Nebraska Gap Analysis

June 2011

Prepared by the Building Codes Assistance Project for the Nebraska Energy Office as part of the American Recovery and Reinvestment Act of 2009

BCAP Dedicated to the adoption, implementation, and advancement of building energy codes
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ACRONYMS & ABBREVIATIONS

ACEEE – American Council for an Energy-Efficient Economy
AIA – American Institute of Architects
ASHRAE – American Society of Heating, Refrigerating, and Air-Conditioning Engineers
BCAP – Building Codes Assistance Project
BPI – Building Performance Institute
CEUs – Continuing education units
DAS – Nebraska Department of Administrative Services
DEQ – Nebraska Department of Environmental Quality
DOE – Department of Energy
EEBA – Energy & Environmental Building Alliance
EECBG – Energy Efficiency and Conservation Block Grants
EEPS – Energy Efficiency Portfolio Standard
EPA – U.S. Environmental Protection Agency
EPC – Energy Performance Contracting
HBA – Home Builders Association
HERS – Home Energy Rating System
IBC – International Building Code
ICC – International Code Council
IECC – International Energy Conservation Code
IRC – International Residential Code
LEED – Leadership in Energy and Environmental Design
LIHEAP – The Low Income Home Energy Assistance Program
MEC – Model Energy Code
MEEA – Midwest Energy Efficiency Alliance
MGA – Midwestern Governors Association
MMC – Metropolitan Mayors Caucus
NAAB - National Architectural Accrediting Board
NAC – Nebraska Administrative Code
NAHB – National Association of Home Builders
NCOA – Nebraska Code Officials Association
NEO – Nebraska Energy Office
NPPD – Nebraska Public Power District
OCEAN – Online Code Environment and Advocacy Network
OPPD – Omaha Public Power District
PBF – Public Benefit Fund
PDH – Professional Development Hours
PSC - Public Service Commission
PNNL – Pacific Northwest National Laboratory
RECA – Responsible Energy Codes Alliance
RESNET – Residential Energy Services Network
RPS – Renewable Portfolio Standard
SEP – State Energy Program
USGBC – U.S. Green Building Council
WGA – Western Governors Association
EXECUTIVE SUMMARY

The purpose of the Nebraska Gap Analysis Report is twofold: 1) document and analyze the unique strengths and weaknesses of the state’s existing energy code adoption and implementation infrastructure and policies; and 2) 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 Nebraska-specific recommendations for actions that would improve the energy efficiency of Nebraska’s built environment.

During research for this report, BCAP conducted interviews with numerous state government officials, home builders, code enforcement professionals, and municipal and county representatives. The Introduction section provides an overview of the amount of energy buildings consume; the amount of money Nebraska spends on imported energy; and a broad perspective on the status and importance of energy code adoption, enforcement, and compliance.

The National Perspective on Energy Codes section provides a comparison of Nebraska’s energy code adoption status to other states in America. It describes the role of the U.S. Department of Energy in the policy process and provides information on federal funding provided to Nebraska through the American Recovery and Reinvestment Act of 2009 (ARRA).

The State Overview section provides an overview of Nebraska’s important demographic and economic indicators, including: population growth; permitting trends in multiple cities and counties; energy consumption and production; the inclusion of energy codes as part of city and county climate plans; and a list of key stakeholders.

The Nebraska’s Energy Code section outlines the process of energy code adoption and other building codes in the state. It discusses Nebraska’s unique system for authorizing local jurisdictions to adopt codes, offering key political insights gleaned from numerous interviews with state and local officials and code enforcement personnel. 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 codes. Finally, it includes legislation and rules that impact this policy arena in Nebraska.

The Implementation section details the programs and initiatives offered by the state government in order to support and incentivize local jurisdictions to increase the energy efficiency of their buildings.

The Enforcement section describes how enforcement is conducted by local building departments, common code-related challenges, and areas for improvement. It includes an overview of the professional requirements of enforcement professionals as related to the energy code, including continuing education units.

The Compliance section explores regional differences in how stakeholders perceive energy, the requirements for licensure and continuing education for building construction trades; and how third-party inspectors can assist in moving the construction industry toward greater energy efficiency.

The Best Practices section highlights actions that leading cities and counties in Nebraska as well as the state energy office are taking to improve the energy efficiency of buildings and foster an effective energy codes infrastructure.
The *Recommendations for Improvement* section identifies 17 actions that the state can take to support, assist, and encourage local jurisdictions with the adoption and enforcement of modern energy codes. Recommendations include training, promotion, consumer education, and other activities designed to lead to updated policies and greater code compliance rates.

Finally, the report’s *Conclusion* summarizes the key findings, including the needs and opportunities to achieve improved adoption, compliance, and enforcement in local jurisdictions as well as importance and benefits of energy codes to the state of Nebraska.

Appendix A features extended commentary on *Community Energy Efficiency Management (CEEM)* programs. Appendix B offers a list of other DOE and Pacific Northwest National Laboratory (PNNL) energy code resources.
INTRODUCTION

Buildings are a major user of energy in the United States, accounting for 40 percent of total energy use and 72 percent of electricity use. Buildings are responsible for 40 percent of U.S. greenhouse gas emissions.

Nebraska spends billions of dollars annually on energy, importing most of its primary energy sources. Some of this money lost from the state’s economy can be reclaimed through energy efficiency measures, improving the living standards of Nebraska families and benefitting the bottom lines of Nebraska businesses through lower energy costs.

As one of the most effective instruments in a state’s policy toolbox, codes reduce energy demand in buildings. Among their many social benefits, energy codes:

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

A common argument in opposition of energy codes is that the upfront cost of building an energy efficient building or home is too costly. There are two costs, however, 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 expenditures an owner will make over the span of a building’s serviceable lifetime. Operations and maintenance costs account for 60 to 80 percent of the total lifecycle costs.

Buildings also last a long time. The average lifespan of a building is roughly 50 years, meaning that today’s building energy policies will affect energy consumption through the year 2060 and beyond.

Recent increases 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 short years ago. Retail and office buildings constructed to meet the requirements of the IECC can be over 30 percent more energy efficient than typical buildings not constructed to meet national model energy standards.

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

This favorable environment for more stringent codes is part of a larger transformation in the way advocates, policymakers, industry and utility representatives, and the general public view energy efficiency. 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 are still falling short of their potential. In municipalities across the country, energy code enforcement and compliance remain woefully insufficient. While development and adoption are the necessary first steps of the energy codes process, they alone do not guarantee compliance. To ensure that energy codes accomplish their potential to reduce energy use and save money, states and cities must design and carry out effective and realistic energy code implementation strategies.
NATIONAL PERSPECTIVE ON ENERGY CODES

The Model Energy Codes

The International Energy Conservation Code (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 ASHRAE, respectively. While there is no federally mandated minimum standard for energy efficiency in private residential or commercial buildings, there are national model codes (ASHRAE 90.1-2007 and 2009 IECC) that establish agreed-upon baselines for residential and commercial development. States that want to ensure that construction within their boundaries meets, at minimum, a national minimum standard will adopt the national model codes. The responsibility for adopting energy codes is generally left to state governments (though in some cases, this authority is passed down to local governments). From a national perspective:

- **Commercial Energy Codes**: As of April 1, 2011, 25 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. Nebraska’s pending code update in August 2011 will add to this total.

- **Residential Energy Codes**: Nineteen states, three U.S. territories, the District of Columbia also have residential codes that meet or exceed the efficiency of the 2009 IECC (see Figure 1). Several other states are in the process of updating their codes, including Nebraska, whose pending code update in August 2011 will add to this total.

Figure 1 on the next page shows which commercial and residential codes are adopted in each state.
Figure 1 – U.S. State Energy Code Status Maps

Commercial State Energy Code Status
AS OF APRIL 1, 2011

Residential State Energy Code Status
AS OF APRIL 1, 2011

From the perspective of some of the states in Nebraska’s region:

- Iowa and Illinois both adopted the 2009 IECC in 2010, with Illinois adding an automatic triennial code review cycle -- similar to the one Iowa has had in place for the past decade.
- Kansas, North Dakota, South Dakota, and Wyoming have no statewide energy code and show little to no movement towards one in the near future.
- As a home rule state, Missouri also has no statewide energy code, but has seen a large number of its local jurisdictions adopt their own codes, many ranging from the 2003 IECC to the 2009 IECC. Research by BCAP has revealed that several major municipalities along the Interstate 70 corridor, including those in the Kansas City and St. Louis metropolitan areas, are considering adoption of the 2009 and 2012 versions of the IECC.
- Also a home rule state, Colorado does not have a de jure statewide energy code, but the state legislature has established the 2003 IECC as a minimum baseline for jurisdictions that do choose to adopt one, creating a de facto state code. Many progressive municipalities have chosen to adopt the 2009 IECC, and the state has seen almost half of the new homes constructed in 2010 qualify for an ENERGY STAR for Homes rating.

**Federal Policy**

Although energy code adoption occurs on the state and local levels, the federal government—through Congress and the U.S. Department of Energy (DOE)—has played a significant role in advancing energy code development, determining the relative 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 mandated that DOE make a new determination within twelve months for every subsequent revision of these codes. Each state would then have two years to certify that it had revised its own energy code to meet or exceed the requirements of the latest edition of the national models. A state could decline to adopt a residential energy code by submitting a statement to the Secretary of Energy detailing its reasons for doing so.\(^3\)

For commercial buildings, DOE determined in late 2008 that ASHRAE Standard 90.1-2004 for would achieve energy savings of 13.9 percent above the previous Standard 90.1-1999 for national source energy and 11.9 percent above for building energy consumption.\(^4\)

For low-rise residential buildings, EPAct currently references the 2000 IECC.\(^5\) DOE, however, has preliminarily determined that the 2009 IECC would achieve greater energy efficiency in than the 2006 IECC. Also, DOE has preliminarily determined that the 2006 IECC would achieve greater energy efficiency than the 2003 IECC. Finally, although DOE has preliminarily determined that the 2003 IECC would not achieve substantially greater energy efficiency than the 2000 IECC, DOE found that the 2003 IECC is no less energy efficient than the 2000 edition. When that determination is finalized (expected sometime in 2011), the 2009 IECC will become the baseline residential code for EPAct compliance.\(^6\)
The Recovery Act

In February 2009, the American Recovery and Reinvestment Act – federal legislation appropriating funds for a variety of state economic initiatives – allocated $3.1 billion for the DOE State Energy Program (SEP) to assist states with building energy efficiency efforts. As a condition of accepting $31 million in SEP funding, Gov. Heineman certified to DOE that the state would update its building energy codes to be of equal or greater stringency than the 2009 IECC for residential construction and ASHRAE Standard 90.1-2007 for commercial construction. States would also have to demonstrate compliance with these standards in 90 percent of new and renovated residential and commercial building space by 2017 along with annual measurements of compliance rates.
STATE OVERVIEW

Nebraska is a geographically diverse state ranging from rolling hills and Missouri River in the east, to the 20,000 square miles of sand hills in the north-central area, to the foothills of the Rocky Mountains in the western part of the state. Nebraska is cross-sectioned by Interstate 80 following the Platte River and former Oregon Trail. It boasts many state parks and over 3,000 lakes for recreational activities. The state is more than just landscapes. It has a major city, Omaha, with a population of over 400,000 which is situated on the Missouri River and the mouth of the Platte River in the eastern part of the state. Lincoln, the state capital and second-largest city, is only a short hour drive southwest of Omaha.

