



Energy Efficiency Program Administrators and Building Energy Codes

A RESOURCE OF THE NATIONAL ACTION PLAN
FOR ENERGY EFFICIENCY

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The Leadership Group of the National Action Plan for Energy Efficiency is committed to taking action to increase investment in cost-effective energy efficiency. *Energy Efficiency Program Administrators and Building Energy Codes* was developed under the guidance of and with input from the Leadership Group. The document does not necessarily represent a consensus view and does not represent an endorsement by the organizations of Leadership Group members.

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List of Abbreviations and Acronyms

ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
CPUC	California Public Utilities Commission
DOE	U.S. Department of Energy
EM&V	evaluation, measurement, and verification
EPA	U.S. Environmental Protection Agency
EPAct	Energy Policy Act
EVT	Efficiency Vermont
GHG	greenhouse gas
ICC	International Code Council
IECC	International Energy Conservation Code
IOU	investor-owned utility
IRC	International Residential Code
ISO	independent system operator
kWh	kilowatt-hour
MEEA	Midwest Energy Efficiency Alliance
NBI	New Buildings Institute
NEEA	Northwest Energy Efficiency Alliance
NEEP	Northeast Energy Efficiency Partnerships
NWECG	Northwest Energy Codes Group
NWPCC	Northwest Power and Conservation Council
NWPPC	Northwest Power Planning Council
NYSERDA	New York State Energy Research and Development Authority
PG&E	Pacific Gas & Electric
PIER	Public Interest Energy Research
SWEEP	Southwest Energy Efficiency Project
UCG	Utility Code Group

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Executive Summary

This brief documents how energy efficiency program administrators have used technical, institutional, financial, and other resources to help advance building energy codes at the federal, state, and local levels, and describes the issues involved in fostering an expanded administrator role for the future. This brief is provided as part of a comprehensive suite of tools and resources to assist organizations in meeting the National Action Plan for Energy Efficiency goal to achieve all cost-effective energy efficiency by 2025.

Improving the energy efficiency of newly constructed and renovated buildings through the adoption and implementation of building codes is one of the most cost-effective options for addressing the challenges of high energy prices, energy security, air pollution, and global climate change. Despite these benefits, building codes are not evenly adopted and enforced across the country. Energy efficiency program administrators—including utilities, state energy offices, third parties, or other entities that operate formal energy efficiency programs—have played important roles in advancing new building codes and improving the savings from existing codes. It is important to explore the opportunity for utilities and other program administrators to play an expanded role as part of achieving all cost-effective energy efficiency.

Advancing Building Energy Codes

The building codes process in the United States currently involves specific efforts at the national, state, and local levels, as well as periodic updates as energy-efficient technologies and practices evolve. The key steps are:

- Development of national model codes to establish minimum levels of efficiency for new and renovated buildings.
- State and local adoption of the model energy codes.
- Local implementation and enforcement of energy codes.
- Measurement of costs and benefits from codes.
- Incorporation of code-related energy system benefits in state or regional energy resource plans.

Energy efficiency program administrators with experience in beyond-code programs and other voluntary initiatives have experience, skills, and resources that position them to make important contributions at each of these steps in the building codes process and to contribute to greater energy savings from building code policies.

Key Findings

- Mandatory building energy codes are an important state policy for overcoming the market barriers to greater energy efficiency in new buildings and buildings undergoing renovation.

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- There are several important elements to effective state codes, including: regular updating of national model codes, state and local adoption and implementation of new model codes, measurement of costs and benefits, and inclusion of the benefits from codes in resource planning.
 - Certain challenges can make it difficult to successfully implement these steps and to achieve the full benefits that codes can offer.
 - Voluntary beyond-code programs give program administrators important technical knowledge, market experience, and analytical resources that can be used to improve the mandatory building codes themselves, as well as compliance with these improved codes.
 - Improving mandatory building energy codes can assist in meeting program administrator objectives such as energy or capacity targets, state or regional environmental or greenhouse gas goals, providing customer service, and lowering customer bills.
 - There is no single best approach or delivery mechanism for administrators working to improve mandatory building energy codes or code compliance. To date, administrators have engaged at all steps in the codes process using a wide range of strategies that are tailored to their unique circumstances.
 - By working to advance codes, administrators can enhance integration with other public policies (e.g., appliance standards, voluntary ratepayer-funded programs, time-of-sale disclosure, and building benchmarking) and increase the overall savings that are achieved.

Next Steps

For program administrators interested in pursuing a role with mandatory codes, the following steps might be appropriate:

- Work with regulators and state energy offices to assess the potential for greater energy savings from up-to-date and well-enforced building codes.
- Assess how voluntary beyond-code programs can provide useful information, services, and expertise to advance mandatory building codes.
- Explore options for measuring the costs and benefits of mandatory code-related activities.

State utility regulators can take steps to explore the role of mandatory codes, including:

- Assess the potential for greater energy savings from up-to-date and well-enforced building codes, as well as the potential impact on energy system requirements.
- Determine the costs and benefits of program administrator involvement to advance building codes.
- Work with utilities to address issues related to program baselines, cost recovery, mandatory savings targets, and other utility policies.

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- Convene affected stakeholders and encourage dialogue on key questions pertaining to an expanded administrator role with codes.
 - Explore options for integrating building code policies into resource plans and linking codes to related state policies for improving building performance and measurement.

Energy Efficiency Program Administrators and Building Energy Codes

A suite of effective energy efficiency policies and programs is necessary to capture the available cost-effective energy efficiency by 2025, as outlined in the National Action Plan for Energy Efficiency Vision for 2025 (see Figure 1). If broadly implemented, these programs and policies can offset the expected growth in electricity and natural gas demand by more than 50 percent, while saving the nation billions on energy bills and avoiding significant emissions of greenhouse gases (GHGs).¹ Adopting building energy codes is one of the key policies that needs to be effectively implemented, as reflected under Goal Six of the Vision for 2025.

This brief focuses on strategies for increasing the energy savings from building energy codes² and, in particular, the contributions that program administrators—including utilities, state energy offices, third parties, and other entities that operate energy efficiency programs—can make to increase the stringency and effectiveness of mandatory codes by leveraging experience gained in the voluntary beyond-codes arena. Issues addressed in this brief include the current status of building codes across the United States, the elements of a successful codes policy, the roles that energy efficiency program administrators have played in the past, and the key challenges and questions that need to be addressed to further engage program administrators in the advancement of building energy codes.

Figure 1. Ten Implementation Goals of the *National Action Plan for Energy Efficiency Vision for 2025: A Framework for Change*

Goal One:	Establishing Cost-Effective Energy Efficiency as a High-Priority Resource
Goal Two:	Developing Processes to Align Utility and Other Program Administrator Incentives Such That Efficiency and Supply Resources Are on a Level Playing Field
Goal Three:	Establishing Cost-Effectiveness Tests
Goal Four:	Establishing Evaluation, Measurement, and Verification Mechanisms
Goal Five:	Establishing Effective Energy Efficiency Delivery Mechanisms
Goal Six:	Developing State Policies to Ensure Robust Energy Efficiency Practices
Goal Seven:	Aligning Customer Pricing and Incentives to Encourage Investment in Energy Efficiency
Goal Eight:	Establishing State of the Art Billing Systems
Goal Nine:	Implementing State of the Art Efficiency Information Sharing and Delivery Systems
Goal Ten:	Implementing Advanced Technologies

Status of Mandatory Minimum Building Energy Codes

Mandatory building energy codes for residential and commercial construction, as well as renovations, establish a minimum “floor” on energy-related building practices. Upon adoption, codes require that specific energy efficiency measures be put in place at the time of major construction, allowing for deeper and more cost-effective savings relative to the opportunities available after a building has been constructed. Building energy codes work to overcome the substantial market barriers to greater energy efficiency in new buildings and buildings undergoing renovation in both the commercial and residential sectors.

