Kentucky Gap Analysis

February 2011

Prepared by the Building Codes Assistance Project and the Kentucky Department of Housing, Building, and Construction - Division of Building Code Enforcement 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

APC – Appalachian Carbon Partnership
ASHRAE – American Society of Heating, Refrigerating, and Air-Conditioning Engineers
BCAP – Building Codes Assistance Project
BPI – Building Performance Institute
CAAK – Code Administrators Association of Kentucky
CEUs – Continuing Education Units
DBCE - Division of Building Codes Enforcement
DEC – Division of Efficiency and Conservation
DEDI – Department for Energy Development and Independence
DOE – Department of Energy
ECAP – Energy Code Ambassadors Program
ECC – Energy and Environment Cabinet
EECBG – Energy Efficiency and Conservation Block Grants
EERS – Energy Efficient Resource Standard
EPA – U.S. Environmental Protection Agency
HBAK – Home Builders Association of Kentucky
HBC - Kentucky Department of Housing, Buildings and Construction
HERS – Home Energy Rating System
HVAC – Heating, Ventilation, Air Conditioning
IBC – International Building Code
ICC – International Code Council
IECC – International Energy Conservation Code
IGCC – International Green Construction Code
IRC – International Residential Code
KBC - Kentucky Building Code
KCAPC - Kentucky Climate Action Plan Council
KEEPS - Kentucky Energy Efficiency Program for Schools
KHC - Kentucky Housing Corporation
KPPC - Kentucky Pollution Prevention Center
KRC - Kentucky Residential Code
KySEA – Kentucky Sustainable Energy Alliance
LEED – Leadership in Energy and Environmental Design
LRC - Legislative Research Commission
MACED - Mountain Association for Community Economic Development
MEC – Model Energy Code
MEEA – Midwest Energy Efficiency Alliance
NAAB - National Architectural Accreditation Board
Executive Summary

The purpose of the Kentucky Gap Analysis Report is twofold: 1) document and analyze the strengths and weaknesses of the state’s existing energy code adoption and implementation infrastructure and policies; 2) 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, including that the state’s energy use is projected to grow by about 40 percent between 2008 and 2025. However, BCAP estimates that if Kentucky began implementing the 2009 IECC and Standard 90.1-2007 statewide in 2011 (making incremental steps toward 90 percent compliance in 2017), by 2030 the Commonwealth would save $277 million in annual energy costs for households and businesses. The monetary saving derived from energy codes increases a consumer’s purchasing power, and helps expand the state’s economy by keeping local dollars in Kentucky. This section describes the importance of energy code adoption, implementation, and enforcement, noting that the Commonwealth of Kentucky is an energy producing state, with one of the lowest rates of electricity in the country. However, spikes do occur. For example, this winter, the Kentucky Public Service Commission has received hundreds of complaints from individuals whose bills rose dramatically from November to January. By reducing demand for energy within Kentucky, more coal would be available for exporting to neighboring states where demand and prices are higher, thus contributing to the state’s economy, while reducing energy bills for families and businesses in Kentucky.

The Adoption section includes descriptions of federal, state, and local policies that influence energy codes in Kentucky. The role of state building standards, green building, and climate change initiatives are described. Notably, the Commonwealth of Kentucky has a head start on energy efficiency, through an aggressive energy strategy developed under Governor Beshear, which has launched discussions and interest in considering energy efficiency, renewable energy, and energy independence in preparation of a forthcoming Climate Action Plan. This section outlines eight major recommendations, such as:

- Ensuring visual, in-person inspections are conducted by state inspectors;
• Adopting an automatic review/update process for future iterations of the model energy code;

• Allowing local jurisdictions to implement a stretch code.

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. The section includes 13 recommendations for a variety of different stakeholder groups. For example, in order to achieve compliance with the IECC 2009 by 2017, the state will need to:

• Provide education and training to improve the ability of builders and contractors to build higher performing buildings and recognize/award exemplary builders;

• Provide support for code officials via additional training, checklists, ready-made materials and inspection schedules that ensure energy code features are visible and inspected;

• Increase public demand for higher performing buildings to raise awareness of the benefits of energy efficiency.

The Conclusion section provides a summary of the economic, societal, and environmental benefits of energy code adoption and implementation in Kentucky. Appendix A offers a list of other DOE and PNNL energy code resources. The table below summarizes the recommendations made in this report.

Summary Table of Recommendations

<table>
<thead>
<tr>
<th>Adoption</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State Policy</strong></td>
<td></td>
</tr>
<tr>
<td>The state should adopt an automatic review and update process for future iterations of the model energy code (p. 18)</td>
<td></td>
</tr>
<tr>
<td>The state should consider policies that will offset the higher upfront cost of above-code energy requirements such as Energy Efficient Resource Standard (EERS) or Public Benefit Fund (PBF). (p. 19)</td>
<td></td>
</tr>
<tr>
<td>The Department of Education should provide simplified information on its website (p. 20)</td>
<td></td>
</tr>
<tr>
<td>Provide technical assistance to schools as they move beyond behavioral changes and consider energy efficiency improvements that would provide long-lasting energy savings to the school (p. 21)</td>
<td></td>
</tr>
<tr>
<td>The Finance and Administration Cabinet should require that either (1) a third-party LEED certified inspector visually inspects every building to ensure they comply with LEED standards; or (2) the state should consider having state inspectors become Certified LEED accredited professionals so that they may assure that buildings meet the state mandate. (p. 22)</td>
<td></td>
</tr>
</tbody>
</table>

| **Local Policy** |  |
| Allow local jurisdictions to adopt stretch codes or codes higher than the IECC 2009 and utilize third-party certification programs (p. 26-27) |  |

| **Implementation** |  |
| **Outreach** |  |
| Provide ready-made information on such programs to building departments (p. 30) |  |
| 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 (p. 30) |  |
| **Raise public demand for energy efficiency in housing by offering courses on energy efficiency via partnerships with groups that reach more rural areas (p. 30)** |
| **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 (p. 30)** |
| **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. (p. 30)** |
| **Give public acknowledgement to those local governments that are taking leadership roles in adopting more stringent codes (p. 31)** |
| **Engage “Energy Code Ambassadors” (p. 31)** |

| **Training** |
| The HBC should provide multiple regional workshops to increase code officials’ knowledge of building science and energy codes, and list them on their webpage. (p. 37) |
| The HBC should require that local building department inspectors are educated in energy codes by requiring code officials to pass ICC certification tests. (p. 37) |

| **Enforcement Community** |
| State inspectors should conduct visual inspections of energy features. (p. 35) |
| Reduce permit fees for buildings that are LEED (or equivalent) certified, ENERGY STAR or Building America qualified. (p. 35) |
| Accept the Builders Challenge qualifications or ENERGY STAR certification in place of the traditional energy code compliance path. (p. 35) |
| Regional inspectors should be made aware that energy codes should be considered as high a priority as other life/safety codes (p. 35) |
| Consider options to ensure statewide enforcement of the residential energy code. (p. 35-36) |

| **Design/Construction Community** |
| Conduct outreach to builders to encourage more efficient construction practices (p. 39) |
| Work to improve architect’s understanding of energy codes (p. 40) |
| Educate builders (p. 41) |
| Work with the HBA to offer encourage members to attend energy efficiency and building courses (p. 41) |

| **Compliance Measurement & Verification** |
| Determine current level of compliance with energy code. (p. 42) |
| As part of educating policy-makers in the state, a Public Benefit Fund should be advocated for. (p. 43) |

### Introduction

In the United States, our demand for energy in buildings accounts for 72 percent of electricity use and 40 percent of total energy use, and is responsible for 40 percent of U.S. Co₂ emissions. As one of the principal instruments in a state’s policy toolbox, energy codes benefit society in a number of important ways, as they:

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

Recent improvements in the stringency of the model energy codes—and 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 short years ago. While Kentucky’s demand for energy is projected to grow by about 40 percent between 2008 and 2025,\(^4\) retail and office buildings constructed to meet the requirements of the IECC can be over 30 percent more energy efficient than typical buildings not constructed to meet national model energy standards.

Electricity use is a leading generator of air pollution. In Kentucky, the per capita consumption of residential electricity is among the highest in the nation, and electricity is the primary energy source for home heating in more than two-fifths of Kentucky households.\(^5\) Energy codes are a proven, cost-effective policy option for addressing these and other environmental impacts. BCAP estimates that if Kentucky began implementing the 2009 IECC and Standard 90.1-2007 statewide in 2011 (making incremental steps toward 90 percent compliance in 2017), by 2030 the Commonwealth would reduce CO2 emissions by 1.3 metric tons.\(^6\)

Today, energy codes are increasingly perceived as a viable and cost-effective component of a comprehensive solution to our current economic, environmental, and energy concerns. 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. Energy efficiency is the cheapest, cleanest energy source available to us today. Moreover, the average lifespan of a building is roughly 50 years, meaning that current building energy policies will affect energy consumption through 2060 and beyond.

Yet, for all this recent progress and promise, energy codes are still falling well short of their potential. In jurisdictions 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 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 Kentucky, 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.
State Overview

The Commonwealth of Kentucky is nestled in between two of the nation’s most expansive physical features, the Appalachian Mountains to the East and the Mississippi River to the West. With a population of just over 4.3 million people, the Commonwealth is ranked 26th in terms of size. Just over a quarter of its population lives in the greater Louisville metro area.

Like other states, Kentucky has suffered from the economic downturn and has a high unemployment rate at 10.6 percent. In addition, job growth in Kentucky is expected to continue to be low. Construction industries are suffering with expected construction to be nearly 40% lower in 2010 than in 2009.

