This page has been intentionally left blank.
# TABLE OF CONTENTS

- Acronyms and Abbreviations .................................................................................................................. 5
- About the Gap Analysis Report ................................................................................................................ 7
- Executive Summary ...................................................................................................................................... 8
- Summary of Recommendations .................................................................................................................. 11
- Introduction ................................................................................................................................................ 16
- National Perspective on Energy Codes ..................................................................................................... 17
  - Federal Policy ........................................................................................................................................... 19
  - EPAct ....................................................................................................................................................... 19
  - The Recovery Act ..................................................................................................................................... 19
- State Overview ........................................................................................................................................... 20
  - Climate ..................................................................................................................................................... 20
- State Energy Portfolio .................................................................................................................................. 21
  - Production .............................................................................................................................................. 21
  - Consumption and Expenditures .................................................................................................................. 21
- Construction Overview ............................................................................................................................... 25
- Comprehensive Energy and Climate Plans .................................................................................................. 26
  - State-Level Plan ...................................................................................................................................... 26
  - Local Efforts .......................................................................................................................................... 27
- Stakeholders ............................................................................................................................................... 28
- Oklahoma’s Energy Code ............................................................................................................................ 30
  - State Energy Code .................................................................................................................................. 30
  - Code Adoption Process and History ........................................................................................................ 31
  - Code Adoption Timeline ........................................................................................................................... 32
  - Residential Energy Code .......................................................................................................................... 33
  - Commercial Energy Code ........................................................................................................................ 33
- Political Environment ................................................................................................................................. 34
- Local Energy Code Adoption ....................................................................................................................... 35
- Public Buildings .......................................................................................................................................... 36
- Potential Savings from Energy Codes ........................................................................................................ 38
Residential Buildings

State-Level Savings Estimates

Code Administration

Division of Responsibilities

Outreach

Policymakers

Building Industry Professionals

Consumers

Enforcement

Enforcement Status

Commercial Construction

Residential Construction

Public Buildings

Barriers According to Enforcement Professionals

Lack of Priority

More Training Needed

Municipal Government System

Industry Support and Above Code Programs

Certification and Licensing

Training and Education

Above Code Programs

Measurement and Verification

Past Activities and Examples in the Region

Conclusion

Acknowledgments

Appendix A

References
<table>
<thead>
<tr>
<th>ACRONYMS AND ABBREVIATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACEEE – American Council for an Energy-Efficient Economy</td>
</tr>
<tr>
<td>AIA – American Institute of Architects</td>
</tr>
<tr>
<td>ARE – Architect Registration Examination</td>
</tr>
<tr>
<td>ARRA – American Recovery and Reinvestment Act of 2009</td>
</tr>
<tr>
<td>ASHRAE – American Society of Heating, Refrigeration, and Air-Conditioning Engineers</td>
</tr>
<tr>
<td>AWC – American Wood Council</td>
</tr>
<tr>
<td>BCAP – Building Codes Assistance Project</td>
</tr>
<tr>
<td>BECP – Building Energy Codes Program</td>
</tr>
<tr>
<td>BIH – Oklahoma Bring It Home Initiative</td>
</tr>
<tr>
<td>CEUs – Continuing Education Units</td>
</tr>
<tr>
<td>CAP – Oklahoma DCS Construction and Property Division</td>
</tr>
<tr>
<td>CIB – Oklahoma Construction Industries Board</td>
</tr>
<tr>
<td>COG – Councils of Government</td>
</tr>
<tr>
<td>CPA – Compliance Planning Assistance (CPA) Program</td>
</tr>
<tr>
<td>DCS – Oklahoma Department of Central Services</td>
</tr>
<tr>
<td>DOE – U.S. Department of Energy</td>
</tr>
<tr>
<td>ECA – Energy Coordinating Agency</td>
</tr>
<tr>
<td>EE&amp;C – Energy Efficiency and Conservation</td>
</tr>
<tr>
<td>EECBG – Energy Efficiency and Conservation Block Grants</td>
</tr>
<tr>
<td>EIA – U.S. Energy Information Administration</td>
</tr>
<tr>
<td>EPA – U.S. Environmental Protection Agency</td>
</tr>
<tr>
<td>FHA – Federal Housing Administration</td>
</tr>
<tr>
<td>GBA – Green Building Alliance</td>
</tr>
</tbody>
</table>
HERS – Home Energy Rating Score
HPwES – Home Performance with ENERGY STAR
IBC – International Building Code (Chapter 13 – Energy Efficiency)
ICC – International Code Council
IECC – International Energy Conservation Code
IRC – International Residential Code (Chapter 11 – Energy Efficiency)
LEED – Leadership in Energy and Environmental Design
OAC – Oklahoma Administrative Code
OCEAN – Online Code Environment and Advocacy Network
ODOC – Oklahoma Department of Commerce
OG&E – Oklahoma Gas and Electric
OSE – Oklahoma Office of the Secretary of Energy
OSHBA – Oklahoma State Homebuilders Association
OSN – Oklahoma Sustainability Network
OUBC – Oklahoma Uniform Building Code
OUBCC – Oklahoma Uniform Building Code Commission
PNNL – Pacific Northwest National Laboratory
PSO – Public Services Company of Oklahoma
SEP – State Energy Program
SPEER – South-central Partnership for Energy Efficiency as a Resource
TPA – Third-party agency
TSD – Technical Support Document
USGBC – U.S. Green Building Council
WAP – Weatherization Assistance Program
ABOUT THE GAP ANALYSIS REPORT

The Building Codes Assistance Project (BCAP) is a nonprofit 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 is headquartered at the Alliance to Save Energy in Washington, D.C. with satellite staff in Albany and Toledo.¹

BCAP strives to be the premier resource for energy code support, coordination, technical assistance, news and information. Our mission is to reduce the energy consumed in the construction and operations of buildings by working with national, state, and local governments and other stakeholders to promote the adoption and implementation of building codes and standards.

Through funding from the U.S. Department of Energy, BCAP partnered with the Oklahoma Department of Commerce as part of the Compliance Planning Assistance (CPA) Program, through which BCAP works with states to help them take practical steps towards achieving full compliance with the model energy codes.²

The CPA Program is divided into two phases:

1. **Gap Analysis Report:** Documents the state’s existing energy code infrastructure to assess the current gaps, identify best practices, and offer initial recommendations for improvement.
   2. **Strategic Compliance Plan:** Develops targeted, state-specific plan with practical near- and long-term action items to move the state towards full energy code compliance.

This Oklahoma Gap Analysis Report and the Oklahoma Strategic Compliance Plan (also published in November 2012) work in tandem for stakeholders to consider the policy recommendations of the Gap Analysis and put them into work through the Strategic Compliance Plan’s five-year roadmap for energy code policy implementation in the state. Together they recommend tasks within various focus areas that state agencies, local jurisdictions, and other stakeholders can take to achieve full compliance with the model energy code policies.
The purpose of the Oklahoma Gap Analysis Report is twofold: 1) to document and analyze the unique strengths and weaknesses of the state’s existing energy code adoption and implementation infrastructure and policies; and 2) to recommend actions that state agencies, local jurisdictions, and other stakeholders can take to support and encourage local jurisdictions to adopt, enforce, and improve compliance with model energy codes. The report also details some of the state’s current best practices and offers specific recommendations for actions that would improve the energy efficiency of the state’s built environment.

During research for this report, the Building Codes Assistance Project (BCAP) conducted in-depth interviews with numerous government officials, home builders, code enforcement professionals, municipal representatives, and other key stakeholders.

Introduction (page 16) provides an overview of the amount of energy residential and commercial buildings consume, the amount of money Oklahoma spends on imported energy, and a broad perspective on the status and importance of energy code adoption, enforcement, and compliance.

National Perspective on Energy Codes (pages 17-19) provides a comparison of Oklahoma’s energy code adoption status to other states in the United States. It describes the role of the U.S. Department of Energy (DOE) in the policy process and provides information on federal funding provided to Oklahoma through the American Recovery and Reinvestment Act of 2009 (ARRA).

State Overview (pages 20-29) provides an overview of Oklahoma’s important demographic and economic indicators: population growth; permitting trends in major cities and counties; energy production and consumption; energy codes in of city, county, and state climate plans; and a list of key stakeholders.

Oklahoma’s Energy Code (pages 30-42) outlines the process of adopting energy codes and other construction codes in the state. It also discusses the local jurisdictions that have chosen to adopt energy codes more efficient than the state code, offering key political insights gleaned from research interviews. This section also describes the potential energy and financial savings available to owners and occupants of new buildings if the state were to achieve substantial compliance with the national model energy code. Finally, it includes legislation and rules that impact this policy arena in Oklahoma.

Code Administration (pages 43-47) details the division of responsibilities particular to Oklahoma’s state and local government cultures and outreach activities that help raise awareness of the need for energy codes.

Enforcement (pages 48-51) describes how enforcement is conducted by code officials, common code-related challenges, and areas for improvement. It includes the requirements of enforcement professionals as related to the energy code, including continuing education units.

Industry Support and Above Code Programs (pages 52-57) further explains the importance of the support from the design and construction community, and trainings and programs that take extra steps beyond the existing code. It describes the potentials each community possesses, and what above code programs are currently available.
Measurement and Verification (pages 58-59) provides and analyzes examples and past activities in the region, and explains the benefits of the process.

The Conclusion (page 60) summarizes the key findings, including the opportunities to achieve improved statewide adoption and local municipal compliance, as well as the importance and benefits of energy codes to the state. To move Oklahoma forward in modernizing minimum building standards, the greatest areas of need are education, collaboration, and funding.

A statewide sampling of stakeholders reflects the following general opinions toward energy codes:

- Political barriers have prevented the state from adopting energy codes on par with updated national model energy code editions;
- Even larger barriers to effective enforcement and compliance exist within the state’s current energy code policy infrastructure and state/local governmental structure and relationships;
- Building professionals and other stakeholders believe more energy code training is needed;
- There is still a significant number of builders who do not believe that energy codes should be mandated nor do they report that consumers demand higher efficiency buildings;
- Many buyers assume that new buildings are energy efficient and do not understand the first cost and long-term costs of ownership, and often do not have the opportunity to ask builders for more efficient individual building elements;
- Code officials often lack the resources and knowledge needed to voice support for more efficient energy codes; and
- Some policymakers do not have the resources and information they need to fully understand the value that minimum energy codes bring to the economy, their constituents, and the state.

Appendix A (page 62) offers a list of DOE and Pacific Northwest National Laboratory (PNNL) energy code resources.

*****

The Summary of Recommendations (pages 11-15) consolidates and reprints all of the gaps identified and policy recommendations made throughout the report. These recommendations are discussed further as the action items of the five-year roadmap for energy code policy implementation in the Oklahoma Strategic Compliance Plan, the companion report to this Gap Analysis.

Among this report’s key policy recommendations:

- Adoption support stakeholder group: The Oklahoma Department of Commerce should continue hosting meetings of key stakeholders to support the recommendations presented herein, especially the first-tier priorities of supporting the adoption of updated energy codes for homes, commercial buildings, and public buildings by the Oklahoma Uniform Building Code Commission (OUBCC). These include representatives from the Office of the Secretary of Energy, the OUBCC, the state
homebuilder association, local champions like the Bring It Home campaign, and regional and national proponents like BCAP and the South-central Partnership for Energy Efficiency as a Resource (SPEER).

- **Restore an adoption timeline for energy codes:** OUBCC established a six-year timeline for reviewing and adopting the 2009 and then 2012 editions of the national model codes (including energy) in early 2012, but was later scrapped for multiple reasons. OUBCC should once again establish a clear schedule for reviewing and adopting these codes, beginning with 2009 International Energy Conservation Code (IECC) and ASHRAE Standard 90.1-2007.

- **Residential energy code:** The OUBCC should review and adopt the 2009 International Energy Conservation Code (IECC) without weakening amendments. Alternatively, the OUBCC could also amend Chapter 11 of the 2009 International Residential Code (IRC) currently in place with five amendments recommended by DOE to make that code as energy efficient as the 2009 IECC.

- **Commercial energy code:** The OUBCC should review and adopt the 2009 IECC or ASHRAE Standard 90.1-2007 without weakening amendments or a more recent update to these codes and standards.

- **Public building energy standards:** To help achieve the state’s goal of a 20 percent energy reduction in state facilities by 2020 (and to complement the state’s aggressive green building standard for these projects), OUBCC should develop updated energy standards for all new and renovated state-owned, -funded, or -leased buildings based on the 2012 IECC and/or ASHRAE Standard 90.1-2010.

- **Outreach and education:** Public outreach and education efforts geared specifically to energy codes and/or building energy efficiency should be hosted by the state, using resources found through partnerships with local governments, nonprofits, educational institutions, and utilities. Current efforts like the BCAP Consumers Energy Code Awareness campaign, its Consumers Take Action tool, and press releases to local media outlets can be tailored to Oklahoma.

- **Training:** Provide more training events for the codes it adopts and consider a longer term, more strategic training program to establish expertise in its construction and enforcement community. In moving forward, the state should consider online training. This approach reduces travel time and costs and may promote higher attendance rates. As the state is very rural, training efforts logically convene in population centers which have historically had moderate attendance rates. Some events should be scheduled outside metropolitan areas like Oklahoma City and Tulsa and work to include more rural communities.

- **Enforcement:** No state agency should have responsibility for enforcement on the local level without a clear mandate to guide its actions. The Oklahoma Legislature should require all municipalities to either be responsible for code enforcement, allow a state entity to fulfill this role, or require contracting out with a third party agency.
Positive change toward energy code adoptions and enforcements will take efforts from numerous sources—state agencies can encourage and facilitate meetings, provide resources, assistance, and recognition for leading jurisdictions; stakeholders can come together to voice support for policies that would provide needed funding for energy code training and resources; and local jurisdictions can partner with stakeholders and regional, county, and municipal organizations to provide education, awareness campaigns, and outreach to their communities. The following represent many opportunities Oklahoma stakeholders, local jurisdictions, and the state could engage when given the opportunity.

The highest priority recommendations for Oklahoma involve establishing an energy code adoption support stakeholder group, reviewing and adopting updated model energy code editions for homes and commercial buildings, and leading by example by adopting standards for public buildings that achieve even greater energy efficiency. Only then can its priorities shift to targeted outreach and education, improving the enforcement infrastructure, and measuring energy code compliance rates. These recommendations will also complement the recommendations of the Oklahoma First Energy Plan to meet its goals for energy efficiency in the building sector (these are reprinted in this report on page 27).

**Gap #1:** Regular meetings of an established energy code adoption support stakeholders group are needed to begin progress on Oklahoma’s highest energy code policy priorities, especially adopting updated model energy codes for homes and commercial buildings.

**Recommendation:** The Oklahoma Department of Commerce should build upon its first meetings with the state’s energy codes adoption support stakeholder group by hosting regular (monthly or bi-monthly) meetings of key participants, including the Office of the Secretary of Energy, OUBCC, OSHBA, BCAP, SPEER, and the Bring It Home campaign. These energy code proponents should set goals, strategies, expectations, timelines, milestones, and action items. By focusing initially on the highest policy priorities like code adoption, this stakeholder group will be well-positioned to expand and evolve later to longer-term recommendations on code enforcement, training, and compliance measurement. \(\rightarrow See\ page\ 31\)

**Gap #2:** The OUBCC does not have a timeline in place to review the 2009 IECC.

**Recommendation:** The OUBCC should once again set a clear timeline for reviewing and adopting the 2009 IECC. OSE and ODOC should work with state legal counsel to provide clear interpretations of OUBCC’s authority to review and adopt energy codes as part of its charge to review and adopt minimum standards for construction in Oklahoma. \(\rightarrow See\ page\ 32\)

**Gap #3:** Oklahoma’s residential energy code is not based on the national model energy code and does not achieve the energy savings of the 2009 IECC.