Prior to taking effect, model codes are typically developed at the national level, adopted at the state and/or local level, and implemented and enforced locally. To date, 37 states have adopted energy codes for both commercial and residential construction (BCAP, 2009). These numbers are expected to increase due to provisions in the American Recovery and Reinvestment Act of 2009 that link the receipt of stimulus funds to adoption of and compliance with the latest residential and commercial codes. Such recent-vintage codes are estimated to yield buildings that are 8–35 percent more efficient than they otherwise would be,³ and are achieved at reasonable up-front costs to builders.⁴ From the perspective of home and building owners and occupants, energy codes are affordable and cost-effective, generating energy bill savings and increases in monthly cash flow (i.e., reductions in energy bills that exceed any increase in mortgage payments associated with code compliance).⁵ Several states, including California and Oregon, have developed mandatory codes that are more stringent than the national models, and yet remain cost-effective. While codes address only about 1–2 percent of the total building stock in an average year (Hewitt, 2009; Massachusetts Department of Energy Resources, 2009), the potential for energy and cost savings increases over time as the fraction of newly constructed buildings increases in comparison to the total stock.

Status of Beyond-Code Programs and Other Voluntary Initiatives

Beyond-code programs establish requirements that are substantially above those of the minimum code, whether or not mandatory codes have been adopted. A leading example of a voluntary initiative is the U.S. Environmental Protection Agency’s (EPA’s) ENERGY STAR® Qualified New Homes program. Under this initiative, specifications for energy performance and verification—including the use of a Home Energy Rating System and onsite inspections—are defined at the national level and implemented locally by energy efficiency program administrators. To ensure effectiveness, administrators provide builder training, incentives for more efficient buildings, verification of construction practices, and savings measurement. ENERGY STAR currently requires homes to be 20–30 percent more efficient than those built to the model code, International Energy Conservation Code (IECC) 2006 (ENERGY STAR, 2009b). As of early 2009, there was substantial market infrastructure for ENERGY STAR homes in more than 13 states, and about 1 million new homes have been built to ENERGY STAR requirements (ENERGY STAR, 2009a).⁶

Program administrators have also taken steps to establish beyond-code programs in commercial buildings that are linked to the development of future mandatory codes. For example, administrators in seven states have adopted the New Buildings Institute’s (NBI’s) Core Performance specification (Hewitt, 2009). In addition, states in the Northeast and elsewhere are exploring the option of adding an informative appendix to existing codes that municipalities can adopt as an alternative to the mandatory model code. This appendix is specified on a state-by-state basis, and is designed to be consistent with incumbent program administrators’ voluntary

programs. For example, the Massachusetts informative appendix to the state code is based on NBI's Core Performance for commercial construction and on ENERGY STAR for residential construction (NEEP, 2009). In municipalities that adopt the appendix, utilities retain the ability to provide financial incentives and claim savings, even though the new, higher efficiency levels are mandatory.

Energy efficiency program administrators are also undertaking other voluntary initiatives to assess and establish the savings and costs of newer technologies, systems, and practices than those reflected in the current code programs and to facilitate their incorporation in mandatory codes.

Steps to Achieving Effective Mandatory Building Energy Codes

For mandatory codes to be effective, a number of key steps must be followed:

- **National model code development.** Routinely reviewing, developing, and updating national model building codes provides the foundation for code policies. For code policies to be successful, it is important to collect and maintain data on the costs, energy savings, and performance of candidate energy efficiency measures so that codes are updated on the basis of accurate and up-to-date information. The “model codes” most frequently adopted by the states are developed by the International Code Council (ICC) and the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), respectively for residential and commercial buildings. The model codes are updated every three years on the basis of stakeholder deliberation and technical analysis to validate improvements.
- **State and local code adoption.** Once new versions of the national model codes are published, state and local governments can update their codes accordingly. As of September 2009, 37 states have adopted residential codes and 37 states have adopted commercial codes (BCAP, 2009). In addition, many large cities and local governments in states with home rule laws—in which municipalities are granted self-government on building and construction policy—have taken similar steps. In many jurisdictions, code adoption occurs through a combination of legislative and administrative processes, and is informed and influenced by substantial stakeholder participation; however, states are increasingly moving to streamline this process with automatic upgrades that coincide with the release of national model codes. As of 2007, 28 states had state policies in place that require routinely reviewing and updating building codes (National Action Plan for Energy Efficiency, 2009). This is a key policy step of the Vision for 2025.
- **Local code implementation, compliance, and enforcement.** After building energy codes have been adopted, a number of implementation steps are necessary to achieve the energy savings and bill reductions that codes offer. These steps, including builder training, compliance assurance, and enforcement, are typically the responsibility of state and local governments. These steps, however, are often not fully or uniformly implemented for numerous reasons, including an emphasis on health and safety issues over the proper functioning of mechanical equipment, a lack of trained staff to review building plans and conduct onsite inspections, and limited funding to carry out key implementation activities. As a result, most jurisdictions do not have the capacity to analyze code compliance and to identify the measures and strategies that should be targeted for improved implementation. In states and municipalities where data exist, they frequently indicate compliance rates between 40 and 60 percent, although much lower

levels of performance have been documented (NEEP, 2009). This gap in data and understanding has been identified as an important issue in the Vision for 2025 and other venues.⁷

Appendix B provides detailed information on the code development, adoption, and implementation processes. Additional steps that are not included in typical code cycle, but that are nevertheless critical to achieving more effective mandatory codes, include:

- **Measurement and understanding of costs and benefits.** Measuring the energy, economic, and environmental impacts of mandatory codes is necessary to assess their overall effectiveness and to provide the information needed to make improvements. Currently, limited data are available on key parameters, including the upfront costs to builders; energy bill impacts to building owners and tenants; and statewide energy, capacity, and GHG savings from complying with the code. Taking steps to address these shortcomings and improve codes measurement is a key component of a comprehensive approach for improving building efficiency and establishing a market value for efficient homes and buildings. In contrast to the limited data availability with mandatory codes, many states and jurisdictions have robust data and tracking systems for their voluntary efforts. These ratepayer-funded programs are typically subject to standard industry protocols and procedures for savings evaluation, measurement, and verification (EM&V).⁸
- **Linkage of codes to energy resource planning.** To capture the full benefits from mandatory codes, mid- and long-term estimates of energy and capacity savings can be integrated into state and utility energy resource plans. Currently, these benefits are rarely considered in the resource planning process, and the contribution of codes policies is not accounted for. In contrast, the energy savings from voluntary beyond-code programs are typically included in resource plans when administered as part of a larger portfolio of energy efficiency programs. The Action Plan highlights the inclusion of long-term savings from building codes in resource planning as an important step in advancing energy efficiency; however, this step has rarely been taken (National Action Plan for Energy Efficiency, 2008).

A separate step that can improve the effectiveness of codes is the establishment of voluntary beyond-code programs for new construction and emerging technologies where they do not already exist. This is a necessary first step for states seeking to take advantage of administrator contributions to mandatory codes that are described in this brief. Such voluntary efforts leverage the interest of builders seeking to differentiate themselves in the marketplace. These efforts involve:

- Identifying and promoting efficient measures and construction techniques.
- Monitoring baseline new construction practices and related trends.
- Updating voluntary program specifications to levels that exceed existing mandatory codes.
- Providing builder training, compliance verification, and enforcement services.⁹

Table 1 provides additional examples of the activities involved in administering voluntary new construction and emerging technologies programs.

Table 1. Types of Program Administrator Activities Supported by Voluntary Code Programs and Other Initiatives

Program	Types of Activities	Examples
<p>New construction programs</p>	<ul style="list-style-type: none"> ▪ Assess costs, expected savings (e.g., annual, lifetime, peak day), and overall cost-effectiveness of measures. ▪ Provide training and ongoing technical support services to builders and contractors. ▪ Provide marketing support to builders. ▪ Conduct onsite verification (e.g., pre-drywall site inspections of insulation and air sealing, building commissioning, blower door testing). ▪ Fund incremental costs of efficient systems and equipment. ▪ Provide code compliance assistance and/or certification. 	<ul style="list-style-type: none"> ▪ In 2006, utilities participating in NWECC proposed 14 code changes to the IECC, 10 of which were fully incorporated into the code. ▪ Oregon utilities, working through NEEA, successfully integrated the Northwest Energy Homes specification, on a provision-by-provision basis, into the state's 2008 residential code.
<p>Emerging technology and practices programs*</p>	<ul style="list-style-type: none"> ▪ Establish technology evaluation criteria for reliability, quality, and performance. ▪ Conduct studies to understand current market conditions and the potential for energy savings from emerging technologies. ▪ Identify candidate technologies for study and promotion. ▪ Assess major market barriers and the likelihood of success. ▪ Manage pilot programs and demonstrations, and assess energy, demand, and environmental performance. 	<ul style="list-style-type: none"> ▪ A Florida utility funded studies on duct sealing and cool roof technologies for inclusion in the state code. These measures have since been added to the state's mandatory building code for new construction. ▪ California utilities are currently working with the state's PIER program to establish a utility retrofit program that achieves energy and demand savings from increased daylighting of existing office buildings and to inform the next round of Title 24 building code changes.

