

Getting Credit for Energy Savings from Promoting Energy Codes and Standards: Status and Evaluation Issues

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ABSTRACT

Since the mid-1990's, California utilities have promoted upgrades of energy-efficiency building codes and appliance/equipment standards as a strategy for increasing energy efficiency. Recently in other states, program administrators have initiated similar efforts. Such activities, however, make it more difficult to achieve savings from conventional energy-efficiency incentive programs since codes and standards increase baseline efficiency levels. From an evaluation perspective, this topic is important because of the lack of widely accepted methods for assessing impacts and crediting program administrators for their codes and standards efforts. To address this issue, California and a growing number of other states are establishing mechanisms whereby energy savings can be quantified and attributed to such program administrator efforts.

This paper provides an overview of this topic and highlights the key evaluation issues that must be addressed. It describes energy-efficiency code and standard development, adoption, and implementation processes. It reviews the status of utility and program administrator activities in code/standard promotion, compliance enhancement, and local "reach code" advocacy.

The paper describes methods proposed and used to evaluate energy savings from such programs. It summarizes the features of different methods to evaluate such programs and discusses implications of the methods. The paper concludes by identifying opportunities for conducting such programs and research, as well as the data needs for evaluating programs in the future.

Introduction

Residential and commercial buildings and the appliances and equipment in them consume about 42% of U.S. primary energy. Energy-efficiency codes and standards (C&S) set minimum efficiency levels that new buildings and appliances must meet or exceed.¹ Because they eliminate low-efficiency products from the market, C&S have become an important mechanism for reducing energy consumption. Since the 1970s, the U.S. Department of Energy (USDOE) has had the authority to promulgate appliance efficiency standards, but not building codes. In part due to lack of federal action, states began establishing regulatory frameworks for developing, adopting, and implementing appliance standards in the 1970s and 1980s. In California, the California Energy Commission (CEC) was created in the late 1970s and one role was the adoption of both codes and standards. The California building codes are referred to as Title 24 standards and the appliance standards are referred to as Title 20 standards, based on their respective location in the California Administrative Code. Both USDOE and

¹ The terms "code" and "standard" are often used interchangeably and there are various explanations of the differences between them. For purposes of this paper, we predominantly use "codes" to refer to building energy-efficiency regulations and "standards" to designate requirements for appliances or equipment, and use "standards" sometimes as a generic term to refer to either.

states have continued developing and upgrading their appliance standards, and the states and national bodies have continued upgrading building codes.

Starting in the late 1990s, California utilities recognized the energy saving potential of C&S and began playing a significant role in researching, proposing, and promoting efficiency C&S through what has become the statewide utility Codes and Standards Program. However, such activities pose a dilemma for utilities and program administrators since they raise the baseline efficiency level against which the savings for conventional programs are measured.

This paper provides an overview of this topic and highlights the key issues that must be addressed to evaluate the impacts of program administrators' (PAs') efforts to promote C&S. It describes the energy-efficiency code and standard development, adoption, and implementation processes. It then reviews the status of PA activities in code/standard promotion, compliance enhancement, and local "reach code" advocacy.² The paper next describes evaluation issues associated with quantifying impacts of these activities and attributing energy savings to program administrator efforts and reviews methods proposed and studies to quantify impacts of C&S programs. The paper concludes by identifying opportunities for conducting such programs and research and data needs for evaluating programs in the future.

Energy-efficiency Codes and Standards Development, Adoption, and Implementation

To understand how PAs can influence energy savings through C&S, it is important to describe the processes involved in developing, adopting, and implementing energy-efficiency codes and standards. These processes differ in some ways between building codes and appliance standards. This section describes the key process steps and the role that PAs can play and what some have done to date.

Overview of Codes and Standards Processes

Development of building energy codes has occurred at the national, regional, state, and local level. The predominant sources of such codes now are model codes produced by the International Code Council (ICC) and the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE). The ICC has developed several editions of the International Energy Conservation Code (IECC) since 1998. The ASHRAE Standard 90.1 applies to commercial buildings.³ The IECC covers both residential and commercial buildings, but allows use of Standard 90.1 for commercial buildings. The IECC is developed through a public process, and is updated on a three-year cycle. ASHRAE 90.1 is developed and adopted through a consensus, with ASHRAE 90.1 addenda produced every 18 months, and an updated standard about every three years.

