Ohio Gap Analysis

February 2011

Prepared by the Building Codes Assistance Project for the United States Department of Energy
Building Codes Assistance Project (BCAP)  

BCAP is a non-profit advocacy organization established in 1994 as a joint initiative of the Alliance to Save Energy, the American Council for an Energy-Efficient Economy, and the Natural Resources Defense Council. BCAP focuses on providing state and local governments in the U.S., as well as stakeholder organizations, with support on code adoption and implementation through direct assistance, research, data analysis, and coordination with other activities and allies. With over sixteen years of experience supporting numerous state energy offices and city building departments, along with tracking code activities across the country, BCAP is well-positioned to assist in local and statewide activity to advance codes. As a trusted resource, BCAP is able to identify and navigate past policy and programmatic pitfalls to help states and jurisdictions put the best possible strategy in place to improve efficiency in both new and existing buildings. Our work pulls together local efforts, identifies national-scale issues, and provides a broad perspective, unbiased by corporate/material interests. BCAP also hosts OCEAN—an online international best practice network for energy codes—and is increasingly working abroad to gather and share best practices that provide value across organizations.
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Acronyms and Abbreviations

AIA – American Institute of Architects
ASHRAE – American Society of Heating, Refrigerating, and Air-Conditioning Engineers
BCAP – Building Codes Assistance Project
BCC - Department of Building Code Compliance
BBS - Ohio Board of Building Standards
BPI – Building Performance Institute
CEUs – Continuing education units
DAS - Department of Administrative Service
DOE – Department of Energy
ECAP – Energy Code Ambassadors Program
EECBG – Energy Efficiency and Conservation Block Grants
EERS - Energy Efficiency Resource Standard
EPA – U.S. Environmental Protection Agency
HERS – Home Energy Rating System
IBC – International Building Code
ICC – International Code Council
IECC – International Energy Conservation Code
IRC – International Residential Code
Joint Committee on Agency Rule Review (JCARR)
IOU – Investor Owned Utilities
IRC – International Residential Code
JCARR – Joint Committee on Agency Rule Review
LEED – Leadership in Energy and Environmental Design
MEC – Model Energy Code
NAAB – National Architectural Accrediting Board
NAHB – National Association of Home Builders
OBBC - Ohio Better Buildings Coalition
OCEAN – Online Code Environment and Advocacy Network
OCILB – Ohio Construction Industry Licensing Board
OCC – Ohio Office of Consumer’s Council
OCILB – Ohio Construction Industry Licensing Board
ODOD - Ohio Department of Development
OEC – Ohio Environmental Council
OHBA – Ohio Home Builders Association
OSFC - Ohio School Facilities Commission
PBF - Public Benefit Fund
PUCO - Public Utilities Commission of Ohio
RCAC – Residential Construction Advisory Committee
RECA – Responsible Energy Codes Alliance
RCO – Residential Code of Ohio
RESNET – Residential Energy Services Network
SAO – State Architect’s Office
SEO – State Energy Office
SEP – State Energy Program
USGBC – U.S. Green Building Council
VEIC – Vermont Energy Investment Corporation
Executive Summary

The purpose of the Ohio Gap Analysis Report is twofold: 1) to document and analyze the strengths and weaknesses of the state’s existing energy code adoption and implementation infrastructure and policies; and 2) to recommend potential actions state agencies, local jurisdictions, and other stakeholders can take to achieve 100 percent compliance with the model energy codes. The report is organized into four sections: Introduction, Adoption, Implementation, and Conclusion. The Adoption and Implementation sections both conclude by listing some of the state’s current best practices and making multiple recommendations for actions that would improve energy code compliance.

The Introduction section provides an overview of relevant state demographics and the impact of the construction boom and subsequent decline. Energy codes can help Ohio keep more money in the state through reduced energy bills.

The Adoption section takes a close look at the federal, state, and local polices that influence energy codes in the state. The Adoption section includes 10 major recommendations, mainly focused on approaches to adopting the 2009 IECC and more stringent codes for state-funded buildings. A main barrier to the adoption of modern residential energy codes in Ohio is the opposition from home builders. Suggestions for overcoming such opposition and partnering with builders are discussed.

The Implementation section covers the many ways in which state and local agencies, the design and construction industries, utilities, and other stakeholders work to promote the adopted energy codes, establish efficient, feasible, and cost-effective enforcement and compliance infrastructures, and adequately prepare code officials and building professionals to carry out their responsibilities. While many Ohio home builders have stopped building due to reduced demand for new homes, those remaining are building better homes to compete in the market place, and in fact the market share of ENERGY STAR new homes has increased to 33 percent. A few key programs operating successfully in Ohio are saving the state millions of dollars annually in energy costs. The Implementation section makes 16 major recommendations for building on these successes and increasing support to builders, designers and code officials.

The Conclusion section provides a summary of the benefits of energy code adoption and implementation in Ohio and concludes with a summarized list of the most important recommendations made in the report.
Introduction

Buildings are a major user of energy in the United States, consuming 72% of electricity, and 40% of total energy use. Buildings are responsible for 40% of U.S. Co₂ emissions. Ohio spends more than $54 million annually on energy. Energy codes can help reclaim these dollars lost from the state’s economy and reduce energy bills for businesses and families in Ohio.

As one of a key instrument in a state’s policy toolbox, energy codes reduce our demand for energy in buildings. Energy codes, when complied with benefit society in a number of important ways - they:

- Reduce emissions of greenhouse gas emissions and air and water pollution;
- Help expand a state’s economy by keeping local dollars in Ohio as consumers and businesses save money;
- Lessen peak energy demand, delaying the need for building expensive new power plants; and
- Increase the reliability of our grid, as we reduce stress on an aging energy grid system.

Recent improvements in the stringency of the model energy codes—as well as the development of the first green codes—continue to raise the bar for energy-efficient design and construction to levels that were almost unimaginable a few years ago. Retail and office buildings constructed to meet the requirements of the IECC can be **over 30 % more energy efficient** than typical buildings not constructed to meet national model energy standards.

Meanwhile, the Recovery Act has provided states and cities with unprecedented funding and incentives to adopt the model energy code, and more places are taking advantage of these opportunities than ever before.

The more favorable environment for more stringent codes is part of a larger transformation in the way advocates, policymakers, industry and utility representatives, and the general public view energy efficiency as a viable and cost-effective component of a comprehensive solution to our current economic, environmental, and energy concerns. The cheapest and cleanest fuel source is the one we do not burn. Nowhere is this more apparent than in the building sector, which accounts for almost 40 percent of total energy use and 70 percent of electricity use. Moreover, the average lifespan of a building is roughly 50 years, meaning that current building energy policies will affect energy consumption until 2060 and beyond.

Yet, for all this recent progress and promise, energy codes are still falling well short of their potential. In municipalities across the country, energy code enforcement and compliance remain woefully insufficient or completely absent. While development and adoption are the necessary first steps of the energy codes process, they alone do not guarantee compliance. To ensure that energy codes accomplish their missions to reduce energy use and save money, states and cities must develop and carry out effective and realistic energy code implementation strategies.
In collaboration with the U.S. Department of Energy, BCAP has undertaken a new program to improve energy code compliance in 15 states, including Ohio, by analyzing the gaps in the existing energy code infrastructure and practices and providing compliance planning assistance and on-the-ground technical support to energy code stakeholders in the state. The first phase of the program is the Gap Analysis Report, which identifies barriers to successful energy code adoption and implementation, opportunities for improvement, available resources, and key stakeholders and potential partnerships.

To gain insights for this report, building departments representing various sized communities in 10 regions of Ohio were interviewed, including: three large cities – Columbus, Cleveland, and Cincinnati; two medium-sized cities – Canton and Toledo; two small cities – Grove City and Willoughby; two rural counties – Wayne and Ashtabula; and one metropolitan county – Montgomery.
State Overview

Ohio is the seventh most populated state in the U.S. with a population of 11.5 million. Ohio’s population grew more slowly than the national average over the last two decades - from April 2000 to July 2007, the state population grew by 1 percent, less than the national growth of 7.2 percent. Likewise, the population grew 1.7 percent from 2000 to 2009 while the national average was 9.1 percent.

Ohio has a low population density, and code enforcement in rural areas is a challenge. Additionally, per capita personal income is fairly low (ranked 34th in the nation), making the high cost of energy a primary concern in Ohio.

Figure 1 - State Population Map

Construction Overview

Like most states, new residential construction has slowed significantly as a result of the recent real estate crisis. In 2009, there were 10,554 new single family housing units built, compared to 16,155 built in 2008.
The reduced demand for new buildings and homes has caused many builders to go out of business or change careers. The Ohio Home Builders Association has lost about 4,000 members in the last two years and is down to about 5,000 members today. As builders leave the industry, those remaining may be more interested in gaining a competitive edge in the market by learning new approaches that will allow them to market their homes or buildings as having lower energy bills and lower environmental impacts. This may already be happening – the market penetration of ENERGY STAR qualified new homes in Ohio increased from 22 percent in 2008 to 33 percent in 2009.

The number of commercial permits has also declined since 2008. Revenues collected by the Board of Building Standards (BBS) from permit fees have been declining as shown in the bar graph below.

**Figure 2 – Ohio Permits by Year**

![Ohio Permits by Year Chart](image)

**Figure 3 – Revenue Collected by Ohio Board of Building Standards**

![Revenue Collected by OH Board of Building Standards Chart](image)
While a stall in construction is detrimental to the economy, it provides a pause in building activity to consider measures to improve energy code enforcement. With reduced construction activity, construction professionals and code officials may have more time to take advantage of available energy code training. This period of slower growth can be used to ease all stakeholders into the new code, rather than trying to adjust while construction is high.

**Energy Portfolio**

Ohio is a moderate energy producer - ranked 17th in the nation. Ohio energy resources are primarily coal from the Appalachian Basin in the eastern part of the state, which provide less than one-third of its consumption; and two nuclear plants along Lake Erie. Ohio’s offshore wind resources from Lake Erie reach the highest energy potential classification. Yet given these and other local resources, Ohio imports more energy than it produces.

Ohio’s industrial sector is among the highest energy users in the nation, accounting for about one-third of the state’s electricity consumption. Ohio is the fourth most coal-consuming state in the nation, and about 86 percent of the electricity generated in the state comes from coal. As a result of Ohio’s intensive use of coal, the state has the second highest carbon dioxide emissions in the country.

**Potential Savings from Energy Codes**

There is a huge opportunity for capturing energy efficiency as a resource in Ohio. As Dave Cawley, the Chief Operating Officer at Energy Smart in Columbus said “Ohio is the Saudi Arabia of energy efficiency.”

Based on 100% compliance, if Ohio began implementing the 2009 IECC and Standard 90.1-2007 statewide in 2011, businesses and homeowners would save an estimated $89 million annually by 2020 and $177 million annually by 2030 in energy costs (assuming 2006 prices).

Additionally, implementing the latest model codes would help avoid about 21.4 trillion Btu of primary annual energy use by 2030 and annual emissions of more than 1.4 million metric tons of CO2 by 2030.

A 2010 BCAP analysis indicates that the weighted average incremental construction cost of upgrading to the 2009 IECC in Ohio would be $803 per home. On average, the annual energy savings per home would be $229.00, meaning the simple payback for homeowners would occur, on average, in 3.5 years. These estimates are conservative and represent the upper estimate of incremental cost.

Achieving 100 percent compliance with the 2009 IECC would result in a 13-14 percent savings in residential energy costs in the state, depending on climate zone. For commercial buildings, achieving 100 percent compliance with ASHRAE Standard 90.1-2007 would result in up to a 9.8 percent savings in energy costs.

The following table shows the estimated annual energy savings per home per year from meeting the requirements in the 2009 IECC. Included in the savings are heating, cooling, and lighting. Quantified in the table are the two climate zones in Ohio, shown with an example city from the climate zone.
Although Charleston is outside Ohio state lines, it represents the small southern portion of the state that is in climate zone 4.

**Figure 4 – Potential energy bill savings with 2009 IECC - RESIDENTIAL**

<table>
<thead>
<tr>
<th>Climate Zone/City</th>
<th>Savings ($/year)</th>
<th>Percent Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charleston, WV (Zone 4A)</td>
<td>$236</td>
<td>14%</td>
</tr>
<tr>
<td>Columbus (Zone 5A)</td>
<td>$222</td>
<td>13%</td>
</tr>
</tbody>
</table>

*Source: 2009 IECC Residential Nationwide Analysis, U.S. Department of Energy*

The following table represents a percentage of potential energy savings that can be achieved by adopting the most up to date ASHRAE 90.1-2007 building energy standard. In the table below “Non Residential” is any mid rise commercial building, “Residential” represents high rise residential buildings and “Semi Heated” represents commercial warehouses. A 100 percent compliance with Standard 90.1-2007 would result in up to 9.8 percent savings in commercial energy costs.