IECC = International Energy Conservation Code; NEEA = Northwest Energy Efficiency Alliance; NWECC = Northwest Energy Codes Group; PIER = Public Interest Energy Research.

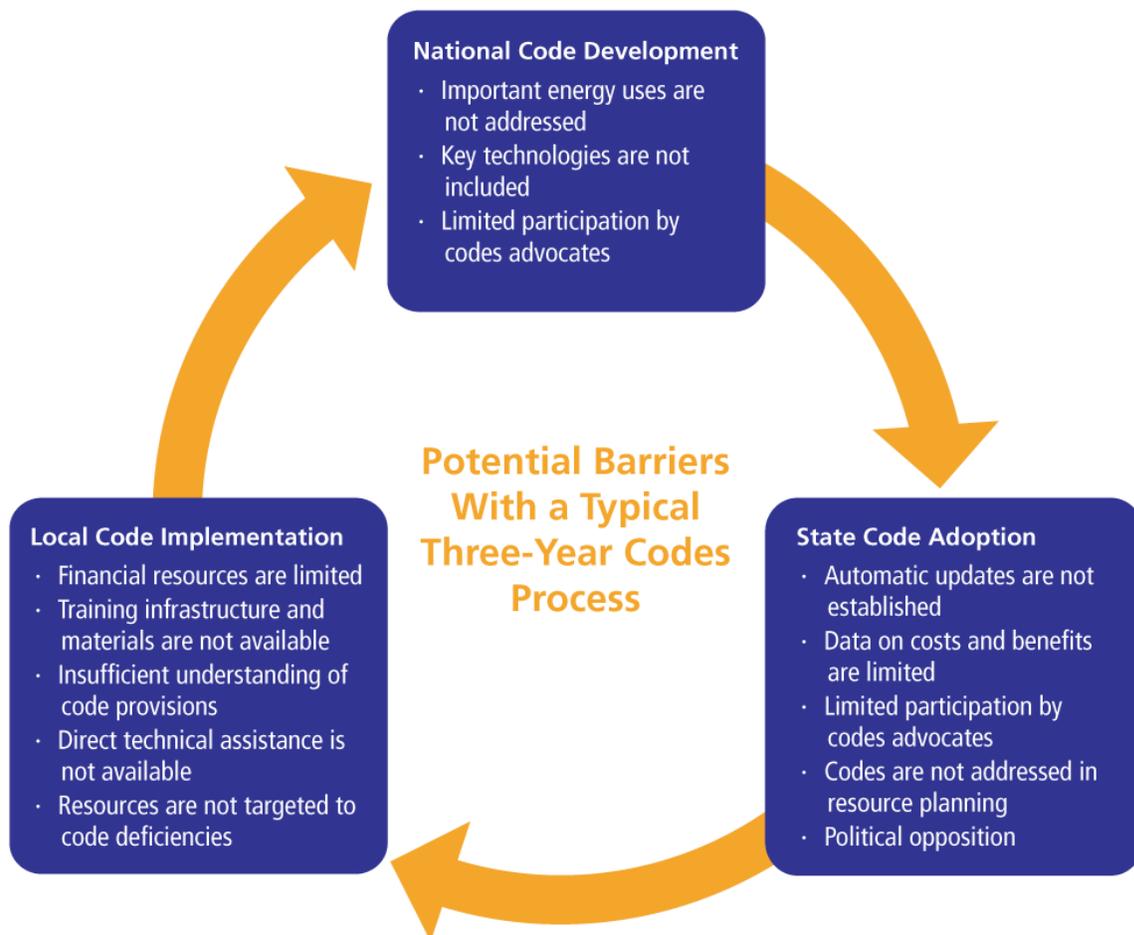
* Emerging technologies are those that are pre-commercial but near commercialization and those that have already entered the market but currently have a small market share.

By establishing voluntary programs for new construction and emerging technologies, states are better positioned to overcome challenges that have hindered the success of mandatory codes in the past,¹⁰ including:

- Lack of information on the costs and benefits of measures being considered for inclusion in the building code.
- Complexity of codes and the need for extensive training of builders, tradespeople, and inspectors.
- Scarcity of measured ex post data on the energy savings and other benefits achieved from codes currently in place.
- Limited quantity of resources at the local level for verification and enforcement, leading to low compliance rates.

Figure 2 describes these and other barriers to more effective codes. Corresponding actions that program administrators have taken to address these barriers are provided in Table 2.

Figure 2. Barriers to Achieving Effective Building Codes



Energy Efficiency Program Administrators and Building Codes

A growing number of energy efficiency program administrators are taking steps to improve the effectiveness of existing building codes and to upgrade to the most recent national model codes (see Table 2). This experience demonstrates early success in leveraging beyond-code programs and other voluntary initiatives to address the barriers to more effective mandatory codes. Administrators are taking the following steps to enhance and upgrade codes:

- Demonstrating specific measures and emerging practices that might be targeted for inclusion in subsequent model codes.¹¹
- Participating directly in national, state, and local efforts to develop, adopt, and implement codes.
- Sharing technical expertise gained from voluntary program experience with advanced techniques and systems.
- Contributing energy savings and cost data for specific measures being considered under mandatory codes.
- Providing education and training resources to builders, contractors, and code officials in support of existing codes or code upgrades.
- Measuring energy savings, code compliance, and baseline market conditions.
- Linking the development of model codes to strategies and measures currently being advanced under voluntary new construction and emerging technologies programs.

By working within the codes process, administrators also contribute to an improved understanding of how to better integrate existing state efficiency policies to maximize overall energy savings. These existing state efficiency policies potentially include building codes, appliance standards, voluntary ratepayer funded programs, time-of-sale disclosure, and building benchmarking, among other things. Contributing to code upgrades and improvements can assist program administrators in achieving their own objectives and requirements. These might include:

- State-regulated targets for energy and capacity reductions
- State and regional environmental or GHG reduction goals
- Customer energy bill reductions and customer service improvements

Table 2 summarizes the full list of contributions that program administrators can make to advance residential and commercial building energy codes. For more detailed examples and case studies, see Appendix C.

Table 2. Selected Program Administrator Roles and Examples With Codes

Selected Administrator Roles	Examples
Development, Adoption, and Implementation of Mandatory Minimum Codes	
Development of National Model Codes	
<ul style="list-style-type: none"> Participate directly in IECC or ASHRAE committees that develop and advance model codes. 	<ul style="list-style-type: none"> PG&E, Southern California Edison, and Sempra Utilities (San Diego Gas & Electric and Southern California Gas)
<ul style="list-style-type: none"> Participate indirectly through regional or national consortia and/or associations. 	<ul style="list-style-type: none"> Edison Electric Institute, National Rural Electric Cooperative Association, and American Public Power Association
<ul style="list-style-type: none"> Conduct research, development, and demonstration for new technologies and building practices that are included in future codes. 	<ul style="list-style-type: none"> Florida Power & Light
Regional, State, and Local Code Development and Adoption Efforts	
<ul style="list-style-type: none"> Build coalitions and/or collaborate with stakeholders to support code adoption and upgrade processes. 	<ul style="list-style-type: none"> NEEA (including Bonneville Power Authority, PacifiCorp, Idaho Power Company, and others), MEEA, and NEEP (including participating utilities)
<ul style="list-style-type: none"> Participate directly in legislative or administrative code adoption and upgrades (e.g., testify). 	<ul style="list-style-type: none"> California IOUs, Georgia Power, National Grid, and the Cape Light Compact (Massachusetts)
<ul style="list-style-type: none"> Conduct outreach and education in support of code adoption. 	<ul style="list-style-type: none"> SWEEP and NEEP
Local Implementation and Compliance	
<ul style="list-style-type: none"> Fund code compliance/enforcement activities in jurisdictions with inadequate resources. 	<ul style="list-style-type: none"> Iowa utilities and Seattle City Light
<ul style="list-style-type: none"> Provide training and materials for code officials, building trades, and product distributors/suppliers. 	<ul style="list-style-type: none"> Efficiency Vermont, PG&E, Nevada Power, Sierra Pacific, Rocky Mountain Power, Questar Gas, United Illuminating, and NEEP
<ul style="list-style-type: none"> Manage a quality assurance and evaluation program to track progress and improve coordination. 	<ul style="list-style-type: none"> UCG (funded by Washington State utilities)