Agriculture is a major part of Nebraska’s economy, with total revenues near the highest in the nation, ranking only behind California, Texas and Iowa. The state also ranked fourth in farmland area with 45.5 million acres, and fourth in the value of the agricultural products with $15.5 billion as of 2007. Manufacturing is another key area in the Nebraska economy, dominated by food processing followed by chemical production. Service industries like telecommunication have also exploded in metropolitan Omaha the past two decades. Nebraska is also the only state where publicly owned utilities provide 100 percent of its electrical power.
The population of Nebraska numbered around 1.8 million in 2010. The state grew at a roughly five percent clip in the past decade, below the national average of 9.1 percent over that period. The median annual household income of about $49,000 in 2008 was also less than the national average of about $52,000.\textsuperscript{13} As of March 2011, Nebraska’s 4.2 percent unemployment rate ranked as the second-lowest behind only North Dakota. Nebraska had just fewer than 800,000 housing units as of 2009.\textsuperscript{14}

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<td>New Single Family Housing Units, 2009</td>
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<td>New Single Family Housing Units, 2008</td>
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<td>CO\textsubscript{2} Emissions in all sectors, 2007</td>
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<td>Total ARRA Funding</td>
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Construction Overview

As Nebraska’s population expanded, the construction industry enjoyed moderate growth through the mid-2000s (see Figure 5). The sector grew from 8,198 residential housing units permitted in 2001 to its peak of 10,922 in 2005. This growth in the housing sector was modest compared to other states that saw housing levels almost double in the same time period. The end of the housing boom and the arrival of the nationwide economic recession, however, drove construction down precipitously in subsequent years, with housing unit permits falling to just 5,180 in 2009, a drop of just over 50 percent to its lowest level since 1987.

After a slight uptick in 2010, 5,150 single family residential building permits were issued in the state, according to NEO. Estimates of the shares in the largest counties include 37 percent in Douglas County (Omaha), 22 percent in Sarpy County (Omaha metro area), and 14 percent in Lancaster County (Lincoln), putting the large majority – 70 to 80 percent – of the residential construction in the state’s two main metropolitan areas.
Figure 5 – Nebraska Residential Building Permits Issued by Year (2000-2010)

Nebraska Permits by Year

![Graph showing the number of residential housing units permitted in Nebraska by year (2000-2010). The graph displays a trend with a peak in 2006 and a decline towards 2010.]

Figure 6 – Nebraska Residential Construction Permits Percentage Change (2008-2009)

Nebraska Residential Construction

![Graph showing the total percentage change in residential building permits in Nebraska for 2008-2009. The graph indicates a decline in permits with the largest decrease in Grand Island (-37%) and Entire State (-21%).]

Source: U.S. Census Bureau

Nebraska Gap Analysis

BCAP
Energy Portfolio

Nebraska does not have abundant fossil fuel resources, dependent largely on coal, natural gas, and oil transported across state lines. Of the state’s modest overall energy production (ranked 36th in 2008), coal-fired power plants supply two-thirds of Nebraska’s electricity generation market, with virtually all of its coal imported by rail from Wyoming. Nuclear power from plants in Fort Calhoun and Cooper supplies less than 30 percent, and several small hydroelectric dams along the Platte and Missouri Rivers account for most of the remainder. The north-central and southwestern parts of the state have substantial wind power potential and significant production capacity for biofuels such as corn-based ethanol.18

Despite its relatively low population size (ranked 38th after the 2010 Census) and low overall energy consumption (ranked 36th in 2008), Nebraska has a comparatively high per capita energy consumption of 439 trillion Btu (ranked 13th in 2008). Boosted by a strong agricultural sector and burgeoning metropolitan areas around Omaha and Lincoln, Nebraska has a very energy-intensive economy, ranking comparatively high in energy consumption per real dollar of GDP (16th in 2008). This is due partly to the low energy prices Nebraska enjoys, as recent average residential (8.03 cents/kWh) and commercial (7.47) electricity prices are below the national residential (11.20) and commercial (10.11) averages (all as of February 2011).23

Nebraska is also unique in that it is the only state in the country served entirely by consumer-owned power entities. The Nebraska Power Review Board is a state agency created in 1963 to regulate the state’s publicly-owned electrical utility industry. The Board has very limited regulatory authority over these utilities, which include public power districts, cooperatives, and municipalities.24

With energy prices projected to rise sharply over the medium- and long-term, however, these factors can leave the state vulnerable to future fluctuations in energy costs and peak demand. By adopting and effectively implementing national baseline standards for building energy performance, Nebraska can mitigate the impacts of price uncertainty and become a more efficient state. Reducing overall energy use would also allow the state to phase out its energy generation from fossil fuels in favor of renewable energy, rather than having to add both in the short- and medium-term to meet increasingly growing demand. In the long-term, it would also allow the state to achieve greenhouse gas emissions reduction more quickly, as well as decrease its reliance on non-renewable energy produced out of state.

Climate Plans

Nebraska does not have a formal state climate action plan or renewable energy standard.25 26 The state government is a member of some organizations and coalition actions that are related to climate change but these have not led to significant effort towards formal statewide initiatives in Nebraska.27

Among these regional coalitions, Nebraska participates in the Western Governors Association (WGA). In June 2006 the WGA passed resolutions to meet or exceed goals of 30,000 megawatts of clean energy capacity by 2015 and a 20 percent increase in energy efficiency by 2020. The resolutions encouraged funding for energy efficiency and renewable generation programs as well as the facilitation of regional energy market development.28 The western governors have also adopted policy resolutions including “Regional and National Policies Regarding Global Climate Change,” “Supporting the Integration of Climate Change Adaptation Science in the West,” and a call for the formation of a Climate Adaptation Work Group,
In 2007, Gov. Dave Heineman signed onto the Midwestern Governors’ Energy Security and Climate Stewardship Platform that calls for increased collaboration and efforts to advance biofuels development to increase energy security. The eleven member states also signed nonbinding agreements designed to cut greenhouse gases, promote energy conservation, and fight global warming. The agreements call for greater use of nonpetroleum-based energy sources such as wind power and grain-based ethanol. The governors agreed that wind power, water, and other renewable sources should eventually provide up to 30 percent of the region’s electricity.

Nebraska does have some statewide energy efficiency initiatives. On April 16, 2008, Gov. Heineman signed a bill that supports energy efficiency improvements among low-income households. Legislative Bill 1001 allows utilities to take approximately five percent of sales tax revenues the utilities collect from customers each month and reinvest these funds, along with a matching sum from the utilities’ revenue, into energy-efficient home improvement programs (LB 1001 was later amended to delay the start of the program until 2013 and to place a cap on the amount of funds utilities can put in). Nebraska also has a Dollar and Energy Savings Loan program run by NEO. Created in 1990, the program makes low interest loans available for residential and commercial energy efficiency improvements. As of March 2011, 26,328 individual loans had been made totaling $218.5 million for projects. The loan program was slated to receive $11 million in Recovery Act funds.

The lack of a statewide climate action plan mirrors the policy choices of several other neighboring states and those in Nebraska’s region, among them Wyoming, Kansas, Oklahoma, and South Dakota. Other neighbors, however, have formed the Midwest Greenhouse Gas Reduction Accord. Through the Accord, the governors of the seven member jurisdictions (Iowa, Illinois, Kansas, Michigan, Minnesota, Wisconsin, and the Canadian province of Manitoba) agreed to establish a program to reduce greenhouse gas emissions in their states, as well as a working group to provide recommendations regarding the implementation of the Accord. Four additional states are observers, including South Dakota, Indiana, Ohio, and the Canadian province of Ontario.

One neighboring state that has developed a formal climate action plan is Colorado. Developed in 2007, the initiative sets a goal of reducing greenhouse gas emissions by 20 percent below 2005 levels by 2020 and 80 percent below 2005 levels by 2050. Energy codes and building energy efficiency are intended to play a major role in achieving the stated goals.
Local Climate Initiatives

Three cities in Nebraska – Omaha, Lincoln, and Bellevue – have signed onto the U.S. Conference of Mayors’ Climate Protection Agreement to enact policies and programs that meet or exceed a greenhouse gas emissions reduction target of 7 percent below their 1990 levels by 2012.\textsuperscript{35}

Omaha, the state’s largest city, is also a member of the International Association of Local Governments for Sustainability (ICLEI). ICLEI, which has over 1,100 members in 68 countries, is a collaboration of local governments that have made a commitment to sustainable development. ICLEI provides technical consulting, training, and information services to build capacity, share knowledge, and support local government in the implementation of sustainable development at the local level. Their basic premise is that locally designed initiatives can provide an effective and cost-efficient way to achieve local, national, and global sustainability objectives.\textsuperscript{36}

Chris Beutler, the Mayor of Lincoln, launched the initiative Cleaner Greener Lincoln in 2009. He promoted the program by predicting it would “make the City of Lincoln an active leader in the area of sustainability, building upon Lincoln's extraordinary community commitment to its quality of life, investing stimulus and other resources, facilitating energy savings at the city, neighborhood, and business levels, fostering new ideas and partnerships, making it easy and affordable to be sustainable in Lincoln, and putting Lincoln in the fore as the green capital city of the Great Plains.”\textsuperscript{37} Lincoln has already started work on green and sustainable projects ranging from the promotion of recycling to performing energy audits on public buildings to establishing a comprehensive greenhouse gas emissions inventory to measure progress towards the Mayor’s goal of reaching 1990 GHG emissions levels by 2015.\textsuperscript{38}

OPPD and NPPD, the state’s two largest utilities (publicly-owned, like all Nebraska utilities), both have voluntary targets of 10 percent electricity generation from renewable sources by 2020. Both utilities claim to be on schedule for these targets.\textsuperscript{39}

Stakeholders

At the beginning of the 2011 legislative session, the Nebraska Energy Office organized the Nebraska Building Code Advisory Council (BCAC). The group consisted of stakeholders from throughout the state and throughout the codes community, including code inspectors, several homebuilders, a state HBA representative, engineers, architects, contractors, licensing board members, utility representatives, a certified home energy rater, and political aides of two city mayors.\textsuperscript{40} The BCAC provided feedback as NEO developed and supported legislation to update the state energy code to the 2009 IECC (see the Nebraska’s Energy Code section below). The Council also discussed other NEO codes activities, including outreach for training opportunities and the beginning of the state’s first residential compliance baseline analysis (both discussed further below).

