b)(4) Costs and Benefits of Consumer Education Programs	→	**Chapter 4. *Experience and Cost Effectiveness of Utility Energy Efficiency Programs (Cost Effectiveness and Consumer Education)***
(b)(5)(A)Removing disincentives **(b)(5)(C) Ensuring appropriate returns on energy efficiency**	→	**Chapter 7. *Rate Structures and Incentives for Utility Energy Efficiency Programs***
(b)(5)(B) Encouraging voluntary energy efficiency	→	**Chapter 9. *Complementary State Policies and Programs: Encouraging Voluntary Utility Energy Efficiency Initiatives***

Following are examples of utility energy efficiency programs that were designed to reduce customer energy consumption:

- Consumer education programs provide consumers with information on the benefits of energy efficiency technologies and programs through flyers, brochures, newspaper and magazine ads, television commercials, and workshops.

- Technical training helps technicians, salespeople, and contractors understand the energy-use implications of various products as well as more energy-efficient installation practices.
- Energy audits help identify the consumer's energy use and reveal measures that can be taken to reduce it.
- Rebates or financial incentives encourage consumers to purchase efficient appliances, equipment, and buildings.
- Financing of energy efficiency investments provides incentives for consumers to invest in energy efficiency such as mortgages for efficient new homes or loans for equipment upgrades.

These programs are discussed in detail in Chapter 4 and Appendix B.

Another method used to modify electric use on the customer side of the meter is "demand response." Demand response includes a broad scope of initiatives that enable customers to modify their demand for electricity based on market information. Through demand response, retail customers are given the opportunity to see and respond to different pricing signals in the energy markets. These programs are designed to reduce demand for electricity when wholesale prices for energy are high or when increased electricity demand poses a threat to reliability.

Energy-Efficient Electric and Natural Gas Utilities Study

Includes energy efficiency policies and information pertaining to:

- **Regulated, investor-owned utilities**
- **Public power utilities**
- **Rural electric cooperatives**
- **Natural gas efficiency**
- **Electric efficiency**

Despite the synergy between demand response and energy efficiency, conclusions and suggestions in this study focus specifically on energy efficiency. A separate study, "Benefits of Demand Response in Electricity Markets and Recommendations for Achieving Them," was conducted by the Department of Energy and submitted to Congress in February of 2006. That report identifies and quantifies the national benefits of demand response and makes recommendations on achieving specific levels of such benefits. The report is available from the Department of Energy's Office of Electricity Delivery & Energy Reliability.[2]

The Bottom Line: Saving Energy

Following the language in EPAct 2005, section 139, the findings of this study are specific to State and regional policies that promote cost-effective utility programs to reduce energy consumption. An important element of a successful energy efficiency program is utility support. Whether or not it is actually administered by a utility, utility buy-in, support, and cooperation is vital to the success of energy efficiency programs.

It is important to note that policy initiatives targeting electric and natural gas utilities capture only a subset of opportunities to encourage energy efficiency. There are other policy options available to States seeking to encourage energy efficiency. For example, States may also consider administering energy efficiency programs through governmental agencies, non-profit

[2] *Benefits of Demand Response in Electricity Markets and Recommendations for Achieving Them.* A Report to the United States Congress Pursuant To Section 1252 of the Energy Policy Act of 2005. United States Department of Energy, February 2006. Available at http://www.oe.energy.gov/DocumentsandMedia/congress_1252d.pdf.

organizations, energy service companies, or other non-governmental institutions. Building codes, appliance efficiency standards, and tax incentives for energy-efficient technologies are among the separate State initiatives that can complement utility-administered energy efficiency programs. Chapter 9 of this study provides an overview of some State energy efficiency policies that can be used to support and supplement utilities' efforts.

Four Primary Benefits of Energy Efficiency

Economics:	**With the cost of fossil fuels continuing to rise, a reduction in energy intensity provides competitive advantage and frees economic resources for investment in non-energy goods and services.**
Environment:	**Energy efficiency will support commitments to reduce air emissions and will help mitigate the degradation of natural resources, risks to public health, and global climate change.**
Infrastructure:	**Energy efficiency will help lessen demands on the electric transmission and distribution systems and prevent associated constraints and congestion on the system.**
Security:	**The most immediate and cost effective means of maintaining energy security is to reduce demand for energy.**

EPAct 2005 includes several Federal provisions that either complement or supplement utility energy efficiency programs. For example, this legislation provides more than $2 billion in manufacturer, business, and consumer tax incentives for advanced energy-saving technologies in buildings, equipment, and vehicles, and it sets minimum energy efficiency standards for 15 widely used consumer and commercial products.

1.2 Why Focus on Energy Efficiency?

Facing the Future

Demand for energy in the United States has increased steadily over time. The Energy Information Administration (EIA) estimates that total U.S. energy use has increased by a third since the energy crisis in the early 1970s, even as energy intensity, energy use per unit of gross domestic product, has dropped by half. Electricity use has more than doubled. But natural gas use has been relatively flat, as declines in direct consumer gas consumption from greater efficiency have been offset by increasing gas consumption in power plants.[3]

The EIA projects that electricity consumption in the United States will increase from 3,567 billion kilowatt-hours in 2004 to 5,341 billion kilowatt-hours in 2030—an increase of approximately 50 percent. This increase in consumption will occur despite the continuation of existing energy efficiency policies and programs and anticipated efficiency gains in both the residential and commercial sectors. Electricity growth of this scale will require an estimated 347 gigawatts of new generation capacity and, most likely, new transmission and distribution lines.[4]

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[3] *Monthly Energy Review April 2006,* U.S. Department of Energy, Energy Information Administration, Tables 1.1, 1.8, 7.6, 4.4. Available at www.eia.doe.gov/emeu/mer/contents.html.

[4] *Annual Energy Outlook 2006*, U.S. Department of Energy, Energy Information Administration, p. 77. Available at http://www.eia.doe.gov/oiaf/aeo/index.html.

Demand for natural gas is also expected to grow, though more slowly than the demand for electricity. Over the next 25 years, analysts project that demand for natural gas will increase from 22.4 trillion cubic feet in 2004 to 26.9 trillion cubic feet by 2030—an increase of 20 percent.[5] The cost of that energy is also on the rise. At the end of 2005, wholesale natural gas prices were five times prices that held until the mid-to-late 1990s, and electric prices also reached all-time highs.[6] The U.S., along with the entire world, is in an era of increasing energy costs driven by growing demand, political instability, and market uncertainties. Energy markets are increasingly volatile and are expected to remain so in the mid term, making electricity and gas prices more susceptible to unpredicted yet inevitable surprises. As populations increase, economies grow, and reliance on electronic technologies and appliances become more pronounced, energy demands and energy prices will likely continue to rise. These issues will continue to challenge regulators and policymakers as they confront complex economic, environmental, infrastructure, and security concerns while trying to balance the supply and demand of energy resources.

The Benefits of Energy Efficiency

To run today's economy without the energy efficiency improvements that have taken place since 1973, we would need 43 percent more energy supplies than we use now.[7] In addition, a 2000 study on potential energy savings from achievable energy efficiency measures estimates that U.S. consumption of electricity could be reduced by 24 percent, and consumption of natural gas by 12 percent over a 20-year span.[8] This is nearly half of the current projected increase in electricity and natural gas demand.

Energy efficiency reduces energy bills and helps stabilize energy prices. It decreases the demand for domestic and imported fossil fuels and can enhance the reliability of the electric system. There are many environmental benefits as well, including lower air emissions and reduced water usage at power plants. Furthermore, energy efficiency presents a proven, easily deployed, near-term opportunity for reducing energy demand that typically costs less than investing in new energy supply resources.

The Barriers to Energy Efficiency

Despite the potential savings and benefits from energy efficiency, it remains an underutilized resource. Barriers to energy efficiency impede the implementation of utility programs, as well as the market penetration of energy-efficient goods and services. These barriers fall into two broad categories: "market barriers" and "utility industry barriers."

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[5] *Annual Energy Outlook 2006*, U.S. Department of Energy, Energy Information Administration, p. 85. Available at http://www.eia.doe.gov/oiaf/aeo/index.html.

[6] *Testimony of Susan J. Court. Director, Office of Market Oversight and Investigations, Federal Energy Regulatory Commission.* Before the Permanent Subcommittee on Investigations, Committee on Homeland Security and Governmental Affairs, U.S. Senate. 13 February 2006. Available at www.ferc.gov/EventCalender/Files/20060213122812-susan-court.pdf; and *Monthly Energy Review April 2006,* U.S. Department of Energy, Energy Information Administration, Tables 9.11, 9.9. Available at www.eia.doe.gov/emeu/mer/contents.html.

[7] *Testimony of Kateri Callahan, President, Alliance to Save Energy before the House Appropriations Subcommittee on Energy and Water Development*. 16 March 2006. Available at www.ase.org/content/article/detail/3047.

[8] Interlaboratory Working Group. 200. *Scenarios for a Clean Energy* Future (Oak Ridge, TN; Oak Ridge National Laboratory and Berkeley, CA; Lawrence Berkeley National Laboratory), ORNL/CON-476 and LBNL-44029, November. Available at http://www.ornl.gov/sci/eere/ccef/. Note that their estimated potential for reducing *primary* natural gas use is slightly lower. See also Steven Nadel, A. Shipley and R. Neal Elliott, *The Technical, Economic and Achievable Potential for Energy-Efficiency in the U.S.–A Meta-Analysis of Recent Estimates*, ACEEE, 2004, p. 3.

Market barriers encompass those barriers that discourage consumer use of energy-efficient products, including high first costs, lack of information, and split incentives. State policies for energy efficiency, including policies to establish utility energy efficiency programs, are designed to overcome one or more of these barriers and encourage the widespread adoption of energy-efficient products and practices. The following table identifies the primary market barriers to energy efficiency.

Market Barriers to Energy Efficiency	
High First Costs	Energy-efficient equipment and services are often considered "high-end" products and can be more costly than standard products, even if they save consumers money in the long run.
High Information or Search Costs	It can take valuable time to research and locate energy-efficient products or services.
Consumer Education	Consumers may not be aware of energy efficiency options, or may not consider lifetime energy savings when comparing products.
Performance Uncertainties	Evaluating the claims and verifying the value of benefits to be paid in the future can be difficult.
Transaction Costs	Additional effort may be needed to contract for energy efficiency services or products.
Access to Financing	Lending industry has difficulty in factoring in future economic savings as available capital when evaluating credit-worthiness.
Split Incentives	The person investing in the energy efficiency measure may be different from those benefiting from the investment (e.g., rental property).
Product/Service unavailability	Energy-efficient products may not be available or stocked at the same levels as standard products.
Externalities	The environmental and other societal costs of operating less efficient products are not accounted for in product pricing or in future savings.

Source: Eto, Goldman, and Nadel (1998); Eto, Prahl, and Schlegel (1996); and Golove and Eto (1996).

The term *utility industry barriers* refers to the disincentives and institutional obstructions that hamper the design and delivery of utility energy efficiency programs. Utility industry barriers include: existing regulatory structures, market rules that provide incentives for utilities to invest in supply-side resources rather than demand-side management, the view that energy efficiency is not a reliable resource, and concerns that the cost of energy efficiency programs will raise rates. The following table outlines the primary utility industry barriers to implementing energy efficiency programs.[9]

[9] Not-for-profit utilities, i.e. rural electric cooperatives and public power utilities, do not necessarily share the same disincentives (or incentives) to implementing energy efficiency programs as investor-owned utilities do. For example, not-for-profit utilities tend to be driven by cost minimization goals, rather than profit maximization.

Utility Industry Barriers to Energy Efficiency	
Throughput	Traditional utility regulations and energy markets reward utilities for increasing sales and for building capital projects to supply more electricity and natural gas.
Rate of Return	Utilities do not earn the same rate of return on energy efficiency as they do on generation, transmission, and distribution investments.
Cost Recovery	Regulators may reject cost recovery for energy efficiency expenditures because the benefits or savings are hard to measure.
Information	Due to a lack of documentation and information, utilities and customers are not always aware of cost-effective program best practices.
Rate Impacts	Energy efficiency programs may raise customer rates but also reduce energy bills overall.
Resource Planning	Planning does not incorporate demand-side resources and does not consider efficiency a reliable energy resource.
Evaluating Benefits	Full value of efficiency is not considered, including reliability, environmental, risk management, and economic benefits.

Source: National Action Plan for Energy Efficiency; Clean Energy Guide to Action; Energy Efficiency Toolkit.

1.3 Study Structure

Following is an overview of the contents of each chapter in this study. Chapters 2, 3, and 4 provide useful background material for policy-makers and regulators who may be new to the subject of utility energy efficiency. Chapters 5 through 8 assess State and regional policies that promote cost-effective energy efficiency programs that are carried out by electric and natural gas utilities. Chapter 9 highlights complementary State policies, and Chapter 10 summarizes the conclusions.

Chapter 2, *Energy Efficiency and Conservation in Electricity and Gas Markets: Two-Decades of Change*, is a brief history of the regulatory structure in the electric and gas industries and the restructuring of the wholesale and retail markets. This chapter also outlines the genesis of demand-side management and describes the evolution of program design and funding for utility energy efficiency programs.

Chapter 3, *Measuring Results*, outlines the importance of and the challenges associated with quantifying the energy and non-energy impacts of efficiency programs. When considering the framework of utility energy efficiency initiatives, regulators will need to consider the design of program evaluation parameters. Chapter 3 introduces the concepts and the issues that need to be addressed when considering how energy efficiency programs are evaluated.

Chapter 4, *Cost-Effectiveness of Select Energy Efficiency Programs,* describes the types of energy efficiency programs administered by utilities. In addition to describing programs, this chapter provides an overview of cost-effectiveness tests and defines the tests commonly used to screen energy efficiency programs.

Chapter 5, *Infrastructure Planning and Improvements and Energy Efficiency,* addresses energy efficiency as an alternative to other resources, such as transmission and distribution assets that make up the power system grid or new generating stations. Some view energy efficiency as a strategy for avoiding or delaying more costly or more polluting means of meeting energy requirements. This chapter describes the various ways utilities use energy efficiency as a resource for this purpose.

An important consideration for any State contemplating a policy specific to utility energy efficiency programs is the source of funds to support these efforts. Chapter 6, *Funding Utility Energy Efficiency*, describes the alternative mechanisms States have established to fund energy efficiency and to provide cost recovery to the utilities implementing the programs. Specifically, this chapter includes information on system benefits charges for energy efficiency and briefly describes utility rate mechanisms for cost recovery.

Chapter 7, *Rate Structures and Incentives for Utility Energy Efficiency Programs,* presents alternative rate structures that help to alleviate disincentives to utilities for energy efficiency, as well as methods to provide incentives for energy efficiency investments and encourage customers to save energy.

Chapter 8, *Energy Efficiency Performance Requirements*, reviews performance-based regulations for energy efficiency and the associated policy issues. The chapter includes examples of energy efficiency performance requirements as well as suggestions for State regulators and policy-makers specific to this policy option.

As previously mentioned, States have instituted policies that are not specifically focused on utility energy efficiency programs, but are separate efforts that may be used independently or as a complement to utility initiatives. Chapter 9, *Complementary State Policies and Programs,* describes several additional policies that States may wish to consider and discusses how these efforts may be linked to utility energy efficiency programs.

Chapter 10, *Conclusions,* presents the findings of the study along with a discussion on suggested policy actions.

1.4 Role of Participating Organizations

In section 139 of EPAct 2005, Congress instructed the Secretary of DOE to consult with both NARUC and NASEO on a study of State and regional policies that promote cost-effective utility energy efficiency programs. DOE in consultation with NARUC and NASEO agreed that the National Council on Electricity Policy (National Council), which includes participation of representatives from both organizations, was the appropriate organization to oversee the preparation of a draft for DOE's consideration in preparation of this study.

The National Council is a joint venture between the NARUC, NASEO, the National Conference of State Legislatures (NCSL), and the National Governors Association (NGA). Established in 1994, the National Council was originally formed to assist policymakers with the changes related to electricity industry restructuring. The current activities of the National Council have expanded to include the analysis and discussion of policy initiatives related to the reliability, efficiency, diversity, and financing of electricity systems. The National Council provides an opportunity for State legislators, regulators, and policymakers to work together in a national forum specifically focused on electricity policy.

With the support of DOE, the National Council was engaged by DOE to prepare a draft of this study. This study reflects the input of the members of the National Council. The study was completed as a collaborative effort, pooling the experience and resources of DOE, State government representatives, non-governmental organizations, and experts on electric utility regulation and energy policy. The Alliance to Save Energy and the Regulatory Assistance Project provided technical assistance and policy analysis, and contributed to the draft document. Experts within the DOE's Office of Electricity Delivery and Energy Reliability as well as Lawrence Berkeley National Laboratory's Environmental Energy Technologies Division, Energy Analysis Department, supplied additional guidance and comments on the draft document prepared by the National Council for DOE. DOE considered the National Council-supplied draft as input to prepare this DOE study that is required under EPAct Sec, 139(a) and (b).

Furthermore, the study benefited from the ongoing efforts of the Leadership Group of the National Action Plan for Energy Efficiency ("Action Plan"). Action Plan participants are a "Leadership Group" of 50 private-, public-, and cooperatively-owned electric and gas

Members of the National Council on Electricity Policy

- **Jeanne Fox, Chair, National Council on Electricity Policy, President, New Jersey Board of Public Utilities**
- **Sheryl Allen, Representative, Utah Legislature**
- **Joe Bryson, U.S. EPA**
- **Beverly Gard, Senator, Indiana Senate**
- **Anne C. George, Commissioner, Connecticut Department of Public Utility Control**
- **Sandra L. Hochstetter, Chairman, Arkansas Public Service Commission**
- **Kathleen Hogan, U.S. EPA**
- **Carl Holmes, Representative, Kansas Legislature**
- **Brian Kastick, Director of Public Policy & Federal Affairs, West Virginia Governor's Office**
- **Kevin Kelly, Office of Markets, Tariffs and Rates, Federal Energy Regulatory Commission**
- **Shane Khoury, Governor's Policy Advisor for Regulatory Affairs, Arkansas**
- **Tony Klein, Representative, Vermont Legislature**
- **Larry Mansueti, U.S. DOE**
- **Hermina M. Morita, Representative, Hawaii Legislature**
- **Patrick J. Oshie, Commissioner, Washington Utilities and Transportation Commission**
- **Phyllis Reha, Commissioner, Minnesota Public Utilities Commission**
- **John Sarver, Supervisor, Consumer Education Programs, Michigan Energy Office**
- **Larry Shirley, Director, North Carolina State Energy Office**
- **Marsha H. Smith, Commissioner, Idaho Public Utilities Commission**
- **Julia A. Souder, U.S. DOE**
- **Dub Taylor, Director, State Energy Conservation Office, Texas**
- **Eric Thumma, Director, Pennsylvania Bureau of Energy, Innovations and Technology Development**
- **Tony Usibelli, Director, Energy Policy Division, Washington**

Executive Committee

- **Jeanne Fox, Chair, National Council President, New Jersey Board of Public Utilities**
- **Christina Mudd, National Council Executive Director**
- **Kate Burke, NCSL**
- **Kara Colton, NGA Center for Best Practices**
- **Jeffrey C. Genzer, NASEO General Counsel**
- **Charles Gray, NARUC**
- **Diane Shea, Executive Director, NASEO**

utilities, utility regulators, State agencies, large end-users, consumers advocates, energy service providers, and environmental/energy efficiency organizations.[10] The Action Plan, established in November 2005, is a concurrent process to create a sustainable, aggressive national commitment to energy efficiency through electric and natural gas utilities, utility regulators, and partner organizations across the United States. The Leadership Group of the Action Plan released a report in July 2006 that summarizes their own recommendations on how to achieve greater energy efficiency as delivered by electric and gas utilities and allied organizations. The working documents and recommendations of the Leadership Group are important inputs to the conclusions contained within this study. The members of the Leadership Group (as of February 2007) are provided in Appendix A.

[10] The Action Plan "Leadership Group" is now co-chaired by Marsha H. Smith, NARUC 1st Vice President and Commissioner, Idaho Public Utilities Commission (replacing Diane Munns, Member of the Iowa Utilities Board and immediate Past-President of NARUC), and Jim Rogers, President and Chief Executive Officer of Duke Energy and currently Chairman of the Edison Electric Institute. DOE and EPA facilitate the work of the Leadership Group and Action Plan and provide technical assistance.

2. Energy Efficiency and Conservation in Electricity and Gas Markets: Two Decades of Change

2.1 The Rise (and Fall) of Demand-Side Management

Utilities first began implementing energy efficiency programs as a response to national energy security and environmental concerns in the 1970s. The National Energy Conservation Policy Act (1978) required utilities to offer on-site energy audits to residential customers, effectively launching what would come to be known as utility demand-side management (DSM) programs. These initiatives were intended to modify the consumer's energy use patterns. The electric and gas utilities proved to be effective agents for educating consumers and implementing energy efficiency and conservation programs as part of a larger package of DSM. Under traditional utility rate-of-return regulation, DSM programs helped utilities manage customer loads in an era characterized by escalating fuel costs, increasing regulatory scrutiny of capital investments, and high interest rates.

In the 1980s, utility regulators began to question the high construction costs of new generation facilities, particularly nuclear power plants, which electric utilities were seeking to recover through their rates. Regulatory commissions disallowed approximately $20 billion in costs that they determined were imprudent, placing utilities under financial stress, and straining the regulator-utility relationship.[11] To help resolve this issue, a new regulatory tool, known as "least-cost planning," was created. Under least cost planning, utilities were required to evaluate their resource options on both sides of the meter—supply and demand. In order to get approval for new resource acquisitions, utilities had to prove this was the least expensive option available.

Least-cost planning provided an opportunity to demonstrate that energy efficiency and demand-side management options could be lower cost alternatives to constructing or purchasing new generation. Estimates of the per-kilowatt-hour costs of energy efficiency vary widely but often are around 3 to 4 cents per kilowatt-hour; lower than most supply-side options.[12] The costs for energy efficiency programs approved under least-cost planning were recovered in utility rates in the same way utilities recovered costs for new generation facilities, through utility rates.

Substantiated by the endorsement of NARUC in 1984, a growing number of States had adopted least-cost planning regulations by the mid-1980s. Under least-cost planning, utility spending on DSM grew rapidly, as did the number and scope of utility energy efficiency programs. These programs continued to grow, peaking in 1993 when an estimated $2.7 billion was spent on utility DSM programs. Spending then decreased with the rise of natural gas and electricity deregulation.[13]

The following two sections describe the evolution of wholesale and retail markets in the natural gas and electricity sectors before and during this time of restructuring. Subsequent sections explain the impact that restructuring has had on gas and electric utility energy efficiency

[11] Eto, Joseph. 1996. *The Past, Present, and Future of U.S. Utility Demand-Side Management Programs.* LBNL-39931, UC-1322. Berkeley, California: Environmental Energy Technologies Division, Ernest Orlando Lawrence Berkeley National Laboratory, December, p.6. Available at http://eetd.lbl.gov/EA/EMP/reports/39931.pdf.

[12] Gillingham, K., Newell, R., and Palmer, K. 2004. *Retrospective Examination of Demand-Side Energy Efficiency Policies.* RFF DP 04-19 REV. Washington, D.C.: Resources for the Future. June; Revised September. Available at http://www.rff.org/Documents/RFF-DP-04-19REV.pdf.

[13] Eto, Joseph. ibid., p.7-8.

programs and the provisions States have made to promote the continuation of energy efficiency programs.

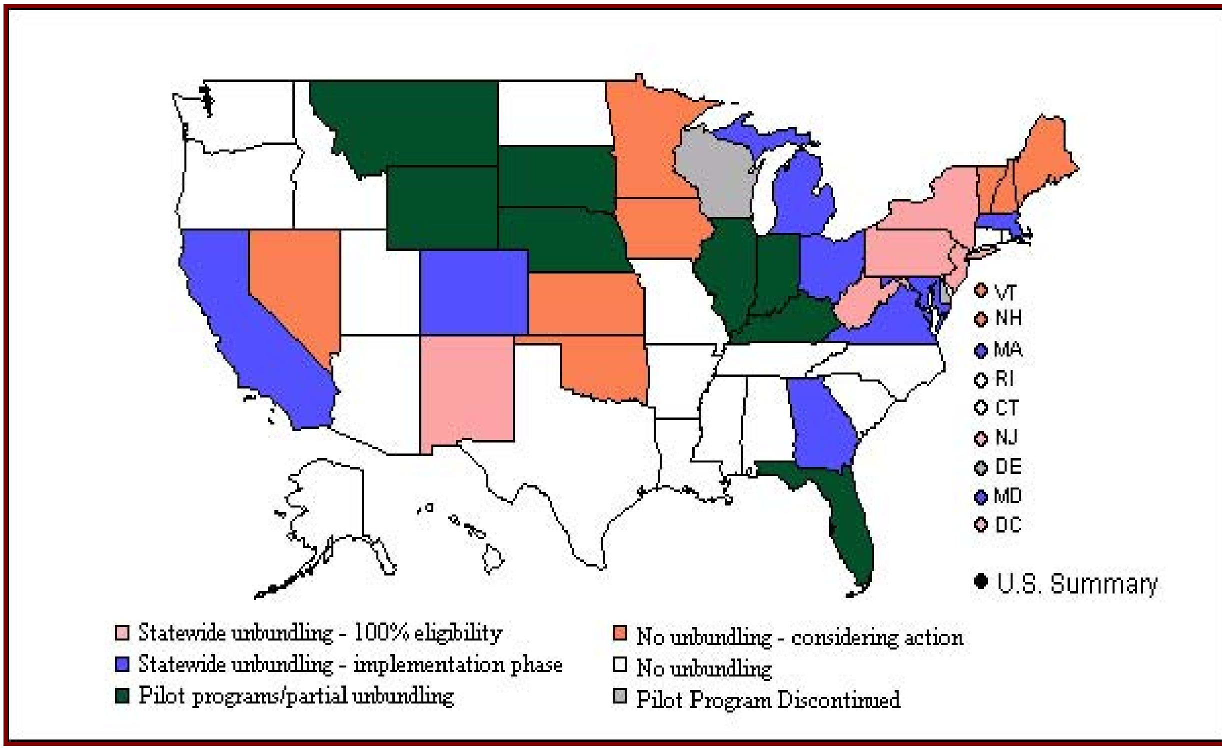
2.2 Natural Gas: The Evolution of Wholesale and Retail Markets

Beginning in the late 1980's, there were significant changes to the regulation of the wholesale natural gas market. Natural gas wellhead price controls were repealed by the U.S. Congress and a series of FERC Orders (including 436 and 636) opened natural gas pipeline transportation services to customers on a non-discriminatory basis and then required pipeline companies to separate their transportation and sales services. As a consequence, many States chose to move ahead with the unbundling of the local natural gas markets. "Retail unbundling" divided gas utility services so that the various components (gas supply and gas transportation) could be purchased separately. With unbundling, consumers could choose their own gas supplier while the local gas distribution utility continued to provide local transportation and distribution services.

Today, unbundling programs are often called "customer choice" programs, giving consumers a choice of retail gas suppliers. Twenty-one States (New Jersey, New Mexico, New York, Pennsylvania, West Virginia, California, Colorado, Georgia, Maryland, Massachusetts, Michigan, Ohio, Virginia, Florida, Indiana, Illinois, Kentucky, Montana, Nebraska, South Dakota, and Wyoming) and the District of Columbia have unbundled gas services for either all or some retail customers (Figure 1). There are eight States (Iowa, Kansas, Maine, Minnesota, Nevada, New Hampshire, Oklahoma, and Vermont) that are considering unbundling the retail natural gas sector while two States, Delaware and Wisconsin, have discontinued their unbundling activities.[14]

[14] *Residential Natural Gas Restructuring Status,* Natural Gas Residential Choice Programs. Department of Energy, Energy Information Administration. Accessed 17 April 2006. Available at http://www.eia.doe.gov/oil_gas/natural_gas/restructure/restructure.html.

Figure 1. Status of Natural Gas Residential Choice Programs by State as of December 2004



Source: U.S. DOE, Energy Information Administration

2.3 Electricity: The Evolution of Wholesale and Retail Markets

Throughout most of the 20th century, the electricity sector was characterized by regulated "vertically integrated utilities." This term means that the same company owned the power generation facilities, the transmission lines, and the local distribution lines that bring electricity to retail customers. These electricity supply systems were regulated by State public utility commissions (PUCs). In addition, some areas were (and still are) served by publicly owned utilities, such as municipal utilities, which are part of the local governments, or rural electric cooperatives.

Pricing discrepancies among States and regions, increasing electricity prices, and the enactment of the Public Utility Regulatory Policies Act of 1978, led to the emergence of independent power producers (i.e., privately owned power plants). To further promote wholesale competition, Congress enacted the Energy Policy Act of 1992 that included provisions for independent power producers to be exempted under the Public Utilities Holding Company Act of 1935. EPAct 1992 also allowed FERC to order the vertically integrated utilities to provide transmission to wholesale transmission customers, including independent power producers, on a case-by-case basis.

To further facilitate competition in the wholesale electricity generation market, in 1996 FERC issued Order 888, requiring all FERC-jurisdictional utilities to provide universal and nondiscriminatory access to the transmission grid under an open access transmission tariff filed annually with FERC. As part of Order 888, FERC required the "functional unbundling" of investor-owned utilities (IOUs). Functional unbundling required the electric utilities to organize into separate generation, transmission, and distribution groups. While the utility was still allowed to retain corporate ownership of all three business functions, the generation and transmission functions within the utility's organization had to be separate. Unbundling was intended to prevent utilities from controlling the transmission of the electricity to the advantage of their own generation facilities. FERC also has encouraged, but not required, utilities to give operational control of their transmission systems to regional transmission organizations (RTOs).

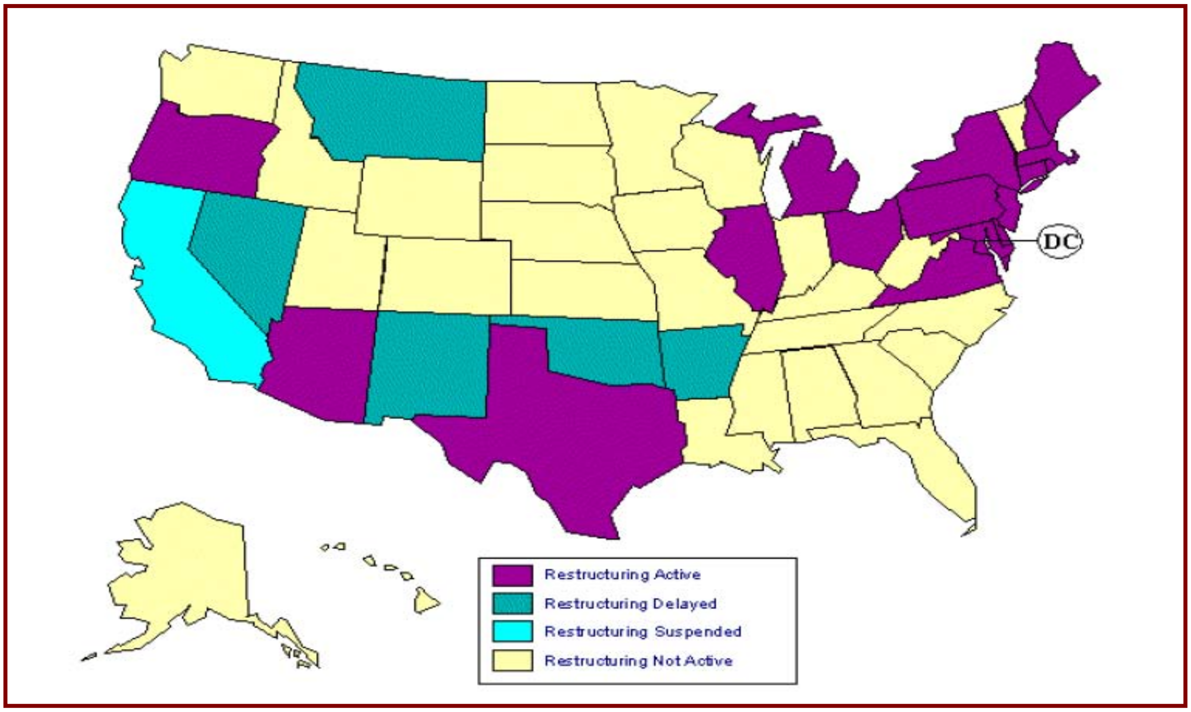
To allow competition at the retail level, some States created policies that allowed consumers to choose their electricity suppliers. Under retail choice (also referred to as "retail access" or "retail competition"), electricity suppliers use transmission and distribution systems owned by regulated utilities to sell and transport electricity to the customer. Some States implementing retail choice require vertical disintegration of their IOUs, mandating separate ownership of generators (non-regulated entities) from the transmission and distribution companies (regulated entities). Depending on the specifics of the State restructuring laws, the requirement of separate ownership of generation and transmission and distribution (T&D) often led to the divestiture of generation assets by an IOU.

Generally, States with higher-than-average retail electricity rates were more interested in allowing retail choice than those States with lower than average rates. Today, the majority of restructuring policies include provisions for energy efficiency programs. However, some States assume that the competitive marketplace will provide energy efficiency services, obviating their need for States to develop mechanisms to fund energy efficiency programs.

Twenty-four States and the District of Columbia took steps to implement retail access, either through legislation or regulatory order (Figure 2).[15] Retail access is available in 16 States, (Arizona, Connecticut, Delaware, Illinois, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New York, Ohio, Oregon, Pennsylvania, Rhode Island, Texas, and Virginia) and the District of Columbia. Oregon allows non-residential customers retail access. Montana has indefinitely delayed the implementation of retail access. Arkansas and Nevada have repealed electric retail choice laws, and California has suspended its retail access initiative. The remaining States are not currently planning to restructure their electricity sector for retail competition.

[15] "State of State Electric Industry Restructuring Activity (As of February 2003)," U.S. Department of Energy, Energy Information Administration, February 2003. Available at http://www.eia.doe.gov/cneaf/electricity/page/restructure.html, Accessed March 12, 2006.

Figure 2. Status of State Electricity Restructuring Activity



Source: U.S. DOE Energy Information Administration, February 2003

2.4 Utility Regulation and State Advocacy for Energy Efficiency

While DSM and energy efficiency programs grew and evolved throughout the 1980s and the first half of the 1990s, so did the regulatory structures that required utilities to implement these programs and that allowed utilities to recover program costs. Initially, many PUCs would set the amount of money to be spent on DSM programs by Commission order, providing cost recovery outside the ratemaking process. However, as the DSM programs and costs grew, many States incorporated cost recovery for DSM as part of utility rate cases (rate cases are the process through which regulated utilities must submit any rate change for approval by the PUC). Some States allowed cost recovery of DSM programs as art of regular fuel cost adjustment clauses rather than waiting for a full rate case—which may take place only once every several years.