Other Activities	
Measurement of Energy Savings	
<ul style="list-style-type: none"> Estimate achieved (i.e., ex post) energy savings and other impacts from codes. 	<ul style="list-style-type: none"> Austin Energy, California IOUs, and NYSERDA
<ul style="list-style-type: none"> Use measured results from voluntary programs to verify compliance with mandatory codes (e.g., “deemed-to-comply” strategies). 	<ul style="list-style-type: none"> New Jersey and Texas
Resource Planning	
<ul style="list-style-type: none"> Integrate codes savings into energy resource plans. 	<ul style="list-style-type: none"> NWPCC and the California Energy Commission, including affected administrators

ASHRAE = American Society of Heating, Refrigerating, and Air-Conditioning Engineers;
 IECC = International Energy Conservation Code; IOU = investor-owned utility;
 MEEA = Midwest Energy Efficiency Alliance; NEEA = Northwest Energy Efficiency Alliance;
 NEEP = Northeast Energy Efficiency Partnerships;
 NWPCC = Northwest Power and Conservation Council;
 NYSERDA = New York State Energy Research and Development Authority;
 PG&E = Pacific Gas & Electric; SWEEP = Southwest Energy Efficiency Project;
 UCG = Utility Code Group

Development, Adoption, and Implementation of Mandatory Codes

Energy efficiency program administrators have opportunities to assist in the development, adoption, and implementation phases of mandatory codes, and can help achieve energy and capacity savings at relatively low program costs per unit of energy saved. For example, during the 2006–2008 investor-owned utility (IOU) program cycle in California, program expenditure data from the utilities indicated that codes-related savings were achieved at a cost of about \$0.01 per first-year kilowatt-hour (kWh) (Lee et al., 2008).

National model code development. Based on current examples, program administrators can engage in model code development processes by:

- Participating in the ICC/IECC or ASHRAE¹² committees that develop and advance model codes.
- Developing and submitting specific code upgrade proposals.
- Participating in regional efficiency organizations (see Appendix D), national associations, and other organizations seeking to advance model codes.
- Conducting pilot studies and analyses of measures targeted for inclusion in future codes.

State and local code adoption. Program administrators have played and can play a role in code adoption at the state and local levels by:

- Building coalitions with other administrators and stakeholders to advocate for specific code proposals.

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- Participating directly in technical working groups or committees to advance a specific code upgrade.
 - Conducting outreach and education to key industry stakeholders on the costs and benefits of proposed code upgrades.
 - Developing marketplace infrastructure to support new codes.
 - Funding and conducting programs designed to increase the market penetration of successful technologies and advance future model code proposals.
 - Analyzing and deploying promising building technologies and practices.

Local code implementation. Program administrators have participated in the implementation processes in various states and localities by:

- Conducting studies of baseline construction practices.
- Providing resources to enhance enforcement in jurisdictions with inadequate staff or funding (e.g., support third-party or other specialized energy code inspectors).
- Providing training and materials for code officials, building trades, and product distributors and suppliers.
- Managing a quality assurance and evaluation program to track progress and improve policy effectiveness.
- Conducting original research on compliance rates, with recommendations for addressing deficiencies.
- Using existing data from voluntary new construction programs to document or support code compliance requirements.

These activities require varying degrees of program resources (BCAP, 2008). The amount of resources an activity requires influences how frequently it has been pursued to date. Program administrator participation in national and regional processes, as well as builder and contractor training, are relatively common and can be conducted with limited new contributions of staff time or financial resources. In contrast, activities such as funding expanded enforcement capabilities or compliance studies are pursued in fewer jurisdictions, typically where building codes are more closely linked to voluntary energy efficiency programs under a robust energy policy framework with regulator oversight.

Other Activities

Energy efficiency program administrators also have opportunities to assist with the measurement of energy savings from codes and to integrate the expected energy savings into energy resource plans.

Measurement of energy savings. To date, there are only limited data on the energy and demand savings achieved through mandatory energy code policies. Where data exist, they tend to be ex ante projections of future savings from a specific policy proposal and not rigorous ex

post estimates of achieved savings that can be used to assess cost-effectiveness and inform policy and program decisions. With experience conducting detailed EM&V in the voluntary arena, many program administrators are well-positioned to play a role in measuring savings from codes and other building efficiency initiatives and to use this information to document code compliance. Administrators can:

- Identify standard building practice and construction baselines in their jurisdiction, as well as shortcomings.
- Link the verification step in voluntary new construction programs to successful code compliance.
- Quantify the ex post impacts of existing mandatory codes and the ex ante savings from proposed code changes.
- Measure the cost of compliance to builders and assess the overall cost-effectiveness of proposed measures—and the code overall—using regulator-approved cost tests.
- Present information on the costs and benefits of individual measures being considered for the code during the code development phase.
- Provide equipment to conduct building energy measurement and coordinate information flow across stakeholders.

In California, IOUs conducted third-party measurement of their activities to enhance the Title 24 code during the 2006–2008 program cycle. Results indicate that savings equivalent to 10–12 percent of the total IOU goals were achieved. Based on program expenditure data from the utilities, codes-related savings cost about \$0.01 per first-year kWh (Lee et al., 2008).

Energy resource plans. To capture the “resource value” of mandatory codes, the projected energy savings must be integrated into state and regional resource planning processes. Building code savings are additive to forecast savings from the efficiency program portfolio and can be reported separately.¹³ Using this approach, state utility commissions can require that savings from building codes be estimated and incorporated into the resource planning process. The Northwest Power and Conservation Council (NWPPCC) and the California Energy Commission are two organizations that capture code savings in the regional and state planning processes (as distinct from a regulated utility’s integrated resource plan). A key lesson from this experience is that successfully reflecting the impacts of codes in energy resource plans requires robust savings evaluation. Independent system operators (ISOs) can also explore ways to capture codes impacts in their capacity planning and transmission and distribution analysis.

Role for Regulators

Like other efficiency program investments, administrator expenditures on codes are typically subject to the approval of state public utility commissions or other oversight bodies. The degree and type of oversight varies significantly across the country, depending on jurisdictional requirements, existing practices, and the magnitude of investment. In cases where codes are viewed as an integral part of the state or jurisdiction’s overall energy policy strategy, regulators and other oversight bodies are likely to perform a detailed review of the administrator’s plan and budget. In other cases, regulatory entities might view codes activities as a minor element of the administrator’s overall efficiency portfolio, and thus subject to limited oversight.

Oversight is typically more thorough for IOUs in states where cost-recovery and shareholder incentive mechanisms require detailed scrutiny of all costs. For public utilities, the jurisdictional entity overseeing the utility and administering the building code might be identical. In these instances, it can be administratively easier to include codes activities in the utility's portfolio. In most states and localities, however, utility regulation and code administration fall under separate agency jurisdictions so effective coordination between regulators and building departments is required.

Next Steps for Program Administrators and Regulators

Energy efficiency program administrators are effectively using their experience with voluntary codes programs to assist in the process of developing, adopting, and implementing mandatory building energy codes. With evidence that these contributions can be cost-effective and result in mandatory codes that are more effective than they would otherwise be, administrators and regulators can initiate and expand their efforts. Administrators interested in exploring or initiating a role with mandatory codes can take the following steps:

- Work with regulators and state energy offices to assess the potential for greater energy savings from up-to-date and well-enforced building codes.
- Assess how beyond-code programs provide useful information, services, and expertise for advancing building codes.
- Explore options for accounting for the costs and benefits of mandatory code-related activities.