\textbf{Best Practice:} The state energy office has built the foundation for a statewide energy codes collaborative made up of stakeholders from throughout the state and throughout the codes community. NEO looks to continue the group’s involvement as it moves forward implementing the updated state energy code.
Nebraska’s codes community has a wide array of stakeholder groups from various levels of government, non-governmental organizations, building professionals, utilities, and consumers.

**State Government**

- **The Nebraska Energy Office (NEO)** whose goal is “to promote the efficient, economic and environmentally responsible use of energy.” NEO provides services such as a home energy ratings system, weatherization projects, and has a webpage completely dedicated to energy codes (http://www.neo.ne.gov/home_const/iecc/iecc_codes.htm).

- **The Department of Administrative Services (DAS) Building Division** “is responsible for providing centralized procurement, operation, maintenance, security and management of office space and independent review, analysis, and oversight of capital construction projects to insure that the most appropriate facilities are provided for the efficient functioning of state government.” DAS runs the municipal buildings for the state government, and therefore could be a partner in any building code or above code work being implemented. There is also a Task Force for Building Renewal, a division of DAS. The Task Force is responsible for Deferred Repair projects, Fire/Life-Safety, ADA (American’s with Disabilities Act), and Energy Conservation projects.

- **The Nebraska Department of Environmental Quality** is charged with protecting “the quality of Nebraska’s environment – our air, land, and water resources.” DEQ also enforces regulations and provides assistance on a vast array of environmental topics.

- **The Nebraska Environmental Trust** whose goal is to conserve, enhance and restore the natural environments of Nebraska. One of their grant areas is Air Quality, which includes actions to reduce greenhouse gas emissions which could tie in to code work.

- **The Nebraska Board of Engineers and Architects**, established in 1937, is charged with serving “the citizens of Nebraska by overseeing the laws and rules which govern the practice of engineering and architecture in the state in order to safeguard life, health, property, and promote public welfare.”

- **The Nebraska Public Service Commission** is charged to assure Nebraskans receive high quality, safe, and reliable public services at fair, affordable rates. The Commission runs Manufactured Home and Modular Housing Units programs. It also monitors and enforces construction and safety standards of manufactured homes and ensures that modular units meet all code standards.

- There are also multiple planning departments throughout the state, including the Lincoln/Lancaster Planning Department, the Metropolitan Area Planning Agency (a voluntary association of local governments in eastern Nebraska and western Iowa), and the Regional Planning Commission for Grand Island which functions as a unified planning department for Grand Island, Hall County, Wood River, Cairo, Doniphan, and Alda.

**Building Professionals Community**

- **The National Association of Home Builders (NAHB)** is a Washington, D.C.-based trade association which represents the industry on a national level. NAHB was founded in 1942, and is made up of over 180,000 members in 800+ state and local associations nationwide. NAHB members build over 80 percent of all new housing in the United States.

- **The Nebraska State Home Builders Association (NSHBA)** is a non-profit trade association comprised of seven local associations and over 1,550 member companies across Nebraska. NSHBA actively
works to address issues that are critical to the survival and success of the home building industry. Those seven local associations are the Columbus HBA, Central Nebraska HBA, HBA of Lincoln, North Platte HBA, Metro Omaha BA (MOBA), HBA of Norfolk, and West Central Nebraska HBA.52

- **American Institute of Architects (AIA) Nebraska** is a state chapter of AIA National and includes 3 local chapters in Omaha, Lincoln, and Western Nebraska. It is also part of the AIA Central States Region including Iowa, Kansas, Missouri and Oklahoma. AIA represents the interests of architects and other design professionals around the state. AIA is interested in training workshops on building codes and building science, including energy, as well as other events for members and public outreach.53

- **Nebraska Code Officials Association (NCOA)** is a “non-profit educational organization designed to improve the quality and uniformity of building regulations throughout the state of Nebraska. NCOA assists Building Officials, Inspectors, Architects, Engineers, and Contractors succeed in their profession by providing training, networking, and educational opportunities.” It is a chapter of the International Code Council (ICC).54

- **The Nebraska Section of American Society of Civil Engineers (ASCE)** is an active organization of over 600 members across Nebraska. The national ASCE represents more than 140,000 civil engineers nationwide and is America's oldest national engineering society. The ASCE is comprised of individuals from all areas of specialization within the civil engineering profession including structural and construction engineers.55

- **The Structural Engineers Association of Nebraska (SEAON)** is a non-profit organization with a membership of Structural Engineers and Professional Engineers who practice structural engineering in Nebraska. SEAON is active in licensing issues and local adoption of model building codes.56 Another engineering society is the **Nebraska Society of Professional Engineers (NeSPE).**57

- **American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)** is an international organization of over 50,000 individuals. ASHRAE’s mission is the advancement of “heating, ventilation, air conditioning and refrigeration to serve humanity and promote a sustainable world through research, standards writing, publishing and continuing education.”58 There is a Nebraska Chapter of ASHRAE.59

**Municipal Government**

- **League of Nebraska Municipalities** is a nonprofit service association formed in 1909 to serve as a voice for Nebraska municipalities at the Nebraska Legislature. The League now has more than 385 member cities and villages. Its members represent 98 percent of Nebraskans who live in municipalities.60

- **The Nebraska Association of County Officials** is a non-profit organization that serves to represent the interests of all elected and appointed county officials in the state.61

**Other**

- **Nebraska Energy Assistance Network** is a partnership of utilities, government agencies, regulators, and community leaders. Its mission is to assist Nebraskans with their energy needs through education, advocacy, and partnerships.62
NEBRASKA’S ENERGY CODE

Current State Energy Code

The Nebraska Energy Code, codified in Nebraska Administrative Code Title 107, is mandatory for all jurisdictions enforcing an energy code. Local jurisdictions may adopt their own codes, but state law requires that these local codes be of equal or greater stringency to the current Nebraska Energy Code. If a town or county has not adopted an energy code or does not wish to adopt an energy code, the Nebraska Energy Office will enforce the code in that jurisdiction.63

As of June 2011, the Nebraska Energy Code references the 2003 IECC. This edition has been in effect since July 1, 2005. The code applies to new residential and commercial construction as well as renovations that will cost more than 50 percent of the replacement cost of the building. There are some exemptions from the code, including historic buildings, modular housing units, mobile homes, and renovations that will cost less than 50 percent of the replacement cost of the building.

The Nebraska Energy Office is in the process of updating the Nebraska Energy Code in 2011. The state's Unicameral Legislature approved LB 329, updating the code’s references to the 2009 IECC and ASHRAE 90.1-2007. The changes will become effective August 24, 2011. The update process is discussed further in the next section.

Best Practice: The state has adopted the latest national model energy codes – the 2009 IECC and its reference to ASHRAE Standard 90.1-2007.

Adoption Process

In the United States, building codes are adopted on the state and local levels. This is due, in part, to the diverse range of cultures and climates across the fifty states, as well as a host of historical political influences that shaped federal-state and state-local relations. The process differs from state to state, but in most cases codes are adopted through a legislative process, a regulatory process, or a combination of both, although a handful of states are considered “home rule” in regards to building codes.64

In Nebraska, the authority to update the state’s energy code lies with the Legislature. Before a bill is introduced, NEO staff consult with the Governor’s office and community stakeholders as they develop legislative language. When the language is deemed satisfactory, the Governor’s office selects a legislator to introduce the bill, which is assigned to a committee by the Speaker of the Legislature. Successful legislation would be approved by the committee and the full chamber, ultimately being signed into law by the Governor. In general, non-emergency laws become effective 90 days after the Legislature adjourns sine die.

Gap: Actions by the Nebraska Energy Office to update the Nebraska Energy Code currently require legislative approval, creating additional procedural barriers to adopting the latest national model energy codes for residential and commercial construction.

Recommendation #1: Develop legislation granting sole authority to update the Nebraska Energy Code to the Nebraska Energy Office. This provides a policymaking process with fewer veto points that often produces simpler, uniform codes. While this authority must be granted by the Nebraska Unicameral itself.
(which is considered highly unlikely), BCAP believes this change will provide a smoother update path to thoughtful policies informed by the stakeholders in the building codes community.

Nebraska has no set code update cycle for modifying the current building and/or energy codes. Over the past three decades, the Unicameral has periodically, but infrequently, updated N.A.C. Title 107. In 1980, LB 954 was passed by the Legislature and signed into law by the Governor to promote the conservation of energy resources and to provide for public health, safety and welfare. It directed the State Energy Office to enforce the Lighting and Thermal Standards portion of the law, the first building energy efficiency standards in the state. The original legislation has since been modified by LB 2 (1981), LB 799 (1982), LB 124 (1983), LB 315 (1985), LB 622, (1997), LB 1135 (2000), and LB 888 (2004). LB 888 made significant changes in the state’s Thermal and Lighting Standards (renamed the Nebraska Energy Code), spurring a complete revision of the Rules and Regulations which govern the Nebraska Energy Code. This bill updated the code to the 2003 IECC.65

While NEO is not mandated by statute to update the Nebraska Energy Code after every model code development cycle, it does review every new model code edition and provide support and information for municipalities that may choose to go above the state code, such as when Omaha chose to adopt the 2006 IECC in 2008 (see Local Adoption Spotlight below). NEO did investigate a possible state code update to the 2006 IECC during that edition’s code cycle, but ultimately determined that the streamlined climate zone map (19 zones in the 2003 IECC were reduced to eight in the 2006 IECC) actually decreased the code’s energy efficiency in large portions of the state. NEO staffers believe the state is unlikely to adopt the 2012 IECC in the next code cycle given the likely gap in community buy-in for the 2012 edition versus buy-in for the recent update to the 2009 edition.

Best Practice: While NEO is not mandated by statute to update the Nebraska Energy Code after every model code development cycle, it does review every new model code edition and provide support and information for municipalities that may choose to go above the state code.

Gap: The state does not have an automatic review and update process on a three-year cycle for future editions of the minimum energy code.

Related Gap: The state does not currently plan to update the Nebraska Energy Code to reference the 2012 IECC during the next code update cycle.

Recommendation #2: Future legislation addressing the authority and duties of NEO should also include a mandatory review and update cycle for future editions of the minimum energy code to lock in future energy savings and remove speculation after the release of each new model energy code. While NEO is not mandated by statute to update the code every development cycle, it does review every new model code edition and provide support and information for municipalities that may choose to go above the state code (e.g. Omaha adopting the 2006 IECC in 2008). Reducing information asymmetry among stakeholders about new code requirements during the next code update process will be key to reducing pushback in later code cycles.
Local Adoption Spotlight

Some key jurisdictions have chosen to go beyond the state code. The city of Omaha adopted the 2006 IECC for nonresidential buildings and the energy efficiency section (Chapter 11) of the 2006 IRC for residential buildings in 2008.66 The city of Lincoln has adopted Chapter 11 of the 2006 IRC with local amendments for residential buildings.67 It has also adopted the 2006 IBC for commercial buildings, but the energy efficiency section (Chapter 13) has been deleted and will be covered by the state’s regulations.68 Both updates were adopted in 2008.

