

ENERGY EFFICIENCY RESOURCE STANDARDS AND ENERGY SAVINGS CERTIFICATES: CONNECTING POLICY AND MARKETS FOR ENERGY EFFICIENCY



Issue Brief

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INTRODUCTION

An Energy Efficiency Resource Standard (EERS), also known as an Energy Efficiency Portfolio Standard (EEPS) or Energy Efficiency Commitment, is a policy mechanism that requires more efficient production, transmission, and use of electricity and natural gas. EERS policies generally obligate utilities and other energy distributors to seek energy usage reductions from their customers based on a specified and increasing percentage or amount each year or period of years. These policies are similar in design to Renewable Portfolio Standards (RPS) or renewable energy obligations. Since energy efficiency measures are a cost-effective means of lowering energy demand and reducing greenhouse gas (GHG) emissions, an EERS often complements other higher-cost strategies aimed at mitigating carbon pollution and climate change.

EERS programs exist around the globe, and governments continue to design new programs. In the United States, 26 states, most recently Wisconsin and Arkansas, have EERS programs. In the European Union, Italy, the United Kingdom, France, and Flanders (Belgium) have implemented EERS, while Poland and other members are considering their adoption. Australia's New South Wales and Victoria have EERS programs, and China announced an EERS-like program at the United Nations Framework Convention on Climate Change in Cancun.¹

There are several approaches to EERS design and implementation. In the U. S., some states include energy efficiency in an RPS or Clean Energy Portfolio Standard requirement, establishing targets and rules through legislation. State public utility commissions may also set efficiency requirements, often through a collaborative process with the utilities that will be expected to meet the savings goals. All EERS policies include end-use energy savings. In some cases, distribution system efficiency improvements, combined heat and power (CHP) systems and other high-efficiency distributed generation systems are also eligible. Other features, such as measurement and verification procedures and penalty structures, also vary by program.

One interesting component of several EERS is an energy savings certificate (ESC) program. ESCs are unique records certifying that a prescribed amount of electricity or gas usage has been avoided through energy efficiency measures. ESCs are also called energy efficiency certificates, energy efficiency obligations, tradable white certificates, and white tags. To date, ESCs have most often worked within compliance EERS programs, but voluntary market expansion is a possibility as the overall ESC market matures. ESC programs offer a market option for a government-mandated priority, and they appeal to investor-owned utilities and other businesses operating in the efficiency space.

¹ "Demand Side Management Measures" National Development and Reform Commission, November 4, 2010.

EERS programs have developed from local priorities and existing resources and have been instituted by states and provinces, as well as countrywide. Because these programs allow versatility in structure and scope, there are many ways to implement EERS and ESCs. While this has led to disparate program design, it has also showcased flexibility in government regulation. The following selection of successful programs from around the world demonstrates collective best practices and innovative EERS designs that arose from local considerations.

ESTABLISHED EERS PROGRAMS AROUND THE WORLD

U.S. – Connecticut

Facing electricity supply challenges, Connecticut was one of the first states to implement an energy diversification approach to seek new power supplies and encourage demand reduction. In June 2005, Connecticut included energy efficiency and combined heat and power plants (CHP) as new Class III requirements under the state RPS. The Class III requirements directed electricity suppliers to meet 1% of their demand through commercial and industrial energy efficiency and CHP by 2007, 2% by 2008, 3% by 2009, and 4% by 2010. Legislation in 2007 added energy savings from waste heat recovery as a Class III source under the RPS. Investor-owned distribution utilities and other power distributors are required to meet these targets, and third-party providers can also earn energy savings certificates and sell them to utilities with Class III obligations. Electricity providers that fail to meet efficiency requirements during an annual period must pay \$0.55 per kWh to the state Department of Public Utility Control (DPUC) for each kWh by which they fall short.