State utility regulators can take steps to explore the role of mandatory codes, including:

- Assess the potential for greater energy savings from up-to-date and well-enforced building codes and the potential impact on energy system requirements.
- Determine the costs and benefits of program administrator involvement with advancing building codes.
- Work with utilities to address issues related to program baselines, cost recovery, mandatory savings targets, and other utility policies.
- Convene affected stakeholders and encourage dialogue on key questions pertaining to an expanded administrator role with codes.
- Explore options for integrating building code policies into resource plans and linking codes to related state policies for improving building performance and measurement.

Notes

- ¹ Energy efficiency savings as a percent of load growth depend on forecast assumptions used, and they vary by region. This magnitude of savings is consistent with the potential savings documented in a number of recent studies, which are listed in Appendix B of the Action Plan's Vision for 2025 (National Action Plan for Energy Efficiency, 2008).
- ² Building codes are written legal requirements governing the design and construction of buildings. Most of the codes adopted by state and local governments set minimum standards for safe occupancy to protect individuals from substandard living and working conditions. Building energy codes are construction specifications that require new commercial and residential buildings and existing buildings undergoing renovations to meet minimum energy efficiency requirements.
- ³ Compared with the previous versions of these codes (American Society of Heating, Refrigerating, and Air-Conditioning Engineers [ASHRAE] 90.1-2004 and the 2006 International Energy Conservation Code [IECC]), the most recent versions—ASHRAE 90.1-2007 and the 2009 IECC—represent efficiency improvements of 8–15 percent, respectively. Because many states have older codes in place, adopting the most current codes can lead to savings from 20 percent (commercial) to 35 percent (residential), depending on the climate zone. These savings were modeled by the Building Codes Assistance Project.
- ⁴ For example, see Cort et al. (2002) and Anderson et al. (2006).
- ⁵ The Midwest Energy Efficiency Alliance (MEEA) has conducted state-level analyses of ex ante benefits of code upgrades for the states in its territory. For example, see MEEA (2009). For detailed information on the methods for determining the cost-effectiveness of codes, see Florida Solar Energy Center (2009).
- ⁶ “Substantial market penetration” refers to states with a penetration rate of 20 percent or higher.
- ⁷ Step 18 under Goal Six of the Vision for 2025 is effective enforcement of building codes (National Action Plan for Energy Efficiency, 2008).
- ⁸ For more information, see National Action Plan for Energy Efficiency (2007c).
- ⁹ Beyond-code programs and voluntary initiatives define building efficiency specifications that are more stringent than the national model codes or adopted state energy codes. Beyond-code programs are alternatively referred to as “stretch code,” “advanced code,” or “above code.”
- ¹⁰ The barriers to more effective building energy codes are described in EPA (2006).
- ¹¹ Examples of the specific measures and strategies included in the most recent commercial and residential codes are provided in a presentation by the Pacific Northwest National Laboratory (Bartlett et al., 2009).
- ¹² The IECC is the predominant model code for residential construction. The ASHRAE 90.1 specification is the basis for most commercial codes.
- ¹³ For more information on incorporating energy efficiency in resource planning, see National Action Plan for Energy Efficiency (2007b).

Appendix A: National Action Plan for Energy Efficiency Leadership Group

Co-Chairs

Marsha Smith
Commissioner, Idaho Public
Utilities Commission
Past President, National
Association of Regulatory Utility
Commissioners

James E. Rogers
Chairman, President, and
C.E.O.
Duke Energy

Kateri Callahan
President
Alliance to Save Energy

Jorge Carrasco
Superintendent
Seattle City Light

Lonnie Carter
President and C.E.O.
Santee Cooper

Sheryl Carter
Co-Director, Energy Program
Natural Resources Defense
Council

Philip Giudice
Commissioner
Massachusetts Department of
Energy Resources

Dian Grueneich
Commissioner
California Public Utilities
Commission

Blair Hamilton
Policy Director
Vermont Energy Investment
Corporation

Leadership Group

Barry Abramson
Senior Vice President
Servidyne Systems, LLC

Tracy Babbidge
Director, Air Planning
Connecticut Department of
Environmental Protection

Angela Beehler
Senior Director, Energy
Regulation/Legislation
Wal-Mart Stores, Inc.

Bruce Braine
Vice President, Strategic Policy
Analysis
American Electric Power

Jeff Burks
Director of Environmental
Sustainability
PNM Resources

Sandra Byrd
Vice President, Strategic Affairs
Arkansas Electric Cooperative
Corporation

Gary Connett
Director of Environmental
Stewardship and Member
Services
Great River Energy

Larry Downes
Chairman and C.E.O.
New Jersey Natural Gas (New
Jersey Resources Corporation)

Roger Duncan
General Manager
Austin Energy

Neal Elliott
Associate Director for Research
American Council for an
Energy-Efficient Economy

Angelo Esposito
Senior Vice President, Energy
Services and Technology
New York Power Authority

Jeanne Fox
President
New Jersey Board of Public
Utilities

Stephen Harper
Global Director, Environment
and Energy Policy
Intel Corporation

Maureen Harris
Commissioner
New York State Public Service
Commission

Mary Healey
Consumer Counsel for the State
of Connecticut
Connecticut Consumer Counsel

Joe Hoagland
Vice President, Energy
Efficiency and Demand
Response
Tennessee Valley Authority

Val Jensen
Vice President, Marketing and
Environmental Programs
ComEd (Exelon Corporation)

Mary Kenkel
Consultant, Alliance One
Duke Energy

Ruth Kiselewich
Director, Demand Side
Management Programs
Baltimore Gas and Electric
Company

Harris McDowell
Senator
Delaware General Assembly

Ed Melendreras
Vice President, Sales and
Marketing
Energy Corporation

Janine Migden-Ostrander
Consumers' Counsel
Office of the Ohio Consumers'
Counsel

Michael Moehn
Vice President, Corporate
Planning
Ameren

Fred Moore
Director, Manufacturing and
Technology, Energy
The Dow Chemical Company

Richard Morgan
Commissioner
District of Columbia Public
Service Commission

Diane Munns
Vice President, Regulatory
Relations and Energy Efficiency
MidAmerican Energy Company

Clay Nesler
Vice President, Global Energy
and Sustainability
Johnson Controls, Inc.

Brock Nicholson
Deputy Director, Division of Air
Quality
North Carolina Department of
Environment and Natural
Resources

Jed Nosal
Chief, Office of Ratepayer
Advocacy
Massachusetts Office of
Attorney General Martha
Coakley

Pat Oshie
Commissioner
Washington Utilities and
Transportation Commission

Jim Parks
Manager, Energy Efficiency and
Customer R&D
Sacramento Municipal Utility
District

John Perkins
Consumer Advocate
Iowa Office of Consumer
Advocate

Doug Petitt
Vice President, Marketing and
Conservation
Vectren Corporation

Phyllis Reha
Commissioner
Minnesota Public Utilities
Commission

Roland Risser
Director, Customer Energy
Efficiency
Pacific Gas and Electric

Gene Rodrigues
Director, Energy Efficiency
Southern California Edison

Wayne Rosa
Energy and Maintenance
Manager
Food Lion, LLC

Art Rosenfeld
Commissioner
California Energy Commission

Ted Schultz
Vice President, Energy
Efficiency
Duke Energy

Larry Shirley
Division Director
North Carolina Energy Office

Paul Sotkiewicz
Senior Economist, Market
Services Division
PJM Interconnection

Jim Spiers
Senior Manager, Planning,
Rates, and Member Services
Tri-State Generation and
Transmission Association, Inc.