**Recommendation:** The OUBCC should review and adopt the 2009 IECC without weakening amendments. Alternatively, given unresolved potential legal barriers, the OUBCC could also adopt the unamended edition of Chapter 11 of the 2009 IRC with five modifications recommended by DOE.
to make Oklahoma’s code as energy efficient as the 2009 IECC and comply with the requirements of Section 410 of ARRA.3 → See page 33

Gap #4: Oklahoma’s commercial energy code is based on an outdated model code edition and does not achieve the energy savings of the 2009 IECC or ASHRAE Standard 90.1-2007.

**Recommendation:** The OUBCC should review and adopt the 2009 IECC or ASHRAE Standard 90.1-2007 without weakening amendments or a more recent update to these codes and standards. → See pages 33-34

Gap #5: Without clear guidance from the state, stakeholders view the energy efficiency requirements of the state’s adopted codes as optional, references, or otherwise not mandatory.

**Recommendation:** The appropriate state entity (OUBCC and/or state legal counsel) should provide a clear interpretation that the energy efficiency requirements of the state’s residential building code (based on Chapter 11 of the 2009 IRC) and commercial building codes (amended so that all code references to the IECC mean the 2006 edition) are mandatory. → See page 34

Gap #6: For the most part, municipalities in Oklahoma (including Oklahoma City and Tulsa) have not yet chosen to adopt or enforce energy codes that achieve significant energy savings beyond the state code.

**Recommendation:** Encourage willing and able local jurisdictions to go beyond the state code and support them with educational materials on cost and savings data and technical support to code officials and design and building professionals. Continue to provide political support and facilitate stakeholder communication and engagement as needed. → See pages 35-36

Gap #7: No local jurisdictions are leading the state in adoption of above-code programs beyond the 2009 IECC.

**Recommendation:** Encourage local adoption of above codes by the OUBCC developing a voluntary “stretch code” as an appendix and provide incentives for code training funding through ODOC, which should connect interested code officials and policymakers with energy performance champions in their jurisdictions. BCAP’s Online Code Environment and Advocacy Network (OCEAN) Code Builder tool provides information on advanced codes for both commercial and residential buildings to architects, builders, and building departments.4 It provides a wealth state and national resources on policy options and the challenges associated with first-time adoption of green and above-code programs, including technical support, guidance for creating these programs, and a number of case studies on programs across the country. → See page 36

Gap #8: Oklahoma’s minimum energy code for public (state-owned and/or state-funded) buildings is not more efficient than its energy codes for homes and commercial buildings.

**Recommendation:** OUBCC should develop updated energy standards for all new and renovated state-owned, -funded, or -leased buildings based on the 2012 IECC and/or ASHRAE Standard 90.1-2010. These buildings can achieve energy savings of more than 30 percent beyond those built to the
current public building energy code in Oklahoma. To maximize the impact these future projects and retrofits have on achieving the state’s goal of a 20 percent energy reduction in state facilities by 2020, the state should lead by example and help prepare the commercial construction market for future energy code updates down the road. By adopting the most recent energy code editions for public buildings, the state also demonstrates fiscal responsibility with taxpayer dollars. More efficient public buildings help governments hedge against uncertain energy availability and costs, create jobs, and stimulate the local economy. → See page 37

Gap #9: The state does not provide municipalities with guidelines for implementing the state residential code.

Recommendation: The appropriate state agency – with feedback from local stakeholders – should create guidelines for implementing the state residential energy that lead to greater uniformity throughout the state. → See pages 43-44

Gap #10: No state agency has jurisdiction over residential enforcement for municipalities that do not adopt or enforce codes, leaving some areas in Oklahoma without proper plan review and building inspection for homes.

Recommendation: No state agency should have responsibility for enforcement on the local level without a clear mandate to guide its actions. The Oklahoma Legislature should require all municipalities to either be responsible for code enforcement, allow a state entity to fulfill this role, or require contracting out with a third party agency. → See page 44

Gap #11: The state does not have sufficient resources to carry out a proper energy code review and inspection process for residential construction in local jurisdictions that cannot or will not enforce minimum energy efficiency requirements.

Recommendation: No state agency should have responsibility for enforcement on the local level unless it has sufficient funding to do so. If these communities do not want the burden of enforcement, as some have already indicated, they could contract out these services to a third party agency, as some municipalities may already do. One way to ease this financial burden is to establish or join a county or regional building inspection department (which state statute allows). → See page 44

Gap #12: The state and local governments do not have strong, consistent outreach efforts geared specifically to energy codes and/or building energy efficiency.

Recommendation: Create more dedicated publications for the energy code, such as bulletins and flyers where energy code information, resources, trainings, updates can be shared statewide. → See page 46

Gap #13: Public outreach and education on home energy efficiency and energy codes to consumers is needed.
**Recommendation:** Public outreach and education efforts geared specifically to energy codes and/or building energy efficiency should be hosted by the state, using resources found through partnerships with local governments, nonprofits, educational institutions, and utilities. Current efforts like the BCAP Consumers Energy Code Awareness campaign, its Consumers Take Action tool, and press releases to local media outlets can be tailored to Oklahoma. → See page 47

**Gap #14:** The Oklahoma State Architectural and Registered Interior Designers Act of 2010 does not address responsibility for architects and other design professionals regarding energy code compliance.

**Recommendation:** The Oklahoma Legislature should amend the Oklahoma State Architectural and Registered Interior Designers Act of 2010 to require architects and other design professionals to certify building code compliance with a professional stamp. → See pages 48-49

**Gap #15:** Many enforcement professionals and local decision-makers do not make energy codes a priority.

**Recommendation:** After the state has adopted an energy code and made clear that its application is a priority, it can educate and direct local jurisdictions that enforcement is an important issue for Oklahoma. Enforcement professionals should prioritize the application of the energy codes alongside more traditional building codes. Local decision-makers should prioritize the enforcement of energy codes by providing sufficient resources to code officials. → See page 50

**Gap #16:** More training opportunities are needed, but there is a lack of funding for stakeholders to attend training workshops.

**Recommendation:** Provide more training events for the codes it adopts and consider a longer term, more strategic training program to establish expertise in its construction and enforcement community. In moving forward, the state should consider online training. This approach reduces travel time and costs and may promote higher attendance rates. As the state is very rural, training efforts logically convene in population centers which have historically had moderate attendance rates. Some events should be scheduled outside metropolitan areas like Oklahoma City and Tulsa and work to include more rural communities. → See pages 50-51

**Gap #17:** Some building departments lack the resources to enforce codes and/or do not have easy access to assistance and information for plan review in complex buildings or other specific building types.

**Recommendation:** Promote and encourage the formation of regional or county inspection programs that pool resources over multiple jurisdictions to provide support to rural and unincorporated areas in improving energy code enforcement. BCAP and the International Code Council (ICC) have created the Energy Code Ambassadors Program (ECAP) to help states reach their energy code compliance goals by providing guidance and training for state and local code enforcement officials. → See page 51

**Gap #18:** Oklahoma does not have requirements for licensing, certification, or continuing education related to energy efficiency or state energy standards for building industry professionals, design professionals, or contractors.
**Recommen**

**dation**: The state could create recognition or certification programs for building industry professionals, design professionals, and contractors in the absence of licensing requirements. The state could work with OSHBA in promoting its Certified Professional Builders program and other green building initiatives as a good model or successful starting point. This program could stipulate minimum expectations for continuing education relevant to energy codes, building science, and sustainability.  

**Gap #19**: Above-code programs are not widely implemented.

**Recommendation**: The use of third party, above-code energy efficiency programs at the local level could be further promoted and expanded. Outreach and consumer education efforts would aid this endeavor. Many states use tax incentives, building labeling, and other recognition initiatives to encourage voluntary programs like ENERGY STAR, LEED, the Builders Challenge, and others.  

**Gap #20**: Electric utilities have not yet taken advantage of the full potential and benefits of energy codes and are not engaged in activities that promote the energy code.

**Recommendation**: Electric and gas utilities must be educated so they realize energy codes complement other efficiency efforts and are often a better tool to meet demand reduction goals. When properly enforced, energy codes curb baseline demand over the life of a building; they are not intermittent or interrupted. The state should engage and strategize with utilities and cooperatives on code development and compliance. One example is to develop incentive programs that support the Blower Door test or any other component of the state energy code. Utilities should become more involved and support code compliance as they, too, benefit when homes and buildings demand less energy. Additionally, the energy efficiency of new construction aids utilities in predicting changes to system-wide demand.

**Gap #21**: The state has not conducted a statewide measurement and verification study and does not have an advisory group of state and industry stakeholders that is equipped to plan and lead initiatives forward to 90 percent energy code compliance.

**Recommendation**: Leading efforts by Texas, New Hampshire, Colorado, Idaho, Nevada, and Delaware formed energy codes compliance collaborative in their states to create realistic plan on how their state will proceed. Oklahoma’s energy code adoption support stakeholder group could eventually expand and evolve beyond addressing the state’s initial policy adoption priorities to engage people to help establish longer-term goals and strategies to measure and verify energy code compliance (view the Oklahoma Strategic Compliance Plan by BCAP for more).
INTRODUCTION

A large amount of energy is used to power and maintain buildings, which account for nearly 49 percent of total energy consumption and 72 percent of electricity use in the United States. Buildings are also responsible for at least 56 percent of U.S. greenhouse gas emissions. Moreover, they last a long time. Today’s building energy policies will affect energy consumption through the year 2060 and beyond.

Oklahoma is rich in energy resources like oil and natural gas. This energy-intensive industrial sector also contributes to the high rate of per capita energy consumption in Oklahoma – ranked 11th in the nation even though it ranks in the bottom half in population. As a state in the bottom third in average per capita personal income with many low-income communities, many households spend a disproportionately higher share their earnings on energy costs. Energy efficiency measures and development can help retain dollars in-state, strengthen local economies, generate more jobs, and improve the living standards of Oklahoma families. By reducing the energy demand in buildings, energy codes can be effective instruments in Oklahoma’s suite of policy tools. Energy codes can also help achieve other positive outcomes:

- Save homeowners and businesses hundreds of dollars per year;
- Improve thermal comfort, reduce noise, and ensure quality construction;
- Keep money generally spent on utility costs in the local economy;
- Decrease demand imported energy and/or increase exports of energy produced locally;
- Generate economic growth that creates jobs;
- Decrease peak energy demand, increasing its reliability and mitigating the construction of expensive new power plants;
- Reduce greenhouse gas emissions and air and water pollution; and
- Improve indoor air quality.

Some claim that energy codes will result in higher upfront building costs or that an energy-efficient building or home is too costly. However, there are two costs that should always be considered when purchasing a building: (1) the upfront (first) cost; and (2) the long-term (operational) cost over the life of the building. Design and construction costs for buildings account for just five to ten percent of the total occupant spending over the span of a building’s serviceable lifetime. Compare that to the ongoing operational and maintenance costs, which “account for 60 to 85 percent of the total lifecycle costs, with land acquisition, conceptual planning, renewal or revitalization, and disposal accounting for the remaining five to 35 percent.” When these costs are considered together from the beginning of a building’s life, energy codes prove to be advantageous to the owner of the facility or home.

Recent improvements in the stringency of the model energy codes—and the development of the first green building codes—continue to raise the bar for energy-efficient design and construction to levels that were almost unimaginable a few years ago. Retail and office buildings constructed to meet the requirements of the 2012 International Energy Conservation Code (IECC) can be at least 15 percent more energy efficient than those constructed to meet the 2009 IECC.
The American Recovery and Reinvestment Act of 2009 (Recovery Act) also provided states and cities with unprecedented funding and incentives to adopt the previous model energy code, the 2009 IECC. This push from the federal government is part of a larger transformation in the way advocates, policymakers, industry and utility representatives, and the general public view energy efficiency. **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.**

Yet, for all this recent progress and promise, energy codes nationwide remain underutilized. In municipalities across the country, energy code enforcement and compliance remain woefully insufficient. While code 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 potential to reduce energy use and save money, states and cities must design and carry out effective and realistic energy code implementation strategies.

The goals of this report are to:

- Document Oklahoma’s energy codes infrastructure, existing gaps, and best practices, and
- Provide initial recommendations for actions the state, local jurisdictions and involved third party organizations can take to fill these gaps and begin to move towards full compliance with the minimum adopted codes and standards of the State of Oklahoma.

**NATIONAL PERSPECTIVE ON ENERGY CODES**

The IECC and ASHRAE Standard 90.1 are developed and published every three years by consensus-based non-governmental organizations: the International Code Council (ICC) and the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE), respectively. While there is no federally-mandated minimum standard for energy efficiency in private residential or commercial buildings, both organizations release national model codes (currently ASHRAE 90.1-2010 and 2012 IECC) every three years that establish baselines for residential and commercial development. States that want to ensure that construction within their boundaries meets national minimum standards will adopt the national model codes. The responsibility for adopting energy codes is generally left to state governments. From a national perspective (see Figure 1):

- **Commercial Energy Codes:** As of October 1, 2012, 33 states, three U.S. territories, and the District of Columbia have mandatory statewide commercial energy codes in effect that meet or exceed the efficiency of ASHRAE Standard 90.1-2007. Several jurisdictions and one state, Maryland, have already implemented a commercial energy code that meets or exceeds ASHRAE Standard 90.1-2010.

- **Residential Energy Codes:** As of October 1, 2012, 28 states, three U.S. territories, and the District of Columbia have residential codes that meet or exceed the efficiency of the 2009 IECC. To date, Maryland is the only state to have implemented the 2012 IECC. Several local jurisdictions across the country have also implemented the 2012 IECC.

Several other states are expected to adopt codes based on the 2009 IECC and even the 2012 IECC in the coming months. Among Oklahoma’s neighbors, Arkansas plans to implement ASHRAE Standard 90.1-2007 in
January 2013 and the 2009 IECC for residential buildings in late 2013. Texas has begun its code update process reviewing the 2012 IECC for implementation potentially as early as 2014. Several local jurisdictions there have also adopted above code or green building policies.

**Figure 1 – U.S. Energy Code Status Maps (as of October 1, 2012)**

*Source: BCAP [http://energycodesocean.org/code-status]*
Although energy code adoption occurs on the state and local levels, the federal government—through Congress and DOE—has played a significant role in advancing energy code development, determining the relative energy savings of national model energy codes and supporting state- and local-level adoption and implementation.