Both these codes became more prominent as a result of the American Recovery and Reinvestment Act (ARRA). To receive State Energy Program (SEP) funding under ARRA, states had to commit to adopting ASHRAE 90.1-2007 for commercial buildings and IECC 2009 for residential buildings, implement a plan to achieve 90 percent compliance with these codes by 2017, and measure current compliance each year. After more than a decade of federal efforts, this "carrot" approach has led to the first widespread commitments and efforts by states to adopt the most recent model codes.

Building codes are usually adopted at the state level and enforcement is typically done at the city or county level. Codes are adopted either through legislation or a regulatory process, depending on the state. In response to ARRA, all states have committed to adopting codes that meet or exceed the

² Reach codes are codes that impose higher requirements than the state code or other code that would otherwise be in effect.

³ The complete title is ANSI/ASHRAE/IESNA Standard 90.1, but is often shortened to ASHRAE 90.1.

requirements of the specified codes. Local jurisdictions enforce the codes through their building department, or similar entity, and usually perform plan checks and site inspections to verify compliance. USDOE has developed tools—*COMcheck* and *REScheck*—that can be used to demonstrate code compliance of commercial and residential building designs, and the outputs can be filed with the building department.

Appliance efficiency standards were first discussed in the 1970s as a way to reduce energy consumption. Through the Energy Policy and Conservation Act of 1975, the federal government established voluntary standards aimed at a 20% average energy use reduction. Several states began processes to develop mandatory standards, including California. The progress of federal appliance standards has varied, often in response to politics. In the meantime, states—California in particular—have proactively identified gaps in the federal standards and pursued adoption of state standards. Over 40 product categories are now covered by federal standards and additional ones are covered by state standards.

USDOE has certification, compliance, and enforcement regulations for certain consumer products and commercial and industrial equipment covered by federal standards. The states also have procedures for enforcing their standards. However, neither USDOE nor the states proactively ensure compliance with the standards and often rely on firms identifying possibly non-compliant products from competitors to initiate enforcement actions.

Program Administrator Codes and Standards Roles and Activities

Successful adoption and implementation of C&S must overcome several barriers including:

- Challenges by industry based on cost implications, lack of technical data, and perceived implementation difficulties.
- Lack of procedures to ensure compliance
- Enforcement costs and difficulties

Program administrators are in a unique position to address these barriers in several ways. They can provide a countervailing industry position in support of C&S. PAs' efficiency programs can generate credible cost, technical, and implementation data to support new C&S. Also, their resources and local presence and influence can help provide tools to assess compliance and alleviate the costs and difficulties of enforcement at the local level. To PAs, these efforts can be a cost-effective strategy for achieving energy and capacity savings goals that lower customer energy bills, contribute to meeting state and regional greenhouse gas (GHG) reduction targets, and transfer successful voluntary program strategies to a mandatory framework that lowers their administrative costs. The only impact evaluation to date of a C&S program suggests that electricity can be saved at a utility average cost of only about 5% the average cost for other conventional efficiency programs.⁴

If PAs take a holistic view—treating market transformation through upgraded C&S as a goal—a systematic approach can be designed that leads from research on emerging technologies, to incentive programs, to targeted research and advocacy for C&S adoption, and, finally, to support for efforts to enhance C&S compliance and enforcement. This type of perspective has emerged gradually over the last decade, starting with California. The experience of PAs in California and other states are described below. It is worth noting that, outside of California, most of the efforts to date have concentrated on building codes and not appliance standards.

⁴ These costs are estimated based on the 2006 through 2008 net first-year energy savings estimated for the California IOUs' C&S Program (see Cadmus et al. 2010) and utility costs, though the cost effectiveness was not formally calculated.