**Figure 5 – Impacts of Standard 90.1-2007 for Commercial Buildings at State Level**

<table>
<thead>
<tr>
<th>Construction Type</th>
<th>City</th>
<th>Energy Savings</th>
<th>Cost Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non Residential</td>
<td>Cincinnati</td>
<td>5.0%</td>
<td>4.6%</td>
</tr>
<tr>
<td>Residential</td>
<td>Cincinnati</td>
<td>9.8%</td>
<td>6.1%</td>
</tr>
<tr>
<td>Semi Heated</td>
<td>Cincinnati</td>
<td>0.6%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Non Residential</td>
<td>Columbus</td>
<td>4.1%</td>
<td>3.4%</td>
</tr>
<tr>
<td>Residential</td>
<td>Columbus</td>
<td>4.9%</td>
<td>2.9%</td>
</tr>
<tr>
<td>Semi Heated</td>
<td>Columbus</td>
<td>0.4%</td>
<td>0.3%</td>
</tr>
</tbody>
</table>


**Adoption**

**Federal Policy**

Although energy code adoption occurs on the state and local levels, the federal government—through Congress and the U.S. Department of Energy (DOE)—has played a significant role in advancing energy code development, determining the relative effectiveness of national model energy codes, and supporting state- and local-level adoption and implementation.

**EPAct**

The Energy Policy Act (EPAct) of 1992 required DOE to determine whether the most current model energy codes would improve energy efficiency for residential and commercial buildings. It also mandated that the DOE make a new determination within twelve months for every subsequent revision of these codes. Each state would then have two years to certify that it had revised its own energy code to meet or exceed the requirements of the latest iteration of the national models. A state could decline to adopt a residential energy code by submitting a statement to the Secretary of the DOE detailing its
reasons for doing so. The Energy Policy Act of 2005 specified that the most current model energy codes were the 2004 supplement to the 2003 IECC and ASHRAE Standard 90.1-2004.14

At the end of 2008, the DOE published its determination for ASHRAE Standard 90.1-2004 for commercial buildings, ruling that energy savings above the previous Standard 90.1-1999 would be 13.9 percent for national source energy and 11.9 percent for building energy consumption. DOE is currently reviewing Standard 90.1-2007, the most recent national model energy code for commercial buildings. For residential and small commercial, the last DOE determination was for the 2000 IECC. At present, DOE is reviewing the 2003, 2006, and 2009 versions of the code. Currently, Ohio is in compliance with EPAct requirements.

The Recovery Act

In 2009, Congress passed the American Recovery and Reinvestment Act (Recovery Act), which provided states with stimulus funds through the State Energy Program (SEP) and the Energy Efficiency and Conservation Block Grants (EECBG) to adopt the 2009 IECC or equivalent for residential construction and the ASHRAE Standard 90.1-2007 or equivalent for commercial construction, as well as achieve 90 percent compliance with the codes by 2017.15 In a letter dated March 9, 2009, then-Governor Ted Strickland accepted $96,083,000 million in American Recovery and Reinvestment Act (ARRA) funding for use in energy efficiency policies and improvements and an additional $24,979,600 EECBG formula grant, a portion of which the state’s energy office - the Ohio Department of Development (ODOD) will use for various residential and commercial energy efficiency projects.16 In this letter, Governor Strickland assured that applicable state officials in Ohio would begin actions to 1) update the code to the 2009 IECC or an equivalent code and 2) achieve 90% compliance with these codes in all new construction by 2017.17

**GAP #1:** The ODOD has begun to collaborate with the Board of Building Standards (BBS) – the agency responsible for code adoption, however, the ODOD has not made energy codes a top priority for funding. (See following section for details).

**Recommendation:** The ODOD and the BBS should coordinate regularly to collaborate on approaches to train, support, and encourage the building industry to build more efficient housing and buildings.

State Policy

In the United States, building energy codes are adopted on the state and local levels. This is due, in part, to the diverse range of cultures and climates found across the fifty states, as well as a host of historical political influences that shaped federal-state and state-local relations. The process differs from state to state, but in most cases codes are adopted through a legislative process, a regulatory process, or a combination of both, although a handful of states are strongly home rule and permit local jurisdictions to adopt energy codes. Every state is unique in how it conducts business and creates policy, and each state requires its own particular strategy for achieving the best possible code for its local governments, citizens, and businesses.
The Board of Building Standards has a long history as the code adoption agency in the state of Ohio. BBS was created in 1955 for this purpose and focused primarily on commercial and industrial buildings. In 1977, the BBS began to establish codes for conserving energy in new one, two, and three-family dwellings. Today, under the Ohio Department of Commerce, the BBS is authorized to formulate, adopt, and amend building codes for the state of Ohio. While the BBS adopts statewide codes, local building departments are responsible for enforcing codes. The BBS certifies building departments in municipalities, villages, townships, or counties to grant the authority to enforce Ohio building codes.

Rules proposed by the BBS are filed with the Secretary of State, the Legislative Service Commission, and a committee of the General Assembly known as the Joint Committee on Agency Rule Review (JCARR) at least 60 days prior to adoption. The JCARR is comprised of five State Representatives and five State Senators who review proposed rules for the following: an agency has not exceeded the scope of its statutory authority; proposed rules do not conflict with another rule; proposed rules do not conflict with the legislative intent of an agency’s enabling statute; and, an agency has prepared a complete Rule Summary and Fiscal Analysis.

In 2005, House Bill 175 was signed into law, creating the Residential Construction Advisory Committee (RCAC) within the Ohio Department of Commerce. The RCAC is comprised of nine individuals with experience in residential construction who are appointed by the Director of the Department of Commerce. Of the members appointed, three are general contractors, one a residential contractor with remodeling experience, one an architect, two are building officials, one is a certified fire safety inspector, and one a municipal mayor. The intent of the RCAC is to provide construction industry input into the code adoption process, to assure that building codes are feasible and realistic. The concept of having such a committee that provides insights from “the field” could be tremendously helpful to the BBS and allows the construction industry a formal way to participate in the code adoption process which affects their livelihood. However, the law was written in such a way that it impedes the authority of the BBS to formulate and adopt a code unless such codes are specifically recommended by the RCAC.

Currently, the RCAC does not support the adoption of the 2009 IECC – primarily because the incremental cost increase of new codes – without an allowable alternative compliance path which is determined to be equivalent with the 2009 IECC.

**GAP #2: State officials lack consistent funding to participate at a national level in the development of model codes and standards.**

**Recommendation:** Ohio should engage in the development of the national model codes and standards and leverage the shared expertise and resources available in national code forums, via:

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i The involvement of RCAC in the code adoption process is as follows: (1) The RCAC recommends a residential building code to the BBS. The RCAC may recommend a nationally recognized code with adaptations it deems necessary to implement the code in Ohio. (2) If the BBS decides not to adopt the RCAC’s recommended code, the RCAC revises the code and resubmits it until the BBS adopts a code that the RCAC recommends.

ii House Bill 1 (effective October 16, 2009) made modifications to the statutes affecting the RCAC and the BBS.
● Participation in IECC/IRC/IBC code development, sharing knowledge and experiences through ICC online forums.

● Participation in ASHRAE Standard 90.1 development, sharing knowledge and experiences through the ASHRAE membership.

● Sending at least one representative to the DOE codes conference.

● Utilizing www.Bcap-ocean.org website resources.

● Participation in OCEAN communities online.

GAP #3: The composition of the RCAC is primarily the building industry - building scientists or those with related expertise are not represented on the committee.

Recommendation: Consideration should be given to appointing stakeholders with other perspectives to the RCAC, such as those representing the interest of the environmental and/or climate issues; a building scientist; university interests, and consumer protection interests such as the Ohio Consumer’s Council.

Energy Code Adoption

Effective January 1, 2009, the Residential Code of Ohio (RCO) requires one of three compliance paths: meeting the 2006 IECC; meeting sections 1101-1103 of Chapter 11 of the Residential Code of Ohio (based on Chapter 11 of the 2006 IRC); or meeting the state code’s new Prescriptive Energy Requirements (section 1104). The prescriptive option for demonstrating energy code compliance is less stringent than the 2006 IECC, and in fact assesses a warmer climate for a larger portion of the state than the IECC code.

The state’s commercial code currently references both the 2006 IECC and the ASHRAE 90.1-2004 as equivalent compliance paths. In February, 2011, the BBS submitted a proposal to the JCARR to adopt the 2009 IECC as the new commercial code. On March 7, 2011, the JCARR accepted this proposal. On April 8, 2011, the BBS will officially adopt the code and set the effective date (which is expected to be set for a date in fall of 2011).

Both codes are mandatory statewide, and REScheck and COMcheck can be used to show compliance.

There is no set code change cycle.

Gap #4: The state does not have an automatic energy code review and update process on a three-year cycle.

Recommendation: The state should adopt an automatic review and update process for future iterations of the model energy code to lock in future energy savings and remove speculation after the release of each new model energy code.
Figure 6. Comparison of Stringency of Adopted Energy Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Impacts of Strengthening/Weakening Amendments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>2006 IECC or Chapter 11 of the Residential Code of Ohio or by meeting the state code’s new Prescriptive Energy Requirements (section 1104)</td>
</tr>
<tr>
<td>Commercial</td>
<td>OBC Chapter 13 currently references both the 2006 IECC and the ASHRAE 90.1-2004 as equivalent compliance paths</td>
</tr>
</tbody>
</table>

**Political Environment**

Governor John Kasich was sworn into office on January 10, 2011. Generally, a key agenda of the new Governor is to reduce unnecessary regulatory barriers to encourage new business in Ohio. The ODOD will be eliminated in favor of a new agency entitled *JobsOhio*. At the time this report was written, it is unknown as to whether staff working on currently funded projects will be re-located to another government agency or work within *JobsOhio*.

In Ohio, energy codes are a passionate issue between code supporters and those opposed to more stringent energy codes, as described in a front page article of the Columbus Dispatch newspaper on January 3, 2011 headlined “Ohio homebuilders fight tougher code”.

The Ohio Home Builders Association (OHBA) strongly opposes code changes that add to the cost of building homes, and feels that the state and federal government are imposing regulations that make housing unaffordable for low-income and reduce their ability to sell homes or make a profit from new home sales. As a result, the OHBA expends significant resources to oppose more stringent energy code adoption. According to one person interviewed for this report: “This has caused the BBS Board of Building Standards and the state to spend most of their resources on the battle with the home builders and they’ve not been able to adopt a new code and begin work on code support and training."

From the perspective of the home builders, according to a representative at the OHBA, builders are wary of government officials “mandating how builders do their jobs” and there is a level of distrust between home builders and government officials. He said that builders are “way surpassing” government officials’ assumptions and that builders need to be included in the code adoption process – and also in the ICC code development process.

The OHBA representative noted that discussions between the state and builders are lacking the expertise of building scientists. He said “We need technical people in the room. We’ve only discussed this with state bureaucrats – and none of us are architects or engineers.” In response to a description of the Building America approach, and the idea of having a builder-to-builder exchange rather than a state-government-to-builder exchange, he replied “If Building America could provide a builder-to-builder conversation that would be extremely helpful.”
The President of the Buckeye Valley Building Industry Association (a regional HBA) said “I would love to take a Building America class – I can’t afford to put energy efficiency into a new home. Everybody wants to do their part and do the right thing but the consumer is boss and that ultimately gets lost sight of and we get expensive codes.”

A major argument against codes is that they are too costly, especially during the current economic and construction downturn. An analysis conducted for the OHBA showed that complying with the code would cost about $2,500 and would take 20 years to pay back in reduced energy bills.

In an effort to overcome these barriers to energy code adoption in Ohio, energy code advocates formed the “Ohio Better Buildings Coalition”. The group includes the Sierra Club, the American Chemistry Council, the Ohio Office of Consumer’s Council (OCC), the Ohio Environmental Council (OEC), the Environmental Law and Policy Center, the ICC, Midwest Energy Efficiency Alliance, OH Partners for Affordable Energy, the League of Women’s Voters, and others. This group meets weekly to discuss actions to getting the BBS to adopt a more stringent energy code, and issues with the RCAC. The Ohio Environmental Council has filed a petition to the BBS requesting that the BBS consider adopting the 2009 IECC for residential construction – the outcome of this action is unknown at this time, but may result in the BBS being forced to consider another code that was not recommended by the RCAC. The OEC is considering further legal action as well.