Under either scenario, utilities recovered DSM program costs as part of standard rate-of-return regulation. Utilities incorporated energy efficiency programs into their Integrated Resource Plans (IRPs), which are their long-term plan for ensuring that they have adequate energy resources to meet growing future demands. Allowing utilities to recover costs through rate-of-return regulation permitted utilities to routinely evaluate and adjust these programs, thus minimizing their risks of investing in DSM.

Under regulation, States employ one of three different strategies to create financial incentives for DSM initiatives, beyond simple cost recovery. The first approach is cost-based, the second is performance-based, and the third rewards the cost effectiveness of the program.[16] The first

[16] Eto, Joseph. 1996. *The Past, Present, and Future of U.S. Utility Demand-Side Management Programs.* LBNL-39931, UC-1322. Berkeley, California: Environmental Energy Technologies Division, Ernest Orlando Lawrence Berkeley National Laboratory, December, p.10. Available at http://eetd.lbl.gov/EA/EMP/reports/39931.pdf.

method allows the utility a percentage adder on the money spent on energy efficiency, providing an incentive to spend more in order to earn more. A second option is to provide a bonus paid to the utility for every kilowatt or kilowatt-hour saved by an efficiency program. The third strategy allows the utility to earn a percentage of the avoided electricity production costs after the program costs have been subtracted. Many States allow utilities to capitalize their energy efficiency expenditures and receive a return on the investment, as they do for supply-side capital investments.

Under restructuring, the same infrastructure planning and financial incentive tools are not available to utilities for implementing energy efficiency programs. In the course of restructuring, gas and electric utilities narrowed the scope of their core businesses to focus on delivery services by either de-emphasizing or altogether eliminating energy supply functions. In a competitive market, State regulation of both planning and pricing of energy supply is limited; therefore, retailers cannot be paid for efficiency programs through competitive rates. This trend led to the downsizing or elimination of many DSM programs. Policymakers have had to re-examine the role that energy efficiency plays in the energy market and the means to foster that efficiency.

State regulators and lawmakers have been forced to reconsider mechanisms for collecting funds for DSM programs in the face of utility deregulation and restructuring. Under this new regulatory environment, lawmakers are confronted with the possibility that utilities are no longer the appropriate administrators of energy efficiency programs. Nevertheless, policy debates have identified two options that would provide rate-payer funds for energy efficiency programs: 1) include the costs as part of the base rates of distribution utilities, where still regulated, or 2) establish a surcharge collected from all customers.

Most restructured States chose to continue support of energy efficiency programs through a system benefits charge that is applied to all utility customers to provide a dedicated revenue stream for energy efficiency and other purposes. Often the State legislature, not the PUC, establishes a system benefits charge or similar fund source as part of restructuring legislation. The State legislature may also define 1) the level and duration of funding, 2) the scope of the charge in terms of what customer classes are included (e.g., residential, commercial, industrial), and 3) whether or not non-State-regulated utilities (e.g., publicly-owned utilities and cooperatively-owned utilities) would be included. System benefits charges are described in more detail in Chapter 6.

2.5 The Changing Role of State Policies for Energy Efficiency: Market Transformation and Resource Acquisition

With the wave of restructuring and the decline in utility spending on energy efficiency programs, there was also a philosophical switch in the type of programs implemented. During the mid-1990s, the focus of energy efficiency efforts shifted from “resource acquisition” to “market transformation.” Resource acquisition programs provide rebates or subsidies to consumers as incentives to purchase energy-efficient equipment. Market transformation programs use outreach and education to create informed consumers that select energy-efficient technologies.

The philosophy of resource acquisition was developed for use by a vertically integrated utility industry concerned with minimizing the cost of purchasing energy resources. In this context, resource acquisition was considered an alternative to investing in supply resources in a utility’s long-term IRP. However, as industry restructuring began and generation assets were sold, many States abandoned the integrated resource planning process. This called for an alternative focus for efficiency. Market transformation helped provide that focus.

Market transformation is defined as "a reduction in market barriers resulting from market intervention, as evidenced by a set of market effects that lasts after the intervention has been withdrawn, reduced or changed."[17] Market transformation interventions rely heavily on consumer awareness and education to encourage consumers to invest in energy-efficient products and services. However, the energy benefits of market transformation programs are more difficult to quantify. Therefore, a mix of resource acquisition and market transformation may be a more appropriate policy strategy than relying on one or the other exclusively.

The emphasis on market transformation has differed somewhat across regions. In California, the shift to a market transformation was relatively strong. For example, the California Public Utilities Commission (CPUC) Decision 95-12-063 called for public spending to shift towards activities that will transform the energy market as opposed to activities that seek energy reductions one product or facility at a time. This order has been reinforced by other decisions issued over the past five years. The initial strategies of market transformation were strongly influenced by the California Board for Energy Efficiency (CBEE), an advisory board to the CPUC. However, more recently, California has shifted control of energy efficiency programs back to the utilities, and the program focus has shifted back to resource acquisition.

While market transformation is not generally the sole focus of energy efficiency in other areas of the country, it has been accepted as a viable policy alternative. Market transformation activities in the Northeast have been spearheaded by the Northeast Energy Efficiency Partnerships, Inc. (NEEP), while programs in the Northwest have been sponsored by the Northwest Energy Efficiency Alliance (NW Alliance). National efforts are promoted by the ENERGY STAR® program, as well as by the activities of the Institute for Market Transformation, the American Council for an Energy-Efficient Economy (ACEEE), and the Consortium for Energy Efficiency (CEE). [18] State governments have actively managed and promoted these activities.

Even with a shift to market transformation alternatives, there is a continuing recognition of the importance of resource acquisition programs. These activities can take many forms—from direct State funding of energy efficiency projects to the use of private capital involving performance contracts. Examples of successful, continuing resource acquisition programs include Texas' LoanSTAR (Saving Taxes and Resources) program and Iowa's School Facility Financing Program. [19] Because the energy benefits of market transformation programs are more difficult to quantify, a mix of resource acquisition and market transformation may be a more appropriate policy strategy than relying on one or the other exclusively.

2.6 Funding for Utility Energy Efficiency Programs

Budgets for utility DSM and energy efficiency programs grew through the 1980s and into the early 1990s. DOE's Energy Information Administration (EIA) began tracking utility expenditures for energy efficiency as part of its annual survey of utility operations. According to the EIA data,

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[17] Eto, J., R. Prahl, and J. Schlegel. July 1996. *A Scoping Study on Energy-Efficiency Market Transformation by California Utility DSM Programs.* LBNL-39058/UC-1322. Available at http://eetd.lbl.gov.

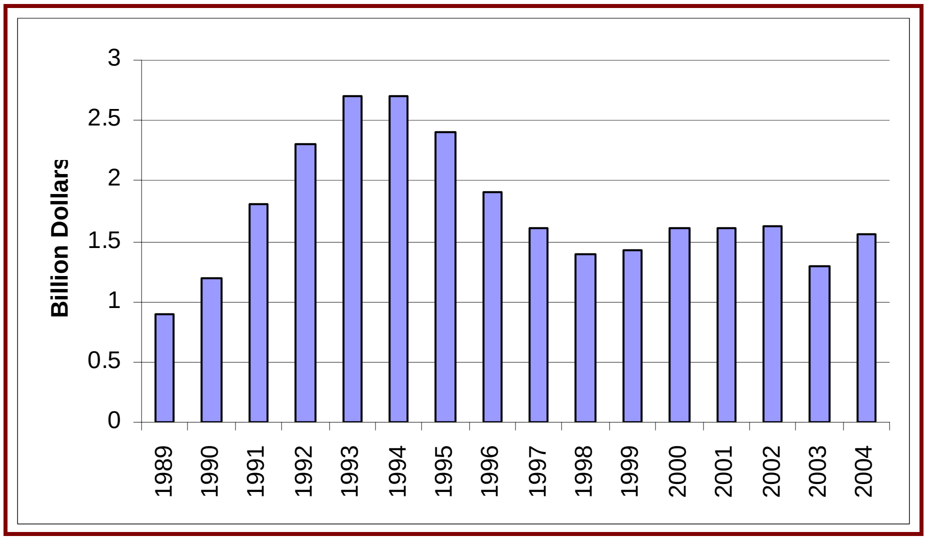
[18] Dickerson, C., F. Sebold, A. Fields, L. Skumatz, S. Feldman, M. Goldberg, K. Keating, and J. Peters. March 1, 2001. *A Framework for Planning and Assessing Publicly Funded Energy Efficiency.* PG&E-SW040. p. 10. Available at http://www.cee1.org/eval/PGE_study.pdf.

[19] For additional information refer to http://www.seco.cpa.state.tx.us/ls.htm for the Texas LoneStar Program and http://www.iowadnr.com/energy/index.html for information on Iowa's School Facility Financing Program.

U.S. utility DSM spending grew from $0.9 billion in 1989 to a peak of $2.7 billion in 1993 and 1994. At their greatest impact in 1996, electric utilities estimated that these programs reduced peak load by 30 gigawatts (the output of about 100 medium-sized power plants) and saved 62 million megawatt-hours.[20]

When States began to consider restructuring natural gas and electricity markets, many utilities reduced or eliminated their investments in energy efficiency programs. Energy efficiency programs were associated with long-term resource adequacy strategies that did not fit with increasingly short-term priorities, regulatory uncertainty, and utility unbundling. The result was a dramatic drop off of funding for utility energy efficiency programs in the mid to late 1990s. Since 1999, utility DSM funding has remained relatively flat (Figure 3). However, increases in similar programs administered by States rather than by utilities have replaced some of the reduced utility spending.

Figure 3. Utility Demand-Side Management Spending, 1989-2004 ($ billion)



Sources: *Energy Information Administration*, Annual Energy Review 2004, Table 8.13, Electric Utility Demand-Side Management Programs, 1989-2003, available at www.eia.doe.gov/emeu/aer/pdf/pages/sec8_49.pdf; and *Energy Information Administration,* EIA Electric Power Report 2004: Table 9.7. Demand-Side Management Program Direct and Indirect Costs, 1993 through 2004, available at www.eia.doe.gov/cneaf/electricity/epa/epa.pdf.

[20] *Energy Information Administration*, Annual Energy Review 2004, Table 8.13 Electric Utility Demand-Side Management Programs, 1989-2003. Available at www.eia.doe.gov/emeu/aer/pdf/pages/sec8_49.pdf; and *Energy Information Administration,* EIA Electric Power Report 2004: Table 9.7. Demand-Side Management Program Direct and Indirect Costs, 1993 through 2004. Available at www.eia.doe.gov/cneaf/electricity/epa/epa.pdf.

3. Measuring Results

3.1 Overview of Evaluation Methods

The evaluation of program impacts is an important element of any State policy on energy efficiency in order to identify any implementation problem and evaluate whether the programs are cost effective. Through these evaluations, State regulators will have access to data measuring the effectiveness of these programs, the energy savings, the efficiency of the management and implementation of the programs, and the programs' effectiveness at reaching stated objectives.

Energy efficiency program evaluations are also used by State regulators who are charged with ensuring that the ratepayer investments in energy efficiency are reasonable and defensible. In order to provide sufficient credibility, accuracy, and certainty, evaluations must be 1) transparent, based on documented sources that are readily available, and 2) consistent, so that savings can be tracked and aggregated as needed. Well-designed evaluations can provide accurate accounting of the *ex post* costs and benefits of a program and add to the program's credibility.

Some critics of utility energy efficiency programs charge that evaluation practices are not designed with sufficient rigor and consistency to present reliable and comparable results. Despite wide recognition of the value of rigorous evaluations, the outcomes of energy efficiency programs are not always reported in a way that allows for a ready comparison, nor do they capture the full range of impacts associated with energy efficiency investments. This is particularly true of evaluations that are used to assess market transformation programs or consumer education initiatives.

Below is a description of four evaluation methods: deemed savings, impact evaluations, process evaluations, and market effects evaluations. The following section discusses the role of policymakers and regulators in implementing program evaluation methods as these evaluations are often used in policy-making decisions.

Deemed Savings

It is not always possible to establish an exact calculation of the energy savings of energy efficiency programs—especially when trying to quantify 1) the benefits to participants (e.g., energy consumers installing efficiency measures) and non-participants (e.g., energy consumers who benefit from increased reliability or lower system energy costs), 2) the reductions in customer bills, or 3) the avoided supply costs. In many cases, particularly with programs focused on consumer products (appliances, lights, insulation, etc.), it is necessary to establish standard energy savings that can be calculated according to the number of participants or measures installed.

The energy savings from standard measures are often referred to as "deemed savings." Deemed savings are the range of energy savings from the installation of a particular application or piece of equipment over a set period of time. Deemed savings do not require on-site data collection or advanced data-collection meters.

Impact Evaluations

Impact evaluations use quantitative assessments and measures to calculate the effects of an energy efficiency program. Data may be collected through measuring devices, such as meters, or through modeling methods or surveys. Impact evaluations can document the savings achieved from various programs at one time and can be used to revise deemed savings estimates. Impact evaluations are essential for accurately measuring energy reductions if these savings are going to be considered as an energy resource. Therefore, utilities with resource acquisition programs tend to rely heavily on these types of evaluations.

M&V Protocols

The U.S. Department of Energy helped establish M&V protocols, the *International Performance Measurement and Verification Protocols (IPMVP)* in 1996. These protocols verify the impacts of energy-savings projects implemented by energy service companies under a shared-savings or guaranteed-savings energy efficiency contract. The protocols ensure that the methodology and framework for conducting evaluations is consistent from one organization to another. The IPMVP have been revised several times and are valuable references for the verification of the energy savings as part of an impact evaluation. Impact evaluation studies also provide critical inputs to cost effectiveness studies. The New York State Energy Research and Development Agency (NYSERDA) relies on the IPMVP protocols for its commercial and industrial performance programs. California includes IPMVP as a reference in its *Energy Efficiency Policy Manual*.

The most reliable impact evaluation methods of measurement and verification (M&V) are engineering-based, such as metered data or on-site examination of technology applications. The second most reliable option is through modeling methods and regression analysis techniques. Approaches using estimation methods or deemed savings obtained from survey or interview data are less dependable.

M&V tools typically include some field measurement prior to implementation to establish a baseline, and after implementation, to measure energy savings. Ideally, M&V protocols provide standard procedures for establishing baseline conditions, stipulated or deemed savings estimates, standard input assumptions, and algorithms for calculating gross and net savings. M&V protocols should also provide consistent evaluation methods for collecting data and verifying initial savings estimates. Because energy efficiency programs vary State-by-State, M&V protocols adopted by each State should account for these differences, and States should periodically review and revise the protocols if necessary.

Process Evaluations

Process evaluations provide two types of data: 1) an assessment of whether program operations are consistent with plans and 2) an evaluation of whether goals and objectives are being met. Because process evaluations help measure the cost effectiveness of a program from the perspective of administrative efficiency (rather than from the perspective of energy savings), these evaluations have become an important component in evaluating overall program performance.

California Evaluation Review

California has created a consistent, systemized approach for planning and evaluating energy efficiency programs, entitled the *California Evaluation Framework*. Evaluations for California's portfolio of energy efficiency programs were found to be lacking for the 2002-2003 program year. Only 55 percent of the kWh savings were evaluated with sufficient rigor to provide reliable impact estimates. This prompted a detailed review of the evaluation framework, clarification of evaluation guidelines, and additional oversight and direction on the evaluation process by the CPUC. A review of the evaluation process determined that minimum impact evaluation metrics should include:

- **First year kWh and KW savings and therm impacts;**
- **Net energy impacts for each year over which savings are expected; and**
- **Actual program expenditures (dollars spent, not dollars budgeted) less program evaluation costs.**

Measurement of the program's effectiveness can be used to develop constructive suggestions for improving the program's structure, function, and operations. Issues that may be evaluated include participant satisfaction, program tracking, data management and information systems, market outreach, and program design. Unlike impact evaluations, which tend to rely on documented M&V protocols and engineering practices, process evaluations are not typically subject to specific protocols that help guide the scope and quality of research efforts. Process evaluations are useful for both resource acquisition and market transformation programs.

Market Effects Evaluations

Market effects evaluations analyze the impacts of market transformation initiatives. Often, these evaluations are not program specific; that is, they cut across entire market sectors to assess the performance of a portfolio of programs. The ultimate objective of the market effects evaluation is to develop credible, defensible measurements of the impacts attributable to the energy efficiency programs. For example, data collection for market effects evaluations may include a survey of the general population on their knowledge of energy-efficient products and purchasing behaviors.

3.2 Role of Policymakers and Regulators

Verifying and tracking energy efficiency/DSM measures is a critical component of any energy efficiency policy or program. When considering policies to strengthen and expand utility energy efficiency programs, regulators may want to consider establishing a framework that includes minimum requirements of evaluators. Some States establish program evaluation guidelines through a regulated proceeding conducted as part of an overall strategy to incorporate energy efficiency into a utility's resource planning activities. Other States require utilities to file evaluation plans and their results as part of the utility's energy plans and cost recovery filings. In this scenario, the utility's evaluation plans are subject to commission approval.

When assessing the development and implementation of program evaluation methods, policymakers and regulators should consider the following questions:

1. How much should be spent on evaluation?

The amount of money set aside for evaluation depends greatly on the size and complexity of the programs. The *California Evaluation Framework* recommends that evaluation spending be between 4 and 10 percent of the program budget. Actual spending on evaluation efforts in 2003 ranged from 0.04 percent to 24 percent. Large, statewide utility programs tend to have a smaller proportion of funds spent on evaluation. However, these programs often had larger evaluation budgets because of the size of the program budget as a whole.[21] New York's Energy $mart[SM] includes $16.2 million for program evaluation over eight years, approximately 1.7 percent of the total budget.[22] The Connecticut Energy Efficiency Fund allocated between 2 and 3 percent of its total program budget for evaluation and planning in 2005 and 2006.[23] The message for utilities and regulators is that some amount of the total program budget should be set aside for evaluation purposes and that the amount should be commensurate with the type and complexity of the programs being offered.

2. Who should conduct the evaluations, the utility or an independent third party?

A review of State evaluation practices indicates that there are several administrative models in use. The utility may be required to file an evaluation plan as part of its DSM filing and then contract with an independent third-party evaluator to carry out the plan. This is the case in California, where utilities hire third-party evaluators to assess the success of their programs. The evaluators are subject to the detailed evaluation framework and M&V protocols developed specifically for purposes of reviewing energy efficiency programs.

Alternatively, a government agency or department may oversee the evaluation process. In Wisconsin, the Department of Administration contracts with an independent evaluator to conduct a comprehensive assessment of the programs that are implemented by non-governmental organizations. In New York, NYSERDA contracts with many different evaluation teams to conduct a series of program assessments.

In those States where funding of energy efficiency programs is established by law, the programs may be subject to evaluation by legislative auditors. This is the case in Minnesota, where the Office of the Legislative Auditor reviews the results of utility evaluations.

In general, States should make use of third-party evaluators as much as possible. An evaluation conducted by an independent, non-biased, third-party evaluator is likely to produce more credible results than one conducted by the utility or program administrator.

[21] *California 2002-2003 Portfolio Energy Efficiency Program Effects and Evaluation Summary Report,* TecMarket Works, January 16, 2006, p. 60. Available (upon request) at http://www.tecmarket.net/projects.htm.
[22] *New York Energy $mart[SM] Program Evaluation and Status Report*, Final Report, New York State Energy Research and Development Authority, May 2005, p. 3-20. Available at http://www.nyserda.org/Energy_Information/SBC/sbcmay05summary.pdf.
[23] *Energy Efficiency: Investing in Connecticut's Future*, Energy Conservation Management Board, March 2006, p. 26. Available at http://www.cl-p.com/clpcommon/pdfs/companyinfo/publications/ECMB_Rpt.pdf.

3. *Should program results be linked to utility performance incentives?*

   A regulatory commission may establish performance incentives as a means to encourage utilities to exceed their legal requirements when implementing energy efficiency programs. Performance incentives beyond the basic cost-recovery for program implementation might be tied to the results of an impact evaluation. If utilities are rewarded for reductions in energy consumption, reductions must be attributable to programs and projects implemented by the utility as verified by third-party independent evaluators or State agencies.

4. *How are evaluation results used to improve programs?*

   The true mark of effective evaluation relates to whether that evaluation is used to tweak, revisit, or eliminate under-performing programs and to create new programs that have greater chances of success. The evaluation should provide more than a measure of the program benefits—it should be incorporated into a formal program review cycle through which utilities are encouraged to adjust programs according to the findings and recommendations provided within the evaluation reports.

5. *What is the objective of the evaluation process, i.e., are we just counting savings or are we trying to understand whether various product and service markets have been transformed (e.g., market transformation)?*

   If energy efficiency programs are to be incorporated in resource planning, the results and impacts of the programs must provide reliable estimates of energy savings to be used for making energy resource decisions and to identify cost-effective energy supply options. Without a rigorous and well-defined evaluation program, it may be difficult to rely on the impacts of utility energy efficiency programs as a reliable energy resource.

3.3 Summary

There are many approaches that have been employed by evaluators to assess energy efficiency programs. From the perspective of the regulator or policymaker, the results of an evaluation program are often used to inform a policy decision about whether to continue to invest in a program. Regulators reviewing the results of an evaluation will look for answers to the following questions:

1. *How much energy has been saved by the investment in energy efficiency?*

2. *Were ratepayer funds spent wisely?*

3. *How can we improve the effectiveness of the efficiency program?*

Programs conducted without a rigorous evaluation effort are often scrutinized and results can be called into question. In circumstances where energy efficiency is used as a system resource, planners and regulators will need to have confidence in program results.

Where there is regional coordination in energy resource planning, the evaluation results from energy efficiency programs will need to be comparable from State to State. Thus, States involved in regional planning may want to also design common evaluation protocols that produce reliable and consistent results. The Northeast Energy Efficiency Partnership (NEEP) is working to develop a framework and dialogue for common regional measurement and verification and reporting protocols as a useful input to regional energy resource planning. [24] State government cooperation has also been a hallmark of successful efforts.

Drawing on the experience of States with utility energy efficiency programs and their practices for evaluating the results of these efforts, we make the following suggestion:

> **Regulators should consider establishing a formal evaluation framework for utility energy efficiency programs in order to generate reliable, consistent, and transparent data measuring the energy savings of energy efficiency projects. The framework should use simplified techniques when applicable, such as deemed savings or benchmarking for appliance upgrades.**

As a State prepares to increase its investments in energy efficiency, it is within the State's best interest to carefully assess the framework and criteria by which the success of such efforts will be measured. States involved in regional planning should also consider establishing technical protocols for measuring, verifying, and reporting energy and capacity savings in a consistent manner. Without a uniform evaluation protocol, it may be difficult to reliably assess and compare the impacts of energy efficiency policies and programs established to meet specific energy, economic, or environmental goals.

> **States involved in regional planning may want to design common evaluation protocols that produce reliable and consistent results. Because energy efficiency programs vary State-by-State, M&V protocols adopted by each State should account for these differences.**

[24] *The Need for and Approaches to Developing Common Protocols to Measure, Verify and Report Energy Efficiency Savings in the Northeast.* Final Report. January 2006. Northeast Energy Efficiency Partnership, Inc. Available at www.neep.org/files/Protocols_report.pdf.

4. Cost Effectiveness of Energy Efficiency Programs

In section 139, Congress expresses an interest in the cost effectiveness of energy efficiency programs, specifically consumer education programs. Many States and utilities have experience implementing cost-effective energy efficiency programs. These programs are operated across sectors and under a variety of regulatory and administrative models. Consumer education programs are typically only one element of a portfolio of programs designed to complement one another and reinforce an overall energy efficiency message. This chapter addresses the specific efforts to promote consumer awareness, as directed by Congress, as well as common techniques used to measure the cost effectiveness of energy efficiency programs.

EPAct section 139(b)(4) directs the Secretary to consider "…the costs and benefits of consumer education programs conducted by State and local governments and local utilities to increase consumer awareness of energy efficiency technologies and measures…"

4.1 Defining Cost Effectiveness

Cost effectiveness analyses measure the program's costs relative to a unit of output saved, for example, how much it costs to reduce energy demand by one kW as compared to other options. Alternatively, benefit-cost tests measure program costs relative to the amount of energy saved in dollars, i.e., how much it costs to save $10 in energy costs.

When comparing the cost effectiveness of their energy efficiency programs, utilities typically conduct two types of analyses: 1) a dynamic analysis that identifies which DSM measures are the most cost effective relative to other options, both supply and demand, and 2) a static analysis that evaluates "avoided costs," i.e., the costs avoided from not generating a kWh from a supply-side resource. Benefit-cost tests are typically required to screen proposed energy efficiency programs to determine how many and which programs to include in a larger DSM portfolio. Benefit cost tests, supplemented by evaluation results, are also used to track the progress of energy efficiency measures, determine the efficiency of the programs implemented, establish if the implementation of the program is efficient, and verify if the mix of energy efficiency measures offered is effective.

A common benefit-cost analysis test is the *California Standard Practice Manual* (SPM) approach. As described below, this analysis includes five tests. The difficult job for State regulators is to determine which test is the most appropriate given the assumptions and circumstances. The most appropriate depends on the views of the regulators and policymakers and the intended purpose of the energy efficiency programs.

The California SPM uses five "stakeholder" tests to assess the benefits and costs of the evaluated energy efficiency programs: 1) the participant test, 2) the utility test, 3) the rate impact measure (RIM) test, 4) the total resource cost (TRC) test, and 5) the societal test. Table 4.1 presents the major components of each of these benefit-cost tests.

- Participant Test – measures quantifiable benefits and costs to program participants. This test is designed to indicate whether the program is economically attractive to a customer.

- The Utility Test – compares the utility's costs for an energy efficiency program to the utility's avoided cost, but ignores participant costs.

- Ratepayer Impact Measure (RIM) Test – indicates the direction and magnitude of the expected change in a customer's bills or rates.

- Total Resource Cost Test (TRC) – compares the total costs of an energy efficiency program, including participant costs, to the utility's avoided costs.

- Societal Cost Test – builds on the TRC by including societal costs and benefits such as emissions, health care, and water resources.

Table 4.1. Components of Five Benefit-Cost Tests

	Participant Test	Rate Impact Measure Test	Total Resource Cost Test	Utility Cost Test	Societal Test
BENEFITS					
Reduction in Customers Utility Bill	**X**				
Incentive Paid by Utility	**X**				
Tax Credit Received by Participant	**X**		**X**		
Avoided Supply Costs		**X**	**X**	**X**	**X**
Avoided Participant Costs	**X**		**X**		**X**
Participant Payment to a Utility		**X**		**X**	
External Benefits					**X**
COSTS					
Utility Costs		**X**	**X**	**X**	**X**
Participant Costs	**X**		**X**		**X**
External Costs					**X**
Lost Revenues		**X**			

Source: Harry Misuriello, Richard Spellman, Direct Testimony and Exhibits before the Georgia Public Service Commission, Docket 17-687-U, May 14, 2004, p. 35.

The five tests are used in varying combinations, with a few States requiring the use of all five tests to screen programs and other States requiring only one or two of the tests. The decision as to which test to use, and when, is often debated among stakeholders and can vary according to the policy objective of the initiative. For example, the RIM test emphasizes the satisfaction of individual consumers over the broader resource and societal values that the program may offer. Alternatively, the TRC test values the economics of the energy efficiency programs but ignores the societal benefits that are often difficult to quantify.

Rather than prescribing a rigid process for measuring the results of energy efficiency programs, it may be preferable to create a dynamic framework that gives decision makers the flexibility to use a variety of benefit-cost tests to accommodate the wide variety of energy efficiency programs and their intended purposes.

4.2 Consumer Education Programs

Consumer education programs provide consumers with information on the benefit of energy efficiency technologies and programs. Consumers are informed of the possible individual savings and the effect energy efficiency has on the energy market, such as improving grid reliability and reducing price volatility. Through education, utilities provide consumers with the information needed to effectively participate in energy efficiency programs.
Early utility energy efficiency programs focused on educating the consumer through flyers, brochures, newspaper and magazine ads, television commercials, and workshops.[25] Diminishing investment and interest in utility energy efficiency programs has resulted in the end of many of these marketing programs. Today, utilities with energy efficiency programs provide a variety of information on their websites about opportunities available to their customers to learn

California's *Flex Your Power*

Initiated in 2001, *Flex Your Power* is a partnership of California's utilities, residents, businesses, institutions, government agencies, and non-profit organizations working to save energy. The campaign includes retail promotions, a website, an electronic newsletter, educational materials, and advertising. The state-wide marketing and outreach program is unique in that it supports and complements other energy efficiency programs. For instance, whereas other energy efficiency programs focus on specific motivations (e.g., incentives), the *Flex Your Power* campaign focuses on the broader goal of heightening consumer understanding of the benefits of energy efficiency, serving as a "call to action" that leads to increased purchases of energy-efficient products and supports all other energy efficiency programs.

In February 2006, the Public Utilities Commission of California ordered participating utilities to carefully evaluate the *Flex Your Power* Program for cost effectiveness during the 2006-2007 funding cycle. Programs that cannot demonstrate cost effectiveness may be terminated in the 2008 funding cycle. After initiating new energy efficiency programs during the 2001 California energy crisis (which included a massive consumer education program), a California Energy Commission identified savings of 10% in one year.

[25] Gillingham, K., Newell, R., Palmer, K., 2004. *Retrospective Examination of Demand-Side Energy Efficiency Policies.* RFF DP 04-19 REV. Washington, D.C.: Resources for the Future. June; Revised September. Available at http://www.rff.org/rff/Documents/RFF-DP-04-19REV.pdf.

more about energy efficiency and about ways to participate in energy efficiency programs. Internet sites can provide consumers with specific information about their own energy use and ways to lower their energy costs by optimizing their daily energy consumption. Guides are also available through online resources that educate consumers about high efficiency equipment that can be installed in homes or businesses. In addition, some utilities have programs on their websites that enable a consumer to conduct a self-audit evaluating the energy usage. Online audits allow consumers to quickly assess their energy consumption patterns and learn about the possible energy-efficient measures that could effectively save them money without having to be involved in the time-consuming and often costly process of having a representative come out to the home (for residential customers) or to the site or facility (for commercial customers). Finally, utilities also provide electronic newsletters sent through electronic mail to update consumers on new energy-efficient technologies, provide energy saving tips, and offer examples of other successful energy efficiency projects in the nation.

Sacramento Municipal Utility District (SMUD)

A successful energy efficiency education program that incorporates the use of ENERGY STAR products is one administered by the Sacramento Municipal Utility District (SMUD). SMUD provides consumers with workshops and seminars in lighting, HVAC, power quality, and environmental compliance. Also, SMUD has interactive exhibits on display that show consumers different energy saving technologies.

Sacramento Municipal Utility District. 2006.
Energy Education. www.smud.org/education/index.html

Energy Star Programs

ENERGY STAR is a voluntary, public-private partnership designed to reduce energy use and related greenhouse gas emissions. Administered by the U.S. Environmental Protection Agency (EPA) and DOE, ENERGY STAR has an extensive network of partners including equipment manufacturers, retailers, builders, energy service companies, private businesses, and public sector organizations.

Wisconsin: *Focus on Energy*

Wisconsin's *Focus on Energy* program includes a number of consumer education programs providing general information on the state's Focus program as well as about ENERGY STAR products. Evaluation research shows a statistically significant increase in energy efficiency activities in the home as of the 2003 program year. Between 2000 and 2002, the number of households that reported undertaking energy efficiency activities (replacing old equipment, installing compact fluorescent bulbs, changing thermostat settings, etc.) rose from 74 percent to 84 percent of those surveyed. However, the increase could not be attributed to the Focus program because the same survey did not reveal a comparable increase in program awareness.

Since the late 1990s, EPA and DOE have worked with utilities, State energy offices, and regional non-profit organizations through ENERGY STAR to help enhance local energy efficiency programs. Today, more than 350 utilities and other efficiency program administrators, servicing 60 percent of U.S. households, participate in the ENERGY STAR program.

The ENERGY STAR label can be found on consumer products, including lighting, electronics, appliances, heating & cooling systems, windows, doors, and commercial food service equipment. To qualify for ENERGY STAR and receive a label, the product must meet specific energy saving and environmental standards. The ENERGY STAR program also works with commercial buildings, home improvements, and new home construction methods for improved energy-efficient building performance. ENERGY STAR additionally provides consumers with education about products, home improvements, business improvements, and new home construction methods that will increase the energy efficiency of the facility or home. Also, the ENERGY STAR program works with manufacturers of products, including new industrial, commercial, and residential buildings to encourage the development of efficient products.

Cost Effectiveness of Consumer Education Programs

The impacts of consumer education programs are hard to quantify since they are typically conducted in a coordinated effort with direct incentive programs or as an underlying "energy efficiency ethic" to support a portfolio of energy efficiency programs. The *California Standard Practice Manual*, which provides guidelines for the economic analysis of demand-side programs and projects, notes that meaningful cost-effectiveness analyses cannot be performed in consumer education programs using standard benefit-cost tests. Instead, the SPM says that for generalized information programs, cost-effectiveness tests are not expected because of the extreme difficulty in establishing meaningful estimates of load impacts.[26]

However, the evaluation of consumer education programs is still an important

ENERGY STAR Energy Efficiency Promotion Efforts

Education and Awareness Building. **ENERGY STAR sponsors broad-based public campaigns to educate consumers on the link between energy use and air emissions and to raise awareness about how products and services carrying the ENERGY STAR label can protect the environment while saving money.**

Establishing Performance Specifications and Performing Outreach on Efficient Products**. More than 40 product categories include ENERGY STAR-qualifying models, which ENERGY STAR promotes through education campaigns, information exchanges on utility-retailer program models, and extensive online resources. Online resources include qualifying product lists, a store locator, and information on product features.**

Establishing Energy Efficiency Delivery Models to Existing Homes**. ENERGY STAR assistance includes an emphasis on home diagnostics and evaluation, improvements by trained technicians/building professionals, and sales training. It features online consumer tools including the Home Energy Yardstick and Home Energy Advisor.**

Establishing Performance Specifications and Performing Outreach for New Homes**. ENERGY STAR offers builder recruitment materials, sales toolkits and consumer education, and outreach that help support builder training, consumer education, and verification of home performance.**

Improving the Performance of New and Existing Commercial Buildings**. EPA has designed an Energy Performance Rating System to measure the energy performance at the whole-building level, to help go beyond a component-by-component approach that misses impacts of design, sizing, installation, controls, operation and maintenance. EPA uses this tool and other guidance to help building owners and utility programs maximize energy savings.**

[26] *California Standard Practice Manual*: *Economic Analysis of Demand-Side Programs and Projects*. October 2001. California Public Utilities Commission. p.5. Available at www.energy.ca.gov.

element of measuring program effectiveness. An evaluation of consumer education programs, or other market transformation initiatives, may examine whether or not the initiative is improving the ability of energy efficiency markets to provide benefits to ratepayers in a lasting way. Market transformation is an overarching goal of State policy on energy efficiency that is accomplished through marketing, education, and training of consumers. Perhaps the best way to evaluate market transformation is through market effects analysis, such as tabulating the number of hits to a website, the number of inquiries on energy efficiency programs and products, measuring product sales data, or conducting customer surveys. Evaluation efforts might also focus on quantifying the increased awareness of energy efficiency products, perhaps through surveys.

