Integrating Codes and Standards into Electric Utility Energy Efficiency Portfolios

IEE Whitepaper
August 2011

The Edison Foundation | Institute for Electric Efficiency

Advancing energy-efficiency and demand response among electric utilities.

Integrating Codes and Standards into Electric Utility Energy Efficiency Portfolios

IEE Whitepaper

August 2011

Prepared by

Adam Cooper
Lisa Wood
Institute for Electric Efficiency

Acknowledgements

The authors would like to thank Tom Eckman of the Northwest Power Conservation Council, Ted Schultz and Chris Calwell of Ecos, Josh Robertson and Dan Dreiling of the Salt River Project, Ellen Zuckerman of the Southwest Energy Efficiency Project, Isaac Elnecave of the Midwest Energy Efficiency Alliance, Harvey Michaels of the Massachusetts Institute of Technology, Steve Galanter, Gene Rodrigues, and Tory Weber of Southern California Edison, and Steve Nadel of the American Council for an Energy-Efficient Economy for their thoughtful comments.

TABLE OF CONTENTS

INTRODUCTION

This paper provides illustrative examples of state policies that provide opportunities for utilities to incorporate codes and standards into their energy efficiency portfolios. Although this may not be possible in all states, we believe that opportunities exist in a large number of states. As indicated by the doubling of budgets for utility funded energy efficiency programs from 2007 to 2010, utilities have pursued a suite of energy efficiency programs that incent market transformation and have been champions in educating consumers on the economic and environmental benefits of energy efficient devices and energy management.[1]

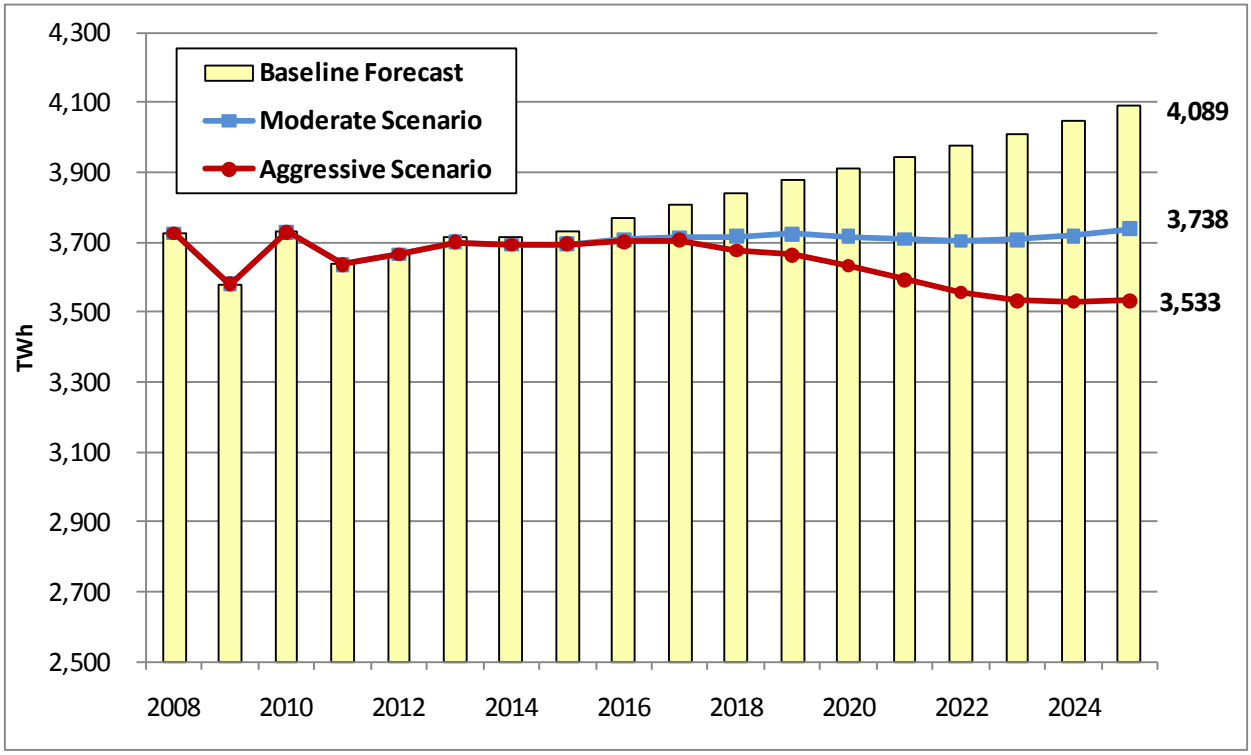
Pursuing energy efficiency in place of building new power plants makes sense; and regulators and legislatures in dozens of states have developed policies that incent utilities to administer energy efficiency programs. However, few states have policies in place that recognize the value of utilities participating in advancing energy efficiency through the development of better enforced and more stringent building energy codes and appliance and equipment standards.

The opportunity to realize energy savings through codes and standards programs is significant. A recent Institute for Electric Efficiency study showed savings of 351 TWh by 2025 under a moderate codes and standards adoption scenario and 556 TWh under a more aggressive scenario, representing between 8.6 percent and 13.6 percent of savings relative to the AEO 2011 baseline forecast for 2025.[2] In fact, as shown in Figure 1, the moderate codes and standards scenario offsets all of the growth in the baseline forecast between 2008 and 2025.

[1] IEE Brief, *Summary of ratepayer-Funded Electric Efficiency Impacts, Budgets, and Expenditures*, January 2011.

[2] IEE Whitepaper, *Assessment of Electricity Savings in the U.S. Achievable through New Appliance/Equipment Efficiency Standards and Building Efficiency Codes (2010-2025)*, May 2011.

Figure 1: Impact of Codes and Standards on Total U.S. Electricity Consumption (TWh)



Source: IEE Whitepaper, *Assessment of Electricity Savings in the U.S. Achievable through New Appliance/Equipment Efficiency Standards and Building Efficiency Codes (2010-2025),* May 2011.

A handful of states and regions—Arizona, California, Massachusetts, Minnesota, and the Pacific Northwest—that have integrated codes and standards into utility energy efficiency program portfolios (or are moving in that direction) provide potential templates for consideration.