Connecticut has the only actively functioning tradable ESC market – each ESC represents the avoided use of one MWh of electricity. Mandated markets began trading on Jan. 1, 2007, for energy efficiency projects completed in the previous year. Ownership of the ESC is determined by funder of the efficiency project – typically either the facility owner or the utility. ESCs have a one-year lifetime. The market functions with a \$10/MWh floor price, and prices typically range from \$20 to \$25/MWh.²

U.S. – Vermont

Vermont leveraged funding from electricity ratepayers to establish and support a technical program that generates savings to meet its efficiency target. The state legislature and the Vermont Public Service Board (PSB) established Efficiency Vermont (EV) in 2000 as a single statewide energy efficiency utility. EV is funded by a public benefit fund administered by the PSB, and the utility is run by a competitively selected contractor in a performance-based contract with the PSB. The contract includes specific energy (kWh) and peak demand (kW) savings targets, and there is a holdback in contractor compensation pending confirmation that contractual goals for savings and other performance indicators have been achieved. By 2008, Vermont's annual efficiency savings were an estimated 2.5% of business-as-usual electricity sales. These savings effectively offset energy load growth despite an increase in the number of electric customers. Savings targets continue to increase, with goals for 2009 to 2011 set at just over 2% of electricity sales each year.³

¹ "The Bottom Line On... Energy Savings Certificates." World Resources Institute. Issue 10, October 2008.

² "Laying the Foundation for Implementing a Federal Energy Efficiency Resource Standard." Laura A. Furrey, Steven Nadel, John A. Laitner. ACEEE. Report E091, March 2009.

Australia – New South Wales

The government of New South Wales replaced the end-use energy efficiency component of its Demand Side Abatement Rule under the 2003 NSW GHG Reduction Scheme with a program that rewards companies for undertaking projects that reduce electricity consumption and improve energy efficiency. The NSW Energy Savings Scheme (ESS) began on July 1, 2009, with legislated annual energy targets that must be met through the creation and surrender of ESCs. The targets start at 0.4% of total annual NSW electricity sales and increase to 4% over four-and-a-half years. The Scheme target will continue at 4% until 2020 and covers electricity retailers and a small group of wholesale market customers and electricity generators that supply directly to the retail customer. These Scheme Participants are required to meet individual energy-savings targets determined by their market share in the electricity market, although the Minister of Energy has authority to exempt large electricity users classified as emissions-intensive trade-exposed industries. There are penalties if targets are not met, but Scheme participants are able to carry a shortfall of certificates up to 20% (50% in the first year of compliance) into the following year.

Italy

Italy was the first country to experiment with meeting energy efficiency targets by creating a market for energy efficiency beyond the utility sector – expanding its program to other participants including energy service companies (ESCOs) and end-users.

Italy's program was driven by the country's reliance on imported fossil fuels and high energy costs. With respect to other industrialized countries, Italy also has a high dependency on electricity imports and is very vulnerable to climate change effects. All of these factors contributed to Italy prioritizing energy efficiency and leading an innovative program to spur growth.

In 2001, the Ministry of Industry established an obligation scheme for gas and electric distribution companies with more than 100,000 customers, and the program began in 2005. Italy's Regulatory Authority for Electricity and Gas (AEEG) designed the program with steadily increasing savings targets from 2005 to 2009. In that five-year period, the program expects to deliver energy savings of 5.8 million tonnes of oil equivalent (Mtoe) – representing approximately 14 terawatt-hours (TWh) in electricity savings and about 3.3 billion cubic meters in natural gas savings. Penalties are paid each year of non compliance, with obligated parties still expected to meet the five year target, so any shortfall must be made up in subsequent years.

ESCs are a central part of Italy's program, opening up the market to ESCOs for all end-use sector projects. Italy's unit of measure for ESCs is one tonne of oil equivalent, and certificates are issued annually for five or eight consecutive years.⁴ Deemed savings values (a validated estimate of energy savings from an energy efficiency measure in a specific application) are recognized for commonly used measures. Regulators also offer a pre-implementation qualitative check of savings estimates. Only investments in energy efficiency technologies (referred to as hard measures) are eligible in Italy's system.