5. Infrastructure Planning and Improvements and Energy Efficiency

In section 139, Congress directed DOE to consider infrastructure planning approaches and infrastructure improvement in conducting this study. This chapter focuses on the role of energy efficiency as an alternative to investing in other electric utility resources, such as the tangible power grid and generating stations.

Energy efficiency can be an economic substitute in many instances for generation, transmission and distribution, and smaller investments that deliver ancillary services. If the growth rate in electric demand or usage can be cut by half or more, significantly less generating capacity would be needed over time. Furthermore, targeted energy efficiency programs, particularly at centers of electric demand growth, can delay the need for power line upgrades. Delay may enable new, more capable generation and power line technologies to emerge, improving the physical, environmental, and economic profiles of the power system from what they otherwise would have been. When energy efficiency programs are used as resource acquisition option, verification methods that ensure that energy efficiency investments have the desired system effects are necessary.

EPAct section 139(b)(3) directs the secretary to consider "…infrastructure planning approaches (including energy efficiency programs) and infrastructure improvements…"

This chapter reviews how investor-owned utilities, under the supervision of their State regulators implementing State and Federal laws, use energy efficiency as an energy resource (as have publicly-owned and cooperatively-owned utilities as well).[27] The following section provides an overview of how consideration of non-transmission alternatives (such as energy efficiency) is precluded from current transmission line siting and permitting regulations. Subsequent sections explain how energy efficiency can be incorporated into a utility's resource plans—whether as part of their formal Integrated Resource Planning; whether directed by the State, such as in California, to be included in a utility's energy plan as a priority resource; or whether it is tied to savings targets and portfolio standards. The next discussion explains the effect of changing markets on investments in energy efficiency as a resource and how energy efficiency can be incorporated into regional planning. Finally, the chapter concludes with a summary of how regulation can play a role in ensuring that energy efficiency continues to be considered as an energy resource option.

Vermont

"Before the public service board issues a certificate of public good…, it shall find that the purchase, investment or construction: …is required to meet the need for present and future demand for service which could not otherwise be provided in a more cost effective manner through energy conservation programs and measures and energy-efficiency and load management measures…" [30 VSA 248(b) (2)]

[27] Publicly-owned utilities with long track records implementing energy efficiency programs include Austin, Texas; Seattle, Washington; Burlington, Vermont; Sacramento, California. Delta-Montrose Electric Association is a cooperative cited in 2006 for its success in energy efficiency efforts by EPA's ENERGY STAR program.

5.1 Siting and Permitting Regulations

State statutes provide guidance to State siting and regulatory authorities concerning permits to construct new electric power transmission and generation. In some of these statutues, the authority is directed to consider whether energy efficiency would avoid or defer the investment, or modify the type of new infrastructure required.

5.2 Integrated Resource Planning

As a response to a wave of changes in the electric utility industry in the 1970s and '80s, many States required utilities to implement more formal long-term planning processes for investing in resources to meet future demands. Dubbed "integrated resource planning," or IRP, this process requires utilities to consider all alternatives to meet customer requirements (demand, energy, reliability) over an extended time horizon and to record the planning process and its conclusions in a report with documentation. An IRP describes forecasted changes to the utility service territory; the available resources to address customer requirements, both existing and prospective; and renders a judgment on how the utility expects to proceed to make decisions over time as events unfold. Utilities are usually obligated to submit the plan, in some States for approval, in others just for information. Finally, utilities are expected to act in conformance with the plan, or have a compelling explanation for deviations, and are expected to assess the plan with an eye toward improving future plans, which would be filed at intervals of one to three years. Figure 5.1 provides a visual representation of the IRP process.[28]

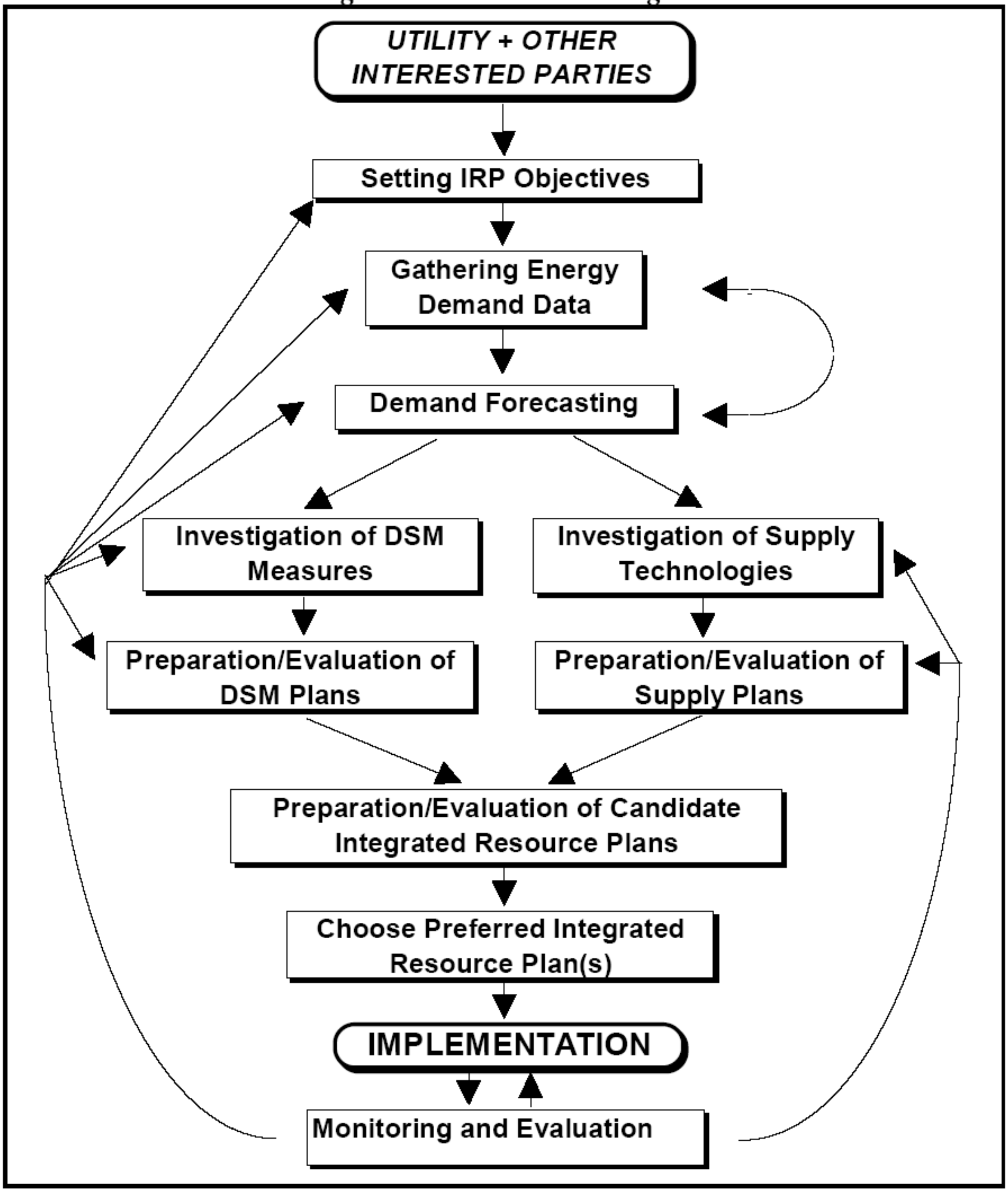
A key challenge for IRP[29] is comparing disparate resources in a reasonable way that reflects their attributes and limitations. Comparing energy efficiency with a range of power generation options is not easy. Increasingly complex computer models developed for this purpose are used to evaluate all resources. Utility staff use judgment and discretion in interpreting model results and consider other policy, political, economic, and social factors as part of their final plan.
An important element of IRP is its long-term perspective. Infrastructure takes a long time to plan and site, while small-scale resources like energy efficiency can be implemented quickly but can take some years to accumulate enough to be equivalent to a power generator or to match the power to be transmitted by a power line. System planning is increasingly able to extend resource planning horizons to 10 years or more.

[28] *Best Practices Guide: Integrated Resource Planning for Electricity*, Tellus Institute. Available at http://www.goodcents.com/Info/Best%20Practices%20Guide_IRP%20Planning.pdf. (July 20, 2005) See also http://www.raponline.org for summaries of State IRP processes.

[29] IRP as a term has taken on a negative connotation in some States because sometimes the review and approval process takes too long or is too adversarial. Another reason is that the IRP may not be connected in practice to actual utility investment decisions. Some utilities object to "central planning" due to the apparent loss of utility control over planning for their resource needs. One response to the negative connotation of IRP is to fix some of the problems and develop a new name that represents change.

Figure 5.1

The Integrated Resource Planning Process



Energy efficiency comes with many advantages. Since it comes in small amounts that accumulate into large quantities when it is deployed over thousands of customers, it can be managed with more precision than many infrastructure investments.

> **What is an "Energy Efficiency Power Plant"?**
>
> **An "energy efficiency power plant" is a group of energy efficiency programs that are functionally and financially comparable to a conventional power plant.**
>
> **Energy efficiency programs have a history of hour-to-hour performance, so applying them in existing buildings or for new construction can produce reliable results, reducing energy usage in a predictable pattern. Planners can produce a finely tuned resource that may more closely match the resource need with more accuracy than a power generating station. For example, programs in the "efficiency power plant" can emphasize savings at peak times or during a particular season. In a system of several thousand megawatts, one could design a portfolio of programs with a capacity value of several hundred megawatts.**

"Precision" means it can be targeted geographically, ramped up and down, and preferred load shapes can be fashioned from the right mix of peak- and baseload-oriented energy efficiency programs. Administrators can learn from the 1990s, however, when programs in many States were ended and could not easily be restarted because of an insufficient workforce, diminished support from trade allies, and reduced consumer awareness that would enable programs to be ramped up as needed. While infrastructure may be needed at some point, energy efficiency can delay it. In addition, if the cost of environmental emission controls figures heavily in an IRP, energy efficiency can be an important strategy to manage this issue by enabling emissions reductions through decreases in fossil fuel generation. In some States, IRP has effectively included energy efficiency. An example is the State of Washington. Guided by clear rules,[30] utility IRPs are due every two years. These plans lead to significant energy efficiency investments, which do affect the rate of need for other resources.[31]

Some are concerned, however, that IRP has not generally valued or featured energy efficiency as highly as it should. Various reasons are cited:

- Utility resource managers are unfamiliar with the resource attributes of energy efficiency, and they do not appreciate what energy efficiency can do.
- Cost-effectiveness tests, such as the ratepayer impact measure test, that are applied to energy efficiency often do not value system benefits, but focus only on rate effects.
- Utilities are reluctant to push energy efficiency because of the adverse effect on profits from a reduction of electricity sales.
- Utilities compare themselves based on metrics like total sales, so growth seems synonymous with success.
- Utilities and regulators are used to considering that electric demand "happens," and is not something that they can influence in a significant way.
- IRP has generally not addressed forecasted transmission and distribution system needs.

[30] Washington Administrative Code 480-100-238. Available at http://www.wutc.wa.gov/rms2.nsf/208e3d50fad2b39d88256a77006f9105/e091202136c29a8b88256feb0061419c!OpenDocument (April 27, 2006).

[31] See Efficiency Policy Tool Kit, Regulatory Assistance Project, March 2006 page 42 for other State examples. Available at http://www.raponline.org/Pubs/General/EfficiencyPolicyToolkit3-1-06.pdf (April 27, 2006).

- Utilities and regulators worry that energy efficiency investments rely on customers taking actions and sticking to those actions, and that customers may not be reliable.
- Some customers and consumer advocates are skeptical about the value of energy efficiency programs and utilities and regulators respond to these concerns.

For these reasons and others, those concerned that energy efficiency is under-utilized in resource planning are looking for other mechanisms to ensure that there is still some investment in energy efficiency. Some of these mechanisms will be discussed later in this chapter.

IRP has had a mixed history. While there is little disagreement about the intent or principle of IRP, its execution is sometimes unsatisfying. For example, in those States where IRP approval is required, an IRP proceeding can be bogged down with interminable analysis. By the time some actual IRPs are approved, a significant part of the planning horizon had already elapsed.

Utilities have also complained that the IRP results seemed too rigid because forecasted events could not sufficiently model actual events. Utilities are also concerned that deviations from IRP investment expectations are accompanied by risks that expenditures would be disallowed. In addition, there has been significant disagreement about the appropriateness of cost-effectiveness tests used to screen energy efficiency programs. For these reasons, the term IRP has taken on the baggage of an administrative-heavy, inflexible process in some States.

With the onset of retail competition, many States suspended IRP requirements. For those States that adopted retail competition, IRP was ended altogether. In these States, generation resource planning is essentially ceded to market forces, while transmission planning remains with the utilities or is conducted by a regional transmission organization, if applicable.

However, IRP is reemerging in States that did not enact retail competition. Dilemmas about future supply resources have led to a renewed interest in resource planning, though alternative names for IRP are sometimes used to disassociate from the less appealing aspects of former IRP efforts.

Where and When Infrastructure Investments are Unavoidable

Reliable electric service is the paramount product of the United States electric system. Reliability at current high levels is achieved through scrupulous adherence to planning and operating standards. These standards guide system and control area operators to assess the quantity, nature, and location of generation transmission needed to meet customer requirements in the event of a reasonably difficult set of contingencies. Adding energy efficiency can stabilize a system so that existing facilities can continue to meet these standards, potentially indefinitely. The system can change in many ways, however. Most obvious is that usage growth continues, albeit more slowly. The reliability of existing system components can change with age. Some components may reach the end of their useful and economic life and be retired. The pattern of customer demand may change, with load shifting within the system in time and place.

Energy efficiency should not be promoted as a way to eliminate the need for infrastructure investment, but it can slow it and change it to be more economically efficient than it otherwise would have been.

Is Energy Efficiency Real?

For the system benefits of energy efficiency to affect infrastructure planning and investment in an effective way, the results of energy efficiency efforts must be real. By real, we mean that the measures will save the capacity and energy that planners expect, in the ways and times they expect, and that forecasted growth rates can be adjusted with probabilistic confidence to account for the effects of energy efficiency.

So is energy efficiency real? Yes. Years of experience evaluating and verifying the effects of energy efficiency programs show that capacity and energy performance can be forecasted with accuracy, taking into account persistence, free riders, and other adjustments needed to accurately measure the value of consumer dollars invested in energy efficiency.

Changes to the wholesale electricity market over the last decade have led to a reassessment of the relationship between planning and markets and how the interaction can produce investment. How these changing market structures affect energy efficiency and its value as an infrastructure resource are addressed in Section 5.6.

5.3 Portfolio Management

“Portfolio Management” is when regulators in retail competition States actively manage *default service*, which provides electric and natural gas service to those customers who have not or cannot select competitive suppliers. There are risks associated with providing default service that can be managed by regulators. While default service offerings today focus entirely on supply, portfolio management encourages regulators to consider varying default power sources, varying contract lengths, varying contract termination dates—in essence, looking at various options that can be used to address and manage the risks associated with providing this service.[32]

Default service could also integrate energy efficiency. By acquiring energy efficiency for default customers at a lower cost than supply, the overall cost of default service can be reduced. In this sense, portfolio management could behave as a successor to IRP in retail competition States. This approach could be applied to where the incumbent utility has the default service obligation or the case where default service is auctioned.

5.4 California’s Loading Order

Clearly interpreting regulations is important for utilities, especially as they consider the many investment choices available to meet customer needs. Sometimes, regulatory clarity comes from exhaustive studies serving as evidence for State legislators and utility commissions. In other circumstances, it flows from experience, intuition, or even desperation when reacting to a crisis. This was the circumstance in California in 2000 and 2001 in which a new policy option, the “loading order,” was conceived and tested.

[32] “Portfolio Management: How to Procure Electricity Resources to Provide Reliable, Low-cost and Efficiency Electricity Service to All Retail Customers,” Bruce Biewald, et al., *Synapse Energy Economics 2003*. Available at http://www.raponline.org/Pubs/PortfolioManagement/SynapsePMpaper.pdf (April 15, 2006).

California energy policy leaders reacted to the devastating electric market events of 2000 and 2001 with a number of reforms: retail competition was vastly curtailed; generation permitting processes were accelerated to restore adequate reliability margins; and a key transmission pathway, Path 15, was upgraded. Utilities were largely returned to the historical role of supplying all electric requirements to most customers.

In considering the role of electric demand and usage growth over time, policymakers were concerned about whether generation could keep up with growing requirements. Further, renewed experience with energy efficiency indicated a huge untapped reservoir of energy efficiency.

In this situation, California's energy agencies issued an Energy Action Plan to utilities for resource procurement.[33] The plan created a "loading order" of resources, i.e., a distinct priority list that directed (not just guides) utility resource investment. In considering California's situation, the State declared that cost-effective energy efficiency is the first priority resource in the loading order. Other resources would be procured if additional needs remain.

The California Energy Commission and the Governor supported this policy, reinforcing the certainty clearly intended by the CPUC. Further reinforcing the policy, regulators and utilities cooperated to end the "throughput incentive." This incentive preserved the direct relationship between electric sales and revenues needed to cover utility fixed costs, including the allowed return (Chapter 7, *Rate Structures*, provides more detail on throughput incentives). With positive signals, the utilities could become full partners in a policy that explicitly features energy efficiency as the most important electric system resource.

What happens when transmission or generation are built too soon?

When transmission and generation are put into service earlier than needed, there is an adverse effect on the value of small-scale local resources like energy efficiency.

What does it mean to build generation and transmission too soon? If energy efficiency to slow growth is a lower cost option in the long run than building new generation and transmission (G&T) to enable growth, then that should be the preferred course. Building G&T before the point when it is needed costs consumers more than it should in present value terms, but it has another, more subtle effect. By adding G&T, which is inherently lumpy, it is likely that the subsequent costs avoided by energy efficiency will become quite low, since supplies and system capacity will exceed demand for some time. This cushion will render many programs uneconomic until customer electric growth brings more balance to the market.

California Energy Efficiency Policy Manual, California PUC, November 29, 2001 http://www.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/11474.htm (April 15, 2006)

Declaring energy efficiency to be the priority resource has the effect of minimizing the need for hard asset investments in generation and transmission. It is too early in the life of the loading order policy to identify clearly the extent to which generation and transmission assets are being changed, delayed, or avoided due to a more intense deployment of energy efficiency.

[33] The Energy Action Plan established a "loading order" to guide new resource procurement. The loading order prioritizes among energy sources, directing utilities to consider cost-effective energy efficiency, demand response, distributed generation, and renewable energy to meet new demand before considering energy from fossil fuel plants. The Energy Action Plan is available at http://www.cpuc.ca.gov/word_pdf/REPORT/28715.pdf (April 15, 2006). The loading order was codified in law in 2005 in SB 1037, available at http://info.sen.ca.gov/pub/bill/sen/sb_1001-1050/sb_1037_bill_20050929_chaptered.html.

5.5 Savings Targets and Portfolio Standards

Energy efficiency can be tied directly to resource planning by establishing that load serving entities, those energy organizations supplying retail electricity and gas to customers, will secure savings equivalent to a certain percentage of forecasted load growth. This percentage, known as a *savings target*, can be applied to expected peak load growth, sales growth, or both. A reasonably achievable savings target can ensure planners that a portion of growth will not require additional infrastructure. This approach has the advantage of focusing on results (such as saving a minimum amount of kWs or kWhs), rather than focusing on budgets. It also encourages the program administrator and load serving entities to find the best way to accumulate the savings. Another approach is to require an amount of energy efficiency savings that is equivalent to a certain percent of total annual sales by a load serving entity. This "energy efficiency portfolio policy" is adapted from the renewable portfolio standards that have been enacted in many States in the last decade.

Texas

Texas adopted a savings target for energy efficiency in its 1999 electric restructuring law of 10 percent of forecasted electric demand growth. In 2004, energy efficiency exceeded this target by 36 percent.

Texas Utilities Code 39.905
Energy Efficiency Accomplishments of the Texas Investor-Owned Utilities (Calendar Year 2004), Frontier Associates, November 2005.

The States of Hawaii, Pennsylvania, Connecticut, and Nevada have woven energy efficiency into existing renewable portfolio standards, though there is no significant experience yet on how this system works in practice.[34] As with the savings target, planners know that a certain amount of energy efficiency will develop to meet portfolio requirements, but its usefulness to avoid specific infrastructure improvements is diminished because this policy does not target efficiency investments in the most valuable places.

Additional information on savings targets and energy efficiency portfolio standards is provided in Chapter 8, *Energy Efficiency Performance Requirements*.

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[34] *EPA Clean Energy Environment Guide to Action*, pg. 4-1, January 2006. Available at http://www.epa.gov/cleanenergy/stateandlocal/guidetoaction.htm (April 27, 2006)

5.6 Markets

How have changes in the electricity markets affected energy efficiency and its value and use as a power system resource?

There have always been electricity markets. Pairs of utilities trade capacity between winter and summer peaking systems, and neighboring utilities trade incremental supplies to manage generation outages and other uncertainties. These practices have long histories.

A stronger role for electric markets began in the 1970s with the Public Utility Regulatory Policies Act (PURPA) and the many upheavals to which it responded. At this stage, utilities were given competition for building new generation. Later, the Energy Policy Act of 1992 (EPAct 92) and subsequent FERC orders created more of a real-time wholesale market. In the 1990s, several States introduced retail choice and took the distribution utilities out of the generation business.

The same forces that led to PURPA also led to IRP. While EPAct 92 had little effect on energy efficiency deployment at the time, there is potential that current wholesale markets will value energy efficiency more than may be evident.

Retail competition did affect energy efficiency deployment in a number of ways. In many States, energy efficiency was "protected" from market forces by funding it through a new rate, a system benefit charge (SBC). While this device did maintain stable funding for energy efficiency, with regard to infrastructure, the effects have been largely negative. Creating an SBC made efficiency appear to the utility more like a "program" for which money was collected and had to be spent wisely, rather than a resource that should be procured to maximize customer value. By separating generation from the load serving entity through divestiture, as was done in many States, the ability to see the system value of energy efficiency has been further fractured.

RTO Planning and Energy Efficiency

The role of energy efficiency in wholesale market planning by regional transmission organizations (RTOs) is ambiguous at this time. It is standard that RTOs will reflect the performance of existing energy efficiency programs. In other words, the load forecasts assume that current efficiency efforts of the many utilities and states in the RTO will continue to produce the results they have produced in recent history.

There is some acknowledgement that energy efficiency should be considered to meet future needs. "The Midwest Independent System Operator Transmission Expansion Plan is to consider all market perspectives, including demand-side options, generation location, and transmission expansion." Practice, however, has shown very little affirmative interest by RTOs in energy efficiency to address future wholesale market needs. Recent activity in New England, where energy efficiency will qualify as a capacity resource, may signal a more positive view of efficiency as a resource from RTOs. Also, as a result of a 2006 FERC order, demand response in the PJM region can compete with generation resources in the reserves and regulations markets.

The SBC tends to segregate energy efficiency activities from the rest of the utility planning activities, which in some cases is now occurring at the regional level. Where a State-run or third-party-run program emerged, the disconnect is even more obvious. With no generation costs to avoid post divestiture or unbundling, utility interest in energy efficiency waned in some States. As a result, energy efficiency program administrators have done their best to deliver savings with the budgets, which have been set by statute or rule, but the results are not as interactive as with a comprehensive planning and investment process. It is hard to tell what energy efficiency is really worth when it is set apart in this way.

There has been progress in linking energy efficiency back into system planning, despite these new institutional barriers. Following are examples of several significant developments. Keep in mind, however, that many States have been largely untouched by many of the market developments of the past two decades, and their regulators are still overseeing IRPs.

One significant new wholesale market-driven initiative that values energy efficiency was developed by ISO-New England. In 2003, reliability conditions in the southwest Connecticut load pocket were getting so severe that emergency measures were deemed necessary. Needed transmission was delayed, and generation construction was deemed unworkable in this densely settled area. The ISO issued a request for proposals in December 2003 for four to five years of resource commitments in the load pocket. As the problem was peak-load driven, peak-load savings from energy efficiency were just as valuable as peak-load supply. In this RFP, one energy efficiency bid was selected. Strict guarantees and penalties were attached to ensure performance. This experience demonstrates the connection between energy efficiency and infrastructure investment.[35]

More recently, as part of a settlement to overhaul the market for capacity in New England, market participants in New England have agreed to allow energy efficiency to receive capacity credits for measured savings starting in June 2006. The cost-effectiveness of qualifying energy efficiency resources will improve with a new revenue stream reflecting real capacity value. While traditional cost-effectiveness tests may have captured these values in the past, in a more market-oriented environment, creating an actual revenue stream will motivate entrepreneurs to seek out these savings beyond SBC budgets. If this behavior happens, energy efficiency could play a much more significant role as a substitute for infrastructure investment.

Selective Use of the Ratepayer Impact Measure Test

In evaluating energy efficiency, states use a number of cost-effectiveness tests. One of these is the ratepayer impact measure test, or RIM test. This test assesses whether the energy efficiency program would raise rates. Essentially, this test assesses the near-term financial effect of the program on non-participants, who are paying the program costs but are not reaping energy efficiency program savings. Energy efficiency programs that add near-term cost and reduce sales may fail the RIM test, while tests that measure their resource value over the life of the measure pass with flying colors.

The RIM test is generally not applied to infrastructure investments. These investments in the monopoly environment are justified by "need." A rate increase for a power generating station or a transmission line is a necessary part of assuring reliability, or adequate capacity. Yet if energy efficiency is a resource that can substitute for these "needed" resources, states that use the RIM test to screen acceptable energy efficiency resources may be leaving open the possibility that infrastructure resources inferior to energy efficiency are being put into utility rates.

[35] Information on the winning bid is available at http://www.csgrp.com/services/demand/demand_sw-ct.html (April 15, 2006)

National Grid in cooperation with the Massachusetts Department of Telecommunications and Energy is conducting an extensive pilot to determine if distribution and sub-transmission investments can be delayed or avoided through the targeted deployment of distributed resources (including demand response, energy efficiency, and distributed generation).[36]

In assessing energy efficiency compared with infrastructure investments, does the cost recovery process introduce any bias?

Bonneville Power Administration is also piloting an effort to avoid building costly infrastructure on the Olympic Peninsula through targeted investments in distributed resources, including energy efficiency.[37]

In New York, the Public Service Commission ordered a program that would provide for 300 megawatts of load reductions through energy efficiency and demand response resources in the heavily resource-constrained Consolidated Edison territory, primarily New York City.[38]

In Vermont, a 2005 law directed transmission planning processes in the State to consider energy efficiency, among other reforms.[39] The Public Service Board has opened a docket, 7081, which has developed into a facilitated stakeholder process to identify exactly how this planning process would work, including the State's transmission company, Vermont Electric Power Company, the State's distributions utilities, and the State's energy efficiency utility, known as Efficiency Vermont.[40]

5.6.1 Regional Planning

Regional electricity planning can be employed to assess the regional benefits of energy efficiency resources in a manner consistent with wholesale energy markets. These benefits may be described generally, primarily addressing resource adequacy (how much power is needed and when), or geographically, primarily addressing system stability and congestion. For example, a plan could articulate a forecasted violation of a reliability planning standard and could identify two types of solutions: 1) general infrastructure solutions, such as adding a transmission line to deliver power from elsewhere, and 2) energy efficiency solutions, such as satisfying load of a certain amount and profile at specific locations. Markets or utilities can determine which resources are actually deployed, depending on the preferences of the States.

Utilities and market participants would be guided by regional planning to develop projects and regulators would rely on regional information when considering cost recovery requests. Based on accurate and transparent information, regional planners can offer guidance into system needs that energy efficiency can address. In addition, the regional entity may have backstop investment responsibility to protect reliability. If the regional entity finds that no utility or market

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[36] Report on the Load Curtailment Program in Brockton, National Grid, October 31, 2002

[37] BPA's "Non-wires program takes root," Linda Anderson, nwcurrent.com, October 31, 2005. Available at http://www.nwcurrent.com/smartenergy/1916867.html (April 15, 2006)

[38] *Order on Demand Management Action Plan*, Case 04-E-0572, New York Public Service Commission, March 16, 2006. Available at http://www3.dps.state.ny.us/pscweb/WebFileRoom.nsf/0/0E845C93F9CF411085257101006E4D4F/$File/04e0572_one_commr.pdf?OpenElement

[39] Act 61, Section 9, 2005 Session of Vermont Legislature, 30 VSA 218c(d)

[40] State of Vermont Public Service Board. *Order Investigating Hearing and Notice of Prehearing Conference, Investigation into Least Cost Integrated Resource Planning for Vermont Electric Power Company, Inc.'s Transmission System.* July 20, 2005. http://www.state.vt.us/psb/orders/2005/files/7081investigationphc.pdf (April 15, 2006)

participant is interested in addressing a forecasted reliability issue, it may determine that action is needed, including investing in energy efficiency.

5.7 Regulation

A key objective of regulation is to provide a reliable forum for utilities to recover their just and reasonable costs that they incur for running a reliable electric system. However, the revenue recovery process may provide a bias against energy efficiency as a resource.

There are several possible sources of this bias. For example, the wholesale tariffs that govern cost recovery for transmission are typically interpreted to not allow cost recovery for energy efficiency. Rather, these tariffs are interpreted by wholesale market participants and RTOs to cover the costs of transmission facilities and, if necessary, "must-run" generation that is needed for reliability. A recent exception occurred in southwest Connecticut, where energy efficiency programs were paid for through the ISO-New England wholesale tariff as an emergency situation. Also, one State, Vermont, has made it State policy to reverse this bias.[41]

Another possible source of bias is the return on equity investment. This is where the investor-owned utility financial statement sets aside money for dividends and reinvestment in the company. Non-investor-owned utilities don't have a return on equity, lacking the need for dividends, though some do have financial obligations to affiliated municipal governments, and most have debt coverage requirements. The return on equity investment is based on the utility rate base and the depreciated value of all of the capital investment over time. It is obvious that the value of long-lived assets is added to the utility's rate base, and the utility earns a return to compensate investors for the use of their capital. Energy efficiency, in most cases, is expensed in the year it is deployed, earning no return for the utility.

There is a range of opinions about whether wholesale tariffs and return on equity investment discourage energy efficiency. Nevertheless, it is important that regulators assess them according to the situation in their jurisdictions.

5.8 Summary

Policymakers today are facing a resource-constrained electric industry. Transmission is harder to build in suburban places. Commodity fuels are more expensive and these volatile prices flow through to electricity prices. Technology promises improved power systems, but when will they be ready? Meanwhile, environmental imperatives pressure the industry to improve its environmental performance, even if electric demand increases. Investors and their debt raters on Wall Street are wary of perceived instability in the rules that lead to cost recovery.

In the face of these circumstances, energy efficiency offers stability. It is manageable locally, predictable due to its extensive track record, and attractively priced. It also strengthens the most important asset of any electric service territory—the customers. The evolution in several jurisdictions of the rules affecting the use of energy efficiency as a resource indicates that there is growing interest in this way of thinking. It remains to be seen how quickly that interest will translate into standard practice that ensures that all cost-effective energy efficiency that is superior to other infrastructure investments will be deployed for that purpose.

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[41] Act 61, Section 8.

5.8.1 Energy Efficiency and Planning

Utilities, states, and other parties should consider integrating energy efficiency and demand response into electric and natural gas system planning, rather than expecting that cost-effective energy efficiency will happen independently of infrastructure planning and investment.

Regulators can support targeting of energy efficiency to meet system needs, even across service territories where appropriate. In most States, service area boundaries and electric flows are unrelated. Energy efficiency to address system deficiencies may be best targeted in an area served by multiple utilities. While resolving cost allocation issues can be thorny, regulators can master this challenge, and encourage energy efficiency that effectively addresses system deficiencies most effectively.

5.8.2 Investment

As part the state permitting or resource procurement process, states should consider requiring consideration of energy efficiency as a resource. Utilities can be asked to demonstrate that cost-effective energy efficiency programs have been fully utilized prior to the decision to build or purchase additional generation or transmission resources.

In the process of siting electric power lines, States can require that applicants demonstrate that they have evaluated energy efficiency resources that might also address system needs. Further, a State can require an all-resource request for proposals to address forecasted system deficiencies as they are identified, long before infrastructure plans become the presumed solution.

Utilities can consider deploying energy efficiency in the form of an energy efficiency power plant, as described in this chapter, as a way to integrate efficiency into infrastructure planning.

Utilities should consider trials of modified planning methods through pilot-scaled tests. These pilots would focus on certain parts of the system that have moderate forecasted growth for which some infrastructure additions would be necessary unless usage growth is reduced. These pilots would focus energy efficiency solutions in order to delay or avoid these infrastructure additions.

5.8.3 Regional Planning

Organizations and groups involved in regional power planning should consider demand resources, including energy efficiency, as a part of their assessment of loads and resources within their respective systems.

As is discussed in Sections 5.2 and 5.6, planning and markets both influence the course of investment in electric system resources. It is possible, but not certain, that energy efficiency will be valued as a system resource solution.

Regional electric system planning is done mostly by regional transmission organizations and larger vertically-integrated electric utilities.[42] Publicly-owned utilities, such as the Bonneville Power Administration, Tennessee Valley Authority, and multi-state G&T cooperatively-owned utilities also have these responsibilities under their own authority. Regional planners can promote a planning and investment climate that assures that the value of energy efficiency is broadcast to the market and to utilities.

5.8.4 Cost Recovery

Regulators should ensure that there is no bias against energy efficiency in the cost recovery practices for substitutes of infrastructure investment. Regulators should also consider whether financial or other incentives for energy efficiency that are comparable to infrastructure rate base incentives would remove any bias that may exist toward utilities preferring infrastructure investments to energy efficiency investments. Such incentives are further examined in Chapter 7. If costs for reliability-driven transmission are spread across many control areas or utilities, costs for reliability-driven efficiency can be spread across the same utilities.

[42] Regional Transmission Organizations' (RTOs) planning jurisdiction is technically limited to regional *transmission* planning, however RTO transmission planning affects generation and efficiency investment. To varying degrees, RTO planning itself takes into account energy efficiency through assumptions on load growth as well as generation.

