Texas Gap Analysis

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BCAP
COMPLIANCE PLANNING ASSISTANCE PROGRAM

SECO
State Energy Conservation Office

Prepared by the Building Codes Assistance Project and the Texas State Energy Conservation Office for the United States Department of Energy

BCAP Dedicated to the adoption, implementation, and advancement of building energy codes
Building Codes Assistance Project (BCAP)

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

AIA – American Institute of Architects  
ASHRAE – American Society of Heating, Refrigerating, and Air-Conditioning Engineers  
BEPS – Texas Building Energy Performance Standards  
BCAP – Building Codes Assistance Project  
BOAT – Building Officials Association of Texas  
BPI – Building Performance Institute  
CEUs – Continuing education units  
COG – Council of Governments  
DOE – Department of Energy  
ECAP – Energy Code Ambassadors Program  
EECBG – Energy Efficiency and Conservation Block Grants  
EPA – U.S. Environmental Protection Agency  
ESL – Energy Systems Laboratory, Texas Agricultural and Mechanical University  
HERS – Home Energy Rating System  
IBC – International Building Code  
IC3 – International Code Compliance Calculator  
ICC – International Code Council  
IECC – International Energy Conservation Code  
IRC – International Residential Code  
LEED – Leadership in Energy and Environmental Design  
MEC – Model Energy Code  
NAHB – National Association of Home Builders  
NCARB – National Council of Architectural Registration Boards  
OCEAN – Online Code Environment and Advocacy Network  
RECA – Responsible Energy Codes Alliance  
RESNET – Residential Energy Services Network  
SECO – Texas State Energy Conservation Office  
SEO – State Energy Office  
SEP – State Energy Program  
TAB – Texas Association of Builders  
TCV – Texas Climate Vision  
TML – Texas Municipal League  
TRCC – Texas Residential Construction Commission  
USGBC – U.S. Green Building Council
Executive Summary

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

The Introduction section provides an overview of relevant state demographics and the impact of the construction boom and subsequent decline. It also covers Texas’ energy portfolio, emphasizing the state’s renewable energy and energy efficiency targets, and the potential savings available through energy codes. For instance, full compliance with the 2009 International Energy Conservation Code would yield approximately 8-15% savings in residential and commercial energy use while safeguarding the state’s valuable energy industries.

The Adoption section takes a close look at the federal, state, and local polices that influence energy codes in the state. This section covers how Texas’ Home Rule attitude among local jurisdictions effects the adoption of the statewide building energy code, the Texas Building Energy Performance Standards (BEPS), based off of the 2000 IECC/2001 Supplement. It describes the roles of the State Energy Conservation Office (SECO), as well as other state-level stakeholders, in this process. Moreover, this section calls attention to a number of green initiatives and high performance building programs on the state and local levels. These programs continue to raise the bar for energy-efficient construction practices and help the enforcement, design, and construction industries become accustomed to the requirements of the increasingly stringent model energy codes.

The Adoption section makes three major recommendations, in addition to multiple related recommendations. The core recommendations are listed below.

As the state agency in charge of state energy policy DELEG should:

- Seek a legal opinion on whether Chapter 388 of the health and safety code allows SECO to adopt the IECC for all construction, including single family homes, and whether SECO may improve the requirements of Chapter 11 of the IRC.

- Because Chapter 388 of the health and safety code does not prohibit individual jurisdictions from adopting the IECC for all construction (including single-family homes), SECO should encourage and support the jurisdiction-by-jurisdiction adoption of the IECC, regardless of whether SECO is permitted to adopt the IECC for all construction at a state level.

- Assess the impact of BEPS statewide to target outreach to areas that are behind
• Complete an assessment of construction in unincorporated areas and develop a code implementation strategy for these areas

With most of the Texas population covered by some form of an energy code, it is critical that the state advance energy code implementation to capitalize on the energy and financial savings available through compliance with the energy code. Beginning on page 32 of the report, the Implementation section covers the many ways in which state and local agencies, the design and construction industries, utilities, and other stakeholders work to promote the adopted energy code, establish efficient, feasible, and cost-effective enforcement and compliance infrastructures, and adequately prepare code officials and building professionals to carry out their responsibilities. This section describes the state’s outreach efforts to local jurisdictions and consumers, particularly through the promotion of state-sponsored training workshops provided by SECO and the Texas A&M Energy Systems Laboratory (ESL). Some of the state’s utilities provide incentives and rebates to consumers for energy efficiency improvements, while energy efficiency experts work with local building departments to raise awareness of building science, technical code compliance assistance, and energy code enforcement issues.

Enforcement and building professionals in Texas vary in their knowledge of and attitudes towards energy codes and current Recovery Act requirements. Some inspection departments emphasize strict, consistent enforcement, and most building professionals adhere to or exceed the adopted standards. While energy code implementation is generally strong, some experts cite a need for better energy code infrastructure and practices throughout the state, more training available to all stakeholders, and a consistent understanding of the forthcoming 90 % compliance tracking procedures. Enforcement and building professionals alike have struggled in the wake of the recession and the collapse of the housing market and are supported by building permit fees which have decreased significantly. Additionally, the state does not have strict licensing requirements for design and building professionals.