Below are some quick facts about Kentucky:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population, 2009</td>
<td>4,314,113</td>
</tr>
<tr>
<td>New Single Family Housing Units, 2009</td>
<td>5,470</td>
</tr>
<tr>
<td>New Single Family Housing Units, 2008</td>
<td>6,452</td>
</tr>
<tr>
<td>New Nonresidential Private Construction Value, 2008</td>
<td>$2,504 million</td>
</tr>
<tr>
<td>Energy Consumption Per Capita, 2008 (Rank)</td>
<td>462.4 million Btu (7th)</td>
</tr>
<tr>
<td>Total Energy Consumption, 2008</td>
<td>1,983 trillion Btu</td>
</tr>
<tr>
<td>Energy Expenditures, 2008</td>
<td>$23,264 million dollars</td>
</tr>
<tr>
<td>Primary Energy Source, 2007</td>
<td>Coal (92.9%)</td>
</tr>
<tr>
<td>Energy Importing or Exporting State (+/- BTU, 2008)</td>
<td>Exporting State (1,137 trillion BTU)</td>
</tr>
<tr>
<td>Residential Electricity Cost, March 2010 (+/- avg.)</td>
<td>7.57 cents/kWh (-3.63 cents/kWh)</td>
</tr>
<tr>
<td>Income Per Capita, 2008 (Rank)</td>
<td>$32,076 (48th)</td>
</tr>
<tr>
<td>CO₂ Emissions All Sectors, 2007</td>
<td>157.73 MMT CO₂</td>
</tr>
<tr>
<td>Total ARRA Funding</td>
<td>$2,619,183,118</td>
</tr>
</tbody>
</table>

Kentucky is unique in that it is an energy producing state, largely dependent on coal. Kentucky lies at a crossroads in energy production and efficiency. Energy is a key employer and driver of Kentucky’s economy. However, low per capita income, the security of domestic energy production, and the ability for homeowners to save over $300 per year with the adoption of the 2009 IECC, make energy conservation an important issue. In order to preserve jobs, the economy, and the environment, it is especially important for the state to have effective energy efficiency policies in place throughout the Commonwealth.
Figure 1 - State Population Map

Notes
The Commonwealth of Kentucky has a decentralized population and vast rural areas. It is a land with diverse topography and abundant resources, including the greatest length of navigable waterways in the lower 48 states.

Kentucky's industrial sector leads the state's demand for energy used to manufacture aluminum, steel, iron, motor vehicles, furniture, machinery, and more.

Construction Overview

Kentucky's population has been rising steadily from 2000 to 2009 at about 6.7% which is just below the national average of 9.1%. However as Figure 2 and 3 illustrate, the total residential housing units permitted were on the rise from 2001 and spiked in 2004 but has been steadily declining ever since. The units permitted dropped from 22,705 in 2004 to 6,878 in 2009 a decrease of 70%.
Commercial permits have declined as well since 2008. The figure below shows the number of architectural reviews for Commercial projects, which include all permits for commercial buildings.
While the decline in the construction industry is not beneficial to the Commonwealth’s economy, now is a good time for the advancement of energy codes in Kentucky as the state and its local jurisdictions have taken advantage of Recovery Act stimulus funding currently available for implementation of energy efficiency initiatives. This is a favorable time to implement building energy codes, as slowed construction will help ease all stakeholders into the new code, rather than trying to force it while construction is high.

Energy Portfolio

Kentucky’s per capita energy consumption is higher than average compared to the rest of the U.S. Energy consumption in Kentucky’s industrial sector - especially impacted by its aluminum and petroleum industries – exceeds that of the nation and the rest of the South. More than 40 percent of Kentucky households use electricity as their primary energy source for home heating. Energy consumption in the state is projected to increase by more than 40 percent between now and 2025, along with the commensurate greenhouse gas emissions. The Commonwealth has one of the lowest rates of electricity in the country. However, this winter the Kentucky Public Service Commission has received hundreds of complaints from individuals whose bills rose dramatically from November to January.

Kentucky is the third largest coal producing state in the nation (following Wyoming and West Virginia) and is one of the few energy exporting states in the country, on average exporting over 1,000 trillion BTU’s of energy each year. Coal-fired plants account for more than nine-tenths of the electricity produced in the state and nearly 8,000 MWh of electricity each year, making Kentucky one of the most coal-dependent states in the nation. Kentucky generates their remaining electricity using petroleum-
fired and hydroelectric power plants.\textsuperscript{14} Kentucky is one of the largest coal exporting states in the country. Below is an overview of the Commonwealth’s energy portfolio.\textsuperscript{15}

**Petroleum:** Kentucky has only a small amount of oil production at only 15.3 Trillion Btu\textsuperscript{16}. Kentucky does have two oil refineries in Catlettsburg and Somerset. Since Kentucky is land locked, the larger Catlettsburg refinery receives the oil via the Capline Pipeline. Kentucky’s total petroleum consumption is high relative to its population.\textsuperscript{17}

**Natural Gas:** Kentucky’s second largest energy production comes from natural gas which equates to only 0.5\% of the nation’s total natural gas production.\textsuperscript{18} More than two-fifths of Kentucky households use natural gas as their primary fuel for home heating.\textsuperscript{19}

**Coal:** Kentucky accounts for 2,927.9 trillion Btu of the nation’s 23,706.4 overall coal production, or about 12\% of the nation’s coal production. Domestic coal accounts for over 93\% of the energy produced in Kentucky. Kentucky has more coal mines than any other state -- nearly one third of all the coal mines in the nation. Kentucky delivers approximately 75 percent of state coal production to more than two-dozen states. Nearly 95 percent of the coal used in Kentucky is for electricity generation, and most of the remainder is used in industrial and coke plants.\textsuperscript{20}

**Renewables:** Kentucky has three hydroelectric power plants that generate more than 100 megawatts of power. The Tennessee and Cumberland Rivers in the Ohio River Basin provide hydroelectric power potential.\textsuperscript{21}

Reducing local demand for energy via the implementation of energy codes would result in lower energy bills for Kentucky residents, and allow more resources to be exported, increasing Kentucky’s wealth.

**Potential Savings from Energy Codes**

Figure 5 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 is one climate zone in Kentucky, shown with an example city from the climate zone. Assuming 100 percent compliance with the 2009 IECC, home owners would have reduced their energy bills by 18 percent and collectively saved $2,311,008\textsuperscript{i} per year in lower energy bills.

**Figure 5: Energy Savings vs. Current Practice**

<table>
<thead>
<tr>
<th>Climate Zone/City</th>
<th>Savings Current Practice vs. 2009 IECC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Savings ($/year)</td>
</tr>
<tr>
<td>4A</td>
<td>$336</td>
</tr>
</tbody>
</table>

Source: [2009 IECC Residential Nationwide Analysis](#), U.S. Department of Energy

\textsuperscript{i} This value was calculated by multiplying the number of new single-family residential permits in 2009 by the median energy savings per home if the home is built to the 2009 IECC.
Figure 6 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. Assuming 100 percent compliance with the code, commercial energy costs would be reduced up to 6.5 percent.

**Figure 6: Energy Savings Commercial**

<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>Lexington</td>
<td>5.6%</td>
<td>5.1%</td>
</tr>
<tr>
<td>Residential</td>
<td>Lexington</td>
<td>10.0%</td>
<td>6.5%</td>
</tr>
<tr>
<td>Semi Heated</td>
<td>Lexington</td>
<td>0.5%</td>
<td>0.3%</td>
</tr>
</tbody>
</table>

Source: [Impacts of Standard 90.1-2007 for Commercial Buildings at State Level](U.S. Department of Energy), Non Residential means any mid-rise commercial building; Residential means high-rise residential buildings; Semi Heated means commercial warehouses. Energy cost savings are estimated using national average energy costs of $0.0939 per kWh for electricity and $1.2201 per therm for natural gas.

BCAP estimates that if Kentucky began implementing the 2009 IECC and Standard 90.1-2007 statewide in 2011 (making incremental steps toward 90 percent compliance in 2017), by 2030 it would save $277 million in annual energy costs for households and businesses, or $2.4 billion from 2001 to 2030. The monetary saving derived from energy codes increases a consumer’s purchasing power, and helps expand the Commonwealth’s economy by keeping local dollars in Kentucky.

**Cost Increment**

Cost is a major barrier to energy code adoption. To address this issue, BCAP undertook a study to quantify the incremental construction cost of upgrading to the 2009 IECC in each state where such an analysis was feasible. Assuming 100% code compliance, the average cost of building to the IECC 2009 is about $774, and the expected energy savings is $336 per year. This equates to a full return on the investment in less than two and half years, as shown in the table below.

**Figure 7: Weighted Average Incremental Cost**

<table>
<thead>
<tr>
<th>Weighted Average Incremental Cost</th>
<th>Median Energy Savings</th>
<th>Simple Payback</th>
</tr>
</thead>
<tbody>
<tr>
<td>$773.92</td>
<td>$336</td>
<td>2.30 Years</td>
</tr>
</tbody>
</table>

Source: [Incremental Cost Analysis](Building Codes Assistance Project), BCAP estimates that if Kentucky began implementing the 2009 IECC and Standard 90.1-2007 statewide in 2011 (making incremental steps toward 90 percent compliance in 2017), by 2030 it would save $277 million in annual energy costs for households and businesses, or $2.4 billion from 2001 to 2030. The monetary saving derived from energy codes increases a consumer’s purchasing power, and helps expand the Commonwealth’s economy by keeping local dollars in Kentucky.

**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 90.1-2004.24

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.

The Commonwealth of Kentucky is currently in compliance with EPAct for both commercial and residential codes.25

The Recovery Act

In February 2009, the American Recovery and Reinvestment Act (Recovery Act) – federal legislation appropriating funds for a variety of state economic initiatives – allocated $3.1 billion for the U.S. Department of Energy (DOE) State Energy Program (SEP) to assist states with building energy efficiency efforts. As a condition of accepting $69 million in SEP funding, Gov. Steven Beshear certified to DOE that Kentucky would implement energy standards of equal or greater stringency than the latest national
model codes and achieve 90 percent compliance in new and renovated residential and commercial building space by 2017.\textsuperscript{26} The Division of Efficiency and Conservation (DEC) under the Department for Energy Development and Independence (DEDI) is responsible for managing the $69 million ARRA funds.