6. Funding Utility Energy Efficiency Programs

EPAct Section 139(b)(2) directs the Secretary to consider "…funding sources, including rate surcharges…"

Section 139 requests information on the funding sources available to support utility energy efficiency programs. Specifically, Congress expresses an interest in rate surcharges, which we interpret to mean a surcharge established for recovering costs that are specific to energy efficiency but are excluded from earnings tests, return on equity sharing, or rate case revenue determination. This chapter considers two mechanisms for collecting funds: 1) a non-bypassable charge on distribution services, commonly referred to as a "systems benefits charge" and 2) cost recovery through rate surcharges. However, the first step to recognizing the financial barriers to utility energy efficiency programs is understanding the basics of how utility rates are established.

6.1 Background: Setting Utility Rates

Utility rates are set through a regulatory process, which affords the utility the opportunity to earn a reasonable return on its investment. The rates established are designed to recover the utility's costs to provide service plus a profit. Rates are only changed through the rate-setting process, with the exception of certain automatic adjustments such as adjustments for fuel costs for vertically integrated utilities. To the extent that the utility incurs unanticipated or unplanned-for costs following the setting of rates, those costs cannot be recovered until rates are reset through a subsequent rate proceeding, and then recovered only on a going-forward basis. Consequently, without prior approval of cost recovery for investments in energy efficiency, regulated utilities are unlikely to be willing to incur costs to develop these programs. Cost recovery for energy efficiency can be established as part of the ratemaking process or as a separate effort where program expenses are recovered from dedicated funds. However, regardless of the specific approach, ratepayers ultimately fund energy efficiency programs.[43]

Recent Trends in Energy Efficiency Funding

After a decline in energy efficiency spending throughout the mid to late 1990s, there has been a gradual increase in ratepayer-funded energy efficiency spending from the low point reached in 1998. Contributing to the rise in energy efficiency spending are:

- **a renewed commitment to energy efficiency from states reacting to high fuel costs, reliability issues, and concern for the environment;**
- **the impact of dedicated funding sources such as system benefits charges; and**
- **continuing support among states with more traditional DSM programs.**

Dan York and Marty Kushler, Third National Scorecard on Utility and Public Benefits Energy Efficiency Programs: A National Review and Update on State-Level Activity, ACEEE, October 2005, p. 1, 3.

As discussed in Chapter 2, restructuring and deregulation led to a significant decline in utility energy efficiency

[43] Daniel Violette and Richard Sedano, *Demand Side Management: Determining Appropriate Spending Levels and Appropriate Cost-Effectiveness Testing,* prepared for the Canadian Association Members of Public Utility Tribunals (CAMPUT), January 30, 2006, p. 22. Available at http://www.raponline.org/Pubs/CAMPUT_Report_1_30_06_Final_Revised.pdf

expenditures. Utility concerns regarding the expected loss of cost recovery for energy efficiency programs was a contributing factor to the decline in energy efficiency spending. Furthermore, some State regulatory commissions determined that DSM programs would function as part of the competitive market and concluded that utility revenues derived from ratepayers were no longer an appropriate source of funds.

States witnessing a decline in utility energy efficiency programs began to consider alternative policies to continue these programs. Securing funding and cost recovery for investments in energy efficiency was a priority for several States, while other States held the view that market signals such as real time and marginal cost pricing would provide sufficient incentives for energy efficiency and conservation without mandating utility programs. However, this scenario has not played out. Most utilities with comprehensive energy efficiency programs recover the costs via funding mechanisms such as systems benefit charges or rate recovery. States without funding mechanisms for energy efficiency see very little activity in this area and the barriers to energy efficiency persist.

The majority of States implementing electricity restructuring used mechanisms for funding energy efficiency programs such as a systems benefits charge. Other States created public benefits funds based on flat monthly charges applied to customer bills or from utility securitization, i.e., bonds established to recover utility stranded costs in restructuring, paid by customers on their bills. Other energy efficiency initiatives were funded through one-time investments, typically through regulatory settlement from proposed utility mergers or from the divestiture of utility assets. Some of these States included funding for natural gas energy efficiency as well as for electricity. However, after the initial wave of restructuring activities in the mid to late 1990s, many States adopted a wait-and-see attitude to better understand the new market structure and its impact on energy efficiency. A decade later, there is a clear need for proactive policies and funding mechanisms to support the implementation of energy efficiency policies.

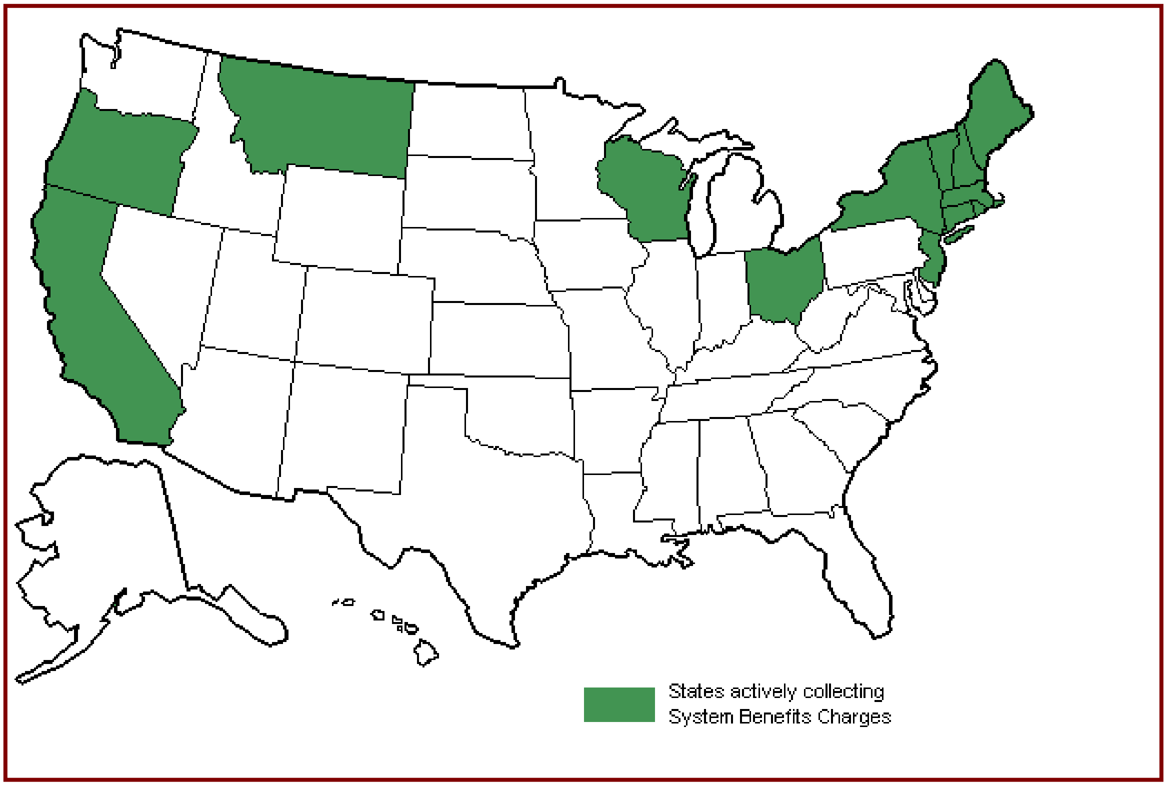
6.2 System Benefits Charges

With electric restructuring and the unbundling of the vertically integrated utility, policymakers created dedicated funding mechanisms to protect "public benefits." In general, public benefits include energy efficiency, renewable energy, low-income assistance, and public-interest research and development projects and are thought of as services and programs that are provided by the utility and benefit the community at large.[44] The majority of the States that enacted systems benefit charges for energy efficiency did so as part of their restructuring legislation or other legislation. New York is the one State that created a system benefit charge through regulation order.

There are 13 States that have created a systems benefits charge for energy efficiency. Figure 6.1 provides a map of those States that are currently funding energy efficiency programs with a systems benefit charge. Of those 13 States, two of the States (Vermont and Wisconsin) have not restructured their electric industries.[45]

[44] Several States, including Maryland, Virginia, Delaware, and the District of Columbia have not established public benefit funds for energy efficiency programs.
[45] Dan York and Marty Kushler, *Third National Scorecard on Utility and Public Benefits Energy Efficiency Programs: A National Review and Update on State-Level Activity*, ACEEE, October 2005, p. 6. Available at http://www.aceee.org/pubs/u054.pdf

Figure 6.1   Systems Benefits Charge for Energy Efficiency



There are three distinguishing elements of a public benefit fund (PBF): 1) the level and increment of funding, 2) the program administration, and 3) the duration. These three elements are explained in the next three subsections. Because this study's primary focus is on utility energy efficiency programs, this discussion will highlight those States where the utilities serve as program administrators. Of the 13 States that use system benefits charges, utilities serve as the program administrators in six of them. A summary of those six States and their levels of funding are provided in Table 6.1. States with system benefits charges administered by government or other third-party administrators are not included within the table. Note that California and Montana actually administer their programs through both utility and government organizations and that government organizations provide oversight and review of utility efficiency programs.

Table 6.1 Utility-Administered System Benefits Charges for Energy Efficiency							
State	Funding			Utilities Included			
	Length of Time (years)	Level (Mills/ kWh)	Annual Funding ($ Millions/ year)	Share of Utility Revenue to EE Programs (%)	IOU Electric	IOU Natural Gas	Publicly-Owned Electric and Gas
California	10	1.3	$280	2.3	✓	✓	✓
Connecticut	7	3.0	$87	3.0	✓		
Massachusetts	5	2.5	$117	2.5	✓	✓	✓
Montana	4	0.7	$9	1.5	✓		✓
New Hampshire	3	1.8	$15	1.5	✓		
Rhode Island	6	2.3	$15	2.3	✓		

Another seven States administer their energy efficiency programs through government or third-party administrators. These States are summarized in Table 6.2.

Table 6.2 Government or Third-Party Administered System Benefits Charge Programs				
State	Funding			
	Length of Time (years)	Level (Mills/ kWh)	Annual Funding ($ Millions/ year)	Share of Utility Revenue to EE Programs (%)
Maine	3	1.5	$16	1.5
New Jersey	8	1.2	$90	1.3
New York	5	0.8	$87	0.7
Ohio	10	0.13	$15	0.2
Oregon	10	1.5	$28	2.0
Vermont	3	2.6	$17	2.4
Wisconsin	3	0.9	$59	1.4

6.2.1 Funding Level

A systems benefit charge provides funding for utility-administered energy efficiency programs. The funding level considers the total amount of funds to be collected for energy efficiency programs and can be expressed in a number of ways, including a total amount per year; a rate per unit of energy, for example, mills per kilowatt-hour; or as a percent of utility revenue. The majority of States set their funding levels to maintain the amount of funding for energy efficiency that was set prior to electricity restructuring. Funds are generally collected across all rate classes, residential, commercial, and industrial. However, a few States have either excluded or capped the total amount of funds to be collected from large customers.

The funding level for States with system benefits charges for energy efficiency range from 0.07 mills/kWh to 3.0 mills/ kWh.[46] In most instances, States gradually increased the funding level

[46] Ibid, p. 8.

over a number of years to allow time for program planning and design prior to ramping up the programs to utilize the full amount of funds.

6.2.2 Program Administration

When considering the administration of public benefit programs, States generally considered two alternatives: 1) utility administration or 2) the administration of programs by a government or non-utility entity. A hybrid approach, which combines utility administration with governmental or non-utility oversight, has also evolved. Because of diverse policy environments and regulatory structures among the States, lawmakers and regulators should choose the best structure based on what works for their State.

As shown in Tables 6.1 and 6.2, six States are characterized as having a public benefits fund that is administered by the utilities in the State, two are characterized as having a hybrid approach where there is a combination of utility and non-utility program administration, and the remainder are operated by State agencies.[47] In many utility-administered programs, the utility makes use of non-utility organizations and non-profits to help implement and supplement programs.

6.2.3 Program Duration

Most States specify a length of time for which the public benefits fund will be collected and energy efficiency programs administered. In early public benefits programs, many States established shorter time frames and required regular program approvals in order to continue collecting the surcharge. However, a review of public benefits programs concludes that there is a trend toward extending and continuing the energy efficiency funding and establishing multi-year approval cycles.

Connecticut:
Utility Administration of PBF Programs

In Connecticut, energy efficiency programs are funded through a non-bypassable surcharge and are administered by the state's two large, investor-owned utilities, Connecticut Light & Power and United Illuminating. The energy efficiency programs are subject to review and oversight by the Connecticut Department of Public Utility Control and the Energy Conservation Management Board (ECMB).

ECMB was created to advise and assist the utility distribution companies in the development and implementation of comprehensive and cost-effective energy conservation and market transformation plans.

ECMB meets once a month, at a minimum, and provides an extensive review of the utilities' conservation plans. They also make use of outside experts who provide expertise not only in programmatic design but also in the nuances of setting goals and establishing performance and incentive structures.

This administrative structure has provided a consistent set of energy efficiency programs while allowing for sufficient flexibility to focus on conservation and energy efficiency in southwestern Connecticut. With the targeted southwest Connecticut focus, the energy efficiency and load management programs have helped reduce demand for electricity during peak times.

The ISO-New England awarded 125 MW of additional capacity in southwest Connecticut and estimates that up to 255 MW of capacity will be available by 2007 from the load management and conservation efforts supported under the state's public benefits fund.

In addition to targeting programs in southwest Connecticut, the utilities also initiated a consumer awareness campaign to help customers reduce energy use as a strategy to mitigate rising electricity costs.

[47] Ibid, p. 13.

For those States that have established specific time periods for which the public benefits fund will be collected, the length of time ranges from 3 to 10 years. Montana, Massachusetts, California, and New York have all extended their public benefits programs. Some States leave the policy open-ended, dependent on the continuing availability of cost-effective energy efficiency programs. Of the States that have implemented public benefits programs for energy efficiency, none have allowed the program to lapse.[48]

6.3 DSM Funding via Utility Rates

A critical element when considering policy options to encourage utility energy efficiency programs is the availability of funds to cover program costs. If utilities are not able to recover the program costs through a public benefits fund, an alternative strategy is for regulators to allow cost recovery through the utility ratemaking process. Under traditional ratemaking, an energy efficiency surcharge could be included in rates with periodic adjustments to reflect the actual costs incurred, or utility investments in energy efficiency may be expensed or tracked and recovered in rates.

During a rate case, regulators may determine the level of funding and the type of energy efficiency programs to be funded. The charges may be applied as a per-unit surcharge on either the distribution or supply services and may be used by both restructured and non-restructured States. While a system benefits charge creates a separate source of funds, DSM funds embedded within the rates are often integrated into utility budgets and finances.

Even though costs for energy efficiency programs are allowed through rate cases, utilities may still associate certain risks with the management and expense of these initiatives. For example, recovery for costs not initially included in the base rate could be rejected, providing a disincentive to starting new energy efficiency initiatives that may have additional costs. Similarly, utilities operating in a State with price caps and performance-based ratemaking (PBR) may be unable to recover new costs between the dates when price caps are reviewed and adjusted. Thus, regulators who choose to fund energy efficiency programs through utility rates will want to design the rate structure in a way that does not add unnecessary risks, and thereby create a disincentive to the innovative program design on the part of the utility. Chapter 7, *Rate Structures and Incentives for Utility Energy Efficiency Programs,* provides a more detailed description of the models and mechanisms employed by State regulators to allow utilities cost recovery for efficiency programs.

6.4 Other Mechanisms for Funding Energy Efficiency

Texas, Nevada, Michigan, and Illinois have utilized alternative funding mechanisms to achieve similar results to a systems benefits charge or rate surcharge. Following is a description of each of these funding mechanisms.

Texas. Texas established a savings target for energy efficiency of 10 percent of forecasted electric demand growth and provides cost recovery to utilities through their rate filings as required to achieve the target. This method is described in greater detail in Chapter 8, *Energy Efficiency Performance Requirements*.

[48] Ibid, p. 16.

Nevada. Nevada's IOUs phased out DSM programs in the mid-1990s as they prepared for deregulation and restructuring. However, in 2001, in the midst of the western electricity crisis, Nevada's restructuring law was repealed. Once more, the State's IOUs were required to submit Integrated Resource Plans. As part of a multi-party settlement, $11.2 million per year is allocated for energy efficiency and load management programs with an emphasis on peak-load reduction and energy savings.[49] Chapter 5, *Infrastructure Planning and Improvements and Energy Efficiency*, provides additional detail as to how utilities incorporate energy efficiency into State and regional planning.

Michigan. Michigan's Customer Choice and Electricity Reliability Act of 2000 (2000 PA 141), authorized the creation of a Low-Income and Energy Efficiency Fund (LIEEF) to be administered by the Michigan Public Service Commission. The fund provides assistance to low-income customers and promotes energy efficiency across all customer classes. The fund was created from the savings from utility securitization for Detroit Edison that exceeded the amount needed to achieve the required rate reduction for residential and business customers. Detroit Edison remits about $45 million annually to the fund. As of May 3, 2004, the utility had provided $129 million in grants to non-governmental organizations for implementing energy efficiency and low-income assistance programs.[50]

In February 2004, in an interim order granting rate relief to Detroit Edison, the PSC determined that there were no longer any excess securitization savings to fund the LIEEF and that it should be included in Detroit Edison's cost of service. A surcharge on the utility's distribution rates was established to generate $39.9 million annually. In its final decision on the Detroit Edison rate case issued in November 2004, the Commission wrote that the "existence and funding of the LIEEF should continue at the present level unless the issue is revisited in an appropriate case." It dismissed arguments from the utility and others that the funds should only be used for low-income customers located in Detroit Edison's service territory because the utility's customers are the only ones paying into the LIEEF.[51]

Illinois. As part of their electricity restructuring settlement, Commonwealth Edison provided a one-time payment of $225 million to establish the Illinois Clean Energy Community Foundation. The foundation was created in 1999 as the result of a compromise between Commonwealth Edison and the State of Illinois regarding the utility's sale of power plants. The impetus of the agreement was the concern by regulators that the utility would receive large profits from the sale of power plants originally funded by ratepayers. As part of the compromise with respect to the sale of these facilities, the State authorized Commonwealth Edison to establish the foundation to provide financial support for clean energy development activities.

6.5 Summary

[49] Howard Geller, *Utility Energy Efficiency Policies and Programs in the Southwest*, Southwest Energy Efficiency Project (SWEEP), September 17, 2004, p. 5. Available at http://www.swenergy.org/news/DSM_program_review_paper_9-041.pdf

[50] *Report on the Low Income and Energy Efficiency Fund,* Michigan Public Service Commission, Department of Labor and Economic Growth, June 1, 2004. Available at http://www.michigan.gov/documents/lieefund04_93149_7.pdf

[51] Ibid.

States without a source of funds dedicated to implementing electric and natural gas energy efficiency should consider, through legislation or regulatory proceedings, determining the preferred mechanism to fund energy efficiency programs.

Establishing a source of funds through which utilities can recover the costs of implementing energy efficiency programs is a necessary step for a State policy on utility energy efficiency programs. This can be achieved either through utility rates or as a rate surcharge, such as a systems benefits charge. The benefit of establishing a system benefits fund is that it provides a consistent source of revenues over a designated period, providing assurance to utilities that eligible costs will be recovered and allowing sufficient time for program benefits to be realized. The possible downside of establishing a public benefits fund, which is essentially a separate source of funds for energy efficiency, is that it can be a target for "funding raids" in times of fiscal uncertainty in the State. Comparatively, there is relatively little risk of a funding raid for energy efficiency programs funded through utility rates.

Whether using a public benefits fund or utility rates, regulators will want to set the funding level in conjunction with a broader strategy for State and regional resource planning. This is perhaps easier through a utility IRP process through which the utility requests funds for DSM programs according to their specific resource goals. However, a periodic revision of system benefits charges and funding levels coupled with an assessment of potential cost-effective energy efficiency programs can avoid the use of formulaic energy efficiency budgets that are out of sync with other utility resource decisions.

States should consider conducting a study of energy efficiency potential in the state and/or region in order to better determine potential cost-effective and achievable energy savings and the appropriate level of funding needed to meet these goals.

A benefit of a systems benefits charge is the opportunity for long-range planning in program design and implementation. Energy efficiency programs, in particular market transformation programs, require a consistent framework and funding level over the course of several years to produce meaningful results. A public benefits program with a 10-year funding horizon provides a level of stability that may not be possible with programs funded through the utility rates process that are subject to more frequent regulatory reviews.

7. Rate Structures and Incentives for Utility Energy Efficiency Programs

7.1 Increasing Profits by Reducing Sales

EPAct Section 139(b)(5) directs the Secretary to consider methods of: (A) removing disincentives for utilities to implement energy efficiency programs; (B) encouraging utilities to undertake voluntary energy efficiency programs; and (C) ensuring appropriate returns on energy efficiency.

A significant barrier to utility energy efficiency programs is that the programs, even if they benefit utility customers, have the potential to reduce utility profits. Electricity and natural gas rates for regulated investor-owned utilities are generally determined by State public utility commissions (PUCs) through formal proceedings (i.e., rate cases) every few years. The PUC allows the utility compensation for the prudent expenses of providing service and a fair return on the substantial investments needed to supply the energy, while minimizing costs to ratepayers and fairly allocating those costs among different ratepayers.

Investor-owned utilities may fear they will lose money on energy efficiency for two reasons. First, they may not be fully compensated for the cost of energy efficiency programs, or may not be allowed a return on energy efficiency investments commensurate with what they receive for supply-side investments. Second, utilities can increase their profits by increasing sales. The purpose of energy efficiency programs is to reduce energy use; thus they reduce utility sales. This chapter explores these two reasons why utilities can be harmed by energy efficiency programs, and how rate regulation can be modified to better align the interest of the utility with the interest of its customers in energy efficiency. It also briefly describes how utility rates can be designed to encourage customers to save energy.

This focus on utility compensation and returns is not meant to imply that it is the responsibility of PUCs to guarantee utility profits. However, if energy efficiency is to be used as a resource, utilities will properly expect to be compensated and to be able to earn appropriate returns on the programs. Cooperation from utilities has been very important to many effective energy efficiency policies and programs, especially where rate structures are designed to encourage energy efficiency.

Paying for Energy Efficiency Programs

Despite the extensive experience with evaluating energy efficiency programs, as described in Chapter 4, it is still more difficult to measure the impact of energy efficiency programs than to measure the output of power plants or the flow through natural gas pipelines. Because of the difficulties associated with evaluating the energy efficiency programs, utilities may be concerned that the PUC will not allow full recovery of the program costs. Regulators may reject covering the cost of programs for which they do not see the value or that they believe have underperformed expectations. Or, utilities may have to increase spending to achieve the expected savings.[52]

[52] Note, however, that there are different, and potentially greater, risks associated with large investments in physical assets.

In addition, profits of regulated utilities are based on an authorized rate of return on capital investments (the "rate base"), especially power plants and transmission and distribution infrastructure, with operating costs considered an expense to be passed through to customers with no profit add-on. If energy efficiency programs are treated purely as normal operating expenses, utilities will receive a profit for supply-side investments but not for end-use energy efficiency investments.

The solution is for State PUCs to work with utilities to ensure they are fairly compensated and provided appropriate incentives for implementing energy efficiency programs. There are a number of different ways to do this, which are described below.

The Link between Sales and Profits

As described in the following box on rate-setting, utility revenues are strongly dependent on sales and associated utility costs (excluding fuel) are mostly fixed. If sales turn out to be higher than predicted, revenues go up proportionally, but fixed costs do not; thus increased revenues due to higher sales is almost all added (pre-tax) profit. Conversely, *if sales are lower than predicted, the utility profits go down*. Thus, energy efficiency programs that reduce sales may harm the utility even if the utility is compensated for the program costs. This direct sales-profit linkage only applies until the next rate case, when new rates are based on new "test year" sales and costs, fully incorporating the effects of energy efficiency programs. In the long run, some utilities may desire growth or feel investors expect company growth, and they may believe increasing sales will lead to greater returns on an expanded rate base.[53]

One solution to help investor-owned utilities maintain profits in the short term despite reduced sales is to change the rate-setting process to try to "decouple" profits from sales, to break the link between them. This can be done by allowing adjustments to rates between rate cases to stabilize revenue. Thus the utility can be compensated for revenue losses due to energy efficiency programs, and other unanticipated changes in revenue can be corrected as well. Under this approach, the PUC sets a target revenue or allows specific revenue adjustments. If a utility receives more revenue than is allowed, the extra money is placed into a balancing account. If the utility receives too little revenue, the debit is placed in the balancing account. The utility then adjusts the rates periodically, raising rates if sales go down and lowering rates if sales rise, to try to zero out the balancing account and achieve the target revenue in the next period (the rates could also be adjusted in the next rate case to true up the account).

There are several approaches to setting the target revenue or partial revenue adjustments, which are described in this chapter. This may make regulatory sense in some jurisdictions, though not others. In addition, restructured and non-restructured States may have different views.

[53] For some utilities, however, increased sales may decrease profits. The utility may be hurt by increased sales in the short run if the cost of adding more energy is very high, e.g. if the utility must purchase energy in the spot market at peak periods, or if the utility faces transmission constraints. In the long term, some utilities believe they are not adequately compensated for new investments, and thus do not want to expand their rate base.

Setting Rates for Investor-Owned Utilities[54]

Electricity and natural gas rates for investor-owned utilities are determined in formal proceedings periodically. During the rate case, the PUC determines the following: 1) the electricity or natural gas sales levels needed to meet anticipated customer demand, 2) the expenses to the utility of providing service, 3) the required revenue for the utility to cover its expenses and earn an appropriate return on investment, and 4) the rates needed to provide that revenue based on the anticipated sales. In simplified form,

Rates x Sales = Revenue = Expenses + Return.

The expenses can be divided into fixed operating expenses that do not vary much with sales (such as meter reading) and variable operating expenses that depend on sales (such as fuel):

Total expenses = Fixed expenses + Variable expenses.

Gas utilities and many electric utilities pass on fuel and purchased power expenses to their customers through separate rate adjustments; therefore, these variable costs are not usually part of base rate cases, which refer to non-fuel rates. For natural gas utilities, well over 90 percent of their remaining costs are fixed. The non-fuel or gas rates are referred to as "base rates."

Large investments such as power plants are not considered expenses but are "capitalized" or "amortized" and recovered over a number of years. The return on capital investments pays for interest on debt and depreciation of investments. Generally, utility profits[55] also are included in the authorized return, while rates are set to recover operating expenses with no premium. The capital investment on which the utility receives a return is called the "rate base."

In the traditional rate-setting process, and under rate caps, base rates remain fixed until the next rate case. Regulatory commissions normally use a defined "test year" to estimate sales, expenses and rate base; the test year can be either projected or historic (or a combination). As sales and costs may be significantly different from the values determined in the last base rate case, the utility's profits may be much higher or lower than projected. Since revenues depend strongly on sales, but expenses are mostly fixed in the short term, a change in sales can have a large impact on the utility's return. Because the rates and profits depend so much on the estimated sales and costs, rate cases can be highly contentious and difficult.

Periodic rate adjustments can also be used to adjust for factors considered to be beyond the utility's control, such as the costs of general wage increases or interest rates, and the sales impacts of weather and fuel prices. The rate adjustments serve the same purpose as those for fuel and other variable costs. While rate adjustments help to stabilize utility profits and often stabilize revenue and total energy bills, they also make rates fluctuate; in a sense they shift the "risk" (both positive and negative) due to outside events or efficiency programs from the utility's profits to the customer's rates. In so doing, it can be difficult to shift some risks but not others.

[54] Setting rates for not-for-profit utilities (i.e., publicly-owned electric and gas utilities and rural electric cooperatives) is similar to that discussed here for investor-owned utilities, but without the focus on profits or return on investment.
[55] "Profits" and "costs" are used here in an accounting sense, not as economists define them. PUCs generally allow a return to investors in the utility comparable to what they would have received from another investment.

7.2 Compensating Utilities for Energy Efficiency Programs

If utilities are to invest in energy efficiency programs, they must be appropriately compensated for the costs they incur in doing so. States have employed a variety of methods for covering the cost of energy efficiency programs, treating energy efficiency investments on a level playing field with supply-side investments, and providing incentives to encourage innovative efficiency approaches.

Energy Efficiency Program Cost Recovery

One barrier to utility energy efficiency programs is the utilities' concern that regulators will not allow them to recover their costs fully. There is general agreement that utilities should be allowed to recover reasonable and prudent costs of implementing approved energy efficiency programs. However, some utilities are concerned that the PUC will not approve full cost recovery for the energy efficiency programs because of the impact on rates (see Chapter 4). Some utilities are concerned that the regulator will deem the costs of underperforming programs not reasonable, or that they will find somewhere else to reduce the utility's request in order to keep rates down while funding the programs. Between rate cases, or when there are rate caps in place, there may be no mechanism to fund new energy efficiency programs.

Predictable, consistent, and fair regulatory treatment will encourage utility support for such programs. It may also help for the utility and the PUC to coordinate on the design of energy efficiency programs, or to use a stakeholder collaborative process for this purpose, in order to provide greater assurance that the activities will be considered appropriate for full cost recovery.

In addition, between rate cases or while rates are frozen, PUCs should consider allowing rate adjustments or a mechanism for deferred cost recovery to enable utilities to start new energy efficiency programs or increase spending on efficiency during those periods. For example, Wisconsin placed energy efficiency expenditures in a balancing account so that utilities would be compensated for programs beyond those proposed in setting rates. This treatment also ensures the utility would not receive compensation for proposed programs they never implemented.

Treating Energy Efficiency as an Investment

Energy efficiency is a resource that may be used in lieu of, or alongside, supply-side resources to meet customer energy needs. Much of the cost of providing energy is treated as a capital investment, typically including generation plants, transmission lines, and distribution pipelines. Utilities are not paid up front for this investment; the investments are "capitalized", i.e., they are depreciated over a number of years and the utilities are provided a rate of return on their net investments. This authorized return is the source of the utility's profitability. Energy efficiency investments, on the other hand, are usually treated as operating expenses, which the utility can recover immediately—but with no profit add-on.

Supply-side and demand-side investments may be treated more equitably if demand-side costs—or at least those costs that clearly result in a long-term energy-saving payback—are capitalized and allowed a return. Capitalizing energy efficiency costs spreads the cost to customers over several years, just as the benefits to customers accrue over several years. This helps reduce the initial rate impact of expanding energy efficiency programs. Adding energy efficiency investments to a utility's rate base also helps maintain the size of the rate base even if sales are declining, thereby sustaining the utility's level of return.

Several States have employed this approach. Small electric utilities in Oregon capitalize energy efficiency costs. Washington, Vermont, and Iowa capitalized energy efficiency costs until program spending declined (as elsewhere in the country) in the late 1990s.[56] Nevada also allows electric utilities to place their DSM expenditures in their rate base.

The challenge to treating energy efficiency programs as an investment is that there are many differences between demand-side and supply-side resources. For example, power plants are tangible assets that can produce revenue and balance out utility debt. Utilities frequently do not own the energy efficiency measures they encourage, and the energy savings do not provide a direct revenue stream to the utilities. To compensate, the regulator can allow the utility to create a "regulatory asset" for expenditures on energy efficiency and allow a return on that asset. However, many energy efficiency measures do not last as long as power plants, and program savings decay over a period of time, so depreciation or amortization schedules may need to be different as well. Also, because a return on energy efficiency investments depends on regulatory decisions rather than on tangible assets, some utilities may prefer rapid cost recovery of energy efficiency expenditures rather than a lengthy amortization.

Treating energy efficiency as a capital investment and providing a return may be a powerful signal to use energy efficiency as a resource and encourage utilities to adopt energy efficiency programs as a potential profit center. Still, the applicability of this method will depend on the particular situation of the utility.

Performance-Based Incentives

Some States allow investor-owned electric utilities to earn a profit on energy efficiency programs that meet performance targets (generally, natural gas utilities are not provided with this type of incentive). Massachusetts and Rhode Island allow incentives of up to 5 percent of spending (in addition to cost recovery) for investor-owned electric utility energy efficiency programs that meet set performance targets. Conversely, programs that do not perform well can be denied full cost recovery. Connecticut, Minnesota, and New Hampshire have similar performance incentives.[57] These programs reward good performance and allow investor-owned utilities to make a profit on the energy efficiency resource, even while treating program costs as an operating expense. However, they do require credible measurement and verification of program energy and/or cost savings.

Nevada places a premium on energy efficiency investments by allowing a greater return on equity for conservation and demand management than for supply-side investments. DSM investments can earn 5 percent plus the base rate of return on equity. This is intended to provide an incentive to pursue the nontraditional resource of energy efficiency. Note that this premium is based on the amount of investment, not on superior program performance.

Another performance-based approach to provide an incentive to utilities for utilizing cost-effective energy efficiency programs is through "shared savings." Shared savings is a way of ensuring that both the utility and their customers receive a percentage of the benefit of

[56] National Action Plan for Energy Efficiency, Revenue Requirements Working Group, Revenue Requirement and Regulation, March 2006.
[57] National Action Plan for Energy Efficiency, Revenue Requirements Working Group, 2006.

implementing energy efficiency programs. For example, if the cost of the energy efficiency programs is less than the utility's avoided cost (i.e., the cost of the energy the utility would otherwise have to provide, such as investing in a new generation plant), utilities reduce their overall costs. However, revenues are also reduced as the customers who save energy lower their utility bills. Normally, ratepayers receive the cost savings and pay for the revenue loss in the next rate case or adjustment. However, with a shared-savings incentive, utilities are allowed to keep a specified percentage of their estimated net cost savings (or, in some cases, a percentage of net societal savings, by subtracting the customer costs for energy efficiency measures as well). This approach was adopted in a number of States starting in 1989, with the utility being permitted to retain from 10 to 25 percent of net savings.[58]

Shared savings is both a performance-based and cost-based incentive approach, directly incorporating program costs, avoided energy costs, and sometimes customer costs as well as energy savings. However, this approach requires estimating avoided and customer costs as well as energy savings, compounding the measurement burden. Utilities may find it difficult to compare this incentive to traditional rates of return, and may regard the potential impacts on their earnings as uncertain. Regulators may also be concerned that this approach is too complex and provides too much compensation to the utility.

7.3 Making Profits Depend Less on Sales

Several mechanisms have been employed so that increased sales in between rate cases do not increase profits and reduced sales do not reduce profits. Note that all these mechanisms only directly affect revenue between rate cases (i.e., before the next rate case, when the base rates are revised). Concerns about long-term impacts of reducing the rate base through efficiency may be addressed by treating efficiency as an investment, as described above.

Frequent Rate Resetting

One way of minimizing the impact of sales changes is to forecast sales and adjust rates frequently. In the 1990s, Wisconsin reset rates for each utility each year.[59] They projected sales and costs, factoring in the anticipated impact of approved energy efficiency programs (using a "future test year" rather than assuming costs and sales would be the same as those in a "historic test year").