Italy's ESC market is characterized by over-the-counter trading, and 2008 prices ranged from approximately 60 to 85 euros.⁵ Most trading has been bilateral between energy distributors and generators, and savings have mostly been achieved through lighting efficiency programs.

⁴ "Energy Efficiency and Renewable Energy, Italy – National Study." Carmen Glorioso, Mario Lionetti, Francesco Presicce. March 2007.

⁵ "The White Certificates system in Italy: results and perspectives." Teobaldo Fenoglio, Daniele Russolillo. November 2008.

United Kingdom

The U.K. program developed from concerns of fuel poverty for low-income families, energy-supply constraints, and environmental protection – connecting the government’s social and environmental objectives.⁶ Parliament passed an Energy Efficiency Commitment (EEC) in 2001 that requires electricity and gas suppliers to achieve targets for energy efficiency in the residential sector. The program was administered by the Office of Gas and Electric Markets (OFGEM), the regulator of gas and electricity markets in Great Britain. It established three-year commitment periods, the first starting in 2002. During the first commitment period, savings exceeded the goal by 40% as suppliers prepared for a new higher goal in the second commitment period. Surplus savings from one period may be redirected toward obligations in the following period.⁷

In the second period (2005–2008), eight power suppliers were required to achieve an energy-savings target of 130 TWh in domestic households. By the end of the second period, suppliers had surpassed the target, achieving savings of 144% of the overall target, or 187 TWh.⁸ Deemed savings values were recognized for many specific energy-saving measures based on previous measurements, calculations and evaluation studies. Electricity and gas suppliers operated different energy-savings programs for end-use customers. Programs were also run directly by third parties, such as housing agencies and boiler manufacturers. Additionally, half of the savings obligation came from low- and moderate- income homes, a key concern during the program’s development, as low-income families tend to be underserved by efficiency programs. Suppliers reported energy-savings results to the OFGEM each quarter using a standard format, and the OFGEM also audited supplier processes and inspected a sample of homes.

In 2008, the U.K. supplanted the EEC program with a new scheme called the Carbon Emissions Reduction Target (CERT) to focus on residential energy efficiency measures. CERT requires gas and electricity suppliers to meet a carbon emissions reductions target instead of an energy-savings target, and also runs in three-year increments. By the end of the second year (2010), suppliers had reduced their emissions by nearly 80% of the overall target of 185 million lifetime tonnes of carbon dioxide.⁹

BEST PRACTICE DISCUSSION

EERS programs differ in structure and implementation as each of the policies discussed above grew out of unique local market circumstances. The different program designs for energy efficiency targets provide significant opportunity for innovation and best-practice development. The following three themes and attributes stand out within the design choices of these programs:

- **Trading participants: utility sourcing vs. broader market participation**

Trading is a cost-effective mechanism that allows utilities and providers to hold and submit credits generated by third parties to meet their obligation if it is cheaper than implementing a utility-only efficiency program. While trading provides an additional way to meet targets, it also opens the possibility of an additional revenue stream as an incentive for utilities running successful programs and for third parties in the efficiency space. When ESC markets are open to third-party efficiency providers, such as ESCOs, the opportunity for lowest-cost savings is maximized as the push for savings extends beyond utilities. Connecticut, NSW and the European programs all include trading programs with third-party providers, though trading is more extensive in some markets than others. For example, while there has not been heavy trading in the U.K. as most providers have developed and implemented programs themselves, Italy has had a robust trading market with third-party participation.

⁶ “Energy Efficiency: a consultation document.” The Office of Gas and Electricity Markets, July 1999.

⁷ “The Potential for Energy Savings Certificates (ESC) as a Major Tool in Greenhouse Gas Reduction Programs.” Dr. Jan Hamrin, Dr. Edward Vine, Amber Sharick. Center for Resource Solutions, May 2007.