California. In the late 1990s, California's investor owned utilities (IOUs) started to take an active role in the C&S development process, motivated by the ability of C&S to make permanent, market-wide efficiency improvements and their expected cost-effectiveness relative to acquisition programs. Much of the impetus for the IOU interest was related to the focus on market transformation strategies that emerged during the 1990s. Utilities began actively engaging in the process in 1998 when they instituted codes and standards enhancement (CASE) initiatives (Mahone et al. 2005). The resulting CASE reports address the technical, market, and economic characteristics of potential changes to Title 20 or 24 and form the basis for proposals to the CEC to modify the standards. The CEC process for proposing and approving changes to the California standards has come to rely on these CASE reports to a large extent.

For the 2005 Title 24 and 2006 Title 20 standards, California's IOUs conducted a jointly coordinated Statewide Codes and Standards Program (C&S Program) funded through the Public Goods Charge (Pennington 2004a). The C&S Program contributed expertise, research, analysis, and other support to the CEC process (Mahone 2005). For 2005 Title 24 updates, 12 standards changes supported by detailed C&S Program activities were adopted by the CEC. For 2006 Title 20 updates, the C&S Program supported the upgrade or adoption of 27 appliance standards.

Since 2005, the California IOUs have continued and expanded their C&S Program activities. They are engaged currently in an intensive process of working with the CEC to identify promising opportunities to upgrade both Title 20 and 24. IOUs support involvement with national, federal, and regional organizations that are working to upgrade building codes and appliance standards. Within California, the IOUs are also dedicating efforts to advocating for adoption of reach codes in local jurisdictions that go beyond the current Title 24 and supporting green building codes. Because of the importance of code compliance, the C&S Program is also implementing strategies in targeted areas to improve code compliance.

Northwest. In the Northwest, the Northwest Energy Efficiency Alliance (NEEA), the Northwest Power and Conservation Council (NPPC), and utilities such as PacifiCorp, Idaho Power, and the Bonneville Power Administration have coordinated regionally to support building energy code adoption and upgrade processes. On behalf of the region, NEEA and NPPC have been active players in national organizations advocating for upgraded model energy codes and supporting upgrades to federal appliance standards. In the region, NEEA, NPPC, and BPA have conducted code compliance research and supported programs to enhance compliance. Some Northwest states have legislatively adopted appliance standards patterned after those in California.

Northeast. PAs in the Northeast have been engaged in activities supporting C&S. In Massachusetts, energy-efficiency providers have retained consultant assistance to (1) plan activities to support C&S that can be delivered as energy-efficiency programs and (2) develop a framework for evaluation that will estimate savings that could be attributed to the programs. These steps and others are efforts toward regulatory acceptance of claiming savings from these activities. Efficiency Vermont has provided training and materials for code officials, building trades, and product distributors/suppliers.

Northeast Energy Efficiency Partnerships (NEEP) is a regional body promoting energy efficiency in the Northeast and Mid-Atlantic States sponsored by regional program administrators and state agencies (see www.neep.org). The organization recognizes the importance of codes and standards for large scale energy and carbon emissions savings through a comprehensive codes and standards effort that embraces policy and evaluation issues. In 2009, NEEP issued a white paper (NEEP 2009) on a progressive building energy code policy that advocated for regular state adoption of the most recent national model energy codes and included an informative appendix presenting an above-code option to guide professionals to higher efficiency levels or allow for local adoption (reach code). The white paper also recommended methods and strategies for improving building energy code compliance such as:

- Better training and certification of code officials, building professionals, and building operations and maintenance staff.
- Increased local and state capacities and expertise to enforce code through the use of certified independent energy code inspectors.
- Maintaining adequate funding so that code agencies can administrate, train local officials, provide technical support, and enforce the code.
- Track and report energy code compliance to inform progress.
- Strategic coordination with energy-efficiency PAs to train the building design community in best practices to meet and exceed minimum energy code requirements.

NEEP implements the Appliance Efficiency Standards Policy Project, a regional coalition advocating for the enactment of state and federal energy-efficiency standards for a range of commercial and residential products.

In September 2010, NEEP held a workshop, Roadmap to Claiming Savings from Building Energy Codes and Appliance Standards, that brought together experts from around the country to provide an opportunity for regulators, PAs, and other energy efficiency stakeholders in the Northeast and mid-Atlantic to interact and learn about ongoing codes and standards policies, programs and evaluation plans.⁵ The workshop was intended to help the region achieve more aggressive savings goals and claim benefits associated with building energy codes and appliance standards. Many of NEEP's sponsors have expressed interest in a research effort, for which NEEP is currently seeking funding, to help them build support for regulatory approval of a program, and help them estimate impacts from codes and standards efforts.