Best Practice: The state energy code sets a minimum energy efficiency standard for construction but also allows jurisdictions to adopt codes that achieve even greater energy savings.

Because NEO reviews each model energy code edition after its release, the state was able to provide support for its jurisdictions willing and able to go beyond the state code through educational materials on cost and savings data and technical assistance to code officials and design and building professionals. While the state is not likely to update the Nebraska Energy Code to the 2012 IECC, NEO expects most of the leading permit-issuing jurisdictions – Omaha, Lincoln, and Douglas, Sarpy, and Lancaster Counties – to at least investigate the costs and benefits of above-code adoptions. One jurisdiction, Douglas County, has already requested more information about the 2012 IECC from NEO.

Gap: For the most part municipalities in Nebraska have not yet chosen to adopt or enforce energy codes that achieve significant energy savings beyond the state code.

Recommendation #3: Through NEO, the state should continue to provide support and facilitate stakeholder communication and engagement as needed. It should use the proposed regional energy code conference in 2011 or 2012 (see the Implementation section below for more) as an opportunity to engage municipalities about above-code adoption, providing a specific forum for discussion and information exchange.

Massachusetts has encouraged local jurisdictions to adopt codes above the statewide minimum code by including a voluntary “stretch code” as an appendix to the state code. Appendix 120AA provides a uniform option for municipalities that seek greater building energy efficiency savings.69 The state has supported this effort by providing funds through the state energy office for training for enforcement and building professionals in the 95 municipalities that had adopted the stretch code as of June 2011.70

Recent Legislation and Rules

Building energy efficiency is not frequently addressed in legislation in the Unicameral, but the recently approved LB 329 will be a major step forward for Nebraska in the policy arena of energy codes.

In consultation with stakeholders in the energy codes community as well as staff from the Governor’s office, NEO staff drafted LB 32971 to update the Nebraska Energy Code to the 2009 IECC. Sen. Tanya Cook introduced the bill on January 12.72 The Urban Affairs Committee conducted a hearing on the bill on February 15, where BCAP was one of several organizations and stakeholders to testify in favor of the legislation. The committee approved the bill unanimously on February 25. The full chamber gave final approval on April 8,
and Gov. Dave Heineman signed the bill into law on April 14. NEO will draft the rule updating N.A.C. Title 107 during the summer, and the new code will be effective August 24, 2011.

Previous legislation on the subject has been rare and mostly unsuccessful. On January 19, 2010, LB 977 was introduced in the Urban Affairs Committee. It would have required new state buildings greater than 5,000 square feet or renovations in which the project cost is greater than 50 percent to achieve LEED Silver certification. The bill died in committee.

**Other Nebraska Building Codes**

LB 888 modified the Nebraska Energy Code to include new and renovated state buildings with the code’s purview. Currently, these buildings must also comply with the 2003 IECC, but this reference will be updated to the 2009 IECC when LB 329 takes effect on August 24, 2011. NEO will analyze the latest editions of the model energy codes – the 2012 IECC and ASHRAE Standard 90.1-2010 – for possible future codes for state construction some time after the 2012 IECC is published in July 2011.

**Gap:** The state’s energy code for state-funded buildings, soon to be based on the 2009 IECC, does not achieve the energy savings of the latest editions of the model energy codes – the upcoming 2012 IECC and ASHRAE Standard 90.1-2010.

**Recommendation #4:** Develop legislative language and engage prospective champions in the Unicameral to introduce legislation to update the energy standards for new and renovated state buildings based on the 2012 IECC, ASHRAE Standard 90.1-2010, or some other advanced guidelines beyond the 2009 IECC. While Nebraska’s pending energy code based on the 2009 IECC for state buildings will be a model policy, it is important for the state to set the example for other commercial construction and stretch for the substantial energy savings achieved through upcoming model code development cycles.

Other important construction codes include, briefly:

- The National Electrical Code is adopted by specific edition by the state legislature and is then administered by the State Electrical Board. The minimum electrical wiring standard shall be the 2008 National Electrical Code. On April 12, 2010, Gov. Heineman signed into law LB 411 which updated the minimum standards for electrical wiring to be the 2008 National Electrical Code. This change went into effect July 12, 2010.

- National Fire Protection Association standard codes are adopted by reference in their entirety as they existed on the date these regulations became effective (June 2004) The Life Safety Code apart of the NFPA and is then administered by the State Fire Marshal.

- For plumbing standards, local code jurisdictions are permitted to adopt their own codes. If there is no plumbing ordinance, however, then the American National Standards Institute Uniform Plumbing Code, ANSI A40-1993, serves as the default plumbing code. In 2011, LB 42 was introduced in the legislature would update the plumbing code to the 2009 Uniform Plumbing Code.

**Costs and Potential Savings from Energy Codes in Nebraska**

A major barrier to energy code adoption across the country is the concern that new codes will add to the purchase price and potential buyers will not be able to afford the homes they want. To address this issue,
BCAP conducted an Incremental Cost Analysis to demonstrate the generally modest added expense of building homes to meet model energy code requirements. BCAP believes these cost estimates are conservative and actually represent an upper bound on incremental cost, as they utilize only traditional building techniques and do not take advantage of new technologies or performance trade-offs that lower these costs further and improve energy performance. In Nebraska, upgrading homes to the 2009 IECC will reduce out-of-pocket expenses for homeowners – paying off their initial investment in a matter of months.

For the average new home, BCAP estimates the costs of the new code (the 2009 IECC) will add a total of $400 in construction costs—an increase of only 0.1 percent. When this amount is rolled into the average mortgage, real costs to homebuyers will mean a down payment increase of $80.00, and $1.73 extra on monthly mortgage bills.

Table 2 shows the estimated annual energy savings per home per year from meeting the requirements in the 2009 IECC. Included in the savings are heating, cooling, and lighting. According to the U.S. Department of Energy, homes will save approximately $236 per year in the city of Omaha in Climate Zone 5 (Note: Climate Zone 5 covers the entire state). One hundred percent compliance with the 2009 IECC would result in 13 percent savings in residential energy costs in the state.

<table>
<thead>
<tr>
<th>City (Climate Zone)</th>
<th>Savings ($/year)</th>
<th>Percent Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Omaha (Zone 5A)</td>
<td>$236</td>
<td>13%</td>
</tr>
</tbody>
</table>

Source: U.S. Department of Energy

The small additional mortgage cost will be offset by monthly energy savings of $19.67, allowing homebuyers to pay off their initial investment (i.e., the additional incremental cost of purchasing a home that meets 2009 IECC requirements) in only four months. After breaking even in Month 5, the home will return buyers a profit of $18 per month—for a total return of $215 every year (for further illustration, see Table 3 and Figure 7 on the next page).
Table 3 – Incremental Cost of Building to the 2009 IECC: Nebraska Residential Sector

<table>
<thead>
<tr>
<th>Month</th>
<th>Mortgage Increase</th>
<th>Monthly Energy Savings</th>
<th>Cumulative Cost/Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$80.00</td>
<td>$19.67</td>
<td>-$60.33</td>
</tr>
<tr>
<td>2</td>
<td>$1.73</td>
<td>$19.67</td>
<td>-$42.39</td>
</tr>
<tr>
<td>3</td>
<td>$1.73</td>
<td>$19.67</td>
<td>-$24.45</td>
</tr>
<tr>
<td>4</td>
<td>$1.73</td>
<td>$19.67</td>
<td>-$6.51</td>
</tr>
<tr>
<td>5</td>
<td>$1.73</td>
<td>$19.67</td>
<td>$11.43</td>
</tr>
<tr>
<td>6</td>
<td>$1.73</td>
<td>$19.67</td>
<td>$29.37</td>
</tr>
<tr>
<td>7</td>
<td>$1.73</td>
<td>$19.67</td>
<td>$47.31</td>
</tr>
<tr>
<td>8</td>
<td>$1.73</td>
<td>$19.67</td>
<td>$65.25</td>
</tr>
<tr>
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<td>$1.73</td>
<td>$19.67</td>
<td>$83.19</td>
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<td>$1.73</td>
<td>$19.67</td>
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<td>11</td>
<td>$1.73</td>
<td>$19.67</td>
<td>$119.07</td>
</tr>
<tr>
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<td>$1.73</td>
<td>$19.67</td>
<td>$137.01</td>
</tr>
<tr>
<td>13</td>
<td>$1.73</td>
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<td>$154.95</td>
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<td>$19.67</td>
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<td>$19.67</td>
<td>$190.83</td>
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<td>$19.67</td>
<td>$208.77</td>
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<td>$226.71</td>
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<tr>
<td>18</td>
<td>$1.73</td>
<td>$19.67</td>
<td>$244.65</td>
</tr>
</tbody>
</table>

Figure 7 – Visualizing the Incremental Cost of Building to the 2009 IECC - Nebraska
Substantial benefits from energy codes also apply to the commercial building sector. Table 4 shows a percentage of potential energy savings that can be achieved by adopting the most up to date ASHRAE 90.1-2007 building energy standard. In the table below, “Non Residential” is any mid-rise commercial building, “Residential” represents high-rise residential buildings and “Semi Heated” represents commercial warehouses. According to DOE estimates, achieving 100 percent compliance with Standard 90.1-2007 would result in up to 12.2 percent savings in commercial energy costs.

Table 4 – Commercial Energy and Cost Savings: Current Practice vs. ASHRAE Standard 90.1-2007

<table>
<thead>
<tr>
<th>Construction Type</th>
<th>City</th>
<th>Energy Savings</th>
<th>Cost Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non Residential</td>
<td>Omaha</td>
<td>12.1%</td>
<td>12.2%</td>
</tr>
<tr>
<td>Residential</td>
<td>Omaha</td>
<td>4.0%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Semi Heated</td>
<td>Omaha</td>
<td>0.3%</td>
<td>0.3%</td>
</tr>
</tbody>
</table>

Source: U.S. Department of Energy

Strengthened building energy codes also offer immense large-scale benefits to the state. According to BCAP’s Code Estimator analysis, as Nebraska begins to implement the 2009 IECC and its reference to ASHRAE Standard 90.1-2007 ahead of the 2012 construction season, businesses and homeowners will save an estimated $786 million in cumulative energy cost savings through 2030. The state would also avert 70 trillion Btu in energy use and nearly four million metric tons of carbon emissions (see Table 5 and its explanatory endnote for more details).