Susan Story
President and C.E.O.
Gulf Power Company (Southern
Company)

Tim Stout
Vice President, Energy
Efficiency
National Grid

Debra Sundin
Director, Energy Efficiency
Marketing
Xcel Energy

Paul Suskie
Chairman
Arkansas Public Service
Commission

Dub Taylor
Director
Texas State Energy
Conservation Office

David Van Holde
Energy Manager, Department of
Natural Resources and Parks
King County, Washington

Brenna Walraven
Managing Director, National
Property Management
USAA Realty Company

J. Mack Wathen
Vice President, Regulatory
Affairs
Pepco Holdings, Inc.

Mike Weedall
Vice President, Energy
Efficiency
Bonneville Power Administration

Michael Wehling
Strategic Planning and
Research
Puget Sound Energy

Henry Yoshimura
Manager, Demand Response
ISO New England, Inc.

Dan Zaweski
Assistant Vice President,
Energy Efficiency and
Distributed Generation
Long Island Power Authority

Observers

Rex Boynton
President
North American Technician
Excellence

James W. (Jay) Brew
Counsel
Steel Manufacturers Association

Susan Coakley
Executive Director
Northeast Energy Efficiency
Partnerships

Roger Cooper
Executive Vice President, Policy
and Planning
American Gas Association

Mark Crisson
President and C.E.O.
American Public Power
Association

Dan Delurey
Executive Director
Demand Response
Coordinating Committee

Reid Detchon
Executive Director
Energy Future Coalition

Ron Edelstein
Director, Regulatory and
Government Relations
Gas Technology Institute

Claire Fulenwider
Executive Director
Northwest Energy Efficiency
Alliance

Sue Gander
Director, Environment, Energy,
and Natural Resources Division
National Governors
Association—Center for Best
Practices

Jeff Genzer
General Counsel
National Association of State
Energy Officials

Donald Gilligan
President
National Association of Energy
Service Companies

Chuck Gray
Executive Director
National Association of
Regulatory Utility
Commissioners

Katherine Hamilton
President
GridWise Alliance

William Hederman
Member, IEEE-USA Energy
Policy Committee
Institute of Electrical and
Electronics Engineers

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Executive Director
Consortium for Energy
Efficiency

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Senior Manager, Generation
and Fuel
National Rural Electric
Cooperative Association

Eric Hsieh
Manager, Government
Relations
National Electrical
Manufacturers Association

Lisa Jacobson
Executive Director
Business Council for
Sustainable Energy

Wendy Jaehn
Executive Director
Midwest Energy Efficiency
Alliance

Meg Matt
President and C.E.O.
Association of Energy Services
Professionals

Joseph Mattingly
Vice President, Secretary and
General Counsel
Gas Appliance Manufacturers
Association

Kate Offringa
President and C.E.O.
North American Insulation
Manufacturers Association

Ellen Petrill
Director, Public/Private
Partnerships
Electric Power Research
Institute

Christie Rewey
Senior Policy Specialist
National Conference of State
Legislatures

Steven Schiller
Board Director
Efficiency Valuation
Organization

Jerry Schwartz
Senior Director, Energy and
Environmental Policy
American Forest and Paper
Association

Andrew Spahn
Executive Director
National Council on Electricity
Policy

Ben Taube
Executive Director
Southeast Energy Efficiency
Alliance

Rick Tempchin
Executive Director,
Retail Energy Services
Edison Electric Institute

Mark Wolfe
Executive Director
Energy Programs Consortium

Lisa Wood
Executive Director
Institute for Electric Efficiency

Facilitators

U.S. Department of Energy

U.S. Environmental Protection
Agency

Appendix B: Background on Code Development, Adoption, and Implementation Processes

Program administrators exploring opportunities with codes should understand the basic process and roles involved in developing and implementing energy codes. Although there are exceptions, building energy codes are usually:

- Developed at the national level
- Enacted into statute or rule at the state level
- Implemented and enforced at the local level (typically by cities and counties)

Background information on this hierarchy for codes-related activities is described below.

National Code Development

The two major organizations currently involved in maintaining and upgrading building codes are the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) and the International Code Council (ICC). On the nonresidential side, most states use ASHRAE Standard 90.1 as the basis for their codes, which provides both prescriptive and performance-based compliance paths for commercial building designers. Several other states have adopted the ICC's International Energy Conservation Code (IECC) as their nonresidential code.

The Energy Policy Act (EPAcT) of 1992 initially specified the process for updating Standard 90.1. This legislation required U.S. Department of Energy (DOE) to determine if a proposed upgrade to the standard improved energy efficiency in nonresidential buildings. If this finding was affirmative, states had to update their codes to meet or exceed the new ASHRAE standard within two years. This upgrade cycle has played out three times, with the 1999, 2004, and 2007 standards. Although DOE has yet to certify the energy savings status of Standards 90.1-2004 or 90.1-2007, Congress stipulated in EPAcT 2005 that the 2004 version of the ASHRAE 90.1 Standard is the current basis for state nonresidential energy codes.

For residential construction, most states follow the ICC's IECC, although a few instead adopt the energy chapter (Chapter 11) of the ICC's International Residential Code (IRC). The IECC has a prescriptive, simple trade-off approach, as well as a performance-based path for compliance. In contrast, Chapter 11 of the IRC has prescriptive and simple trade-off-based options, but refers to the IECC for a performance path. Both the IECC and the IRC are updated every three years, with code change proposals considered from all interested stakeholders. As with the nonresidential codes, DOE has not made a determination for the 2003 or 2006 IECC, although Congress declared in EPAcT 2005 that the 2004 versions of the model energy codes should be the current basis for comparison.

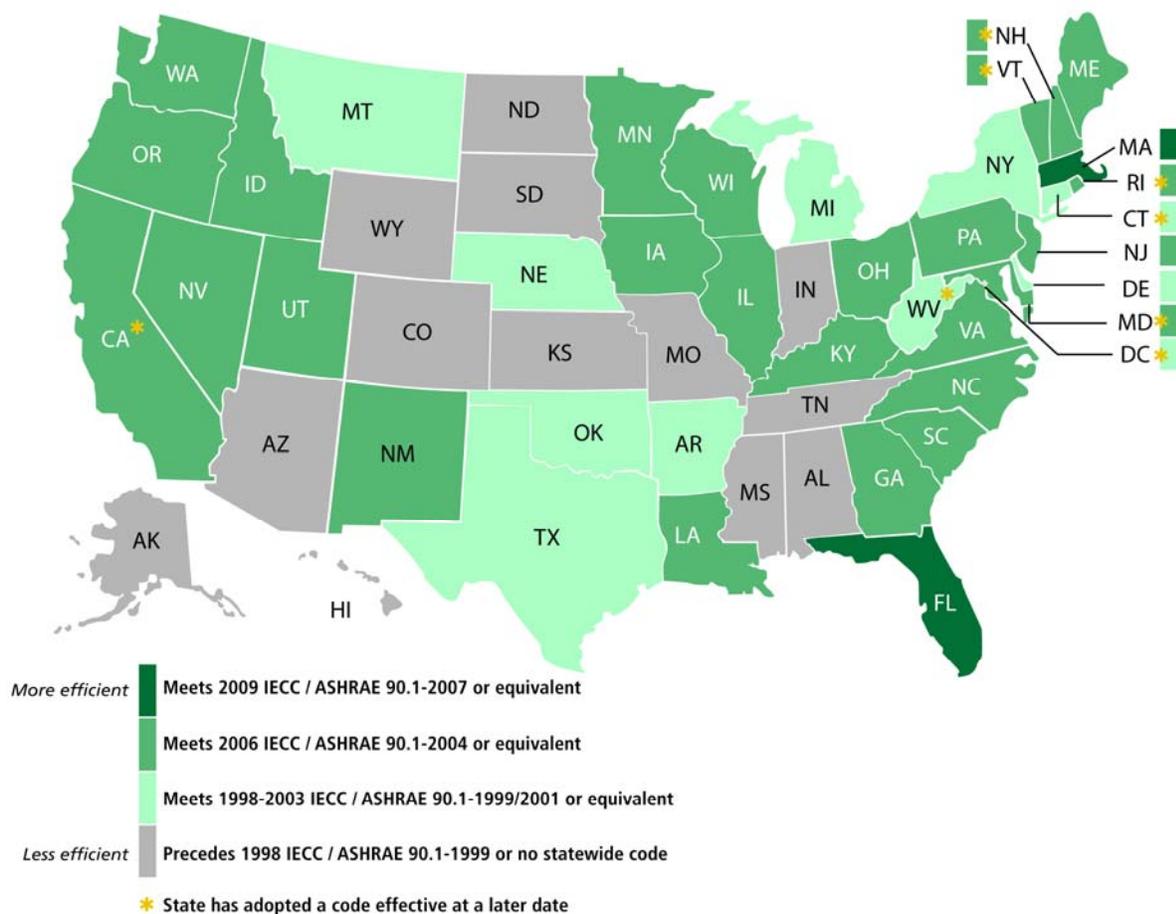
In addition to the majority of states that adopt national model codes, a few states have developed and adopted their own energy codes (e.g., California, New York, Oregon, Washington). These codes are typically influenced by the national models but are tailored to local circumstances and are often more stringent than their national counterparts.