Southwest. Various C&S activities involving PAs have occurred in the Southwest. In 2005, Nevada Power and Sierra Pacific provided funding for the training and education of builders and local code officials to prepare and educate the market for the building code change adopted by the state.

The Southwest Energy Efficiency Project (SWEET), which receives support from several utilities, has provided much of the leadership in the Southwest to support energy-efficiency building codes and conducted outreach and education in support of code adoption. SWEET works to promote more efficient building practices in the Southwest by:

- Advocating for the development and adoption of more stringent residential and commercial building energy codes at the state and municipal levels
- Conducting analyses and outreach on the benefits of highly efficient homes, including "zero-energy homes"
- Participating in utility energy efficiency program planning and advocating for additional utility incentives and programs that support building efficiency, such as training and design assistance
- Developing case studies of exemplary energy-efficient buildings and projects in the region

Most recently SWEET was involved in Arizona in the adoption of regulations for Energy Efficiency Standards setting savings goals for electric and gas utilities and allowing the utilities to claim partial credit for savings from C&S.

BC Hydro. In British Columbia, BC Hydro has been actively involved in supporting efforts to upgrade building energy codes and product efficiency standards. BC Hydro provided support and influenced the implementation of the green B.C. Building Code that took effect in September 2008. BC Hydro

⁵ Materials from the workshop can be found at

http://neep.org/uploads/EMV%20Forum/EMV%20Products/Codes_Standards_Workshop_92810_Materials.pdf

continued their support by participating in reshaping the next National Energy Code for Buildings. In fiscal year 2009, BC Hydro worked with federal and provincial government agencies to support and influence new federal product standards estimated to save 1,050 GWh by 2020. In addition, BC Hydro supported provincial regulation of general service lighting, electric water heaters and industrial motors. Their efforts are associated with the utility's Power Smart Program and the intent is to use a market transformation approach through which Power Smart helps introduce new technologies and energy efficient building design practices by providing incentives, training, and education until a market share is reached that is acceptable for consideration of regulations. In parallel, the utility works with the government on minimum energy-efficiency C&S that provide a backstop to prevent the market from sliding back to less efficient products and buildings.

Minnesota. In 2007, Minnesota passed legislation setting aggressive energy conservation goals and laid out approaches for utilities to achieve those goals. A report was commissioned and technical work groups were established to identify barriers and make recommendations to overcome them to achieve the legislation's goals. One focus area was energy-efficiency codes and standards (MEI 2011 and Haase 2011).

Three C&S issues were identified in the project: (1) effect of changing C&S on the baseline for utility DSM program savings and methods for counting the change; (2) development of a methodology for the state to track energy savings from implementation of existing and new building codes and standards; and (3) identification of business as usual for codes implementation, development of strategies to address how utility programs can assist in breaking down implementation barriers to codes and standards, and development of a methodology for utilities to track energy savings from increased implementation of new and existing codes and standards.

Progress is being made in developing the mechanisms to respond to these issues. Though C&S development is part of the thrust, much of the focus appears to be on C&S compliance. Options being discussed include (1) utilities participating in a statewide code compliance effort, contributing to it as a percent of their retail sales, and taking savings attributed to the program also proportional to their contributions or (2) a utility having the alternative of doing a specific program within their service territory. In the latter case, credit could only be taken when market study data showed code compliance level increases above and beyond what similar data showed statewide or for other territories without a similar territory specific program. It is important to note that the objective is to take a statewide view, i.e., not just for IOUs, but also including municipal utilities (in part, because of relationship potential between these utilities and local building officials) and utility cooperatives that may be in rural areas where code enforcement may be less strict.

Approaches that utilities could implement to support compliance include:

- Establish a Utility Codes Group to establish a specialized plans examiner/inspector program.
- Conduct research to determine high-priority tactical solutions for code compliance and focus efforts accordingly.
- Increase training and support for local building code officials.
- Investigate regulatory tools such as licensing/ registration enforcement.
- Evaluate proposed changes to the code and compliance approaches to simplify and expedite compliance.