**EPACT**

The Energy Policy Act (EPAct) of 1992 requires DOE to determine whether the most current model energy codes would improve energy efficiency for new and renovated residential and commercial buildings. EPAct also mandates that DOE make a new determination within twelve months for every subsequent revision of these codes. Each state then has two years to certify that it has revised its own energy code to meet or exceed the requirements of the latest edition of the national models. A state can decline to adopt a residential energy code by submitting a statement to DOE detailing its reasons for doing so.\(^{13}\)

For commercial buildings, DOE issued a final determination in October 2011 that ASHRAE Standard 90.1-2010 would achieve greater energy efficiency in buildings subject to the standard than if they were built to ASHRAE Standard 90.1-2007, specifically national source energy savings of 18.2 percent and 18.5 percent above for site energy consumption.\(^{14}\)

For low-rise residential buildings, DOE issued a final determination in May 2012 that the 2012 IECC would achieve greater energy efficiency in buildings subject to the code than if they were built to the 2009 IECC. The determination details the various code changes and subsequent energy savings gains that move the code towards DOE’s stated goal of 30 percent energy savings beyond the baseline established in the 2006 IECC.\(^{15}\)

**THE RECOVERY ACT**

In February of 2009, Congress passed the Recovery Act, which had three immediate goals: create new jobs and save existing ones, spur economic activity and invest in long-term growth, and foster unprecedented levels of accountability and transparency in government spending.\(^{16}\) To help achieve these goals, the Recovery Act provided states with stimulus funds through the State Energy Program (SEP) and the Energy Efficiency and Conservation Block Grants (EECBG) to adopt codes that meet or exceed the energy savings of the 2009 IECC (or equivalent), for residential construction and ASHRAE Standard 90.1-2007 (or equivalent), for commercial construction, as well as craft plans to achieve and demonstrate 90 percent compliance with the codes by 2017.\(^{17}\)

As a stipulation for receiving SEP funds, then-Governor Brad Henry wrote a letter to DOE in February 2009 assuring that state officials would begin actions to achieve these goals.\(^{18}\) Based on the governor’s assurance and the State Energy Plan submitted, DOE awarded $46.7 million of SEP funds to the state for energy efficiency and renewable energy programs.\(^{19}\) DOE also approved the state’s EECBG program plan and awarded a $36.5 million formula grant, a portion of which was intended for the state to use to adopt, implement, and conduct trainings to meet the 90 percent compliance goal.\(^{20}\) Additionally, in 2009, DOE allocated $60.9 million in Weatherization Assistance Program (WAP) funds to improve the energy efficiency of existing low-income housing in Oklahoma.\(^{21}\)
Oklahoma’s 2011 population of almost 3.8 million represents the state’s current period of economic expansion. While the state’s population growth rate of 8.7 percent from 2000 to 2010 was slightly below the national average rate of 9.7 percent, a significant portion of this growth has occurred in only the last few years. Indeed, the state’s 2010 to 2011 growth rate of 1.1 percent outpaced the national rate over that time. This population occupies almost 1.7 million housing units throughout the state.

Located in the south-central United States, Oklahoma’s climate ranges from humid subtropical in the east to semi-arid in the west. The Gulf of Mexico provides warm, moist air over the southern and eastern portions of the state, bringing humidity, precipitation, and high temperatures for much of the year. Winters are shorter and less severe than those of the more northern Plains states. As the summers are long and usually quite hot, warm weather is one of the biggest spurs to residential and commercial energy consumption. Heat index values of 105 degrees or greater occur more than 40 times per year in the far southeast and less than 10 times per year in the far northwest. The 10-year average for cooling degree days in the state is 46 percent above the national average, meaning that the average Oklahoma resident pays significantly more to cool the same home in Oklahoma than elsewhere in America.

Figure 2 – Oklahoma Normal Average Temperature (1981-2010)
STATE ENERGY PORTFOLIO

PRODUCTION

The American energy production sector has shifted substantially in recent years as increased natural gas and crude oil yields and burgeoning renewable sources like wind power have contributed to a domestic energy renaissance, one in which Oklahoma is helping lead the way. Oklahoma is a major energy-producing state, ranked eighth in the nation in 2010 in total energy production with 2,546 trillion Btu. In the first months of 2012, the state’s natural gas and petroleum production sectors each ranked in the top five in the U.S.

Oklahoma produces a significant amount of oil, with annual production in recent years accounting for more than 3 percent of total U.S. production. Oklahoma’s five refineries have a combined capacity of over 500,000 barrels per day, or about 3 percent of the total U.S. refining capacity. Several pipelines connect those refineries to markets in Oklahoma and neighboring states. Oklahoma is also one of the nation’s top producers of natural gas, extracting nearly 10 percent of the country’s total from more than a dozen of the largest natural gas fields in the United States.

CONSUMPTION AND EXPENDITURES

Driven by its oil and natural gas production, the industrial sector is the leading energy-consuming sector in the state. This sector makes Oklahoma’s total energy consumption per capita well above average compared to other states, ranking 11th in 2010.

Coal- and natural gas-fired power plants supply nearly all electric power production in Oklahoma (see Figure X). Coal accounts for roughly 50 percent of this total and is supplied almost exclusively by railcar from Wyoming. Natural gas accounts for about 41 percent of power production. Roughly three-fifths of Oklahoma households rely on natural gas as their primary energy source for home heating while just over one quarter use electricity. Nevertheless, only about one-third of Oklahoma’s natural gas production is consumed in state. The remainder is exported through pipelines to other states, with more than half sent to Kansas. Nearly all of the imported natural gas in the state comes from Texas and Colorado.

Renewables – including burgeoning wind power resources – supply about 7 percent of the state’s power. The state had 2,400 Megawatts (MW) of wind power online in 2011, the 8th most wind capacity installed and

Figure 3 – Oklahoma U.S. Rankings in Energy Consumption, Production, and Expenditures (2010)

<table>
<thead>
<tr>
<th>Oklahoma, U.S. Rankings</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Consumption</strong></td>
<td></td>
</tr>
<tr>
<td>Total Energy per Capita</td>
<td>11</td>
</tr>
<tr>
<td><strong>Production</strong></td>
<td></td>
</tr>
<tr>
<td>Total Energy</td>
<td>8</td>
</tr>
<tr>
<td>Crude Oil</td>
<td>6</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>4</td>
</tr>
<tr>
<td>Coal</td>
<td>22</td>
</tr>
<tr>
<td>Electricity</td>
<td>18</td>
</tr>
<tr>
<td>Carbon Dioxide Emissions</td>
<td>17</td>
</tr>
<tr>
<td><strong>Prices</strong></td>
<td></td>
</tr>
<tr>
<td>Natural Gas</td>
<td>7</td>
</tr>
<tr>
<td>Electricity</td>
<td>48</td>
</tr>
</tbody>
</table>

Source: EIA State Energy Data System
the 10th highest share of electric power produced from wind in America. Oklahoma wind farms generate enough electricity to power about 770,000 new homes.  

Figure 4 – Oklahoma Primary Energy Flow by Source and Sector (2009)  

Figure 5 – Oklahoma Overall Energy Source Distribution (2009)
Energy prices in Oklahoma are quite different when comparing the natural gas and electricity markets. While retail natural gas prices ranked 7th in the nation in 2010, retail electricity prices ranked near the bottom at 48th. State residential and commercial electricity prices historically have been substantially lower than the national average for both sectors (see Figures 7 and 8). Although prices dipped somewhat during the recent economic downturn, they are starting to rise again. The most recent statistics put the state’s average residential electricity price of about 8.5 cents per kilowatt-hour well below (roughly 26 percent) the national average price of about 11.5 cents per kilowatt-hour (see Figure 6). Energy efficiency measures are valuable as they further ensure that dollars remain in the state, generating more jobs and improving the living standards of Oklahoma families.

Figure 6 – Oklahoma Residential Electricity Prices Compared to Other U.S. States (2011)  

Source: Oklahoma First Energy Plan
Figure 7 – Oklahoma Residential and Commercial Electricity Prices (1990-2010)

Oklahoma Residential and Commercial Electricity Prices (1990-2010)

Source: U.S. EIA

Figure 8 – Oklahoma Residential and Commercial Electricity Prices (1990-2010)

Oklahoma Residential and Commercial Electricity Prices Adjusted for Inflation (1990-2006)

Source: U.S. EIA
Like most states, **new construction in Oklahoma has slowed significantly** as a result of the recent economic recession, beginning to dip after the 2006 peak of the national housing. As Figure 9 illustrates, total one- and two-family residential housing permits rose steadily during the beginning of the 2000s, reaching an apex of over 16,000 in 2006. Since then, permitted units have been on a steep decline, falling below 7,000 in the nadir of 2010. While the state posted an increase in building permits from the previous year in 2011 (the first in five years), this figure still represents a 56 percent decrease from sector’s 2006 peak.

The severely reduced demand for new construction has caused many builders to go out of business or leave the market entirely, both in big cities and suburbs. The state’s two largest metropolitan areas, Oklahoma City and Tulsa, have both endured roughly 60 percent drops in residential permits issued over the same period of decline as the statewide housing market.

**Figure 9 – Oklahoma One- and Two-Unit Residential Building Permits (2004-2011)**

Comprehensive commercial construction and real estate data can be difficult to attain, but one 2012 assessment from Integra Realty Resources shows that real estate markets throughout the United States generally continue to recover since the economic downturn. Cycle reports from the markets studied in the report show American office and retail markets evenly split between cycles of recession and recovery, while industrial sector construction markets appear to be further into the recovery phase. The multifamily housing
sector appears to have recovered the most of the sectors investigated. The report included Tulsa in the commercial real estate markets studied.

The Tulsa area’s commercial markets tracked closely to many other cities in the rest of the country. The area’s central business district (CBD) and suburban office markets were still in a recessionary phase, characterized by increasing vacancy rates and moderate to low rates of new construction. The retail and industrial real estate markets were in a recovery phase, characterized by decreasing vacancy rates and low rates of new construction. The area’s apartment and multi-family residential market was even beginning to expand, marked by decreasing vacancy rates and moderate to high levels of new construction.

Even though the decline in residential and commercial construction has been detrimental to the economy, it presents a unique opportunity for the advancement of energy codes in Oklahoma. When the market is slow, it presents the chance for design, code officials, and building sector professionals to seek training to become more familiar with codes and standards encountered daily in their trade. Some professionals may take the time to acquire additional certifications and/or above-code trainings. Reduced construction also helps ease all stakeholders into the new energy code, rather than trying to adjust while construction is high.

### COMPREHENSIVE ENERGY AND CLIMATE PLANS

A growing number of states are developing climate change task forces to develop state climate action plans. A task force often brings together experts within the state to develop a comprehensive strategy to address climate change. Members typically include state and local policymakers, policy analysts, environmentalists and other stakeholders from the energy, industry, transportation, agriculture, forestry, and waste sectors.

#### STATE-LEVEL PLAN

While Oklahoma has not yet created a plan to address these environmental impacts, in 2011 the administration of Governor Mary Fallin — led by Secretary of Energy Michael Ming — developed the **Oklahoma First Energy Plan**. The first of its kind in the state, the document outlines Oklahoma’s priorities for managing its abundant energy resources to achieve the goals of creating jobs, expanding the economy, and establishing energy security for Oklahoma in the coming decades while providing its citizens a clean environment and supporting public health by addressing air quality.

Among the Oklahoma First Energy Plan’s many recommendations to reach these goals, it addresses energy consumption in residential, commercial, and public buildings on page 8 of the report (and reprinted here in
Local Climate Program Participation

Two Oklahoma cities have signed the U.S. Conference of Mayors Climate Protection Agreement (as of October 31, 2012):

- Norman (pop. 110,925)
- Shawnee pop. 29,857)

Three Oklahoma cities participate in the Sierra Club Cool Cities Program (as of October 31, 2012):

- Norman (pop. 110,925)
- Stillwater (pop. 45,688)
- Tulsa (pop. 396,466)

Sources: U.S. Conference of Mayors, Sierra Club, 2010 U.S. Census

LOCAL EFFORTS

Climate efforts can be seen at the local level as well. U.S. Conference of Mayors Climate Protection Agreement is one example. Inspired by the Kyoto Protocol in 2005, Seattle Mayor Greg Nickels launched an initiative to advance the goals of the Kyoto Protocol through local level leadership and action. There are a total of 1,054 cities throughout the U.S. and two in Oklahoma (Norman and Shawnee) that have signed the agreement. Participating cities share best practices with each other and other survey data published by the U.S. Conference of Mayors.

Another local climate initiative is Sierra Club’s Cool Cities Program, a collaborative project led by volunteers from community members to local leaders and businesses to implement clean energy solutions that save money, create jobs, and help curb global warming. There are currently three Oklahoma cities (Norman, Stillwater, and Tulsa) that participate in the program.

Objective: Empower consumers with the tools and information necessary to make informed energy decisions, taking advantage of efficiency opportunities that are economically feasible, in order to minimize life-cycle energy costs, maintain comfort and services, and help minimize the need for new power generation.

- Benchmark all state buildings, conduct energy audits, and set target efficiency gains (what gets measured gets managed)
- Ensure the effectiveness of legislative and municipal efforts designed to promote energy efficiency planning and reporting
- Encourage public outreach efforts to communicate the benefits of efficiency for commercial and residential applications.
Oklahoma possesses a constellation of stakeholders who are invested in energy codes and building performance:

**Oklahoma Uniform Building Code Commission (OUBCC)** was created in 2009 to establish minimum statewide construction codes for protection of life and property, to be utilized by each respective trade throughout the state, assuring public health, safety, and welfare.\(^{48}\)

**Oklahoma Department of Commerce (ODOC)** is the primary economic development entity in the state. Its mission is to increase the quantity and the quality of jobs in Oklahoma. As the State Energy Office responsible for disbursement and oversight of Recovery Act funding through the State Energy Program tied to energy code goals, ODOC views energy efficiency as a tool for economic development to help sustain and grow Oklahoma communities.\(^{49}\)

**Oklahoma Office of the Secretary of Energy (OSE)** is charged to support current energy industries, facilitate the development of alternative and renewable energies, and to foster the growth and economic development of the state through strategic diversity. The Oklahoma Secretary of Energy is appointed by the Governor to establish energy policy, oversee several state energy-related commissions and boards, and serve as the Governor’s representative to organizations in the larger energy policy arena. The Secretary of Energy is Michael Ming and the Assistant Secretary of Energy is Jay Albert.\(^{50}\)

**Oklahoma Bring It Home Initiative (BIH)**, developed by the Oklahoma Sustainability Network (OSN) and the Phillips Murrah–C.H. Guernsey partnership, assisted Oklahoma communities in adopting and implementing energy efficient building codes. This project is the first and only coordinated effort in Oklahoma created to reduce energy consumption and assist the Oklahoma workforce to compete in an energy smart construction economy. The Bring It Home campaign has been critical in establishing connections with and educating local stakeholders on this issue throughout the state. Buy-in from these individuals and organizations helps determine the success of the adoption, implementation, and enforcement of building energy codes.\(^{51}\)

**South-central Partnership for Energy Efficiency as a Resource (SPEER)**, the newest regional energy efficiency organization, is a partnership of energy efficiency industry stakeholders committed to accelerating the adoption of energy efficient products and services and advanced building systems in Oklahoma and Texas. These two states include nearly 30 million people and 13 of the 15 fastest growing cities in America. SPEER embraces the opportunity to increase energy efficiency in the region through building codes, retrofits for existing buildings, better training, innovative policies, and cooperative marketing to make it easier for the public to understand efficiency opportunities.\(^{52}\)

**The Oklahoma Chapter of the American Society of Heating Refrigerating and Air Conditioning Engineers (ASHRAE)** has two regional chapters in Central Oklahoma\(^{53}\) and Northeastern Oklahoma.\(^{54}\) Each chapter is interested in educating students as the next generation of energy professionals.

**American Institute of Architects (AIA)** and its three regional chapters (Central Oklahoma\(^{55}\), Eastern Oklahoma\(^{56}\), and North Central Oklahoma\(^{57}\)) represent the interests of architects and other design professionals around the state. With the strength of almost 800 members, the chapters can have significant influence at the State Capitol when lawmakers are considering bills that will govern the way architecture is
practiced in Oklahoma. AIA is interested in providing workshops on building codes and building science, including energy efficiency, as well as public outreach and other events for members.