The Implementation section makes many major recommendations, in addition to multiple related recommendations, for a variety of different stakeholder groups.

To improve state efforts to support local jurisdictions with energy code implementation, the state could:

• Add stringency language that local jurisdictions need to obtain ESL certification that an analysis was done on their proposed energy code amendments
• Develop a strategy for code implementation in unincorporated areas by assuming the responsibility of BEPS enforcement in unincorporated areas, managing a program of 3rd party HERS raters to enforce the BEPS, or investigate some other innovative compliance model to address the issue of “code-free” areas
• Provide assistance for plan review in complex buildings or other specific building types and offer assistance to local building departments by encouraging the use of PNNL technical resources
• Continue to provide materials, services, and resources to support code compliance to building departments, and help subsidize 3rd party inspections and the use of testing materials that local building departments do not own
• Require that all code officials performing energy inspections be certified, either by the ICC or a state-run certification program, and use strict measures to enforce the rule
• Reach out to energy code stakeholders in rural areas to provide them with easier access to training, or motivation to travel long distances to the common training locations
• Require that all residential contractors earn certification through licensing that includes energy efficiency and code education
• Require that all residential contractors and non-AIA-member architects earn CEUs in energy efficiency and codes
• Complete an energy code compliance measurement and verification study using the DOE guidelines and account for work needed to resolve noncompliance found over time.

The Conclusion section provides a summary of the myriad benefits of energy code adoption and implementation in Texas and concludes with Figure 6, a summary list of the most important recommendations made in the report with page numbers for quick reference. Appendix A offers a list of other DOE and PNNL energy code resources.
Introduction

As one of the principal instruments in the energy efficiency policy toolbox, energy codes benefit society in a number of important ways: they reduce energy use, which decreases greenhouse gas emissions and pollution, save consumers and businesses money, lessen peak energy demand, increase utility system reliability, and improve indoor air quality.

Recent improvements in the stringency of the model energy codes—not to mention the development of the first green codes—continue to raise the floor and ceiling for energy-efficient design and construction to levels that were almost unimaginable a few short years ago. Meanwhile, the American Recovery and Reinvestment Act of 2009 has provided states and cities with unprecedented funding and incentives to adopt the model energy code, and more places are taking advantage of these opportunities than ever before.

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

Yet, for all this recent progress and promise, energy codes are still falling well short of their potential. In municipalities across the country, energy code enforcement and compliance remain woefully insufficient or completely absent. While development and adoption are the necessary first steps of the energy codes process, they alone do not guarantee compliance. To ensure that energy codes accomplish their missions to reduce energy use and save money, states and cities must develop and carry out effective and realistic energy code implementation strategies.

In collaboration with the U.S. Department of Energy, BCAP has undertaken a new program to improve energy code compliance in 15 states, including Texas, by analyzing the gaps in the existing energy code infrastructure and practices and providing compliance planning assistance and on-the-ground technical support to energy code stakeholders in the state. The first phase of the program is the Gap Analysis Report, which identifies barriers to successful energy code adoption and implementation, opportunities for improvement, available resources, and key stakeholders and potential partnerships.
State Overview

Texas is a very diverse state demographically, from major urban and metropolitan areas such as Dallas, Houston, San Antonio, and Austin, to vast, rural plains, deserts, and coastal areas. In 2009 Texas had a population of just under twenty-five million, with approximately 62% of its residents living in the four major metropolitan centers.

The median income in Texas is 27th in the nation at around $38,000. As of November 2010, Texas had the 30th ranked unemployment rate in the country, at 8.2%. Texas’s major industries include agricultural production, energy distribution, and technology research and development, all of which have suffered due to current economic conditions, though not as significantly as in other industries. Due to this decline, the state has seen significant cutbacks and layoffs in both the public and private sectors, and new construction has hit 10-year lows.

Figure 1. State Population Map

Notes

- The State of Texas can be divided into seven distinct regions:
  1. Gulf Coast - which includes Houston and Corpus Christi
  2. Piney Woods - the northeast part of the state
  3. Prairies and Lakes - which includes Dallas-Ft. Worth
  4. Hill Country - which includes Austin
  5. South Texas Plains - which includes San Antonio and Laredo
  6. Panhandle Plains - which includes Amarillo and Lubbock
  7. Big Bend Country - which includes El Paso

Notes

- Over the past decade, Texas's population has increased from just under 20 million in 2000 to nearly 25 million in 2009.
- 62 percent of Texas's residents live in four major metropolitan areas: Dallas-Ft. Worth, Houston, Austin, and San Antonio.
- As of 2008, the per capita income was around $37,800, 27th in the nation.
- Two of Texas's biggest industries are in energy production and distribution and technology research and development.
- At 8.2 percent, Texas's unemployment rate is 30th in the nation.