Table 5 – BCAP Code Estimator: Nebraska Statewide Large-Scale Model Code Savings

<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RESIDENTIAL</td>
</tr>
<tr>
<td>OVERALL Energy % Over BAU</td>
</tr>
<tr>
<td>4%</td>
</tr>
</tbody>
</table>

Source: BCAP Code Estimator, April 2011

Explanations: See Endnote
**Gap:** Information asymmetry exists among stakeholders in the codes community about the true costs and benefits of adopting and implementing model building energy codes.

**Recommendation #5:** NEO should consider available information from BCAP on the incremental cost of constructing a new home to the 2009 IECC (also presented above), which helps builders, policymakers, and home buyers understand that more efficient homes are not cost-prohibitive, as well as give jurisdictions an additional argument for implementing the latest model energy codes.
IMPLEMENTATION

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

Training

A lack of educational opportunities for the community of building professionals is a major barrier to successful energy code policy implementation. The Nebraska Energy Office offered 11 energy code training workshops in the first half of 2011. These included four sessions on mechanical, lighting, and envelope compliance for commercial buildings under ASHRAE Standard 90.1-2007, the first time ASHRAE training has been offered in Nebraska by the state energy office. NEO will also be offering over 75 free copies of the Standard 90.1-2007 User’s Manual. The workshops also included multiple sessions on advanced building science topics from the esteemed Joe Lstiburek from Building Sciences Corporation. NEO has distributed over 300 complimentary copies of the 2009 IECC codebook to workshop attendees.

Code officials that BCAP interviewed commended NEO for providing state-funded educational opportunities on energy codes over the last four to five years. Several respondents stated that the state was effectively providing support and information to local jurisdictions but also allowing local stakeholders the control and independence to implement code policies.

Best Practice: Extensive and ongoing training and education for various stakeholders has helped to bridge the information asymmetry in the codes community and to foster the formation of a culture of code compliance.

Outreach

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 requirements. Outreach involves all of the activities states and local jurisdictions can undertake to raise awareness of the need for energy codes, promote their adoption and implementation, and identify opportunities for training, technical assistance, and other support. Given the
diversity of the energy codes community across the country, execution of strategic outreach campaigns can improve understanding of code changes, create buy-in, and can lead to greater levels of compliance.

As part of a DOE grant received in 2008, NEO is planning a regional energy codes conference involving codes community stakeholders from throughout the state. NEO expects this event to take place in late 2011 or early 2012

**Gap:** The state has not yet tapped into its full potential for building a broad energy codes coalition.

**Recommendation #6:** The state should expand its role as facilitator by working with non-governmental actors, such as the Midwest Energy Efficiency Alliance (MEEA), utilities, trade associations, manufacturers, environmental organizations, and others, to build a stronger coalition of interested parties that can influence changes that lead to stronger energy code implementation. Pressure – and incentives – from multiple parties coordinated at the state level can motivate the enforcement, design, and construction professionals in ways that the state cannot achieve through mandates.

**Recommendation #7:** Reenergize the Nebraska Building Codes Advisory Council – perhaps by reconstituting it along the lines of the model statewide codes collaborative developed by Idaho – for the purpose of 1) assisting with the evaluation, adoption, and implementation of new energy codes, 2) consideration of new or revised processes to improve levels of code compliance, 3) expansion of energy code outreach and awareness throughout local governments, the construction industry and the general public, and 4) consideration and pursuit of other resources that could be utilized to advance energy efficiency through energy codes in Nebraska.

**Recommendation #8:** NEO should utilize the proposed regional energy codes conference in 2011 or 2012 to identify key participants/stakeholders for achieving success, with participants provide geographic and industry-sector diversity. These participants should include homeowners, consumer advocates, and low income housing advocates alongside regularly-involved stakeholders.

One important barrier to improved code compliance is the lack of local and state infrastructure and experience in enforcing energy codes seen in many jurisdictions throughout the United States. Using national and regional energy code experts as mentors to assist states and local code officials in developing and implementing effective enforcement and compliance approaches will provide needed support and technical assistance. These mentors also provide advocacy support in their states for code adoption and updates.

BCAP partnered with the International Code Council to develop and pilot an energy code support initiative called the **Energy Code Ambassadors Program (ECAP)**. Through ECAP, the program partners have recruited, trained, and placed Code Ambassadors in four states – New York, Idaho, Illinois, and Kentucky – in coordination with their respective state energy offices and ICC chapters. The Ambassadors will provide support and energy code expertise including in-field guidance and/or training to the code enforcement community. Further, Ambassadors will be adept in using ICC, BCAP, DOE, and other resources to act as grassroots code adoption and implementation representatives.

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

**Recommendation #9:** Engage BCAP and ICC about the Energy Code Ambassadors Program whereby key regional building code officials or builders would be hired to advocate for energy codes regionally and mentor and encourage local building departments as they transition to a new, more efficient energy code.

**Recommendation #10:** Encourage or facilitate local jurisdictions in hiring a Community Energy Efficiency Manager (CEEM). A CEEM promotes energy saving projects within a community and helps a town build capacity by transferring knowledge to inspectors, key officials and residents, and creating a knowledge base to empower local communities. Although a rural region may not currently have the ability to act on its own, a CEEM can help a town, or region, to become self-sufficient and pro-active. The CEEM may be employed temporarily – just until a municipality has a solid understanding of the benefits of energy efficiency *(NOTE: More information on CEEM can be found in Appendix A).*

In order to help increase demand for new, highly efficient homes and recognize builders and raise public awareness, it is important to arm consumer with information they need to know about energy codes and the tools they can use to verify whether or not a new home meets code requirements. BCAP has partnered with Consumers Union to develop a suite of resources (see Figure 9) geared towards homebuyers to educate them on Nebraska’s energy code requirements, what to look for in their home to ensure compliance, and identify opportunities to improve energy efficiency.

**Gap:** The state lacks a strategy for energy codes adoption and implementation that would help raise public awareness of the benefits of energy efficiency new buildings, and encourage new home buyers to demand; builders to build; and code officials to promote high-quality, energy-efficient homes and buildings.

**Recommendation #11:** Engage contractors and architects and other LEED-certified or similar professionals in the promotion of energy efficiency, by providing them with ready-made marketing materials that describe the compelling and specific benefits of energy efficiency.

**Recommendation #12:** Give builders who are going the extra mile a competitive edge on builders who are not paying attention to the detail of energy efficiency by recognizing every new building or home built to higher standards and seek publicity (e.g., give awards, distribute press releases) for builders who meet the Builders Challenge qualifications. Such actions will raise public awareness, drive demand for energy efficiency and raise the bar in Nebraska for advanced homes.

**Recommendation #13:** Engage homebuyers and other consumers by disseminating outreach materials such as the *BCAP Homeowner Energy Code Guide* and *Homeowner’s Energy Code Checklist*. Possible outlets include the NEO website and the planned regional energy codes conference in 2011 or 2012.
ENSURING QUALITY CONSTRUCTION FOR

Nebraska Homeowners

If you are interested in buying a home or want to learn about the energy code and how to make your home more energy efficient, this checklist provides a quick way to assess energy performance and identify opportunities to improve energy efficiency.

You can use the checklist below to verify a few of the energy code requirements that are easy to identify. While this checklist doesn’t include every requirement, it will help you assess a new home and make an informed decision about the quality of construction and the likelihood that the home will use energy efficiently.

### Energy Certificate
- Energy Certificate located on circuit breaker box is completed and signed
  
  See reverse side for an example and more details.

### Insulation
- Crawl space walls or the crawl space ceiling are properly insulated
- Access hatch or door is weatherstripped and insulated

### Air Sealing
- All holes between floors and through walls have been sealed with caulk or foam, examples include:
  - where phone and cable wires enter the house
  - where plumbing goes through walls, floors, and ceiling

### Windows
- Windows have a U-factor of 0.35 or less
- Skylights have a U-factor of 0.60 or less

Existing Homes:
- Evaluate windows for age, quality and air tightness

### Fireplace
- The fireplace doors are sealed with gaskets

### Thermostat
- If a forced air system is being installed, the home has a programmable thermostat.

### Ducts
- In Attic:
  - Ceiling and walls are insulated
  - Ducts are sealed and insulated to a value of R-8

Whole House:
- All ducts are sealed with mastic

### Lighting
- At least half of the home’s light fixtures have high efficiency lights

### Alternative Compliance Path

- If these requirements are not met, ask your contractor for documentation showing the home meets minimum standards for energy consumption.

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June 2011, Nebraska Homeowner Checklist. For more information, please visit [http://www.neo.ne.gov/](http://www.neo.ne.gov/)
ENFORCEMENT

In research conducted for this report, it became clear that code enforcement officials take their jobs seriously, understanding their role as the first line of defense in protecting the buyer and the general public by assuring that the buildings they inspect are built correctly. They have seen failed buildings and have wisdom in understanding the importance of health and safety in buildings. Most expressed a desire to learn more about the energy code. While enforcement is a local issue, states play a crucial role in providing municipalities with the resources and support they need to establish effective enforcement infrastructures and practices. As codes are continually updated over the years, it is incumbent on states and cities to provide the enforcement community with access to sufficient energy code training.

Overview

Enforcement is conducted by the cities, towns, and counties that have adopted an energy code. Local jurisdictions may adopt codes other than the statewide code, but state law requires that these local codes be of equal or greater stringency to the current Nebraska Energy Code. If a town or county has not adopted an energy code or does not wish to adopt an energy code, the Nebraska Energy Office will enforce the code in that jurisdiction.

Building inspection typically follows a standard procedure: building professionals submit their plans to plans examiners, who return them with comments. Architects then re-submit plans with corrections, and plans examiners issue building permits once they are adequate. Code officials then conduct multiple on-site inspections at different stages in the building process (foundation, frame, electrical, plumbing, final), issuing inspection write-ups or stop-work orders for violations as needed (very rarely or never for energy related issues). After code officials have verified that construction correctly adheres to the building plans, they issue the appropriate final documentation, depending on the type of building and project.

Barriers to Effective Enforcement

Lack of priority

In most jurisdictions, the energy code is a newer consideration, and many policymakers and code officials alike view it as a secondary concern compared to the more traditional life, health, and safety codes. In addition, a major concern is encouraging growth in their cities, so when pressured by designers, builders, or new businesses moving into their city, officials may concede energy code enforcement in order to attract new developments or industry. Building officials that do not value the energy code as integral to occupant health and safety are less likely to integrate the code into their established routines, particularly if their superiors take such a view. Funding for proper energy code enforcement ultimately comes from city council members and other local decision makers, many of whom lack the conviction to support its implementation.