Others: Other involvement by PAs in C&S activities has occurred around the country, though usually on a relatively limited scale. In Florida, the Florida Energy Efficiency and Conservation Act (first enacted in 1980) authorized utility programs to provide energy efficiency education and support to assist with code compliance and to increase awareness of ways to increase building efficiency beyond

the minimum requirements of the code (FBC 2009). Florida Power & Light has conducted RD&D for new technologies expected to be included in future building codes. In the 1990s, the Utility Code Group was instituted by utilities in Washington to establish a code training program, raise code awareness, and increase compliance through training and enforcement innovation. The Special Plans Examiner/Inspector was an innovative approach developed whereby third-party professionals, including those who were not code officials, could be qualified to provide energy code inspections and it appeared to be successful at increasing compliance rates. Most other activities have involved providing various types of assistance to enhance code compliance.

Implications of C&S Program Efforts

Although there are many good reasons for PAs to provide support for energy codes and standards development, adoption, and compliance, there are reasons for PAs to be reluctant to do so. Some of the reasons include:

- C&S activities can be very diverse, ranging from engineering studies to public advocacy.
- C&S activities may require skills and knowledge not readily available to all PAs.
- The activities required are dissimilar to activities conducted in conventional efficiency programs; thus, it may be difficult to integrate C&S programs into a program portfolio.
- Energy savings may not be readily linked to program activities and may be separated significantly in time.

The major impediment to PAs conducting C&S programs, however, is a gap in the protocols for giving PAs credit for energy savings resulting from C&S that they support. If a PA's promotion of an upgraded appliance standard or building code leads to significant energy savings, but the regulatory process has no way to count the savings toward the PA's savings goal or requirement, then the PA has little incentive to invest resources in these efforts. The problem is compounded by the fact that a successful effort to increase an appliance standard can increase the baseline efficiency level of the appliance enough that it becomes difficult to design and implement PA programs to produce significant energy savings for the appliance at a reasonable cost.

As described above, the California IOUs have engaged in a systematic C&S program and it has had to address all these impediments. The energy impacts of this program are documented in the first program impact evaluation (KEMA *et al.* 2010).

Integration with PA Forecasting, Planning, and Savings Targets

The process of crediting a PA's C&S program with energy savings must be considered in a broader context. When energy planners forecast demand and the mix of resources to meet demand, it is essential to understand how codes and standards are treated in these forecasts. Some planners and models may consider the energy savings of future codes and standards as an intrinsic part of the forecast, reducing demand a predicted quantity at the end-use level, but as a result of external efforts. In other cases, C&S savings may be treated as a percent of demand or percent of total energy use and applied to forecast aggregate demand.

If PA energy savings goals or targets are set assuming that exogenous C&S will be implemented and the PA has no C&S program, then the ability of the PA to meet its target will be influenced by what actual C&S are adopted. For example, if a PA incentive program for SEER 17 air conditioners has a target of saving 1,000 annual kWh per home based on the standard increasing to SEER 15, but the standard does not increase, then it is much easier for the PA to meet its savings goal. The opposite is true if the standard is raised more than expected.

If a PA does have a program to increase savings due to C&S, this provides a way to take a more holistic approach. For example, if the PA has an aggregate savings target for new residential construction and a process is in place to credit the PA for C&S savings, then the PA can trade off C&S activities and incentive programs.

The primary point is that C&S savings need to be treated on a consistent basis across forecasts, plans, and the setting of savings targets and counting of savings. Adjustments need to be made to reflect changes in assumptions so that progress toward desired goals is properly assessed. Crediting PAs with savings credit for their C&S activities can provide important flexibility for meeting goals, but the treatment of C&S savings still needs to be consistent.

Evaluating and Crediting Program Administrator Codes and Standards Activities

In the case of PA activities to advocate for upgraded C&S, the amount of credit PAs should get for energy savings that result from these activities depends on the following:

- An accurate estimate of technical energy savings potential due to each adopted code or standard if fully complied with.
- An estimate of consumption trends in the counterfactual case, i.e., without C&S adoption.
- Determination of the actual compliance level.
- An estimate of attribution, i.e., what share of net savings can be attributed to PAs' efforts, in situations where attribution is required for credit to a savings goal or financial reward.