State Code Adoption

Building energy codes developed nationally must be adopted by individual jurisdictions to bring them into force. In most cases, this is done at the state level to establish a uniform, mandatory statewide code. Following the approach set forth in EPA Act 1992, states are required to *consider* minimum energy codes for residential buildings based on current model codes, and to *certify* to the Secretary of Energy within two years that their nonresidential energy code meets or exceeds Standard 90.1.

There are instances, however, where mandatory statewide codes have not been adopted. For example, some states have a voluntary code, and others have codes that are one or more upgrade cycles out of date. Other states have home-rule provisions that give cities or counties the autonomy to adopt their own local code. Arizona is an example of a state in which multiple local jurisdictions have adopted energy codes. The current status of state code adoption is shown in Figures B-1 and B-2.

Figure B-1. Commercial State Energy Code Status as of September 2009



Source: BCAP, 2009.

and enforcement are key steps to realizing energy savings from a code once it has been adopted. Because these activities occur primarily at the local level, compliance and enforcement have historically been the elements of the codes process most directly targeted by program administrators.

To ensure adequate code compliance, it is typically necessary to inform, educate, and train code officials, building trade organizations, architects, and engineers about the requirements of the code and the benefits of compliance. Building departments have traditionally emphasized life and safety codes, and they may need additional information to adequately address energy efficiency provisions. Ensuring compliance also requires participation by product suppliers and trade associations (such as local contractor groups) in advance of code implementation, as well as collaboration with the building industry and DOE's Building Energy Codes Program to provide guidance, resources, and tools. Partnering with industry groups can be another effective strategy for efficiently distributing guidance and for organizing training efforts. A readily accessible source of technical information, such as a "hotline," is another option for increasing compliance.

On the enforcement side, code officials will also benefit from information and tools that help them execute this step. Typically, enforcement takes place at two levels: plans examination and field inspection. The plans examination phase is important to prevent the need to correct mistakes in the field. Post-construction field inspections are also necessary for ensuring that the building plans were followed and that energy savings are likely to be achieved upon occupancy. To be successful, field inspections for energy codes should be integrated into the code officials' usual process without undue disruptions or added costs. Simplified procedures or guidance can be especially useful at this stage. In addition, many states have associations of building officials that can assist in communicating information and resources to local code officials. Because local governments often face resource and staffing constraints, direct assistance with enforcement—through the provision of funding or personnel—can be effective.

Appendix C: Examples of Program Administrator Activities to Advance Codes

National Code Development

Energy Efficient Codes Coalition: The Energy Efficient Codes Coalition is a collaborative group formed to advocate for a 30 percent improvement in the 2009 IECC's residential energy code provisions compared with the 2006 version of the standard. Key program administrators in the coalition include electric utilities—represented through the Edison Electric Institute—the American Public Power Association, and regional energy efficiency organizations (e.g., Northeast Energy Efficiency Partnerships [NEEP] and Northwest Energy Efficiency Alliance [NEEA]). The coalition was successful in seeing the ICC's voting members adopt 55 of the coalition's 80 recommendations and 13 of the 21 elements of the coalition's comprehensive proposal ("The 30% Solution"), resulting in energy efficiency gains of approximately 12 percent nationwide compared with the 2006 IECC. This group now operates as the Building Energy Efficient Codes Network, and it is continuing to work toward improvements during the next code cycle.

Pacific Gas & Electric (PG&E), Southern California Edison, and Sempra Utilities (San Diego Gas & Electric and Southern California Gas): California's investor-owned utilities (IOUs) have been involved in advancing the state's Title 24 building codes since the mid 1990s. These administrators have since become active participants in national code development, engaging with ASHRAE and the ICC. For example, program engineers from California IOUs have served on ASHRAE technical committees and assisted in the development of test procedures and design requirements for Standard 90.1. A key reason for the California administrators' involvement is the potential to expand the market share for technologies required under Title 24 and thus drive down the costs faced by local builders and residents. The national code developers also benefit from the experience and knowledge that California utilities bring to the process. In addition to assisting ASHRAE and the ICC, California IOUs interact at the national level with DOE, major national building organizations, and national building product manufacturers and suppliers to advance specific code upgrades.

Northwest Energy Codes Group (NWECCG): NEEA is a regional organization that both advocates for and delivers energy efficiency programs to businesses and residences. It has played a role in national model code development for more than 25 years, and it has successfully leveraged the expertise of utility members and contractors to develop code upgrade proposals and advance them through the national upgrade process. To assist in this process and to represent the region at the national level, NEEA and its members formally established NWECCG in 2004. Since then, NWECCG has demonstrated how administrators with significant voluntary program experience at the state and regional levels can influence a national model code. For example, in 2006, NWECCG proposed 14 code changes to the IECC, 10 of which were fully incorporated into the code.

Regional, State, and Local Code Development and Adoption Efforts

NEEP: NEEP is a regional efficiency organization with significant experience providing technical assistance to states on building codes. For example, in 2008, NEEP worked with the Maine Public Utilities Commission to adopt and implement the state's first energy code. NEEP and its

program administrator members helped Massachusetts upgrade its code to the most recent versions of the IECC (2009) and ASHRAE Standard 90.1 (2007), and then in the spring of 2009 they helped the state adopt a first-in-the-nation “informative appendix” to the building energy code, or “stretch code,” which provides municipalities with a state-approved option for an above-code building standard, should they desire it. In all cases, NEEP played a key role in bringing a wide range of partners, including program administrator members, to the table to educate and inform decision-makers about the benefits of codes and related issues. Appendix D provides a list of NEEP’s administrator members.

NEEA: As the regional efficiency organization for the Northwest, NEEA draws heavily on the expertise of its 139 program administrator members, including public and private utilities, in offering technical assistance to states on code adoption and upgrades. For example, NEEA recently assisted Idaho and Montana in the adoption of their first statewide energy codes, and it played a role in upgrading codes in both Oregon and Washington. In Oregon, NEEA successfully integrated its Northwest Energy Homes specification, on a provision-by-provision basis, into the state’s 2008 residential code. For 2009, NEEA is working to assemble and fund a team to assist the Oregon Department of Energy with the implementation of a 20–30 percent upgrade in its nonresidential code. Appendix D provides a list of NEEA’s administrator members.

Southwest Energy Efficiency Project (SWEEP): SWEEP, the regional efficiency organization for the Southwest, includes several program administrator members that it calls on to advance codes. These administrators have played roles providing data on cost-effectiveness, assisting in the adoption of statewide energy codes (often by providing testimony on specific code elements), and helping local stakeholders understand key provisions in the national model codes. For example, in 2009 SWEEP is working to help communities in Arizona better understand the costs and benefits of adopting the most recent residential IECC. At the national level, SWEEP partnered with the NWECC and the Energy Efficient Codes Coalition in 2008 to achieve a significant upgrade to the IECC’s residential code. Appendix D provides a list of SWEEP’s administrator members.

Local Implementation and Compliance

Efficiency Vermont (EVT): EVT is the sole administrator of electric efficiency programs and services in Vermont. With aggressive statewide goals for efficiency savings and a limited codes infrastructure, EVT and the Department of Public Service identified code compliance as a key opportunity. Unlike municipalities in most states, Vermont municipalities are not required to conduct health and safety inspections of new homes, nor do they issue occupancy permits. In the absence of on-the-ground inspection and enforcement of energy codes, builders are responsible for self-certifying compliance. Recognizing this gap, EVT instituted a training and technical assistance package designed to increase understanding and compliance. One component of their approach is a telephone hotline, operated by EVT experts, which builders and tradespeople can call with codes-related questions. In addition, EVT works to educate and train selected participants in their voluntary programs on code provisions. With a relatively small building market, EVT has been successful in reaching the majority of large builders.