Density Map and Populations courtesy of U.S. Census Bureau
Census 2000 Summary File 1 Population by Census Tract
Population Estimates as of July 1, 2007
Construction Overview

Construction is a very important industry to Texas, as it provides many jobs in the state. Historically, both residential and commercial construction in the state has been very high due to Texas’s expanding economy through the first half of the 2000’s. In 2006, over 200,000 residential units were permitted for construction,\(^3\) which was one of the highest rates in the United States. However, as Figure 2 indicates, by 2009 that number had dropped to around 75,000 units.

According to the Urban Land Institute’s (ULI) *Emerging Trends in 2011* report, construction and investment prospects in Dallas, Houston, Austin, and San Antonio are very mixed.\(^4\) All four of these cities have a very positive outlook for commercial and multifamily investment, and most have above average scores for single-family home development. Prospects for commercial development are below average in all cities but Austin.

Even though the slowdown in construction has slowed the economy, it presents a unique opportunity for the advancement of energy codes in the state. Homebuilders, contractors, and code officials may have more time to devote to learning how to comply with the new energy codes and learn why they are so important. The State of Texas is taking advantage of Recovery Act stimulus funding currently available to them to implement energy code trainings A decline in construction activity could provide an opportunity for bringing all stakeholders up to speed on new practices to will increase compliance and enforcement of the new code. Finally, it a tight market, builders will be looking for ways to gain a competitive edge, keep demand for their homes high, and provide consumers with homes designed to be more energy efficient, which lowers energy bills and environmental impacts, is always a plus.

Energy Portfolio

Texas is a producer of energy, and relies very little on energy imported from other states. As Figure 3 shows, Texas generated about 96% of the energy it consumed in 2008. The state’s primary source of energy is petroleum (47%), followed by natural gas (32%), and coal (14%).\(^5\) Renewables play a somewhat minor role in the state, accounting for 3% of the state’s total energy consumption and 5% of the total renewable energy consumed in the United States in 2008. In 1999, the state created a renewable energy portfolio standard (RPS) with SB 7 (Session 76(R)),\(^6\) requiring that energy providers in...
Texas collectively generate 2,000 MW of energy from renewable sources by 2009. Then, in 2005, SB 20 (Session 79(1)) revised the previous bill to require 5,880 MW by 2015, and 10,000 MW by 2025.

Reducing overall energy use through the adoption and implementation of the model energy code would allow the state to meet their RPS goals more readily and help to meet growing demand. According to an American Council for an Energy-Efficient Economy’s (ACEEE) 2010 State Energy Efficiency Scorecard, Texas now ranks 32nd among U.S. states in energy efficiency—down from 23rd in 2009. In the 2010 Scorecard, the building energy codes portion uses two criteria to score states: the stringency of residential and commercial codes accounts for five points, while compliance efforts and enforcement accounts for the remaining two points. Texas received a 1.0 on its energy code compliance efforts. The study cites the passage of 2009 International Energy Conservation Code (IECC), but it is yet to be seen if this will affect the score. In the long-term, using model energy codes would allow the state to achieve its goals for greenhouse gas emissions reduction more quickly, potentially becoming a net-exporter of renewable energy, as it is now for non-renewables.

Residential energy costs in Texas are slightly above the national average, at 11.49 cents/kWh. Nonetheless, energy use per capita in Texas is extremely high at 475 million Btu per person, which is 5th nationwide. However, there are low cost opportunities for reducing consumption in order to reduce costs to consumers in the present and to meet future demand. Compliance with energy codes such as the 2009 IECC will significantly reduce energy consumption, lessen the impact on the grid, save consumers money, and help secure Texas’s energy for the future.

### Potential Savings from Energy Codes

The adoption of and compliance with updated model energy codes are the “low hanging fruits” to significant energy savings. This is especially important to a state like Texas, given its energy-efficiency targets for 2015 and beyond. Assuming the 2009 IECC and ASHRAE Standard 90.1-2007 are implemented in the beginning of 2011, the state would see the following savings:

<table>
<thead>
<tr>
<th></th>
<th>Energy Savings (Trillion Btu)</th>
<th>Utility Cost Savings (Based on 2006 Prices)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>by 2015</td>
<td>by 2020</td>
</tr>
<tr>
<td></td>
<td>51.8</td>
<td>104.7</td>
</tr>
<tr>
<td>by 2015</td>
<td>$391 million</td>
<td>$789 million</td>
</tr>
<tr>
<td>by 2020</td>
<td></td>
<td></td>
</tr>
<tr>
<td>by 2030</td>
<td></td>
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</tbody>
</table>