THE UTILITY'S ROLE IN BUILDING ENERGY CODES

Utilities can play an integral role in the development of energy efficient buildings at a state and local level. Utilities operating across the U.S. are well aware of the energy needs of their customers and well suited to participate in and influence the energy code process. Utility involvement will vary given region specific circumstances. The list below outlines different facets of the building code process and the potential areas for utility involvement.

- Development—During the development of building energy codes, a utility can help in the design of code language and cost effectiveness testing. Simplified code language is generally preferred as a simple code tends to be better enforced than a complex code.
- Market push—In preparation of the code, utilities can intentionally design efficiency rebate programs to grow the share of the market held by highly energy efficient building products to support the market viability of the proposed code.
- Adoption—If the current code lags readily available codes, utilities can actively support and promote the adoption of new building energy codes.
- Training—Utility training programs, such as role-based training, and the provisioning of training materials (e.g., code manuals, software, etc.) for the building design and construction community (e.g., HVAC, builders, engineers, code officials, etc.) are effective methods to educate and train key participants to design and build structures to code.
- Compliance enhancement—While the general business practices of utilities excludes their involvement in direct inspection of completed buildings, a utility can become involved in compliance enhancement efforts by supporting third-party inspectors and plan reviewers.
- Awareness—The potential for revisions in both the nation's model energy code and state or region specific codes requires constant communication among various stakeholders including utilities, state energy offices, regulatory bodies, building professionals, and local code officials. Utilities can play a key role by monitoring changes, convening meetings, and providing up-to-date information to stakeholders.[3]

The areas described represent a range of engagement options for utilities. The majority of U.S. states have not adopted the most recent residential or commercial building code and this gap in adoption is an immediate opportunity for utilities.[4] Training and compliance enhancement efforts are also areas where utility involvement would lead to energy savings.

[3] Measuring the impact of awareness efforts by utilities is difficult and requires a strong methodology for identifying the unique contributions of the utility and assessing the effects of their actions.

[4] The status of building energy codes is detailed in Appendix A.

THE UTILITY'S ROLE IN APPLIANCE AND EQUIPMENT EFFICIENCY STANDARDS

There are three ways for utilities to get involved with standards. First, when there is no set standard for a product but a market exists, a utility can work with regulators to negotiate a market-sourced baseline and run programs that support the adoption of more efficient products by households. The utility can claim the incremental energy saving from utility run programs referenced against the market-sourced baseline.

Second, utilities can work between final rule making and effective date of a new standard to help accelerate market adoption of high efficiency products and secure energy savings through a market transformation effort. In this approach, the new standard becomes the baseline and utilities can focus the market by incenting the purchase of higher than minimum efficiency products. In some cases, readily available high efficiency products will not pass cost-effectiveness tests and the utility will need to work with the product manufacturers.

A third, and less common, approach is for utilities to work with a state agency, such as a standard setting energy office, to develop a standard for a product that is not federally covered.[5] A recent example of this approach is the creation of new energy efficiency standards for color televisions in California.

In summary, utilities can contribute to the development and implementation of efficiency standards in a variety of ways. Examples of utility involvement with standards include:

- Holding meetings and working groups to target products ripe for new standards;
- Developing technical reports on the feasibility, costs, and benefits of candidate technologies for standards consideration;
- Developing standards testing practices and evaluation tools;
- Increasing the market share of high efficiency products through incentives; and
- Providing expert witness testimony in regulatory hearings and assisting with consumer and regulator education efforts.

[5] It should be noted that not every state energy agency has the authority to pursue and set efficiency requirements. In some states, a legislative effort may be required to alter minimum efficiency standards.

CODES AND STANDARDS CAN BE A SIGNIFICANT SAVINGS OPPORTUNITY—CALIFORNIA

The opportunity for energy savings from codes and standards programs is large, yet, to date, only California gives utilities credit toward their efficiency goals for such energy savings. Table 1 shows the 678 GWh of electricity savings and 123 MW of peak reductions during the 2006-2008 program cycle and 2009 bridge funding period attributable to codes and standards programs.[6] These savings represent about 9 percent of the overall energy efficiency portfolio for the California investor owned utilities (IOUs) in that period. Importantly, these savings were delivered cost-effectively. Because the codes work is so cost effective, the addition of codes and standards program savings to the broader portfolios of utility incentive, education, and marketing programs can reduce the overall program portfolio cost per kWh saved.

Table 1: Evaluated Savings of California IOUs from Codes and Standards Programs (2006-2009)

IOU	Electricity (GWh)	Peak Savings (MW)
PG&E	299	55
SCE	309	56
SDG&E	70	13
Total	**678**	**123**
Share of EE Portfolio	**9.20%**	**9.40%**

Source: CPUC-ED, Energy Efficiency Evaluation Report for the 2009 Bridge Funding Period, January 2011.

Given the significant level of energy savings realized and the cost-effectiveness, at least two of the three California IOUs plan to increase their codes and standards program funding levels for the 2010-2012 cycle. By locking in future purchases of devices at a higher energy efficiency level, preliminary estimates of energy savings from codes and standards for the 2010-2012 program cycle are about 837 GWh.[7]

An important financial consideration for utilities is that energy savings through codes and standards programs are achieved without the cost of rebating efforts. California's significant

[6] California Public Utilities (CPUC) Energy Division, *Energy Efficiency Evaluation Report for the 2009 Bridge Funding Period*, January 2011.

[7] CPUC Fact Sheet, *Energy Efficiency Statewide Codes and Standards Program (2010-2012)*, July 2010. http://www.cpuc.ca.gov/NR/rdonlyres/FAA129C6-55D8-42CC-8B1C-3F4FBAD8FE5B/0/EE14CodesandStandardsPrograms0710.pdf

energy savings from codes and standards programs provide motivation for other states to consider the adoption and enhancement of utility-supported codes and standards programs.[8]

[8] A challenge for utilities seeking credit for the incremental savings associated with making improvements to base building energy codes and/or appliance standards is the development of a commission-approved business-as-usual baseline. As with energy efficiency programs, all quantitative assessments of performance require a comparison of actual recorded consumption to a business as usual baseline.

THE ENVIRONMENT FOR UTILITY ENGAGEMENT

This section describes potential pathways for utilities and stakeholders to integrate codes and standards into utility energy efficiency portfolio goals. Three approaches that encourage utility involvement in codes and standards are described. These approaches embody different emphasis areas and varying levels of engagement between utilities and stakeholders involved with the development, adoption, and enhancement of building energy codes and appliance/equipment standards. These are potential pathways for utilities and stakeholders to work together to bring about cost-effective energy savings from codes and standards.