**GAP #5:** There is a difference of opinion between the OHBA and the state regulatory code agency regarding the true costs of implementing more stringent energy codes.

**Recommendation:** BBS and the OHBA should collaborate to launch a voluntary effort to train and support the construction agency, utilizing a “builder-to-builder” approach via resources available from Building America. BBS should work with the OHBA from the beginning to develop such a program so that it is clearly designed with their buy-in.

**Gap #6:** In order to address the situation with the RCAC and as more stringent codes are considered, new legislators in the state need to be educated on the benefits of energy codes and the role they play in boosting the state’s economy, increasing new home sales and saving home owners money.

**Recommendation:** Stakeholders should conduct meetings with legislators in Ohio to bring them up to speed on the situation with the RCAC and the benefits of energy codes. A special “legislative breakfast” or other organized meeting could deliver a concise presentation to legislators.

**Recent Energy Codes-related Legislation**

On May 1, 2008, Senate Bill 221 was signed into law, establishing an Energy Efficiency Resource Standard (EERS) that requires investor-owned utilities (IOUs) to achieve a cumulative energy reduction

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[iii If the OHBA is not willing to collaborate, reach out to the regional HBAs for collaboration.]
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(from baseline energy consumption) of 22 percent by the end of 2025. This policy has spurred energy efficiency investments by electric IOUs.

Stakeholders are concerned that under new state leadership there may be legislative changes that negatively impact the energy efficiency standard in this law.

Other Ohio Building Codes

Other state codes promulgated by the BBS include: for commercial buildings, a building code, mechanical code, and plumbing code. Either certified building departments or the local health department administers the plumbing code.

Energy Codes for State-funded Facilities

In January of 2007, House Bill 251 was passed, which set energy reduction goals for state agencies. Additionally, Executive Order 2007-02S (now expired) required all state agencies, boards and commissions to conduct an energy audit for all owned and leased facilities by June 2007. Each entity was required to reduce statewide energy use in their facilities by 5% during the next year, and 15% during the next four fiscal years based on the results of the audit. However, as unfunded mandates, full implementation did not occur. Also in 2007, an inter-university council was created to develop energy efficiency guidelines for their respective Board of Trustees and a 15-year plan, but this council is no longer active.

However, the State Architect’s Office (SAO) of Energy Services within the Department of Administrative Service (DAS) currently administers two programs that are reducing energy use in state funded buildings: (1) Capital Funds program, which funds specific energy efficiency measures for state buildings; and (2) Performance Contracts program, which has simplified and accelerated the process for state agencies in Ohio to enter into contracts with private ESCOs through their Performance Contracts program. The Performance Contracts program offers oversight and consultation to state agencies – from the initial contact between the state entity and the ESCO, through the energy needs-analysis, design and implementation of improvements, maintenance and energy saving measurement and verification for up to 10 years. The program provides state agencies with technical support, customized advice, ready-made contracts and a list of approved ESCO contractors. As a result, the state is saving about $5.5 million annually in reduced energy costs in 22 state-owned buildings. Administrative costs are recovered by fees rolled into the overall project costs, and funded via bond sales initiated by the Ohio Air Quality Development Board – so no tax payer funding is needed to run the program.

On September 27, 2007, the Ohio School Facilities Commission (OSFC) passed Resolution #07-124, approving the incorporation of energy efficiency and sustainable design features into all future and some previously approved school projects. All K-12 public school projects approved by the OSFC are required to meet a minimum of LEED for Schools Silver certification, with strong encouragement to achieve the Gold level. OSFC covers the cost for LEED registration and certification fees and the additional costs necessary to meet the requirements.
Why Climate Change Initiatives Matter

Since building energy use accounts for roughly 40 percent of energy use in the nation—and in Ohio, the majority of that energy comes from non-renewable sources—energy codes are a vital tool for reducing energy use and, thus, greenhouse gas emissions, as well as saving money. Energy savings built into new construction will accrue over the life of the building. Considering that buildings typically last from 50-100 years, adopting energy codes not only impacts new building energy performance, but also the energy performance of existing buildings until 2060 and beyond. This makes energy codes an important long-term policy for mitigating climate change and supporting the Ohio economy.

Statewide Climate Change Initiatives

Ohio does not have a climate action plan. However, there have been recent efforts to consider climate change. Former EPA Director Chris Korleski formed an Ohio EPA climate change task force in order to monitor federal and state developments on climate change initiatives, and develop actions to address climate change. In 2007 Governor Strickland officially recognized the need to address the effects of climate change in his Energy Jobs and Progress Plan.

In addition, included in SB 221 is a requirement that the Public Utilities Commission of Ohio (PUCO) adopt rules establishing greenhouse-gas (GHG) reporting requirements.

Finally, Ohio University and The Ohio State University are collaborating on an inventory of GHG emissions, and the opportunities and risks of GHG policies to Ohio industries with a special appreciation of the impact to Ohio’s energy intensive industries that are vital to the state’s economy.

GAP #9: The state does not have one over-riding climate change or energy policy that could help support energy codes as one piece of a larger statewide effort.
**Recommendation:** Ohio should consider adopting a “Climate Change” or “Energy” Plan to:

- Raise awareness statewide of the importance of energy efficiency and the benefits it can bring to Ohio.
- Link energy codes as one policy that can support related policies (e.g., energy efficiency can help make the RPS goals easier to achieve; energy efficiency can help reduce emissions in EPA non-attainment areas; support of energy codes can help achieve EERS goals).

**Overview of Green and Above-Code Building Programs**

Building departments interviewed for this report reported that they see very few new homes or buildings that utilize green building practices and other above-code programs such as Building America, ENERGY STAR, LEED for Homes, or the NAHB’s green rating program. However, both the BBS and the Ohio Association of Home Builders report that ENERGY STAR activity in the state is strong, and indeed - only nine states have a greater market penetration of ENERGY STAR new homes than in Ohio.

There is a lack of a statewide collaboration between building department, builders, and state government in an effort to encourage builders to build quality new energy efficient homes. In fact, if a builder chooses to build beyond the energy code, the state government and local building departments are usually not aware. Across most of Ohio, individual efforts to build above and beyond the energy code occur in a “solo” environment – the state lacks a widespread “movement” that would help raise public awareness of the benefits of energy efficiency new buildings, and encourage new home buyers to demand; builders to build; and code officials to promote high-quality, energy-efficient homes and buildings.

**LEED**

The U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED) Green Building Rating System is a nationally accepted benchmark for the design, construction, and operation of high performance green buildings. LEED Ohio is the 12th most active state in the nation with 868 LEED registered projects. The city of Columbus is ranked the 30th most active city with 104 projects.

**ENERGY STAR for Homes**
While overall demand for new homes dropped from 2008-2009, the market penetration of ENERGY STAR® new homes grew from 21 percent in 2008 to 33 percent in 2009. The prevalence of ENERGY STAR homes shows that a significant portion of new homes in Ohio are already being built above-code, indicating that the cost and learning curve of transitioning to the 2009 IECC may be easier than in other states where ENERGY STAR is not as prevalent.

There are 31,346 ENERGY STAR labeled homes in Ohio. In 2010, 3,933 homes were labeled. There are 241 partners registered with ENERGY STAR in Ohio. There are 48 companies providing ENERGY STAR rating services in Ohio. There are 37 registered HERS certified rating companies.

Building America

Since 1994, the DOE’s Building America program has been raising the bar for energy efficiency and quality in new and existing homes. Working with national laboratories and the residential builders its goal is to improve the quality and performance of today’s homes while continually working towards net-zero energy homes. To qualify, homes must receive a score of 70 or less on the HERS index. The program’s house-as-a-system approach can reduce a home’s average energy consumption by as much as 40 percent with little or no impact on the cost of new construction. Building America approaches have been used in more than 42,000 homes across the country to date. These homes typically sell within weeks while other new homes sit on the market for months. There are active projects in Cleveland, Columbus, Dayton, Elyria, and Piketon but only 26 homes have been completed.

Through its Builders Challenge program, new homes that meet stringent qualifications can earn an EnergySmart Home Scale label. Builders Challenge is similar to ENERGY STAR for Homes in that both programs assist and reward builders who build homes more efficiently than standard practice. However, the energy threshold requirements for the Builders Challenge program are different than those of ENERGY STAR (see sidebar box).

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**The HERS Index Explained**

The HERS Index is a scoring system that provides a scale for measuring the energy efficiency of a new home compared to a reference home that was built to the 2004 IECC, which is assigned the score of 100 points. The lower a home’s HERS Index, the more energy efficient it is. For every 1 point decrease in the HERS Index it corresponds to a 1 percent reduction in energy consumption compared to the HERS reference home. For example, a home that scores 85 is 15 percent more efficient than the HERS reference home, and a home that scores zero is a home that is a net zero user of energy. Homes that meet the Builders Challenge qualifications score 70 or less on the scale (or are 30 percent more efficient than a typical new home). Homes that meet ENERGY STAR qualifications score 85 or less on the scale (or are 15 percent more efficient than a typical new home). Both programs intend to increase the stringency of their requirements in the coming months.

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iv ENERGY STAR for Homes is a national above-code building program started by the EPA. To qualify for the ENERGY STAR for Homes label, homes must receive a score of 85 or less on the HERS index.
GAP #10: The state lacks a widespread “movement” that would help raise public awareness of the benefits of energy efficiency new buildings, and encourage new home buyers to demand; builders to build; and code officials to promote high-quality, energy-efficient homes and buildings.

Recommendation: Social marketing research shows that people who see their neighbors and friends taking action [in a desired behavior] is a powerful force that often convinces them to also engage. This concept could be used with builders and code officials – if they see their colleagues being publicly recognized for their leadership efforts in the construction of highly efficient new buildings, they may be more interested in engaging themselves. In order to help increase demand for new, highly efficient homes and recognize builders and raise public awareness, the BBS and ODOD should:

A: For residential buildings, consider amending the state law to allow local jurisdictions to adopt a state-designed stretch code\(^v\) (a code higher than the state energy code) and encourage certified building departments to utilize third-party certification programs such as ENERGY STAR, LEED for homes, or Building America (EnergySmart).

B: Provide ready-made information on such programs to building departments, so that departments can help raise awareness of such programs with their local construction industry.

C: Engage contractors and architects and other LEED-certified or similar professionals in the promotion of energy efficiency, by providing them with ready-made marketing materials that describe the compelling and specific benefits of energy efficiency.

D: Raise public demand for energy efficiency in housing by offering courses on energy efficiency via partnerships with groups that reach more rural areas of the state such as the State Extension Service, the Mid-Ohio Regional Planning Commission and home builder associations. The State Extension Service may be an especially good candidate for partnership since they have a history and expertise in offering courses to the public, including energy efficiency courses.

\(^v\) For example, in the state of Massachusetts, stretch code provisions for new residential construction are specified as: “New residential buildings 3 stories or less will be required to meet an energy performance standard using the Home Energy Rating System\(^v\) (HERS). The HERS index scores a home on a scale where 0 is a zero-net-energy home, and 100 is a code compliant new home (currently based on the IECC 2006 code). The MA stretch code requires a HERS index of 65 or less for new homes of 3,000 square feet or above, and 70 or less for new homes below 3,000 square feet (this includes multi-family units in buildings of 3 stories or less). A HERS index of 65 means that the home is estimated to use 65 percent as much energy as the same home built to the 2006 energy code, or a 35 percent annual energy savings. For residential home renovations: Home additions and renovations have two options to meet the stretch code: (i) The same “performance” approach as new construction but requiring a HERS of 80 or less for significant changes to homes over 2,000 square feet, or 85 or less for homes below 2,000 square feet. (ii) A “prescriptive” approach, where specific efficiency measures are required rather than a HERS index number. This utilizes the Energy Star for Homes program prescriptive requirements, and insulation at least equal to IECC 2009”. The stretch code also applies a performance-based code to commercial buildings – for more information, see http://www.mass.gov/?pageID=eopsmodulechunk&L=3&L0=Home&L1=Public+Safety+Agencies&L2=Massachusetts+Department+of+Public+Safety&sid=Easeops&b=terminalcontent&f=dps_bbrs_build_code_changes_public_hearing &csid=Easeops
E: Give builders who are going the extra mile a competitive edge on builders who are not paying attention to the detail of energy efficiency by recognize every new building or home built to higher standards and seek publicity (e.g., give awards, distribute press releases) for builders who meet the Builders Challenge qualifications in order to raise public awareness and drive demand for energy efficiency and raise the bar in your state for advanced homes.