Kentucky must continue and broaden its efforts to successfully implement the building energy code plans submitted to DOE. It is in the Commonwealth’s best economic interest to adopt the 2009 IECC and Standard 90.1-2007 statewide and begin the construction of more efficient 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.

**Political Environment and Energy Code Adoption**

Under the Public Protection Cabinet, the Kentucky Department of Housing, Buildings and Construction (HBC) is responsible for promulgating building codes for the state. The HBC also administers licensing of building trades professionals. The department has four divisions: (1) Building Code Enforcement; (2) Heating, Ventilation and Air Conditioning (HVAC); (3) Plumbing; (4) Fire Prevention / Office of the State Fire Marshal.

The 2007 **Kentucky Building Code (KBC)** is a uniform mandatory statewide code for all commercial buildings\textsuperscript{\textsuperscript{ii}}, based off of the 2006 IBC with state amendments, none of which affect the energy efficiency chapter. It went into effect July 1, 2007. The energy code is set at the state level, and compliance is mandatory statewide.

The **Kentucky Residential Code (KRC)** is a mandatory statewide code based on the 2006 IRC with some modifications to the energy code. It went into effect August 1, 2007. The KRC is a “min/max” code, in that it establishes minimum and maximum building code requirements for detached single family dwellings, two-family dwellings, and townhouses, and no local government shall adopt or enforce any other building code on these units.

\textsuperscript{\textsuperscript{ii}} Exceptions include farm dwellings, farm buildings and manufactured houses.
**Code Adoption Process**

The HBC’s Division of Building Codes Enforcement (DBCE) was established following the initial adoption of the Kentucky Building Code on February 15, 1980. The DBCE is responsible for enforcing code changes and amendments. While the state does not have a set schedule for updating building codes, it generally (but not always) follows a three-year cycle. Typically the energy code is considered at that time. Changes to the KBC may be submitted for consideration and voted upon by the Board of Housing, Buildings and Construction (HBC).[iii] Below is a brief general description of the process for changing codes:

1. The code is brought before the affected committees and boards for comments and recommendations;
2. The code is brought before the HBC for review and approval, amendment or rejection;
3. If approved, a regulatory amendment is filed with the Legislative Research Commission (LRC) for public comment and further review.
4. Once approved by the LRC, changes and amendments are adopted and entered as part of the state requirements and they become state law by the state statute.

Currently, the HBC has approved the 2009 IECC for commercial codes and is awaiting final approval from the LRC.

The 2009 IECC for residential dwellings is being reviewed by a committee (convened by the HBC) that includes builders, architects, energy professionals and HBC staff to research the additional cost and expected payback period of the updates. HBC staff participating in the committee hope to gain the support of this committee and submit the IECC 2009 (perhaps with Kentucky amendments) to the full HBC board in the next few months.

**Gap #1: Kentucky does not have an automatic energy code review and update process on a three-year cycle.**

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

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[iii] The board consists of 21 members appointed by the Governor.
Recent Energy Codes-related Legislation

As of January 2011 and as a result of Senate Bill 10 (SB 10), the Commonwealth of Kentucky now requires permits and inspections for all new HVAC systems statewide (for both commercial and residential). Any contractor or homeowner installing new heating or cooling equipment/mechanical system must apply for a HVAC permit and the unit must be inspected by a state certified professional to ensure code compliance.¹ The Division of Heating, Ventilation and Air Conditioning won an “Innovation in Regulation Award” from the National Association of State Contractors Licensing Agencies for their excellence in establishing the statewide permitting and inspection program for HVAC installations.

On January 26, 2010, the Kentucky General Assembly voted unanimously to adopt resolution House Resolution (HR 24). This resolution endorsed the creation of a “Green Schools Caucus in the Kentucky General Assembly to advocate and encourage broader application of the design and construction practices for green schools.” School districts are also encouraged to seek LEED certification or an equivalent standard for school buildings. This formalized a process for Kentucky legislators to become educated on energy efficiency or sustainable buildings. According to the Executive Director for the Kentucky U.S. Green Building Council (USBGC), “Legislators are genuinely interested in learning about green building practices.”

On April 13, 2010, Governor Beshear signed SB 132 into law, in order to support and encourage the use of efficient design concepts in new and renovated school buildings. Schools are required to follow the KBC, and the state does not have separate, energy codes or standards for schools. However, the law requires the Department of Education to develop and adopt guidelines for efficient school design; and to establish an efficient school design trust fund. As the law only encourages schools to “consider school design, construction, operation, and maintenance” in the initial design and decision-making process, it is not a state mandate that schools must comply with. While the Department of Education does provide a checklist for energy efficiency and encourages schools to consider energy efficiency requirements there is not a penalty for non-compliance.

GAP #2: The School Design Trust Fund is an unfunded initiative, and many schools feel they can’t afford the [perceived or real] additional upfront cost of going above the state energy code.

Recommendation A: The state should consider policies that will offset the higher upfront cost of above-code energy requirements such as Energy Efficient Resource Standard (EERS)² or Public Benefit Fund (PBF)³.

¹ Exceptions include HVAC systems installed in manufactured housing, window unit air conditioners, and space heaters.

² An Energy Efficiency Resource Standard is a regulatory mechanism that encourages utilities to improve the efficiency of their generation, transmission, and use of electricity and natural gas by establishing an explicit, numerical target for incorporating energy efficiency into a utility company’s power source mix.
**Recommendation B:** Kentucky should establish a long-term, self-funded program to help schools engage an ESCO for major remodeling projects (see recommendation B, Gap #4 below).

**GAP #3:** There is very little information available to schools about the school efficiency program on the Department of Education’s website.

**Recommendation:** The Department of Education should provide simplified information on its website, including a concise description of the financial, health, and educational achievement benefits that result from greater energy efficiency in schools.

**In April of 2009, HB 2** was signed into law, requiring all new public facilities and renovations using 50 percent or more of state funding to achieve high performance building standards - which vary depending on the size of the project. (See Energy Codes for State Funded Facilities section below). HB 2 also required each board of education to enroll in the Kentucky Energy Efficiency Program for Schools (KEEPS), which is administered by the Kentucky Pollution Prevention Center (KPPC) at the University of Louisville J.B. Speed School of Engineering. The KEEPS program employs regional coordinators that assist Kentucky school districts in putting together and assisting school cross-functional “teams” (e.g., consisting of school administrators, facility managers, teachers, students, parents, food staff, curriculum coordinators) as they develop an energy management program to reduce energy consumption. Each board must report annually on their energy usage, cost and savings measures. Of the 174 school districts in Kentucky, 98 districts have fully functioning energy teams. The KEEPS program was established using ARRA funds. There is no funding available for making energy improvements as part of the KEEPS program, and it relies heavily on behavioral changes (conservation) rather than long-lasting energy improvements (efficiency). Conservation/behavioral changes are important to instill in teachers and students and can make significant impacts on energy bills. However, behavioral changes are often difficult to maintain over time and with staff turnover.

To further support the KEEPS program, the School Energy Managers Project (SEMP) was created, and local school district energy managers were hired to implement the recommendations established by KEEPS. SEMP energy managers are the “boots on the ground” to accomplish KEEPS goals.

**GAP #4:** When ARRA funding is gone, the momentum that’s been created with the KEEPS program may not persevere across generations of teachers and students without continued support.

Now that KEEPS teams are established in school districts, it is an opportunity for the state to step in and assist these teams that have taken ownership and interest in lowering their school energy bills build upon the momentum that’s begun. It should:

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vi A Public Benefit Fund is a policy tool used to provide a cohesive strategy and long-term funding for state and city-run energy programs. It is most commonly supported by a Systems Benefit Charge (SBC), a small fixed fee added to customers’ electricity bills each month.
**Recommendation A:** Educate and encourage KEEPS teams to advocate for state policies that would enhance their work and allow them to go to the next level of energy efficiency and energy bill savings. For example, KEEPS teams could advocate for state-level policies such as an Energy Efficiency Resource Standard (EERS) or a Public Benefit Fund (PBF). These policies would provide an opportunity to involve utility companies as potential funders of the long-lasting efficiency improvements KEEPS teams may identify and maximizing the energy bill savings they are working to achieve. Such policies could also be used to support energy code training and other support, such as rebates for ENERGY STAR qualified homes.

**Recommendation B:** Provide technical assistance to schools as they move beyond behavioral changes and consider energy efficiency improvements that would provide long-lasting energy savings to the school districts. For example, when ARRA funding ends, HBC or the Department for Local Government (in the Office of the Governor) could provide technical services to the KEEPS program to encourage and facilitate school districts’ use of ESCOs. Services could include offering pre-approved contractors, ready-made contracts (pre-negotiated with contractors as a condition of being a pre-approved contractor); advise and assist in the review of audits; assist in paperwork; and more. The additional staff cost for this program can be recovered in the total cost to the state agency administering the program – a successful model for this is the state of Kansas.\(^\text{vii}\)

Such initiatives help to train and familiarize the construction industry in more energy efficient building techniques, which ultimately leads to easier and faster acceptance of more stringent energy codes.