When compared to the current residential construction practice standards in the United States, building a home to the 2009 IECC will cost an additional $818.72, on average. However, consumers living in this home will save an average of $243.37 per year in energy costs, bringing the simple payback period to around 3 years and 4 months. When this cost is amortized over the course of 30 years, the savings become even greater. Assuming the incremental costs are rolled into the homebuyer’s mortgage, it will
increase the down payment by $164 and the monthly payments by $3, and the $20/month utility savings would create a payback of just 10 months. Given the length in time most consumers live in a home, purchasing a house that is built to the 2009 IECC in Texas is an extremely good investment.
Adoption

Federal Policy

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

EPAct

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

For commercial buildings, DOE determined in late 2008 that ASHRAE Standard 90.1-2004 for would achieve energy savings of 13.9% above the previous Standard 90.1-1999 for national source energy and 11.9% above for building energy consumption.\(^\text{14}\)

For low-rise residential buildings, EPAct currently references the 2000 IECC.\(^\text{15}\) DOE, however, has preliminarily determined that the 2009 IECC would achieve greater energy efficiency 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.\(^\text{16}\)

The current Texas Building Energy Performance Standards (BEPS), based on the 2000 IECC and 2001 supplemental edition, are in compliance with the current EPAct residential baseline requirements. The current state code’s commercial provisions based on those same IECC editions does not meet EPAct requirements, but will once the updates to the BEPS take effect.

The nonresidential building provisions of BEPS will be updated to reference the 2009 IECC effective April 1, 2011 and should comply with EPAct.\(^\text{17}\) The provisions for one- and two-family dwellings, however, will reference the 2009 IRC Chapter 11 energy requirements only effective January 1, 2012, and DOE has determined that this code is not equivalent to the 2009 IECC.\(^\text{18}\)

The Recovery Act
In 2009, Congress passed the American Recovery and Reinvestment Act (Recovery Act), which provided states with stimulus funds through the State Energy Program (SEP) and the Energy Efficiency and Conservation Block Grants (EECBG) to adopt the 2009 IECC or equivalent for residential construction and the ASHRAE Standard 90.1-2007 or equivalent for commercial construction, as well as achieve 90% compliance with the codes by 2017. In a letter dated March 23, 2009, Governor Rick Perry assured that the Texas State Energy Conservation Office of the Texas Comptroller’s Office (SECO) would continue to adopt the most recent editions of the IECC and IRC. In response, DOE awarded the state $218.8 million in SEP funding for use in energy efficiency policies and improvements and an additional $163.1 million EECBG formula grant, a portion of which the SECO will use for various residential and commercial energy efficiency projects.

State Policy

In the United States, building energy codes are adopted on the state and local levels. This is due, in part, to the diverse range of cultures and climates found across the fifty states, as well as a host of historical political influences that shaped federal-state and state-local relations. The process differs from state to state, but in most cases codes are adopted through a legislative process, a regulatory process, or a combination of both, although a handful of states are strongly home rule and permit local jurisdictions to adopt energy codes. Every state is unique in how it conducts business and creates policy, and each state requires its own particular strategy for achieving the best possible code for its local governments, citizens, and businesses.

Environmental organizations in Texas helped lobby for House Bill 773 of the 82nd Texas legislative session in 2011 to create a coordinating council to formally streamline state energy efficiency efforts in various agencies. If adopted, this could help target specific areas to integrate into a statewide energy efficiency strategy, such as energy codes. Right now the agencies’ programs in energy efficiency are independent of each other. For example, the Public Utility Commission reviews and approves energy efficiency programs for investor owned utilities. The Department of Housing and Community Affairs and the State Energy Conservation Office oversee their own EE Programs. In this bill, the council would be made up of the above mentioned entities and the Texas Commission on Environmental Quality, Energy
Cross referencing and connecting energy efficiency programs provides the state the opportunity to optimize energy savings.

**Political Environment and Energy Code Adoption**

Chapter 447 of the government code pertaining to the state energy conservation office states that SECO “may establish procedures and adopt rules relating to the development and implementation of energy and water conservation measures and programs applicable to state buildings and facilities.” Under this chapter, which has been in place since 1989, SECO can establish energy conservation design standards for new state buildings and renovation, thus it has authority over the adoption of building codes for state-funded buildings.

Chapter 388, Sec. 388.003 of the state health and safety code pertains to the Texas building energy performance standards and gives SECO authority to initiate an energy code amendment with each new IECC and IRC code cycle. The Energy Systems Laboratory (ESL) at Texas A&M University is responsible for providing technical analysis to SECO on energy codes. Generally, SECO will not propose an update to the energy code without a recommendation from ESL. Their findings must show that the proposed code will be more efficient than the existing code. Then SECO may by rule adopt the code or more stringent editions and establish an effective date not earlier than nine months after the date of adoption. Prior to 2001 Texas did not have mandatory statewide energy codes for either residential or commercial buildings. No attempt had been made to adopt mandatory energy codes on a statewide basis until this point, but the state was encouraging voluntary adoption and use of energy codes by training code officials and home builders.