G: Launch a statewide campaign including public relations efforts and earned media radio and TV interviews, news releases and articles all with the intent to raise awareness of the benefits of energy efficiency.

Local Policy

As all political jurisdictions statewide are mandated to comply with the state code, as promulgated by the BBS, cities are not eligible to adopt their own codes. However, any building owner may voluntarily build a more efficient building than is required by code and thus cities may choose to build their own public buildings at a higher level.

Energy Codes for Municipal-funded Facilities

By requiring stricter standards for public buildings, jurisdictions demonstrate their commitment to energy-efficient construction, create a more conducive environment for stricter energy code adoption for private construction, and give themselves leverage in negotiating with stakeholder groups that are hesitant to upgrade the baseline energy code. They also save taxpayer dollars with lower energy bills, further reduce their environmental impact, and improve the air quality and comfort of public buildings. While some local governments are interested in promoting “green” or “above-code” requirements, state law does not allow municipal governments to set more progressive energy code policies for their communities. However, local governments can choose to set higher standards for their own buildings.

Local Climate Change Initiatives

The building departments interviewed for this report were not aware of their local communities having a climate change initiative in place. However, 31 cities in Ohio have signed onto the U.S. Conference of Mayors’ Climate Protection Agreement and seven cities are members of ICLEI – Local Governments for Sustainability – Akron, Alliance, Athens, Cleveland, Oberlin, Oxford, and Youngstown.

These communities would be a good starting point if the BBS and/or ODOD decide to encourage a higher standard of energy efficiency in buildings.

\[vi\] ICLEI is a worldwide association of local governments committed to sustainable development.
Adoption Summary

Current Best Practices

- The Energy Efficiency Resource Standard created by Senate Bill 221 has spurred energy efficiency investments by electric IOUs, creating an important funding mechanism for energy efficiency in the state.

- The State Architect’s Office at the Ohio Department of Administrative Services is successfully removing barriers for state agencies by providing an excellent technical assistance to state agencies, and is already saving the state more than $5.5 million in reduced energy bills annually, while educating and familiarizing the construction industry on how to utilize energy efficiency technologies and practices.

- Ohio is leading by example by adopting higher energy standards for K–12 state-funded schools. Leading by example in new or renovated buildings familiarizes and trains the construction industry and code enforcement officials and stimulates local economies by increasing the demand for energy efficiency products from product suppliers, manufacturers and service providers. It also demonstrates responsible government stewardship of tax dollars by reducing energy bills for the lifetime of a building.

Gaps and Recommendations

The following summarizes the recommendations made in this section:

**GAP #1: The ODOD has begun to collaborate with the Board of Building Standards (BBS) – the agency responsible for code adoption, however, the ODOD has not made energy codes a top priority for funding.**

**Recommendation:** The ODOD and the BBS should coordinate regularly to collaborate on approaches to train, support, and encourage the building industry to build more efficient housing and buildings.

**GAP #2: State officials lack consistent funding to participate at a national level in the development of model codes and standards.**

**Recommendation:** Ohio should engage in the development of the national model codes and standards and leverage the shared expertise and resources available in national code forums, via:

- Participation in IECC/IRC/IBC code development, sharing knowledge and experiences through ICC online forums.

- Participation in ASHRAE Standard 90.1 development, sharing knowledge and experiences through the ASHRAE membership.

- Sending at least one representative to the DOE codes conference.

- Utilizing www.Bcap-ocean.org website resources.
- Participation in OCEAN communities online.

**GAP #3:** The composition of the RCAC is primarily the building industry - building scientists or those with related expertise are not represented on the committee.

**Recommendation:** Consideration should be given to appointing stakeholders with other perspectives to the RCAC, such as those representing the interest of the environmental and/or climate issues; a building scientist; university interests, and consumer protection interests such as the Ohio Consumer’s Council.

**Gap #4:** The state does not have an automatic energy code review and update process on a three-year cycle.

**Recommendation:** The state should adopt an automatic review and update process for future iterations of the model energy code to lock in future energy savings and remove speculation after the release of each new model energy code.

**GAP #5:** There is a difference of opinion between the OHBA and the state regulatory code agency regarding the true costs of implementing more stringent energy codes.

**Recommendation:** BBS and the OHBA should collaborate to launch a voluntary effort to train and support the construction agency, utilizing a “builder-to-builder” approach via resources available from Building America. BBS should work with the OHBA to clearly design such a program so that it is designed with their buy-in.

**Gap #6:** In order to address the situation with the RCAC and as more stringent codes are considered, many new legislators in the state need to be educated on the benefits of energy codes and the role they play in boosting the state’s economy, increasing new home sales and saving home owners money.

**Recommendation:** Stakeholders should conduct meetings with legislators in Ohio to bring them up to speed on the situation with the RCAC and the benefits of energy codes. A special “legislative breakfast” or other organized meeting could deliver a concise presentation to legislators.

**GAP #7:** Ohio has not adopted a modern energy code for state funded buildings, nor one that “pushes the market” by leading by example.

**Recommendation:** The state should adopt energy codes that are more stringent than state energy codes. By requiring a more stringent energy code for state-funded buildings, the state demonstrates fiscal responsibility with tax payer dollars. In addition, more stringent requirements familiarize and train the construction industry and code enforcement officials, and increase demand for “greener” products from product suppliers, manufacturers and service providers. More efficient public

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vii If the OHBA is not willing to collaborate, reach out to the regional HBAs for collaboration.
buildings also help governments hedge against uncertain future energy costs and availability, and reduce a government’s susceptibility to fuel price volatility while creating jobs and stimulating the local economy.

**GAP #8: The Performance Contracts program administered by the SAO to state agencies is an exemplary program that is saving Ohio significant dollars.** There is no equivalent program for local governments.

**Recommendation:** Consider expanding the SAO Performance Contracts program (or creating a new one modeled after the SAO program) to include services to local governments in addition to state agencies.

**GAP #9: The state does not have one over-riding climate change or energy policy that could help support energy codes as one piece of a larger statewide effort.**

**Recommendation:** Ohio should consider adopting a “Climate Change” or “Energy” Plan to:

- Raise awareness statewide of the importance of energy efficiency and the benefits it can bring to Ohio.

- Link energy codes as one policy that can support related policies (e.g., energy efficiency can help make the RPS goals easier to achieve; energy efficiency can help reduce emissions in EPA non-attainment areas; support of energy codes can help achieve EERS goals).

**GAP #10: The state lacks a widespread “movement” that would help raise public awareness of the benefits of energy efficiency new buildings, and encourage new home buyers to demand; builders to build; and code officials to promote high-quality, energy-efficient homes and buildings.**

**Recommendation:** Social marketing research shows that people who see their neighbors and friends taking action [in a desired behavior] is a powerful force that often convinces them to also engage. This concept could be used with builders and code officials – if they see their colleagues being publicly recognized for their leadership efforts in the construction of highly efficient new buildings, they may be more interested in engaging themselves. In order to help increase demand for new, highly efficient homes and recognize builders and raise public awareness, the BBS and ODOD should:
A: For residential buildings, consider amending the state law to allow local jurisdictions to adopt a state-designed stretch code [viii] (a code higher than the state energy code) and encourage certified building departments to utilize third-party certification programs such as ENERGY STAR, LEED for homes, or Building America (EnergySmart).

B: Provide ready-made information on such programs to building departments, so that departments can help raise awareness of such programs with their local construction industry.

C: Engage contractors and architects and other LEED-certified or similar professionals in the promotion of energy efficiency, by providing them with ready-made marketing materials that describe the compelling and specific benefits of energy efficiency.

D: Raise public demand for energy efficiency in housing by offering courses on energy efficiency via partnerships with groups that reach more rural areas of the state such as the State Extension Service, the Mid-Ohio Regional Planning Commission and home builder associations. The State Extension Service may be an especially good candidate for partnership since they have a history and expertise in offering courses to the public, including energy efficiency courses.

E: Give builders who are going the extra mile a competitive edge on builders who are not paying attention to the detail of energy efficiency by recognizing every new building or home built to higher standards and seek publicity (e.g., give awards, distribute press releases) for builders who meet the Builders Challenge qualifications in order to raise public awareness and drive demand for energy efficiency and raise the bar in your state for advanced homes.

G: Launch a statewide campaign including public relations efforts and earned media radio and TV interviews, news releases and articles all with the intent to raise awareness of the benefits of energy efficiency.

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[viii] For example, in the state of Massachusetts, stretch code provisions for new residential construction are specified as: "New residential buildings 3 stories or less will be required to meet an energy performance standard using the Home Energy Rating System (HERS). The HERS index scores a home on a scale where 0 is a zero-net-energy home, and 100 is a code compliant new home (currently based on the IECC 2006 code). The MA stretch code requires a HERS index of 65 or less for new homes of 3,000 square feet or above, and 70 or less for new homes below 3,000 square feet (this includes multi-family units in buildings of 3 stories or less). A HERS index of 65 means that the home is estimated to use 65 percent as much energy as the same home built to the 2006 energy code, or a 35 percent annual energy savings. For residential home renovations: Home additions and renovations have two options to meet the stretch code: (i) The same "performance" approach as new construction but requiring a HERS of 80 or less for significant changes to homes over 2,000 square feet, or 85 or less for homes below 2,000 square feet. (ii) A "prescriptive" approach, where specific efficiency measures are required rather than a HERS index number. This utilizes the Energy Star for Homes program prescriptive requirements, and insulation at least equal to IECC 2009”. The stretch code also applies a performance-based code to commercial buildings – for more information, see [http://www.mass.gov/?pageID=eopsmodulechunk&L=3&L0=Home&L1=Public+Safety+Agencies&L2=Massachusetts+Department+of+Public+Safety+&sid=Eeops&b=terminalcontent&f=dps_bbrs_build_code_changes_public_hearing&csid=Eeops](http://www.mass.gov/?pageID=eopsmodulechunk&L=3&L0=Home&L1=Public+Safety+Agencies&L2=Massachusetts+Department+of+Public+Safety+&sid=Eeops&b=terminalcontent&f=dps_bbrs_build_code_changes_public_hearing&csid=Eeops).
Implementation

While energy code adoption is the necessary first step in the energy codes process, it does not guarantee compliance. To achieve the benefits of energy codes, states and cities must carry out implementation, a term used to describe all of the activities needed to prepare state energy offices, local building departments, the building industry, and other stakeholders for compliance with the energy code. It includes outreach to stakeholder groups, on-site, classroom, and web-based training, establishing and utilizing enforcement infrastructure, tools, and systems, and other educational and organizational efforts.

Overview of State and Local Implementation Policies

There are great differences between the implementation of commercial and residential energy codes in Ohio.

The commercial code: (1) is simple -- there are two codes adopted; (2) has been in place for several years and so the building industry and code officials have become accustomed to it; and (3) is enforced statewide. In areas without a certified building department, the Department of Building Code Compliance (BCC) enforces the commercial codes. Code officials report that builders are complying with the code.

The residential code: (1) offers numerous ways to comply, and not all compliance paths utilize the same climate zone maps; (2) has only been in place since 2006; (3) is not enforced statewide. In areas without a certified building department, although energy codes are mandated, there is no residential enforcement mechanism. Of the 88 counties in Ohio, only 22 enforce the residential energy code.

ix Ohio has a dual enforcement system: (1) Local building department are certified by the BBS to enforce building codes locally. Certified building departments enforce the energy code within their jurisdiction. In areas not covered by a city certified building department, a certified county building department has jurisdiction; (2) in areas without a local building department, and for state-owned buildings, the state building department enforces building codes for commercial buildings via home-based inspectors located across Ohio. See “Overview of Enforcement Structure” in this report for more details.
The graph below shows the multiple compliance methods and climate zones for the residential code:

The RCO Section 1104 compliance path refers to a different climate zone map, which moved 27 counties to a warmer climate zone, rendering the energy code less stringent in those counties.

The IECC 2006 assumes the following climate zones for Ohio.

Gap #11: The numerous compliance paths and different climate zone maps make the residential code complex and confusing. One prescriptive option for demonstrating energy code compliance is less stringent than the 2006 IECC, and utilizes a warmer climate zone for a larger portion of the state than the IECC code.

Recommendation: The state should simplify the residential code and utilize only one climate zone map between compliance options and eliminate the weakened prescriptive path.

Outreach

Energy codes have come a long way, but many are yet unaware of their benefits, including most consumers and some policymakers. Many code officials and building and design professionals are also uneducated about energy code benefits and requirements. Outreach involves all of the activities states and local jurisdictions can undertake to raise awareness of the need for energy codes, promote their
adoption and implementation, and identify opportunities for training, technical assistance, and other support. Given the diversity of the energy codes community across the country, execution of strategic outreach campaigns can improve understanding of code changes, create buy-in, and can lead to greater levels of compliance.