Even though this annual effort did mitigate the impact of changing sales on authorized profits, there are certain reasons why this frequent rate setting is not usually considered practical. First, rate cases typically involve an enormous effort, and neither utilities nor States are likely to want to engage in them more frequently. Second, performance-based ratemaking (PBR) is intended to increase the length of time between cases in order to provide a stable incentive structure for utilities. When utilities are between rate cases, they retain the cost savings from more efficient operations as well as from reducing capital costs—whether through energy efficiency or by other means. But with a short time period between cases, utilities would have little opportunity

[58] Joseph Eto, Alan Destribats and Donald Schultz, 1992, "Sharing the Savings to Promote Energy Efficiency" in S.M. Nadel, Michael W. Reid and David R. Wolcott, Regulatory Incentives for Demand-Side Management, Washington, D.C.: ACEEE, 1992. See also EPA, 2006, EPA Clean Energy-Environment Guide to Action.
[59] Paul Newman, Steven Kihm and David Schoengold, 1992, "Spare the Stick and Spoil the Carrot: Why DSM Incentives for Utility Stockholders Aren't Necessary" in S.M. Nadel, Michael W. Reid and David R. Wolcott, Regulatory Incentives for Demand-Side Management, Washington, D.C.: ACEEE, 1992.

to benefit from reduced costs because those savings are quickly captured for consumers in the revised rates.

Recovering Revenue Lost Due to Energy Efficiency Programs

Several States allow narrow adjustments in rates to account for revenue lost due to the impact of specific energy efficiency programs. With the Lost Revenue Adjustment Mechanism (LRAM), the lost revenue is calculated as the fixed portion of the utility's rates (the utility's fixed costs divided by the projected sales) multiplied by the estimated sales reduction due to the utility's energy efficiency programs. The lost revenue is subtracted from the balancing account, and the utility's rates are adjusted to allow the utility to recoup the loss in the next period. Iowa, Minnesota, Oregon, Connecticut, Idaho, Massachusetts, and several other States have experimented with allowing lost revenue adjustments for electric utilities, natural gas utilities, or both. An alternative mechanism, if the energy efficiency programs are anticipated during the rate case, is to factor in their revenue impacts when initially determining the rates. However, this mechanism does not address incentives for new programs not known at the time of the rate case

While an LRAM may address utility concerns about the lost sales impacts of energy efficiency programs a number of utilities and States that have tried this approach no longer use it because of several disadvantages.[60] First, LRAM is based on projected savings rather than on actual energy savings, which can allow too great a compensation if the projected savings are too high. LRAM could actually create perverse incentive for utilities to conduct energy efficiency programs that fail, because they can then collect lost revenues from the programs and actual revenues from increased sales. Basing LRAM on measured savings would require careful measurement and verification, which adds complexity. Second, an LRAM does not break the general link between profits and sales, and thus does not remove the incentive for utilities to oppose outside energy efficiency measures or to take other actions that increase sales but reduce efficiency.

Fixed Revenue Targets

Some States have tried to break the link between sales and revenues more comprehensively. They set a revenue target that may vary with certain external factors, but does not depend on sales. Then, rates are adjusted so that the utility receives the allowed revenue, but no more than the allowed revenue. One approach is to fix allowed revenues per customer in a rate case. Then growth in revenue is allowed between rate cases only due to growth in the customer base. Maine and Washington pioneered this approach in the early 1990s. California, Maryland, Oregon, and North Carolina have all adopted it more recently for electric and/or gas utilities. Other States including New Jersey, Arizona, Indiana, Montana, and Washington are considering it, mostly for gas utilities.

A key feature of this approach is that revenue is fixed regardless of the reason why sales change. If the impact of energy efficiency programs is not anticipated in the rate case, sales may be lower than expected, causing rates to rise slightly in order to keep revenue up. But if sales go down because of mild weather or a poor economy, rates still rise, shifting the risk from these events from the utility to the customers. This apparently happened in Maine in the early 1990s—sales decreased due to recession than due to efficiency programs, thus raising electric

[60] EPA 2006, EPA Clean Energy-Environment Guide to Action, Section 6.2, David Moskovitz, Cheryl Harrington, and Tom Austin 1992, "Decoupling vs. Lost Revenues: Regulatory Considerations," Regulatory Assistance Project, May. Available at http://www.raponline.org/Pubs/General//decoupling.pdf.

rates when customers were least able to pay for them.[61] On the other hand, if sales rise due to bad weather or a strong economy, rates may go down. Several States in the South have achieved similar return or rate stabilization for gas utilities through automatic rate adjustments.[62]

Target revenues can be adjusted for a variety of external factors. California adopted its Electric Revenue Adjustment Mechanism (ERAM) in 1981 and used it until utility restructuring in 1996 (it has since adopted a revenue-per-customer approach). Under ERAM, the revenue target was adjusted for external impacts on costs rather than sales, such as wages and other inflation, investments in new plants and costs of capital as well as for fuel costs.[63] Essentially, allowed revenue was adjusted for the impact on utility costs of a number of external factors considered to be beyond the control of the utility. The risk for these costs (both positive and negative), as well as for changes in sales, is shifted to the customer. New York employed a similar approach in the 1990s with somewhat different adjustments.

Target revenues can also be adjusted to compensate for external impacts on sales rather than on costs. In the Distribution Margin Normalization mechanism adopted for Northwest Natural in Oregon, an estimated sales impact of weather is subtracted from the revenue adjustment.[64] In a more comprehensive approach, "statistical recoupling," revenue is based on a model of energy sales rather than on actual sales.[65] The dependence of sales on a number of factors such as energy rates, weather, the economy, and the number of customers is modeled using historical data. Then, the allowed revenue is determined based on that model of sales and actual data for the period. This method allows revenue to fluctuate due to specific external factors, and thus helps stabilize rates. But any actions of the utility that affect actual sales, and any sales impacts of other factors not anticipated in the model, will not affect the allowed revenues, and thus will be ameliorated through consumer rate adjustments.

In all of these approaches in which revenue is held to a target level through rate adjustments, a reduction in sales should not reduce the utility's profits, at least in the short term. In fact, since a sales reduction could reduce a utility's costs (which are not entirely fixed) without reducing revenue, it could actually increase the utility's short-term profits. This is true whether the sales reduction is due to utility energy efficiency programs, government policies, or other factors. Since utilities will be protected if sales go down because of State programs or policies, they are more likely to be supportive of government action and work cooperatively with the regulators and with outside efficiency initiatives.

7.4 Customer Rate Design and Utility Bill Financing for Energy Efficiency

Utility rate structures can play a role in encouraging utilities to implement energy efficiency programs and can also be used to encourage customers to save energy directly. The focus here is not on the overall rate level but on the rate design, on how the rates are apportioned based on energy usage, and on using utility bills as a mechanism to finance energy efficiency

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[61] Joseph Eto, Steven Stoft, and Timothy Belden, 1994, "The Theory and Practice of Decoupling Utility Revenues from Sales," Lawrence Berkeley Laboratory. Available at http://eetd.lbl.gov/EA/EMS/reports/34555.pdf.
[62] American Gas Association, 2005, "Natural Gas Rate Round-Up," November.
[63] J. Eto et al. 1994, Chris Marnay and G. Alan Comnes, 1992, "California's ERAM Experience" in S.M. Nadel, Michael W. Reid and David R. Wolcott, Regulatory Incentives for Demand-Side Management, Washington, D.C.: ACEEE, 1992.
[64] AGA 2005.
[65] Eric Hirst, Eric Blank, and David Moskovitz, 1994, "Three Ways to Decouple Electric-Utility Revenues from Sales," NARUC-DOE Fifth National Integrated Resource Planning Conference. Available at http://www.osti.gov/energycitations/servlets/purl/241429-cjDps6/webviewable/241429.pdf.

measures. Thus rate design serves as a complement to the utility end-use energy efficiency programs that are the focus of most of this study. Where there is competition, rate designs may be severely constricted by competitive pressures. However, publicly-owned and cooperatively-owned utilities, as well as PUCs and investor-owned utilities in non-restructured states, often have more freedom to design rates to promote energy efficiency.

Rate Designs that Help Decouple Utility Revenues from Sales

A number of gas utilities have sought to implement a rate design that reduces the impact of sales on utility profits. A utility's fixed costs can be recovered through a flat charge for each customer rather than through a "volumetric" rate, a rate for each unit of energy used. Because fluctuations in sales do not affect the revenues from the flat charge, the utility's rate design separates recovery of fixed costs from sales. Although gas utility bills often include a small flat charge to cover customer-specific expenses, such as meter-reading, it rarely covers all fixed costs. Some gas utilities would like to expand the charge to better cover their fixed costs in the face of declining sales.

Flat bill charges "decouple" utility costs from consumer energy use, thus reducing rates per unit of energy. While this approach reduces the financial disincentive for utilities to save energy, it also reduces the incentive for consumers to save energy. As it may increase rather than decrease energy use due to reducing the cost of using more energy, this rate design may work against energy efficiency measures. Note, however, that gas commodity costs are still covered by volumetric rates, so some financial incentive to conserve energy remains.

Flat bill charges also raise an issue of fairness: should consumers who use more energy pay more of the utility's "fixed" costs, or should those costs be borne equally by all?

Rate Designs that Reward Saving Energy

Commodities often are cheaper in bulk—the more you buy, the less you pay for each unit. This reflects both the lower transaction costs for large purchases and, where a market is less than perfect, the greater bargaining power of a large purchaser. Large commercial and industrial utility customers generally have more options for energy suppliers and often pay lower rates for electricity and natural gas commodity. Even within customer classes, some utilities have "declining block tier rates," in which there are two or more tiers of usage with lower rates in the higher tiers. After using a set amount of energy each month, the customer is charged a lower rate for additional energy use. By reducing the marginal rates for most customers, especially those who use large volumes of energy and thus may have the most savings potential, this rate design does not encourage energy efficiency. Flat charges, discussed above, have a similar impact by reducing the marginal price of energy at all usage levels.[66]

An alternative rate structure is inclining (or increasing) block tier rates, which have higher rates in the higher tiers. Thus the more energy a customer uses, the more expensive that energy becomes. This increases the incentive to save energy, especially for larger and more energy intensive customers. It also benefits small and often low-income customers by providing a minimum amount of energy at a lower price. However, inclining block tier rates may increase the volatility of utility revenues by increasing marginal rates for most customers, and thus, in the

[66] Cheryl Harrington, Catherine Murray, and Liz Baldwin, 2006, *Energy Efficiency Policy Toolkit*, The Regulatory Assistance Project, March. Available at http://www.raponline.org/Pubs/General/EfficiencyPolicyToolkit.pdf.

absence of decoupling, they may enhance the incentive for utilities to increase sales. The rate design also arguably distorts customer and utility behavior by separating prices from actual costs. A number of utilities in Arizona, California, Florida, Michigan, Nevada, New Hampshire, New York, Vermont, New Jersey, and elsewhere have adopted inclining block tier residential rates.[67]

A second rate design approach is to provide a discount to customers for reducing energy use. This approach has been notably used by California. In an aggressive effort to avoid blackouts in the summer of 2001, California offered residential and non-residential customers the "20/20" program—if they reduced electricity consumption that summer by at least 20 percent compared to the previous summer, they would receive a 20 percent rebate off their summer electricity bills in addition to the reduction in their bills due to lower electricity use. In conjunction with a massive public education campaign, this program was very successful: about one-third of customers earned the rebate, electricity use was reduced by an estimated 7 percent, and peak power demand by 10 percent, and the State did avoid summer blackouts.[68] California extended the program in subsequent summers, and in the winter of 2005-6 Pacific Gas & Electric Company adopted a similar program for natural gas, with a 20 percent rebate off of winter natural gas bills for customers that reduced natural gas usage by 10 percent compared to the previous winter.

Rate Designs that Reward Reducing Peak Demand

A number of utilities are also using or experimenting with rate designs that have higher rates at periods of peak demand.[69] These include:

- Seasonal rates, with higher electricity rates in the summer or higher natural gas rates in the winter;
- Time-of-use rates, with higher electricity prices at certain times of day, usually summer afternoons;
- Real-time pricing, with electricity prices that vary, even by the hour, based on wholesale prices;
- Critical peak pricing, with sharply higher prices on a limited number of days of peak demand; and
- Demand charges, based on peak demand rather than on energy consumption.

Except for seasonal rates, these rate designs are typically applied to large commercial and industrial customers who generally have a greater ability to track prices and respond quickly to them. These rate designs are aimed more at shaving peak demand than reducing overall energy use. They often move energy consumption to non-peak periods rather than provide an overall reduction in energy usage.

[67] National Action Plan for Energy Efficiency, Rate Design Working Group, Using Rate Design to Promote Energy Efficiency, March 2006.
[68] Goldman, Charles A., Joseph Eto, and Galen A. Barbose 2002, *California Customer Load Reductions during the Electricity Crisis: Did they Help to Keep the Lights On?*, LBNL-48733, May. Available at http://eetd.lbl.gov/EA/EMP/reports/49733.pdf.
[69] U.S. Department of Energy, 2006, *Benefits of Demand Response in Electricity Markets and Recommendations for Achieving Them*, February. Available at http://www.oe.energy.gov/DocumentsandMedia/congress_1252d.pdf.

Financing Energy Efficiency through Utility Bills

Another way of paying for energy efficiency improvements is for the utility to put up the cost of the upgrade and possibly provide expertise and project management and then get paid back over time with interest through the customer's bill. The utility acts like an energy service company executing an energy savings performance contract, but with a significant difference—the utility gets paid back through an addition to the utility bill. For the customer, the combined cost of the reduced energy bill and the payment will generally be lower than the energy bills they have been paying. Thus, the utility has a reasonable assurance of getting paid and the customer gets the benefit of the utility's typically low borrowing costs and the utility's energy expertise. This lowers the cost and risk for both parties.

One method is through on-bill financing. Programs such as "Pay As You Save (PAYS)" allow a utility or potentially an energy service company to pay for and install an approved energy improvement.[70] A charge is then added to the customer's bill to pay back the utility or other provider with interest. The charge is less than the cost of the saved energy, for a shorter time than the improvement is expected to last. If the improvement is not portable, the charge is attached to the building or meter—if the customer moves, then the new customer at that location is responsible for the charge. The PAYS program has been tried in New Hampshire and is under consideration in other States.

Another approach is through benefit sharing. In this approach, the customer's actual energy savings are calculated compared to an estimated baseline energy bill. The utility receives a percentage of the customer savings until the project cost (including interest) is paid off. In a converse alternative, the customer shares the utility's savings. Under this method, the customer pays their baseline energy bill minus a percentage of the utility's avoided costs due to reduced demand. Benefit sharing is typically used for large commercial and industrial customers because of the difficulty of determining customer savings. Note that the term "shared savings" may also used for benefit sharing and for programs with fixed payback, like on-bill financing (and should not be confused with the performance-based incentive, "shared savings," discussed earlier in this chapter).

7.5 Addressing Issues with Alternative Rate Structures

Stabilizing Energy Rates or Total Energy Bills

A rate structure that breaks the link between utility sales and profits will shift the sales impacts not only of energy efficiency programs but also of a variety of actions and events from utility revenues to customer rates. By stabilizing utility revenues, the rate structure will also stabilize total customer outlays, but it will make rates fluctuate. This may not necessarily be a drawback. Many States have other rate mechanisms that are designed to shift some of the impacts of uncontrollable events, such as weather or fuel prices, from utilities to customers. The shift applies equally to positive and negative impacts. For example, when cold weather increases natural gas sales, decoupling returns the additional revenue due to increased sales to customers in the form of lower rates rather than flowing as additional profit to the utilities. However, when sales are reduced due to a bad economy, customers may face increased rates when they can least afford it. The Connecticut PUC recently rejected full "decoupling" because

[70] Cillo, Paul A. and Harlan Lachman 1999, Pay-As-You-Save Energy Efficiency Products: Restructuring Energy Efficiency, National Association of Regulatory Utility Commissioners, December. Available at http://www.paysamerica.org/EEI_Pays_1st_paper.pdf.

it found that the change would eliminate normal business risks for utilities and be unacceptable to ratepayers.

Four techniques may be used to mitigate this risk to customers. First, the rate structure can cap or amortize rate adjustments to avoid rate shock in cases of a large, sudden change in demand. Second, the adjustment can be set at less than 100 percent of revenue shifts, to split the revenue impacts of changes in sales. Third, the rate structure can include specific adjustments to allow utility revenues to vary from sales changes due to external events such as weather and economic shifts. Fourth, a rate increase could be allowed if needed to allow the utility to earn its authorized return. However, if the decoupling of sales from profits is partial, of course the utility will retain some incentive to increase rather than decrease sales.

Studies of California's early ERAM experience and of Oregon's Northwest Natural's gas rates found that decoupling did not significantly increase rate volatility. In California, the impact of ERAM on rates was small compared to the impact of fuel cost adjustments. For one utility, ERAM reduced rate volatility; for the other two, volatility increased slightly.[71] A study of NW Natural's distribution margin normalization (DMN) mechanism found that there was little shift of risk from economic changes because residential and commercial gas usage per customer were not sensitive to economic conditions.[72]

There is also a danger in missing universal benefits from energy efficiency in a struggle over allocating costs. Especially for natural gas and electric distribution utilities, the fixed costs at issue may be a small part of customer bills. If arguments over optimal rates interfere with reducing the major energy costs through energy efficiency, the customers may end up losing more than they gain.

Measuring Savings

The rate structures targeted specifically at performance of energy efficiency programs, including the Lost Revenue Adjustment Mechanism and the performance-based incentives, require estimating the program impacts. As discussed above, estimating energy savings can be difficult, and thus utilities could receive too much compensation, or they could be denied compensation for programs whose impacts are difficult to measure.

The problem of overcompensation and undercompensation can be reduced by careful, independent measurement and verification of program savings, rather than relying on projected savings or simple estimates. However, such analysis adds cost to the programs, which customers ultimately will have to bear.[73]

Full decoupling does not rely on estimates of energy savings. In fact, one of its benefits is that it also removes the strong dependence of utility revenues and profits on rate case estimates of future sales, thus removing one point of contention. Nonetheless, even under decoupling careful program evaluation may still be desirable in order to measure and improve program impacts and cost effectiveness.

[71] J. Eto et al. 1994.
[72] Daniel G. Hansen and Steven D. Braithwait, 2005, "A Review of Distribution Margin Normalization as Approved by the Oregon Public Utility Commission for Northwest Natural," Christensen Associates, March. Available at http://www.raponline.org/Pubs/General/OregonPaper.pdf.
[73] These costs can sometimes be reduced by using careful measurement of savings from similar programs under "deemed savings" or "benchmarking" as described in Chapter 3.

Do Rate Structures Save Energy?

Ultimately, none of these ways of setting rates has a direct impact on energy use. They do not require the utilities to implement any energy efficiency programs or support government energy efficiency policies and initiatives. They may remove financial disincentives or provide positive incentives, but the rate structures only have a positive impact when utilities use the opportunity to pursue energy efficiency aggressively as a resource.

There is a correlation between rate structures that provide appropriate compensation for energy efficiency and utilities pursuing aggressive and innovative efficiency measures. The goal of energy efficiency, to reduce energy sales, may go against an ingrained corporate culture: utilities rarely seek to shrink their business. Getting the financial incentive structure right can help change this mindset. In California, which has had decoupling for most of the last couple decades, the large investor-owned utilities have cooperated with regulators in planning record levels of efficiency programs, and have gone well beyond traditional utility programs to supporting strong appliance standards, building codes, rate designs, and other energy efficiency measures. Several utilities interested in pursuing energy efficiency have sought rate structure changes so their use of such programs would not result in a financial penalty.

Removing disincentives is important, but it is not by itself sufficient. States need to ensure that their utilities (and others) use the opportunity to implement effective energy efficiency programs. This is especially true when utilities seek new rate structures to sustain their returns. States need to make sure that rate changes are accompanied by a real increase in utility commitments to energy efficiency programs to benefit their customers.

7.6 Summary

Innovative rate structures can be used to overcome a key barrier to implementing utility energy efficiency programs—regulated utilities fear they will lose money. Rate structures can address two concerns: first, utilities fear they may not receive full cost recovery or returns on the program costs; second, they fear they will lose revenue because the programs decrease their sales. Utilities should receive appropriate compensation and not be penalized for using energy efficiency as a resource.

Regulators should consider allowing utilities' returns at least as great from prudent investments in energy efficiency as from supply-side investments. States should also consider capitalizing energy efficiency programs costs to reduce the initial impact on rates and to facilitate appropriate investment returns.

A process for pre-approval of energy efficiency programs, combined with fair and consistent regulatory treatment, should enable utilities to earn full cost recovery. Performance incentives, with or without capitalizing appropriate energy efficiency program costs, enable a utility to receive returns on demand-side investments as they do for supply-side investments, and reward effective program implementation.

Regulators should consider reviewing and assessing existing rate structures to ensure they provide utilities full cost recovery for approved and effective energy efficiency programs.

The throughput incentive that rewards utilities for increasing sales, and hence penalizes them for end-use energy efficiency, can be reduced in several ways: anticipating the sales impacts of energy efficiency in rate cases, adjusting rates between rate cases to compensate for the sales impacts of additional energy efficiency programs, and partially or fully decoupling utility revenues from sales between rate cases. These approaches differ in their effectiveness and in their side effects, both positive and negative.

Regulators should consider rate structures under which utilities' profits are not hurt by programs that save energy and thus reduce their sales. Several different approaches are available that differ in ease of implementation and stability of rates, bills, and utility revenues.

All these approaches are important for fair treatment of utilities using energy efficiency as a resource, and may be needed to secure utility cooperation in seeking out and effectively exploiting that resource. But while they may provide the opportunity, by themselves they do not create any energy efficiency programs. To be effective, they should be paired with other policies. A utility may seek a modified rate structure in an effort to improve its cost recovery and reduce risk, as well as to remove disincentives for reducing energy use. In this situation, a State will only realize energy savings if it also ensures the implementation of energy efficiency programs through planning incentives, requirements, or other methods described in other chapters of this study.

Regulators and utilities should consider establishing rate designs and alternative financing options (as well as programs) that encourage end-use energy efficiency, such as inclining tier block rates, rate discounts for energy efficiency, benefit sharing, and on-bill financing (pay-as-you-save).

While this chapter mostly focused on setting rate levels, and hence revenue levels, to overcome barriers to utilities implementing energy efficiency programs, utility rates also can be used to overcome barriers to customers implementing energy efficiency projects. In this way, they can complement and enhance the utility programs.

8. Energy Efficiency Performance Requirements

8.1 Performance-Based Regulation of Energy Efficiency

One of the surest ways to promote utility energy efficiency programs is to set a target, through regulation or legislation, for utilities to achieve end-use energy savings. In the last few years, several States have created some form of an energy efficiency performance standard (EEPS), which requires utilities to implement energy efficiency programs to save a specified amount of energy, such as one percent of the previous year's sales. Note that this is not a requirement that the utility's sales decrease by one percent in absolute terms (which, for utilities that are growing, would be much harder) or a limit on their sales at all (which fluctuate too much to regulate directly). Rather, it is a requirement that utilities implement programs that are estimated to save a specified amount of energy.

Utilities are given broad flexibility about how and where to achieve the energy savings. Consequently, they can design and implement energy efficiency programs that: 1) meet operational needs, such as relieving transmission constraints, 2) meet specific customers' needs, 3) are lowest cost or most reliable, or 4) serve other goals. In addition, utilities may have the option to buy credits from other utilities that have exceeded their own targets. Usually, the costs of the energy efficiency programs are recovered from energy customers through utility rates, but in some cases public benefit funds from rate surcharges are available to at least partially fund these programs.

Since energy savings are cumulative, at least for the multi-year lifetime of the measures put in place, the potential impact of an EEPS can be substantial. If a 0.75 percent per year EEPS were implemented nationwide for electricity and natural gas nationwide by 2020, it could save more than 5 quadrillion Btus a year, or 8 percent of otherwise forecasted annual electricity and natural gas consumption, with net savings to consumers of $64 billion.[74]

When electric utilities started energy efficiency programs in the 1970s and 1980s, these programs were generally part of a planning process for generation and transmission infrastructure. In conducting Least Cost Planning or Integrated Resource Planning, utilities and their regulators realized that it is often cheaper to substitute energy efficiency programs for building the generating plants or other infrastructure and purchasing the fuel to generate the energy. However, when States and utilities anticipated a competitive industry, they dropped these planning processes; without regulated rates, it was not clear that utilities could be compensated for energy efficiency programs. Therefore, spending on such programs declined (see Chapter 2).

The most common approach to promoting energy efficiency programs in a restructured environment is through a systems benefit charge (see Chapter 6 for more details). This is a flexible mechanism to fund a variety of programs that are not adequately provided by the marketplace. Critics have questioned whether spending on DSM programs—either funded through a systems benefit charge or through rates—is wasted, and whether the programs have been carefully evaluated.

[74] Nadel, Steven, 2006, *Energy Efficiency Resource Standards: Experience and Recommendations*, ACEEE Report E063, March. Available at http://aceee.org/pubs/e063.pdf?CFID=128530&CFTOKEN=31276509.

There has also been a movement toward performance-based regulations. These regulations let utilities determine how best to achieve a general desired outcome, rather than setting detailed prescriptions for action. Over 20 States have set a renewable portfolio standard (RPS), a requirement that a specified percentage of overall electric generation be from an array of renewable sources of energy. An energy efficiency performance standard is an analogous requirement to reduce generation, and can be implemented in parallel with, or as part of, an RPS.

The EEPS is a performance-based approach to energy efficiency that is applicable in a competitive or regulated environment. As a flexible mechanism, the State cannot easily use it to target specific actions or needs. As a performance requirement, it requires exacting measurement of program impacts with independent monitoring and evaluation; therefore, it is not easily amenable to programs for which the impacts are difficult to measure.

8.2 Current Implementation of Energy Efficiency Requirements

Several States have recently created some form of energy efficiency requirement, but only a few have been in place sufficiently long to permit the evaluation of results. So far, the programs appear to have been successful—utilities are meeting the standards. In some of the more recent programs, regulations have established more aggressive targets than was the case for earlier programs. Below, we describe energy efficiency requirements currently being used by a variety of States.

8.2.1 Legislated Energy Efficiency Performance Standards

Texas: Peak Demand Target

The first State to create a performance requirement for utility energy efficiency programs was Texas, under then-governor George W. Bush. The 1999 Texas electric restructuring legislation, SB-7, required electric utilities to avoid 10 percent of kilowatt demand growth through energy efficiency programs starting at the end of 2003. Customer peak demand determines peak load, which in turn largely determines the need for generating plants, transmission lines, and other capital investments. Kilowatt-hour energy use over time, on the other hand, largely determines fuel consumption and air pollution. As load growth in Texas had been averaging about 2 percent, these savings correspond to about 0.2 percent of average load each year.

Utilities are to achieve the savings by providing retail electric providers and energy service providers incentives to conduct standard offer programs and market transformation programs. The Texas PUC[75] has set rules that are intended to ensure that all customer classes and "hard-to-reach" low-income customers have access to the energy efficiency services. The PUC also requires that baseline load growth be determined using a rolling five-year weather-adjusted average. Measurement of energy and peak demand savings from the programs is required, using an approved measurement and verification protocol or approved deemed savings. The PUC hires an independent measurement and verification expert to review the savings. Funds to achieve the goal are to be included in each utility's transmission and distribution rates, including administrative costs not to exceed 10 percent.

[75] P.U.C. Subst. R. 25.181. References for this and other EEPS are in EPA 2006, EPA Clean Energy-Environment Guide to Action, Section 4.1. Available at http://epa.gov/cleanenergy/pdf/gta/guide_action_chap4_s1.pdf.

So far, Texas utilities have exceeded the savings targets. In 2003, verified annual savings were 151 MW and 370 million kWh, compared to a 135 MW goal. The 2004 programs saved 192 MW of peak load, saved consumers $25 million a year, and reduced NOx emissions by 623 tons a year, at a total cost (to the utilities) of $85 million.[76]

Connecticut: Commercial and Industrial Focus

In 2005, Connecticut added an energy efficiency requirement to its existing renewable portfolio standard. Public Act 05-1 requires that all electric distribution companies and electric suppliers obtain a specified percentage of their total output from “Class III resources,” i.e., the electricity output from combined heat and power systems and the electricity savings from conservation and load management programs created starting in 2006 for commercial and industrial facilities. Residential energy efficiency programs do not currently qualify. The percentage amount for Class III resources increases over several years: it is 1 percent in 2007, 2 percent in 2008, 3 percent in 2009, and 4 percent in 2010 and thereafter. In 2004, utility energy efficiency programs in commercial and industrial facilities saved about 0.6 percent of electricity sales.

While continued non-residential energy efficiency programs at the current level will provide much of the required savings, they will not provide all. Utilities may meet the requirement through trading for credits, including credits for savings due to Connecticut’s public benefits fund, the Energy Conservation and Load Management Fund. Utilities that fail to meet the requirements may be charged up to 5.5 cents per kWh (but the PUC is likely to set a lower charge), with proceeds from the charge being added to the public benefits fund. Electric distribution companies can recover prudently incurred costs to meet this requirement and recover earnings lost due to decreased energy use because of this program. The Connecticut Department of Public Utility Control is developing administrative and verification procedures and will consider expanding the program to include residential electricity savings.

8.2.2 Alternative Energy Portfolio Standards

Pennsylvania: Tiered Standard

In 2004, Pennsylvania enacted the Alternative Energy Portfolio Standard Act (SB 1030). The law requires that a percentage of electricity sold by electric distribution companies and electric generation suppliers to retail customers be from two tiers of alternative sources: Tier I includes renewable sources and fuel cells; Tier II includes demand-side management and combined heat and power, as well as waste coal, large-scale hydropower, municipal solid waste, wood byproducts, and integrated gasification combined cycle coal plants. Demand-side management includes energy efficiency and load management or demand response technologies, management practices, or other strategies, and the use of industrial byproducts to produce electricity. The requirement for Tier II starts at 4.2 percent in 2006 and gradually increases to 6.2 percent in 2011, 8.2 percent in 2016, and 10 percent in 2021. The requirements do not take effect until rate caps expire, which vary by utility and can be as late as 2010. Utilities may trade and bank credits to comply with the requirement, including buying credits from utilities outside the State but within their regional transmission organization area (for most utilities that is the “PJM” region, mostly the Mid-Atlantic States). All costs except non-compliance penalties can be recovered through an automatic energy adjustment clause.

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[76] Nadel, 2006. Note that $85 million is a one-time cost, while the savings will be repeated annually for the life of the projects.

The Pennsylvania PUC has developed regulations and a *Technical Reference Manual* to verify energy savings using "deemed savings" or custom calculations. However, existing Tier II resources accounted for roughly 8 percent of statewide electricity use in 2003; thus, there may not be a need for new action to meet the Tier II requirements for a decade or more.[77]

Hawaii: Combined Standard

In 2004, Hawaii amended its renewable portfolio standard (Act 95) to raise the standard level and to include energy efficiency among the eligible electricity sources. The legislation increases the renewable portfolio standard for electric utilities to 8 percent of net electricity sales by 2005, 15 percent by 2015, and 20 percent by 2020. "Renewable" energy includes a long list of resources, including electricity savings from the use of "quantifiable energy conservation measures," rejected heat from co-generation and combined heat and power systems, ice storage, and heat pump water heating, among more traditional renewable sources. Note that there is a single standard without separate tiers or limits on the use of efficiency measures. In 2004, renewable energy and energy efficiency accounted for 11 percent of electricity needs, with about one-third of that from efficiency.[78]

The PUC can revise and extend the standards based on studies to be conducted by the University of Hawaii. The PUC also can exempt a utility if it is unable to meet the standard in a cost-effective manner, and the PUC is to ensure that the cost of electricity purchased by the utility is not more than the avoided cost of producing the electricity. A utility's affiliates may aggregate their renewable energy portfolios to achieve the RPS target. The PUC is to develop a ratemaking structure, which may include performance-based ratemaking, to provide incentives to utilities to meet the standards.

Nevada: Combined Standard with Limit on Efficiency

In 2005, Nevada modified its renewable portfolio standard (Assembly Bill 03) to include energy efficiency in part because the utilities were having trouble meeting the previously existing standard. The amended legislation requires each provider of electric service to generate, acquire, or save electricity from portfolio energy systems or efficiency measures. The overall requirement rises from at least 6 percent of electricity sales in 2005 to 20 percent starting in 2015. Up to 25 percent of the requirement can be met through energy efficiency, and at least 50 percent of this must be from residential customers. Energy efficiency measures include only new measures that reduce customer energy consumption (not load shifting), paid for in part by the electricity provider. The provider can meet the requirements through its own programs, by credits, or through contracts.

The PUC issued the implementing regulations[79] and can exempt providers if a sufficient amount of eligible electricity and savings are not available with just and reasonable terms and conditions. The PUC can enforce the standard with the imposition of fines. The PUC is to approve contracts, which then shall be deemed prudent investments, so the provider may recover all just and reasonable costs.

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77 Nadel, 2006.
78 Nadel, 2006.
79 Nevada PUC Docket No. 05-7050.

8.2.3 Other Performance Requirements

California: PUC Goals

In 2003, the PUC and the California Energy Commission (CEC) established a "loading order" making energy efficiency the preferred energy resource. In 2004, the PUC established electricity and natural gas savings goals for the State's major investor-owned utilities. The CEC developed statewide energy savings goals based on detailed energy efficiency potential studies in the State, which served as the basis, along with stakeholder input, for the goals the PUC set for each utility.[80]

The PUC set goals for annual and cumulative electricity and natural gas savings, and cumulative peak electricity demand savings, for 2004 through 2013, but the goals are to be revised every three years. The total goals for the IOUs start at 1,838 GWh, 379 MW, and 21 MMTh in 2004 and rise to 23,138 GWh, 4,885 MW, and 444 MMTh (cumulative) in 2013.[81] These goals represent about half of the expected increase in electricity needs in that decade, and about 90 percent of the maximum achievable program potential for electricity savings identified in the studies. The goals for natural gas only capture about 40 percent of the estimated maximum achievable potential, but will double the savings presently achieved from current natural gas programs.

Although these goals are not directly enforceable, they are serving as the basis for resource procurement and program planning. In the subsequent energy efficiency program cycle, the PUC in 2005 approved utility plans for more than $2 billion in energy efficiency programs over three years.[82] Savings from programs funded under California's public benefits fund count toward the goals, but more than half the approved funding is from the utilities' resource procurement budgets. The PUC is updating its measurement and verification protocols, and will hire independent consultants to evaluate the utility programs. California has a long and successful history of evaluating energy savings from efficiency programs.