APPROACH 1: CALIFORNIA, MASSACHUSETTS, MINNESOTA

California

California is often recognized as a pioneering state when it comes to energy efficiency. Since 1998, California utilities have played a key role in advancing building energy codes and appliance/equipment standards, and starting in 2005, the annual energy savings goals set by the California Public Utilities Commission (CPUC) allowed for energy savings from codes and standards to be counted towards meeting the goals.[9]

Key contributions from the California IOUs are the Codes and Standards Enhancement (CASE) reports that the IOUs develop and provide to the California Energy Commission (CEC). CASE reports evaluate the costs and benefits of pursuing specific energy saving technology measures (e.g., efficient TVs) and help the CEC justify changes to California's Administrative Codes Title 20 (Appliance Codes) and Title 24 (Building Codes).

Prior to the development of CASE reports, the IOUs and the CPUC create a goal of developing a certain number of reports. The CPUC then authorizes funding requests for the CASE reports as part of the overall energy efficiency funding request. Once a technology/measure is identified for evaluation, the utility develops the CASE report in collaboration with the CEC. Although this process can be lengthy—it may take several years for a code change opportunity to be assessed through a CASE study, codified into the state's building codes and appliance standards, and for estimated savings to be incorporated into the utilities' energy efficiency portfolios—the IOUs'

[9] Eilert, et al., *Managed Diffusion*, ACEEE Summer Study on Energy Efficiency in Buildings, 2006.

efforts to develop and support increasingly stringent building energy codes and appliance/equipment standards have led to substantial cost-effective energy savings.

In addition to the information and foresights delivered by the CASE reports, California has developed a robust evaluation and attribution model that can be used to credit utilities for the energy saving resulting from the adoption of codes and standards (see Appendix C).

California has served as a model for the efficiency community for many years, and the maturity of their codes and standards programs and the robust results delivered demonstrate the benefits of utility involvement. Some states and utilities are taking portions of the California approach and tailoring this model of engagement to fit the needs of their codes and standards community and to meet their energy efficiency goals. Of note are the efforts underway in Massachusetts and Minnesota.

Massachusetts

The Commonwealth of Massachusetts is currently finalizing a process that recognizes the role of utilities in advancing codes and standards. The 2008 Green Communities Act allows for communities (cities and towns) to apply for "green community" status and adopt building reach codes that are greater than the minimum statewide energy code.

As of June 2011, 95 of 351 Massachusetts communities have adopted reach codes.[10] The reach code is a standardized, optional appendix to the current Massachusetts building energy code (IECC 2009) that provides communities the option to adopt an energy code that is more efficient than the statewide code for all new residential and some new commercial buildings.[11] The reach code is designed to be 20 percent more energy efficient than the base energy code.[12] Reach codes provide Massachusetts the opportunity to realize energy savings greater than what would be achieved under IECC 2009.

A working group comprising Massachusetts utilities, the Energy Efficiency Advisory Council (EEAC), and the Department of Public Utilities (DPU) is developing a process that will recognize the role of utilities in supporting codes and standards and provide credit for such

[10] http://www.mass.gov/Eoeea/docs/doer/green_communities/grant_program/stretch_code_towns.pdf
[11] A standardized reach code simplifies training efforts and accelerates the market transformation process.
[12] http://www.mass.gov/Eoeea/docs/doer/green_communities/grant_program/q_and_a_stretch_code.pdf

savings in meeting energy efficiency goals.[13] In addition to the evaluation process, efforts are underway to develop a code compliance study, an estimation of savings potential from code improvements, and refinement of the program design.

Accruing sustainable energy savings from codes (reach or statewide minimum) is a challenge. Research efforts by the Massachusetts Institute of Technology are examining how best to carry forward codes and retrofit efforts related to the American Recovery and Reinvestment Act through utility-to-community programs. MIT's Energy Efficiency Strategy Project is proposing several innovative approaches, including a utility-supported financial model for public facilities, utility leadership in reach codes, and taking a closer look at retrofit ordinances for majority renter populations.[14]

Minnesota

In Minnesota, the 2007 Next Generation Energy Act calls for energy savings of 1.5 percent of the utility's annual retail electricity sales, starting in 2010.[15] Energy savings from building codes and appliance standards can count towards the utilities' annual energy savings goals.[16]

Through an effort funded by the state Department of Commerce and facilitated by the Minnesota Environmental Initiative, a group of stakeholders was brought together to fashion a set of recommendations on how codes and standards can contribute to the 1.5 percent goal. Stakeholders for this working group included the Midwest Energy Efficiency Alliance, Xcel Energy, Otter Tail Power, Dakota Power, The Weidt Group, Brookfield Properties, and the Center for Energy and Environment.[17]

The recommendations focused on enhancing code compliance and discussed ways to measure energy savings. Suggestions for possible utility activities include:

- Early-retirement DSM programs for appliances and equipment.

[13] Tolkin, et al., *Savings from Codes and Standards Activities: Developing an Evaluation Mechanism in Massachusetts*, 2010.
[14] Michaels, Harvey, *Community Engagement: A Potential Transformative Path to Greater Energy Efficiency*, August 2011.
[15] 2010 Minnesota Statutes, 216B.241 – Energy Conservation Improvement. https://www.revisor.mn.gov/statutes/?id=216B.241
[16] Next Generation Energy Act of 2007, Section 4 – Energy Conservation Policy Goal.
[17] 1.5% Energy Efficiency Solutions Project, Minnesota Environmental Initiative, March 2011 Final Report.

- Establishing a program modeled after the Washington State Utility Codes Group that includes funding and/or rebates for a third-party plan review and inspection program.[18]

By training, testing, and certifying a group of inspectors and providing rebates for inspections, the Minnesota utilities can become a third-party facilitator of advancing energy codes and would then be able to claim an appropriate share of the energy savings associated with their codes and standards program efforts.

[18] Kunkle, Rick, *The Washington State Energy Code: Energy Code Privatization—The Utility Code Group Story*, January 1997.