State's Role in Promoting Codes

Whenever there are changes to the energy code, the BBS provides training and requires certified building department personnel to attend. In addition, technical staff at the BBS is available to support certified building departments. Several years ago the BBS and ODOD joined the Code College network online video training site. The BBS is planning to develop similar online training for contractors soon.

However, the construction industry is not a targeted audience of the BBS and does not typically receive technical support from the board. The BBS has reached out to the HBA with an offer of training for members, but the HBA declined. The HBA offers its members other types of training. Access to accurate and free information is not readily available to contractors. As one Inspection Supervisor said “they [code officials] don’t have any place to send contractors to get the information. They are not allowed to be designers and we can’t give them the code book online. They have to buy the code book... it’s copyrighted material not available to the public. It gets them upset because they [builders] try to do it right, but can’t find answers... but if we do it for them, we’re liable. The code is not available online for free or in the library so builders have to buy it, and it’s not cheap.”

Others said that builders don’t learn well in the classroom. As one said “... builders don’t read. They learn on the job – when they’re out building houses.”

GAP #12: Builders and contractors in Ohio do not have a state “go-to” resource to obtain technical assistance, training, or code interpretation assistance and are not well-educated on modern technologies and approaches to building energy efficient homes. It’s likely that some builders and code officials are not aware of the opportunity to access a free version of the code.

Recommendation A: The state should put in place a method to provide energy code assistance for contractors, architects, engineers and other construction personnel in order to (1) Provide one voice on codes (rather than risking misinformation which may come from various other sources); (2) Foster a more positive relationship with the construction industry. Conduct aggressive outreach statewide to let builders know about this new resource. In addition, make code officials aware of the availability of the free online version of the IECC.

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x The course was originally developed for the state of California with BCAP assistance.

xi An online version is available at this website: http://publicecodes.citation.com/st/oh/st/OH-P-2005-000004.htm
**Recommendation B:** Overcome the knowledge barrier to energy code compliance by offering education to your building industry trades professionals. \(^{xi}\) For example, by attending a Building America sponsored training course, builders will learn to implement approaches to construct the best homes possible. Partner with an existing non-governmental organization, (e.g., the OHBA or the Mid-Ohio Regional Planning Commission) to help gain political clout for such a course. Recommended actions include:

- Host a Building America course locally. The cost is $6,500 per one-day course, (this includes **all** costs, including marketing to builders in your state, and continuing education credits for builders). There are two course options available: “**Houses that Work**” for new homes and “**Remodeling for Energy Efficiency**” for existing homes. The registration fee for builders is about $125 per person. To schedule, call Nancy Bakeman at The Energy and Environmental Building Alliance at (952) 881-1098 or [nancy@eeba.org](mailto:nancy@eeba.org).

- Encourage builders to attend a Building America sponsored training (see [http://eeba.org/housesthatwork/index.html](http://eeba.org/housesthatwork/index.html) for locations). Attendees receive CEU credits for various programs, including AIA, AIBD, BPI, RESNET, NAHB, and USGBC/LEED, plus additional benefits offered through EEBA.

- Offer a 50% subsidy to builders, architects or other building professionals to attend a training outside your state;

- Reimburse permit fees for builders who achieve the Builders Challenge qualifications.

- Consider legislation that would allow the Builders Challenge qualifications or ENERGY STAR certification to be accepted by building departments in place of the traditional energy code compliance path. (Require that both the builder and HERS rater be registered with Building America or ENERGY STAR program to participate.)

- Present awards to builders who meet the Builders Challenge qualifications in order to raise public awareness and drive demand for energy efficiency and raise the bar in your state for advanced homes.

**Recommendation C:** Enhance the BBS website so that it is more consumer-friendly (simplified) and easy to use. Provide a calendar of educational events and market it to affected parties.

**Recommendation D:** Require that code officials (in certified building departments that conduct residential inspections) attend a Building America training course to enhance their understanding of building science and the importance of proper installations of insulation, air sealing, and other

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\(^{xi}\) Educational courses must be marketed to builders in such a way that they see a benefit to taking time off to attend, and for paying their subcontractors a day’s salary to attend. Therefore, they must be marketed to clearly communicate the marketing benefits and financial gain to the builder for building energy efficient homes.
energy features. Provide an incentive for full participation by all code officials statewide in the form of (1) making the course free to building officials; (2) Providing higher than normal CE credits; (3) providing free breakfast and lunch.

**Local Government’s Role in Promoting Codes**

Most local building departments do not engage in outright promotion of energy codes, but they do work with contractors to ensure that they are familiar with the energy code—most frequently when inspectors find lapses.

The Supervisor for Plans Examination in Cincinnati reported that design professionals, builders and subs “lack education... to design professionals – energy is not a big issue.” And that additional education is needed. Thanks to EECBG funding this building department is developing training courses.

**GAP #13: Ready-made marketing and compliance materials are not available to local jurisdictions.**

**Recommendation A:** Create and distribute materials tailored for code officials, design professionals, and contractors on the energy code, such as compliance checklists for inspectors; or a form that clearly lists the requirements of the code and requires design professionals to check each line item and sign off that their plans will include such energy features. The form should be required to accompany the permit application. See Appendix A for PNNL resource list.

**Recommendation B:** Offer ready-made marketing materials that support building departments as they educate designers and consumers about the importance and benefits of energy codes. Informational outreach materials targeted to different audiences such as consumers, designers, and policymakers would assist code enforcement personnel who are in the position of defending and educating codes. Information should emphasize the potential money saved by lower energy bills in order to gain support for private investments in energy efficiency and boost market demand for energy efficient products and services.

**Stakeholders’ Role in Promoting Codes**

In addition to the BBS, the main stakeholders include:

- **The Ohio Department of Development (ODOD),** which offers some targeted training and education programs across the state, although not directly related to energy codes.

- **The Ohio Home Builders Association,** which strongly opposes the adoption of more stringent energy codes.

- **The “Better Buildings Coalition”.** The group includes the Sierra Club, the American Chemistry Council, the Ohio Office of Consumer’s Council (OCC), the Ohio Environmental Council (OEC), the Environmental Law and Policy Center, the ICC, Midwest Energy Efficiency Alliance, OH Partners for Affordable Energy, the League of Women’s Voters, and others.

- **Investor Owned Utilities (IOUs)** subject to the Energy Efficiency Resource Standard (EERS). If given energy efficiency credit toward their mandated goals, IOUs may be willing to provide
utility-funded energy-code support, for example, in the form of training in above-code voluntary programs for builders.

- **The Mid-Ohio Regional Planning Commission** is interested in promoting energy codes as one aspect of promoting more progressive and “livable” cities. As such, they are seeking partners in education. As a non-biased, non-HBA related entity, this organization might be a good partner for promoting energy codes in a fresh, positive way in the state.

- **The Ohio State Extension Service** is likewise another organization that could be a good partner in promoting energy codes. They have a long history of bringing education from the university level to the masses, and are particularly interested in promoting energy efficiency to the general public.

### Enforcement Community

The enforcement community provides the teeth behind adopted codes, as it is their responsibility to ensure that design and building professionals comply with the provisions of the energy code. While enforcement is most commonly a local issue, states play a crucial role in providing municipalities with the resources and support they need to establish effective enforcement infrastructures and practices. As codes are a moving target, it is also incumbent on states and cities to provide the enforcement community with access to sufficient energy code training.

### Overview of Enforcement Infrastructure

Building departments usually incorporate energy code enforcement into their other inspections, rather than set up a specific energy inspection. In larger cities and towns, efficiency experts interviewed believe that energy code enforcement is generally stronger than in smaller rural communities; however no statewide study has confirmed this conviction with data.

Ohio has a dual enforcement system:

1. Some local building departments are certified by the BBS to enforce building codes locally, and those certified building departments enforce the energy code within their jurisdiction. \(\text{xiii}\)
2. In areas without a certified building department, and for state-owned buildings, the Department of Building Code Compliance (BCC) enforces building codes for commercial buildings via state inspectors (who work from their homes) across Ohio. \(\text{xiv}\)

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\(\text{xiii}\) Not all building departments enforce both the residential and commercial building codes: Some cities and counties are certified to enforce both residential and commercial construction; some only commercial, and some only residential. There are 268 local building departments certified to fully enforce all commercial codes; and 268 certified to fully enforce all residential codes. (As some departments enforce both, there’s overlap in those numbers.) In addition, other building departments are not fully certified – that is, they enforce the codes that they are certified to enforce – either themselves or via subcontractors. There are 385 building codes certified in this way for commercial codes, and 209 for residential.
The state does not fund certified building departments. Local certified building departments determine their own fees, which includes a small amount (3 percent for commercial; 1 percent for residential) that goes to the BBS to cover the cost of administering the BBS. Some building departments are able to cover their costs with fees, others are not and have had to reduce staff. Code enforcement personnel interviewed for this report said that they understand energy code requirements and are enforcing the code. They enforce the energy code to maintain their status as a certified building department.

Builders typically use REScheck or COMcheck to demonstrate compliance. The typical process is as follows: building plans include details on insulation levels and other energy features, and code inspectors take a copy of the plans with them to ensure that what’s installed matches the approved plans.

Code officials and builders interviewed for this report gave mixed messages on the level of energy code compliance. Builders and several code officials reported that builders are complying with the energy code. As one code official said: “We do not issue a stop-work order for non-compliance because it doesn’t happen -- If insulation is missing, they simply require a correction and the builder corrects it.”

For the most part, building departments reported that code compliance for commercial buildings is satisfactory, and that builders understand and abide by the code, likely because they’ve had more experience with the commercial code, and because there is an enforcement mechanism statewide. Where there is not a certified building department to enforce the code, a state code inspector visits the site (however, they typically do not do special energy inspections, but rather inspect for insulation or HVAC equipment as part of other inspections (mechanical or structural, for example).

For residential buildings, code officials told a different story, which suggested that code officials may not completely understand or support a more stringent energy code. For example, one mechanical inspector in Columbus said “Regulatory bodies need to understand the impact to builders. Some things may look more energy efficient - such as HEPA furnace filters - but can actually cause trouble.”

Another code official in Wood County, Ohio said “I have a report that shows it [IECC 2009] will raise the cost of construction 15%. Can you recoup this in savings as a new home owner? I’m not sure if anyone has run the numbers. In South Carolina and other areas they’ve modified the code to make it less restrictive and I think Ohio will do that too. Home builders are livid about a new code impacting construction and I can’t say I blame them. In Wood County a few years ago we were building 700 new homes a few years ago and now it’s just 100 some.” He added that in Northwest Ohio the code officials have a good working relationship with builders and that he will soon give a talk at a builder’s meeting, adding “We want to keep good working relationship with home builders... I have a job because the builders are out there building things.” He also added that code enforcement “depends on political

xiv The state does not conduct special energy inspections for commercial buildings – rather the plans are reviewed for compliance by state Plans Examiners and energy compliance is inspected for by the relevant Inspectors (HVAC, structural).
situation locally... sometimes it becomes the mayor’s job to tell people how they want things done. If a code official has a high ethical standard that doesn’t match... [local government expectations] they’re asked to depart.” And he added that “these federal guidelines are getting out of hand – they’re too expensive. I can’t afford a new home. Enough is enough.”

One Plans Examiner Supervisor said that commercial code enforcement is “no problem”, but that “Residential builders try to cut corners – builders don’t know the latest in codes and standards. We need an analysis and education to teach them the methods and show an economic comparison, including ASHRAE or IECC or alternative methods... they [builders] are accustomed to their old ways and don’t want to change. They don’t know the alternatives.”

Even before the housing bubble burst nationwide, Ohio had begun to experience a decline in residential building permits and a decrease in commercial development. In 2009, local jurisdictions issued far fewer permits than in 2004 and 2005. This decline greatly reduced inspection departments’ workloads and budgets, and many have been forced to reduce staff while giving remaining staff additional workload and responsibilities. When understaffed and overworked, energy code enforcement is often the first area local inspection departments deemphasize or disregard, while life and safety codes are a priority.