In 2001, the U.S. Environmental Protection Agency (EPA) identified 22 nonattainment counties based on environmental air quality in Texas, which threatened federal funding opportunities for transportation if the state did nothing to address them. One of multiple responses included the June 2001 adoption of a mandatory statewide energy code, based on the 2000 IECC including the 2001 supplement, through Senate Bill 5 (SB 5). This became known as 34 TAC §19.53, or the Texas Building Energy Performance Standards (BEPS), and affected residential and commercial buildings statewide. BEPS is currently the mandatory minimum energy code statewide.

In 2006, the Energy Systems Laboratory at Texas A&M University had concerns about the stringency of the 2006 IECC residential chapter when applied in Texas. ESL recommended that if the 2006 IECC code was adopted, the windows to wall ratio from 2001 should be put back into the code. SECO did not move to update the BEPS to reference the 2006 IECC for state funded building. Instead it adopted 2003 IECC for residential and ASHRAE 90.1 commercial for state funded buildings. Prior to 2007, SECO did not have rulemaking authority. An amendment to chapter 388 gave SECO adoption authority if they determined the energy efficiency provisions of the latest IECC and IRC code was more stringent than prior code.
Recent Energy Codes-related Legislation

The last IECC and IRC code cycle triggered the rulemaking process in May 2009 for SECO to update the BEPS. The office requested comments from stakeholders and made recommendations in September 2009 in favor of amending BEPS with the 2009 IECC code. However, this process continued into January 2010 and SECO held a stakeholder meeting. As a result, legislation was put forth to revise Chapter 388 which outlined BEPS, to require that single-family homes comply with the energy efficiency provisions (Chapter 11) of the 2009 IRC instead of the IECC. The Controller’s General Counsel said SECO could not leave out chapter 11 of the IRC because the statute says the state shall adopt the IRC for single family homes. On June 4, 2010, SECO officially adopted a rule to update the Texas BEPS codified in 34 TAC §19.53 to reference Chapter 11 of the 2009 IRC, which will be effective January 1, 2012 for all new single family homes. The code for all other residential, commercial, and industrial buildings will be updated to reference the 2009 IECC effective, April 1, 2011. The Texas Association of Builders (TAB) requested a later date for the law to come into effect so the building community could have time to bring the industry up to speed on the code and appropriate building design software could be updated. Yet, the U.S. Department of Energy has determined that Chapter 11 of the IRC, without strengthening amendments, is not as stringent as the 2009 IECC.

Gap #1: SECO did not adopt the 2009 IECC as mandatory for single family homes, and will instead enforce the less stringent 2009 IRC Chapter 11. SECO should seek a legal opinion on whether it has authority to adopt the IECC for all construction or to make improvements to Chapter 11 of the IRC.

Recommendation: SECO must address the inconsistencies between IRC Chapter 11 and the IECC, and must bring it up to the stringency of the IECC. Otherwise, the energy code for single family homes will continue to remain below national standards. If SECO cannot address the IRC inconsistency at a state level, SECO must support the adoption of the IECC for all construction in the jurisdictions considering code improvements. Forward thinking, the 2012 IRC will likely include efficiency requirements equivalent to the IECC, so there may not be a need to take the above action for the 2012 edition of the International Codes.

Other Texas Building Codes

Local municipalities set and enforce their own building codes at the jurisdiction level. The Texas Department of Licensing and Regulation sets the building and energy codes for manufactured homes. The following codes are set at the state level:

- 2003 International Building Code, ICC
- 2003 International Residential Code, ICC
- 2008 National Electric Code
- ASME A17.3-2002 Elevator Code

Energy Codes for State-funded Facilities

BCAP Texas Gap Analysis
Recall that SECO can establish energy conservation design standards, thus building codes, for state buildings and renovation via Chapter 447 of the government code. In 2005 Texas adopted the residential chapter of 2003 IECC for all state funded residential buildings. Then in 2009 the state adopted ASHRAE/IESNA 90.1-2007 for commercial buildings receiving state funding as well as state agencies and higher education. Texas also requires that state government departments compare the estimated cost of conventional design practices and energy systems with the cost using energy efficient architecture and design and/or alternative energy systems. The state agencies and public institutions of higher education must do this for each of the buildings systems (HVAC, water heating, electrical loads etc.) for all new state government construction or renovation. If the energy efficient design is economically feasible then it must be included into the project plans.

Texas also passed S.B. 982 in 2005, which grants SECO the authority to approve the methodology for making the economic feasibility comparisons. The bill also requires that engineers or design architects of new state funded buildings certify that the new construction or renovation complies with energy efficient architectural and engineering design evaluation requirements before the construction phase begins.

SECO administers and maintains the Texas Design Standard for new state buildings and significant remodels via the State Agencies Program which, through multiple initiatives, ensures that current state facilities are maintaining optimal energy efficiency and that new state buildings will use energy efficient practices from the planning stages through its completion.

**Statewide Climate Change Initiatives**

Although Texas does not have a formal climate action plan, SECO has multiple programs with aims to reduce energy use and cost by maximizing efficiency and reducing pollution. SECO provides residents with educational information on conserving energy as well as provides incentives for renewable energy and energy efficiency. In addition, SECO sponsors several programs and initiatives that promote renewable, education, and efficiency.