APPROACH 2: ARIZONA

Arizona

A second model for a utility to receive credit for its efforts in advancing codes and standards is emerging in Arizona, where regulated IOUs can receive a credit of up to one-third of the savings associated with codes programs.

In 2010, the Arizona Corporation Commission unanimously approved an Electric Energy Efficiency Standard that requires regulated electric utilities to achieve cumulative energy savings equivalent to at least 20 percent of retail energy sales, plus up to a 2 percent credit for peak demand reductions from demand response programs, for a total of 22 percent by 2020.[19,20] In its recommendation, the Commission outlined an opportunity for utilities to count up to one-third of the energy savings resulting from the implementation of building energy codes towards these energy efficiency goals. Savings must be quantified and reported through a measurement and evaluation study undertaken by the affected utility.

At this time, savings from appliance and equipment standards are credited to regulated gas utilities but not electric utilities. Therefore, electric utilities are focusing on enhancing building energy codes to receive credit towards the statewide energy efficiency standard. For example, Tucson Electric Power (TEP), an IOU, has submitted a building code support pilot program as part of its 2011-2012 Energy Efficiency Implementation Plan, currently pending before the Arizona Corporation Commission. The program seeks to:[21]

- Better prepare code officials and building professionals to adhere to existing standards;
- Provide data and market insight to document the specific local benefits of code enforcement, and recommend energy code changes over time;
- Ensure utility incentive programs align well with local energy codes;
- Collaborate with relevant stakeholders to help build a more robust community working to advance strong and effective building energy codes across the local jurisdictions within TEP; and
- Advocate for energy code updates over time.

[19] Arizona Corporation Commission, Docket No. RE-00000C-09-0427.
[20] Electric distribution cooperatives are required to meet 75 percent of the savings specified by the Electric Energy Efficiency Standard.
[21] TEP 2011 & 2012 Building Code Support Pilot Program Description, Appendix C: Energy Codes Enhancement Program.

The Salt River Project (SRP), another electric utility in Arizona, but one that is not regulated by the Arizona Corporation Commission, is also pursuing energy code enhancement programs. In May 2011, SRP's Board of Directors approved a proposal which incorporates codes into its Sustainable Portfolio Standard. SRP is not obligated to meet the energy efficiency standard passed by the Arizona Corporation Commission, and has developed its own target of meeting 20 percent of its expected retail energy requirements through sustainable resources by 2020.[22] SRP views codes and standards as a means to achieving the goal.

Specifically, SRP plans to:

- Work with municipal jurisdictions to help accelerate the implementation of more robust building energy codes for new construction and major remodels. SRP will count no more than 50 percent of the energy savings resulting from the adoption of more efficient model energy codes beyond current code levels and credit savings towards its sustainable portfolio.
- Support activities at the state and federal levels to expedite the passage of more stringent energy standards. These standards will include both commercial and residential electric appliances, devices, and equipment. SRP will count no more than 50 percent of the energy savings resulting from the passage of new standards above the prevailing level toward its sustainable portfolio.[23]

SRP's initial assessment of the likely energy savings from implementing its energy code advocacy and training assistance program indicates that the program could potentially deliver up to 80,000 MWh of savings per year by 2016.[24] The achievement of this goal would represent about 0.25 percent of SRP's retail sales in 2016.[25] Recognizing the opportunity, SRP, in conjunction with the Arizona Department of Commerce's Energy Office, has already launched initial efforts to support building code advancement in the state. To date, SRP's efforts include providing resources for jurisdictions to purchase energy code books and manuals, providing funds to support energy code trainers, providing technical support to make energy code trainings available by producing DVDs, providing physical space for energy code trainings, and supporting adoption of the 2009 and 2012 IECC by the 19 local jurisdictions in their service territory.

---

[22] Sustainable resources are renewable energy sources and energy efficiency.
[23] SRP Sustainable Portfolio Principles. https://www.srpnet.com/environment/earthwise/pdfx/spp/April1/2011RevisedPrinciples033111.pdf
[24] SRP Position Paper on Model Energy Codes, *In Support of Clean & Efficient Energy*. https://www.srpnet.com/environment/earthwise/pdfx/spp/ModelEnergyCodes2011.pdf
[25] Email correspondence with Josh Robertson, Senior Policy Analyst, Salt River Project. (5/25/2011). Discussion by phone with Dan Dreiling, Product Manager, Salt River Project. (6/15/2011).

APPROACH 3: PACIFIC NORTHWEST

Pacific Northwest

In the Pacific Northwest, the region's utilities, the Northwest Energy Efficiency Alliance (NEEA), and the Northwest Power and Conservation Council (NPCC) coordinate efforts to realize energy savings in a four state area. Codes and standards programs are a cornerstone of their success.

The Northwest Power and Conservation Act of 1980 (NW Power Act) authorized the states of Idaho, Oregon, Montana and Washington to form an interstate compact, the NPCC. The planning act called for the NPCC to develop a 20-year load forecast and resource plan while working together to develop reliable electricity through a least cost resource approach with energy efficiency recognized as the highest priority resource, equivalent to generation.

With respect to codes and standards, the NPCC is tasked under the NW Power Act with promulgating model conservation standards (MCS) that must be "designed to produce all power savings that are cost-effective for the region and economically feasible for consumers, taking into account financial assistance made available to consumers" (by utilities).[26] Given the NPCC recommendations, the utilities in the Northwest, along with NEEA, determine the mix of codes and standards programs that will yield the largest savings at the lowest cost with the highest level of compliance.

In the beginning, the NPCC had to overcome technical, political, and market-based challenges to demonstrate the benefits of adopting the MCS. In the early 1980s, the NPCC worked with the Bonneville Power Authority (BPA) to demonstrate the feasibility of implementing the MCS on a pilot demonstration basis. Between 1982 and 1984, four-hundred homes were built to MCS levels. With the engineering and building science aspects validated and the lifetime cost-effectiveness of building to MCS levels verified, the BPA and the NPCC moved forward with a consumer marketing program to build demand for high efficiency homes. To offset the slightly higher cost to construct MCS dwellings, the BPA paid builders $2,000 to build to MCS requirements. Between 1983 and 1999, several thousand homes were built using MCS techniques, expanding the technical know-how of the homebuilder community. The final step in locking in the savings from the MCS was to codify the standard into law. Recognizing that early

[26] Northwest Power and Conservation Act, Section 4.(f)(1).

adopting jurisdictions would need additional support and training to deliver on the promise of the MCS, the BPA provided training for building code officials, provided computers and code compliance software, and paid the incremental cost of compliance enhancement efforts.[27]

Today, NEEA actively participates in the code development process and leads contractor training workshops.[28] NEEA's strategy is to advance energy savings through commercial, industrial, and residential initiatives that are voluntary and are designed to train and inform building professionals on new technologies that can deliver energy savings. This strategy has successfully developed trained building professionals that can explain the benefits of energy efficiency measures to their customers. As the voluntary approach spreads and benefits are realized, the new technologies and practices by building professionals are then adopted by the state code.