Figure 7 – Ohio Residential Construction 2008-2009

<table>
<thead>
<tr>
<th>City</th>
<th>Total Percentage Change in Residential Building Permits 2008-2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columbus</td>
<td>10%</td>
</tr>
<tr>
<td>Cleveland</td>
<td>-22%</td>
</tr>
<tr>
<td>Cincinnati</td>
<td>-18%</td>
</tr>
<tr>
<td>Toledo</td>
<td>-20%</td>
</tr>
<tr>
<td>Akron</td>
<td>-26%</td>
</tr>
<tr>
<td>Dayton</td>
<td>0%</td>
</tr>
<tr>
<td>Parma</td>
<td>-69%</td>
</tr>
<tr>
<td>Canton</td>
<td>-73%</td>
</tr>
<tr>
<td>Lorain</td>
<td>82%</td>
</tr>
<tr>
<td>Springfield</td>
<td>-26%</td>
</tr>
<tr>
<td>Hamilton</td>
<td>-24%</td>
</tr>
<tr>
<td>Elyria</td>
<td>-18%</td>
</tr>
<tr>
<td>Kettering</td>
<td>-48%</td>
</tr>
<tr>
<td>Mentor</td>
<td>-24%</td>
</tr>
<tr>
<td>Entire State</td>
<td>-45%</td>
</tr>
</tbody>
</table>
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**Recommendation:** The state should put in place specific requirements for enforcing the residential code, such as an energy-code checklist given to the permit applicant at the time of application, a checklist of energy features that should be visually inspected by code officials, and an inspection schedule for energy efficiency items.

GAP #15: Where there is not a certified local building department, residential code enforcement is absent. Approximately 80% of Ohio’s population is in areas with residential code enforcement.\textsuperscript{34}

**RECOMMENDATION:** Although it would take legislative action, the Department of Commerce should consider expanding plan review and enforcement services to include residential buildings.

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**Recommendation:** State building inspectors should attend a special training to become educated in the importance of energy code enforcement. The state should demonstrate that energy features are given the same priority as health and safety inspections, and ensure that special energy inspections occur to ensure that:

- Energy features (e.g. air sealing or insulation) are properly installed. For example, insulation loses R-value when it is compacted– in studies conducted in other states this is a common problem.

- Energy features are not covered up prior to inspection. For example, insulation R-values are rated with the assumption that every wall cavity is properly air sealed. Most builders are likely not air sealing wall cavities prior to installing insulation.

GAP #17: There is a lack of political support at the local government level to “champion” energy codes. This is an extremely important aspect for success. BCAP has found that areas that have a local champion (whether within a building department, or a Mayor, or other political figure) are much more successful in implementing the energy code.

**Recommendation A:** Give public acknowledgement to those local governments that are taking leadership roles in adopting more stringent codes. The Governor should reward and publicize existing champions to encourage others to do their part. Work with the Mayors Associations, the Mid-Ohio Regional Planning Commission, the Municipal League and/or other similar groups to raise the awareness of local government leaders on what other municipalities within Ohio are doing take

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a leadership role in energy efficiency. Key messages should include that energy codes and related policies allow local governments to demonstrate fiscal responsibility for taxpayer dollars, stimulate jobs, and save people (and governments) money through lower bills. The local governments that received federal funding should be contacted to determine what efforts they may have made to increase energy code or energy awareness in their communities. Awards, news releases and other publicity could be given to those that have recently completed an energy efficient upgrade to an existing building; completed a LEED certified new building; a zero energy home; or related efforts.

**Recommendation B:** Build support at the local level for improving construction practices by encouraging building departments to:

- Expedite the permitting process for builders who build to Builders Challenge or ENERGY STAR (or equivalent).
- Accept the Builders Challenge qualifications or ENERGY STAR certification in place of the traditional energy code compliance path. (Require that both the builder and HERS rater be registered with Building America or ENERGY STAR program to participate).
- Encourage local building departments to reduce permit fees for buildings that are LEED (or equivalent) certified, ENERGY STAR or Building America qualified. The state could reimburse local building departments to offset this cost.
- If utilities (subject to EEPS goals) were able to claim credit toward their EEPS goals\textsuperscript{xvi}, their portion of the EEPS funding could be used for this purpose. They make look upon this favorably, as it is an “incentive” and “voluntary” program rather than an enforcement program, and they could gain positive publicity for their individual achievements -- building-by-building (for each LEED certified building), or community-by-community (for every ENERGY STAR or equivalent home /development).

**Recommendation C:** Engage “Energy Code Ambassadors” whereby key regional building code officials or builders would be hired to advocate for energy codes regionally and mentor and encourage local building departments as they transition to a new, more stringent energy code.

**Certification and/or Licensing, Training and CEUs**

Certified building departments must have at least one each of these certified staff: electrical safety inspector, building official, plans examiner, building inspector. These staff must obtain 30 hours of CE credit every three years plus any mandatory classes (such as when a new code is adopted). Recertification is required every three years via proof of CE credits and a $30 renewal fee.

\textsuperscript{xvi} The actual amount of energy efficiency credit earned toward EEPS goals could be determined via the actual energy rating or other documentation provided for LEED certification or ENERGY STAR compliance.
Newly certified individuals certified to enforce commercial codes must have successfully completed the Ohio Building Code Academy offered by BBS. The BBS provides building departments with a list on timings for required inspections in commercial buildings in order to assure that code inspectors are able to see the energy features before they’re covered up.

The Supervisor for Plans Examinations in Cincinnati said “Inspectors are required to have a certain amount of education, but with reduced funding it’s difficult [to afford to train inspectors]. …if there was a way to educate or provide ready-made education he would greatly appreciate it so it [the cost] doesn’t come back on them.” He added that even a class offered at a reduced fee would be helpful.

**GAP #18: Building departments find CE training to be a hardship.**

**Recommendation:** The BBS or ODOD could offer subsidized training or partner with others to offer prioritized training seminars at reduced costs. For example, see the Recommendation B at gap # 12 for a class that could be very helpful to elevate building science concepts for code officials.

**Third Party Infrastructure**

Where a building is being built to a higher level than required by code, for example – LEED or ENERGY STAR, a third-party professional certifies that the building complies to specific requirements. Building departments interviewed for this report were typically either unaware of such buildings being built, or reported that they were not involved in this process. They asserted that they see the plans, and conduct inspections to assure that a building meets the plans. As one building official in Cleveland said “**You can build to 2009 IECC and if that’s documented, then it would be inspected to that.**” He explained that inspectors conduct visual inspections for whatever is documented according to the plans – as he said, “You can have a new home that wants to be rated LEED GOLD. You can, people do, and we’ll review and inspect according to whatever’s in the plans.”

**Design/Construction Community**

The design and construction community—made up of designers, architects, engineers, developers, builders, and subcontractors—are in charge of conceiving and constructing the built environment. It is ultimately their responsibility to comply with the requirements of the adopted energy codes. However, state and local agencies, energy code advocates, and other stakeholder groups share in this responsibility. They have the opportunity to provide the training, tools, educational materials, and support to understand and be able to comply with the code, including how to correctly install materials and use testing equipment. They can also work with the design and construction community to establish a workable compliance process that is accountable, yet flexible, and accommodates local practices and circumstances.

**Overview of Design/Construction Community Infrastructure**

According to our research, most design and construction professionals respond to the stringency placed on codes by the local inspection departments. In areas where code officials conduct a special insulation and energy inspection (such as Cleveland), contractors and designers seek out training and work with
plans examiners and building inspectors to follow the letter and intent of energy code provisions. In jurisdictions that do not place as high of a priority on energy codes, designers submit plans that comply with the energy code, and contractors comply with the code only to the extent that inspectors check for.

As a Plans Examiner in Cincinnati said, “Commercial building compliance is not an issue, but residential builders try to cut corners – builders don’t know the latest in codes and standards. We need an analysis and education to teach them the methods and show an economic comparison, including ASHRAE or IECC or alternative methods to educate the home builders about what’s out there. They are accustomed to their old ways and don’t want to change. They don’t know the alternatives.”

According to Robert Martin, Inspection Supervisor in Montgomery County, “we don’t have any place to send contractors to GET the information. The state does not allowed us [code officials] to BE designers and we can’t give them the code book online. They have to BUY the code book and they might be one-time builds but it’s copyrighted material not available to the public. It gets them upset because they try to do it right, but can’t find answers. But if we do it for them, we’re liable.”

Energy code officials interviewed for this report say that the energy code is being complied with, and code officials have a mostly positive relationship with their local building community. As one code official said “Throughout Ohio our bread and butter is the home builders... I have a job because the builders are out there building things.” He added that training for builders on how to build more efficient homes would be helpful, since they currently only learn how to implement codes from the code officials themselves. Since building departments must be certified by the BBS to carry out the mandates given to them by the BBS, they are conscientious of maintaining their certification and abide by the rules. When asked if they feel pressured by builders, architects, or customers, their response is typically “No. We enforce the codes as required by the BBS, and builders understand that.”

As another code official said “In the 6 years I’ve been there, there’s been only one issue”, and he’d “heard of un-insulated attics prior to his tenure there.”

The National Architectural Accrediting Board (NAAB) is the only agency authorized to accredit U.S. professional architecture degree programs, and most state registration boards in the US require those who apply for licensure to have graduated from a NAAB-accredited program. Thus, the NAAB is the agency determining what constitutes an appropriate education for an architect. According to a representative at the Ohio Architects Board, “there is no requirement for energy codes in the education that architects receive.”

GAP #19: Architects, although ideally positioned to include energy in the design plans of a building, are not well-educated in energy codes and how to include energy efficiency in the design of buildings.

Recommendation A: Forge strategic alliances with community colleges especially any that have recently received grants for “green jobs” training to coordinate and encourage (and perhaps provide
additional funding for) the inclusion of energy code training (and/or RESNET training\(^{xvii}\)) for students who may become code officials or building professionals upon graduation. Structure the collaboration to assure that the community college continues to teach the energy code even when the funding is exhausted so that the next generation of construction trades professionals understand and embrace the importance of including energy efficiency in the design and construction of buildings in Ohio.

**Recommendation B:** Work with AIA to gain their support to promote continuing education courses on energy codes in the short-term. In the longer term, build a relationship with AIA and the NAAB to get energy code education added as a core requirement to becoming a licensed Architect.

**Recommendation C:** Add the BCAP energy code calculator on the state’s website to help educate visitors: [http://bcap-ocean.org/resource/energy-code-calculator](http://bcap-ocean.org/resource/energy-code-calculator)

Overall, however, authorities on both sides of the issue cite a strong causation between strict, consistent enforcement practices and improved compliance, as well as a willingness among most building professionals to work with code officials on energy code issues as needed.

As noted earlier, many builders have either gone out of business or changed careers as a result of the economic downturn. The Ohio Home Builders Association has lost about 4,000 members in the last two years and has about 5,000 members remaining. While demand for new homes has decreased, the market penetration for ENERGY STAR homes increased from 21 percent in 2008 to 33 percent in 2009. Perhaps many of the residential builders who have survived and begun to stabilize have done so by becoming ENERGY STAR for Homes partners and prioritizing funds to train their employees on building to this standard. This sets them apart in the marketplace.

Design firms have found similar success with LEED, and for many large commercial builders, it has become the standard. Although residential and commercial builders are beholden to the demands of their clients, they can take the initiative to build to higher standards and influence their clients’ priorities.

**Certification, Licensing, Training, and CE credits**

**The Ohio Construction Industry Licensing Board (OCILB)** licenses commercial contractors in five trades: Electrical, HVAC, Hydronics, Plumbing, and Refrigeration. Any project that requires a building permit in Ohio requires a licensed professional. About 20,000 individuals are licensed in these trades. Annual license fees are $60 and licensed professionals must have completed 10 hours of CE and have proof of insurance.

**Ohio’s State Board of Registration for Professional Engineers and Surveyors** licenses such professionals in the state. Professional engineers and surveyors must obtain 15 professional development hours and renew their license annually.

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\(^{xvii}\)RESNET certified home energy raters are able to qualify homes for the Energy Star program.
The Ohio Architects Board and the Ohio Board of Examiners of Landscape Architects regulate both architecture and landscape architecture (although there are two boards, they share one budget and one staff). There are about 6,400 licensed architects in Ohio. Some commercial construction requires an architect’s seal, showing that plans were prepared under the architect’s authority and that they comply with building codes. New residential construction does not require an architect’s seal in Ohio. “Anyone can submit a plan”, said a representative from the Ohio Architects Board. The representative added that “there’s a lot of interest in LEED and energy efficient design, and it is considered very important by architects and clients, but homebuilders are notoriously cheap -- they don’t’ like the Board of Building Standards telling them that they have to make homes safer or more efficient.”

Architects must be relicensed bi-annually (relicensing fee is $125) and are required to complete 24 hours of CE every two yrs – of which 16 hours must be in the areas of health, safety, and welfare. (AIA requires 18 CEU/yr – 4 in sustainable design). Energy codes and similar “sustainable design” credits are considered acceptable topics within the health, safety, and welfare categories.