Utility Code Group (UCG): In 1991, Washington State began a 3-year process to revise its nonresidential energy code. The goal of the region’s utilities and the Northwest Power Planning Council (NWPPC) was to increase the energy efficiency of new commercial buildings to levels proposed by the NWPPC. To achieve this objective and coordinate the program administrator

roles, the UCG was established later that year as a nonprofit entity overseen by a board of utility representatives. Key activities funded and conducted by the UCG included:

- Developing and implementing a training program.
- Marketing energy code information and training to industry audiences.
- Cooperating with code officials and funding the development of the Special Plans Examiner and Inspector Program.
- Managing a quality assurance and evaluation program to track progress.
- Coordinating with all stakeholders to assure the successful implementation of the code.

The UCG was in operation for three and a half years, culminating in the successful adoption and implementation of the NWPPC code recommendations in 1994. (Note that the NWPPC became the Northwest Power and Conservation Council [NWPCC] in 2003.)

Nevada Power and Sierra Pacific: In 2005, the State of Nevada adopted the 2003 IECC as its residential code. To prepare and educate the market for this change, Nevada Power and Sierra Pacific worked ahead of the code adoption schedule to provide funding for the training and education of builders and local code officials. DOE contributed additional resources, and the Nevada Energy Office coordinated the overall adoption process.

PG&E: PG&E developed and delivers a training course on California's Title 24 energy code at its Energy Training Center in Stockton. PG&E designed the course to focus on high-impact changes, including duct installation standards and leakage testing requirements in commercial and residential buildings, and explicitly links the utility's energy efficiency incentive programs to the code training curriculum. For example, PG&E develops analytical tools and test methods derived from program experience to estimate energy savings and verify performance of code measures. This supports California's 2008 energy efficiency strategic plan (CPUC, 2008), which emphasizes the need for improved energy code compliance and enforcement. The plan states that: "This strategy will require a strong, coordinated effort among Federal, State and local entities, the utilities, California building officials (and their association, CALBO) and other code compliance organizations, trade and professional licensing/registration agencies, and building/developer/ contractor/manufacturers associations."

State of Maine: In 2004, the Maine Public Utilities Commission was legislatively directed to study the implementation of building energy codes and report its findings and recommendations to the Joint Standing Committee on Utilities and Energy. With the Public Utilities Commission's subsequent recommendation, Maine adopted the latest commercial and residential codes, including a requirement to provide code training to builders and local officials. To assist in carrying out this requirement, Maine's nonprofit program administrator, Efficiency Maine, developed a suite of training resources that address basic and advanced topics related to legal and technical code considerations. Efficiency Maine also delivers the training program and directly assists builders in securing their certification of occupancy.

State of Iowa: In 2008, the Iowa legislature passed a ruling that requires the state's IOUs, as well as cooperative and municipal utilities, to set energy savings goals, create plans for achieving these goals, and report their progress to the Iowa Utilities Board. Although many utilities viewed the new state codes as a strategy for achieving these goals, they had questions

about low compliance levels and the resulting impact on energy savings. To address these concerns, the utilities made a commitment, in conjunction with the Iowa Office of Consumer Advocate, to analyze compliance levels, determine the reasons for low compliance, and identify options and best practices for improvement. A study was initiated in late 2007, for which data were gathered via onsite home inspections, leakage tests, and software analyses. Once the results are available, the utilities intend to develop a strategy for improving compliance and enforcement as needed.

New York State Energy Research and Development Authority (NYSERDA): Under New York's 2008 energy portfolio standard proceeding, NYSERDA, the state's largest program administrator, was tasked with expanding its role to advance the commercial and residential building codes. As a first step, NYSERDA will conduct analysis and gather data to assist stakeholders in understanding market conditions and key issues involved in improving code compliance. Other activities include conducting a baseline study to document current building practices in different regions of the state and initiating basic research aimed at identifying areas of low compliance. Once these efforts are complete, NYSERDA will use the results to inform its curriculum for training code officials.

Other Activities

Codes Evaluation—California IOUs: In the late 1990s, California IOUs began actively collaborating with the California Public Utilities Commission (CPUC) to identify, research, and promote codes as a programmatic strategy for achieving efficiency savings at low cost relative to existing resource acquisition programs. Unlike traditional efforts, however, energy savings from utility codes activities are implemented by multiple parties over a long period of time, and are therefore comparatively difficult to evaluate. Nevertheless, the CPUC determined that codes held the potential for large and cost-effective savings, and authorized incentive payments for utilities that demonstrated successful efforts. In a sophisticated evaluation protocol, the CPUC subsequently specified the metrics for measuring savings. The protocol estimates net ex post energy savings achieved from program administrator-induced code changes above and beyond what would naturally occur in the market. Initial evaluations of the utility codes activities in the 2006–2008 program cycle indicate that savings equivalent to 10–12 percent of the total IOU goals were achieved. Based on program expenditure data from the utilities, codes-related savings cost about \$0.01 per first-year kilowatt-hour (kWh) (Lee et al., 2008).

Appendix D: Administrator Participation in Regional Efficiency Organizations

Experience has shown that, in many parts of the country, one of the most effective strategies that program administrators can use to influence code development, adoption, or implementation is to work with their regional energy-efficiency organizations. Table D-1 lists these regional efficiency “consortia” and their participating administrators.

Table D-1. Utility Members of Regional Efficiency Organizations

Organization	Utility Members
Midwest Energy Efficiency Alliance	<ul style="list-style-type: none"> ▪ Alliant ▪ Ameren ▪ American Electric Power ▪ Associated Electric Cooperative ▪ City Utilities of Springfield, Missouri ▪ Columbia Gas of Ohio ▪ Columbia Water and Light ▪ Commonwealth Edison ▪ DTE Energy ▪ Duke Energy ▪ Hoosier Energy ▪ Indianapolis Power & Light ▪ MidAmerican Energy ▪ Minnesota Energy Resources ▪ Minnesota Power ▪ Southern Minnesota Municipal Power Agency ▪ Wabash Valley Power Association ▪ Wisconsin Public Service ▪ Xcel Energy

Organization	Utility Members
Northeast Energy Efficiency Partnerships	<ul style="list-style-type: none"> ▪ Cape Light Compact ▪ Connecticut Light and Power ▪ Efficiency Maine ▪ Efficiency Vermont ▪ Long Island Power Authority ▪ National Grid (Massachusetts, New Hampshire, and Rhode Island) ▪ New Jersey Board of Public Utilities Clean Energy Program ▪ NSTAR Electric and Gas ▪ NYSERDA ▪ United Illuminating ▪ Unitil ▪ Western Massachusetts Electric Co.
Northwest Energy Efficiency Alliance	<ul style="list-style-type: none"> ▪ Avista Utilities ▪ Idaho Power Company ▪ NorthWestern Energy ▪ PacifiCorp ▪ Puget Sound Energy ▪ Many public utility districts, municipal utilities, and rural electric cooperatives. See the full list at http://www.nwalliance.org/aboutus/partners.aspx.
Southeast Energy Efficiency Alliance	<ul style="list-style-type: none"> ▪ Duke Energy ▪ Southern Company ▪ Tennessee Valley Authority
Southwest Energy Efficiency Project	<ul style="list-style-type: none"> ▪ Salt River Project ▪ Sierra Pacific ▪ Southwest Gas ▪ Xcel Energy

NYSERDA = New York State Energy Research and Development Authority

Appendix E: Resources for More Information

Selected Organizations

American Public Power Association. <<http://www.appanet.org/>>

American Society of Heating, Refrigerating, and Air-Conditioning Engineers [ASHRAE]. <<http://www.ashrae.org/>>

Building Codes Assistance Project. <<http://www.bcap-energy.org/>>

Edison Electric Institute. <<http://www.eei.org/>>

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