**Oklahoma Construction Industries Board (CIB)** has a “mission to protect life and property by licensing and inspection of the related trades for the health, safety and welfare of the public.” CIB is charged with enforcing all electrical, mechanical, plumbing and fuel gas minimum codes and standards once adopted. CIB also sets and tracks continuing education requirements for industry professionals in the state.\(^{58}\)

**Oklahoma Office of the State Fire Marshal (OSFM)** has a mission to “promote safety and awareness and reduce the loss of lives and property to the citizens and businesses of Oklahoma through public education, investigations, inspections, building plan reviews, code assistance/enforcement and statistical data collection.” OSFM is charged with plan review and inspection of the commercial building code for structures such as schools, hospitals, hotels, churches, and factories. OSFM must review and approve building plans before projects can obtain a certificate of occupancy. Its staffers perform over 2,000 inspections across the state each year.\(^{59}\)

**Oklahoma Department of Central Service (DCS) Construction and Property (CAP) Division** administers the Minimum Codes for State Construction and the state’s High Performance Buildings program.\(^{60}\)

**Oklahoma State Home Builders Association (OSHBA)** is a trade association of over 2,800 members in 12 local chapters statewide dedicated to providing a safe, quality and affordable housing industry in Oklahoma. OSHBA is an affiliate of the National Association of Home Builders (NAHB) and includes a member base of builders, remodelers, developers, suppliers, manufacturers, architects, engineers, real estate brokers, lenders, attorneys and other industry professionals.\(^{61}\)

**Oklahoma Chapter of the U.S. Green Building Council (USGBC)** represent the interests of professionals in the building industry who strive to transform communities into healthier, more prosperous and sustainable places for people to live, work, and learn in Oklahoma.\(^{62}\)

**Oklahoma Municipal League** is an association of local jurisdictions dedicated to effective local government practices. The League has served as a contact point for state advocates to identify local champions and stakeholders.\(^{63}\)

**Public Service Company of Oklahoma (PSO)** is a state partner of the Home Performance with ENERGY STAR (HPwES) program. HPwES is an energy efficiency home improvement program sponsored and promoted by a partnership between the Environmental Protection Agency (EPA), DOE, and local program sponsors; local sponsors are usually utilities, state energy offices, and other interested organizations. PSO, a unit of American Electric Power, is the HPwES program in Oklahoma and offers up to $3,000 in incentives to participants.\(^{64}\)

**International Code Council Region X** was established with the cooperation of the ICC Chapters in Arkansas, Oklahoma and Texas to improve communication between ICC and the organizations to identify areas of mutual interest between the chapters.\(^{65}\)
In the United States, building codes are generally adopted on the state and local levels. The process differs from state to state, but in most cases codes are adopted through a legislative process, a regulatory process, or—as in Oklahoma—a combination of both. A handful of states are considered “home rule” in regard to building codes, which means codes are adopted at the local level.66

Prior to 2009, Oklahoma was a state far behind the curve on building energy code policy. Oklahoma had no statewide energy code, no agency with authority or the explicit charge to review or adopt codes, and no state energy plan.

Recent years have seen dramatic changes in this state policy arena, spurred by increased federal attention on energy codes through ARRA and an increased emphasis on energy policy spanning two gubernatorial administrations. The state legislature created the Oklahoma Uniform Building Code Commission (OUBCC), which initially developed a timeline through 2016 to review and adopt the 2009 and 2012 editions of the ICC codes, including each IECC edition. The Secretary of Energy has developed the Oklahoma First Energy Plan, the first of its kind in the state. Local stakeholders created the first coordinated effort in Oklahoma, the Bring It Home campaign, to reduce energy consumption and assist the Oklahoma workforce to compete in an energy smart construction economy.

Oklahoma is an important state for energy code adoption support because of its projected growth, its momentum thus far on this policy issue, and the state’s burgeoning constellation of energy code stakeholders. With surging populations in metropolitan Oklahoma City and Tulsa and a booming energy production sector, the state is ranked in the top half of the nation in housing starts, so the economic impact of energy-efficient buildings is significant for the state’s citizens and businesses.

BCAP has been involved in Oklahoma since 2010, when it first visited the state to attend OUBCC hearings on the state’s residential code and establish a network of local stakeholders. After the state approved residential (IRC) and commercial (IBC) building code updates in 2011 and 2012, the OUBCC stated publicly its intention to spend 2012 reviewing and amending the 2009 IECC for recommendation and potential legislative approval in 2013. This timeline, however, has been put on hold.

Two of the 2009 IECC edition’s eight climate zones encompass the state, with the majority of Oklahoma in climate zone 3. Three counties (Beaver, Cimarron, and Texas) in the western panhandle fall within climate zone 4 (see Figure 10).

**Figure 10 – Depiction of 2009 IECC Climate Zones 3 and 4 in Oklahoma**

![Image of map showing climate zones](image-url)
Before recent years, Oklahoma did not have a defined process for uniform code review and adoption outside regular order of the state legislature. While the Office of the State Fire Marshal set construction standards for the projects under its purview (largely those in the nonresidential sector), no up-to-date energy code existed for residential dwelling.

In June 2009, the Oklahoma Legislature passed a bill (SB 1182) creating the Oklahoma Uniform Building Code Commission that would be charged to review and recommend building codes (including energy codes) for residential and commercial construction to be used by all entities within the state for adoption.\(^{68}\)

The eleven-member OUBCC determines which codes need to be adopted and puts out a call for volunteers from across the state to serve on technical committees. Volunteers are professionals in their respective trades, and are appointed to the technical committee that best fits their expertise. Technical committees are tasked with reviewing a particular code or standard and making a recommendation to the Commission with any modifications or amendments deemed necessary.

Under the revised Oklahoma Administrative Code, Title 748,\(^{69}\) the codes and standards recommended by the Commission are submitted as legislation through regular order in the Oklahoma Legislature and Governor of Oklahoma. Any codes adopted through such legislation would then be submitted to the Secretary of State (SOS) for filing. All codes and standards with their amendments and modifications as adopted by the OUBCC are the minimum construction standards for the State of Oklahoma. Local governments would be allowed to adopt "higher" standards than those adopted by the Commission.

Given the hurdles that policy proposals face in any regulatory or legislative update process – especially a newly-established one like this – it is essential that key participants convene regular meetings of an energy code adoption support stakeholders group. These interactions allow energy code proponents to set goals, strategies, expectations, timelines, milestones, and action items.

In October 2012, the Oklahoma Department of Commerce (ODOC) hosted an introductory meeting of representatives of the organizations likely to participate. This group discussed the political, legal, and procedural hurdles facing energy code adoption at the state level and prioritized addressing those issues before other policy gaps in the state’s energy code infrastructure. The individuals agreed to future meetings of the group.

**Gap #1**: Regular meetings of an established energy code adoption support stakeholders group are needed to begin progress on Oklahoma’s highest energy code policy priorities, especially adopting updated model energy codes for homes and commercial buildings.

**Recommendation**: The Oklahoma Department of Commerce should build upon its first meetings with the state’s energy codes adoption support stakeholder group by hosting regular (monthly or bi-monthly) meetings of key participants, including the Office of the Secretary of Energy, OUBCC, OSHBA, BCAP, SPEER, and the Bring It Home campaign. These energy code proponents should set goals, strategies, expectations, timelines, milestones, and action items. By focusing initially on the highest policy priorities like code adoption, this stakeholder group will be well-positioned to expand
and evolve later to longer-term recommendations on code enforcement, training, and compliance measurement.

**CODE ADOPTION TIMELINE**

*Oklahoma First Energy Plan Recommendation: Ensure the effectiveness of legislative and municipal efforts designed to promote energy efficiency planning and reporting*

In January 2012, the OUBCC presentation to the Bring It Home Symposium in Oklahoma City provided details of the Commission’s plans to review and adopt the 2009 and then 2012 editions of the IRC, IBC, and IECC over a six-year timeline. Following a rough schedule of OUBCC technical committees reviewing a code edition for several months from spring to fall of a given year, that recommendation would be made to the Oklahoma Legislature and approved for adoption in the spring of the following year. The code update would then become effective sometime in the summer or fall of the year it was adopted. The list below provides a tentative estimate of the timeline.

**Years 1-2 Completed:**

- **2009 IRC:** Reviewed fall 2010, adopted June 2011, effective July 2011
- **2009 IBC:** Reviewed spring through fall 2011, adopted May 2012, effective November 2012

**Years 3-6 Not Yet Completed:**

- **2009 IECC:** Reviewed spring through fall 2012, adopted spring 2013, effective summer 2013
- **2012 IRC:** Reviewed spring through fall 2013, adopted spring 2014, effective summer 2014
- **2012 IBC:** Reviewed spring through fall 2014, adopted spring 2015, effective summer 2015
- **2012 IECC:** Reviewed spring through fall 2015, adopted spring 2016, effective summer 2016

While the OUBCC has completed its review process for the 2009 IRC and 2009 IBC, in spring 2012 the Commission stated that it no longer intended to review the 2009 IECC for adoption because it believes that its adoption of Chapter 11 of the 2009 IRC is sufficient for its commitments under Section 410 of ARRA. Questions have also arisen about whether the OUBCC has the authority to adopt energy efficiency codes like the IECC as part of its duties to review and adopt minimum construction standards applicable throughout the state. Clear interpretations of the statutes governing the OUBCC like the passage below are needed from the appropriate state legal authorities.

"Building Code" means a collection of required standards and practices intended to apply to all or part of the construction of new, or the alteration or renovation of existing, buildings or structures, including integral finishes, fixtures and building systems therein. – OAC 748:3-1-2. Definitions

**Gap #2:** The OUBCC does not have a timeline in place to review the 2009 IECC.

**Recommendation:** The OUBCC should once again set a clear timeline for reviewing and adopting the 2009 IECC. OSE and ODOC should work with state legal counsel to provide clear interpretations of OUBCC’s authority to review and adopt energy codes as part of its charge to review and adopt minimum standards for construction in Oklahoma.
RESIDENTIAL ENERGY CODE

Oklahoma’s residential energy code applies largely to single-family dwellings and townhouses. In October 2010, supporters – including BCAP – testified before the OUBCC supporting a recommendation to adopt the 2009 IECC or Chapter 11 of the 2009 IRC modified to achieve equivalent energy savings to the 2009 IECC. While Chapter 11 of the 2009 IRC allows meeting the requirements of the 2009 IECC as an acceptable compliance path, it also contains its own prescriptive compliance path that contains different requirements (Note: In the 2012 IRC, this separate option was removed from Chapter 11, and the 2012 IECC is the only compliance path allowed).

The Commission held several meetings discussing code change proposals for the 2009 editions of the ICC codes - including the IRC - through March 2011. On March 31, the Commission formally recommended a residential code based on the 2009 IRC with Oklahoma amendments. This recommendation was approved by Gov. Mary Fallin on May 10. The recommendation passed through the Legislature, leading to the official adoption of the code on May 27. The statute was printed in the state register on July 1, becoming effective July 15, 2011.

The OUBCC has made modifications to IRC Chapter 11, most notably removing the requirement of programmable thermostats, allowing visual inspections for duct sealing, and making the placement of energy efficiency certificates on a home's electrical panel voluntary.

A 2009 comparative review by DOE has found that Chapter 11 of the 2009 IRC does not achieve the energy savings of the 2009 IECC and is not compliant with the requirement of Section 410 of ARRA. The DOE review offered a set of five strengthening amendments to Chapter 11 of the 2009 IRC for states that choose not to adopt the IECC. These modifications are designed to achieve equivalence with the 2009 IECC. Some states that have either traditionally not adopted the IECC or faced similar questions of legal authority to do so – like Alabama and Indiana – have adopted the amendments to address these issues.

**Gap #3:** Oklahoma’s residential energy code is not based on the national model energy code and does not achieve the energy savings of the 2009 IECC.

**Recommendation:** The OUBCC should review and adopt the 2009 IECC without weakening amendments. Alternatively, given unresolved potential legal barriers, the OUBCC could also adopt the unamended edition of Chapter 11 of the 2009 IRC with five modifications recommended by DOE to make Oklahoma's code as energy efficient as the 2009 IECC and comply with the requirements of Section 410 of ARRA.

COMMERCIAL ENERGY CODE

The Oklahoma State Fire Marshal’s office adopted the 2006 International Building Code (IBC) for the buildings under its purview in 2007. Chapter 13 of the IBC, the code’s energy efficiency section, requires compliance with Chapter 5 of the 2006 IECC. In 2011, the OUBCC began reviewing several 2009 ICC code series editions for the first time, including the 2009 IBC (with its reference for compliance with the 2009 IECC).
In January 2012, the OUBCC submitted recommendations for approval by the Oklahoma Legislature to adopt several 2009 ICC code editions, including the 2009 IBC. The proposal, however, stated that all references to the IECC within the codes adopted by the OUBCC shall refer to the 2006 IECC commercial code as adopted and modified by the State Fire Marshal until replaced with a code adopted by the OUBCC. The recommended codes were approved by the Legislature and Governor Fallin in May and were submitted to the Secretary of State's Office of Administrative Rules. They will be effective November 1, 2012.

**Gap #4:** Oklahoma’s commercial energy code is based on an outdated model code edition and does not achieve the energy savings of the 2009 IECC or ASHRAE Standard 90.1-2007.

**Recommendation:** The OUBCC should review and adopt the 2009 IECC or ASHRAE Standard 90.1-2007 without weakening amendments or a more recent update to these codes and standards.

**POLITICAL ENVIRONMENT**

Oklahoma has a strong history of local government, and prior to 2011, it did not have a statewide energy code. The adoption represents a substantial shift in the relationship between the state and local communities on this policy issue, one that many jurisdictions are struggling with. Certain stakeholders within the state—particularly in rural areas—believe that local governments should be allowed to choose their own building code to adopt—or whether to adopt a building code at all.

Local government officials’ views varied, with some believing the energy requirements of the OUBCC adoption are “optional” beside the other “mandatory” life/health/safety requirements. Others maintained a certain level of distrust of the state code in general as an unwelcome intervention into local politics and/or an unfunded mandate. A clear statutory interpretation of the energy efficiency requirements of the state’s codes is needed from the appropriate body, be that OUBCC and/or state legal authorities. Only then can these hurdles to energy code compliance be addressed further in the areas of inspection and enforcement discussed later in this analysis.

**Gap #5:** Without clear guidance from the state, stakeholders view the energy efficiency requirements of the state’s adopted codes as optional, references, or otherwise not mandatory.

**Recommendation:** The appropriate state entity (OUBCC and/or state legal counsel) should provide a clear interpretation that the energy efficiency requirements of the state’s residential building code (based on Chapter 11 of the 2009 IRC) and commercial building codes (amended so that all code references to the IECC mean the 2006 edition) are mandatory.