Vermont: Performance Contract

In Vermont, energy efficiency programs are funded by a public benefits fund. In 1999, the Vermont Public Service Board transferred energy efficiency funding and programs to an independent statewide "energy efficiency utility." Efficiency Vermont is run by a competitively selected contractor. The contract includes savings targets for electricity and peak demand. The State reviews savings claimed by the utility, and does not fully pay the contract unless the savings goals are achieved. Current annual savings goals are over one percent of electricity sales each year.

In addition, in 2005 Vermont enacted a renewable portfolio standard requiring in general that all load growth be met through renewable resources. This standard implicitly allows energy efficiency to substitute for renewable electricity by reducing load growth, and thus reducing the renewable requirement.

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[80] This process was codified in law in 2005 in SB 1037, available at http://info.sen.ca.gov/pub/bill/sen/sb_1001-1050/sb_1037_bill_20050929_chaptered.html.

[81] California PUC Decision 04-09-060. Available at http://www.cpuc.ca.gov/published/final/decision/40212.htm.

[82] California PUC Decision 05-09-043. Available at http://www.cpuc.ca.gov/published/final_decision/49859.htm.

Illinois: Voluntary Guidelines

In 2005, the Illinois governor proposed the Illinois Sustainable Energy Plan, including an EEPS and a separate RPS. Later that year, the Illinois Commerce Commission (ICC) adopted a modified version of the EEPS as a "voluntary demand response and energy efficiency standard." The ICC set targets beginning at a 10 percent reduction in electric load growth in 2007-8 and rising to a 25 percent reduction in 2015-17.[83] The predicted annual load growth rate in Illinois is 1.9 percent. The ICC set a cap on the annual rate increase due to these programs of 0.5 percent. Electric utilities and alternative retail electric suppliers are to file documents to implement the plan and are to report regularly on their programs and performance. While these targets are not binding on the utilities, the major utilities supported the plan, and thus it was hoped they would implement it voluntarily. Nonetheless, initial implementation has been slow.[84]

8.3 Policy Issues

8.3.1 Who and What Is Covered?

Energy efficiency requirements are usually applied to load serving entities—both integrated electric utilities in a regulated electric market and all retail electric service providers in a State with retail electric competition. These organizations have a direct relationship with the end users that the energy efficiency programs serve. However, especially with contracting of programs and credit trading, requirements could be applied at other points in the electric system for political or administrative reasons.

Publicly-owned utilities and rural electric cooperatives are usually exempt from State-imposed energy efficiency requirements, as these entities typically are not regulated by State utility commissions. But some States encourage publicly-owned utilities to implement energy efficiency programs in other ways. In California, they are included in the overall State energy savings goal. In Connecticut, the law that established the efficiency standard for IOUs also created a public benefits fund for publicly-owned and cooperatively-owned utilities in the State.

While there is a longer history of electric demand-side management programs, natural gas end-use energy efficiency programs have also been effective. Natural gas savings may be especially important right now—when tight natural gas markets have driven up prices to record levels. A small reduction in natural gas demand in the United States or even in a region could allow a dramatic reduction in prices.[85] Thus, consumer savings from natural gas efficiency may be even greater than from electricity efficiency over the next several years. California includes natural gas targets as well as electricity targets (although at less aggressive levels). Connecticut requires gas utilities to submit annual gas conservation plans to the State PUC, but did not set gas savings targets. For States that adopt an EEPS as part of an RPS, a standard for natural gas utilities would have to be treated separately, as they are not subject to the renewable requirements. Nonetheless, given the potential savings, it makes sense for States to consider savings requirements for natural gas as well as for electricity.

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[83] ICC Resolution 05-0437. Available at http://www.dsireusa.org/documents/Incentives/IL04R.pdf.
[84] S. Nadel, 2006.
[85] R.N. Elliot and A.M. Shipley, 2005, *Impacts of Energy Efficiency and Renewable Energy on Natural Gas Markets: Updated and Expanded Analysis*, ACEEE Report Number E052, April. Available at http://aceee.org/pubs/e052full.pdf?CFID=128539&CFTOKEN=37235316.

All energy efficiency requirements can be met through utility programs to encourage energy efficiency among their customers, but requirements for those programs differ. Some States require or encourage the utilities to contract out the programs to energy service companies rather than running the programs themselves in part to build up independent energy service company capacity. Other States allow utilities flexibility in how they want to meet the requirements. Some States also require that the programs be distributed among all customer classes—residential, commercial, and industrial—so that the benefits of the energy efficiency measures will be widely shared. Others restrict programs to certain customer classes. In general, the goal of ratepayer equity calls for spreading the programs widely, so all may share in the direct benefits, while the goal of cost minimization may call for letting utilities target the programs to least-cost savings. The performance-based regulatory approach places as few restrictions as possible, consistent with the goals of the regulation.

Several States with energy efficiency requirements also have public benefits funds that pay for some or all of the required programs. There are several ways to integrate these policies. States could keep them separate by excluding public benefit funded programs from satisfying the requirements; however, this could lead to lack of coordination between programs with shared goals. Performance requirements can be used to maximize the impact of public benefit funded programs, as in Vermont. Or performance requirements can be used with partial funding by a public benefit fund, as in California and Connecticut. While it may seem redundant to require and to provide a separate funding source for the same programs, a wires charge brings a somewhat different distribution of the burden of funding than rate-based utility costs—rates may differ greatly by customer type or size, while a system benefits charge is the same for each kWh or therm—and thus can be used to balance ratepayer equity concerns.

Other ways to save energy can also be included within the scope of energy efficiency requirements. For example, some States allow utilities to use combined heat and power and other clean, efficient distributed generation to meet efficiency requirements. These technologies can have the same benefits as energy saving technologies, and can be included if there is a need to provide incentives for them as well. Also, some States include load shifting and other demand response measures if their goal is to reduce peak demand. However, some other States specifically exclude these measures because their impact in reducing fuel consumption and environmental impacts is much less clear and may be highly situation-dependent. Finally, generation and transmission improvements that reduce energy losses may also be included; however, it may be even more difficult than in end-use efficiency to determine whether these improvements would have occurred anyway and, depending on rate structures, utilities may be rewarded for such improvements in other ways.

8.3.2 How Much Efficiency Is Required?

A general energy efficiency requirement is a blunt policy instrument compared to the possible uses of flexible energy efficiency and demand-response programs in specific utility operation and planning situations. For instance, a general requirement is not the most direct way to target geographic locations with severe transmission constraints or periods of time when supply is short. Rather, a requirement can be tailored to specific circumstances using set-asides or credit multipliers for particular locations, times, or technologies. For regulated utilities, a rate case proceeding may lend itself more than a legislated standard to careful consideration of the optimal level of cost-effective efficiency spending.

These limitations do not mean that general requirements have no place—in some cases a performance requirement can overcome pockets of opposition and bureaucratic obstacles to ensure that the efficiency resource is used. It leaves great flexibility to the utility while ensuring fairness between utilities. It can reap the overall benefits of efficiency and build up program infrastructure. However, it may be difficult to pick the level at which to set the standard.

The first question in setting the standard is determining what metric should be used. For electricity, the choice between regulating: 1) energy use (kWh, i.e., how long power is used), 2) peak demand (kW, i.e., how much power is used), or 3) both depends on the goals of the regulation or legislation. Energy efficiency programs, unlike some demand response programs, usually reduce both use and demand, but not always in the same amounts.

Requirements can target savings from new measures in a given year, or savings from actions taken in previous years as well. Since most efficiency measures, such as buying a new appliance or installing insulation, yield energy savings over a number of years, incremental savings and total savings can be very different. Focusing on cumulative savings can help ensure that measures remain in place, but only if savings from old programs are verified. A cumulative metric also may make determining the baseline more problematic, as baseline energy use will change over the years.

Each State also has to determine how aggressive a numerical target to set. The most rigorous method is a careful study of the long-term potential for savings from energy efficiency programs in the State, and perhaps the region, as well as local experience with DSM programs. Several recent State and regional potential studies have found a range of "achievable" savings levels: for electricity, 10 percent in 10 years in California, 11 percent in 20 years for Puget Power, 33 percent in 17 years in the Southwest, and 31 percent in 10 years in Vermont; for natural gas, 10 percent in 10 years in California and 9 percent in 20 years for Puget Power.

It is not clear to what extent this broad range reflects differences between the States versus different study methodologies. Unlike specific supply-side resources, energy efficiency is available in all States. States without active energy efficiency programs, which have not been actively reaping this resource, may have more economic savings as well as more potential for greater reductions. However, States with a history of energy efficiency programs have more infrastructure set up to achieve the savings. Certainly, States that have been aggressively pursuing efficiency for years, such as California and Vermont, do not find this resource is tapped out; they are increasing their spending on efficiency in the expectation of achieving even greater savings.

As mentioned above, the achievable natural gas savings potential estimates are sometimes (but not always) lower than for electricity. This is not because of lack of opportunity—the technical and economic potential for natural gas savings is usually estimated to be greater than for electricity. Presumably, it is because of the lack of program experience and infrastructure for natural gas. Therefore, in most States, natural gas efficiency requirements might have to be phased in more slowly than for electricity, but it is not clear if the long-term requirements need be lower.

8.3.3 How Are the Savings Verified?

A common criticism of energy efficiency utility programs is that the claimed savings are not real or at least not verifiable. It may be difficult to know whether customers really took actions to reduce their energy use, more difficult to know how long the measures remain in place, and most difficult to know whether they would have done the same thing even without the utility program. Certainly it is harder to measure energy savings than to meter energy supply (mostly because it is harder to know the baseline energy consumption, i.e., how much energy would have been used without the program). Thus, a successful energy performance requirement is dependent upon careful measurement and verification of energy savings.

As described in Chapter 4, *Cost Effectiveness of Energy Efficiency Programs*, carefully developed measurement and verification protocols have been used by regulators and utilities to approve as prudent billions of dollars in efficiency expenditures over the past two decades, and a rich program evaluation literature has been produced. Most States with performance requirements use either a specified list of "deemed savings" for standard efficiency measures or an established protocol for measuring savings of more unusual programs. These approaches should factor in the "free riders" who would have taken action anyway, appliances that burn out early, and other factors that reduce savings. However, the data are still subject to manipulation. Often States require independent verification of savings, so that at least the estimates are made by an expert who should have no stake in the outcome.

The focus on verifying savings under performance requirements may also restrict the kinds of energy efficiency programs utilities conduct. In particular, the impacts of market transformation programs, such as consumer education programs, may be very difficult to measure. Other innovative programs may also be discouraged because of the effort it would take to try to measure the savings (where standard programs may have savings that are "deemed" and not measured at all).

8.3.4 What Alternative Compliance Is Allowed Under Performance Requirements?

The flexibility of utilities under performance requirements, and thus their ability to meet the requirements at the lowest possible cost, will be maximized if they are allowed to achieve the energy savings wherever and whenever they choose. If a State sets up a system of tradable credits for energy savings, a utility, instead of creating a program for some required energy savings, can pay another utility to exceed its own targets. A credit trading system should allow the energy savings to be achieved at the lowest possible cost. However, credit trading may be limited unless there are many participants, and it may make it more difficult to target the energy savings. As energy efficiency savings are available everywhere, credit trading may not be necessary, and tracking the credits entails some administrative burden, but trading should make it easier to meet the requirement.

Utilities also can be allowed to bank credits, to apply excess savings to future years, or even to borrow credits, postponing savings to future years. Utilities can also be allowed to buy credits from the State, essentially setting a cap on price of the credits. If the price is set below the marginal cost of producing and delivering energy, it will help ensure the energy savings are cost effective, giving all stakeholders more confidence in the value of the efficiency requirement. But if the price is set below the cost of achieving energy efficiency improvements, utilities will buy credits instead of implementing programs, and the price cap will also cap the level of achieved energy savings.

8.3.5 Should an Efficiency Requirement and Renewable Requirement Be Combined?

Flexibility can also be maximized by allowing both supply-side and demand-side resources to satisfy a joint requirement. Some States have recently expanded their RPS policies to include energy efficiency, in part because some utilities said they had trouble generating enough renewable power to meet the standard. Again, this makes conceptual sense if the goal is to push utilities to meet their customers' needs with as much clean resources as possible. It also can ease the administrative burden compared to having two completely separate policies. However, there are potential drawbacks if the goals of supporting the different resources are different. Given the choice, utilities may opt for more generation because they are more familiar with how to make energy than they are with encouraging others to save it—or because rate structures reward them for increasing, not decreasing, sales. Still, it is also possible that utilities may opt for cheaper efficiency programs and thus not pursue development of new generation technologies.

The risk of neglecting important resources can be avoided by limiting competition. For example, Nevada restricted the percentage contribution efficiency could make. Pennsylvania carved out a separate tier restricted to certain renewable technologies (and further carved out a portion of that tier for solar power). Connecticut went a step further by completely separating the efficiency and renewable tiers while making them subject to many of the same rules.

One other significant drawback to combining supply-side and demand-side requirements is that States may not want to apply the requirements to the same utilities. Supply-side requirements probably do not make sense for natural gas utilities; natural gas savings requirements do. In addition, while credit trading and program contracts allow great flexibility as to where to apply both requirements, States with restructured electricity sectors may find it makes more sense to apply supply-side requirements to energy providers and demand-side requirements to distribution providers.

8.4 Summary

States should consider adopting performance requirements or minimum energy savings targets for electric and natural gas utility end-use energy efficiency programs. An energy efficiency performance requirement can complement or be made part of generation portfolio standards for renewables or other supply-side resources.

Setting performance requirements for utility energy efficiency programs is a performance-based approach to energy efficiency that can be applied to investor-owned, publicly-owned or cooperatively-owned utilities, and retail energy providers under competition. Such requirements have been set by State legislatures, public utility commissions, and local governing boards for non-State-jurisdictional utilities. Benefits of this approach will be maximized if the utility is given flexibility in how to meet the requirements, such as by allowing credit trading and including clean, efficient distributed generation among eligible measures. A pilot program to develop tracking and trading systems for energy savings by utilities and other organizations would be helpful.

Since benefits from reducing natural gas use may be at least as great as from electricity, the benefits of this approach will also be maximized if the State sets efficiency requirements for natural gas utilities (even though these utilities are not included in renewable portfolio standards) For electricity, fuel savings and environmental benefits will be maximized if States set efficiency performance standards based on electricity consumption instead of, or in addition to, standards based on peak demand.

For electric utilities, an efficiency standard can be combined with renewable or other alternative generation standards. If States are concerned that efficiency will crowd out renewables under a combined requirement, and they want to protect emerging renewables technologies, they can limit the use of efficiency to meet the overall standard.

9. Complementary Federal and State Policies

Several States have created policies that promote energy efficiency that are outside of and in addition to utility energy efficiency programs. State policies include appliance efficiency standards, building codes, and tax incentives. Some State policies are complemented by Federal policies created by the Energy Policy Act (EPAct) of 2005. Each of these policies, which are described below, can supplement and accelerate the implementation of utility energy efficiency programs.

9.1 Appliance Efficiency Standards

Appliance efficiency standards require that certain appliances such as air conditioners, refrigerators, and heaters, meet specific energy requirements. The goal of appliance efficiency standards is to improve the energy efficiency of appliances and to reduce the amount of energy or electricity to operate these products. Currently, 10 States have appliance efficiency standards.[86]

Federal appliance standards include minimum energy efficiency requirements for refrigerators, air conditioners and heat pumps, furnaces and boilers, dishwashers, clothes washers, and other equipment.[87] EPAct 2005 sets new Federal efficiency standards for ceiling fan light kits, dehumidifiers, unit heaters, torchiere lamps, compact fluorescent lamps, fluorescent lamp ballasts, mercury vapor lamp ballasts, illuminated exit signs, traffic signals, commercial pre-rinse spray valves, low voltage dry type distribution transformers, commercial package air conditioning and heating equipment, automatic commercial ice makers, commercial clothes washers, and commercial refrigerators, freezers, and refrigerator freezers.[88]

Federal appliance standards preempt State standards; however, if the State standards are more stringent than the Federal, then appliances must meet the State standard. With the enactment of Federal appliance efficiency standards, all manufacturers will be required to produce at least minimally energy-efficient products.

States were the first to initiate energy efficiency standards for appliances and equipment. In the 1970s, California adopted appliance efficiency standard laws, and over the next decade, other States began to follow. . The existing standards have reduced the amount of energy used by common household appliances and commercial equipment. For example, a refrigerator today uses approximately one- third of the energy a refrigerator used three decades ago.

Ten States have developed State standards for appliance and equipment efficiency, as shown in Table 9a.[89]

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[86] Alliance to Save Energy. *Appliance Standards: State Energy Efficiency Index.* Available at www.ase.org.
[87] Alliance to Save Energy. *Appliance Standards: State Energy Efficiency Index.* Available at www.ase.org.
[88] U.S. Department of Energy. January 2006. *Submitted Pursuant to Section 141 of the Energy Policy Act of 2005 and the Conference Report (109-275) to the FY 2006 Energy and Water Development Appropriations Act.* Energy Conservation Standards Activities. Available at www.eere.energy.gov/buildings/appliance_standards/pdfs/congressional_report_013106.pdf.
[89] The Alliance to Save Energy. *Appliance Standards: State Energy Efficiency Index.* Available at http://www.ase.org.

Table 9a. State Appliance Efficiency Standards		
State	**Standards**	**Enacted Date***
Arizona	Energy efficiency standards for twelve appliances sold, offered for sale or installed in the State: commercial prerinse spray valves, digital television adapters, illuminated exit signs, low voltage dry type distribution transformers, metal halide lamp fixtures, torchieres, traffic signal modules, and unit heaters. Beginning in 2010 new commercial refrigerators, freezers, and refrigerator freezers and large packaged air conditioning equipment will have to meet standards. Automatic commercial icemakers, commercial clothes washers, refrigerators, freezers, and refrigerator freezers, and single voltage external AC to DC power supplies must meet California's energy efficiency standards.	2005
California	Minimum efficiency standards for 21 categories of appliances. Some examples are standards for refrigerators, freezers, refrigerator freezers, room air conditioners and room air conditioning heat pumps, central air conditioners, pool heaters, plumbing fittings and fixtures, fluorescent lamp ballasts and replacements, dishwashers, clothes washers, clothes dryers, electric motors, distribution transformers, and power suppliers and consumer audio and video equipment.	2002 and 2005
Connecticut	Energy efficiency standards for eight products: commercial clothes washers, refrigerators and freezers, illuminated exit signs, large packaged air conditioning equipment, low voltage dry type distribution transformers, torchiere lighting fixtures, traffic signal modules, and unit heaters. Building code standards take precedent over appliance efficiency standards.	July 2004
Maryland	Standard for the following appliances and equipment sold in and installed in the State: torchiere lighting fixtures, unit heaters, low voltage dry type distribution transformers, ceiling fans and ceiling fan light kits, traffic signal modules, illuminated exit signs, commercial refrigeration cabinets, large packaged air conditioning equipment, set top boxes, commercial clothes washers.	January 2004
Massachusetts	Efficiency standards for appliances sold or installed in the State including: refrigerators, refrigerator freezers, and freezers, storage type electric, gas and oil water heaters, fluorescent ballasts for lamps, luminaries with fluorescent ballasts, and showerheads.	November 2005
New Jersey	Standard for the following products sold or installed in the State: commercial clothes washer, freezers and refrigerators, illuminated exit signs, air cooled very large commercial package air conditioning and heating equipment, low voltage dry type distribution transformers, torchiere lighting fixtures, traffic signal modules, unit heaters	March 2005
New York	Efficiency standards for ceiling fans, light kits, commercial washing machine, refrigerators, freezers and icemakers, torchiere lighting fixtures, and other commercial and household items.	July 2005
Oregon	Efficiency Standards for the following appliances: automatic commercial ice cube machines, commercial clothes washers, prerinse spray valves, refrigerators and freezers, illuminated exit signs, metal halide lamp fixtures, single voltage AC to DC power supplies, State regulated incandescent reflector lamps, torchieres, traffic signal modules, unit heaters.	2005
Rhode Island	Minimum standards for 13 products sold or installed in the State: automatic commercial ice makers, commercial clothes washers, prerinse spray valves, refrigerators, freezers and refrigerator freezers, high intensity discharge lamp ballasts, illuminated exit signs, large packaged air conditioning equipment, low voltage dry type distribution transformers, metal halide lamp fixtures, single voltage AC to DC power supplies, torchieres, traffic signal modules, and unit heaters.	July 2005
Washington	Standards for products sold or installed in the State: automatic commercial ice makers, commercial clothes washers, prerinse spray valves, refrigerators and freezers, illuminated exit signs, low voltage dry type distribution transformers, metal halide lamp fixtures, single voltage AC to DC power supplies, State regulated incandescent reflector lamps, torchieres, traffic signal modules, and unit heaters.	July 2005
* Refers to the most recent policy enactment date		

Sources: The Alliance to Save Energy. *Appliance Standards: State Energy Efficiency Index*, available at http://www.ase.org; Appliance Standards Awareness Project, available at http://www.standardsasap.org; Pew Center, available at http://www.pewclimate.org.

Most of the appliance efficiency standards allow only energy-efficient products to be installed or sold in the State to help remove inefficient products from the market. Most States refer to ENERGY STAR specifications, commonly used industry standards, or minimum efficiency standards adopted by other States for their own efficiency ratings. California's appliance efficiency standards are commonly used by other States for creating their own standards.

9.2 Building Codes

Building codes are minimum energy efficiency standards for homes and commercial buildings. Buildings use more than one-third of the energy in the United States and account for more than one-third of the carbon emissions. Building efficiency can be difficult to integrate into the market in part because of the problem of "split incentives." Typically, builders shoulder the higher costs of more energy-efficient buildings but the home or building owners or renters are the ones who actually reap the benefits of energy efficiency. Additionally, the specialized craft skills needed for construction in the building industry has limited the implementation of building energy codes into the market. Nevertheless, because of the possible energy savings and benefits, most States have implemented building codes that promote energy efficiency.

IECC and ASHRAE 90.1
Building Codes

The International Energy Conservation Code (IECC) addresses energy standards for commercial and residential buildings. The codes from the IECC mainly focus on energy efficiency and its relationship to the "building envelope"—the ceiling, wall, window, floor, and foundation insulation and ventilation of buildings. Additionally, under the IECC, there are set requirements for duct sealing and insulation, air conditioning, space heating, and water heating for both residential and commercial buildings. IECC has no lighting or appliance requirements for residential buildings, but it does for commercial buildings.

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 90.1 Code is a set of requirements for commercial buildings to promote the application of cost-effective, energy-efficient building design and technologies. The 90.1 Code applies to the lighting, insulation, windows, cooling and heating equipment, piping, hot water systems, and electric motors of buildings. It does not address any requirements for energy used by office equipment. The ASHRAE 90.1 code is for new high-rise residential and commercial buildings; therefore, it is not concerned with single-family homes or smaller apartment buildings.

There are a few common energy-efficient building code standards that most States and businesses use as a guideline in implementing their own standards. The most widely referenced building codes used by States are the International Energy Conservation Code (IECC) and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 90.1. Some examples of State building codes are in Table 9b.

Some studies have demonstrated the possible savings and benefits of building codes for residential and commercial buildings. Based on one study in 1998, it is estimated that over a

30-year period, if residential building codes were updated from the 1989 codes to 1993 standards, a State with 373 trillion Btu in residential energy consumption per year could save approximately 65 trillion Btu, which equates to nearly $650 million in savings.[90]

In 1978, California became the pioneer in developing energy efficiency building codes. In the following years, other States developed their own energy codes for buildings and residential homes, hoping to reduce residential and commercial energy costs. Eventually, when the Council of American Building Officials developed its Model Energy Code ("MEC"), more States adopted building codes. The MEC contains energy efficiency criteria for ceilings, walls, floors, lighting, and power systems for new residential and commercial buildings and for additions to existing buildings.

The MEC was first initiated in 1983 and has been updated several times over the past two decades.[91] The Energy Policy Act of 1992 (EPAct 92) required States to study adoption of the MEC for their residential energy codes and the ASHRAE 90.1 standard for their commercial buildings. Many States have either adopted an edition of the MEC or IECC standards for residential buildings codes or have created State-specific standards that are based on either one of them. EPAct 92 also pushed the development and adoption of building codes by many States and allowed the Department of Energy to provide technical assistance and grants to the States' building code programs. Currently, nearly every State and the District of Columbia have at least a minimum residential or commercial building code for energy efficiency.

Current State Building Code Status

Currently, out of the 50 states and the District of Columbia, nine states have voluntary residential standards, 14 have developed state specific mandatory standards, 26 have adopted either IECC or MEC standards, and only two states, South Dakota and Hawaii, do not have any residential building codes. Commercial building codes are mandatory in 40 states, 30 of which have codes based on a version of the IECC or ASHRAE, and the other 10 are state-specific codes. Six states have voluntary commercial building codes, while four states do not have any official building codes for commercial buildings. Three of the states that lack commercial building codes do, however, have regulations for state-owned buildings that are similar to IECC or ASHRAE standards. (See www.bcap-energy.org **for more information.)**

9.3 Tax Incentives

Tax incentives are another tool that States and the Federal government use to promote energy efficiency. Tax incentives lessen the higher up-front costs associated with energy-efficient products and practices, and also lower the net cost of energy-efficient products for consumers by making their price more comparable to less energy-efficient products. States offer numerous tax incentives for energy efficiency, including income tax credits or deductions, sales tax exemptions, and other tax incentives for energy-efficient products and practices. There are also some Federal tax incentives for energy efficiency. Examples of Federal and State tax incentive policies for energy efficiency are provided below.

[90] Prindle, W., Dietsch, N., Elliot, R.N., Kushler, M., Langer, T., Nadel, S. 2003. *Energy Efficiency's Next Generation: Innovation At The State Level.* ACEEE-E031. (Washington, D.C.: American Council for an Energy-Efficient Economy.) November. Available at http://aceee.org/pubs/e031full.pdf?CFID=128539&CFTOKEN=37235316.
[91] U.S. Department of Energy. November 1999. *Codes & Standards: The Model Energy Code.* DOE/GO-10099-934. U.S. Department of Energy Office of Building Technology, State and Community Programs. Available at www.energycodes.gov/implement/pdfs/modelcode.pdf.

9.3.1 Federal Tax Incentives

EPAct 2005 created some new Federal tax incentives for energy-efficient buildings, equipment, and vehicles. Beginning in 2006, the Federal government began offering Federal tax credits ranging from $250 to $3,400 to consumers and businesses that purchase or lease a new hybrid gas-electric car or truck. Additionally, tax credits are available to consumers who install specific energy-efficient windows, insulation, doors, roofs, and heating and cooling equipment in their home (see Table 9c).

Table 9c. Selected EPAct 2005 Tax Credits

Tax Incentive	Description	Duration
Automobile	Income tax credit of $250 - $3,400 for buying or leasing a new hybrid gas-electric car or truck. Amount of credit depends on the fuel economy and weight of the automobile.	January 2006 until each manufacturer sells 60,000 or December 31, 2010
Home Improvements	Tax credit up to $500 for installing qualifying energy-efficient windows, insulation, doors, roofs, and heating and cooling equipment.	January 1, 2006 to December 31, 2007
	Tax credit up to 30%, not exceeding $2,000, of expenditures for purchase of qualified photovoltaic property and solar water heating property intended for other than swimming pool purposes.	January 1, 2006 to December 31, 2007
Business	Tax credit for purchase of hybrid vehicles, building energy-efficient buildings, and improving efficiency of buildings.	January 1, 2006 to December 31, 2007
Biodiesel/Alternative Fuels	Small agri-biodiesel producers can receive 10 cent per gallon tax credit for up to 15 million gallons of agri-biodiesel produced.	January 1, 2006 to December 31,2008
	Fueling stations are eligible to receive a 30% credit on the cost of installing clean-fuel vehicle refueling equipment.	January 1, 2006 to December 31, 2010
Buildings	Tax credit of 30% of the purchase price for the installation of qualified fuel cells, 10% credit for stationary microturbine power plants and 30% credit for qualifying solar equipment.	January 1, 2006 to December 31, 2007
	Tax credit for contractors that construct new energy-efficient homes that save 50% of the energy compared to EPAct standard and meets ENERGY STAR criteria	January 1, 2006 to December 31, 2007
	Tax deduction equal to the cost of energy-efficient equipment installed, with a maximum deduction of $1.80 per square foot of the building plus 60 cents per square foot for subsystems, for commercial buildings that reduce energy and power consumption by 50% compared to ASHRAE 2001 standard.	January 1, 2006 to December 31, 2007
	Tax credit, depending on the efficiency, for the manufacturer of efficient dishwashers, clothes washers, and refrigerators.	All products manufactured from 2006 through 2007

Source: U.S. Department of Energy. The Energy Policy Act of 2005 – Tax Breaks. www.energy.gov/taxbreaks.htm

Businesses can receive tax credits for making energy efficiency improvements to commercial buildings or for constructing new energy-efficient buildings. A building that reduces its annual energy and power consumption by 50 percent, compared to the ASHRAE 2001 standard, will receive a tax deduction equal to the cost of the installation of the energy-efficient equipment up to $1.80 per square foot and additionally a partial deduction of 60 cents per square foot deduction for building subsystems. Other energy efficiency incentives are detailed in Table 9d. Additionally, contractors are eligible to receive tax credits for participating in the construction of energy-efficient homes that save at least 50 percent compared to the EPAct standard.[92]

Table 9d. Examples of EPAct 2005 Tax Incentives for Energy-Efficient Home Improvements

Product Category	Product Type	Tax Credit Specification	Tax Credit
Windows	Exterior Windows	Meet 2000 IECC & Amendments	10% of cost not to exceed $200 total
	Skylights	Meet 2000 IECC & Amendments	10% of cost not to exceed $200 total
	Exterior Doors	Meet 2000 IECC & Amendments	10% of cost not to exceed $500 total
Roofing	Metal Roofs	ENERGY STAR qualified	10% of cost not to exceed $500 total
Insulation	Insulation	Meet 2000 IECC & Amendments	10% of cost not to exceed $500 total
HVAC	Central AC	EER 12.5/SEER 15 split Systems EER12/SEER 14 package systems	$300
	Air source heat pumps	HSPF 9 EER 13 SEER 15	$300
HVAC	Geothermal heat pumps	EER 14.1 COP 3.3 closed loop EER 16.2 COP 3.6 open loop EER 15 COP 3.5 direct expansion	$300
	Gas, oil, propane water heater	Energy Factor 0.80	$300
	Electric heat pump water heater	Energy Factor 2.0	$300
	Gas, oil, propane furnace or hot water boiler	AFUE 95	$150
	Advanced main air circulating fan	No more than 2% of furnace total energy use	$50

Source: U.S. Department of Energy. The Energy Policy Act of 2005 – Tax Breaks. www.energy.gov/taxbreaks.htm

[92] U.S. Department of Energy. 2005. *The Energy Policy Act of 2005: What the Energy Bill Means to You.* U.S. DOE. Available at www.energy.gov/taxbreaks.htm.

9.3.2 State Tax Incentives

Some States, such as Maryland, New York, and Oregon, provide tax breaks for consumers who use green building standards when constructing their homes or businesses. The Green Building Guidelines are commonly referenced by States that develop tax incentives for green buildings.[93] These tax credits reward builders for meeting energy-reduction goals and using environmentally friendly materials when constructing new buildings.

Green Building Guidelines

The Green Building Guidelines assist homebuilders in incorporating environmentally friendly and energy-efficient products and technologies into the building and design of their homes that are cost effective. In addition to energy efficiency, the green building guidelines also address water efficiency, resource efficiency, lot design and preparation, indoor environmental quality, global impact, and the operation, maintenance, and education of the homeowner. Based on these guidelines, points are allocated to the building in one of three levels: bronze, silver, or gold. The gold level is the highest level of green building attainable through the point system.

NAHB Research Center. 2006. Green Home Building Guidelines. NAHB. Available online: *www.nahbrc.org/greenguidelines/index.asp*

In Maryland, a new building must be 35 percent more efficient than the current efficiency levels indicated in the ASHRAE 90.1 1999 energy standard, and the building must meet Maryland Energy Administration criteria to be considered for tax credits. The Maryland Energy Administration uses the Leadership in Energy and Environmental Design (LEED) Silver standards to determine qualifications for green buildings. These standards cover water efficiency, the design process, indoor environmental quality, optimization of energy use, light pollution, and materials and resources for the building.[94]

Leadership in Energy and Environmental Design (LEED)

LEED is a voluntary, consensus-based rating system that the U.S. Green Building Council provides to give standards for the development of energy-efficient and environmentally conscious buildings. Levels of energy performance that are above ASHRAE Standard 90.1-1999 levels contribute to LEED certification of a building. LEED created a standard of measurement for green buildings and helps to promote green building competition with a goal to transform the building market into an energy-efficient, environmental market. There are four levels of LEED: Certified, Silver, Gold, and Platinum which are allocated based on the building's performance in five areas including sustainable sites, water efficiency, energy and atmosphere, materials and resources, and indoor environment quality. LEED is a commonly used guide for green buildings in the United States.

[93] NAHB Research Center. 2006. *Green Home Building Guidelines.* NAHB. Available at www.nahbrc.org/greenguidelines/index.asp.

Other States offer income tax deductions for the interest paid or the sales price of energy efficiency products purchased and installed. Some States, such as Connecticut and South Carolina, offer exemptions from sales tax for the purchase of energy-efficient products and equipment. ENERGY STAR appliances, hybrid automobiles, and high-efficiency water heaters are products commonly exempt from sales tax in many States to encourage the purchase of energy efficiency technologies (see Table 9e).

Table 9e. States With Tax Incentives

	Personal Tax	Corporate Tax	Sales Tax	Property Tax
Arizona	X			
California	X			
Connecticut			X	
District of Columbia	X			
Idaho	X			
Georgia			X	
Massachusetts	X	X		
Maryland	X	X		X
Montana	X	X		
Nevada				X
New York	X	X		
Oklahoma	X			
Oregon	X	X		

Source: Database of State Incentives for Renewable Energy, Financial Incentives for Renewable Energy

9.3.3 State and Federal Program Funding

While the Federal government funds energy efficiency programs that provide State support, State programs often effectively match Federal efforts, whether through direct funding or tax incentives. For example, DOE's State Energy Program (SEP), which provides grants and funding to State energy offices, received $36 million in Federal FY'06 funds; the Federal Low-Income Weatherization Assistance Program received $242 million in Federal FY'06 funds; and the Low-Income Home Energy Assistance Program (LIHEAP), approximately 10% of which are used for low-income weatherization assistance, received $3.2 billion in Federal FY'06 funds. However, States generally invest significant funds in energy projects to match Federal funds and utility efforts. For example, the State contribution for low-income weatherization assistance is approximately $8-10

LIPA's Residential Energy Affordability Partnership Program (REAP)

Long Island Power Authority's (LIPA's) REAP Program provides installation of comprehensive electric energy efficiency measures and energy education and counseling. The program targets customers who qualify for DOE's Low-Income Weatherization Assistance Program (WAP) and electric space heating and cooling customers who do not qualify for WAP and have an income that is no more than 60% of the median household income level. This program has saved 2.5 MW and 21,520 MWh from 1999-2004 with spending of $12.4 M.