For some communities, enforcement may be weak or entirely lacking. Either the local code official does not enforce the energy code at all or they visually inspect only one aspect of the code – such as attic insulation. One builder in rural Nebraska believed that even the smallest communities in Nebraska (under 5,000 people) were “probably building to code,” but it was highly questionable to assume proper enforcement procedures were always followed. Such observations reinforce the need to improve code enforcement around the
country – some estimates of energy code compliance rates place the national average at roughly 40 percent – to achieve the substantial individual and collective benefits of saving energy in the built environment.

Some communities integrate energy codes inspections into other inspections which can be an extremely effective way to leverage small inspection staffs and limited budgets.

Different issues may also arise among different types of construction. Large, new commercial building projects appear to have the most emphasis placed on code compliance as they tend to involve several building professionals across multiple disciplines that are generally better educated on code requirements. This level of knowledge appears to decline when moving into remodeling projects or smaller commercial starts. The home building sector - involving a wide spectrum of experiences, backgrounds, and expertise – appears to be the weakest in this area. One code official emphasized the need for continuing dialogues between inspectors and home builders about the importance of code compliance.

**Gap:** The biggest information gap on energy code requirements exists in the homebuilding sector.

**Recommendation #14:** Provide forums for inspectors to engage the construction professionals in the homebuilding community (especially in smaller municipalities) about the benefits of code compliance and opportunities to improve. The proposed regional energy codes conference in 2011 or 2012 would be an ideal opportunity for this.

**A lack of resources for energy code enforcement**

Local inspection departments collect building permit fees, but these fees often do not fully offset the cost of code enforcement. The majority of local building departments are understaffed and overworked, and, for some, the burden of supporting the energy code is not manageable. Many others understand the crucial role energy codes play in improving the life, health, and safety of buildings and occupants, but lack the resources and time required to give the energy code equal status and attention. These issues also apply to members of the building industry, who often lack the training and financial incentives that would motivate them to build to code.

As an example, Omaha has about 30 to 35 code inspectors on staff for a city of over 400,000 with a large amount of construction. Each building requires four to eight inspections and each one of these inspection require some kind of energy inspection. One local code inspector said that “an inspection should take about an hour if you want it to be done right”. This would work out to an inspector ideally performing around eight to ten inspections per day in Omaha, but this local inspector guessed that some individuals are performing over 30 per day. Resources gaps simply prohibit inspectors from doing a more thorough job in inspections.

According to those interviewed for this report, field inspections for compliance are performed by in-house staff in large areas such as Omaha and Lincoln, but some smaller communities use third party entities and will contract with larger jurisdictions to use their inspection staff part-time. Areas using this approach included Grand Island, Hastings, Kearney, and Springfield.

**Best Practice:** Some smaller jurisdictions leverage third party resources and resources from larger jurisdictions, including contracting inspection staff on a part-time basis, to bridge resource gaps in their code enforcement infrastructure.
Lack of familiarity

Familiarity with energy code provisions varies greatly between code officials in the state. Most code enforcement professionals interviewed for this report understand the importance of energy codes. However, trained to enforce traditional life, health, and safety codes, most code officials have not had formal education in building science, energy codes, or the proper application of energy codes in the field. The vast majority of inspectors come from the design and building sectors. They tend to focus on the areas of construction with which they are the most familiar. Since few, if any, come from an energy efficiency background, they lack experience with the provisions of the code and how to enforce it. In addition, new provisions in the 2009 IECC require performance testing equipment, such as blower doors and duct testing equipment, with which most code officials and builders are largely unfamiliar.

Distance between jurisdictions

With the majority of the population located in the Omaha and Lincoln metro areas along the I-80 corridor, code officials located in the eastern part of the state naturally have more exposure to the information, techniques, and tools they need compared to the rural areas of the state. For code officials who live outside of this region, the logistics of traveling long distances limits access to training and information exchanges. Regional enforcement programs – the pooling of resources over multiple jurisdictions – present one option for improving enforcement in rural and unincorporated areas, but remain unlikely in the absence of broad, long-term support.

One model example of this is the Pikes Peak Regional Building Department in Colorado.91 It was created by an agreement between the City of Colorado Springs, El Paso County, and the outlying cities of Fountain, Green Mountain Lake, Manitou Springs, Monument, and Palmer Lake. A commission of elected officials manages the department, and multiple committees advise the commission on building code issues, including adoption. The commission makes recommendations to the Colorado Springs City Council and the El Paso County Board of County Commissioners, and both bodies must approve the proposals for them to take effect. The regional model allows communities to pool resources and increase efficiency and gives smaller towns access to the greater resources available in neighboring cities.92

Gap: Some building departments lack the resources to enforce codes.

Related Gap: Some local building departments do not have easy access to assistance and information for plan review in complex buildings or other specific building types.

Recommendation #15: Smaller, rural Nebraska communities should continue to develop regional enforcement programs (where practical) that pool resources over multiple jurisdictions to provide support to rural and unincorporated areas in improving energy code enforcement. NEO can provide assistance on how these energy inspections can occur in areas where other construction inspections are often not conducted by providing information on model practices in other states like Colorado.
COMPLIANCE

Most design and construction professionals will respond to the importance placed on codes by the local inspection departments. In jurisdictions where compliance is expected, industry professionals will seek out training for their staff and work with plans examiners and building inspectors to follow the intent of energy code provisions. In jurisdictions that do not place a high priority on energy codes, building professionals follow their lead and comply with the code only to the extent necessary, if at all. BCAP research shows that compliance with code provisions is often stronger among builders in urban areas than rural ones. Above all, strict, consistent enforcement practices improve compliance. It is important to remember that an energy code is really the “low bar” for buildings.

Building professionals comply with or exceed energy code requirements for a variety of reasons: a desire to produce high-quality structures; financial incentives; or simply because codes are the law. Others disregard energy codes as unnecessary and/or costly regulations regardless of local or state pressure, support or incentives. Many others would be more receptive to compliance, but lack training or do not view energy codes as integral to occupant life, health, and safety.

While builders can choose to build more efficient homes and differentiate themselves from competition in the market, minimum standards are designed to protect owners from high energy bills over the lifetime of the structure. Building it right the first time is the most economical time to address energy efficiency --it is much more difficult to go back and add insulation once the drywall has been hung.

Overview

NEO has never conducted an energy codes compliance study in the state, and staffers were unaware of any such investigation being undertaken by local or third party organizations. Performing a statistically valid or fair baseline analysis of compliance with the current model codes would be difficult given that all construction in Nebraska to this point would have been required only to meet 2003 IECC standards. Other metrics, as detailed below, are needed.

As part of a Recovery Act-funded PNNL grant, NEO will complete the state’s first baseline compliance study for energy codes in 2011. NEO randomly selected 100 new homes constructed in 2010 (more than double the number prescribed by guidance from DOE) from a cross-section of home sizes and urban, suburban, and rural jurisdictions. While contacting the homeowners about the study and offering a $250 stipend from grant funds, NEO contracted with Home Energy Defense – a BPI and RESNET certified home rater – to perform the home inspections. These homes were rated for their compliance against the energy code in effect at the time of their construction, the 2003 IECC. Inspections began in April and the vast majority had been conducted by late June. NEO expects to complete the inspections later in the summer and hopes to receive a formal analysis of the inspections in fall 2011, with the aim of establishing a reasonable baseline compliance rate as it transitions to the 2009 IECC. The office believes this information will help lay the groundwork for future studies of compliance with the model codes as the state moves toward the Recovery Act goal of demonstrating compliance in 90 percent of new and renovated residential and commercial building space by 2017.
**Best Practice:** NEO is conducting the state’s first residential compliance baseline study in 2011, with the aim of establishing a reasonable baseline compliance rate as it transitions to the 2009 IECC.

![Figure 10 – Current Nebraska Energy Code / 2003 IECC Climate Zones by County](image)

Source: Nebraska Energy Office

Stakeholders interviewed for this report highlighted the perceived push for “sustainability” by Omaha and Lincoln as a promising opportunity for implementing progressive code policies. Omaha was seen to especially emphasize long-term planning and sustainability through its Environment Omaha initiative. Local interest in sustainability, “green” building, and energy efficiency could provide a means for engaging the public and the construction industry on energy codes.

**Third Party Programs**

Where a building is being built to a higher level than required by code, for example LEED or ENERGY STAR, a third-party professional certifies that the building complies with specific certification requirements. Most building departments interviewed for this report were either unaware of such buildings being built or reported that they were not involved in this process.

NEO has developed a model program through its GREEN BUILDING-Nebraska Certified Homes and Buildings initiative. In partnership with the Nebraska State Homebuilders Association, the program’s webpage has resources on finding GREEN BUILDING-Nebraska certified builders, the requirements for buildings to earn certification, and how to design them.

**Best Practice:** NEO has partnered with the Nebraska State Homebuilders Association to create and promote the GREEN BUILDING-Nebraska Certified Homes and Buildings initiative.

The Residential Energy Services Network (RESNET) provides federally recognized third-party rating services to assess building energy performance. Its website provides information about energy audits and the energy

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**Why Green and Above-Code Programs Matter**

Green and advanced codes and standards help to transform the marketplace by bringing high performing buildings into the mainstream. They also raise awareness of energy- and resource-efficient design for the public, as well as 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 HERS Index Explained

The HERS Index is a scoring system that provides a scale for measuring the energy efficiency of a new home compared to a reference home that was built to the 2004 IECC, which is assigned the score of 100 points. The lower a home’s HERS Index, the more energy efficient it is. Every one point decrease in the HERS Index corresponds to a one percent reduction in energy consumption compared to the HERS reference home. For example, a home that scores an 85 is 15 percent more efficient than the HERS reference home, and a home that scores zero is a net zero building (see www.resnet.us for more details). Both ENERGY STAR for Homes and Building America intend to increase the stringency of their requirements in the coming months.

LEED

The U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED) Green Building Rating System is a nationally accepted benchmark for the design, construction, and operation of high performance green buildings. As of June 2011, Nebraska had 25 out of more than 7,600 LEED-certified buildings, and 64 out of over 23,000 projects registered with LEED. Counted separately from other projects, the state had only two LEED-certified homes in Omaha out of more than 10,000 nationwide. Additionally, Nebraska’s U.S. Green Building Council (USGBC) Flatwater Chapter has members representing real estate professionals, architects, engineers, and designers, contractors, product manufacturers, state and local government officials, homebuilders and homeowners. They have been keeping up-to-date records of the state’s LEED buildings since the first was certified in 2005.

ENERGY STAR for Homes

As of June 2011, there almost 2,900 ENERGY STAR-qualified new homes built in Nebraska to date. Of those, 655 were built in 2010, and 103 had been built thus far in 2011. There are 83 ENERGY STAR Homes partners, including 72 builder partners, eight of whom have committed to build 100 percent of their homes to achieve the ENERGY STAR label. The latest available national market index data shows that ENERGY STAR Homes
had a 22 percent market penetration in Nebraska in 2009, ranked 19th overall and just above the national average of 21 percent.\textsuperscript{101}

\textit{Building America}

Since 1994, the U.S. Department of Energy’s (DOE) Building America program has been raising the bar of energy efficiency and quality in new and existing homes by working with national laboratories and the residential building industry to improve the quality and performance of today’s homes while continually advancing the frontier for homes of the future – homes that will ultimately produce as much energy as they use. The program’s innovative construction approaches can reduce a home’s average energy consumption by as much as 40 percent with little or no impact on the cost of new construction. By designing a house as a system, various energy-related components work together to maximize efficiency at the lowest cost.