Evaluating the impacts of PAs' other C&S activities also needs to take into account appropriate factors. For example, if PAs engage in efforts to enhance compliance with building codes, the following would need to be determined:

- Compliance levels given the PAs' efforts.
- Compliance levels in the counterfactual case, i.e., without the PAs' efforts.
- Changes in energy consumption due to the changes in compliance levels.

The process required to perform these analyses (or basically conduct an impact evaluation) can be complex and data and resource intensive. How these issues have been addressed in California and other locations is discussed next.

The California Experience

The California IOUs have recognized both the benefits from pursuing a C&S advocacy program, as well as the potential negative consequences on savings from other programs and the lack of recognition for the resulting C&S energy savings. Given the likelihood that C&S could achieve large energy savings and the lack of an impact evaluation procedure for quantifying their savings, the IOUs initiated steps to develop a quantification methodology starting in 2000. The first effort to assess energy savings due to utility efforts occurred in 2001 and was applied to C&S changes that occurred that year (HMG 2001). In 2004, a second study (ADM 2004) critiqued the way the prior study estimated attribution for savings to the IOUs and pursued a different attribution method.

The third attribution approach, developed under IOU funding defined five factors presumed to lead to adoption of a code or standard (Mahone 2005). A group process involving a committee of IOU, consultant, and CEC staff developed attribution weights and scores. The study also defined a detailed methodology to estimate the quantity of energy and demand savings to credit to IOUs for their C&S Program activities.

The fourth C&S Program study (Khawaja et al. 2007) focused on two key analysis components in the prior study—trends in market efficiency and compliance with the standards. Naturally occurring

market adoption, NOMAD, was estimated using a market adoption estimation approach based on the Bass curve methodology. Title 24 code compliance was estimated from a building department document review and building site visits. Compliance with Title 20 was estimated from data gathered through site visits and telephone calls to retailers.

In 2006, the California Public Utilities Commission (CPUC) published a detailed program evaluation protocol (TTWT 2006) covering a wide range of program types, including utility C&S programs. The protocol for C&S program evaluations largely reflects the methodologies used in the last two studies mentioned above.

An impact evaluation of the IOU C&S program was conducted by Cadmus beginning in 2007 using the CPUC protocol (KEMA *et al.* 2010). The authors estimated residential code compliance based on site visits and software analyses of 194 new homes and estimated nonresidential code compliance from site visits to 81 buildings. They estimated compliance with selected appliance standards by visiting retailers and contacting distributors statewide to document specific units being sold in California. Cadmus estimated what the natural market adoption would have been for several C&S by gathering expert judgment using an online tool developed for this purpose. The authors estimated attribution through a thorough review and independent assessment of records documenting the development of each code or standard and input from participants in the process. The results of these analyses were integrated in the final estimates of savings attributable to the efforts of the IOU program.

The CPUC agreed to credit the program with 50% of the energy savings verified through the evaluation (given uncertainties about how to measure them). The savings were not, however, to be included in the financial risk/reward calculations applied to the utilities. The CPUC has indicated that 100% of verified C&S program savings will be counted both toward utility savings goals and in the risk/reward determination for C&S efforts after 2006.

The IOUs have initiated new program activities directed at increasing C&S compliance and the adoption of local “reach codes” that exceed the statewide Title 24. How the savings from these efforts will be evaluated and treated in the regulatory process have yet to be defined, but the CPUC recognized the need to not discourage adoption of reach codes and decided that customers in “reach code” communities shall be allowed to fully participate in utility programs and incentives, and shall not be treated as free-riders for evaluation purposes.

Experiences in Other Regions

California has gone farther than any other state or region in developing processes to assess the impacts of utility or PA efforts advocating for C&S upgrades and providing mechanisms for recognizing the resulting savings. However, several other locales have come to see the value of including advocacy of C&S upgrades and efforts to support their adoption and compliance in an overall PA energy-efficiency strategy. States such as Minnesota are still examining what mechanism could be used to attribute savings to the efforts of individual utilities. The two states, other than California, farthest along in this process are described below.