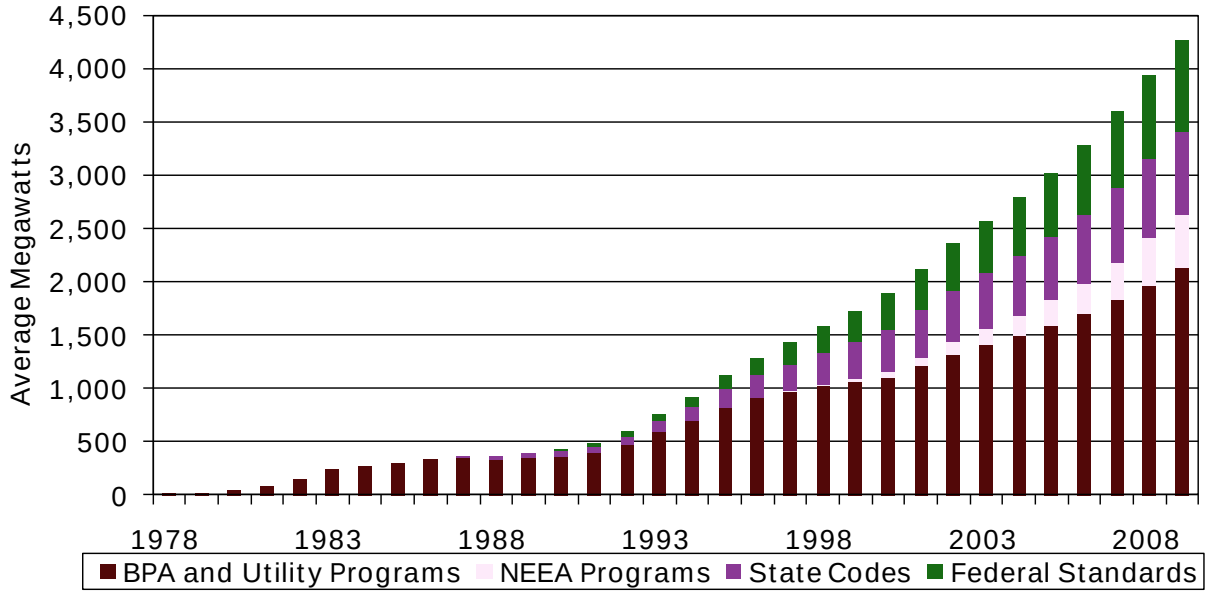
Washington and Oregon are two of three states to have ever documented a 90 percent energy code compliance rate across the entire state.[29] In 2009, NEEA's support of the Northwest ENERGY STAR Homes program led to the development of roughly 1 out of 8 new homes in the region meeting ENERGY STAR Home efficiency levels.[30] ENERGY STAR homes are at least 15 percent more energy efficient than code.

The relationship between NEEA program efforts, utility sponsorship, and recognition of energy savings by the regulatory agencies is outlined in the utilities' integrated resource plan filings.

Figure 2 shows that advancements in state building codes, supported in part by utilities, accounted for 18 percent of total cumulative energy savings between1978 and 2009 in the Pacific Northwest. In total, NEEA efforts and state codes account for 30 percent of total cumulative energy savings during that period.

[27] The Proven Road to 90% Compliance, David Cohan, NEEA (Draft).
[28] http://www.nwalliance.org/ourwork/index.aspx
[29] The Proven Road to 90% Compliance, David Cohan, NEEA (Draft). The third state is California.
[30] Northwest Energy Efficiency Alliance Annual Report, 2009.

Figure 2: Pacific Northwest Annual Energy Savings (1978-2009, cumulative)



Source: Northwest Power and Conservation Council.

The success of the Pacific Northwest in the areas of energy savings from codes and high rates of code compliance could not have occurred without substantial upfront investments and ongoing involvement by the utilities.

EXAMPLES OF UTILITY INVOLVEMENT WITH STANDARDS

The 1987 National Appliance Energy Conservation Act (NAECA) authorized federal standards set by DOE to preempt state law, but utilities can still advance energy savings by providing incentives for households and businesses to purchase greater than minimum efficiency products, or adopt state specific appliance/equipment standards in the absence of prevailing federal standards. DOE's Appliances and Commercial Equipment Standards Program develops the minimum efficiency standards for residential appliances and commercial equipment and currently has authority to regulate efficacy levels for over 40 residential, commercial, and industrial products.[31]

Educating Customers and Regulators on Changes in Standards

The Energy Independence and Security Act of 2007 (EISA) authorized DOE to develop new efficiency requirements for household lamps starting in 2012. The transition between standards creates a space for utilities to become involved and add value. The upcoming revisions to residential lighting standards, promulgated by EISA, are important to utilities due to the prominence of utility-sponsored lighting rebate programs that incent households to replace incandescent lights with compact fluorescent lamps (CFLs). According to Ecos Consulting, in 2010, at least 100 U.S. utilities ran a CFL lighting program and the cumulative budgets exceeded $250 million.[32] Since the 1990s, utilities have paid rebates on hundreds of millions of CFLs, saving billions of kWh.

EISA does not ban the manufacture or sale of incandescent bulbs. Incandescent bulbs will still be available but will be built to operate at more efficient wattages relative to light output (measured in lumens). Utilities can step in and help the customer understand their choices of bulbs and the appropriate replacement bulb based on the lighting application and the efficiency (lumen output per watt) of the bulb.