Building America has worked with builders to utilize innovative technologies and strategies in more than 42,000 high quality, energy-efficient homes. Through Building America and the Consortium for Advanced Residential Buildings, Steven Winter Associates assisted NEO in the design and construction of a prototype home completed in 2005 in Lincoln to benchmark energy-efficient, affordable housing in Nebraska. A $99,334 State Energy Program - Special Projects grant provided a portion of the cost of this project.\textsuperscript{102}

There are, however, currently no active projects in Nebraska, or in neighboring states Iowa, South Dakota, and Wyoming.\textsuperscript{103} Through Building America’s “Builders Challenge” program, new homes today that meet the Builders Challenge qualifications can earn an “Energy Smart Home Scale” label. These homes typically sell within weeks while other new homes sit on the market for months.

\textbf{Gap:} Third party, above-code energy efficiency programs like LEED for Homes and Building America are underutilized in Nebraska.

\textbf{Recommendation #17}: The state energy office should revitalize its relationship with Building America through DOE about opportunities to involve the organization in future projects in the state.
BEST PRACTICES

The *Best Practices* section highlights actions that leading cities and counties in Nebraska as well as the state energy office are taking to improve the energy efficiency of buildings and foster an effective energy codes infrastructure.

**Best Practice:** The state energy office has built the foundation for a statewide energy codes collaborative made up of stakeholders from throughout the state and throughout the codes community. NEO looks to continue the group’s involvement as it moves forward implementing the updated state energy code.

**Best Practice:** The state has adopted the latest national model energy codes – the 2009 IECC and its reference to ASHRAE Standard 90.1-2007.

**Best Practice:** While NEO is not mandated by statute to update the Nebraska Energy Code after every model code development cycle, it does review every new model code edition and provide support and information for municipalities that may choose to go above the state code.

**Best Practice:** The state energy code sets a minimum energy efficiency standard for construction but also allows jurisdictions to adopt codes that achieve even greater energy savings.

**Best Practice:** Extensive and ongoing training and education for various stakeholders has helped to bridge the information asymmetry in the codes community and to foster the formation of a culture of code compliance.

**Best Practice:** Some smaller jurisdictions leverage third party resources and resources from larger jurisdictions, including contracting inspection staff on a part-time basis, to bridge resource gaps in their code enforcement infrastructure.

**Best Practice:** NEO is conducting the state’s first residential compliance baseline study in 2011, with the aim of establishing a reasonable baseline compliance rate as it transitions to the 2009 IECC.

**Best Practice:** NEO has partnered with the Nebraska State Homebuilders Association to create and promote the GREEN BUILDING-Nebraska Certified Homes and Buildings initiative.
RECOMMENDATIONS FOR IMPROVEMENT

The Recommendations for Improvement section summarizes the 17 actions highlighted in this report that the state can take to support, assist, and encourage local jurisdictions with the adoption and enforcement of modern energy codes. Recommendations include training, promotion, consumer education, and other activities designed to lead to updated policies and greater code compliance rates.

Adoption

**Gap:** Actions by the Nebraska Energy Office to update the Nebraska Energy Code currently require legislative approval, creating additional procedural barriers to adopting the latest national model energy codes for residential and commercial construction.

**Recommendation #1:** Develop legislation granting sole authority to update the Nebraska Energy Code to the Nebraska Energy Office. This provides a policymaking process with fewer veto points that often produces simpler, uniform codes. While this authority must be granted by the Nebraska Unicameral itself (which is considered highly unlikely), BCAP believes this change will provide a smoother update path to thoughtful policies informed by the stakeholders in the building codes community.

**Gap:** The state does not have an automatic review and update process on a three-year cycle for future editions of the minimum energy code.

**Related Gap:** The state does not currently plan to update the Nebraska Energy Code to reference the 2012 IECC during the next code update cycle.

**Recommendation #2:** Future legislation addressing the authority and duties of NEO should also include a mandatory review and update cycle for future editions of the minimum energy code to lock in future energy savings and remove speculation after the release of each new model energy code. While NEO is not mandated by statute to update the code every development cycle, it does review every new model code edition and provide support and information for municipalities that may choose to go above the state code (e.g. Omaha adopting the 2006 IECC in 2008). Reducing information asymmetry among stakeholders about new code requirements during the next code update process will be key to reducing pushback in later code cycles.

**Gap:** For the most part municipalities in Nebraska have not yet chosen to adopt or enforce energy codes that achieve significant energy savings beyond the state code.

**Recommendation #3:** Through NEO, the state should continue to provide support and facilitate stakeholder communication and engagement as needed. It should use the proposed regional energy code conference in 2011 or 2012 (see the Implementation section for more) as an opportunity to engage municipalities about above-code adoption, providing a specific forum for discussion and information exchange.
Gap: The state’s energy code for state-funded buildings, soon to be based on the 2009 IECC, does not achieve the energy savings of the latest editions of the model energy codes – the upcoming 2012 IECC and ASHRAE Standard 90.1-2010.

Recommendation #4: Develop legislative language and engage prospective champions in the Unicameral to introduce legislation to update the energy standards for new and renovated state buildings based on the 2012 IECC, ASHRAE Standard 90.1-2010, or some other advanced guidelines beyond the 2009 IECC. While Nebraska’s pending energy code based on the 2009 IECC for state buildings will be a model policy, it is important for the state to set the example for other commercial construction and stretch for the substantial energy savings achieved through upcoming model code development cycles.

Gap: Information asymmetry exists among stakeholders in the codes community about the true costs and benefits of adopting and implementing model building energy codes.

Recommendation #5: NEO should consider available information from BCAP on the incremental cost of constructing a new home to the 2009 IECC (also presented above), which would help builders, policymakers, and home buyers understand that more efficient homes are not cost-prohibitive, as well as give jurisdictions an additional argument for implementing the latest model energy codes.

Implementation

Gap: The state has not yet tapped into its full potential for building a broad energy codes coalition.

Recommendation #6: The state should expand its role as facilitator by working with non-governmental actors, such as the Midwest Energy Efficiency Alliance (MEEA), utilities, trade associations, manufacturers, environmental organizations, and others, to build a stronger coalition of interested parties that can influence changes that lead to stronger energy code implementation. Pressure – and incentives – from multiple parties coordinated at the state level can motivate the enforcement, design, and construction professionals in ways that the state cannot achieve through mandates.

Recommendation #7: Reenergize the Nebraska Building Codes Advisory Council – perhaps by reconstituting it along the lines of the model statewide codes collaborative developed by Idaho – for the purpose of 1) assisting with the evaluation, adoption, and implementation of new energy codes, 2) consideration of new or revised processes to improve levels of code compliance, 3) expansion of energy code outreach and awareness throughout local governments, the construction industry and the general public, and 4) consideration and pursuit of other resources that could be utilized to advance energy efficiency through energy codes in Nebraska.

Recommendation #8: NEO should utilize the proposed regional energy codes conference in 2011 or 2012 to identify key participants/stakeholders for achieving success, with participants provide geographic and industry-sector diversity. These participants should include homeowners, consumer advocates, and low income housing advocates alongside regularly-involved stakeholders.

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

**Recommendation #9:** Engage BCAP and ICC about the Energy Code Ambassadors Program whereby key regional building code officials or builders would be hired to advocate for energy codes regionally and mentor and encourage local building departments as they transition to a new, more efficient energy code.

**Recommendation #10:** Encourage or facilitate local jurisdictions in hiring a Community Energy Efficiency Manager (CEEM). A CEEM promotes energy saving projects within a community and helps a town build capacity by transferring knowledge to inspectors, key officials and residents, and creating a knowledge base to empower local communities. Although a rural region may not currently have the ability to act on its own, a CEEM can help a town, or region, to become self-sufficient and pro-active. The CEEM may be employed temporarily – just until a municipality has a solid understanding of the benefits of energy efficiency (NOTE: More information on CEEM can be found in Appendix A).

**Gap:** The state lacks a strategy for energy codes adoption and implementation that would help raise public awareness of the benefits of energy efficiency new buildings, and encourage new home buyers to demand; builders to build; and code officials to promote high-quality, energy-efficient homes and buildings.

**Recommendation #11:** Engage contractors and architects and other LEED-certified or similar professionals in the promotion of energy efficiency, by providing them with ready-made marketing materials that describe the compelling and specific benefits of energy efficiency.

**Recommendation #12:** Give builders who are going the extra mile a competitive edge on builders who are not paying attention to the detail of energy efficiency by recognizing every new building or home built to higher standards and seek publicity (e.g., give awards, distribute press releases) for builders who meet the Builders Challenge qualifications. Such actions will raise public awareness, drive demand for energy efficiency and raise the bar in Nebraska for advanced homes.

**Recommendation #13:** Engage homebuyers and other consumers by disseminating outreach materials such as the BCAP Homeowner Energy Code Guide and Homeowner’s Energy Code Checklist. Possible outlets include the NEO website and the planned regional energy codes conference in 2011 or 2012.

**Enforcement**

**Gap:** The biggest information gap on energy code requirements exists in the homebuilding sector.

**Recommendation #14:** Provide forums for inspectors to engage the construction professionals in the homebuilding community (especially in smaller municipalities) about the benefits of code compliance and opportunities to improve. The proposed regional energy codes conference in 2011 or 2012 would be an ideal opportunity for this.

**Gap:** Some building departments lack the resources to enforce codes.

**Related Gap:** Some local building departments do not have easy access to assistance and information for plan review in complex buildings or other specific building types.
**Recommendation #15:** Smaller, rural Nebraska communities should continue to develop regional enforcement programs (where practical) that pool resources over multiple jurisdictions to provide support to rural and unincorporated areas in improving energy code enforcement. NEO can provide assistance on how these energy inspections can occur in areas where other construction inspections are often not conducted by providing information on model practices in other states like Colorado.

**Compliance**

**Gap:** An insufficient number of qualified HERS raters in the state hinders the development of potential third party enforcement infrastructure.

**Recommendation #16:** Coordinate educational resources and curriculum ideas with contacts from the Building Performance Institute (BPI) and local higher learning institutions with programs related to construction and building science, including two emerging weatherization programs in local community colleges.

**Gap:** Third party, above-code energy efficiency programs like LEED for Homes and Building America are underutilized in Nebraska.