Residential Contractors and General Contractors are not required to be licensed in Ohio and therefore are not subject to CEU requirements. However, some local building departments take the initiative to conduct training for builders. For example, Cleveland is planning some seminars now.

**GAP #20:** Residential Contractors and General Contractors are not required to be licensed in Ohio and therefore are not subject to CEU requirements.

**Recommendation:** Aside from requiring licensure, the state could work with the HBA to engage them in encouraging their members to attend energy efficiency and building science courses. HBA could and help organize such classes. Provide incentives for builders to attend classes.

**Gap #21:** There is no requirement for Energy code training, certification, or CEUs for any building trades professionals.

**Recommendation A:** Work with the appropriate bodies of professional regulation to adopt a new requirement for energy code training for key trades (e.g., architect, engineer) as part of the CEU requirements for license renewal.

**Recommendation B:** Reach out to AIA to seek their support in encouraging their architect members to attend energy code or Building America training. For example, they may be willing to increase the CEU credits for attendance at an ICC energy code course, or require it as part of their CEU requirements.

**Compliance Measurement and Verification**

With energy codes becoming ever more stringent, it is increasingly important for the enforcement and building communities to take extra steps beyond code to ensure that compliant buildings achieve their...
predicted energy savings, as many buildings fall short of their potential. The solution to underperforming buildings is measurement and verification, or the process of measuring energy performance and verifying that it matches the expected outcome. On the micro level, this process—known as commissioning for large commercial construction and performance testing for residential construction—involves blower door tests, duct blaster tests, and other performance measurements. On the macro level, it can involve state agencies, utilities, building science professionals, advocacy organizations, and other stakeholders compiling and analyzing building performance statistics to measure compliance and gauge implementation effectiveness.

Past and Current Activities

The state does not have a process in place to measure and evaluate compliance with the energy code, nor any recent studies that show code compliance.

GAP #2: The state does not know the current level of compliance. There is not a method in place to measure and evaluate compliance with the energy code.

Recommendation: The BBS and ODOD should collaborate to develop an ongoing process to measure and evaluate compliance.

- The state should assess the amount of residential and commercial construction in the state, so that it has accurate data (and not rely on census for residential data).
- Review DOE’s guidance on measuring energy code compliance and disseminate this information to local jurisdictions with suggestions for how to adopt DOE’s recommendations given the realities on the ground in particular communities or develop an evaluation methodology.
- Following the initial baseline study in 2011, conduct regular compliance checks and studies to determine the level of compliance.
- To demonstrate the 90 percent compliance rate, an onsite audit of buildings, based on a statistically valid sample of buildings across jurisdictions in the state, is necessary.

GAP #23: Ohio lacks a funding mechanism to implement many of the recommendations within this report.

Recommendation A: As part of educating policy-makers in the state, a Systems Benefit Charge should be advocated for, in order to establish a funding mechanism for the expansion of state services, a support system for builders, additional training for code officials, and the other recommendations herein, which should become part of a larger statewide efforts to reduce energy use in Ohio.

Recommendation B: Additionally, the EERS legislation that mandates IOUs to reduce energy could provide funding for some of these efforts. The ODOD should investigate opportunities to credit utilities for their support of energy codes.

Recommendation C: All communities that received EECBG funding could be contacted for potential collaboration on outreach efforts in their own communities. These communities have recently received funding for similar efforts and may be more primed for additional energy-related work. If
the ODOD was able to provide matching dollars for training contractors, for example, perhaps some communities would be willing to cost-share on an effort to improve their community buildings, especially if they were recognized for their efforts to improve their local communities and economies.36

Implementation Summary

Current Best Practices

- Whenever there are changes to the energy code, the BBS provides training and requires certified building department personnel to attend.
- Technical staff at the BBS is available to support certified building departments.
- The BBS and ODOD developed a video module course on energy codes, which is available online free of charge.\textsuperscript{ix} The BBS is planning to develop similar online training for contractors soon.
- The state building department ensures statewide coverage in commercial code enforcement.
- The BBS provides building departments with a list on timings for required inspections in commercial buildings in order to assure that code inspectors are able to see the energy features before they’re covered up.
- The BBS assures that local building departments are educated in energy codes by requiring code officials to pass ICC certification tests.
- The BBS requires code officials to obtain Continuing Education credits, which is an opportunity to keep them apprised of the latest technological or policy developments.

Gaps and Recommendations

The following summarizes the recommendations made in this section:

Gap #11: The numerous compliance paths and climate zone make the residential code complex and confusing. The prescriptive option for demonstrating energy code compliance is less stringent than the 2006 IECC, and assesses a warmer climate zone for a larger portion of the state than the IECC.

Recommendation: The state should simplify the residential code and utilize only one climate zone between compliance options.

GAP #12: Builders and contractors in Ohio do not have a state “go-to” resource to obtain technical assistance, training, or code interpretation assistance and are not well-educated on modern

\textsuperscript{xix} The course was originally developed for the state of California with BCAP assistance.
technologies and approaches to building energy efficient homes. It's likely that some builders and code officials are not aware of the opportunity to access a free version of the code.

**Recommendation A:** The state should put in place a method to provide energy code assistance for contractors, architects, engineers and other construction personnel in order to (1) Provide one voice on codes (rather than risking misinformation which may come from various other sources); (2) Foster a more positive relationship with the construction industry. Conduct aggressive outreach statewide to let builders know about this new resource. In addition, make code officials aware of the availability of the free online version of the IECC.

**Recommendation B:** Overcome the knowledge barrier to energy code compliance by offering education to your building industry trades professionals. For example, by attending a Building America sponsored training course, builders will learn to implement approaches to construct the best homes possible. Partner with an existing non-governmental organization, (e.g., the OHBA or the Mid-Ohio Regional Planning Commission) to help gain political clout for such a course. Recommended actions include:

- Host a Building America course locally. The cost is $6,500 per one-day course, (this includes all costs, including marketing to builders in your state, and continuing education credits for builders). There are two course options available: “Houses that Work” for new homes and “Remodeling for Energy Efficiency” for existing homes. The registration fee for builders is about $125 per person. To schedule, call Nancy Bakeman at The Energy and Environmental Building Alliance at (952) 881-1098 or nancy@eeba.org.

- Encourage builders to attend a Building America sponsored training (see [http://eeba.org/housesthatwork/index.html](http://eeba.org/housesthatwork/index.html) for locations). Attendees receive CEU credits for various programs, including AIA, AIBD, BPI, RESNET, NAHB, and USGBC/LEED, plus additional benefits offered through EEBA.

- Offer a 50% subsidy to builders, architects or other building professionals to attend a training outside your state;

- Reimburse permit fees for builders who achieve the Builders Challenge qualifications.

- Consider legislation that would allow the Builders Challenge qualifications or ENERGY STAR certification to be accepted by building departments in place of the traditional energy code compliance path. (Require that both the builder and HERS rater be registered with Building America or ENERGY STAR program to participate.)

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xx Educational courses must be marketed to builders in such a way that they see a benefit to taking time off to attend, and for paying their subcontractors a day’s salary to attend. Therefore, they must be marketed to clearly communicate the marketing benefits and financial gain to the builder for building energy efficient homes.
Present awards to builders who meet the Builders Challenge qualifications in order to raise public awareness and drive demand for energy efficiency and raise the bar in your state for advanced homes.

**Recommendation C:** Enhance the BBS website so that it is more consumer-friendly (simplified) and easy to use. Provide a calendar of educational events and market it to affected parties.

**Recommendation D:** Require that code officials (in certified building departments that conduct residential inspections) attend a Building America training course to enhance their understanding of building science and the importance of proper installations of insulation, air sealing, and other energy features. Provide an incentive for full participation by all code officials statewide in the form of (1) making the course free to building officials; (2) Providing higher than normal CE credits; (3) providing free breakfast and lunch.

**GAP #13:** Ready-made marketing and compliance materials are not available to local jurisdictions.

**Recommendation A:** Create and distribute materials tailored for code officials, design professionals, and contractors on the energy code, such as compliance checklists for inspectors; or a form that clearly lists the requirements of the code and requires design professionals to check each line item and sign off that their plans will include such energy features. The form should be required to accompany the permit application. See Appendix A for PNNL resource list.

**Recommendation B:** Offer ready-made marketing materials that support building departments as they educate designers and consumers about the importance and benefits of energy codes. Informational outreach materials targeted to different audiences such as consumers, designers, and policymakers would assist code enforcement personnel who are in the position of defending and educating codes. Information should emphasize the potential money saved by lower energy bills in order to gain support for private investments in energy efficiency and boost market demand for energy efficient products and services.

**Recommendation D:** The state should review DOE’s new guidelines on measuring energy code compliance and disseminate this information to local jurisdictions with suggestions for how to adopt DOE’s recommendations given the realities on the ground in particular communities.

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**Recommendation B:** Build support at the local level for improving construction practices by encouraging building departments to:

- Expedite the permitting process for builders who build to Builders Challenge or ENERGY STAR (or equivalent).
- Accept the Builders Challenge qualifications or ENERGY STAR certification in place of the traditional energy code compliance path. (Require that both the builder and HERS rater be registered with Building America or ENERGY STAR program to participate).

- Reduce permit fees for buildings that are LEED (or equivalent) certified, ENERGY STAR or Building America qualified. The state could reimburse local building departments to offset this cost.

- If utilities (subject to EEPS goals) were able to claim credit toward their EEPS goals\textsuperscript{xxii}, their portion of the EEPS funding could be used for this purpose. They make look upon this favorably, as it is an “incentive” and “voluntary” program rather than an enforcement program, and they could gain positive publicity for their individual achievements -- building-by-building (for each LEED certified building), or community-by-community (for every ENERGY STAR or equivalent home /development).

**Recommendation C:** Engage “Energy Code Ambassadors” whereby key regional building code officials or builders would be hired to advocate for energy codes regionally and mentor and encourage local building departments as they transition to a new, more stringent energy code.

**GAP #18: Building departments find CE training to be a hardship.**

**Recommendation:** The BBS or ODOD could offer subsidized training or partner with others to offer prioritized training seminars at reduced costs. For example, see the recommendation at gap #12 for a class that could be very helpful to elevate the understanding of building science for code officials.

**GAP #19: Architects, although ideally positioned to include energy in the design plans of a building, are not well-educated in energy codes and how to include energy efficiency in the design of buildings.**

**Recommendation A:** Forge strategic alliances with community colleges especially any that have recently received grants for “green jobs” training to coordinate and encourage (and perhaps provide additional funding for) the inclusion of energy code training (and/or RESNET training\textsuperscript{xxiii}) for students who may become code officials or building professionals upon graduation. Structure the collaboration to assure that the community college continues to teach the energy code even when the funding is exhausted so that the next generation of construction trades professionals understand and embrace the importance of including energy efficiency in the design and construction of buildings in Ohio.

\textsuperscript{xxii} The actual amount of energy efficiency credit earned toward EEPS goals could be determined via the actual energy rating or other documentation provided for LEED certification or ENERGY STAR compliance.

\textsuperscript{xxiii} RESNET certified home energy raters are able to qualify homes for the Energy Star program.
**Recommendation B**: Work with AIA to gain their support to promote continuing education courses on energy codes in the short-term. In the longer term, build a relationship with AIA and the NAAB to get energy code education added as a core requirement to becoming a licensed Architect.

**Recommendation C**: Add the BCAP energy code calculator on the state’s website to help educate visitors: http://bcap-ocean.org/resource/energy-code-calculator

**GAP #20**: Residential Contractors and General Contractors are not required to be licensed in Ohio and therefore are not subject to CEU requirements.

**Recommendation**: Aside from requiring licensure, the state could work with the HBA to engage them in encouraging their members to attend energy efficiency and building courses. HBA could and help organize such classes. Provide incentives for builders to attend classes.

**Gap #21**: There is no requirement for Energy code training, certification, or CEUs for any building trades professionals.

**Recommendation A**: Work with the appropriate bodies of professional regulation to adopt a new requirement for energy code training for key trades (e.g., architect, engineer) as part of the CEU requirements for license renewal.

**Recommendation B**: Reach out to AIA to seek their support in encouraging their architect members to attend energy code or Building America training. For example, they may be willing to increase the CEU credits for attendance at an ICC energy code course, or require it as part of their CEU requirements.

**GAP #22**: The state does not know the current level of compliance. There is not a method in place to measure and evaluate compliance with the energy code.

**Recommendation**: The BBS and ODOD should collaborate to develop an ongoing process to measure and evaluate compliance.