The new lighting standard will require utilities to partially redesign their lighting programs and to work with regulators to redefine the baseline. In general, net energy savings from rebated bulbs will be smaller and the cost per lifetime kWh saved will increase (from 0.5-1.0

[31] http://www1.eere.energy.gov/buildings/appliance_standards/
[32] Ecos presentation, Next Generation Lighting Webinar, October 13, 2010.

cent/lifetime kWh saved to 1.5-2.5 cent/lifetime kWh saved).[33] The decrease in energy savings and increase in cost per kWh saved has implications.

- First, we are already seeing utilities beginning to diversify their lighting portfolios by providing incentives for non-CFL energy efficient bulbs. Although CFL rebate programs have been successful in terms of household savings and cost per lifetime kWh saved, the efficient lighting market is not limited to CFLs.
- Second, even with the new lighting standards that become effective in 2012, residential lighting programs will remain very cost effective relative to other utility energy efficiency programs.

The new lighting standard is one example of how an enhanced minimum efficiency requirement changes the baseline and challenges utilities to design even more efficient programs in the future.

Standard Setting with State Entities

Televisions and other set top boxes, such as digital video recorders, cable boxes, and DVD players, consume 10 percent of a home's electricity.[34] Currently, color TVs are not covered by federal standards, though DOE has initiated a rulemaking and test procedure development process for them. In 2008, the California IOUs recognized an opportunity to save energy and pursued a state standard for TVs.[35] The IOUs provided technical assistance to the CEC by developing a CASE report that assessed the costs and benefits of improving the efficiency levels of color TVs. In addition, utility representatives attended hearings, collected supplemental data, and countered criticisms of the proposed standards by particular manufacturers and the Consumers Electronics Association.

Working with individual TV manufacturers and technology developers, the color TV CASE report showed that the incremental cost of increasing efficiency would not increase the purchase price of televisions because the incremental technology costs are offset by reductions in other components.[36] As part of the transition to the standard, the California IOUs worked with large box stores to educate their sales forces about efficient TVs, and to offer financial rebates on sales of the most efficient models. Over 1,000 TV models are currently available in the mass market

[33] Ecos presentation, Next Generation Lighting Webinar, October 13, 2010.
[34] http://www.energy.ca.gov/appliances/tv_faqs.html
[35] http://www.energy.ca.gov/2009publications/CEC-400-2009-024/CEC-400-2009-024.PDF
[36] Ibid.

that meet the 2011 California TV efficiency standard. The California TV standards are projected to deliver efficiency increases between 33 and 49 percent, equivalent to an average annual utility bill reduction of $18 to $30.[37]

As a result of their efforts in the standards setting process, the California IOUs receive credit for savings attributed to the sale of color TVs that meet the new standard.

Perhaps one of the largest contributions a utility can provide in the standards area is in their development of technology evaluation reports that assess candidate technologies for standards consideration, bringing forward those that have large, cost-effective savings worth pursuing.

[37] http://www.energy.ca.gov/appliances/tv_faqs.html

CONCLUSION

Building codes and appliance standards are two policy mechanisms that hold tremendous potential to save energy. This paper indentifies ways for utilities, policy makers, and regulators to work together to integrate cost-effective codes and standards programs within a utility's energy efficiency portfolio. A variety of engagement opportunities for utilities exist. Although regulatory acceptance, legislative requirements, and regional characteristics will influence the potential utility engagement pathways, codes and standards programs are a critical part of managing the energy needs of future generations.

Key lessons learned and elements of success in states where utilities are getting credit for advancing codes and standards are:

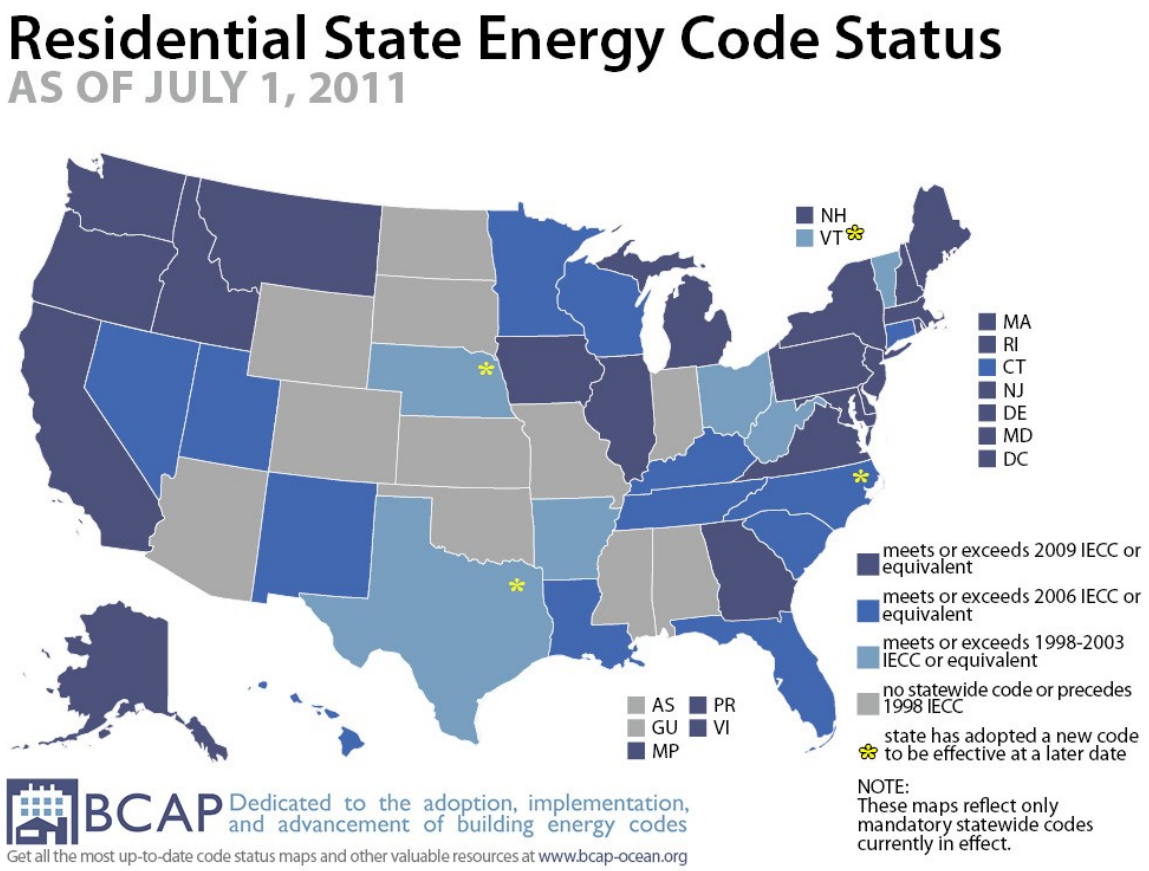
- Move from information-only efforts to programs that advocate and support the enhancement of codes and standards;
- Improve utility visibility by documenting utility involvement in the codes and standards process;
- Unify minimum code requirements across all municipal jurisdictions in a state;
- Enable jurisdictions to elect more stringent, cost-effective codes and standards;
- Develop a credit and reporting system used by utilities and regulators that places an emphasis on compliance and training;
- Improve the compliance rate of new buildings meeting the minimum energy code of the state or region;
- Develop state standards for appliances/equipment not covered by federal standards;
- Provide information updates and educational briefings for new regulatory commissioners and staff;
- Transform the marketplace by incenting the purchase of appliances and equipment with efficiency ratings greater than the minimum standard.