**Other Building Codes**

There are numerous building codes in place in Kentucky; the main ones related to energy codes include:

- **2007 Kentucky Building Code (Based on the 2006 IBC)**
  - 2006 International Mechanical Code, adopted by reference in the 2007 Kentucky Building Code, used for all mechanical installations other than one and two family dwelling which is regulated by the 2007 Kentucky Residential Code.
  - 2006 NRPA National Fuel Gas Code
  - 2004 ICC/ANSI A117.1 – Accessible and Usable Buildings and Facilities
  - 2007 Kentucky Standards of Safety
  - 2007 Kentucky Residential Code (Based on the 2006 IRC)
  - 2007 Kentucky Building Code (Day Care Centers – see Section 420 for special requirements)
  - 2007 Kentucky Plumbing Code
  - 2008 NFPA 70 National Electric Code

\(^\text{vii}\) For example, the state of Kansas has improved the energy efficiency of more than 70 percent of its public buildings and is saving more than $13 million annually on energy bills. See the Compendium of Best Practices report, page 72 available at - http://www.reeep.org/16672/compendium-of-best-practices.htm
- 2006 International Fire Code, used for new construction; only when specifically referenced by the body of KBC
- 2006 International Fire Code for Portable Extinguishers (Section 906)
- 2002 NFPA 13- Sprinkler Systems
- 2002 NFPA 13D-Sprinkler Systems – One/Two Family Dwelling
- 2002 NFPA 13R-Sprinkler systems in Residential Occupancies
- 2003 NFPA 14-Standpipe, Hose Systems
- 2002 NFPA 72-Fire Alarm
- State Boiler Codes & Regulations (KRS 236 and 815 Chapter 15 as currently filed with LRC)
- 1989 or later edition ASME Boiler, Pressure Vessel and Pressure piping Codes
- 1989 or later edition of the National Board Inspection Code

Energy Codes for State-funded Facilities

As previously mentioned, HB 27 requires all projects for which 50% or more of the total capital cost is paid by the state to meet high performance building standards. Requirements vary depending on the cost of the project, but generally require that higher budget projects meet higher LEED certification requirements. For example, projects over $25 million must achieve LEED Silver certification or higher; projects between $5 and $25 million must achieve LEED Certified and earn a minimum of seven points under the *Energy and Atmosphere Credit 1, Optimize Energy Performance* standards.

By having more stringent energy standards for state-funded buildings, the Commonwealth is demonstrating fiscal responsibility with tax payer dollars; familiarizing and training the construction industry and code enforcement officials; and increasing demand for “greener” products from product suppliers, manufacturers and service providers. More efficient public buildings also help the state hedge against uncertain future energy costs and availability and reduce its susceptibility to fuel price volatility.

Projects are administered by Capital Project Managers at the Finance and Administration Cabinet. Capital Project Managers do not conduct visual inspections, but rather they rely on their review of submitted plans. Currently, the project managers do not require LEED certification because the state wanted to first assure that builders were up to speed enough to build to the standards. The state has considered obtaining LEED professional credentials for HBC state building inspectors.

**GAP #5: Neither a visual inspection for energy features nor LEED certification is being enforced by Capital Project Managers for state buildings.**

**Recommendation:** The Finance and Administration Cabinet should further consider having state inspectors become LEED accredited professionals so that they may assure that buildings meet the state high performance building standards.
Statewide Climate Change & Energy Efficiency Initiatives

In 2008, the Governor released a seven-part energy strategy called “Intelligent Energy Choices for Kentucky’s Future”. If the strategy is fully enacted, the plan will achieve energy independence from imported oil, reduce per capita carbon emissions by 50 percent, optimize use of renewable energy, and more. The first of the seven strategies is to “improve the energy efficiency of Kentucky’s homes, buildings, industries, and transportation fleet”. The goal of this strategy is that “Energy efficiency will offset at least 18 percent of Kentucky’s projected 2025 energy demand.”

Following the release of the energy strategy, in June 2009 the Governor issued via Executive Order 2009-0538 which (among other directives) resulted in a major departmental realignment under the Kentucky Energy and Environment Cabinet (EEC). It established the Department for Energy Development and Independence (DEDI) and six divisions to specifically address the seven energy strategies. If in 2011 Kentucky begins implementing the 2009 IECC and Standard 90.1-2007 statewide (making incremental steps toward 90 percent compliance in 2017), by 2030 CO2 emissions would be reduced by 1.3 metric tons.

The EEC then formed the Kentucky Climate Action Plan Council (KCAPC) in December 2009. The KCAPC has since been developing a Climate Action Plan to make policy recommendations to the Governor to address climate change while becoming more energy efficient, more energy independent, and spurring economic growth. The climate action plan is expected to be complete in early 2011. It will include recommendations on policies the state should adopt, such as model energy codes that allow local jurisdictions to go above the code, continuing programs that allow the government to lead by example, and increasing implementation and enforcement of existing codes. According to Talina Mathews, Assistant Director of Carbon Management Division at DEDI, the draft Climate Action Plan does not include recommendations such as an Energy Efficiency Portfolio Standard or Public Benefit Fund, both of which could provide important funding mechanisms for increased energy code work that needs to occur in the state.

Potential Impact on Pollution Reduction

Electricity use is a leading generator of air pollution. The per capita consumption of residential electricity in Kentucky is among the highest in the nation with more than two-fifths of Kentucky households relying on electricity for their primary energy source for home heating. Rising power demand increases emissions of sulfur dioxide, nitrous oxides and carbon dioxide. Energy codes are a proven, cost-effective policy for addressing these and other environmental impacts.

8 There are three departments within the EEC: The Department for Environmental Protection, Department for Natural Resources, and Department for Energy Development and Independence (DEDI). DEDI now includes these divisions: (1) Division of Efficiency and Conservation; (2) Division of Renewable Energy; (3) Division of Biofuels; (4) Division of Energy Generation Transmission and Distribution; (5) Division of Carbon Management; (6) Division of Fossil Energy Development.
Gap #6: The draft Climate Action Plan does not include recommendations such as an Energy Efficiency Portfolio Standard or Public Benefit Fund, both of which could provide important funding mechanisms that could fund increased energy code initiatives that need to occur in the state.

**Recommendation:** The state should consider adopting policies that will help fund energy code and related energy efficiency policies that will be included in the Climate Action Plan.

While the above programs are the main initiatives related to energy codes in the state of Kentucky, there are a number of other projects that support energy efficiency in the Commonwealth (e.g., the Green and Healthy Schools Program is a voluntary program whereby students work with teachers to collect data and design a program for their schools; and the Green Bank, a revolving loan fund to be used for retrofits to state buildings.)

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

The state of Kentucky has taken great strides in marketing and supporting third-party certification programs such as LEED (for state buildings), ENERGY STAR (for new homes), and Home Performance with ENERGY STAR (for existing homes). DEDI works with universities, home builder associations, and others to promote such programs. Of special note, and with funding and support from DEDI, the Kentucky Housing Corporation (KHC) has designed a well-rounded program that simplifies and incentives single family homeowners to utilize the Home Performance program for existing homes. This program provides training to contractors; streamlines the process for customers by making information about utility and other incentives available to customers at the time of sale; provides ready-made marketing materials for contractors, and more.

In addition, for the past eight years, the Department for Energy Development and Independence (DEDI) has sponsored an annual High Performance Schools Workshop for school decision-makers, architects and engineers planning a new construction or major renovation project. The workshop includes high performance/sustainability concepts and how these building designs benefit the learning environment and building operations.

**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. Of the 5,156 LEED certified buildings in the country, Kentucky has 38 (less than 1 percent of the national total). For LEED registered buildings, Kentucky accounts for 179 of the more than 18,000 projects registered nationally (less than 1 percent). Compared to its neighbors in the southeast, Kentucky has an average number of LEED-certified structures, but less than Florida, Georgia, North Carolina, Texas and Virginia. However, according to a
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. Every one point decrease in the HERS Index corresponds to a one percent reduction in energy consumption compared to the HERS reference home. For example, a home that scores an 85 is 15 percent more efficient than the HERS reference home, and a home that scores zero is a net zero building (see www.resnet.us for more details). Both ENERGY STAR for Homes and Building America intend to increase the stringency of their requirements in the coming months.

Senior Advisor to the Secretary of the Finance and Administration Cabinet, over the past two years, the interest and participation in LEED has increased tremendously, and is expected to continue to rise.33

ENERGY STAR for Homes

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. ENERGY STAR qualified homes are typically 20–30% more efficient than a standard new home.

Kentucky has 7,162 ENERGY STAR homes. This accounts for just over 0.6% of the nation’s number of Energy Star homes. In 2010, 1,809 ENERGY STAR qualified homes were built – or 28 percent of all new homes – an increase in comparison to the 1,639 and 20 percent market penetration in 2009. These homes were constructed by 171 different Energy Star partner builders in the state.34 There are about 46 entities that conduct energy ratings in the state.

The prevalence of ENERGY STAR means that many builders are already building above-code, indicating that the cost and learning curve for such builders will be easier as they transition to the 2009 IECC.

The largest utility in the state - LG&E and KU – offers rebates to builders in their service territory through their Demand Side Management (DSM) program to offset the cost of the energy rating for ENERGY STAR qualifying homes. Since the program began in 2009, they’ve provided more than 1,300 rebates to builders, significantly increasing the number of ENERGY STAR homes in the state.35

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 building industry, 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, though the program’s innovative 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.

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).

According to the Building America website, no homes in Kentucky have been built to Building America specifications.\(^{36}\)

**GAP #7: Third party, above-code energy efficiency programs are underutilized in Kentucky.**

**Recommendation A:** The state should continue and expand its successful efforts to support and encourage the use of voluntary third-party programs that increase the energy efficiency of buildings beyond what the energy code mandates.

**Local Policy**

Local energy code adoption varies greatly from state-to-state. In strong home rule states, local jurisdictions have full authority to adopt energy codes that best fit the needs of their community, while others must meet a statewide minimum first. Other states - like Kentucky, mandate a minimum-maximum energy code that prohibits local jurisdictions from diverging from the state code whatsoever. Most states fall somewhere in between, mandating a minimum code, but allowing some flexibility to go beyond it in progressive jurisdictions.