Energy codes actually fit well within pro-business political environments, as uniform standards are often viewed as “pro-business” through decreased risk and uncertainty. The state also has several key stakeholders that are supportive of building energy efficiency and sustainability policies and practices, recognizing the benefits they provide Oklahoma’s citizens and its economy. The Office of the Secretary of Energy, the Oklahoma State Homebuilders Association, the Oklahoma Department of Commerce, the Bring It Home campaign, the South-central Partnership for Energy Efficiency as a Resource, and others appear primed to foster discussions with BCAP on how Oklahoma can move forward in this policy area, including through some of the recommendations made in this Gap Analysis.
**Local Adoptions Above Oklahoma State Energy Efficiency Requirements**

The following three municipalities have adopted the 2009 IECC (as of October 1, 2012):

- Tahlequah (pop. 15,753)
- Bartlesville (pop. 43,070)
- Choctaw (pop. 11,146)

Three other municipalities signed commitment letters with Bring It Home pledging to adopt the 2009 IECC:

- Moore (pop. 55,081)
- Piedmont (pop. 3,650)
- Shawnee (pop. 29,857)

**Sources:** Bring It Home 2012 Report, follow-up interviews with Bring It Home staff, and the 2010 U.S. Census

---

Oklahoma First Energy Plan Recommendation: Ensure the effectiveness of legislative and municipal efforts designed to promote energy efficiency planning and reporting

Oklahoma municipalities and political subdivisions are required to abide by the minimum construction codes and standards adopted by the Commission. According to OUBCC, local jurisdictions “should endeavor to come into compliance with the state law (Title 59 O.S. 1000.20 to 1000.29), in a reasonable amount of time.”

The statute that created the OUBCC allows state agencies and political subdivisions to adopt codes and standards with requirements which exceed the standards and requirements adopted by the Commission. Local jurisdictions are required to file an adopted code with the Commission. They may amend codes adopted by the Commission to make changes necessary to accommodate local conditions, subject to the approval of the Commission. All adopted codes for state agencies and political subdivisions will be listed on the OUBCC website.

During its grant period between 2010 and 2012, the Bring It Home initiative extended the opportunity for free technical training and adoption assistance to communities that had showed interest in moving forward with code adoption. The project distributed an information-gathering survey to the 24 priority communities and requested letters of commitment to demonstrate the local jurisdiction’s desire to adopt an energy code more efficient that the OUBCC-adopted code. In the commitment letter, the local jurisdiction stated its intent to attempt to adopt the 2009 IECC as part of their residential code by the end of 2011. The letter allowed for the jurisdiction to include the 2009 IECC as a voluntary option in addition to the existing code.

The Bring It Home team prioritized Oklahoma City and Tulsa to join this effort, as many communities had reservations about moving forward until those two leading municipalities had done so. The project ultimately received commitment letters from six municipalities. As of October 2012, three of these communities had adopted the 2009 IECC: Bartlesville (adopted), Choctaw (adopted), Moore, Piedmont, Shawnee, and Tahlequah (adopted).

As of October 2012, neither Oklahoma City nor Tulsa has adopted the 2009 IECC. In April 2012, Oklahoma City adopted the OUBCC’s 2009 IRC Chapter 11, but had not yet updated its version of the IBC, which remained at the 2003 edition. Tulsa has adopted the 2009 IRC Chapter 11 and 2006 IBC base versions adopted by the OUBCC.
Gap #6: For the most part, municipalities in Oklahoma (including Oklahoma City and Tulsa) have not yet chosen to adopt or enforce energy codes that achieve significant energy savings beyond the state code.

Recommendation: Encourage willing and able local jurisdictions to go beyond the state code and support them with educational materials on cost and savings data and technical support to code officials and design and building professionals. Continue to provide political support and facilitate stakeholder communication and engagement as needed.

Massachusetts and North Carolina have both encouraged local jurisdictions to adopt codes above the statewide minimum code by including a voluntary “stretch code” as an appendix to the state code. Massachusetts’s Appendix 115AA provides a uniform option for adoption by municipalities that seek greater building energy efficiency savings. Some estimates state that stretch code compliance could result in 20 to 35 percent energy efficiency savings in residential structures, and 20 percent energy efficiency savings in commercial buildings beyond the 2009 IECC. Massachusetts has supported this effort by providing funds through the state energy office for training for enforcement and building professionals in those communities. As of June 2012, 121 municipalities in Massachusetts had adopted the stretch energy code.

Gap #7: No local jurisdictions are leading the state in adoption of above-code programs beyond the 2009 IECC.

Recommendation: Encourage local adoption of above codes by the OUBCC developing a voluntary “stretch code” as an appendix and provide incentives for code training funding through ODOC, which should connect interested code officials and policymakers with energy performance champions in their jurisdictions. BCAP’s Online Code Environment and Advocacy Network (OCEAN) Code Builder tool provides information on advanced codes for both commercial and residential buildings to architects, builders, and building departments. It provides a wealth state and national resources on policy options and the challenges associated with first-time adoption of green and above-code programs, including technical support, guidance for creating these programs, and a number of case studies on programs across the country.

PUBLIC BUILDINGS

Oklahoma First Energy Plan Recommendation: Benchmark all state buildings, conduct energy audits, and set target efficiency gains (what gets measured gets managed).

Oklahoma statute states that “all public projects are required to abide by the minimum standards and requirements; provided, nothing in this act shall prevent or take away from state agencies the authority to enact and enforce requirements containing higher standards and requirements than such minimum standards and requirements.”

One way many state governments lead by example for energy codes is to adopt a more efficient energy code for state-owned and/or state-funded facilities. Unlike many leading states, however, Oklahoma does not yet have high energy efficiency standards for state-owned, -funded, or -leased buildings. The lack of an advanced energy code for public buildings is a lost opportunity for energy and money savings.
The Oklahoma Department of Central Services (DCS) Construction and Property (CAP) Division administers the Minimum Codes for State Construction. Established in June 2007, the applicable codes and standards began as those adopted by OSFM but were later superseded by the codes adopted by OUBCC in 2012. As of November 1, 2012, the public buildings code continues to reference the 2006 IECC and ASHRAE Standard 90.1-2004. While statute allows CAP to require compliance with additional codes not adopted by OSFM or OUBCC including the latest edition of the IECC, the DCS website did not contain any records of administering any advanced efficiency requirements.

In 2012, the Oklahoma Legislature passed SB 1096 to create the Oklahoma State Facilities Energy Conservation Program. Overseen by the Office of State Finance, all state facilities will be subject to an energy cost reduction target of 20 percent by the year 2020 compared to fiscal year (FY) 2012 utility expenditures. All fees and funding related to the program, including any personnel compensation for persons dedicated exclusively to program implementation, are to be paid through savings generated by reducing energy costs.

The legislation instituted an initial fee-free period of not less than 12 months as well as a free ongoing vendor support beyond its initial term as the program is established. The bill also directs the Office of State Finance to review prior organizational behavior-based energy conservation programs under contract with a state agency to determine if the contract complies with the program.

Initial analyses of the bill estimated that total electricity, natural gas, and other utility expenditures from state facilities have averaged slightly over $100 million over the previous four fiscal years. The legislature’s official analysis noted that industry sources estimate cumulative savings have potential to reach an amount in excess of $200 million, with upside potential of $500 million in cumulative savings over a period of years.

While upcoming years will tell if this program is a success, its creation is a best practice. It may be focused on consumption reductions in existing buildings through behavioral changes, but the state can maximize the program’s potential by ensuring that the next generation of state facilities and the next list of major retrofits are substantially more energy efficient. Assuming these future buildings would meet the current minimum standards for these projects under the purview of the latest energy code adopted by OSFM – the 2006 IECC – the state could see greater than 30 percent energy savings in these new projects through the adoption of the 2012 IECC for public buildings.

**Gap #8:** Oklahoma’s minimum energy code for public (state-owned and/or state-funded) buildings is not more efficient than its energy codes for homes and commercial buildings.

**Recommendation:** OUBCC should develop updated energy standards for all new and renovated state-owned, -funded, or -leased buildings based on the 2012 IECC and/or ASHRAE Standard 90.1-2010. These buildings can achieve energy savings of more than 30 percent beyond those built to the current public building energy code in Oklahoma. To maximize the impact these future projects and retrofits have on achieving the state’s goal of a 20 percent energy reduction in state facilities by 2020, the state should lead by example and help prepare the commercial construction market for future energy code updates down the road. By adopting the most recent energy code editions for public buildings, the state also demonstrates fiscal responsibility with taxpayer dollars. More efficient
public buildings help governments hedge against uncertain energy availability and costs, create jobs, and stimulate the local economy.

See the Above Code Programs section of this report for information on the state’s High Performance Buildings program for public building construction.

**POTENTIAL SAVINGS FROM ENERGY CODES**

**Oklahoma First Energy Plan Recommendation:** Empower consumers with the tools and information necessary to make informed energy decisions, taking advantage of efficiency opportunities that are economically feasible, in order to minimize life-cycle energy costs, maintain comfort and services, and help minimize the need for new power generation.98

Many states and local governments often do not understand the energy savings and incremental construction costs that are associated with updating their energy code. By identifying and putting a price tag on specific energy code upgrades, and comparing them against the anticipated energy savings, it begins to address concerns about the costs that home builders—and eventually home buyers—will encounter if a new code is adopted. After considerable consultation, research, and analysis, BCAP developed resources that help explain construction costs that are amortized within a homebuyer’s mortgage.99 BCAP has published Incremental Cost Analyses for select states and cities for both the 2009 IECC100 and the 2012 IECC.101 DOE has also created national and state analyses assessing the cost-effectiveness of residential energy codes based on a life-cycle approach, balancing first costs against longer-term energy savings over the life of the home.102 These resources help to cultivate conversations – and support those already going on – in states and cities considering an update to their energy code.

**RESIDENTIAL BUILDINGS**

While BCAP did not perform an analysis on the 2009 or 2012 IECC for Oklahoma, enough analyses have been performed for states and major cities around the country that adequate analogs can be found. One such analogous analysis looked at the incremental cost of the 2012 IECC on homes in Dallas, Texas in IECC Climate Zone 3. With much of Oklahoma, including Oklahoma City and Tulsa, in IECC Climate Zone 3, we can infer that Oklahoma homeowners would enjoy similar benefits to those in Dallas and save significant money if homes were built to the latest energy code, the 2012 IECC.

According to BCAP analysis, the incremental costs to build homes in Dallas to the 2012 IECC (as compared to the 2009 IRC Chapter 11; Texas and Oklahoma both have residential codes based on this) will conservatively add no more than $2,358 to $2,440 to the cost of a new home (based on exterior wall type) – although this figure could increase or decrease depending on climate zone and local practices.103

Compliance with the 2012 IECC represents a down payment increase of no more than $488, plus an additional $9 to monthly mortgage payments on an average new home in climate zone 3. The analysis estimates a breakeven point for homebuyers of 33 to 37 months, or roughly three years, after which those homebuyers would enjoy an annual profit of $159 to $169.104 This analysis is based on the following mortgage particulars: 20% down payment, 30 year term, and nationwide interest rate average of 4.03 percent. Please see the table below for payback periods for specific construction elements in Dallas in climate zone 3.
Table 1 – 2012 IECC Mortgage Payback for Homebuyers in Dallas by Exterior Wall Type

<table>
<thead>
<tr>
<th>Exterior Wall Type</th>
<th>Incremental Costs</th>
<th>Energy Savings per home</th>
<th>Down Payment Increase (and Mortgage Increase per Month)</th>
<th>Breakeven Point</th>
<th>Annual Profit for Homeowner after Breakeven Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate Zone 3: R-20 Walls</td>
<td>$2,440</td>
<td>$271/year</td>
<td>$488 (plus $9/month)</td>
<td>37 months</td>
<td>$159</td>
</tr>
<tr>
<td>Climate Zone 3: R13+5 Walls</td>
<td>$2,358</td>
<td>$277/year</td>
<td>$472 (plus $9/month)</td>
<td>33 months</td>
<td>$169</td>
</tr>
</tbody>
</table>


It is worth noting this conservative break-even scenario is subject to significant fluctuations in input variables. For example, facing the prospect of rising energy costs, both payback and break-even on the incremental cost of code improvements would be accelerated significantly. Similarly, variations in lending interest rates and required money down can alter this projection. Increases in incremental cost may increase payback time, whereas decreases in incremental cost would speed up payback time.\(^{105}\)

In mid-2012, DOE released national and statewide analyses of the IECC.\(^{106}\) The estimates assume the statewide baseline or current practice is equivalent to the prescriptive code requirements of the 2009 IECC. Oklahoma's customized analysis asserts that the 2012 IECC life-cycle\(^{107}\) cost savings over 30 years would be $5,786.\(^{108}\) The data suggests that consumers in Oklahoma would find a 30.7 percent energy savings\(^{109}\) and save an average of $408 per year.\(^{110}\) The simple payback of the 2012 IECC for Oklahoma is 5.9 years.\(^{111}\) To calculate baseline and incremental construction costs, these estimates rely on a construction data source, 2011 RS Means Contractor’s Pricing Guide, in order to approximate baseline cost and the costs of specific building component changes.\(^{112}\)
Oklahoma First Energy Plan Recommendation: Empower consumers with the tools and information necessary to make informed energy decisions, taking advantage of efficiency opportunities that are economically feasible, in order to minimize life-cycle energy costs, maintain comfort and services, and help minimize the need for new power generation.\(^\text{113}\)

In 2012, BCAP developed the latest version of its Code Savings Estimator, a tool to estimate energy, utility cost, and carbon emissions savings at a state level through the adoption and implementation of updated residential and commercial energy codes. The tool provides estimates for a variety of scenarios input by the user. The Estimator compares the desired target code scenario to the “business-as-usual” baseline scenario based on the Annual Energy Outlook (AEO) reference case published by the U.S. Energy Information Administration. Details on the methodology behind the tool are available in the BCAP Code Savings Estimator Primer on OCEAN.\(^\text{114}\)

To illustrate the significant savings potential codes have for Oklahoma households and businesses, BCAP looked at two theoretical target scenarios to supplement information available to policymakers. In the first (Figure 11), the state adopts and implements the 2009 IECC for residential and commercial buildings in 2014; in the second (Figure 12), the state adopts and implements the 2012 IECC. Both scenarios assume incremental gains in state compliance rates towards the 90 percent goal outlined in the Recovery Act.