APPENDIX A—BUILDING ENERGY CODES: RESIDENTIAL AND COMMERCIAL

Today, building energy codes apply to both commercial and residential structures and are voluntarily adopted by state and municipal governments.

However, adoption of a code does not necessarily mean that the code is enforced. In contrast to standards where a manufactured product is regulated and tested to meet national minimum requirements prior to release in the marketplace, the codes development process is less orderly.

Figure A-1: Residential State Energy Code Status (July 2011)

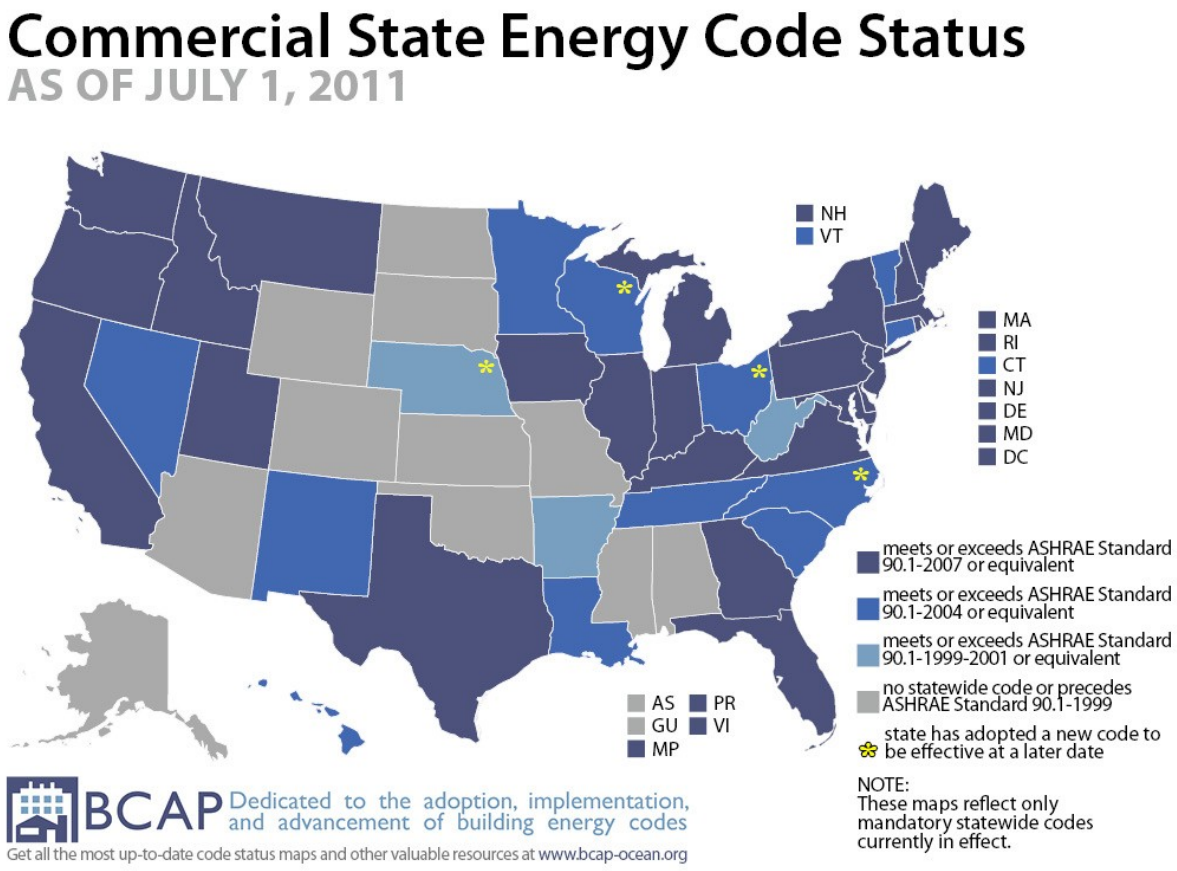


Source: Building Codes Assistance Project, http://bcap-ocean.org/code-status-residential.

Residential codes are developed by the International Code Council, in collaboration with DOE, with publication of a new International Energy Conservation Code (IECC), also known as the model energy code, every three years. Industrial and commercial codes are primarily developed by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE),

in collaboration with DOE, with updates occurring every three years. Figures A-1 and A-2 present the status of residential and commercial state energy codes.

Figure A-2: Commercial State Energy Code States (July 2011)



Source: Building Codes Assistance Project, http://bcap-ocean.org/code-status-commercial.

APPENDIX B—COMPLIANCE AND REACH CODE ISSUES: OPPORTUNITIES FOR UTILITIES

Compliance

A primary issue with building codes is low compliance rates. There are a number of options for utilities to become engaged with building code compliance efforts. For instance, a utility can develop compliance enhancement programs, sponsor workshops to improve the training of code inspectors, help administer the programs, or offset the cost of third-party administered inspections.

With each building energy code update, additional education and training is required for building code officials, builders, and others to keep current. Utility support of education efforts and workshops for code officials and code compliance professionals is very helpful.

Reach Codes

Another opportunity for utility involvement is in the development and support of reach codes. Reach codes provide an opportunity to advance market transformation and achieve accelerated energy savings. Reach codes allow for testing of new codes and help determine if increasing the stringency of the existing code is a cost-effective approach. Often, reach codes are developed at a local level for evaluation purposes prior to dissemination statewide.