Massachusetts. Several stakeholders in the Northeast, most notably the ratepayer efficiency PAs in Massachusetts, have taken productive steps to explore the concept of a C&S program more formally. As noted earlier, Massachusetts’ PAs, working with oversight from the Massachusetts Energy Efficiency Advisory Council, have pursued efforts to develop a Codes and Standards Program proposal for residential and commercial/industrial sectors. It is important to note that the primary focus of the Massachusetts effort to date has been building codes, as opposed to appliance efficiency standards. However, the goal is ultimately to claim savings from promotion of both codes and standards.

One preliminary study, completed in 2009 for Massachusetts' PAs, reviewed existing frameworks for attribution of benefits from residential codes support and proposed a strategy relating to Residential New Construction efficiency programs (NMR 2009).

Various factors are making the situation more challenging in Massachusetts. For example, Massachusetts communities are increasingly adopting a more aggressive "stretch" code. Although these codes adopted by local jurisdictions save additional energy, their adoption creates a patchwork of codes within the PA territories and increases the challenges of coordinating code adoption efforts.

As mentioned earlier, increasing compliance with the existing building code may be an area in which PAs' programs can be very helpful. Fortunately, baseline studies to establish the compliance rate are taking place in Massachusetts, as well as in several states around the region.

Arizona. As described earlier, the Arizona Corporation Commission adopted rules establishing energy savings goals for both gas and electric utilities and the rules allowed the utilities to take partial credit for savings due to C&S. The intent of the rules was to induce utilities to advocate for upgraded C&S with some certainty about getting credit for the energy savings achieved.

Utilities can count up to one-third of the energy saved by new building codes (credit for savings from appliance standards was available initially only for gas utilities). The details of the attribution procedure are still to be worked out, but the savings have to be estimated through a formal evaluation and utilities must document their C&S support efforts (see the Rasin *et al.* presentation in this paper session at this conference). The parties involved in negotiating the rules wanted to develop a simpler approach than the one utilized in California, but provide credibility for the achieved savings and a level of certainty to the utilities that they would get credit for their efforts.

Recommendations

Implementing C&S can be an effective way of delivering large energy savings and transforming markets. Utilities and other program administrators can play an essential role in developing and implementing C&S, but to do so effectively several issues need to be addressed. These are summarized below along with our recommendations on how to address them.

Consistent, Integrated Treatment of Codes and Standards in Planning

Energy forecasts and plans vary in how they treat savings from codes and standards. To encourage PAs to advocate for C&S upgrades and set conditions necessary to support such efforts, it is essential that the resulting energy savings be included and treated consistently in forecasts of energy consumption and savings, as well as planning frameworks such as integrated resource plans. In addition, awareness of and actions taken to leverage the interactions between conventional energy-efficiency programs and programs supporting C&S can maximize portfolio savings achieved and reduce costs. To facilitate these outcomes we make the following recommendations:

- Savings goals or targets established by regulators and others should explicitly, clearly, and consistently take C&S savings into account.
- Assessments of C&S savings should allow for distinguishing results attributable to PAs' efforts.
- Entities that develop resource and conservation projections should explicitly, clearly, and consistently incorporate C&S savings.

- PAs should develop a holistic view of the energy-efficiency program portfolio and take advantage of ways conventional efficiency programs can support upgraded codes and standards and, in turn, leverage C&S programs to enhance conventional programs.

Appropriate Treatment of Codes and Standards in Impact Evaluations

Because activities to support and upgrade C&S require resource investments (though they are likely to be modest) and upgraded codes or standards can reduce the savings potential from conventional programs, there are disincentives for a PA to invest in C&S advocacy unless both policies for acknowledging the savings and methods to measure them are in place. To minimize disincentives to PAs investing in C&S activities, an approach is needed to determine the impacts attributable to C&S programs, just as they are for conventional programs. To provide the policies and protocols needed to encourage such investments by PAs, we recommend the following:

- Regulators should establish a clearly defined structure to define how savings from C&S programs fit into energy savings targets and ensure equitable treatment.
- Protocols for evaluating savings from C&S programs should be developed and prescribed by entities that define evaluation protocols for conventional efficiency programs.
- C&S savings evaluation protocols should reflect an appropriate balance between costs to evaluate and rigor, as well as be consistent with the evaluation requirements for other programs.