The 2009 IECC target scenario estimates combined residential and commercial cumulative savings of 35 trillion Btu (almost 1 percent below the business-as-usual scenario), $292 million in utility costs, and 2 million metric tons in carbon emissions reductions through 2030. The 2012 IECC target scenario estimates even more substantial potential benefits for Oklahoma’s citizens, with combined residential and commercial cumulative savings of 139 trillion Btu (2.3 percent below the business-as-usual scenario), over $1.1 billion in utility costs, and 8 million metric tons in carbon emissions reductions through 2030.
### Table: Selected Savings Estimates - Oklahoma

<table>
<thead>
<tr>
<th>Selected Savings Estimates - Oklahoma</th>
<th>Annual Savings by Year</th>
<th>Cumulative Savings through Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Residential</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall source energy savings (trillion Btu)</td>
<td>0.01</td>
<td>0.60</td>
</tr>
<tr>
<td>Percent of business-as-usual energy use</td>
<td>0.01%</td>
<td>0.40%</td>
</tr>
<tr>
<td>Energy cost savings (millions of 2008 dollars)</td>
<td>0.10</td>
<td>5.00</td>
</tr>
<tr>
<td>CO₂ emissions reduction (million metric tons)</td>
<td>0.001</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Commercial</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall source energy savings (trillion Btu)</td>
<td>0.03</td>
<td>0.90</td>
</tr>
<tr>
<td>Percent of business-as-usual energy use</td>
<td>0.02%</td>
<td>0.70%</td>
</tr>
<tr>
<td>Energy cost savings (millions of 2008 dollars)</td>
<td>0.20</td>
<td>6.00</td>
</tr>
<tr>
<td>CO₂ emissions reduction (million metric tons)</td>
<td>0.001</td>
<td>0.05</td>
</tr>
<tr>
<td><strong>Residential and Commercial Combined</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall source energy savings (trillion Btu)</td>
<td>0.04</td>
<td>1.00</td>
</tr>
<tr>
<td>Percent of business-as-usual energy use</td>
<td>0.01%</td>
<td>0.50%</td>
</tr>
<tr>
<td>Energy cost savings (millions of 2008 dollars)</td>
<td>0.30</td>
<td>12.00</td>
</tr>
<tr>
<td>CO₂ emissions reduction (million metric tons)</td>
<td>0.002</td>
<td>0.10</td>
</tr>
</tbody>
</table>

### Diagram: Residential and Commercial Energy Use Covered by Code - Oklahoma

**Residential Energy Use Covered by Code - Oklahoma**

- **Business as Usual**
- **Improved Codes Scenario**

**Commercial Energy Use Covered by Code - Oklahoma**

- **Business as Usual**
- **Improved Codes Scenario**

---

41
Figure 12 – BCAP Code Savings Estimator – Selected Savings Estimates for Implementing the 2012 IECC Statewide in Oklahoma in 2014

<table>
<thead>
<tr>
<th>SELECTED SAVINGS ESTIMATES - OKLAHOMA</th>
<th>ANNUAL SAVINGS BY YEAR</th>
<th>CUMULATIVE SAVINGS THROUGH YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall source energy savings (trillion Btu)</td>
<td>0.02</td>
<td>2</td>
</tr>
<tr>
<td>Percent of business-as-usual energy use</td>
<td>0.01%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Energy cost savings (millions of 2008 dollars)</td>
<td>0.2</td>
<td>18</td>
</tr>
<tr>
<td>CO₂ emissions reduction (million metric tons)</td>
<td>0.001</td>
<td>0.1</td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall source energy savings (trillion Btu)</td>
<td>0.4</td>
<td>4</td>
</tr>
<tr>
<td>Percent of business-as-usual energy use</td>
<td>0.3%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Energy cost savings (millions of 2008 dollars)</td>
<td>3</td>
<td>28</td>
</tr>
<tr>
<td>CO₂ emissions reduction (million metric tons)</td>
<td>0.02</td>
<td>0.2</td>
</tr>
<tr>
<td>Residential and commercial combined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall source energy savings (trillion Btu)</td>
<td>0.4</td>
<td>6</td>
</tr>
<tr>
<td>Percent of business-as-usual energy use</td>
<td>0.2%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Energy cost savings (millions of 2008 dollars)</td>
<td>3</td>
<td>46</td>
</tr>
<tr>
<td>CO₂ emissions reduction (million metric tons)</td>
<td>0.02</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Residential energy use covered by code - Oklahoma

Commercial energy use covered by code - Oklahoma

- Business as Usual
- Improved Codes Scenario

Trillion Btu

2010 2015 2020 2025 2030 2035

115 120 125 130 135 140 145 150 155 160 165

Business as Usual

Improved Codes Scenario

Energy cost savings (millions of 2008 dollars)

CO₂ emissions reduction (million metric tons)
**CODE ADMINISTRATION**

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, Oklahoma and its municipalities must carry out energy code implementation, a term used to describe all of the activities needed to prepare the state, local and regional building departments, the building industry, and other stakeholders for compliance with the energy code. Code administration includes such items as: 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.

**DIVISION OF RESPONSIBILITIES**

As a home rule state, Oklahoma has a strong local government culture that allows communities a good deal of latitude in determining their own standards in a variety of policy areas, including construction codes. Though the codes adopted by OUBCC are considered minimum standards statewide, the state leaves residential construction code enforcement to the jurisdictions having authority across Oklahoma’s 77 counties and hundreds of cities and unincorporated areas. The OUBCC website provides notice that some municipalities may not adopt or enforce building or construction codes. In most cases, jurisdiction for enforcement of certain state minimum building codes goes to the Oklahoma State Fire Marshal (particularly for the commercial sector) While comprehensive data on local energy code enforcement practices was not available, stakeholders interviewed for this report believed there is a stark contrast in code enforcement practices between communities in major metropolitan statistical areas (MSAs) like Oklahoma City and Tulsa and those communities in the rural parts of the state. Energy code enforcement in particular was believed to be non-existent in those areas.

As is the case across many states in America, code administrative practices are not consistent throughout the state. Just as having uniform standards adopted is preferable to a patchwork of code policies, more consistent administrative efforts and infrastructure yield more consistent results in code compliance.

A few rural municipalities do conduct their own inspections. Since construction rates are generally much lower in such communities, code officials often serve multiple functions for the municipality. However, operating a comprehensive building code program in compliance with the state building code may not be feasible for many smaller municipalities. In neighboring states like Texas, some smaller municipalities pool their resources together to form a council of government (COG), which serve the municipalities in various aspects, one being the administration and enforcement of the state’s construction codes.

In another example, Pennsylvania’s rural COGs require each municipality to adopt the state code by ordinance and approve an intergovernmental agreement to establish the operations of the code enforcement program. These often adopt a resolution to create a common fee schedule is also approved by the COG membership. After the initial investment and start-up period, “intergovernmental code administration programs tend to be totally funded through permit fees” and have good support from “local residents and builders because uniform procedures and standards streamline the permitting and inspection process.”
However, the state largely does not provide local jurisdictions with guidelines or other assistance for code implementation. These municipalities must determine how to best implement the state codes in their community, which can create a confusing patchwork of different enforcement practices.

**Gap #9:** The state does not provide municipalities with guidelines for implementing the state residential code.

**Recommendation:** The appropriate state agency – with feedback from local stakeholders – should create guidelines for implementing the state residential energy that lead to greater uniformity throughout the state.

Though OSFM carries out general plan review and building inspection for commercial buildings, no state agency is responsible for residential code enforcement for communities that choose not to adopt or enforce codes. Many stakeholders interviewed believe that the office does not have sufficient resources to include a proper energy code review and inspection. Moreover, there is widespread belief among building and enforcement professionals that officials do not view energy code enforcement as an important part of the office’s responsibilities.

**Gap #10:** No state agency has jurisdiction over residential enforcement for municipalities that do not adopt or enforce codes, leaving some areas in Oklahoma without proper plan review and building inspection for homes.

**Recommendation:** No state agency should have responsibility for enforcement on the local level without a clear mandate to guide its actions. The Oklahoma Legislature should require all municipalities to either be responsible for code enforcement, allow a state entity to fulfill this role, or require contracting out with a third party agency.

**Gap #11:** The state does not have sufficient resources to carry out a proper energy code review and inspection process for residential construction in local jurisdictions that cannot or will not enforce minimum energy efficiency requirements.

**Recommendation:** No state agency should have responsibility for enforcement on the local level unless it has sufficient funding to do so. If these communities do not want the burden of enforcement, as some have already indicated, they could contract out these services to a third party agency, as some municipalities may already do. One way to ease this financial burden is to establish or join a county or regional building inspection department (which state statute allows).

Finally, the Department of Central Services has jurisdiction over all state buildings, whose standards are set by OSFM. See the Adoption section above for more information on the state goal’s for reducing energy consumption in state facilities.
OUTREACH

**Oklahoma First Energy Plan Recommendation:** Encourage public outreach efforts to communicate the benefits of efficiency for commercial and residential applications.¹²⁰

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

**POLICYMAKERS**

State-level energy code outreach to inspection departments and local decision-makers is critical, due in large part to the codes and standards adopted by OUBCC serving as the minimum energy code statewide. State outreach helps building inspectors and local policymakers understand the value of energy codes and their role in the life, health, and safety of building occupants. State-level outreach is generally code training and technical assistance, particularly when a new code has been adopted.

Gov. Fallin hosted the **2012 Governor’s Energy Conference** in Oklahoma City in October 2012. The event highlighted myriad energy issues important to Oklahoma and continue to promote the administration’s Oklahoma First Energy Plan.¹²¹ The agenda, however, did not appear to include any sessions on energy codes or building energy efficiency despite those issues’ place the plan.

**BUILDING INDUSTRY PROFESSIONALS**

The state’s outreach to these energy code stakeholders was largely done through opportunities created by the Bring It Home project. This included speaking engagements from state officials and coordination for approved continuing education courses. The efforts spearheaded by Bring It Home represent an important best practice in the energy code policy arena, but the project has been on hiatus since March 2012 after its grant funding period ended. The initiative would be an excellent source for future outreach activities.

- **Lunch and Learns**¹²²

  The project’s initial outreach efforts included two introductory sessions in Oklahoma City and Tulsa in January 2011 to address common questions about the current status of building codes and a need for education and discussion. Attendees learned about the recently-created OUBCC, best practices underway in states and cities across the nation, and the Bring It Home campaign in general.

- **Technical Training Sessions**¹²³

  Bring It Home held technical training sessions in Tulsa and Oklahoma City in October, November, and December 2011 and February 2012. The Construction Industries Board approved the sessions for several hours of for continuing education credits for its 2009 IRC Chapter 11 overview and two-
part 2009 IECC review. This coordination indicated the technical nature of the material and high quality of the curriculum, providing value to both the attendees and to their local jurisdictions.

- Building Code Symposia

The two single largest outreach events with Building Code Symposia put on by Bring It Home in Oklahoma City in January 2012 and Tulsa in March 2012. The events were well-rounded overview of issues related to both local governments and building industry professionals. The content included general sessions focusing on standards across the country and goals for energy efficiency in Oklahoma as well as technical training sessions in the afternoon. BCAP participated in both by giving presentations. Other speakers at the events included Secretary of Energy Michael Ming and OUBCC CEO Billy Pope.

- Additional outreach by Bring It Home included:

  - Oklahoma Sustainability Network 2010 Annual Conference, Edmond, OK, June 2010
  - Association of Electrical Engineers, Oklahoma City, OK, March 2011
  - Construction Specifications Institute, Oklahoma Meeting, Tulsa, OK, April 2011
  - Oklahoma Home Builders Association / Northwest Oklahoma City, Oklahoma City, OK, May 2011
  - Oklahoma Historic Preservation Statewide Conference, Guymon, OK, June 2011
  - Oklahoma Home Builders Association, Statewide Conference, Durant, OK, July 2011
  - Department of Energy National Building Code Conference, Salt Lake City, UT, July 2011
  - Green Home Builders Conference, Oklahoma City, OK, September 2011
  - American Planning Association, Oklahoma Chapter Statewide Conference, Bartlesville, OK, October 2011
  - Oklahoma Municipal League Statewide Practical Guide Workshop, Midwest City, OK, December 2011
  - Bring It Home Building Code Symposium, Oklahoma City, OK, January 2012
  - Bring It Home Building Code Symposium, Tulsa, OK, March 2012
  - Association of Electrical Engineers, Oklahoma City, OK, March 2012

The Oklahoma State Homebuilders Association was a primary sponsor and organizing partner of the 2012 Oklahoma Green Building Summit. Attendees included over 400 building industry professionals and realtors. Secretary of Energy Michael Ming was one of the key speakers, presenting on the Oklahoma First Energy Plan.

The extent to which local jurisdictions engage in outreach activities varies widely across the state. Most jurisdictions do not have explicit efforts to promote the energy code, either to consumers or industry professionals. Often, the presence of a dedicated building code official, typically within the building department can be a large difference in achieving effective code enforcement or falling short of this goal.

**Gap #12:** The state and local governments do not have strong, consistent outreach efforts geared specifically to energy codes and/or building energy efficiency.

**Recommendation:** Create more dedicated publications for the energy code, such as bulletins and flyers where energy code information, resources, trainings, updates can be shared statewide.
**CONSUMERS**

*Oklahoma First Energy Plan Recommendation: Empower consumers* with the tools and information necessary to make informed energy decisions, taking advantage of efficiency opportunities that are economically feasible, in order to minimize life-cycle energy costs, maintain comfort and services, and help minimize the need for new power generation.\(^{127}\)

The state in recent years appears to have realized the value in consistent public education on energy issues. Emphasis on the role that energy codes play is urgently needed, and the state is the most powerful entity to lead and/or coordinate an outreach effort with partners like Bring It Home. There are beneficial partnerships that could be made with local governments, nonprofits, educational institutions, and utilities, to educate Oklahoma consumers on how they can save energy, money, and help protect the state’s natural resources.

To assist states in the difficult task of engaging consumers on this issue, BCAP created the Consumer Energy Code Awareness campaign in partnership with Consumers Union.\(^{129}\) The effort yielded resources such as energy code checklists and easy-to-use guides for prospective homebuyers know the energy code requirements in their area.

In August and September 2012, BCAP issued press releases through the Alliance to Save Energy highlighting the consumer campaign and its new grassroots adoption support Take Action tool.\(^{130}\) The tool enlists individual homeowners and homebuyers in targeted states to send emails to their state and municipal elected officials (based on the individual’s zip code) in support of adopting and implementing updated energy codes to ensure more energy-efficient homes. The Alliance to Save Energy distributed the press releases to state media outlets in Texas, Michigan, Pennsylvania, and Alaska. Based on the feedback and actions taken by these initial recipients, BCAP could take this grassroots effort to other states like Oklahoma and expand its database of individual energy code supporters to bolster coalitions in future state code adoption processes.

**Gap #13:** Public outreach and education on home energy efficiency and energy codes to consumers is needed.

**Recommendation:** Public outreach and education efforts geared specifically to energy codes and/or building energy efficiency should be hosted by the state, using resources found through partnerships with local governments, nonprofits, educational institutions, and utilities. Current efforts like the BCAP Consumers Energy Code Awareness campaign, its Consumers Take Action tool, and press releases to local media outlets can be tailored to Oklahoma.
ENFORCEMENT

Enforcement provides the teeth behind adopted codes, as it is the responsibility of code officials and third party inspectors to ensure that design and construction professionals comply with the provisions of all construction codes, including energy codes. While enforcement is a local issue in Oklahoma, the state can and must play a crucial role in providing municipalities with the resources and support they need to establish effective enforcement infrastructures and practices. As codes are regularly evolving, it is also incumbent on the state, municipalities, and involved third party organizations to provide the enforcement community with access to sufficient energy code training, especially for those inspection departments where multiple barriers exist to enforcing the energy code sufficiently to achieve compliance with the state code requirements.

ENFORCEMENT STATUS

COMMERCIAL CONSTRUCTION

The OUBCC is not charged with enforcing the minimum codes and standards once they have been adopted. The Construction Industries Board enforces any electrical, mechanical, plumbing and fuel gas minimum codes and standards once adopted. The Oklahoma State Fire Marshal is tasked with enforcing the commercial building code. Both agencies were assigned those duties before the OUBCC was created. The Oklahoma Legislature has not charged any agency with the responsibility to enforce any other portions of the state minimum adopted codes.\textsuperscript{131}

CIB sets the requirements for building inspectors in Chapter 70 of its 2011 Permanent Rules as the “minimum levels of inspection practice required of inspectors for the components and systems identified in these rules.”\textsuperscript{132}

CIB provides a staff of six electrical inspectors, seven mechanical inspectors, and six plumbing inspectors with territories covering the counties of the state.\textsuperscript{133} Title 74 § 317 of Oklahoma Statute outlines the required locations of inspections to be performed by the State Fire Marshal agents, who perform over 2,000 inspections across the state each year.\textsuperscript{134}

BCAP has found that state stakeholders believed energy code enforcement is somewhat more effective in commercial construction, due to the increased likelihood of involvement by architects and/or engineers in the building design process.