**Local Adoption Challenges**

Energy codes in Kentucky follow Dillon’s Rule, meaning that the code is established at the state level and amendments at the local level are not allowed (called a “min/max” code in Kentucky). This code prevents local governments from adopting energy codes more stringent or weaker than the state code. While preventing localities from going above code, does make for a strong uniform mandatory statewide code. One consequence of this type of state primacy is that it prevents local governments from adopting mandatory local green initiatives, or adopting the 2012 IECC, ASHRAE Standard 90.1-2010, the International Green Construction Code (IGCC), or ASHRAE Standard 189.

**Gap #8: Cities and counties in Kentucky are not able to exceed state energy code requirements and adopt advanced codes.**

**Recommendation:** Offer local jurisdictions the option of adopting a Kentucky “stretch code”\(^9\) – which is an alternative to the base state-mandated code. Stretch codes provide an alternative to

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\(^9\) 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\(^2\) (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 of less than 3,000 square feet.”
those municipalities that seek to ensure that construction within their boundaries is designed and built above the state standards. Consider requiring that the stretch code utilizes third-party certification programs such as Energy Star, LEED, Core Performance, or Building America (EnergySmart).

**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.

As mentioned above, a stretch code offers an alternative to those municipalities that seek to ensure that construction within their boundaries is designed and built above the state standards.

**Local Climate Change Initiatives**

The Mountain Association for Community Economic Development (MACED) is a non-profit organization that provides financial investments and technical assistance to local businesses to help distressed communities; and to craft solutions that improve communities. MACED is a partner in the Appalachian Carbon Partnership (ACP) which was formed to help promote sustainable forest management in Central Appalachia by connecting family forest owners to the carbon offsets market.

In addition, MACED is currently working on two projects that indirectly support energy codes: (1) MACED is working with four electric cooperatives to launch a program that will allow homeowners to finance energy efficiency improvements on their monthly energy bill - this program will increase 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=Ecops&b=terminalcontent&f=dps_bbrs_build_code_changes_public_hearing&csid=Ecops
demand for energy auditing services and local energy efficiency improvements contractors/providers. 10

(2) MACED’s Energy Efficiency Enterprises (E3) project promotes energy efficiency to small businesses and NGOs located in Appalachian, Kentucky by offering energy audit equipment free of charge, technical assistance to building trade contractors, financing for energy improvements, and energy consulting by a certified energy manager.

Both programs are educating and familiarizing the construction industry in regards to “how to” build energy efficiently, and educating consumers about the benefits.

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

Some cities in Kentucky are acknowledging that their use of energy impacts the climate and are taking steps to reduce city-wide energy usage. Such cities include:

Lexington – has established a GHG inventory for the year 2007, and has a Climate Action Team which is developing recommendations for the city.27

Louisville - its *Partnership for a Green City* is a collaborative effort by three of Louisville’s largest public entities: Louisville Metro Government, the University of Louisville, and the Jefferson County Public Schools. It crafted a city Climate Action Report that includes recommendations such as fast-tracking permitting processes on buildings; incentives building constructed beyond state energy code; stronger energy standards for state buildings; and other code-related recommendations.

Frankfort - its *Mayor’s Task Force* developed recommendations energy efficiency for the city in order to address climate change.

**Current Best Practices**

Kentucky has a number of best practices for adoption that other states can replicate:

- The Board of Housing, Construction and Buildings has adopted the 2009 IECC for commercial buildings (pending final approval by the LRC).
- The HBC has actively involved the building construction industry in the adoption process by having convened a committee that includes builders, architects, energy professionals and HBC.
- At least three cities in Kentucky are demonstrating leadership by formally addressing climate change as a priority that their cities can work toward solving locally.
- The Governor is demonstrating leadership by having released a seven-part energy strategy to achieve energy independence, reduce per capita carbon emissions, optimize use of renewable

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10 The program was designed with lessons learned from the Lawrence Berkeley National Laboratory’s report “Driving Demand”, and by researching other “on-bill” financing programs.
energy, and more. The first of the seven strategies is to “improve the energy efficiency of Kentucky’s homes, buildings, industries, and transportation fleet”.

- The ensuing Kentucky Climate Action Plan Council has made great strides on a Climate Action Plan, and has educated and garnered inclusiveness by including various stakeholders in the process.
- By having more stringent energy standards for state-funded buildings, the Commonwealth is demonstrating fiscal responsibility as tax dollars will be better-spent (through lower energy bills).
- The state has engaged and raised awareness of the importance of energy efficiency in school districts via the KEEPS program, whereby every school district in Kentucky has developed an energy management program to reduce energy consumption.

**Adoption Summary**

The Commonwealth of Kentucky, while currently undergoing its legislatively mandated building code review cycle, has made significant steps toward adopting updated energy codes, which demonstrates leadership towards energy independence.

The Commonwealth of Kentucky stands to gain significant energy savings through the adoption and implementation of the current national model code. As an energy-exporting state, reducing demand for energy across the Commonwealth will allow it to export more locally produced energy – saving individual businesses and families money on their energy bills, while increasing the state’s income.

Kentucky’s current code practice is as a min/max state, which creates a strong uniform statewide mandatory code.

**Implementation**

While energy code adoption is the necessary first step in the energy codes process, it does not guarantee compliance. To achieve the desired energy and financial savings available through energy codes, states and cities must carry out energy code 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**

Under the Kentucky Public Protection Cabinet, the HBC is responsible for establishing and enforcing the statewide standards for building construction, known as the Kentucky Building Code (KBC). The agency also licenses and certifies building inspectors, plumbers, electricians, boiler contractors, and other
building trade professionals. It strives to provide a more effective building inspection process. The HBC’s Division of Building Codes Enforcement (DBCE) is responsible for enforcing codes.

**Outreach**

Energy codes have come a long way, but many people are still unaware of their benefits, including most consumers and some policymakers. Many code officials and building and design professionals are also not educated in building science and don’t fully understand the benefits and requirements of the energy code. 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. DEDI is implementing a number of outreach strategies that impact energy codes as described below.

With funding from DEDI for public education, the Kentucky Cooperative Extension Service travels to events such as state fairs and home and garden shows to promote ENERGY STAR and Home Performance with ENERGY STAR programs. The state extension service has also conducted training for builders. Its offices across the state could disseminate energy efficiency information to the populous.

In addition, DEDI regularly awards builders who achieve ENERGY STAR qualification for new homes. In late 2010, First Lady Jane Beshear attended events to recognize ENERGY STAR homes, raising public awareness of the importance of energy efficiency and encouraging others to take action.

According to Joan Pauley, the Executive Director for the Kentucky chapter of the USGBC “Education is a key need in the state... only then [with education] will a greater understanding come about and we’ll be able to change faster”.

**GAP #9:** There is a lack of demand from consumers for energy codes, due primarily to the low electric rates in the state. 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:** In order to: help increase demand for energy efficient homes; recognize builders; and raise public awareness, the HBC should:

**A:** Provide ready-made information on the importance of energy efficiency, energy codes and voluntary, third-party programs to building departments, so that they can help raise awareness of such programs with their local construction industry.

**B:** Engage contractors, architects and other related 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.
C: Raise public demand for energy efficiency by offering courses on energy efficiency via partnerships with organizations/groups that reach rural areas of the state. The extension service may be a good candidate for partnership due to its history and expertise in offering courses to the public, including energy efficiency courses.

D: Seek publicity (e.g., give awards, distribute press releases) for builders who meet the Builders Challenge qualifications, or other high performance building programs, in order to raise public awareness and drive demand for energy efficiency and raise the bar for advanced homes. This helps give builders who are going the extra mile a competitive edge on builders who are not paying attention to the detail of energy efficiency.

E: Launch a statewide campaign to raise awareness of the benefits of energy efficiency which could include public relations efforts, radio and TV interviews, news releases, and articles.

State’s Role in Promoting Codes

Kentucky has taken a leadership role in promoting energy efficiency as described throughout this report. Its main efforts regarding energy codes specifically include:

- HBC is working with the University of Kentucky to develop training modules for commercial energy code implementation, and in May of 2011 will conduct three days of workshops in Paducah, Bowling Green, Lexington, and Louisville. One day will provide information for building inspection professionals; two days will provide information for design professionals. The HBC is also working with BCAP to develop similar training modules for implementation of the residential energy code, and it is anticipated that workshops will be delivered via technical colleges in the state (to be determined).

- The HBC’s Division of Building Codes Enforcement (DBCE) provides an “Energy Code Workbook” designed to help builders demonstrate compliance with the 2006 IECC. The workbook describes the three possible methods for compliance on the residential side, and one prescriptive path for commercial. This workbook has been adopted by several jurisdictions in the Commonwealth, creating a best practice that many other states are lacking. However, it is unclear how much and whether jurisdictions are utilizing the workbook.

GAP #10: The extent to which local governments promote codes varies widely between jurisdictions. 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: In the same way that DEDI and First Lady Beshear publicly recognizes ENERGY STAR home achievements, DEDI and the First Lady (or Governor Beshear) could give public recognition to those local governments that are taking leadership roles in adopting more stringent codes for municipal owned buildings. Work with Mayors, regional planning commissions, the Kentucky League of Cities and/or other similar groups to raise the awareness of local government leaders about what other municipalities are doing take 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. 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:** 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.

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

The extent to which local governments promote codes varies widely between jurisdictions. Most jurisdictions either do not promote the code, or simply inform architects (or other construction professionals) of the code when they seek a building permit. Local building departments that enforce energy codes may host training seminars when new energy codes are passed. Others go the extra mile by conducting training and education activities for design and construction professionals in order to encourage better energy code compliance. For example, the city of Paducah hosted a one-day seminar for code changes and promoted it through state and local home builder associations. However, turnout for such seminars is typically very low because, as the Deputy Building Inspector of Paducah said “builders would rather not pay someone [their employees or sub contractors] to sit in a building for a day than to pay them to be out building all day.”

**Stakeholders’ Role in Promoting Codes**

Stakeholders can raise awareness of energy efficiency issues, often directly to energy consumers. When consumers start caring about energy issues, it increases demand for energy-efficient construction, which creates an environment in which improved construction practices and techniques required to meet the provisions of the latest energy codes become standard practice. This, in turn, allows for the adoption and implementation of even more efficient energy codes.