- The state should assess the amount of residential and commercial construction in the state, so that it has accurate data (and not rely on census for residential data).
- Review DOE’s guidance on measuring energy code compliance and disseminate this information to local jurisdictions with suggestions for how to adopt DOE’s recommendations given the realities on the ground in particular communities or develop an evaluation methodology.39
- Following the initial baseline study in 2011, conduct regular compliance checks and studies to determine the level of compliance.
- To demonstrate the 90 percent compliance rate, an onsite audit of buildings, based on a statistically valid sample of buildings across jurisdictions in the state, is necessary.

**GAP #23**: Ohio lacks a funding mechanism to implement many of the recommendations within this report.

**Recommendation A**: As part of educating policy-makers in the state, a Systems Benefit Charge should be advocated for, in order to establish a funding mechanism for the expansion of state
services, a support system for builders, additional training for code officials, and the other recommendations herein, which should become part of a larger statewide efforts to reduce energy use in Ohio.

**Recommendation B:** Additionally, the EERS legislation that mandates IOUs to reduce energy could provide funding for some of these efforts. The BBS and ODOD should investigate opportunities to credit utilities for their support of energy codes.

**Recommendation C:** All communities that received EECBG funding could be contacted for potential collaboration on outreach efforts in their own communities. These communities have recently received funding for similar efforts and may be more primed for additional energy-related work. If the ODOD was able to provide matching dollars for training contractors, for example, perhaps some communities would be willing to cost-share on an effort to improve their community buildings, especially if they were recognized for their efforts to improve their local communities and economies.\(^{40}\)

**Conclusion**

Saving energy through energy code compliance is the ultimate goal of the energy codes process. Yet this outcome requires buy-in, support, and input from a diverse group of energy code champions. On the frontlines are the inspection and design and construction communities, without whom energy codes cannot succeed. State legislators, city council members, mayors’ offices, and other policymakers must understand the value of energy codes and enact policies that assist enforcement and compliance. Utilities, state and local agencies, environmental and energy efficiency organizations, consumer groups, and other interested parties each can play crucial roles in promoting codes, funding and improving the energy code infrastructure, providing technical expertise and materials, and strengthening support for building energy efficiency on the national, regional, state, and local levels.

Reducing energy use through the adoption and implementation of the model energy codes would promote increased energy exportation and safeguard a vital industry in the state. As a net importer of energy, it would also reduce the amount of money sent out of state to buy energy, allowing more dollars to stay in Ohio, boosting the state’s economy. While the BBS has rightfully focused on adopting codes, the state has not spent an equal amount of effort teaching and supporting the building industry as they become accustomed to implementing energy codes. If the BBS or another state agency were to provide a way for builders to access free technical assistance, training and other support, it would go a long way toward building trust with contractors. However, repairing the relationship between the BBS and contractors will require more than just this – the state will need to provide a comprehensive program to win builders over and show them how energy efficiency will help them sell more homes. Such an effort will require financial incentives, marketing assistance, and other support. The main gaps and opportunities for the state of Ohio are shown in the chart below:
### Adoption

<table>
<thead>
<tr>
<th>State Policy</th>
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<tbody>
<tr>
<td>The ODOD and the BBS should coordinate regularly to collaborate on approaches to train, support, and encourage the building industry to build more efficient housing and buildings (p. 14)</td>
</tr>
<tr>
<td>Ohio should engage in the development of the national model codes and standards (p. 15-16)</td>
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<tr>
<td>Appoint stakeholders with other perspectives to the RCAC (p. 16)</td>
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<tr>
<td>Adopt an automatic review and update process for future iterations of the model energy code (p. 16)</td>
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<tr>
<td>Launch a voluntary “builder-to-builder” approach to educate builders on building science (p. 18)</td>
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<tr>
<td>Educate legislators on the situation with the RCAC and the benefits of energy codes (p. 18)</td>
</tr>
<tr>
<td>Set a more stringent energy code for state-funded buildings (p. 20)</td>
</tr>
<tr>
<td>Expand the SAO Performance Contracts program to include local governments (p. 20)</td>
</tr>
<tr>
<td>Consider adopting a “Climate Change” or “Energy” Plan (p. 21)</td>
</tr>
<tr>
<td>The state could allow local jurisdictions to adopt stretch codes (p. 23)</td>
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<tr>
<td>Launch a statewide campaign to raise awareness of the benefits of energy efficiency. (p. 24)</td>
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### Implementation

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<tr>
<th>Outreach</th>
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<tr>
<td>Offer technical assistance and energy code interpretations. Conduct aggressive outreach statewide to let builders know about this new resource (p. 31-32)</td>
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<tr>
<td>Present awards to builders in order to raise public awareness, drive demand for energy efficiency and raise the bar in your state for advanced homes (p. 32)</td>
</tr>
<tr>
<td>Enhance the BBS website so that it is more consumer-friendly (simplified) and easy to use (p. 32)</td>
</tr>
<tr>
<td>Create and distribute materials tailored for code officials, design professionals, and contractors on the energy code. (p. 33)</td>
</tr>
<tr>
<td>Offer ready-made marketing materials that support building departments as they educate designers and consumers about the importance and benefits of energy codes. (p. 33)</td>
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<th>Enforcement Community</th>
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<tr>
<td>The state should put in place specific requirements for enforcing the residential code. (p. 37)</td>
</tr>
<tr>
<td>Department of Commerce should consider expanding plan review and enforcement services to include residential buildings. (p. 37)</td>
</tr>
<tr>
<td>State building inspectors should attend a special training to become educated in the importance of energy code enforcement. (p. 37)</td>
</tr>
<tr>
<td>Publicly recognize local governments that are taking leadership roles in adopting more stringent codes (p. 37-38)</td>
</tr>
<tr>
<td>Engage “Energy Code Ambassadors”. (p. 38)</td>
</tr>
<tr>
<td>The BBS or ODOD could offer subsidized training or partner with others to offer prioritized training seminars at reduced costs. (p. 39)</td>
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<tr>
<th>Design/Construction Community</th>
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<tbody>
<tr>
<td>Work with AIA to gain their support to promote continuing education courses on energy codes. (p. 41)</td>
</tr>
<tr>
<td>Work with the HBA to engage to encourage members to attend energy efficiency and building courses (p. 42)</td>
</tr>
<tr>
<td>Adopt new requirement for energy code training for key trades as part of the CEU requirements for license renewal. (p. 42)</td>
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<th>Compliance Measurement &amp; Verification</th>
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<tr>
<td>The BBS and ODOD should collaborate to develop an ongoing process to measure and evaluate compliance (p. 43)</td>
</tr>
<tr>
<td>Systems Benefit Charge should be established for the expansion of state services. (p. 43)</td>
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</table>

In Ohio, the main gaps and opportunities for **implementation** are:

1. There is a great need for education and support in the construction industry. The state should provide a supportive open-door relationship with builders by offering free technical assistance and energy code interpretations. Conduct aggressive outreach statewide to let builders know about this new resource. If local HBAs are not interested in participating, other organizations.
might be, such as the State Extension Service offices or the Mid-Ohio Regional Planning Commission.

2. Certified building departments should be included in all educational efforts as ultimately the enforcement for codes is their responsibility. Currently, life and safety codes are a higher priority and as budgets are cut, energy compliance becomes less of a priority for code officials. With additional education, they could support the builders as they increase in their abilities to build differently. Financial incentives for building above code could be offered from building departments to local builders of highly efficient buildings.

3. Outreach and education of new legislators should occur to make them aware of how energy codes will save the state money; increase home sales; and individual home owner’s money in reduce energy bills.

Ohio has a strong existing structure from which to build: certified building departments are in place; a state building department with regional code officials is established; and the market penetration of ENERGY STAR new homes among the highest in the nation at 33 percent. With the addition of funding for support, education, and incentives to builders and code officials and with recognition for good efforts, Ohio can achieve 90 percent compliance with IECC 2009 by 2017.

Acknowledgments

We would like to acknowledge the financial support of the Department of Energy, which made this report possible.

State officials collaborated in the production of this report, providing comprehensive background information, local stakeholder contacts, and ongoing review of our work. In particular, we would like to acknowledge the aid of the Ohio Board of Building Standards, especially Regina Hanshaw, Steve Regoli, and Debbie Ohler.

We appreciate the assistance from Christina Panoska and Preston Boone at the Ohio Department of Development; Carol Ross at the Ohio Construction Industry Licensing Board; Yeong Jiang at the Ohio Bureau of Construction Compliance; Cheryl Thaxton at the Ohio Architects Board; and Oscar Zanganeh and Patrick Love at the State Architect’s Office of the Ohio Department of Administrative Services.

Many local building commissioners, code officials and plan reviewers, and association representatives contributed to our efforts to learn about energy code issues at the local level. Among these local building department officials were: Majed Dabdoub (Cincinnati), Cheryl Roahrig (Columbus), David Cooper (Cleveland), Angela Cavanaugh (Canton), Chris Zervos (Toledo), Mike Boso (Grove City), Richard Smith (Willoughby), Tim McClintock (Wayne county), David Smith (Ashtabula county), and Robert Martin (Montgomery county).

We appreciate the contributions of numerous stakeholders, including Isaac Elnecape with the Midwest Energy Efficiency Alliance; Jennifer Miller at the Sierra Club; Joan Pomarance, Mark Wills, and Angie Taylor at the AIA; Darren Meyers and Corey Roblee at the International Code Council; Nolan Moser of
the Ohio Environmental Council, Amy Gomberg and the Office of the Ohio Consumers’ Council; Chris Montgomery at Brickler & Eckler, LLP; Kate Bartter at the Ohio State University Institute for Energy; Corey Hawkey at Ohio State University; and Dave Cawley at Efficiency Smart/Vermont Energy Investment Corporation.

We appreciate the individuals from the building industry who shared invaluable insights with us, especially Bill Decker (Decker Homes), Brent Black (Buckeye Valley Building Industry Association), and Vince Squillance at the Ohio Home Builders Association.

Thank you to Stuart Seigfried and Bob Wolf at the Ohio Public Utilities Commission, and Randy Corbin at American Municipal Power.

We also thank federal stakeholders who provided information for the report, especially Jonathon Passe and Jack Barnette at the U.S. Environmental Protection Agency; George James and Terry Logee at the U.S. Department of Energy’s Building America program; Joe Nebbia with Newport Partners, LLC; and Eric Makela with the Pacific Northwest Laboratory.

Cover image taken in Somerville, OH courtesy of Flickr Creative Commons, by author haglundc, Cathy.
Appendix A

The Department of Energy (DOE) provides a number of useful resources that can assist states and local governments in their efforts to achieve code compliance. Many of these resources are available at Energycodes.gov. Materials include training presentations and background on DOE-sponsored software programs, Rescheck and Comcheck, which evaluate compliance for residential and commercial buildings, respectively. These software programs, which present prescriptive code requirements and calculate compliance tradeoffs, simplify the process of evaluating a building’s code compliance. By explaining requirements, these software programs can help designers, builders, and code officials streamline efforts to achieve code compliance.

Resource Guides for Code Officials
1. ICC/DOE BECP Resource Guide for Code Officials: a comprehensive and easy to read collection of the best resources available from ICC and DOE.
   [link]

Energy Code Compliance Training Materials:
1. Commercial PowerPoint Training with links to videos
   [link]

2. Residential PowerPoint Training with links to videos
   [link]

3. DOE Guidance for State Compliance Measurement Efforts
   [link]

Primer on Rescheck and Comcheck
1. Commercial Compliance
   [link]

2. Residential Compliance
   [link]

Available Downloads
1. Commercial Basic Requirements Download
   [link]

2. Residential Basic Requirements Download
   [link]

Users Guides
1. COMcheck Software Guide
   [link]

2. REScheck Software Guide
   [link]
Plan Check and Field Inspection

   http://www.energycodes.gov/training/pdfs/comm_review_guide1.pdf
2. Residential Plan Review Quick Reference Guide

Code Notes
http://www.energycodes.gov/help/notes.stm
References

12. For the full report, see http://bcap-ocean.org/resource/incremental-cost-analysis. This analysis is based on traditional building approaches. However, if Building America approaches are utilized, a new home can be built 40% more energy efficiently without any added cost.
13. BCAP (state write ups)
17. http://www.energy.gov/ohio.htm
23. http://codes.ohio.gov/oac/123%3A4-1-03
27. http://bcap-ocean.org/state-country/ohio
29 http://www.energystar.gov/index.cfm?fuseaction=new_homes_partners.showStateResults&s_code=OH
32 http://www.usmayors.org/climateprotection/ClimateChange.asp