In Oklahoma, however, architects and other design professionals are not responsible for a failure to comply with the energy code (as is the case in many states) according to the rules established in the Oklahoma State Architectural and Registered Interior Designers Act of 2010.\textsuperscript{135} If the state is committed to achieving energy savings through the enforcement of the energy code, it is imperative that all professionals involved in the design and construction of buildings are held accountable. Although a professional stamp does not ensure that a building meets energy code requirements, it is an important minimum protection for building owners.

\textbf{Gap #14}: The Oklahoma State Architectural and Registered Interior Designers Act of 2010 does not address responsibility for architects and other design professionals regarding energy code compliance.
**Recommendation:** The Oklahoma Legislature should amend the Oklahoma State Architectural and Registered Interior Designers Act of 2010 to require architects and other design professionals to certify building code compliance with a professional stamp.

### RESIDENTIAL CONSTRUCTION

Aside from the plumbing, electrical, mechanical, and fuel gas inspectors from CIB noted above, there is no state agency tasked with residential energy code enforcement. CIB sets the requirements for home inspectors in Chapter 70 of its 2011 Permanent Rules as the “minimum levels of inspection practice required of inspectors for the components and systems identified in these rules.” The rules explicitly state that inspectors are not required “determine the strength, adequacy, effectiveness, efficiency or insurability of any system or component;” “determine duct leakage or calculate duct sizing [of HVAC distribution systems];” or “determine the uniformity, adequacy, or distribution balance of the heat or cooling supply to habitable rooms.”

By not having a minimum energy code until the last couple of years, the state has experienced a slow reception of the energy code and is working on implementation practices to achieve better compliance rates. Some stakeholders imparted their belief that communities in the metropolitan areas of Oklahoma City and Tulsa have better enforcement systems and hold higher compliance rates than rural municipalities. As the flexible nature of the enforcement infrastructure allows, rural municipalities implement the state minimum requirements with their own approach, without incentives to do so from the state, are not likely to make major improvements in consistency or compliance rates. Other stakeholders noted that because many rural municipalities lack the money and resources to effectively enforce the energy code, one person is often doing the work of two to four jobs – code official zoning officer, health inspector, public works department, and office administrator. Moreover, as mentioned earlier, there has been a decline in overall construction since 2006, which may speak to the lack of attention and resources dedicated to code enforcement, especially in rural areas.

### PUBLIC BUILDINGS

OSFM oversees plan review and permitting for the Minimum Codes for State Construction on behalf of DCS. When a state construction project requiring a permit from OSFM is located within a local code enforcement jurisdiction, CAP encourages obtaining an additional building permit from the local jurisdiction and/or arranging cooperative inspections with the jurisdiction and OSFM.

### BARRIERS ACCORDING TO ENFORCEMENT PROFESSIONALS

#### LACK OF PRIORITY

Code officials and third-party enforcement professionals interviewed cite a lack of priority for energy code enforcement as the largest barrier to full energy code compliance. Many believe that their primary mission is to ensure the health and safety of occupants and that the energy code is not equivalent to overall health, safety, welfare considerations.
Enforcement professionals also stress that rigorous building code inspection is relatively new in many municipalities. Prior to 2011, there was no statewide residential construction code. Even in municipalities that had adopted their own building code, energy was not often a priority compared to other concerns.

A few stakeholders interviewed even mentioned that some of their industry professionals in the state view the energy code as a purely political issue and an example of the state being forced to follow a national or DOE-mandated energy policy against its will. Other policymakers were of the mind that such requirements are an “unfunded mandate.” In this context, energy code enforcement is seen as an unnecessary burden on already overworked local government employees, representing a key view in many sections of Oklahoma regarding federal-state and state-local politics. With regards to energy codes: careful, consistent outreach efforts that stress the importance of energy codes to life, health and safety (pollution, indoor air quality, economic benefits) are critical for changing such attitudes.

Regardless of the reasons, enforcement professionals who do not value the energy code as integral to occupant health and safety are less likely to attend trainings, issue stop-work orders for energy code violations, or integrate the code into their established routines, particularly if energy conservation and efficiency are not high among the values embraced by a community. Inspection department directors must be energy code champions who prioritize energy code enforcement and work to communicate this attitude to the building and design professionals they work with. Support for proper energy code enforcement must also come from local decision-makers, who should prioritize code enforcement as a crucial economic and environmental mechanism that keeps money in the local community—and follow through with adequate funding for inspection departments to carry out their duties.

**Gap #15:** Many enforcement professionals and local decision-makers do not make energy codes a priority.

**Recommendation:** After the state has adopted an energy code and made clear that its application is a priority, it can educate and direct local jurisdictions that enforcement is an important issue for Oklahoma. Enforcement professionals should prioritize the application of the energy codes alongside more traditional building codes. Local decision-makers should prioritize the enforcement of energy codes by providing sufficient resources to code officials.

**MORE TRAINING NEEDED**

The other significant barrier to stronger energy code enforcement is a need for more and ongoing energy code training. While the spotlight placed on energy codes in the last few years – especially through the creation of the OUBCC and the establishment of the Bring It Home campaign – has yielded a greater volume of training than the state had seen previously, more is necessary. Unfortunately, funding to attend trainings is often one of the first items to be cut when municipalities are financially strapped, and funding to put on these trainings in the future is in doubt.

Bring It Home held technical training sessions in Tulsa and Oklahoma City in October, November, and December 2011 and February 2012. The Construction Industries Board approved the sessions for several hours of for continuing education credits for its 2009 IRC overview and two-part 2009 IECC review. This coordination indicated the technical nature of the material and high quality of the curriculum, providing
value to both the attendees and to their local jurisdictions. Bring It Home sponsored approximately six other training sessions for audiences including developers, city managers, town managers, and city officials.

The City of Oklahoma City held four trainings for an audience of roughly 60 area industry professionals on the 2009 IRC and 2009 IECC for the Central Oklahoma HBA chapter in June and July 2012 through funding from the Recovery Act EECBG stimulus through the city’s sustainability office. The City of Tulsa held a series of three-hour trainings on the 2009 IRC for an audience of roughly 35 industry professionals through funding from Bring It Home.

**Gap #16:** More training opportunities are needed, but there is a lack of funding for stakeholders to attend training workshops.

**Recommendation:** Provide more training events for the codes it adopts and consider a longer term, more strategic training program to establish expertise in its construction and enforcement community. In moving forward, the state should consider online training. This approach reduces travel time and costs and may promote higher attendance rates. As the state is very rural, training efforts logically convene in population centers which have historically had moderate attendance rates. Some events should be scheduled outside metropolitan areas like Oklahoma City and Tulsa and work to include more rural communities.

---

**MUNICIPAL GOVERNMENT SYSTEM**

A final barrier to stronger energy code enforcement is the state’s home rule history and hundreds of municipalities responsible for enforcement. Though this system allows local control of local issues, it also puts an additional bureaucratic burden on many municipal officials, who must either enforce the state code or contract with a third-party enforcement agency to do so. This system affects smaller municipalities that have relatively little construction activity in particular.

Addressing ways to improve the efficiency of Oklahoma’s local community culture—or even whether such improvements need to be made—falls well beyond the scope of this report. One solution specific to building inspection (and that might have applicability in other areas) is to promote the formation of regional or county inspection departments that serve multiple municipalities. CIB is in fact allowed to license and classify a circuit rider inspector if the person is employed by more than one political subdivision.

**Gap #17:** Some building departments lack the resources to enforce codes and/or do not have easy access to assistance and information for plan review in complex buildings or other specific building types.

**Recommendation:** Promote and encourage the formation of regional or county inspection programs that pool resources over multiple jurisdictions to provide support to rural and unincorporated areas in improving energy code enforcement. BCAP and the International Code Council (ICC) have created the Energy Code Ambassadors Program (ECAP) to help states reach their energy code compliance goals by providing guidance and training for state and local code enforcement officials.
INDUSTRY SUPPORT AND ABOVE CODE PROGRAMS

Energy codes boast increased efficiency improvements over the last few years, yet it is ever more important for the enforcement and building communities to take extra steps beyond code development to ensure that compliant buildings achieve their predicted energy savings, as many buildings fall short of their potential.

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

CERTIFICATION AND LICENSING

DESIGN PROFESSIONALS

Relevant design professionals are regulated, certified, and licensed by the Oklahoma Board of Licensed Architects, Landscape Architects, and Registered Interior Designers. Oklahoma law and rules require architectural firms to be registered in the state by applying for a Certificate of Authority with the board in addition to filing a separate application with the Office of the Secretary of State. All licenses for individuals and firms are renewed every two years and require 24 hours of continuing education, all of which must be "HSW" (health, safety, welfare) every 2-year renewal period. All licensees are subject to a random audit each renewal period.147

CODE ENFORCEMENT PROFESSIONALS

The Construction Industries Board administers the qualifications and requirements for certification and licensing for code inspectors in Oklahoma. CIB issues licenses for inspectors for two classifications—“unlimited” for all structures and “residential” for R3 or R4 residential structures only—and for five categories—plumbing, electrical, mechanical, building, and energy code. CIB may also classify a circuit rider inspector if the person is employed by more than one political subdivision.148

BUILDING PROFESSIONALS

While the certification process is established for the enforcement community, Oklahoma does not require the same for building industry professionals, who may provide services without being licensed or certified.

The Oklahoma State Home Builders Association (OSHBA), however, has created the Certified Professional Builder program over concern with the lack of home-builder licensing in the state. After initially supporting legislation to implement licensing in the state that ultimately failed, OSHBA sought a designation to increase professionalism in the industry and set the best builders apart from their competitors. OSHBA began the
program in January 2001 listing and recognizing Certified Professional Builders who voluntarily commit to a set of industry best practices. The program requirements include:

- Carry workers compensation and general liability insurance;
- Build in compliance with all appropriate local, state and national building codes;
- Provide homeowners with a written warranty of no less than one year; and
- Take continuing education classes to stay at the top of his or her field; among other requirements.

### TRAINING AND EDUCATION

#### DESIGN PROFESSIONALS

Regulations for continuing education for relevant design professionals are administered by the Oklahoma Board of Licensed Architects, Landscape Architects, and Registered Interior Designers. All licenses for individual and firms are renewed every two years and require 24 hours of continuing education, all of which must be "HSW" (health, safety, welfare) every 2-year renewal period. All licensees are subject to a random audit each renewal period. Although the American Institute of Architects offers courses related to sustainability that the Board may approve for credit, the state does not require design professionals to have continuing education units (CEU) related to sustainability. Given that architects have the ability to reduce building costs and decrease a building’s energy needs, such professionals should be familiar and receive training on updates to the state’s energy code. At the point of building conception, architects are well positioned to ensure that buildings are designed and built in compliance.

#### CODE ENFORCEMENT PROFESSIONALS

The Construction Industries Board administers the requirements for continuing education for code inspectors in Oklahoma. CIB issues licenses for inspectors for two classifications – “unlimited” for all structures and “residential” for R3 or R4 residential structures only – and for five categories – plumbing, electrical, mechanical, building, and home. CIB may also classify a circuit rider inspector if the person is employed by more than one political subdivision.

CIB posts listings of training courses available for the various inspector categories that have been approved for CEUs on its website.

The Oklahoma Residential Code Inspectors Association (ORCIA) provides information on the process of home inspections on its website, but its “Inspection Descriptions” page does not include information beyond what is mandated by rules established by CIB for inspectors (i.e. no additional guidance is provided regarding what to look for regarding energy efficiency requirements). The website’s listing of approved CEU courses is several years out of date.

#### BUILDING PROFESSIONALS

CIB does not require building professionals to attain CEUs or receive training on state energy efficiency code requirements. In order for sound energy code compliance throughout Oklahoma, it is imperative that builders and contractors gain knowledge and familiarity with building techniques so they may produce
energy-efficient, structurally sound buildings that have lower material and labor costs than conventional buildings.

OSHBA requires its Certified Professional Builders to obtain and report nine hours of continuing education annually to ensure they are up-to-date on industry best practices and new regulations. Three hours must be courses on insurance, safety, or ethics. While the program does not require any courses on energy efficiency, green building, or sustainability practices, OSHBA seems to promote these principles and green building techniques on its website, its participation in the National Association of Homebuilders (NAHB) Certified Green Professional program, and as a primary sponsor of the Oklahoma Green Building Summit.

**Gap #18:** Oklahoma does not have requirements for licensing, certification, or continuing education related to energy efficiency or state energy standards for building industry professionals, design professionals, or contractors.

**Recommendation:** The state could create recognition or certification programs for building industry professionals, design professionals, and contractors in the absence of licensing requirements. The state could work with OSHBA in promoting its Certified Professional Builders program and other green building initiatives as a good model or successful starting point. This program could stipulate minimum expectations for continuing education relevant to energy codes, building science, and sustainability.

### ABOVE CODE PROGRAMS

#### LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED)

The U.S. Green Building Council’s (USGBC) 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. As of October 1, 2012, there were 43 LEED certified projects and 135 LEED registered projects (projects with the intent to seek LEED certification) in Oklahoma. The USGBC Oklahoma Chapter estimated nearly 700 LEED members in the state as of 2011, including nearly 600 LEED Accredited Professionals (APs).

In June 2008, the Oklahoma Legislature passed a bill (HB 3394) creating the High Performance Buildings programs for certain state construction projects. The bill directed DCS to develop a standard to meet the certification guidelines of either the U.S. Green Building Council's (USGBC) LEED system or the Green Building Initiative's Green Globes rating system. The requirement applies to new construction or substantial renovation projects (i.e. those costing in excess of 50 percent of the value of the facility) that begin the design phase after July 1, 2008 in buildings larger than 10,000 square feet (public schools are exempted from the program). Buildings with less than 5,000 square feet may be held to these standards for minor renovations and controlled maintenance. The standards apply to all projects where state funds or state-insured funds make up more than 50 percent of the project cost. State agencies are directed to meet advanced codes and standards helping to transform the marketplace by bringing high performing buildings into the mainstream. They raise awareness of energy- and resource-efficient design for the public, as well as for design and building professionals and code officials. Finally, they raise the bar for building energy performance, which, in turn, accelerates and shapes the development and adoption of future model codes.
the highest level of certification attainable under a payback period of five years or less. In cases where the increased initial cost of achieving certification is expected to be greater than 5 percent, DCS must examine the design prior to approval. DCS also has general discretionary authority to grant exemptions for other extenuating circumstances.163

Since DCS published its guidelines for the program in July 2009, the state has seen substantial reductions in energy consumption in state buildings since FY 2008, particularly in electricity, natural gas, and water use.164

**ENERGY STAR**

New ENERGY STAR qualified homes are at least 15 percent more efficient than typical new homes. According to the ENERGY STAR website, there are 20 entities that conduct ENERGY STAR ratings in Oklahoma and one lender who offers energy improvement mortgages from the Federal Housing Administration (FHA) and Veterans Affairs (VA).165 There are 16,186 ENERGY STAR certified homes built to-date in Oklahoma. Of those, 244 were built in 2012 (as of October 31) and 1,552 in 2011. There are also 37 ENERGY STAR partner builders.166 Oklahoma ranked in the top half of all states with an ENERGY Certified New Homes Market Index between 20 and 25 percent.167

Within ENERGY STAR for Homes is another program called the Home Performance with ENERGY STAR (HPwES). HPwES is an energy efficiency home improvement program sponsored and promoted by a partnership between the Environmental Protection Agency (EPA), DOE, and local program sponsors; local sponsors are usually utilities, state energy offices, and other interested organizations.168 The Public Service Company of Oklahoma (PSO), a unit of American Electric Power, is the HPwES program in Oklahoma and offers up to $3,000 in incentives to participants. With the core mission to help Oklahoma homeowners save energy and money and improve the quality of their homes, it is available to all eligible Oklahoma consumers.169

As of October 2012, the EPA named **eight Oklahoma state buildings** as ENERGY STAR buildings, including the Department of Agriculture, Attorney General, Department of Transportation, Allen Wright Memorial Library, DHS-CAP, Jim Thorpe, and the Kerr-Edmondson buildings. The Oklahoma State Capitol building was ENERGY STAR certified in 2010, marking the first state capitol building in the nation to earn the recognition.170

**BUILDERS CHALLENGE**

The Builders Challenge is one of DOE’s residential building-efficiency programs established in 2008.171 It is similar to the ENERGY STAR for new homes program in that both programs assist and reward builders who build homes that are more efficient than conventional new homes. However, the energy threshold requirements for the Builders Challenge program are slightly different than the ENERGY STAR new homes program172 because it incorporates innovative solutions and best practices proven by Building America in addition to the ENERGY STAR for Homes Version 3 requirements.173 Building America is a research program initiated by DOE to improve advanced residential building energy technologies, strategies, and practices.174 When a home meets all three requirements, it earns an “Energy Smart Home Scale” label (E-Scale).