Some of these programs include the Pollution Mitigation Program which provides technical assistance to instate public institutions. The program attempts to show the value of energy technologies, training, energy efficient building practices and emission and energy tracking and data. SECO gathers data of energy reduction in kWh for technologies or practices in use in public facilities and then publishes an annual report. Through its Transportation Energy savings built into new construction will accrue over the life of the building. Considering that buildings typically last from 50-100 years, adopting energy codes not only impacts new building energy performance, but also the energy performance of existing buildings until 2060 and beyond. This makes energy codes an important long-term policy for mitigating climate change and supporting the Texas economy.
Program, which focuses on reducing fuel consumption, air pollution and traffic congestion, SECO gives workshops on new technologies and practices. Projects include fuel-safe school buses, traffic signal synchronization, and intelligent traffic management systems.

In 2001 Texas passed SB5 (as mentioned above) and SB12, collectively known as the Texas Emissions Reduction Plan, and extended the laws in 2007. These laws were enacted to facilitate the state’s compliance with the Federal Clean Air Act, and contain new energy-efficiency measures that are designed to decrease energy consumption while improving air quality. SB12 requires that all political subdivisions in the 41 urban non-attainment areas and their surroundings implement all cost-effective energy-efficiency measures to reduce electric consumption in current facilities. SB12 also mandates the adoption of goals to reduce electric consumption by five percent each year for six years, beginning September 1, 2007, with annual reporting to SECO.

Overview of Green and Above-Code Programs

Leadership in Energy and Environmental Design (LEED)
Of the 5,156 LEED certified buildings in the United States, 301 (approximately 6%) were located in Texas. For LEED registered buildings, Texas accounts for 1,240 (approximately 7%) of 18,029 registered buildings nationally. The state has a much larger share of LEED construction regionally. Texas accounts for 23% of the LEED certified and registered buildings in the Southeast. Texas leads the region, followed closely by Florida then by Virginia, Georgia and North Carolina, which have about half as many LEED structures. West Virginia ranks the lowest in the region.

ENERGY STAR for Homes
ENERGY STAR for Homes is a national above-code building program administered by the EPA. To qualify for the ENERGY STAR for Homes label, homes must receive a score of 85 or less on the HERS index.

Texas has 320,397 Energy Star homes. This accounts for nearly 29% of the nation’s Energy Star homes and 75% of Energy Star homes in the Southeast region. Approximately 29,572 or 9% of the total Energy Star homes in the state were constructed in 2009. These homes were constructed by 822 different Energy Star partner builders in the state, over 40% of which signed up after 2008. The ENERGY STAR New Homes program in Texas had a market penetration of 43% in 2009, which was more than double the national value of 21% and the fifth highest in the country. SECO is also an Energy Star Partner, and the two groups work together to bring “financial and technical assistance, tools, and information to help better manage energy, which can reduce operating costs and pollution.”

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

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

According to its website, builders in Texas have built 1,574 homes to Building America specifications, and a total build-out of 1,783 homes is expected. Houston and San Antonio lead the way with large developments, and other large developments are in the works.

Other Green and Above-Code Programs
SECO also provides multiple programs to promote green building design. The LoanSTAR Program offers low-interest loans to all public entities for Energy Cost Reduction Measures including insulation, lighting and HVAC. The loans can be used for retrofitting existing buildings and equipment or to make up the cost for purchasing energy efficient equipment and materials that go beyond established standards. As of November 2007, the program had funded 191 projects, resulting in approximately $212 million in energy savings.41

SECO also has a sustainable building design and a sustainable school design initiative for public projects. In these two initiatives the building occupants, as well as architects, engineers and contractors design and build structures that are sustainable, using less energy and limiting the environmental impacts of the buildings.42

Additionally, the Housing Partnership Program supports the efficient use of energy in low to moderate income housing through training, technical assistance, and partnerships among multiple local organizations and companies. The program works with builders and design teams to use energy design concepts and technologies to supports low income areas of Texas to use energy efficiency measures and technologies in new and retrofit construction.43

Local Policy

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1 It is possible that both of these numbers are higher, given that the website lacked information on a number of projects and efforts to learn more were unsuccessful.
Local energy code adoption varies greatly from state-to-state. In strong home rule states, local jurisdictions have full authority to adopt energy codes that best fit the needs of their community, while others must meet a statewide minimum first. In other states a minimum-maximum energy code prohibits local jurisdictions from diverging from the state code whatsoever. Most states fall somewhere in between, mandating a minimum code, but allowing some flexibility to go beyond it in progressive jurisdictions.