**Recommendation #17:** The state energy office should revitalize its relationship with Building America through DOE about opportunities to involve the organization in future projects in the state.
CONCLUSION

Energy efficiency – through the adoption and enforcement of strong building energy codes – is the quickest, cheapest, and cleanest way to reduce energy consumption and help achieve a sustainable, prosperous future for Nebraska. Compliance with the code not only helps consumers and businesses save money on their energy bills, it also reduces pollution and peak loads, resulting in a cleaner environment and a more stable and diverse energy supply. Improving the tools of the state energy office to adopt updated codes, empowering local jurisdictions to effectively enforce them, and creating demand for code compliance will help Nebraska continue in the right direction toward greater energy efficiency in the built environment.

Working with local governments and energy code advocates and stakeholders in the state, the Nebraska Energy Office plays a pivotal role in raising awareness of energy efficiency issues and promoting the uniform implementation of the Nebraska Energy Code in jurisdictions across the state. NEO can also provide the state-level coordination, resources, expertise, and training necessary to support local enforcement professionals as well as the design and construction communities to keep them up-to-date with the model energy code and its requirements. The state can also analyze gaps in the enforcement infrastructure to find to improve compliance for all types of construction in Nebraska. Even in a state that values jurisdictional independence, there is much the state government can do to ensure that its citizens benefit from the widespread adoption and successful implementation of the model energy codes.

Compared to many states in its region, Nebraska is in a much better position to achieve the energy code policy outcomes targeted in the Recovery Act. By already implementing best practices such as statewide adoption of the model energy codes to providing extensive code education and training to being led by engaged and thoughtful staff in the state energy office, Nebraska has built a solid foundation upon which more advanced, complex, or long-term recommendations can be pursued.

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

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State officials also collaborated in the production of this report, providing comprehensive background information, local stakeholder’s contacts, and ongoing review of our work. In particular, we would like to acknowledge the irreplaceable assistance of NEO project officer Jerry Loos, as well as the assistance of NEO staffers Danielle Jensen, Lynn Chamberlin, Bonnie Ziemann, and Ginger Willson.

We also appreciate the time provided by members of the Nebraska Building Codes Advisory Council and representatives of the Nebraska Code Officials Association. Special thanks go out to Omaha code inspector Jim Harper and Milo Mumgaard, Senior Policy Aide for Sustainability in the City of Lincoln Mayor’s Office. We would also like to thank individuals who provided key insight and contacts including Tyler Kohtz at the Nebraska Board of Architects and Engineers, Sara Kay at the American Institute of Architects, and Kim Cowman.

We truly appreciate all the help that was given to us, large and small, to complete this document.
APPENDIX A – COMMUNITY ENERGY EFFICIENCY MANAGEMENT

**General Recommendation**: Initiate a state-level program – a *Community Energy Efficiency Management, or CEEM* (currently being piloted in New York state) – to support local jurisdictions as they adopt and enforce energy codes. This program would use experts to assess energy savings potential for buildings, develop plans to fund and achieve energy savings, and provide on-the-ground energy code support to one or more communities of code enforcement officials.

One method of doing this may be to designate a Community Energy Efficiency Manager (CEEM) in: 1) a completed municipal energy inventory, 2) a Community Energy Action Plan, 3) a handbook outlining the CEEM program process applicable to any rural region including an online resource template, and 4) funding recommendations for hiring a full-time in-house CEEM and/or the creation of a Local Energy Committee (LEC) to be trained to take on the role of initiating retrofits and energy use reduction campaigns in the future.

A CEEM promotes energy saving projects within a community and helps close the efficiency gap between new and existing buildings by promoting retrofits through education, benchmarking, setting targets, and identifying funding options and efficiency recommendations. The CEEM will help a town to build capacity by transferring knowledge to inspectors, key officials and residents, and creating a LEC to empower the communities. Although a rural region may not currently have the ability to act on its own, a CEEM can help a town, or region, to become self-sufficient and pro-active. A CEEM may stay in the area for one to two years to create capacity and to develop a Community Energy Action Plan. The CEEM will remain until a municipality has a better understanding of the benefits of energy efficiency, is more forward thinking, and is able to act independently with the motivation and the tools to carry out the Action Plan through the guidance of the LEC.

It is important to involve as many key stakeholders as possible when creating a Community Energy Action Plan. It is important to gauge their readiness and commitment to an Energy Action Plan as well as the general understanding of the importance of energy efficiency. We will explain the CEEM program and the benefits of energy efficiency to town boards, along with the expected actions and outcomes for the community. The CEEM must gain the support of both officials and the local community. If the town leaders would like to become a part of the pilot CEEM program, the first step is for the energy manager to conduct a baseline analysis of the community. During this process the CEEM will gain an understanding of important factors that make up the town’s character which will contribute to the success of the project including the major businesses and industry within a municipality, the community and its personality, issues that are important to the town, who the major utilities are that serve the region, and important local leaders and members of a community that have an interest in either energy efficiency or community development in general.

To create a comprehensive Energy Action Plan, the CEEM will address the municipal, commercial and residential building sectors. Typically, municipal buildings use the most energy in a rural community. A municipal energy inventory can give a snapshot of the town’s energy use in buildings, vehicles and streets lights as well as reveal which buildings are the most inefficient. Through this inventory a CEEM can make recommendations for next steps, target which buildings need retrofits the most, facilitate project implementation and identify funding opportunities. To further the discussion on project implementation as well as to communicate between the community and town officials, a Local Energy Committee (LEC) will be
formed. This committee will be involved in the inventory process and trained to enable the group to continue to track and benchmark the energy use of the municipality in the future. The LEC can also help the CEEM to understand the commercial and residential building situation and to advise on the biggest needs and concerns of the community.

To address the commercial building sector, the CEEM will identify the major businesses in the municipality. The CEEM will advise businesses about the opportunities and benefits of saving energy including information on the retrofitting process, how to get an energy audit, and funding strategies. In addition, the CEEM will help businesses investigate the possibilities of using alternative forms of energy. The CEEM will seek out commercial businesses that are the biggest energy users outside of municipal buildings. This will help businesses to operate more efficiently, therefore improving profitability, and will serve as high profile examples for smaller businesses in the community. The CEEM will seek to engage local hardware and building supply stores to assure that they sell efficiency equipment and help them to promote retrofitting training workshops. Many residents and small business owners can make small, inexpensive changes to buildings that can contribute to significant community energy savings, but do not have the knowledge to properly install hardware.

To promote energy efficiency and conservation in the residential sector, the CEEM should work closely with the LEC and businesses. Educational workshops are necessary in order to raise awareness on the benefits of reducing energy use. Funding and training workshops can help residents to realize that retrofitting is possible, even in lower income areas. Many municipalities have had success organizing campaigns that offer incentives for energy conservation and retrofits like efficient appliance rebates and selling efficient lights at a lower cost to residents in a municipality. There are also major funding opportunities for ‘efficiency blocks’ in which residential areas may be grouped together for free retrofits, especially among low income households. Coordination in the residential building sector with the LEC can stimulate community action, cooperation and involvement which all contribute to building social capital.

Through efforts in the municipal, commercial and residential building sector the CEEM will assist the LEC in developing a Community Energy Action Plan. Although the CEEM will write the report, the LEC should be involved in developing future targets and projects to implement. The LEC should be the champion of new energy reduction campaigns using the action plan as a guide for the future. The CEEM’s role will be transformed in a few years from direct involvement in the community and development of an action plan, to a resource and advisory role in support of the LEC.

In addition to a Community Energy Action Plan for the pilot communities, BCAP plans to create a handbook outlining the role of a CEEM and the process a community can follow to create and implement its own Community Energy Action Plan. This handbook will serve as a guide that can be tailored to individual towns across rural America, filling the current gap that exists between populated and rural regions in the country.
APPENDIX B – MISCELLANEOUS CODE RESOURCES

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
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

18 EIA. U.S. State Energy Profiles. “State Ranking 1. Total Energy Production, 2008.” http://www.eia.doe.gov/state/state-energy-rankings.cfm?keyid=89&orderid=1**NOTE: Certain data citations are subject to change as they are regularly updated by their source information organizations, particularly EIA. Please follow all links to access the latest available data.
21 EIA. “Table R1. Energy Consumption by End-use Sector, Ranked by State, 2008.”
22 EIA. “Table R2. Energy Consumption by Source and Total Consumption per Capita, Ranked by State, 2008.”
   http://www.eia.gov/emeu/states/hf.jsp?incfile=sep_sum/plain_html/rank_use_per_cap.html
23 EIA. “Table R3. Total Energy Consumption, Gross Domestic Product (GDP), Energy Consumption per Real Dollar of GDP, Ranked by State, 2008.”
28 WGA. Initiative on Climate Change and Adaptation. http://www.westgov.org/initiatives/adpation


U.S. Conference of Mayors. Mayors Climate Protection Center. “Cities that have signed on.” http://www.usmayors.org/climateprotection/ClimateChange.asp


Interviews with NEO staff

Developed from a BCAC member list provided by NEO staff

NEO. Homepage. http://www.neo.ne.gov/

DAS. “DAS Building Division Homepage.” http://www.das.state.ne.us/building/

DAS. “Task Force for Building Renewal.” http://www.das.state.ne.us/309/administration.html

DEQ. Homepage. http://www.deq.state.ne.us/


State of Nebraska Board of Engineers and Architects. Homepage. http://www.ea.ne.gov/

Nebraska Public Services Commission. Homepage. http://www.psc.state.ne.us/


NSHBA. “Local Associations.” http://www.nshba.org/localassoc/


Nebraska Chapter of the American Society of Civil Engineers. Homepage. http://www.neasce.org/

Structural Engineers Association of Nebraska. Homepage. http://www.seaon.org/


ASHRAE. Homepage. http://www.ashrae.org/

ASHRAE Nebraska Chapter. Homepage. http://cmdeptr.unl.edu/ne-ashrae/


BCAP Nebraska Gap Analysis
Using BCAP’s Code Estimator tool, these numbers are derived from the estimated savings of the target code scenario compared to the business-as-usual (BAU) scenario.

**Target Code Scenario:** The 2009 model codes (2009 IECC and/or ASHRAE Standard 90.1-2007) are implemented beginning in 2012. No future increases in energy code stringency are assumed. From a current assumed baseline of 50% compliance in both new construction and renovations, incremental steps are made each year towards 90% compliance in both by 2017. A level of 90% compliance is then assumed through 2030.

**Business-as-usual (BAU) scenario:** The stringency of the current energy code in place (for states that have adopted the 2009 model codes already, the previous codes in place were used for the baseline) remains constant through 2030. The current assumed baseline of 50% compliance in both new construction and renovations remains constant through 2030.

ENERGY STAR. “New Homes Partners in Nebraska.” http://www.energystar.gov/index.cfm?fuseaction=new_homes_partners.showStateResults&s_code=NE