In Massachusetts, a unified reach code has been developed for communities seeking to move their minimum efficiency building code above statewide levels. Reach codes can also help achieve policy goals, such as those described in California's Zero Net Energy Action Plan and the non-binding goals of California's Long Term Energy Efficiency Strategic Plan.

APPENDIX C—CALIFORNIA EVALUATION MODEL

Identifying the net energy savings from utility actions includes discounting for factors such as compliance and naturally occurring market changes that would have occurred without utility efforts. The exercise of first "proving" the savings from the codes and standards program, then "claiming" the savings was first developed in California.

The evaluation model used to attribute energy savings from California IOUs' codes and standards programs has 5 steps:

- Potential Savings Analysis: A per unit energy savings is calculated for the incremental benefit of adopting a new or more stringent code or standard at the statewide level.
- Compliance: Realized energy savings are estimated by discounting the potential energy savings estimates for each measure by the compliance level associated with each measure. *Utilities can play a role in improving code compliance rates by sponsoring workshops and training programs.*
- Normally Occurring Market Adoption (NOMAD): Energy savings are adjusted for the naturally occurring adoption of more energy efficient appliances, equipment, and building techniques in the marketplace.
- Attribution: Final statewide energy savings are estimated by discounting for how much the utilities' efforts contribute to codes and standards adoption.[38, 39]
- Allocation: Final statewide energy savings are assigned to each utility based on the IOU's percentage of statewide electricity sales.

[38] The attribution step in the California methodology assesses utility contributions based on five factors: 1) Importance of the energy efficient product in the market; 2) Effort needed for test methods and research; 3) Innovation of the new standard; 4) CASE study preparation; 5) Work with stakeholders in the public process. A Delphi Panel assigns a value for each category based on importance and a contribution value for the utility by category. These values are multiplied to produce an attribution score from 0 to 1.

[39] California utilities are pursuing the opportunity to earn proportionate energy savings credit for their successful engagement in federal energy efficiency standards to the extent that such standards save energy in their service territories. This attribution approach could open up participation to many utilities whose states do not, themselves, adopt energy efficiency requirements for appliances and buildings.

REFERENCES

Arizona Corporation Commission, Docket No.: RE-00000C-09-0427. June 25,2010

Building Energy Code Enforcement: A Look at California and Seattle, Prepared by Lynn Benningfield and John Hogan for the Natural Resources Defense Council, November 7, 2003

California Energy Commission, *2009 Appliance Efficiency Rulemaking, Staff Report*, Phase 1, Part C, Docket #09-AAER-1C, September 2009

Chase, Alex, *Analysis of Standards Options for Televisions: Revised Proposal*, July 3, 2008.

Codes and Standards (C&S) Porgrams Impact Evaluation, Volume III, Prepared for California Public Utilities Commission- Energy Division, April 9, 2010

Codes and Standards Technical Working Group Strategies, Minnesota>Environmental<Initiative, October 15, 2010

Cohan, David, *A Proven Road to 90% Energy Code Compliance*, 2011 (Draft)

Developing Protocols for Codes and Standards Activities in Massachusetts: A Work in Progress, NMR Group, Inc., September 28, 2010 (presentation)

Energy Efficiency Evaluation Report for the 2009 Bridge Funding Period, California Public Utilities Commission—Energy Division, January 2011

Eilert, Pat, et al., *Managed Diffusion,* 2006

Institute for Electric Efficiency, *Assessment of Electricity Savings in the U.S. Achievable through New Appliance/Equipment Efficiency Standards and Building Energy Codes (2010-2020),* December, 2009

Institute for Electric Efficiency, *Assessment of Electricity Savings in the U.S. Achievable through New Appliance/Equipment Efficiency Standards and Building Energy Codes (2010-2025),* May, 2011

Institute for Electric Efficiency, *Summary of Ratepayer-Funded Electric Efficiency Impacts, Expenditures, and Budgets,* January, 2011

Kunkle, Rick, *The Washington State Energy Code: Energy Code Privatization—The Utility Code Group Story*, January, 1997

Laws of Minnesota for 2007, Chapter 136—S.F.No. 145

Legal Barriers to the Adoption of the Model Building Energy Performance and Disclosure Act, Institute for Energy and the Environment, Vermont Law School, February 2010

Michaels, Harvey, *Community Engagement: A Potential Transformative Path to Greater Energy Efficiency*, MIT Energy Efficiency Strategy Project, August 2011

Minnesota Environmental Initiative, *1.5% Energy Efficiency Solutions Project* Final Report, March 2011

Minnesota Statute 216B.241 (2010)

Multi-Year Program Plan—Building Regulatory Programs, U.S. Department of Energy Building Technologies Program, October 2010

NEEA Codes and Standards Support Project: MPER #2, Market Progress Evaluation Report, April 11, 2008 http://neea.org/research/reports/E08-184.pdf

NEEA Market Progress Evaluation Report 3: Evaluation of Codes and Standards Program, December 1, 2009

Northwest Energy Efficiency Alliance Annual Report, 2009. http://www.energy.ca.gov/appliances/tv_faqs.html

Supporting Energy-Efficiency Codes and Standards through DSM/EE Programs, RAP Advocates Webinar, April 7, 2011

SRP Sustainable Portfolio Principles, Revised April, 2011. https://www.srpnet.com/environment/earthwise/pdfx/spp/April1/2011RevisedPrinciples033111.pdf

SRP, *In Support of Clean & Efficient Energy*, SRP Position on Model Energy Codes, https://www.srpnet.com/environment/earthwise/pdfx/spp/ModelEnergyCodes2011.pdf

The Role of PNW Energy Efficiency Resources, Northwest Power and Conservation Council (Powerpoint)

Tolkin, Betty, et al, *Savings from Codes and Standards Activities: Developing an Evaluation Mechanism in Massachusetts,* 2010

Q&A for MA Stretch Energy Code Appendix 780CMR 115.AA, October, 2010

For more information contact:
Institute for Electric Efficiency
701 Pennsylvania Avenue, N.W.
Washington, D.C. 20004-2696
1.202.508.5440
www.edisonfoundation.net/iee

The EDISON FOUNDATION | Institute for Electric Efficiency