Compliance Focus

The energy savings from codes and standards are achieved only to the extent that compliance is achieved. In conventional incentive programs, the utility or PA takes steps to ensure that measures or products meet the program's efficiency requirements (through field inspections, engineering reviews, etc.), but for building codes, compliance is most often the responsibility of a local government agency or department, which often lacks resources to fully enforce energy codes. For appliance standards, enforcement traditionally has been mostly in response to claims by manufacturers that a competitor is not complying. To enhance compliance we recommend the following:

- PAs should conduct regular projects to determine compliance rates for both codes and standards
- PAs should pursue ways to provide resources to local code enforcement organizations (such as training, tools, and possibly staff funding)
- PAs should leverage non-C&S programs and develop targeted programs to train the building industry and product suppliers about C&S compliance

Strategic Activities

Finally, we offer two strategic recommendations that we believe will increase the energy savings delivered in conjunction with PA C&S activities:

- PAs and other entities should target their standards advocacy efforts on products that are not covered by federal preemption and should leverage the standard adoption activities in California and other states.
- PAs should work with other organizations, including public advocacy groups and local and regional entities such as NEEP, to leverage resources and maximize effectiveness in pursuing new and upgraded C&S.

References

- ADM. 2004. *Evaluation of 2002 Statewide Codes and Standards Program*. Sacramento, California: Prepared for Southern California Edison.
- [FBC] Florida Building Commission. 2009. *Florida Energy Code, The Baseline Efficiency for Florida Buildings*.
- Haase, Jeff. Demand Efficiency Program Supervisor, Minnesota Office of Energy Security. March 29, 2011. Personal communication.
- [HMG] Heschong Mahone Group. 2001. *CA IOU Codes and Standards Earnings Claims Framework*. Fair Oaks, California: Prepared for Pacific Gas & Electric.
- KEMA, The Cadmus Group, Itron, Nexus Market Research, and ENRG. 2010. *Volume III Codes & Standards (C&S) Programs Impact Evaluation—California Investor Owned Utilities' Codes and Standards Program Evaluation for Program Years 2006-2008*. CALMAC Study ID: CPU0030.06 Final Evaluation Report. Prepared for the California Public Utilities Commission.
- Khawaja, M.S., A. Lee, M. Levy, and L. Benningfield. 2007. *Statewide Codes and Standards Market Adoption and Noncompliance Rates*, Final Report, CPUC Program No. 1134-04, SCE0224.01. Portland, Oregon: Quantec, LLC.
- Mahone, D. 2005. *Codes and Standards Program Savings Estimate For 2005 Building Standards and 2006/2007 Appliance Standards*, CALMAC Study ID: SCE0241.01. Fair Oaks, California: Heschong Mahone Group. Prepared for Joint Utilities.
- Mahone, D., Nick Hall, Lori Megdal, Ken Keating, and Richard Ridge. 2005. *Codes and Standards White Paper on Methods for Estimating Savings*. Fair Oaks, California: Heschong Mahone Group. Prepared for Marian Brown, Southern California Edison.
- [MEI] Minnesota Environmental Initiative. 2011. *1.5% Energy Efficiency Solutions Project*. Prepared for Minnesota Department of Commerce, Office of Energy Security (OES).
- [NEEP] Northeast Energy Efficiency Partnerships. 2009. *Model Progressive Building Energy Codes Policy for the Northeast States*.
- NMR. December 22, 2009. "Memorandum: Outline for Attribution of Codes and Standards Savings," presented to Sponsors of the Massachusetts New Homes with ENERGY STAR® Program
- Pennington, G.W. 2004a. *California's Building Energy Efficiency Standards*. Sacramento, California: California Energy Commission.
- [TTWT] The TecMarket Works Team. 2006. *California Energy Efficiency Evaluation Protocols: Technical, Methodological and Reporting Requirements for Evaluation Professionals*. Prepared for the California Public Utilities Commission.