In Texas, cities and counties are technically supposed to adopt and enforce the statewide energy code, but no incentive or penalty to motivate the local jurisdictions to do so currently exists. Doug Garrett of Building Performance & Comfort, Inc., points out that energy code adoption lacks a visible constituency who will fight for it. He said “if library budgets are cut, library patrons can rally city council, but taking up the issue of adopting stringent energy codes does not often have a local voice. The builders are vocal.” Furthermore, many local governments will see the mandatory statewide code as an unfunded mandate set by the state, providing justification not to proceed with its adoption at the jurisdiction level.

Gap #2: There is no “carrot” or “stick” to motivate local jurisdictions to adopt the state-mandated Texas Building Energy Performance Standards. Given local political trends, many jurisdictions may see the BEPS as an unfunded mandate and choose to ignore it.

Recommendation: ESL is tasked with providing SECO with the status of code adoptions by cities. Using this info, SECO could assess the impact of BEPS statewide to target outreach to areas that are behind. This will allow SECO and energy code advocates to focus adoption efforts in the parts of the state that do not adopt the most recent version of the BEPS on their own.

The IECC and Standard 90.1

Since the adoption of the Texas Building Energy Performance Standards in 2001, nearly every local jurisdiction in Texas that self-reports their codes to the ICC had adopted some version of the IECC, according to the ICC database. While this report may not be completely accurate, it is safe to assume that most of the state’s population and construction are in parts of the state where at least some version of the IECC is adopted.

While the BEPS does reference ASHRAE Standard 90.1-1999 for commercial construction, much less is known about which municipalities in Texas have adopted the code, and what version. It is likely that in most jurisdictions, a comparable version of Standard 90.1 can be used to show compliance in lieu of the IECC, as

IECC vs. IRC

The 2009 International Residential Code (IRC) is not equivalent to the 2009 IECC. Texas must add a number of amendments to bring the 2009 IRC up to 2009 IECC standards. These include:

- Strengthening fenestration and insulation requirements
- Adding new air barrier and insulation checklists
- Redefining “conditioned space”
- Adding “mandatory,” “prescriptive,” and “performance” labels in the code
- Exempting only “building thermal envelope provisions that do not contain conditioned space”
the commercial chapters of the IECC reference Standard 90.1 in many areas.

The IRC and IBC

Given SECO’s adoption of the IRC for single family homes instead of the IECC, many communities in Texas will likely do the same when updating their code. Chapter 11 of the IRC, the energy efficiency chapter, references the IECC as an alternative compliance path, yet it also includes prescriptive energy efficiency requirements that are slightly less stringent than the IECC. This gives the building and design industries the option of taking an easier compliance path, which reduces these codes’ impact on energy savings as compared to the IECC.

Some local jurisdictions may also choose to adopt the International Building Code (IBC), which covers commercial construction, although this would not meet the state-level energy requirement. The IBC’s Chapter 13 references the IECC—which, in turn, references ASHRAE Standard 90.1-2007 as an alternative compliance path—but does not reproduce it. In theory, then, the IBC is equivalent to the IECC and Standard 90.1, but only if the jurisdiction also adopts the IECC for all construction, including single-family homes.

Figure 4. Energy Code Status by City, Compared with Residential Construction

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Local Adoption Trends

SECO has adoption authority over the IECC and IRC energy codes. Local counties and municipalities then adopt the state code by ordinance. Counties and municipalities have authority to interpret the code, amend it as necessary, and carry out code enforcement. If they amend the code, they go to ESL to obtain an analysis on energy impacts.

In some cases, a regional council of governments or “COG” has taken action to spearhead the promotion of energy codes. Often times, building departments and the construction industry alike are supportive of COG-wide energy code adoption, as this helps to keep building requirements consistent throughout the region, which helps make compliance easier across the board. Twenty-four COGs exist in Texas and belong to the Texas Association of Regional Councils. A large and very active COG in the state is the North Central Texas Council of Governments (NCTCOG), which includes the Dallas-Ft. Worth major metropolitan areas - 16 counties and over 240 communities. NCTCOG’s Regional Codes Coordinating Committee is made up of building officials, city managers and high level city staff. During each code cycle, this committee organizes working groups of 25-30 people to review different codes (i.e. electrical, building, mechanical, and energy codes). In order to cover each stakeholder’s views, these working groups have designated slots allotted for small, medium and large size cities and include building code organizations, builders, general contractors and other industry representatives. Considering NCTCOG’s territory covers over 12,000 square miles (larger than the state of Maryland), this presents an opportunity to influence adoption.

COGS do not have the authority to require its members to adopt the newly updated code, but they can make recommendations and provide a platform to promote regional standardization. In the latest code round, NCTCOG recommended strengthening provisions for its members to adopt on top of the state BEPS, which Texas A&M ESL confirmed as adequate. However, it is unsure how many jurisdictions will adopt NCTCOG’s version of the code. Jurisdictions will often make adaptations to the COG’s code for local use. It is in the process of conducting a code survey to see who has adopted which versions of the code and hopes to have it completed by winter 2011. If municipalities are adopting beyond the code or NCTCOG’s regional recommendations, NCTCOG encourages them to share this with the IECC.