Source: LIPA Clean Energy Initiative, Annual Report 2004.

[94] Maryland Energy Administration. 2006. *Green Building Tax Credit.* MEA. Available at www.energy.state.md.us/programs.commercial.greenbuilding.

million annually, and is expected to far exceed those amounts in 2005-2006. Direct State appropriations to the LIHEAP programs have been in the hundreds of millions of dollars for 2005-2006

Summary

As described in this chapter, there are a number of significant mechanisms to promote energy efficiency in addition to utility energy efficiency programs. These include Federal (and State, in some cases) appliance efficiency standards, State building codes, State and Federal tax incentives, as well as other complementary State policies and regulations. EPAct 2005 authorizes additional Federal appliance efficiency standards and Federal tax incentives.

10. Conclusions

Increasing energy prices and environmental concerns are driving policymakers to search for long-range solutions to the energy challenges facing the U.S. The U.S. Congress in the EPAct of 2005. required the Department of Energy to conduct a study of State and regional policies that promote cost-effective utility energy efficiency programs.

Energy efficiency programs can lower consumer costs, help avoid or delay investment in more expensive capital improvements, and provide environmental benefits. States with dynamic energy efficiency programs are achieving real and often significant results. For example, energy efficiency programs established in New York saved more than 1,400 gigawatt hours of electricity and 860 megawatts of peak demand from 2002 to 2004.[95]

Utility energy efficiency programs have faced a number of challenges in recent years, and continue to face challenges going forward.

- The nation would require 43 percent more energy than it does now if it were not for the energy efficiency improvements that have occurred since 1973.[96]
- By the end of 2005, wholesale natural gas prices were five times higher than in the mid-to-late 1990s, and electricity prices have also increased significantly.
- Energy efficiency is impeded by a number of market barriers, including high first costs, high information or search costs, and split incentives.
- Utilities face several barriers to adopting utility energy efficiency programs including cost recovery, information, and throughput, i.e., the impetus for utilities to increase revenues by increasing sales.
- Spending on utility energy efficiency programs declined significantly in the late 1990s and remained relatively flat, but increases in similar programs administered by States rather than utilities have replaced some of the reduced utility spending.
- Markets are not likely to provide meaningful incentives for energy efficiency programs—proactive government policies or incentives are required.
- Various tools and methods for evaluating the effectiveness of utility energy efficiency programs have emerged that appear to provide meaningful results and can be valuable in identifying cost-effective programs and program implementation issues.
- Energy efficiency may help offset the need for investments in generation, transmission, and distribution, and can provide various ancillary services that are necessary to protect grid reliability.
- Stable and predictable funding via cost recovery, systems benefits charges, rate surcharges, or other regulatory mechanisms is critical to the success of energy efficiency initiatives.
- States and the Federal government have adopted a number of complementary policies to encourage energy efficiency, such as appliance energy efficiency standards, building codes, and tax incentives. The enactment of EPAct 2005 also provided Federal tax incentives and the setting of new Federal efficiency standards for a number of products.

[95] NYSERDA Evaluation p. ES-9
[96] *Testimony of Kateri Callahan, President, Alliance to Save Energy, Before the House Appropriations Subcommittee on Energy and Water Development.* March 16, 2006. Available at http://www.ase.org/content/article/detail/3047.

Energy efficiency is a valuable and underutilized resource available to State energy regulators, planners, and policymakers as well as governing boards of non-State-regulated utilities. [97] Greater investment in energy efficiency is a cost-effective way to balance growing energy demands in an era of diminishing and costly energy supplies.

The overarching conclusion of this study is that State policies should capitalize on the opportunities to use low-cost energy efficiency as a means to meet growing energy demands and enhance system reliability.

The support and implementation of utility energy efficiency programs is an important consideration for energy policy at the State level, as well as by governing boards of non-State-regulated utilities.

Energy Efficiency Program Evaluations (Chapter 3)

It is within the State's best interest to establish a framework for evaluating energy efficiency programs and to establish the criteria upon which these programs will be measured. A State may also wish to establish technical protocols for measuring, verifying, and reporting energy and capacity savings to more effectively and reliably determine if energy efficiency policies and programs meet specific energy, economic, or environmental goals.

Conclusion 1:

Regulators should consider establishing a formal evaluation framework for utility energy efficiency programs in order to generate reliable, consistent, and transparent data measuring the energy savings of energy efficiency projects. The framework should use simplified techniques when applicable, such as deemed savings or benchmarking for appliance upgrades.

In circumstances where energy efficiency is used as a system resource, planners and regulators will need to have confidence in the program's results. Furthermore, where there is regional coordination in energy resource planning, the evaluation results from energy efficiency programs will also need to be comparable from State to State.

Conclusion 2:

States involved in regional planning may want to design common evaluation protocols that produce reliable and consistent results. Because energy efficiency programs vary state-by-state, M&V protocols adopted by each state should account for these differences.

[97] Conclusions in this study at the State level apply as well to non-State-regulated utilities (i.e., most publicly-owned electric and gas utilities and rural electric cooperatives) and their governing boards.

Infrastructure Planning and Energy Efficiency (Chapter 5)

Regulators can support energy efficiency to meet system needs, even across service territories. While resolving cost allocation issues can be difficult, regulators can master this challenge by encouraging the energy efficiency strategies that address system deficiencies most effectively.

> **Conclusion 3:**
>
> **Utilities, states, and other parties should consider integrating energy efficiency and demand response into electric and natural gas system planning, rather than expecting that cost-effective energy efficiency will happen independently of infrastructure planning and investment.**

When siting electric power lines, States can require that applicants demonstrate that they have evaluated energy efficiency resources that might also address system deficiencies. Further, a State can require an all-resource request for proposals to address forecasted system deficiencies as they are identified, long before infrastructure development becomes the presumed solution. Utilities should consider trials of modified planning methods through pilots.

> **Conclusion 4:**
>
> **As part of the state permitting or resource procurement process, states should consider requiring the consideration of energy efficiency as a resource. Utilities can be asked to demonstrate that cost-effective energy efficiency programs have been fully utilized prior to the decision to build or purchase additional generation or transmission resources.**

Organizations that are involved in regional electricity planning can assess the regional benefits of energy efficiency resources. These benefits may be described generally, primarily addressing resource adequacy, or they may target geographic locations, primarily addressing stability and congestion. Where regional planning does not occur, or for sub-regions that are clearly under the responsibility of distribution companies, utilities would have to assume the type of planning discussed in the previous suggestion.

> **Conclusion 5:**
>
> **Organizations and groups involved in regional power planning should consider demand resources, including energy efficiency, as part of their assessment of loads and resources within their respective systems.**

As is discussed in Sections 5.2 and 5.6, planning and markets both influence a utility's decision to invest in particular electric system resources. It is possible, but not certain, that energy efficiency will be valued as a system resource solution.

Regional electric system planning is done mostly by regional transmission organizations and utilities. Public entities such as Bonneville Power Administration, Tennessee Valley Authority, and multi-state G&T cooperatives also have these responsibilities under their own authority.

Regional planners can promote a planning and investment climate that assures that the value of energy efficiency is broadcast to the market and to utilities.

Funding Utility Energy Efficiency Programs (Chapter 6)

Establishing a source of funds or rate mechanism through which utilities can recover the costs of implementing energy efficiency programs is a necessary step for a State policy on utility energy efficiency programs.

Conclusion 6:

States without a source of funds dedicated to implementing electric and natural gas energy efficiency should consider, through legislation or regulatory proceedings, determining the preferred mechanism for funding energy efficiency programs.

One option for ensuring an adequate funding source is to include the funds for energy efficiency within a regulated utility's revenue requirement. The level of funding could be determined according to an energy efficiency potential study that would be submitted as part of a utility rate filing or as part of an Integrated Resource Plan. Regulators will want to set the funding level in conjunction with a broader strategy for utility, State, and regional resource planning.

Conclusion 7:

States should consider conducting a study of the energy efficiency potential in their state and/or region in order to better determine potential cost-effective and achievable energy savings and the appropriate level of funding needed to meet these goals.

Rate Structures and Incentives (Chapter 7)

Innovative rate mechanisms can be used to address utility concerns regarding full cost recovery or a return on investment for implementing energy efficiency programs, as well as the financial consequences of losing revenue because energy efficiency programs decrease electricity sales. Utilities should receive appropriate compensation for prudent investments in energy efficiency programs that benefit customers.

Conclusion 8:

Regulators should consider reviewing and assessing existing rate structures to ensure they provide utilities full cost recovery for approved and effective energy efficiency programs.

States should consider rate structures that provide utilities with positive financial incentives for offering energy efficiency programs and that allow utilities to recover prudently incurred costs for operating cost-effective energy efficiency programs. When a utility seeks rate adjustments for energy efficiency programs in order to recover costs, the rate case may also provide an opportunity for the oversight and modification of energy efficiency programs.

Conclusion 9:

Regulators should consider allowing utilities' returns at least as great from prudent investments in energy efficiency as from supply-side investments. States should also consider capitalizing energy efficiency program costs to reduce the initial impact on rates to facilitate appropriate investment.

Utility revenues rise when electricity sales increase, thereby potentially acting as a disincentive for utility energy efficiency programs. The so-called "throughput incentive" can be reduced in several ways: anticipating the sales impacts of energy efficiency in rate cases, adjusting rates between rate cases to compensate for the sales impacts of additional energy efficiency programs, and partially or fully separating utility revenues from sales between rate cases.

Conclusion 10:

Regulators should consider rate structures under which utilities' profits are not hurt by programs that save energy and thus reduce their sales. Several different approaches are available that differ in the ease of implementation and stability of rates, bills, and utility revenues.

While utility rates may be adjusted to overcome barriers to utility energy efficiency programs, utility rates may also be used to overcome barriers to customer implementation of energy efficiency programs, thereby complementing and enhancing utility energy efficiency programs.

Conclusion 11:

Regulators and utilities should consider establishing rate designs and alternative financing options (as well as programs) that encourage end-use energy efficiency, such as inclining tier block rates, rate discounts for energy efficiency, benefit sharing, and on-bill financing (pay-as-you-save).

Energy Efficiency Performance Requirements (Chapter 8)

Setting performance requirements for utility energy efficiency programs is a performance-based approach to energy efficiency that can be applied to regulated utilities, publicly-owned or cooperatively-owned utilities, and retail energy providers under competition. An energy efficiency performance requirement can either be made part of or complement generation portfolio standards for renewables or other supply-side resources. If States are concerned that efficiency will crowd out renewables under a combined requirement, and they want to protect emerging renewables technologies, they can limit the use of energy efficiency to meet the overall standard.

Conclusion 12:

States should consider adopting performance requirements or minimum energy savings targets for electric and natural gas utility end-use energy efficiency programs. An energy efficiency performance requirement can complement or be made part of generation portfolio standards for renewables or other supply-side resources.

Performance requirements or minimum energy savings targets should be flexible and broadly applicable for investor-owned utilities, publicly-owned or cooperatively-owned utilities, and retail energy providers under competition. The benefits of this approach may be maximized if the utility is given flexibility in how to meet the requirements, such as allowing credit trading and including clean and efficient distributed generation as an eligible resource.

APPENDIX A

MEMBERS OF THE NATIONAL ACTION PLAN FOR ENERGY EFFICIENCY

A. Appendix: MEMBERS OF THE NATIONAL ACTION PLAN FOR ENERGY EFFICIENCY

Members of the National Action Plan for Energy Efficiency [98]		
Co-Chairs		
Marsha Smith		Jim Rogers
Commissioner, Idaho Utilities Board 1st Vice President, National Association of Regulatory Utility Commissioners		President and Chief Executive Officer, Duke Energy

Leadership Group		
Barry Abramson	Senior Vice President	Servidyne Systems, LLC
Angela S. Beehler	Director of Energy Regulation	WAL-MART Stores, Inc.
Bruce Braine	Vice President- Strategic Policy Analysis	American Electric Power
Jeff Burks	Director of Environmental Sustainability	PNM Resources
Kateri Callahan	President	Alliance to Save Energy
Glenn Cannon	General Manager	Waverly Light and Power
Jorge Carrasco	Superintendent	Seattle City Light
Lonnie Carter	President and Chief Executive Officer	Santee Cooper
Mark Case	Vice President for Business Performance	Baltimore Gas and Electric
Gary Connett	Manager of Resource Planning and Member Services	Great River Energy
Larry Downes	Chairman and Chief Executive Officer	New Jersey Natural Gas (New Jersey Resources Corporation)
Roger Duncan	Deputy General Manager, Distributed Energy Services	Austin Energy
Angelo Esposito	Senior Vice President Energy Services and Technology	New York Power Authority
TBD		New York State Public Service Commission
Jeanne Fox	President	New Jersey Board of Public Utilities
Anne George	Commissioner	Connecticut Department of Public Utility Control
Dian Grueneich	Commissioner	California Public Utilities Commission
Blair Hamilton	Policy Director	Vermont Energy Investment Corporation
Leonard Hayes	Executive Vice President Supply Technologies Renewables and Demand Side Planning	Southern Company
Mark Healy	Consumer Counsel for the State of Connecticut	CT Consumer Counsel
Helen Howes	Vice President Environmental Affairs	Exelon
Chris James	Air Director	Connecticut Department of Environmental Protection
Bruce Johnson	Director, Energy Management	Keyspan
Ruth Kinzey	Director of Corporate Communications	Food Lion
Rick Leuthauser	Manager of Energy Efficiency	MidAmerican Energy Company
Mark McGahey	Manager	Tri-state Generation and Transmission Association Inc.
Ed Melendreras	Vice President, Sales and Marketing	Entergy Corporation
Janine Midgen-Ostrander	Consumers' Counsel	Office of the OH Consumers' Counsel
Richard Morgan	Commissioner	District of Columbia Public Service Commission
Brock Nicholson	Deputy Director Division of Air Quality	North Carolina Air Office

[98] National Action Plan for Energy Efficiency membership as of February 2007. For an updated list of membership, please visit http://www.epa.gov/cleanenergy/eeactionplan.htm.

Pat Oshie	Commissioner	Washington Utilities and Transportation Commission
Douglas Petitt	Vice President Governmental Affairs	Vectren Corporation
Bill Prindle	Deputy Director	American Council for an Energy-Efficient Economy
Phyllis Reha	Commissioner	Minnesota Public Utilities Commission
Roland Risser	Director Customer Energy Efficiency	Pacific Gas and Electric
Gene Rodrigues	Director Energy Efficiency	Southern California Edison
Art Rosenfeld	Commissioner	California Energy Commission
Jan Schori	General Manager	Sacramento Municipal Utility District
Larry Shirley	Division Director	North Carolina Energy Office
Michael Shore	Senior Air Policy Analyst	Environmental Defense
Gordon Slack	Energy Business Director	The Dow Chemical Company
Tim Stout	Vice President, Energy Efficiency	National Grid
Deb Sundin	Director Business Product Marketing	Xcel Energy
Dub Taylor	Director	Texas State Energy Conservation Office
Paul von Paumgartten	Director Energy and Environmental Affairs	Johnson Controls
Brenna Walraven	Executive Director	USAA Realty Company
Devra Wang	Director, California Energy Program	Natural Resources Defense Council
Steve Ward	Public Advocate	State of Maine
Mike Weedall	Vice President Energy Efficiency	Bonneville Power Administration
Tom Welch	Vice President External Affairs	PJM
Jim West	Manager of Energy Right	Tennessee Valley Authority
Zac Yanez	Program Manager	Puget Sound Energy
Henry Yoshimura	Manager Demand Response	ISO New England
	Observers	
Keith Bissell	Attorney	Gas Technology Institute
James W. (Jay) Brew	Counsel	Steel Manufacturers Association
Roger Cooper	Executive Vice President Policy and Planning	American Gas Association
Dan Delurey	Executive Director	Demand Response Coordinating Committee
Roger Fragua	Deputy Director	Council of Energy Resource Tribes
Jeffrey Genzer	General Counsel	National Association of State Energy Officials
Donald Gilligan	Predicate LLC	National Association of Energy Service Companies
Chuck Gray	Executive Director	NARUC
John Holt	Senior Manager of Generation and Fuel	NRECA
Lisa Jacobson	Executive Director	Business Council for Sustainable Energy
Joseph Mattingly	Vice President, Secretary and General Counsel	Gas Appliance Manufacturers Association
Kenneth Mentzer	President and Chief Executive Officer	NAIMA
Christina Mudd	Executive Director	National Council on Electricity Policy
Ellen Petrill	Director of Public/Private Partnerships	Electric Power Research Institute
Alan Richardson	President and Chief Executive Officer	APPA
Steven Rosenstock	Manager Energy Solutions	Edison Electric Institute
Diane Shea	Executive Director	National Association of State Energy Officials
Rick Tempchin	Director, Retail Distribution Policy	Edison Electric Institute
Mark Wolfe		National Energy Assistance Directors' Association
	Sponsors	
Stacy Angel	Program Manager	Climate Protection Partnerships Division, Office of Air and Radiation, U.S. Environmental Protection Agency
Larry Mansueti	Director, State and Regional Assistance	Office of Electricity Deliverability and Energy Reliability, U.S. Department of Energy

APPENDIX B

EXAMPLES OF UTILITY ENERGY EFFICIENCY PROGRAMS

B. Appendix: Examples of Utility Energy Efficiency Programs

B.1. Technical Training

Energy Training Center

Pacific Gas & Electric (PG&E) has an energy efficiency training facility, the Energy Training Center, which provides hand-on labs and information for contractors, builders, and other targeted groups in California.

Technical training programs can be applied to support the residential, commercial, and industrial sectors. Technicians, such as commercial lighting experts, can be trained to understand the energy-use implications of using various products as well as more energy-efficient installation practices. Salespeople can be trained to explain the long-term economic benefits of more energy-efficient equipment, making these products more attractive to customers. Utilities can provide training and information to suppliers and contractors to encourage contractors to use energy-efficient products and measures when constructing, remodeling, or repairing homes, businesses, or industrial facilities. Overall, providing technical training for energy efficiency to technicians, salespeople, and contractors may increase the awareness of energy efficiency programs and make it easier for more consumers to participate in energy efficiency activities.

NYSERDA Commercial Lighting Program

NYSERDA's Small Commercial Lighting Program provides training and guidance on designing and installing energy-efficient lighting in commercial buildings, and offers financial incentives to lighting distributors, contractors, and designers to sell more energy-efficient designs and technologies to their customers. As of October 2004, more than 640 lighting professionals had been trained with a net savings of 17 GWh per year and demand reduction of 4 MW.

New York Energy $mart Program Evaluation and Status Report, Final Report, May 2005, p. 5-174

Some common training programs include those for energy-efficient lighting and heating, ventilation, and air conditioning (HVAC). Commercial lighting experts are trained to design and install lighting systems that result in better lit spaces with lower energy use. Designers learn how to incorporate energy-efficient technologies into creative interior designs and electricians are trained on the installation of high-efficiency lighting technologies and applications, lighting maintenance, and disposal. HVAC training might include correctly sizing HVAC units, system design, electrical controls wiring and use, performance testing, duct sealing, and repair methods for technicians.

TXU's Technical Training Program

TXU Energy, a retail electric provider in Texas, has participated in an Air Conditioning Installer & Training Market Transformation Program since 2004. This technical training program is designed to encourage improved installation practices for heating, ventilation, and air conditioning equipment.[99] In Texas, a home's air conditioning can account for up to 40 percent of a customer's electricity bills.[100]

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[99] TXU Energy. 2006. *Air Conditioning Installer Program.* TXU Electric Delivery. Available at www.oncorgroup.com/electricity/teem/ac_installer/default.asp.

[100] City of Austin. 2001. *Air Conditioning.* Green Living through Education: Austin City Connection. Available at www.ci.austin.tx.us/greenbuilder/glfs_airconditioning.htm.

These types of training programs help increase the market penetration of high-efficiency air conditioning equipment because they encourage contractors to use this equipment. Since air conditioning and ventilation are significant users of energy, it can be cost effective for utilities to create technical training courses specifically designed for contractors who use high-efficiency equipment for customer installation.

B.2. Rebates

Financial incentives in the form of rebates for energy efficiency purchases provide consumers with a reduced initial cost of purchasing high-efficiency products and facilities. A rebate provides retail savings for customers when purchasing energy efficiency equipment. Rebates assist in making the highly efficient product, which is usually more expensive than a low efficiency product, more economically attractive to consumers and encourages them to replace old, inefficient products and technologies with new, more efficient equipment.

Rebate programs are common with household appliances such as high-efficiency refrigerators, air conditioning equipment, lighting, and washing machines. Many utilities offer consumers rebates for purchases of ENERGY STAR labeled appliances and technologies. Additionally, utilities provide rebates to consumers for updating HVAC systems by installing high efficiency heat pumps and air conditioning.

In addition to rebates, States may provide manufacturers with financial incentives to produce more energy-efficient products for consumers, which lead to more products in the marketplace that qualify for rebates. California, for example, offers incentives to manufacturers to increase the supply to energy efficiency lighting and appliances to consumers.[101]

Utilities may offer two types of rebates; standard and customized. Standard rebates, which are based on the level of energy efficiency created by the equipment purchased, provide consumers with quick and easy access to funding for common energy efficiency improvements to their homes or businesses. Custom rebates, which are specifically tailored for a customer, can provide grants up to 70 percent of the cost to install energy efficiency projects or contribute to the reduction of the cost of construction, upgrading, and retrofitting.[102]

Results from Rebates

The three investor-owned utilities in California take part in a state-wide rebate program known as the Single Family Home Energy Efficiency Rebate (HEER) program, which provides rebates on certain home products such as heating, air conditioning and ventilation equipment, appliances, and pool pumps. Consumers, both residential and business, reported a high degree of satisfaction with these programs. By November 2005, PG&E's rebate programs had generated cumulative energy savings that were well over the set targets, all of which met state cost-effectiveness requirements. The goal of saving annual kilowatt-hours of approximately 399,000,000 was surpassed by about 20,000,000 kilowatt-hours. Also, the programs exceeded established goals for natural gas reductions of 6,305,969 therms per year by 115 percent.

Pacific Gas & Electric Company. 2006. Energy Efficiency Program Monthly Reports: Single Family Energy Efficiency Rebate. Program No. 1115-04. www.pge.com/rebates/program_evaluation/montly_reports

101 California Energy Commission, "Green California Energy Programs." Available at www.green.ca.gov/EnergyPrograms/Rebates.htm. Accessed May 23, 2006.

102 Puget and Energy, 2006. "Efficiency Programs and Rebates Grant Programs-Introduction." Available at www.pse.com/solutions/For Business_Efficiency Programs.uspx

Some reports indicate that utilities believe that rebates by themselves have not been able to provide the desired amount of energy efficiency savings because of lower-than-expected participation rates. Rebate programs can have free-rider problems, meaning that people who received rebates for purchasing energy-efficient equipment would have purchased the items even if the rebate was not offered. To keep free-riding to a minimum, successful rebate programs have created more specific standards for appliances and equipment to qualify for rebates. However, there are successful rebate programs that have been cost effective, with little free-riding. These rebate programs usually have a simple application process, effective marketing, and an active involvement with the equipment dealers and other trade allies.[103]

NEEP's Rebate Program

The Northeast Energy Efficiency Program (NEEP) operates a commercial HVAC initiative, Cool Choice, which is part of several utility energy efficiency portfolios. Cool Choice seeks to replace old, inefficient HVAC equipment with high-efficiency commercial HVAC systems that lessen air conditioning electricity consumption and costs. Depending on where the demand reductions occur, Cool Choice may also contribute to easing transmission congestion by reducing electricity consumption from air conditioners. Cool Choice provides rebates to consumers who purchase approved HVAC units ranging from $73 per ton to $92 per ton. In 2003, over 2,570 rebates were paid through the Cool Choice program, which contributed to a reduction in load of 5,615 kilowatts equating to 4,881,900 kilowatt-hours or $586,000 saved a year.[104]

An Example of a Simple Program

Seattle City Light's $mart Business program offers a "per-fixture" rebate for specific fixtures in existing small businesses. Customers can use their own licensed electrical contractor or select from a pre-approved contractor list. Seattle City Light provides the rebate to either the installer or participating customer upon completion of the work. Completed work is subject to on-site verification. Seattle City Light's $mart Business program has cumulative savings (for all measures) of 79,382 MWh.

Source: Energy Conservation Accomplishments: 1977-2004, Seattle City Light 2005

B.3. Performance-Based Incentives and Contracts

Performance-based incentives provide a financial incentive for decreasing energy usage through energy-efficient equipment. These incentives reward consumers for actively using their energy-efficient products and systems (whereas rebates reward consumers for only purchasing the equipment). Performance-based incentives contribute directly to the decrease in energy usage. These incentives are typically aimed at industrial and commercial business consumers. Utilities may give consumers who use energy-efficient technologies a specific financial incentive for each kilowatt reduced in their load or for decreasing their electricity usage by a specified percentage.

[103] Gillingham, K., Newell, R., Palmer, K., June 2004. *Retrospective Examination of Demand-Side Energy Efficiency Policies.* RFF DP 04-19 REV. (Washington, D.C.: Resources for the Future.) Revised September.
[104] Linn, Jon. Second Quarter 2004. *Regional HVAC Initiative Helps Reduce Demand, Improve System Reliability.* NEEP Notes. Available at www.neep.org/newsletter/Sq2004/coolchoice.htm.

Performance-Based Contracts

Performance-based contracts are another type of financial incentive program that utilities use to promote energy efficiency. Utilities may partner with Energy Service Companies (ESCOs) to implement these programs. An ESCO is a business that installs, finances, and develops projects that improve the energy efficiency of a facility over a specified time period, typically ten or more years. ESCOs work under performance-based contracts for a customer of a utility to assist the customer in obtaining energy savings that translate into dollar savings. An ESCO provides comprehensive projects that include efficiency measures such as high efficiency lighting, heating and air conditioning, efficient motors and variable speed drives, and centralized energy management systems. The compensation and financing of an ESCO project are directly linked to the amount of energy saved. Typically, consumers must initially make a large capital investment, with savings being realized in the long run. [105] Under performance-based contracts, the initial capital investment is made by the ESCO, and the ESCO is repaid over time from the savings achieved.

ESCOs provide a variety of services that lead to savings. For example, if the performance-based energy efficiency projects under the ESCO contract include maintaining the high-efficiency equipment, the customer will see savings from reduced maintenance costs in addition to their reduced energy costs. The ESCO may also provide specialized training for maintaining the energy equipment after the contract expires. Additionally, ESCOs provide education services to customers about the pattern of their energy use so that customers can fully understand the benefits of implementing and maintaining energy efficiency programs. Overall, a majority of ESCO projects are cost effective, in that they have a benefit/cost ratio of greater than one.[106]

New York Commercial/Industrial Performance Program (CIPP)

Sponsored by the New York State Energy and Research Administration (NYSERDA), the CIPP provides incentives to Energy Service Companies (ESCOs) and other contractors through a standard performance contract to promote energy efficiency capital improvement projects for commercial, industrial, school, and government sectors. An evaluation by NYSERDA found that from the implementation of CIPP in January 1999 through December 31, 2004, the 174 participating ESCOs, contractors, and manufacturers in the program created a net savings of approximately 515 gigawatt-hours annually. Also, over the same time period, NYSERDA estimates that the program generated a summer peak demand reduction of 75 megawatts a year.

B.4. Direct Installation

In direct installation programs, the utility installs energy-efficient equipment at the residence or business. It may be less expensive for the utility to directly install energy-efficient equipment and measures than to develop a program dependent on consumer action and third-party installers. Some utilities will directly install efficiency equipment for consumers during an energy audit of

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105 National Association of Energy Service Companies, 2005. *What is an ESCO?* Available at www.naesco.org/about/esco.htm.

106 Osborn, J., C. Goldman, and N. Hopper, LBNL, and T. Singer, NAESCO, August 2002, *Assessing U.S. ESCO Industry Performance and Market Trends: Results from the NAESCO Database Project*. LBNL-50304. (Lawrence Berkeley National Laboratory); and Hopper, N., C. Goldman, and J. McWilliams (Lawrence Berkeley National Laboratory), D. Birr (Synchronous Energy Solutions), K. McMordie Stoughton (Pacific Northwest National Laboratory). 2005. *Public and Institutional Markets for ESCO Services: Comparing Programs, Practices and Performance.* (Lawrence Berkeley National Laboratory.) LBNL-55002. March.

the customer's facility. The direct installation program allows the utility to access consumers that would not be able to afford energy efficiency installations.

Utilities may install a large number of different appliances and technologies that, such as water saving devices, high-efficiency refrigerators, air conditioning filters, and systems to monitor the usage of major appliances, and simple measures such as set back thermostats, freezer and refrigerator thermometers, pipe insulation, and the replacement of light bulbs with more energy-efficient ones. Utilities may offer direct installation at no cost to the consumer, pay for a large percentage of the cost of implementing the energy-efficient equipment, or provide rebates and cost-sharing arrangements. However, direct installation of energy efficiency equipment can be time-consuming, which can limit the amount of consumers that can receive this service each year.[107]

Massachusetts Electric Company's Direct Installation Program

Some utilities have programs that will install low-cost, energy-efficient measures in low-income housing or remote community areas to help increase cost savings and efficiency. The Massachusetts Electric Company conducted an energy audit and direct installation program in 1996 and 1997 for high-consumption, low-income consumers. Along with providing consumers with energy information booklets, the utility installed compact fluorescent lights, air conditioning filters, and low-flow showerheads and replaced high-energy use refrigerators with more efficient ones. Over the course of the two years, 1,340 households were serviced and approximately 973 kilowatt-hours of net energy were saved annually per household.[108]

Neighborhood Blitz

A "neighborhood blitz" is when utilities target specific neighborhoods to install low-cost efficiency measures and to perform other services in low-income customer areas. United Illuminating in Connecticut operated a neighborhood blitz between 1990 and 1995 to install compact fluorescent lights, water heater wraps, pipe insulation, water heater temperature setbacks, low-flow showerheads, and faucet aerators in the homes of low-income consumers. The program saved an estimated 2.1 gigawatt-hours, each year, or $0.032 per kilowatt-hour for an annual budget of $534,550.[109]

B.5. Financing

Utilities may offer loans and other subsidized financing for energy-efficient measures, based on the potential savings that will result from energy efficiency improvements to homes or businesses. Some utilities have created new home loan programs that provide loans to residential consumers that purchase new, energy-efficient homes. Additionally, utilities have created loans for residential and commercial consumers who install energy efficiency equipment to their facilities. Some residential consumers are able to qualify for lower interest rate mortgages if their homes meet certain energy efficiency standards. Some studies have shown that consumers have little interest in subsidized loans, but prefer larger financial incentives to

[107] Gillingham, K., Newell, R., Palmer, K., June 2004, *Retrospective Examination of Demand-Side Energy Efficiency Policies.* RFF DP 04-19 REV. (Washington, D.C.: Resources for the Future.) Revised September.
[108] Southwest Energy Efficiency Project. *Low-Cost/No-Cost Energy Efficiency Measures: Neighborhood Blitz, Direct Install and Conservation Kit Programs.* Available at www.swenergy.org.
[109] Ibid.

entice them to purchase energy-efficient equipment, decrease their demand for energy, or invest in energy-efficient measures.[110]

Mortgage Financing Incentives

Home mortgage companies have become involved in energy efficiency by offering homeowners financial incentives to purchase energy-efficient homes. Fannie Mae, the nation's largest source for financing home mortgages, teamed up with Portland General Electric (PGE) and some Oregon housing and energy agencies to promote a program, Oregon Sustainability Solutions Alliance, which encourages the construction and ownership of energy-efficient homes. Fannie Mae also offers a mortgage financing incentive, known as Home Performance Power, for home buyers of energy-efficient homes. This incentive allows the homebuying power of a consumer to increase because it includes the energy and utility savings expected from the energy-efficient home in the qualifying mortgage calculation. The mortgages provided by Fannie Mae through the Home Performance Power program allow homebuyers to receive larger mortgages or reduce or eliminate down payment requirements, as well as provide a three percent borrower contribution for closing costs.[111]

Along with other organizations, Fannie Mae has created an Energy Efficient Mortgage (EEM) that allows borrowers to qualify for larger mortgages on energy-efficient homes. The EEM increases the home buying power of a wider income range by recognizing the money saved in energy costs and factoring that amount into their mortgage qualification calculation. For example, if a home is evaluated to save $2,500 annually from its energy efficiency, then Fannie Mae will include that amount directly into the consumer's mortgage qualification calculation.[112] EEM is a financial incentive for homebuyers that encourages the purchase of energy-efficient homes and increases the ability of many to achieve homeownership. Also under the EEM program, Fannie Mae offers loans at competitive rates to homeowners for the purpose of retrofitting their homes to be more energy-efficient.[113]

Pay As You Save (PAYS)

Another financing method available to consumers in some regions is known as Pay As You Save (PAYS). These programs allow energy consumers to finance the purchase of approved energy efficiency appliances, services, and devices on their electric bill by eliminating the up-front costs of energy efficiency products. A PAYS program is offered by the Public Service Company of New Hampshire (PSNH) and the New Hampshire Electric Cooperative. Under the program, PSNH pays all of the installation and purchase costs for approved energy efficiency appliances and measures. Therefore, the consumer avoids the high initial cost of energy efficiency measures, which is a common barrier to increasing participation in energy efficiency programs. The costs of installation and purchase are repaid through a monthly charge that is added onto the consumers' electric bill. PSNH also provides a financing program for small

[110] Gillingham, K., Newell, R., Palmer, K, June 2004, *Retrospective Examination of Demand-Side Energy Efficiency Policies.* RFF DP 04-19 REV. (Washington, D.C.: Resources for the Future.) Revised September.
[111] Fannie Mae, November 19, 2001, *Governor John Kitzhaber, Portland General Electric, and Fannie Mae Announce Statewide Alliance to Promote Resource-Efficient Mortgages and Home Building.* (Fannie Mae News Release.) Available at www.fanniemae.com/newsrelease/2001/1638.jhtml?p=Media&s=News+Releases.
[112] Fannie Mae. June 14, 2004, *New Incentives for Charlotte Area Home Buyers to Purchase Environmentally Efficient Homes.* (Fannie Mae News Release.) Available at www.fanniemae.com/newsrelease/2004/3148.jhtml?p=Media&s=News+Releases.
[113] Fannie Mae, 2005, *Energy Efficient Mortgage At A Glance: Conserve energy, save money, and live comfortably.* (Fannie Mae Energy Efficient Mortgage.) Available at www.efanniemae.com/sf/mortgageproducts/pdf/eemataglance.pdf.

businesses that upgrade lighting, install electric hot water measures and programmable thermostats, building controls, and other energy-efficient technologies. The utility assists in funding the installations and upgrades to the businesses' energy usage equipment through the Small Business Retrofit Program.[114]

B.6. Free Energy Audits and Other Direct Utility Assistance

To promote energy efficiency measures, utilities may provide free energy efficiency measures and assistance to consumers, which range from installing and providing energy efficiency equipment at no charge, to performing free energy audits, and providing advice and education. For example, free energy audits help identify the consumer's energy use and may reveal measures that can be taken to reduce the customer's energy usage. Utilities may also provide mechanisms that allow consumers to reduce their demand of energy, such as planting deciduous trees to block sunlight in the summer but allow sunlight in the winter after the leaves fall off.