⁸ “A review of the Energy Efficiency Commitment 2005–2008.” The Office of Gas and Electricity Markets, August 2008.

⁹ “A review of the second year of the Carbon Emissions Reduction Target.” The Office of Gas and Electricity markets, August 2010.

- **Alignment with state objectives and funding support**

It is beneficial to have other funds and conservation initiatives for covered utilities to draw on: This creates a knowledge base of efficiency measures and benefits, and an immediate level of buy-in for a program using penalties. For example, Connecticut's commercial and industrial energy efficiency targets included in the state RPS are supported by established government conservation and efficiency programs, which bolster efforts to meet legislated EERS targets and encourage savings from public utilities. Connecticut has had a public benefit fund since 2000 and also has a fund that requires minimum contributions for municipal utility conservation and load management programs. Vermont's program also showcases an EERS policy leveraging local opportunity by deploying an existing statewide utility (EV) responsible for administering other efficiency programs. EV's objective is to secure all efficiency that costs less than supply. The program is supported by carbon market revenues and by participation in the regional forward capacity market, along with consumer payments.

Additionally, many governments implementing EERS programs are committed to addressing climate change, and they recognize efficiency as a cost-effective means of reducing GHG emissions, driving a broader sustainability initiative.

- **Compliance terms and penalty structures**

Multiple-year target periods provide extra flexibility for meeting targets and reduce the administrative burden of annual filings. The U.K.'s multiple-year target periods allow covered providers to adjust efforts if they are ahead or behind in the first year. Similarly, Scheme Participants in Australia are allowed some flexibility in meeting targets by carrying a shortfall of certificates into the next year. Another best practice of the European programs is recognizing deemed savings values. This gives participants certainty in planning and accounting and reduces administrative costs. It is important that these values are evaluated with systematic calculations and are periodically reviewed. In 2006, about 75% of Italy's ESCs used deemed savings estimates.¹⁰

Within the penalty structure of a trading program, the implementing body can define a cost cap to ensure that costs will be moderate. In Connecticut, providers can purchase credits for about half the average retail cost of electricity in the state. The credit fee serves as a price cap on the cost of compliance for individual electricity suppliers.¹¹

Vermont's program avoids the traditional penalty structure component and borrows a private-sector model by using a performance contract to guarantee savings. By including peak-demand savings in the contract, Vermont aims to avoid service disruptions and stress on generation and distribution infrastructure that could require construction of additional capacity.

¹⁰ "Energy Efficiency and Renewable Energy, Italy – National Study." Carmen Glorioso, Mario Lionetti, Francesco Presicce. March 2007.

¹¹ "Energy Efficiency Resource Standards: Experience and Recommendations." Steven Nadel. ACEEE, Report E063, March 2006.

CONCLUSION

Energy efficiency promises to be a key strategy in reducing GHG emissions, and EERS-like policies are a driver of significant savings and investments in energy efficiency. In the U.S., many programs are targeting and achieving savings of 1% of covered electricity and natural gas each year through end-use energy efficiency programs. This is about 50% of load growth, since annual load growth is approximately 2% per year across the country.¹²

Thus far, EERS programs have responded to specific political and market circumstances, and future program design will most likely continue to follow that path. EERS programs will continue to innovate and evolve, especially around ESC markets, where many elements still need to be worked out. Leaders in Connecticut, Vermont, New South Wales, Italy, and the U.K. have laid the groundwork for EERS and ESC implementation while leaving opportunity for future ideas and growth around the globe.

¹² "Energy Efficiency Resource Standards: Experience and Recommendations." Steven Nadel. ACEEE, Report E063, March 2006.

The Institute for Building Efficiency is an initiative of Johnson Controls providing information and analysis of technologies, policies, and practices for efficient, high performance buildings and smart energy systems around the world. The Institute leverages the company's 125 years of global experience providing energy efficient solutions for buildings to support and complement the efforts of nonprofit organizations and industry associations. The Institute focuses on practical solutions that are innovative, cost-effective and scalable.

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