More than 10,000 high-performance homes have been constructed under this program as of January 2012 and “have generated an estimated energy cost savings of nearly $15 million and slashed 71,000 tons of carbon emissions since 2008.”175 DOE is in the process of updating the Builders Challenge program to
increase energy efficiency requirements and save up to 40 percent more energy than that achieved with the 2009 energy codes.\textsuperscript{176}

In Oklahoma, there are currently eight organizations participating in the program that do business in the state.\textsuperscript{177} One organization, Guaranteed Watt Saver, is located right in Oklahoma City.\textsuperscript{178} The Builders Challenge program would help Oklahoma builders improve the housing stock by exceeding minimum energy codes and encourage builders to embrace high-performance building approaches and technologies.

**Gap #19:** Above-code programs are not widely implemented.

**Recommendation:** The use of third party, above-code energy efficiency programs at the local level could be further promoted and expanded. Outreach and consumer education efforts would aid this endeavor. Many states use tax incentives, building labeling, and other recognition initiatives to encourage voluntary programs like ENERGY STAR, LEED, the Builders Challenge, and others.

**UTILITY PROGRAMS**

While Oklahoma’s major utilities, Public Service Oklahoma (PSO) and Oklahoma Gas and Electric (OG&E), do not currently have incentive programs related to energy code compliance, they do run a limited set of programs energy efficiency incentive programs, including utility loan and utility rebate programs. The Oklahoma Municipal Power Authority also offers energy efficiency incentives.

While not explored in depth in this report, a list of such programs is provided below. To find a more complete and detailed view of the financial incentives for energy efficiency offered by utilities as well as state and local governments, visit the relevant webpages hosted by ACEEE\textsuperscript{179},\textsuperscript{180} and DSIRE USA.\textsuperscript{181}

- **Utility Loan Programs**
  - Oklahoma Municipal Power Authority - WISE Energy Efficiency Loan Program
  - Red River Valley REA - Heat Pump Loan Program
- **Utility Rebate Programs**
  - Residential Energy Efficiency Rebate (Offered by Several Cooperative Utilities)
  - AEP Public Service Company of Oklahoma - Non-Residential Efficiency Rebate Program
  - AEP Public Service Company of Oklahoma - Residential Efficiency Rebate Program
  - CenterPoint Energy (Gas) - Commercial Efficiency Rebates
  - CenterPoint Energy (Gas) - Residential Efficiency Rebates
  - East Central Electric Cooperative - Residential Rebate Program
  - Edmond Electric - Residential Heat Pump Rebate Program
  - OG&E - Commercial Energy Efficiency Rebate Programs
  - OG&E - Residential Energy Efficiency Program
  - Oklahoma Electric Cooperative - Energy Efficiency Rebate Program
  - Oklahoma Municipal Power Authority - Commercial and Industrial Energy Efficiency Program
  - Oklahoma Municipal Power Authority - Geothermal Heat Pump Rebate Program
  - Oklahoma Municipal Power Authority - WISE Energy Efficiency Rebate Program
  - Oklahoma Natural Gas - Residential Efficiency Rebates
  - Verdigris Valley Electric Cooperative - Residential Energy Efficiency Rebate Program
**Gap #20:** Electric utilities have not yet taken advantage of the full potential and benefits of energy codes and are not engaged in activities that promote the energy code.

**Recommendation:** Electric and gas utilities must be educated so they realize energy codes complement other efficiency efforts and are often a better tool to meet demand reduction goals. When properly enforced, energy codes curb baseline demand over the life of a building; they are not intermittent or interrupted. The state should engage and strategize with utilities and cooperatives on code development and compliance. One example is to develop incentive programs that support the Blower Door test or any other component of the state energy code. Utilities should become more involved and support code compliance as they, too, benefit when homes and buildings demand less energy. Additionally, the energy efficiency of new construction aids utilities in predicting changes to system-wide demand.
MEASUREMENT AND VERIFICATION

One solution to improving 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 ACTIVITIES AND EXAMPLES IN THE REGION

It is critical that the effectiveness of energy code compliance is measured to help determine the areas in which compliance is lacking and develop enforcement and compliance strategies that address these deficiencies. According to Department of Commerce officials, there has not been a statewide measurement and verification study in Oklahoma. It should be noted, however, that to-date, relatively little work has been done with measurement and verification throughout the country. Most states and municipalities are in the same position as Oklahoma.

The process of adopting and enforcing energy codes often pits advocates against builders, leaving elected officials, the media, and consumers wondering what to believe, while code enforcement officials are stuck in the middle. An Energy Code Compliance Collaborative provides a forum for all stakeholders impacted by energy codes to come together to work toward common interests.

An Energy Code Compliance Collaborative is a long-term, multi-year initiative for states, designed to:

- Assist states that are struggling with declining budgets, resources, and staff by assembling a team of local experts to assist the state as it works to achieve DOE 2017 compliance goals;
- Provide a forum for improving relations between diverse stakeholders affected by energy codes as they listen and learn about each other’s concerns, and work together to find common interests and goals;
- Assist the state in implementing a plan to achieve full compliance with energy codes.

BCAP has helped states form Collaboratives. Resources available on the OCEAN Compliance Portal will help states learn more about this work and begin the process of establishing an Energy Codes Compliance Collaborative in Oklahoma. This group would be central to the implementation of the recommendations in
this Gap Analysis through the five-year roadmap developed further its companion document, the Oklahoma Strategic Compliance Plan.

Two of Oklahoma’s neighbors – Colorado\(^{184}\) and Texas\(^{185}\), states with strong traditions of local enforcement and policy independence – established Collaboratives in the summer of 2012. Both states have worked with BCAP to create the groups from a diverse set of interested parties with a stake in energy code compliance that meet to discuss key barriers and determine realistic paths forward to address the state’s more pressing topics. Both collaboratives have made measurement and verification of the 2009 IECC by 2017—required by the Recovery Act as a condition of accepting SEP funding—a priority.

Outside the region, other states have piloted new approaches. New Hampshire conducted a survey of code officials in 2006 and again in 2009 to understand barriers to energy code compliance and determine a simple baseline. These results have guided the state’s $600,000 two-and-a-half-year project to improve compliance in the state—a national best practice.\(^{186}\) Delaware also conducted a survey of code officials in 2010 and is using the data to help direct its current efforts, which include hiring a contractor to administer a baseline analysis of new residential construction building practices.

Oklahoma could create a new approach for such an advisory group. As the state addresses it highest priorities through the establishment of an energy code adoption support stakeholder group, these individuals would be natural participants in a group that could expand and evolve into addressing the longer-term priorities for Oklahoma like training, enforcement, and compliance measurement.

**Gap #21:** The state has not conducted a statewide measurement and verification study and does not have an advisory group of state and industry stakeholders that is equipped to plan and lead initiatives forward to 90 percent energy code compliance.

**Recommendation:** Leading efforts by Texas, New Hampshire, Colorado, Idaho, Nevada, and Delaware formed energy codes compliance collaborative in their states to create realistic plan on how their state will proceed. Oklahoma’s energy code adoption support stakeholder group could eventually expand and evolve beyond addressing the state’s initial policy adoption priorities to engage people to help establish longer-term goals and strategies to measure and verify energy code compliance (view the Oklahoma Strategic Compliance Plan by BCAP for more).
Building energy codes are one of the most cost-effective tools for Oklahoma to secure its energy future. Compliance with current energy code requirements 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. Unfortunately, the state has stalled recently on the adoption front and should continue to push towards review of the 2009 IECC for residential and commercial construction. The state should also set the example for municipalities by adopting a more stringent energy code or standard for state buildings.

Efforts to bridge these adoption policy gaps do not alone achieve the desired benefits of energy codes discussed throughout this analysis. Ultimately, full compliance with the 2009 IECC is the most important goal for Oklahoma. Moving forward on statewide energy code adoption has raised awareness among local municipalities and provided enforcement professionals and design and construction professionals with training opportunities. The state, municipalities, and other interested third parties must expand these efforts, as outlined in the implementation recommendations summary in this report. The state must also begin to prepare for measuring and verifying energy code compliance by establishing a baseline and creating a plan for moving forward. Together, these actions will result in greater energy efficiency for new commercial and residential construction and renovations, as well as save Oklahoma’s citizens and businesses money and strengthen its economy.

The recommendations made in this Gap Analysis (consolidated and summarized on pages 56 through 60) are meant to guide state and local officials and other interested 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 identification of new funding sources, a careful, comprehensive action plan that leverages existing infrastructure and provides the state with realistic funding mechanisms will help ensure that new construction and renovations in the state achieve full compliance with the 2009 IECC now and in the future. These recommendations are discussed further as the action items of the five-year roadmap for energy code policy implementation in the Oklahoma Strategic Compliance Plan, the companion report to this Gap Analysis.
ACKNOWLEDGMENTS

We would like to acknowledge the financial support of a grant made through the U.S. Department of Energy, which made this analysis possible. We would also like to thank the Oklahoma Department of Commerce for its partnership on this project. A number of state stakeholders (especially the Oklahoma Sustainability Network and Bring It Home campaign participants) also collaborated in the creation of this report, providing comprehensive background information, local stakeholder contacts, and ongoing review of our work. We would also like to acknowledge the many code officials, design and construction professionals, utility and trade association representatives, and other interested parties across the state that provided us with crucial insights that contributed to our efforts to document and analyze energy code issues in Oklahoma.

Cover page image: Courtesy of Flickr Creative Commons.
APPENDIX A

The U.S. Department of Energy 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
www.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

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

Users Guides
1. COMcheck Software Guide
   009_IECC.pdf
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

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


Number derived by adding 2010 building sources of CO$_2$ (residential, commercial and industrial), then dividing by total CO$_2$. Look at page Energy 3-1 for Table 3-1 depicting Gas/Source information from 1990-2010.

10. Ibid.
20. Ibid.
21. Ibid.
24. Ibid.
26. Ibid.
28 Oklahoma Climatological Survey. “Figure 2: Map of the normal annual temperature (in degrees Fahrenheit) for Oklahoma using data from 1981 to 2000.” http://climate.ok.gov/images/site/avg_tavg_1981-2010.png
34 Ibid.
35 Ibid. from page 8.
43 Ibid. from pages 10-23.
47 Sierra Club. Cool Cities Program: About Cool Cities. (Click the Map on Oklahoma), http://www.coolcities.us/about.php?sid=7db9575f59f4841a49bc8c9b8e6415e0 and http://www.coolcities.us/state.php?state=OK
49 Oklahoma Department of Commerce website. http://okcommerce.gov/
51 Bring It Home website. http://www.bringithomeok.org/
52 SPEER website. http://eepartnership.org/
53 ASHRAE Central Oklahoma website. https://ashraecok.org/
56 AIA Eastern Oklahoma Chapter website. http://www.aiaeok.org/
57 Listing for AIA North Central Oklahoma Chapter. http://www.aiaok.org/Local%20Chapters.htm
Oklahoma Board of Licensed Architects, Landscape Architects, and Registered Interior Designers website. “FAQs.”


Oklahoma Legislature. SB 1182. 2009 General Session.


Interview with Kelly Coffman, C.H. Guernsey. (July 2012).


OAC 748:20-1-18 IBC® Chapter 35 Referenced Standards (Effective November 1, 2012).
http://www.ok.gov/oubcc/documents/Permanent%20IBC%202009.pdf.


OUBCC website. “Frequently Asked Questions.”


Interview with Sarah Spencer-Workman of the Bring It Home campaign.

Oklahoma City, Oklahoma, Code of Ordinances. Chapter 12, Article II (IBC) and Article VII (IRC).

City of Oklahoma City Department of Development Services. “Building Permits.”
http://www.ok.gov/devservices/buildpermits/.

Tulsa, Oklahoma, Code of Ordinances. Title 51, Chapter 1 (IBC) and 2 (IRC).


OUBCC website. “Frequently Asked Questions.”
Please see BCAP resources on 2012 IECC adoption:


BCAP. “2012 IECC Analysis for Dallas.”


Id.

For more details on the methodology and incremental cost estimates for Dallas, please see the full memo:


U.S. DOE’s Residential IECC Cost Effectiveness Analysis and Results can be found online:

http://www.energycodes.gov/development/residential/iecc_analysis/

A life-cycle cost is full accounting over a 30-year period, considering energy savings, the initial investment financed through increased mortgage costs, tax impacts, and residual values of energy efficiency measures.

DOE. (June 2012). Oklahoma Energy and Cost Savings for New Single- and Multifamily Homes: 2012 IECC as Compared to the 2009 IRC.


The percent savings is the annual energy cost savings for heating, cooling, water heating, and lighting divided by the total baseline annual energy cost for heating, cooling, water heating, and lighting.

Ibid. at page 8.

Ibid. at page 3.


http://www.newpa.com/webfm_send/1553


131 Ibid. 158:70-1-3 subsections (b) and (h).
132 (BCAP discussion with frequent energy code trainer in the state, October 2012).
133 Ibid.
134 (BCAP discussion with OUBCC stakeholder in October 2012).
155 Ibid.
The Home Energy Rating System Index (HERS) is a scoring system that provides a scale for measuring the energy efficiency of a new or existing home compared to a reference home that was built to the 2006 IECC, which is assigned the score of 100 points. The lower a home’s HERS Index, the more energy efficient it is. For every 1 point decrease in the HERS Index it corresponds to a 1 percent reduction in energy consumption compared to the HERS reference home. For example, a home that scores 85 is 15 percent more efficient than the HERS reference home, and a home that scores zero is a home that is a net zero user of energy (see www.resnet.us for more details). Homes that meet the Builders Challenge qualifications score 70 or less on the scale (or are 30 percent more efficient than a typical new home). Homes that meet ENERGY STAR qualifications score 85 or less on the scale (or are 15 percent more efficient than a typical new home). Both programs intend to increase the stringency of their requirements in the coming months.


Ibid.


68