Austin Energy
Home Performance with ENERGY STAR

Austin Energy's Home Performance with ENERGY STAR program takes an innovative whole-house approach to improving the comfort and energy efficiency of existing homes. Qualified contractors perform a top-to-bottom energy inspection of the home and make customized recommendations for improvements. These may include measures such as: air sealing and duct sealing, adding insulation, installation of energy-efficient lighting, and if needed, new HVAC equipment or windows. In 2005, Austin Energy served over 1400 homeowners with the Home Performance with ENERGY STAR program, with an average savings per customer of $290 per year. Collectively, Austin Energy customers saved an estimated $410,000 and more than 3 megawatts.

Source: 2006 ENERGY STAR Awards

[114] Public Service Company of New Hampshire, 2006, *Efficiency Programs – Business.* PSNH. Available at www.psnh.com/Business/Efficiency/default.asp; and New Hampshire Office of Energy and Planning, November 29, 2001, *New Hampshire Electric Cooperative and Public Service Company of New Hampshire Pilot Pay-As-You-Save Energy Efficiency Program: Order Implementing Pilot Program.* Order No. 23,851. Available at http://nh.gov/oep/programs/energy/pays.htm.

APPENDIX B

A NATIONAL ACTION PLAN FOR ENERGY EFFICIENCY: EXECUTIVE SUMMARY

National Action Plan for Energy Efficiency

A PLAN DEVELOPED BY MORE THAN 50 LEADING ORGANIZATIONS IN PURSUIT OF ENERGY SAVINGS AND ENVIRONMENTAL BENEFITS THROUGH ELECTRIC AND NATURAL GAS ENERGY EFFICIENCY

JULY 2006

The goal is to create a sustainable, aggressive national commitment to energy efficiency through gas and electric utilities, utility regulators, and partner organizations.

Improving energy efficiency in our homes, businesses, schools, governments, and industries—which consume more than 70 percent of the natural gas and electricity used in the country—is one of the most constructive, cost-effective ways to address the challenges of high energy prices, energy security and independence, air pollution, and global climate change.

The U.S. Department of Energy and U.S. Environmental Protection Agency facilitate the work of the Leadership Group and the National Action Plan for Energy Efficiency.

Executive Summary

This National Action Plan for Energy Efficiency (Action Plan) presents policy recommendations for creating a sustainable, aggressive national commitment to energy efficiency through gas and electric utilities, utility regulators, and partner organizations. Such a commitment could save Americans many billions of dollars on energy bills over the next 10 to 15 years, contribute to energy security, and improve our environment. The Action Plan was developed by more than 50 leading organizations representing key stakeholder perspectives. These organizations pledge to take specific actions to make the Action Plan a reality.

A National Action Plan for Energy Efficiency

We currently face a set of serious challenges with regard to the U.S. energy system. Energy demand continues to grow despite historically high energy prices and mounting concerns over energy security and independence as well as air pollution and global climate change. The decisions we make now regarding our energy supply and demand can either help us deal with these challenges more effectively or complicate our ability to secure a more stable, economical energy future.

Improving the energy efficiency[1] of our homes, businesses, schools, governments, and industries—which consume more than 70 percent of the natural gas and electricity used in the country—is one of the most constructive, cost-effective ways to address these challenges.[2] Increased investment in energy efficiency in our homes, buildings, and industries can lower energy bills, reduce demand for fossil fuels, help stabilize energy prices, enhance electric and natural gas system reliability, and help reduce air pollutants and greenhouse gases.

Despite these benefits and the success of energy efficiency programs in some regions of the country, energy efficiency remains critically underutilized in the nation's energy portfolio.[3] Now we simultaneously face the challenges of high prices, the need for large investments in new energy infrastructure, environmental concerns, and security issues. It is time to take advantage of more than two decades of experience with successful energy efficiency programs, broaden and expand these efforts, and capture the savings that energy efficiency offers. Much more can be achieved in concert with ongoing efforts to advance building codes and appliance standards, provide tax incentives for efficient products and buildings, and promote savings opportunities through programs such as ENERGY STAR®. Efficiency of new buildings and those already in place are both important. Many homeowners, businesses, and others in buildings and facilities already standing today—which will represent the vast majority of the nation's buildings and facilities for years to come—can realize significant savings from proven energy efficiency programs.

Bringing more energy efficiency into the nation's energy mix to slow demand growth in a wise, cost-effective manner—one that balances energy efficiency with new generation and supply options—will take concerted efforts by all energy market participants: customers, utilities, regulators, states, consumer advocates, energy service companies, and others. It will require education on the opportunities, review of existing policies, identification of barriers and their solutions, assessment of new technologies, and modification and adoption of policies, as appropriate. Utilities,[4] regulators, and partner organizations need to improve customer access to energy efficiency programs to help them control their own energy costs, provide the funding necessary to deliver these programs, and examine policies governing energy companies to ensure that these policies facilitate—not impede—cost-effective programs for energy efficiency. Historically, the regulatory structure has rewarded utilities for building infrastructure (e.g., power plants, transmission lines, pipelines) and selling energy, while discouraging energy efficiency, even when the energy-saving measures cost less than constructing new infrastructure.[5] And, it has been difficult to establish the funding necessary to capture the potential benefits that cost-effective energy efficiency offers.

This National Action Plan for Energy Efficiency is a call to action to bring diverse stakeholders together at the national, regional, state, or utility level, as appropriate, and foster the discussions, decision-making, and commitments necessary to take investment in energy efficiency to a new level. The overall goal is to create a sustainable, aggressive national commitment to energy efficiency through gas and electric utilities, utility regulators, and partner organizations.

The Action Plan was developed by a Leadership Group composed of more than 50 leading organizations representing diverse stakeholder perspectives. Based upon the policies, practices, and efforts of many organizations across the country, the Leadership Group offers five recommendations as ways to overcome many of the barriers that have limited greater investment in programs to deliver energy efficiency to customers of electric and gas utilities (Figure 1). These recommendations may be pursued through a number of different options, depending upon state and utility circumstances.

As part of the Action Plan, leading organizations are committing to aggressively pursue energy efficiency opportunities in their organizations and assist others who want to increase the use of energy efficiency in their regions. Because greater investment in energy efficiency cannot happen based on the work of one individual or organization alone, the Action Plan is a commitment to bring the appropriate stakeholders together—including utilities, state policy-makers, consumers, consumer advocates, businesses, energy services companies, and others—to be part of a collaborative effort to take energy efficiency to a new level. As energy experts, utilities may be in a unique position to play a leading role.

The reasons behind the National Action Plan for Energy Efficiency, the process for developing the Action Plan, and the final recommendations are summarized in greater detail as follows.

Figure 1. National Action Plan for Energy Efficiency Recommendations

- **Recognize energy efficiency as a high-priority energy resource.**
- **Make a strong, long-term commitment to implement cost-effective energy efficiency as a resource.**
- **Broadly communicate the benefits of and opportunities for energy efficiency.**
- **Promote sufficient, timely, and stable program funding to deliver energy efficiency where cost-effective**.
- **Modify policies to align utility incentives with the delivery of cost-effective energy efficiency and modify ratemaking practices to promote energy efficiency investments.**

The United States Faces Large and Complex Energy Challenges

Our expanding economy, growing population, and rising standard of living all depend on energy services. Current projections anticipate U.S. energy demands to increase by more than one-third by 2030, with electricity demand alone rising by more than 40 percent (EIA, 2006). At work and at home, we continue to rely on more and more energy-consuming devices. At the same time, the country has entered a period of higher energy costs and limited supplies of natural gas, heating oil, and other fuels. These issues present many challenges:

Growing energy demand stresses current systems, drives up energy costs, and requires new investments. Events such as the Northeast electricity blackout of August 2003 and Hurricanes Katrina and Rita in 2005 increased focus on energy reliability and its economic and human impacts. Transmission and pipeline systems are becoming overburdened in places. Overburdened systems limit the availability of low-cost electricity and fossil fuels, raise energy prices in or near congested areas, and potentially compromise energy system reliability. High fuel prices also contribute to higher electricity prices. In addition, our demand for natural gas to heat our homes, for industrial and business use, and for power generation is straining the available gas supply in North America and putting upward pressure on natural gas prices. Addressing these issues will require billions of dollars in investments in energy efficiency, new power plants, gas rigs, transmission lines, pipelines, and other infrastructure, notwithstanding the difficulty of building new energy infrastructure in dense urban and suburban areas. In the absence of investments in new or expanded capacity, existing facilities are being stretched to the point where system reliability is steadily eroding, and the ability to import lower cost energy into high-growth load areas is inhibited, potentially limiting economic expansion.

High fuel prices increase financial burdens on households and businesses and slow our economy. Many household budgets are being strained by higher energy costs, leaving less money available for other household purchases and needs. This burden is particularly harmful for low-income households. Higher energy bills for industry can reduce the nation's economic competitiveness and place U.S. jobs at risk.

Growing energy demand challenges attainment of clean air and other public health and environmental goals. Energy demand continues to grow at the same time that national and state regulations are being implemented to limit the emission of air pollutants, such as sulfur dioxide, nitrogen oxides, and mercury, to protect public health and the environment. In addition, emissions of greenhouse gases continue to increase.

Uncertainties in future prices and regulations raise questions about new investments. New infrastructure is being planned in the face of uncertainties about future energy prices. For example, high natural gas prices and uncertainty about greenhouse gas and other environmental regulations, impede investment decisions on new energy supply options.

Our energy system is vulnerable to disruptions in energy supply and delivery. Natural disasters such as the hurricanes of 2005 exposed the vulnerability of the U.S. energy system to major disruptions, which have significant impacts on energy prices and service reliability. In response, national security concerns suggest that we should use fossil fuel energy more efficiently, increase supply diversity, and decrease the vulnerability of domestic infrastructure to natural disasters.

Energy Efficiency Can Be a Beneficial Resource in Our Energy Systems

Greater investment in energy efficiency can help us tackle these challenges. Energy efficiency is already a key component in the nation's energy resource mix in many parts of the country. Utilities, states, and others across the United States have decades of experience in delivering energy efficiency to their customers. These programs can provide valuable models, upon which more states,

Benefits of Energy Efficiency

Lower energy bills, greater customer control, and greater customer satisfaction. Well-designed energy efficiency programs can provide opportunities for customers of all types to adopt energy savings measures that can improve their comfort and level of service, while reducing their energy bills.[6] These programs can help customers make sound energy use decisions, increase control over their energy bills, and empower them to manage their energy usage. Customers are experiencing savings of 5, 10, 20, or 30 percent, depending upon the customer, program, and average bill. Offering these programs can also lead to greater customer satisfaction with the service provider.

Lower cost than supplying new generation only from new power plants. In some states, well-designed energy efficiency programs are saving energy at an average cost of about one-half of the typical cost of new power sources and about one-third of the cost of natural gas supply (EIA, 2006).[7] When integrated into a long-term energy resource plan, energy efficiency programs could help defer investments in new plants and lower the total cost of delivering electricity.

Modular and quick to deploy. Energy efficiency programs can be ramped up over a period of one to three years to deliver sizable savings. These programs can also be targeted to congested areas with high prices to bring relief where it might be difficult to deliver new supply in the near term.

Significant energy savings. Well-designed energy efficiency programs are delivering annual energy savings on the order of 1 percent of electricity and natural gas sales.[8] These programs are helping to offset 20 to 50 percent of expected growth in energy demand in some areas without compromising the end users' activities and economic well-being (Nadel et al., 2004; EIA, 2006).

Environmental benefits. While reducing customers' energy bills, cost-effective energy efficiency offers environmental benefits related to reduced demand such as lower air pollution, reduced greenhouse gas emissions, lower water use, and less environmental damage from fossil fuel extraction. Energy efficiency can be an attractive option for utilities in advance of requirements to reduce greenhouse gas emissions.

Economic development. Greater investment in energy efficiency helps build jobs and improve state economies. Energy efficiency users often redirect their bill savings toward other activities that increase local and national employment, with a higher employment impact than if the money had been spent to purchase energy (Kushler et al., 2005; NYSERDA, 2004). Many energy efficiency programs create construction and installation jobs, with multiplier impacts on employment and local economies. Local investments in energy efficiency can offset imports from out-of-state, improving the state balance of trade. Lastly, energy efficiency investments usually create long-lasting infrastructure changes to building, equipment and appliance stocks, creating long-term property improvements that deliver long-term economic value (Innovest, 2002).

Energy security. Energy efficiency reduces the level of U.S. per capita energy consumption, thus decreasing the vulnerability of the economy and individual consumers to energy price disruptions from natural disasters and attacks on domestic and international energy supplies and infrastructure. In addition, energy efficiency can be used to reduce the overall system peak demand or the peak demand in targeted load areas with limited generating or transport capability. Reducing peak demand improves system reliability and reduces the potential for unplanned brownouts or black-outs, which can have large adverse economic consequences.

utilities, and other organizations can build. Experience shows that energy efficiency programs can lower customer energy bills, cost less than and help defer new energy infrastructure, provide energy savings to consumers, improve the environment, and spur local economic development (see box on Benefits of Energy Efficiency). Significant opportunities for energy efficiency are likely to continue to be available at low costs in the future. State and regional studies have found that adoption of economically attractive, but as yet untapped, energy efficiency could yield more than 20 percent savings in total electricity demand nationwide by 2025. Depending on the underlying load growth, these savings could help cut load growth by half or more compared to current forecasts (Nadel et al., 2004; SWEEP, 2002; NEEP, 2005; NWPCC, 2005; WGA, 2006). Similarly, savings from direct use of natural gas could provide a 50 percent or greater reduction in natural gas demand growth (Nadel et al., 2004).

Capturing this energy efficiency resource would offer substantial economic and environmental benefits across the country. Widespread application of energy efficiency programs that already exist in some regions could deliver a large part of these potential savings.[9] Extrapolating the results from existing programs to the entire country would yield annual energy bill savings of nearly $20 billion, with net societal benefits of more than $250 billion over the next 10 to 15 years. This scenario could defer the need for 20,000 megawatts (MW), or 40 new 500-MW power plants, as well as reduce U.S. emissions from energy production and use by more than 200 million tons of carbon dioxide, 50,000 tons of sulfur dioxide, and 40,000 tons of nitrogen oxides annually.[10] These significant economic and environmental benefits can be achieved relatively quickly because energy efficiency programs can be developed and implemented within several years.

Additional policies and programs are required to help capture these potential benefits and address our substantial underinvestment in energy efficiency as a nation. An important indicator of this underinvestment is that the level of funding across the country for organized efficiency programs is currently less than $2 billion per year while it would require about 4 times today's funding levels to achieve the economic and environment benefits presented above.[11, 12]

The current underinvestment in energy efficiency is due to a number of well-recognized barriers, including some of the regulatory policies that govern electric and natural gas utilities. These barriers include:

- *Market barriers,* such as the well-known "split-incentive" barrier, which limits home builders' and commercial developers' motivation to invest in energy efficiency for new buildings because they do not pay the energy bill; and the transaction cost barrier, which chronically affects individual consumer and small business decision-making.

- *Customer barriers,* such as lack of information on energy saving opportunities, lack of awareness of how energy efficiency programs make investments easier, and lack of funding to invest in energy efficiency.

- *Public policy barriers,* which can present prohibitive disincentives for utility support and investment in energy efficiency in many cases.

- *Utility, state, and regional planning barriers,* which do not allow energy efficiency to compete with supply-side resources in energy planning.

- *Energy efficiency program barriers,* which limit investment due to lack of knowledge about the most effective and cost-effective energy efficiency program portfolios, programs for overcoming common marketplace barriers to energy efficiency, or available technologies.

While a number of energy efficiency policies and programs contribute to addressing these barriers, such as building codes, appliance standards, and state government leadership programs, organized energy efficiency programs provide an important opportunity to deliver greater energy efficiency in the homes, buildings, and facilities that already exist today and that will consume the majority of the energy used in these sectors for years to come.

The Leadership Group and National Action Plan for Energy Efficiency

Recognizing that energy efficiency remains a critically underutilized resource in the nation's energy portfolio, more than 50 leading electric and gas utilities, state utility commissioners, state air and energy agencies, energy service providers, energy consumers, and energy efficiency and consumer advocates have formed a Leadership Group, together with the U.S. Department of Energy and the U.S. Environmental Protection Agency, to address the issue. The goal of this group is to create a sustainable, aggressive national commitment to energy efficiency through gas and electric utilities, utility regulators, and partner organizations. The Leadership Group recognizes that utilities and regulators play critical roles in bringing energy efficiency programs to their communities and that success requires the joint efforts of customers, utilities, regulators, states, and other partner organizations.

Under co-chairs Diane Munns (Member of the Iowa Utilities Board and President of the National Association of Regulatory Utility Commissioners) and Jim Rogers (President and Chief Executive Officer of Duke Energy), the Leadership Group members (see Table 1) have developed this National Action Plan for Energy Efficiency, which:

- Identifies key barriers limiting greater investment in energy efficiency.
- Reviews sound business practices for removing these barriers and improving the acceptance and use of energy efficiency relative to energy supply options.
- Outlines recommendations and options for overcoming these barriers.

The members of the Leadership Group have agreed to pursue these recommendations and consider these options through their own actions, where appropriate, and to support energy efficiency initiatives by other industry members and stakeholders.

Recommendations

This National Action Plan for Energy Efficiency is a call to action to utilities, state utility regulators, consumer advocates, consumers, businesses, other state officials, and other stakeholders to create an aggressive, sustainable national commitment to energy efficiency.[1] The Action Plan offers the following recommendations as ways to overcome barriers that have limited greater investment in energy efficiency for customers of electric and gas utilities in many parts of the country. The following recommendations are based on the policies, practices, and efforts of leading organizations across the country. For each recommendation, a number of options are available to be pursued based on regional, state, and utility circumstances (see also Figure 2).

Recognize energy efficiency as a high priority energy resource. Energy efficiency has not been consistently viewed as a meaningful or dependable resource compared to new supply options, regardless of its demonstrated contributions to meeting load growth.[13] Recognizing energy efficiency as a high-priority energy resource is an important step in efforts to capture the benefits it offers and lower the overall cost of energy services to customers. Based on jurisdictional objectives, energy efficiency can be incorporated into resource plans to account for the long-term benefits from energy savings, capacity savings, potential reductions of air pollutants and greenhouse gases, as well as other benefits. The explicit integration of energy efficiency resources into the formalized resource planning processes that exist at regional, state, and utility levels can help establish the rationale for energy efficiency funding levels and for properly valuing and balancing the benefits. In some jurisdictions, these existing planning processes might need to be adapted or even created to meaningfully incorporate energy efficiency resources into resource planning. Some states have recognized energy efficiency as the resource of first priority due to its broad benefits.

Make a strong, long-term commitment to cost-effective energy efficiency as a resource. Energy efficiency programs are most successful and provide the greatest benefits to stakeholders when appropriate policies are established and maintained over the long-term. Confidence in long-term stability of the program will help maintain energy efficiency as a dependable resource compared to supply-side resources, deferring or even avoiding the need for other infrastructure investments, and maintain customer awareness and support. Some steps may include assessing the long-term potential for cost-effective energy efficiency within a region (i.e., the energy efficiency that can be delivered cost-effectively through proven programs for each customer class within a planning horizon); examining the role for cutting-edge initiatives and technologies; establishing the cost of supply-side options versus energy efficiency; establishing robust measurement and verification procedures; and providing for routine updates to information on energy efficiency potential and key costs.

Broadly communicate the benefits of and opportunities for energy efficiency. Experience shows that energy efficiency programs help customers save money and contribute to lower cost energy systems. But these benefits are not fully documented nor recognized by customers, utilities, regulators, or policy-makers. More effort is needed to establish the business case for energy efficiency for all decision-makers and to show how a well-designed approach to energy efficiency can benefit customers, utilities, and society by (1) reducing customers' bills over time, (2) fostering financially healthy utilities (e.g., return on equity, earnings per share, and debt coverage ratios unaffected), and (3) contributing to positive societal net benefits overall. Effort is also necessary to educate key stakeholders that although energy efficiency can be an important low-cost resource to integrate into the energy mix, it does require funding just as a new power plant requires funding. Further, education is necessary on the impact that energy efficiency programs can have in concert with other energy efficiency policies such as building codes, appliance standards, and tax incentives.

Promote sufficient, timely, and stable program funding to deliver energy efficiency where cost-effective. Energy efficiency programs require consistent and long-term funding to effectively compete with energy supply options. Efforts are necessary to establish this consistent long-term funding. A variety of mechanisms have been and can be used based on state, utility, and other stakeholder interests. It is important to ensure that the efficiency programs' providers have sufficient long-term funding to recover program costs and implement the energy efficiency measures that have been demonstrated to be available and cost effective. A number of states are now linking program funding to the achievement of energy savings.

Modify policies to align utility incentives with the delivery of cost-effective energy efficiency and modify ratemaking practices to promote energy efficiency investments. Successful energy efficiency programs would be promoted by aligning utility incentives in a manner that encourages the delivery of energy efficiency as part of a balanced portfolio of supply, demand, and transmission investments. Historically, regulatory policies governing utilities have more commonly compensated utilities for building infrastructure (e.g., power plants, transmission lines, pipelines) and selling energy, while discouraging energy efficiency, even when the energy-saving measures may cost less. Within the existing regulatory processes, utilities, regulators, and stakeholders have a number of opportunities to create the incentives for energy efficiency investments by utilities and customers. A variety of mechanisms have already been used. For example, parties can decide to provide incentives for energy efficiency similar to utility incentives for new infrastructure investments, provide rewards for prudent management of energy efficiency programs, and incorporate energy efficiency as an important area of consideration within rate design. Rate design offers

Figure 2. National Action Plan for Energy Efficiency Recommendations & Options

Recognize energy efficiency as a high priority energy resource.

Options to consider:

- Establishing policies to establish energy efficiency as a priority resource.
- Integrating energy efficiency into utility, state, and regional resource planning activities.
- Quantifying and establishing the value of energy efficiency, considering energy savings, capacity savings, and environmental benefits, as appropriate.

Make a strong, long-term commitment to cost-effective energy efficiency as a resource.

Options to consider:

- Establishing appropriate cost-effectiveness tests for a portfolio of programs to reflect the long-term benefits of energy efficiency.
- Establishing the potential for long-term, cost-effective energy efficiency savings by customer class through proven programs, innovative initiatives, and cutting-edge technologies.
- Establishing funding requirements for delivering long-term, cost-effective energy efficiency.
- Developing long-term energy saving goals as part of energy planning processes.
- Developing robust measurement and verification procedures.
- Designating which organization(s) is responsible for administering the energy efficiency programs.
- Providing for frequent updates to energy resource plans to accommodate new information and technology.

Broadly communicate the benefits of and opportunities for energy efficiency.

Options to consider:

- Establishing and educating stakeholders on the business case for energy efficiency at the state, utility, and other appropriate level addressing relevant customer, utility, and societal perspectives.
- Communicating the role of energy efficiency in lowering customer energy bills and system costs and risks over time.
- Communicating the role of building codes, appliance standards, and tax and other incentives.

Provide sufficient, timely, and stable program funding to deliver energy efficiency where cost-effective.

Options to consider:

- Deciding on and committing to a consistent way for program administrators to recover energy efficiency costs in a timely manner.
- Establishing funding mechanisms for energy efficiency from among the available options such as revenue requirement or resource procurement funding, system benefits charges, rate-basing, shared-savings, incentive mechanisms, etc.
- Establishing funding for multi-year periods.

Modify policies to align utility incentives with the delivery of cost-effective energy efficiency and modify ratemaking practices to promote energy efficiency investments.

Options to consider:

- Addressing the typical utility throughput incentive and removing other regulatory and management disincentives to energy efficiency.
- Providing utility incentives for the successful management of energy efficiency programs.
- Including the impact on adoption of energy efficiency as one of the goals of retail rate design, recognizing that it must be balanced with other objectives.
- Eliminating rate designs that discourage energy efficiency by not increasing costs as customers consume more electricity or natural gas.
- Adopting rate designs that encourage energy efficiency by considering the unique characteristics of each customer class and including partnering tariffs with other mechanisms that encourage energy efficiency, such as benefit sharing programs and on-bill financing.

opportunities to encourage customers to invest in efficiency where they find it to be cost effective and participate in new programs that provide innovative technologies (e.g., smart meters) to help customers control their energy costs.

National Action Plan for Energy Efficiency: Next Steps

In summer 2006, members of the Leadership Group of the National Action Plan on Energy Efficiency are announcing a number of specific activities and initiatives to formalize and reinforce their commitments to energy efficiency as a resource. To assist the Leadership Group and others in making and fulfilling their commitments, a number of tools and resources have been developed:

National Action Plan for Energy Efficiency Report. This report details the key barriers to energy efficiency in resource planning, utility incentive mechanisms, rate design, and the design and implementation of energy efficiency programs. It also reviews and presents a variety of policy and program solutions that have been used to overcome these barriers as well as the pros and cons for many of these approaches.

Energy Efficiency Benefits Calculator. This calculator can be used to help educate stakeholders on the broad benefits of energy efficiency. It provides a simplified framework to demonstrate the business case for energy efficiency from the perspective of the consumer, the utility, and society. It has been used to explore the benefits of energy efficiency program investments under a range of utility structures, policy mechanisms, and energy growth scenarios. The calculator can be adapted and applied to other scenerios.

Experts and Resource Materials on Energy Efficiency. A number of educational presentations on the potential for energy efficiency and various policies available for pursuing the recommendations of the Action Plan will be developed. In addition, lists of policy and program experts in energy efficiency and the various policies available for pursuing the recommendations of the Action Plan will be developed. These lists will be drawn from utilities, state utility regulators, state energy offices, third-party energy efficiency program administrators, consumer advocacy organizations, energy service companies, and others. These resources will be available in fall 2006.

The U.S. Department of Energy and U.S. Environmental Protection Agency are continuing to facilitate the work of the Leadership Group and the National Action Plan for Energy Efficiency. During winter 2006–2007, the Leadership Group plans to report on its progress and identify next steps for the Action Plan.

Table 1. Members of the National Action Plan for Energy Efficiency

Co-Chairs

Diane Munns	Member President	Iowa Utilities Board National Association of Regulatory Utility Commissioners
Jim Rogers	President and Chief Executive Officer	Duke Energy

Leadership Group

Barry Abramson	Senior Vice President	Servidyne Systems, LLC
Angela S. Beehler	Director of Energy Regulation	Wal-Mart Stores, Inc.
Bruce Braine	Vice President, Strategic Policy Analysis	American Electric Power
Jeff Burks	Director of Environmental Sustainability	PNM Resources
Kateri Callahan	President	Alliance to Save Energy
Glenn Cannon	General Manager	Waverly Light and Power
Jorge Carrasco	Superintendent	Seattle City Light
Lonnie Carter	President and Chief Executive Officer	Santee Cooper
Mark Case	Vice President for Business Performance	Baltimore Gas and Electric
Gary Connett	Manager of Resource Planning and Member Services	Great River Energy
Larry Downes	Chairman and Chief Executive Officer	New Jersey Natural Gas (New Jersey Resources Corporation)
Roger Duncan	Deputy General Manager, Distributed Energy Services	Austin Energy
Angelo Esposito	Senior Vice President, Energy Services and Technology	New York Power Authority
William Flynn	Chairman	New York State Public Service Commission
Jeanne Fox	President	New Jersey Board of Public Utilities
Anne George	Commissioner	Connecticut Department of Public Utility Control
Dian Grueneich	Commissioner	California Public Utilities Commission
Blair Hamilton	Policy Director	Vermont Energy Investment Corporation
Leonard Haynes	Executive Vice President, Supply Technologies, Renewables, and Demand Side Planning	Southern Company
Mary Healey	Consumer Counsel for the State of Connecticut	Connecticut Consumer Counsel
Helen Howes	Vice President, Environment, Health and Safety	Exelon
Chris James	Air Director	Connecticut Department of Environmental Protection
Ruth Kinzey	Director of Corporate Communications	Food Lion
Peter Lendrum	Vice President, Sales and Marketing	Entergy Corporation
Rick Leuthauser	Manager of Energy Efficiency	MidAmerican Energy Company
Mark McGahey	Manager	Tristate Generation and Transmission Association, Inc.
Janine Migden-Ostrander	Consumers' Counsel	Office of the Ohio Consumers' Counsel
Richard Morgan	Commissioner	District of Columbia Public Service Commission
Brock Nicholson	Deputy Director, Division of Air Quality	North Carolina Air Office
Pat Oshie	Commissioner	Washington Utilities and Transportation Commission
Douglas Petitt	Vice President, Government Affairs	Vectren Corporation

Bill Prindle	Deputy Director	American Council for an Energy-Efficient Economy
Phyllis Reha	Commissioner	Minnesota Public Utilities Commission
Roland Risser	Director, Customer Energy Efficiency	Pacific Gas and Electric
Gene Rodrigues	Director, Energy Efficiency	Southern California Edison
Art Rosenfeld	Commissioner	California Energy Commission
Jan Schori	General Manager	Sacramento Municipal Utility District
Larry Shirley	Division Director	North Carolina Energy Office
Michael Shore	Senior Air Policy Analyst	Environmental Defense
Gordon Slack	Energy Business Director	The Dow Chemical Company
Deb Sundin	Director, Business Product Marketing	Xcel Energy
Dub Taylor	Director	Texas State Energy Conservation Office
Paul von Paumgartten	Director, Energy and Environmental Affairs	Johnson Controls
Brenna Walraven	Executive Director, National Property Management	USAA Realty Company
Devra Wang	Director, California Energy Program	Natural Resources Defense Council
Steve Ward	Public Advocate	State of Maine
Mike Weedall	Vice President, Energy Efficiency	Bonneville Power Administration
Tom Welch	Vice President, External Affairs	PJM Interconnection
Jim West	Manager of *energy right* & Green Power Switch	Tennessee Valley Authority
Henry Yoshimura	Manager, Demand Response	ISO New England Inc.

Observers

James W. (Jay) Brew	Counsel	Steel Manufacturers Association
Roger Cooper	Executive Vice President, Policy and Planning	American Gas Association
Dan Delurey	Executive Director	Demand Response Coordinating Committee
Roger Fragua	Deputy Director	Council of Energy Resource Tribes
Jeff Genzer	General Counsel	National Association of State Energy Officials
Donald Gilligan	President	National Association of Energy Service Companies
Chuck Gray	Executive Director	National Association of Regulatory Utility Commissioners
John Holt	Senior Manager of Generation and Fuel	National Rural Electric Cooperative Association
Joseph Mattingly	Vice President, Secretary and General Counsel	Gas Appliance Manufacturers Association
Kenneth Mentzer	President and Chief Executive Officer	North American Insulation Manufacturers Association
Christina Mudd	Executive Director	National Council on Electricity Policy
Ellen Petrill	Director, Public/Private Partnerships	Electric Power Research Institute
Alan Richardson	President and Chief Executive Officer	American Public Power Association
Steve Rosenstock	Manager, Energy Solutions	Edison Electric Institute
Diane Shea	Executive Director	National Association of State Energy Officials
Rick Tempchin	Director, Retail Distribution Policy	Edison Electric Institute
Mark Wolfe	Executive Director	Energy Programs Consortium

Notes

1 Energy efficiency refers to using less energy to provide the same or improved level of service to the energy consumer in an economically efficient way. The term energy efficiency as used here includes using less energy at any time, including at times of peak demand through demand response and peak shaving efforts.

2 Addressing transportation-related energy use is also an important challenge as energy demand in this sector continues to increase and oil prices hit historical highs. However, transportation issues are outside the scope of this effort, which is focused only on electricity and natural gas systems.

3 This effort is focused on energy efficiency for regulated energy forms. Energy efficiency for unregulated energy forms, such as fuel oil for example, is closely related in terms of actions in buildings, but is quite different in terms of how policy can promote investments.

4 A utility is broadly defined as an organization that delivers electric and gas utility services to end users, including, but not limited to, investor-owned, publicly owned, cooperatively owned, and third-party energy efficiency utilities.

5 Many energy efficiency programs have an average life cycle cost of $0.03/kilowatt-hour (kWh) saved, which is 50 to 75 percent of the typical cost of new power sources (ACEEE, 2004; EIA, 2006). The cost of energy efficiency programs varies by program and can include higher cost programs and options with lower costs to a utility such as modifying rate designs.

6 See Chapter 6: Program Best Practices for more information on leading programs.

7 Data refer to EIA 2006 new power costs and gas prices in 2015 compared to electric and gas program costs based on leading energy programs, many of which are discussed in Chapter 6: Program Best Practices.

8 Based on leading energy efficiency programs, many of which are discussed in Chapter 6: Energy Efficiency Program Best Practices.

9 These estimates are based on assumptions of average program spending levels by utilities or other program administrators, with conservatively high numbers for the cost of energy efficiency programs. See highlights of some of these programs in Chapter 6: Energy Efficiency Program Best Practices, Tables 1-1a and 1-1b.

10 These economic and environmental savings estimates are extrapolations of the results from regional program to a national scope. Actual savings at the regional level vary based on a number of factors. For these estimates, avoided capacity value is based on peak load reductions de-rated for reductions that do not result in savings of capital investments. Emissions savings are based on a marginal on-peak generation fuel of natural gas and marginal off-peak fuel of coal; with the on-peak period capacity requirement double that of the annual average. These assumptions vary by region based upon situation-specific variables. Reductions in capped emissions may reduce the cost of compliance.

11 This estimate of the funding required assumes 2 percent of revenues across electric utilities and 0.5 percent across gas utilities. The estimate also assumes that energy efficiency is delivered at a total cost (utility and participant) of $0.04 per kWh and $3 per million British thermal units (MMBtu), which are higher than the costs of many of today's programs.

12 This estimate is provided as an indicator of underinvestment and is not intended to establish a national funding target. Appropriate funding levels for programs should be established at the regional, state, or utility level. In addition, energy efficiency investments by customers, businesses, industry, and government also contribute to the larger economic and environment benefits of energy efficiency.

13 One example of energy efficiency's ability to meet load growth is the Northwest Power Planning Council's Fifth Power Plan which uses energy conservation and efficiency to meet a targeted 700 MW of forecasted capacity between 2005 and 2009 (NWPCC, 2005).

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