While the Division of Building Codes Enforcement (DBCE) (under the HBC Public Protection Cabinet), is responsible for building codes, and Department for Energy Development and Independence (DEDI) (under the Kentucky Energy and Environment Cabinet (EEC)) promotes multiple outreach and training initiatives in the state, these additional organizations have a stake in energy codes in Kentucky: BCAP - recent work in Kentucky is described in the State’s Role in Promoting Codes section above.

- **Kentucky Housing Corporation (KHC)** works with lenders, nonprofit housing providers, builders, real estate agents, community organizations, developers to create affordable housing opportunities through programs and services. It also administers the Kentucky Home Performance program, which works with builders, lenders, utility companies and contractors to
streamline the process for single-family home owners in making energy efficiency improvements to their houses.  

- **Kentucky Community & Technical College System (KCTCS)** is the largest provider of higher education and workforce training in Kentucky. One of KCTCS’s strategic goals in its 2010-2016 Strategic Plan is to: “Enhance the economic and workforce development of the Commonwealth”. As such, and in partnership with the KHC’s Kentucky Home Performance program, its 16 colleges located on 68 campuses offer additional educational opportunities for the construction industry such as Building Performance Institute (BPI) training for building analysts/energy auditors. It plans to offer a Building Science Engineering program in the future.

- **The Code Administrators Association of Kentucky (CAAK)** has more than 600 members in the building inspection and construction industry trades. It hosts two meetings annually to offer continuing education credits for code officials and regional meetings across the state throughout the year. CAAK works with the HBC to host training for builders in conjunction with local HBAs.

- **The Home Builders Association of Kentucky (HBAK)** has about 6,400 members comprised of construction industry professionals and manufacturers (membership has dropped since the high of 7,400 members in 2006). HBAK collaborates with CAAK to host nine code training seminars regionally throughout the year. It has a “Registered Builder Program” which is a voluntary program that requires builders to offer buyers a contract, warranty, and to submit to conciliation if needed, and to obtain six hours of continuing education credit annually. According to the Executive Vice President of HBAK, most of their members participate in this program. They also have a “Green Build Kentucky” program to promote energy efficient and green building practices among builders, subcontractors, suppliers and lenders via NAHB Green Building Guidelines.
  - Notably, the Home Builders Association of Lexington has taken a leadership role in promoting energy efficiency in new homes – it works with the state to support the Energy Star Home Performance program efforts, provides educational opportunities for its members, and hosts an annual ENERGY STAR conference attended by about 400.

- **The Kentucky League of Cities** is an association of 382 Kentucky cities. It collaborates with local, state and national organizations and works with businesses on various city interests. It has not been involved in the energy code thus far, but the director of policy development during an interview for this report, expressed interest in assisting the HBC in reaching its members to promote energy codes.

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11 For more information about the Home Performance program, see http://www.kyhomeperformance.org/.

12 For more information about the conference, see http://www.midwestenergyconference.com/.
• **Louisville Gas and Electric and Kentucky Utilities** is the largest energy services company in the state. Its website promotes the ENERGY STAR for New Homes Program.

• **Kentucky Sustainable Energy Alliance (KySEA)** is working to promote legislation that would establish a Renewable Portfolio Standard (RPS) and an Energy Efficiency Resource Standard (EERS).

• **The Mountain Association for Community Economic Development (MACED)** (described in the Local Climate Change Initiatives section of this report).

• **The State Extension Service** The State Extension Service is the outreach arm of the University of Kentucky and offers educational programs to residents in all 120 counties. It has a history and expertise in offering courses to the public and contractors, and attends public events to promote the ENERGY STAR and Home Performance programs.

• **The International Code Council (ICC)** provides education and certification for construction-related professionals. Code officials, building inspectors, design professionals and others are certified and maintain certification through continuing education credits as required by the ICC.

• **Midwest Energy Efficiency Alliance (MEEA)** is a not-for-profit organization that bridges the gap between policy adoption and program implementation by promoting market penetration of energy efficient technologies, processes and best practices within a 13-state region. In the past ten years, MEEA has provided nearly 16,000 days of training for more than 2,300 contractors. It works with all stakeholders related to energy efficiency from manufacturers, state and local governments, utilities, and academic institutions.

• **The Southeast Energy Efficiency Alliance (SEEA)** promotes energy efficiency policies and practices in the Southeastern region of the United States by working with businesses, utilities, governments, public utility commissions, energy service companies, manufacturers, retailers, energy and environmental organizations, low-income energy advocates, large energy consumers, and universities.

**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**

The Commonwealth of Kentucky is unique because the primary enforcement structure for codes is at the state level via the HBC’s Division of Building Codes Enforcement (DBCE) but enforcement...
responsibilities are shared with some city and/or county governments that have local building inspection programs. According to the DBCE, “A building permit is required when you intend to construct, enlarge, remodel or change the occupancy of a building, or to erect, install, enlarge, alter, repair, remove, convert or replace any electrical, gas, mechanical or plumbing system.” Commercial projects involving new structures, additions or renovations require architect and/or engineer’s seal when the building size or occupant load exceeds certain limits as prescribed by the KBC.

At the state level, the DBCE conducts plan reviews, inspections and enforces building codes for all buildings with occupancy loads over 100 persons (e.g., commercial and multi-family residential buildings). DBCE also enforces codes for all daycare centers, state owned educational institutions, elementary, middle and high schools, health care and correctional facilities and all state owned or leased buildings, high hazard buildings, industrialized building systems, and institutional buildings.

While plan reviews are conducted in Frankfort, inspections are conducted by 16 regional code inspectors that cover all 120 counties in Kentucky. The DBCE provides a fee inspection worksheet to permit applicants; the minimum fee is $250.

Although the state does not enforce low-rise residential buildings, such buildings are required to be in compliance with the state code. Enforcement of the residential code for detached single-family dwellings, two-family dwellings and townhouses is the responsibility of local building departments that have been granted authority by the HBC to enforce such codes. Although complying with the code is mandatory for all construction projects, in some places there is simply no enforcement of the residential codes. According to a representative at the HBC, “About 60 percent of the state has no residential code enforcement.”

Any local government may petition the commissioner of the DBCE to request responsibility for plan review and inspection functions for residential buildings; or to take over the commercial review and inspection duties from the DBCE. Therefore, some local jurisdictions enforce only the residential code; some enforce only the commercial code; and some enforce both. The term “Expanded Jurisdiction” applies to those local governments that enforce both the residential and commercial building codes. Expanded jurisdiction agreements are renewed every three years. As of November 2010, 29 jurisdictions have Expanded Jurisdiction programs, including Bowling Green, Lexington/Fayette, Louisville Metro, and Puduech. In areas of the state without a local building inspection program, all commercial construction projects must be submitted to the DBCE for review and approval prior to the start of a construction project.

The DBCE and local building inspection programs do not conduct special energy code inspections, but rather compliance is determined during plan reviews, and through submission of COMcheck, REScheck or similar paperwork. Visual inspections for energy code features are rolled into other inspections or do not happen at all. For example, some code officials reported that air sealing is visually inspected during a framing inspection, and other reported that they don’t inspect for air sealing. In addition, without a special energy inspection, other energy features are often covered up before an inspector sees them. For example, as one Deputy Building Inspector said, “We don’t see the R value on insulation – we trust
builders to follow the plans to a certain extent. The in-wall insulation you can’t see, but attic and
crawlspace and foundational inspection we’re able to see.” Another Building Inspector in Owensboro
said “It’s on an honor system as to whether they’re putting R-19 or other in the walls, but during final
we see the attic, basement at that point.” Budget and personnel issues are key challenges to code
enforcement. Local building inspection programs set their own fees, which often do not cover all the
costs associated with operating the programs.

No local building program may enforce plumbing, elevator or manufactured housing – those inspections
are all conducted by state inspectors.

**Gap #11:** The state’s regional inspectors do not conduct visual in-person energy code inspections;
and the state building department does not conduct any special inspections for the energy code.
Rather, energy items are rolled into other inspections, such as structural or mechanical. As such,
inspectors often are not able to inspect for such items as proper air sealing or R-values on wall
insulation before they are covered up by drywall.

**Recommendation:** The state’s regional inspectors should conduct visual inspections to ensure that
energy features are properly installed. The DBCE should develop an inspection schedule that
includes inspections for energy features to assure that energy features are visible during
inspections. These inspectors should attend building science training in order to fully understand the
benefits of energy codes and the importance of correct and detail-oriented installation (e.g., high
quality air sealing and insulation installations).

**GAP #12:** Energy codes are not considered to be as high a priority as health-safety-welfare codes,
and as such, the inspection for energy features is often not given the same level of stringency.

**Recommendation A:** Regional inspectors should be made aware that energy codes should be
considered as high a priority as other life/safety codes. The state should consider doing spot checks
of local building programs to heighten awareness and importance of energy code enforcement.

**Recommendation B:** Demonstrate support for advanced buildings by supporting third-party
certification programs - encourage local inspection programs to build support at the local level by:

- Expediting the permitting process for builders who build to Builders Challenge or Energy Star (or
equivalent).

- Accepting 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).

- Reducing 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.
Gap #13: An energy code inspection is not conducted by state code officials for single family dwellings; in areas without a local building inspection program there is no residential enforcement.\(^{13}\)

Recommendation: The state should consider options to ensure statewide enforcement of the residential energy code. Considerations could include: (1) expanding state inspectors’ role to include regions without residential code enforcement; (2) expanding the role of the newly hired HVAC inspectors; and (3) engaging third-party energy inspectors (such as RESNET energy raters) to perform energy inspections in areas without a local building inspection program.

Certification and/or Licensing

The Commonwealth of Kentucky requires building inspectors to be certified as mandated by the uniform state building code. The HBC administers the building inspector’s certification program, which is designed to ensure uniform statewide enforcement of applicable state building codes. In order to become a licensed code official, a candidate must submit: (1) a completed application form; (2) $50 application fee; and (3) written proof that the applicant has met the following requirements:

- Possesses a high school diploma or has earned a general education diploma; and
- Has three years experience in a responsible, directly related construction position, such as a foreman, which required the ability to effectively read and interpret building plans and specifications; or
- Has three years experience in an architect’s or engineer’s office performing building design or drafting duties; or
- Graduated from a college or university with an associate degree in a design or construction related subject; or
- Graduated from a college or university with a bachelor’s degree in architecture, engineering, fire science, or building technology.

Local building inspection programs must have at least one state certified inspector. The HBC must be assured that local governments have qualified personnel to provide the level of inspection and/or plan review functions as outlined within the statute.

HVAC inspectors must be licensed or certified in accordance with the provisions of KRS 198B.650 to 198B.689, and have either (1) at least six years experience as a licensed heating, ventilation and air conditioning journeyman mechanic or a licensed master heating, ventilation, and air conditioning contractor; or (2) be a certified building inspector who has successfully passed the examinations relating to heating, ventilation, and air conditioning systems.

\(^{13}\) HBC does conduct plan review and inspections for two-family dwellings and townhomes.
Code officials are not required to have specialized knowledge of energy efficiency. In interviews conducted for this report, it seems that different localities enforce the energy code differently and that inspectors – if they look for insulation at all – may not know the importance of how the insulation is installed.

**GAP #14: Some code officials lack a solid understanding of energy codes and building science.**

**Recommendation A:** Given the chronic shortage of resources devoted to code enforcement, helping code officials maximize their ability to properly enforce the code should be a priority. Following the recommendations of #11 and #12 above, the state should ensure that building officials conducting residential enforcement at local building departments are well-educated in building science and the energy code so that they can fully enforce the energy code, including identifying whether energy features are properly installed.

**Recommendation B:** Assure that local building departments are well educated in energy codes by increasing the knowledge of building officials.

- Require code officials to pass the ICC Energy Inspector certification test.  
- Require code officials obtain ongoing *energy code education* as part of their CEU requirements (CEUs).

**Training and CEUs**

Code officials must obtain 12 continuing education hours annually. They typically obtain their hours by seminars offered by CAAK. CAAK hosts two meetings per year where code officials can obtain their 12 hours. Additional one-day meetings are held across the state and offer six credits per meeting.

**Gap #15: Code officials are not required to be ICC certified as energy code inspectors.**

**Recommendation:** The HBC should require that local building department inspectors are educated in energy codes by requiring code officials to pass ICC certification tests.

**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.

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14 Most local jurisdictions do this, but the state could reinforce this requirement.

15 HBC is in the process of requiring code officials to be ICC certified as energy code inspectors.
According to the ENERGY STAR website, there are 46 entities that conduct energy ratings in the state.\textsuperscript{16} Twenty-five of these organizations or companies are registered with RESNET.\textsuperscript{39} The Residential Energy Services Network (RESNET) provides federally recognized third-party rating services to assess building energy performance. Its website provides information about energy audits and the energy rating process, as well as a list of certified energy auditors, raters, and qualified contractors and builders.

Some utility companies in Kentucky offer rebates to offset the cost of third-party testing. For example, the largest utility in Kentucky LG&E and KU has taken a leading role in the promotion of the ENERGY STAR for New Homes program by offering rebates to builders to offset the cost of having these homes tested. Since they became involved, the number of new homes seeking the ENERGY STAR rating has increased dramatically. (However, they only offer rebates in LG&E and KU service territory.)

**Local Implementation Spotlight**

Interest in energy efficiency seems to be growing in Kentucky. Some notable indications include:

- In the city of Louisville, the Urban League conducted a training seminar for about 100 attendees on energy efficiency, sustainability, resource management. The seminar was called “Green Advantage” and was funded by Wal-Mart.

- There are 87 ENERGY STAR schools in Kentucky. Some notable examples include: Richardsville Elementary in Warren County (near Bowling Green) -- one the nation’s first net-zero energy public schools. The school expects to sell excess power produced by solar photovoltaic panels to the Tennessee Valley Authority at about 22 cents per KWh\textsuperscript{40}; T.C. Cherry Elementary is a model sustainable school operating below the average school cost in Kentucky; anda net-zero energy school is designed for Kenton County.

**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. Such agencies have the opportunity to provide builders and contractors with 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.

\textsuperscript{16} Not all ENERGY STAR rating providers are certified through RESNET.
Overview of Design/Construction Community Infrastructure

State officials have made extensive efforts to collaborate with builders in Kentucky, resulting in a more positive relationship between regulators and builders than exists in other states. In addition DEDI has worked with the (previously mentioned) Kentucky Community & Technical College System (KCTCS) to offer Building Performance Institute (BPI)\textsuperscript{17} training programs at community colleges.

Code officials in Kentucky report that they are frustrated that builders are not required to be licensed nor obtain CEUs. According to one “\textbf{Anybody who picks up some sort of tool can become a rebuilder or home builder.}” Another said “So much is done just because that’s the way they’ve done it forever. “

While building officials are the enforcers of codes, they do not feel it is their responsibility to educate builders. As one said “\textbf{It’s not our job to teach builders how to build... or select materials.}” According to another code official, builders generally do not have an interest in building more efficient homes and are not selling energy efficiency to customers but they do have energy to fight against more stringent energy codes.

The Home Builder’s Association of Kentucky (HBAK) has a volunteer “Registered Builder Program” which requires builders to offer a contract and warranty to buyers, and obtain six hours of continuing education credits annually. According to Bob Weiss, Executive Vice President of HBAK, most of their nearly 2,000 builder members participate. However, not all builders are members of the HBAK - according to one code official in Paducah, “only about 10 percent or less of contractors participate in these [HBA] organizations. So unless you can somehow catch them in the field... you can’t reach them”.

\textbf{GAP #16: Builders are very difficult to reach with training and other opportunities.}

\textbf{Recommendation:} \textit{To build upon communication with builders,} the state could continue and expand its work with the HBAs 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.

Typically, design and construction professionals respond to the stringency placed on codes by the local inspection departments. 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.

\textbf{GAP #17: Builders are not licensed.}

\textsuperscript{17} BPI is an independent organization helping to create “green collar” jobs by accrediting individuals (and companies) to perform energy audits and make energy efficiency recommendations for existing homes.
**Recommendation A:** Require contractors to be licensed and recertified with every three-year code update.

**Recommendation B:** Incentivize builders to invest in education for their staff and subcontractors by providing cash incentives to contractors that attend energy code training (especially important given the busy schedules of contractors, and the fact that contractors don’t need CEUs).

**Recommendation C:** The state could work with builders who are interested, and launch a full campaign to increase consumer demand for more efficient housing is necessary. See Outreach section above.

Many builders have gone out of business or are doing more remodeling than building of new homes. Of those who have survived appear to be the higher quality builders. Some are ENERGY STAR for Homes partners and are prioritizing funds to train their employees on building to this standard. This sets them apart in the marketplace. These builders must bring in HERS raters and other third party inspectors at their own cost, but are able to recoup the additional investment through a higher sale price for consumers who want a better quality home with lower operational costs. 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. However, according to one state official interviewed for this report, “many builders participating in ENERGY STAR or LEED were already building to the higher standard to begin with. They say: ‘I might as well get credit for what I already do’ and sign up for a third-party program.” It is unclear whether third-party labeling programs are influencing lower-quality builders to move to a higher quality in order to achieve a third-party label.

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. In research for this report, we were unable to confirm that architects are receiving any education on energy codes.

**GAP #18:** Architects, although ideally positioned to include energy efficiency 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:** Collaborate with (and perhaps provide additional funding for) community colleges (especially any that have recently received grants for “green jobs” training) to coordinate and encourage the inclusion of energy code training (and/or RESNET training\(^\text{18}\)) for students who may become code officials or building professionals upon graduation. Structure the collaboration to

\(^{18}\) RESNET certified home energy raters are able to qualify homes for the Energy Star program.
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 Kentucky.

**Recommendation B:** Work with AIA to gain their continued, long-term support of the continuing education courses on energy codes being developed with the University of Kentucky (for commercial buildings) and BCAP (for residential dwellings) in the longer term, cultivate the relationship with AIA and the NAAB to get energy code education added as a core requirement to becoming a licensed Architect.

**Certification, Licensing, Training, and CEUs**

The state requires certain aspects of building construction to be conducted by licensed professionals, including installers of: HVAC, plumbing, sprinklers, electrical, mechanical, elevators, boilers, tank installations, and welding. Requirements for each trade vary, and most require professionals to obtain continuing education requirements and renew their license annually.

The Kentucky Board of Architects administers licenses for about 2,500 registered architects in the state. In order to be licensed, architects must: (1) Have an architect’s degree from a National Architectural Accreditation Board (NAAB) accredited program; (2) Complete a NCARB’s Intern development program; (3) Pass the Architectural Registration Examination (ARE). Architects must obtain 12 professional development units per year – eight of those must be in health, safety, welfare (of which energy efficiency and “sustainable” design is considered applicable). These requirements may change in the next year to require all professional development units be in health, safety and welfare. Becoming a LEED accredited professional will count for eight credits.

The Kentucky Board of Engineers and Land Surveyors administer the licenses for registered engineers. In order to be licensed, engineers must: (1) Hold an EAC/ABET accredited engineering degree; (2) Pass the Fundamentals of Engineering Examine; (3) Have 4 yrs experience in field; (4) Pass the Principals and Practice Engineering Examine. Engineers must renew their license every two years and must have 15 hours of continuing education credit hours and pay $150 for renewal.

Licensed HVAC installers are required to obtain eight hours of continuing education credits annually and renew their license.

**GAP #19: Some construction personnel lack proper training on the latest approaches to building more efficient homes.**

**Recommendation A:** Encourage your building industry trades professionals to attend a Building America sponsored training course and by implementing the approaches to construct the best homes possible. 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 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% stipend 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.
- 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.)
- 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. This is an important aspect of raising consumer awareness and demand for more efficient homes, while acknowledging builders who make efforts to “above and beyond” what’s required by code.

**Recommendation B:** Provide a calendar of educational events on energy codes and market it to targeted construction industry groups.

**Recommendation C:** Consider partnering with the HBAK’s builder certification program to enhance the quality of homes build by these builders. This could include requiring that half of their 6 hours of CEU credits be in energy efficiency or energy code seminars and that state could provide incentives for builders to attend classes. Consider partnering with HBAK to create a higher tier for builders that build ENERGY STAR homes, and provide awards and outreach to media for those builders that participate.

**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 code compliance. No energy code compliance studies are known to have been conducted.

To achieve 100 percent compliance with the energy code, Kentucky needs to determine both the current overall level of compliance, and the specific areas of strength and weaknesses in construction to help tailor training and support activities. The ability to target training would maximize resources in those areas that need the most help. As well, partnering with CAAK, as well as home builder associations, and other groups would help to make strides in statewide compliance.

**GAP #20:** There is not a method in place to measure and evaluate compliance with the energy code.

**Recommendation:** Measure and verify compliance to improve compliance

- Implement recommendations from DOE’s guidance on measuring energy code compliance.
- 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 #21:** Kentucky does not have a funding mechanism to implement many of the recommendations within this report.

**Recommendation A:** As part of educating policy-makers in the state, a Public Benefit Fund 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 Kentucky.

**Recommendation B:** As previously noted in this report, EERS legislation that mandates Independently Owned Utilities (IOUs) to increase energy efficiency could result in funding for some of these efforts. The appropriate agency should investigate opportunities to credit utilities for their support of energy codes. If utilities (subject to EERS goals) were able to claim credit toward their EERS goals, their portion of the EERS 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

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19 The actual amount of energy efficiency credit earned toward EERS goals could be determined via the actual energy rating or other documentation provided for LEED certification or ENERGY STAR compliance.
each LEED certified building), or community-by-community (for every ENERGY STAR or equivalent home /development).

Current Best Practices

- HBC has successfully working with state HBAs and has a more positive relationship with builders than in other states.
- DEDI has developed a collaborative relationship with AIA and partnered with it for special energy events/contests. AIA will soon offer continuing education credits for courses being developed on energy codes (in collaboration with the University of Kentucky (for commercial buildings) and BCAP (for residential dwellings).
- DEDI recognizes every ENERGY STAR building built, and has involved the First Lady in public events to raise awareness and support for energy efficiency.
- The Kentucky Housing Corporation offers a well-rounded Home Performance with ENERGY STAR program to incentivize home owners to invest in energy efficiency.
- With support from DEDI, the Kentucky Community & Technical College System (KCTCS) has made energy auditing/analysis certification and training a priority for construction professionals and related professionals at its network of 16 colleges on 68 campuses.
- The HBC requires code officials to obtain Continuing Education credits, which is an opportunity to keep them apprised of the latest technological or policy developments.
- The HBC’s DBCE provides an “Energy Code Workbook” designed to help builders demonstrate compliance with the 2006 IECC.
- State buildings are required to achieve LEED standards, helping to familiarize the construction industry personnel and create demand for greater energy efficiency products and services.
- The largest utilities in the state provide rebates to builders to offset the testing costs associated with qualifying new homes for the ENERGY STAR mark which has helped increase use of the program.
- The HBC’s DBCE advertises free ICC code books on the front page of the Building Codes Enforcement webpage (http://dhbc.ky.gov/bce/).
- The Governor’s Seven Part Strategy has led to momentum and important consideration of a Climate Action Plan which would include improving the energy efficiency in buildings through more stringent codes and incentives for above-code buildings.
- The HBC has specific requirement of building inspectors, to assure they have experience and education.
- Whenever the energy code is updated, the HBC provides training and requires certified building department personnel to attend. Technical staff at the HBC are available to support local building departments.
- The HBC is developing training seminars for both commercial and residential energy codes, and will conduct workshops (on the commercial energy code) in major cities beginning in May 2011 for building inspection professionals as well as design professionals. Video module training courses will also be made available online, free of charge.
• The state has two ready-made structures in place for statewide coverage for building inspections: (1) regional HVAC inspectors and (2) regional building inspectors.
• The largest utilities in Kentucky reimburse builders for the testing costs associated with achieving an ENERGY STAR rating for new homes.
• HBC is working with the University of Kentucky to develop training modules for commercial energy code implementation; and
• The HBC is also working with BCAP to develop similar training modules for implementation of the residential energy code, and it is anticipated that workshops will be delivered via technical colleges in the state (to be determined).

Conclusion

Building energy codes are one of the easiest and most cost-effective ways for Kentucky to secure its energy future. Compliance with the code not only helps consumers and businesses save money on their energy bills, it also reduces pollution and peak loads, resulting in a cleaner environment and a more stable and diverse energy supply.

Kentucky is moving toward adoption of the 2009 IECC as policy tool for improving the state’s commercial buildings. It should also adopt the IECC 2009 residential code; strengthen the state’s adoption process; promote above-code adoption for public buildings and at the municipal level; support successful enforcement of and compliance with the code through training, resources, and clear state-level guidance; and increase consumer demand for code compliance. These actions will result in greater energy efficiency for new construction and renovations, as well as save Kentucky’s citizens and businesses money and strengthen the state economy.

While the state has rightfully focused on adopting codes, it has not spent an equal amount of effort teaching and supporting the building industry as they become accustomed to implementing energy codes. If the HBC or other state agency were to provide a way for builders to access free technical assistance, training and other support that includes showing builders how energy efficiency will sell more homes, it would go a long way toward building buy-in with contractors. Such an effort will require financial incentives, marketing assistance, and other support.

The recommendations made in this gap analysis, summarized in the table below, are meant to guide state officials and other Kentucky stakeholders as they work to support improved code adoption and implementation and begin the process of developing a compliance action plan. Though some recommendations may require increased funding over an extended period, a careful, comprehensive action plan that leverages existing infrastructure and provides the state with realistic funding mechanisms will help ensure that new construction in the state achieves 100 percent compliance with the model energy codes now and in the future.
Acknowledgments

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

State officials also collaborated in the production of this report, providing comprehensive background information, local stakeholder’s contacts, and ongoing review of our work. In particular, we would like to acknowledge the aid of the Department of Housing, Buildings, and Construction, especially Ray Whitener, Ric McNees, George Mann, and Housing Board member Jerry Taylor. We appreciate the contributions from the Department for Energy Development and Independence, particularly John LeFevre, Anna Harmon, Lee Colten, Talina Mathews; Kenya Stump at the Division of Compliance Assistance, Air Quality; and the contributions from Rex Cecil of the Kentucky Board of Architects; Melissa Kopp with the Kentucky Board of Engineering; Greg Dunbar with the Kentucky Department of Education; Paul Kaplan of the Administration and Finance Cabinet; Ron Willhite of the Kentucky School Boards Association; Andrew Isaacs of Kentucky Housing Corporation; and Fred Byrd with the KEEPS program at the University of Louisville.

We appreciate the assistance from Isaac Elnecave with the Midwest Energy Efficiency Alliance; Jeff Fugate at the Mountain Association for Community Economic Development; Bill Cooper at LG&E and KU; Joe Ewalt at the Kentucky League of Cities; and individuals from the University of Kentucky - Dr. Robert Fehr at the Biosystems and Agricultural Engineering Department; Dr. Gary Palmer and Ashley Osborne in the Agriculture and Natural Resources Department.

We thank the EPA’s Jonathon Passe and Jack Barnette, and Building America’s George James and Terry Logee, as well as Joe Nebbia with Newport Partners, LLC and Eric Makela with the Pacific Northwest Laboratory for their contributions. We appreciate the contributions of AIA staff Joan Pomarance, Mark Wills, and Angie Taylor; and the ICC’s Darren Meyers and Corey Robley.

We also thank Joan Pauley and Chris Tyler of the Kentucky chapter of the US Green Building Council; Bob Weiss with the Kentucky Home Builders Association; and Sandy Beck of the Home Builders Association of Lexington.

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 officials were Keith Free and Kyle Trunnell in Owensboro; Les Frugate in Paducah; Mike Carpenter of the Northern Area Planning Commission; Glenn Burns in Bowling Green; Joe Lillis in Richmond.

Cover page image taken in Warrenville, IL courtesy of Flickr Creative Commons, by photographer Michael Kappel. www.mikekappel.com
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.
   http://www.energycodes.gov/publications/resourceguides/

Energy Code Compliance Training Materials:
1. Commercial PowerPoint Training with links to videos
2. Residential PowerPoint Training with links to videos
3. DOE Guidance for State Compliance Measurement Efforts

Primer on Rescheck and Comcheck
1. Commercial Compliance
   http://www.energycodes.gov/comcheck/
2. Residential Compliance
   http://www.energycodes.gov/rescheck/

Available Downloads
1. Commercial Basic Requirements Download
   http://www.energycodes.gov/comcheck/download.stm
2. Residential Basic Requirements Download
   http://www.energycodes.gov/rescheck/download.stm

Users Guides
1. COMcheck Software Guide
2. REScheck Software Guide
Plan Check and Field Inspection

   http://www.energycodes.gov/training/pdfs/comm_review_guide1.pdf
2. Residential Plan Review Quick Reference Guide
3. Code Notes
   http://www.energycodes.gov/help/notes.stm

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30 http://bcap-ocean.org/state-country/kentucky
31 http://www.usgbc.org/LEED/Project/CertifiedProjectList.aspx
32 http://www.usgbc.org/LEED/Project/RegisteredProjectList.aspx
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