While NCTCOG hopes to standardize codes regionally, the efforts of a few communities to adopt stringent energy codes combined with market forces are providing positive externalities for their neighboring jurisdictions. Even if a local jurisdiction is not formally adopting the latest code, a builder who has worked in a neighboring jurisdiction with a more stringent energy code may find it easier to replicate his higher performing designs for another project in another community. Doug Garrett says a competitive market can create compliance because “if a builder down the road is advertising his Energy Star development, other builders in the area will feel they need to up the game.” He believes the vast majority of green building projects are started because the client asks for it. In commercial construction compliance is usually met because lenders hold builders to meeting all codes. Garrett says that lenders even hire 3rd party inspectors to check for compliance in order to ensure their investments are protected. Consumer demands for residential construction vary greatly but customer preferences
dictate the market and city councils follow their constituents’ desires. If going green is popular with the community, then a city is more likely to act.

Generally speaking, trends in local adoption can be categorized by community size – large urban municipalities, high growth medium size cities, smaller cities and towns, and unincorporated areas in counties.

**Larger Cities**

Code adoption in Texas’s urban areas (with populations of 600,000 or more) is by far the most progressive in the state. Many of these cities have their own climate change mitigation and/or energy efficiency initiatives, and strive to be as “green” as possible. For example, the city of Houston, with the support of then-mayor Bill White, adopted the 2006 IECC with amendments to make it 15% more stringent, and the code is mandatory for all construction in the city. Once the Texas Building Energy Performance Standards update takes effect in April 2011, the city will begin enforcing a 15% more efficient version of the 2009 IECC and ASHRAE Standard 90.1-2007. Additionally, San Antonio already adopted a code equivalent to the 2009 IECC, and is making preparations for the adoption of the 2012 IECC. Like Houston’s energy code, San Antonio uses the IECC for all construction, replacing Chapter 11 of the IRC. The progressive nature of Texas’s urban areas makes the adoption of updated codes much easier, and as a result they all have adopted a more stringent version of the Texas Building Energy Performance Standards.

**High Growth Medium Size Cities**

These cities are characterized by their growing density and expanding population (50,000 – 600,000), which has led to increase in home building and commercial development. Corpus Christi, El Paso, Frisco, Plano, and Waco, are some examples. Other than inner ring suburbs adjacent to large metropolitan areas, many of these high growth medium size cities are considered “outlier” cities. Absent of the influence of a larger city, these outlier cities have taken it upon themselves to adopt higher energy codes in order to attract high quality developments.

**Smaller Cities and Towns**

Smaller cities and towns in Texas tend not to have the same advanced infrastructure as the urban areas, and more often than not they will adopt the baseline BEPS, if any energy code at all. As mentioned before, nearly every reporting jurisdiction in the ICC self report had claimed to adopt at least the 2000 IECC and 2001 Supplement, likely because of statewide BEPS mandate. The 2009 IRC/IECC will be a significant jump from the current BEPS standard, and the lack of city-wide energy efficiency strategies will make its adoption less of a priority. Furthermore, homebuilders may have more clout and less opposition in these smaller cities, and could try to argue that the added cost of the new code will make new homes unaffordable, which would be detrimental to the economy.

**Unincorporated Areas in Counties**

Potentially some energy code compliance is not documented due to lack of enforcement infrastructure. Garrett reports that some counties don’t even have zoning or land use controls. Municipalities have building officials who can in turn exercise compliance. Some counties in Texas have adopted an energy code to be enforced in unincorporated areas, but this does not mean it has been enforced. Technically,
construction outside of city limits must comply with the statewide energy code if the county does not have its own energy code in place. However, the counties lack the enforcement infrastructure and authority to enforce the code. In some instances, a county might not even have a buildings department. As a result, there is effectively no adopted energy code, let alone other building codes for unincorporated areas throughout Texas. Recall that SECO’s authority to adopt codes comes from Chapter 388 of the health and safety code. This was strategically placed in the health and safety code under the argument that energy codes relate to the health and welfare of building occupants and was one way to place a minimum standard to cover unincorporated areas of counties too. Cities have municipal authority, but the law does not have explicit language to authorize counties to exercise the same.

**Gap #3:** Unincorporated areas in Texas are not actively adopting the state mandatory energy code, so construction outside city lines are not consistent and can result in disparities in building quality versus neighboring incorporated jurisdictions.

**Recommendation:**

a. Texas should complete an assessment of these unincorporated areas, to determine the rate of construction in these areas and the status of energy code adoptions. This will give the state an idea of how much construction is “slipping through the cracks.”

b. Based on their findings, SECO should develop a strategy for energy code implementation in unincorporated areas. Ideally, all counties in Texas should formally adopt the BEPS with the intention of enforcing it in unincorporated areas.

**Energy Codes for Municipal-funded Facilities**

Numerous cities in Texas have developed ordinances to promote stricter energy codes for municipal and state funded facilities, mostly using the LEED certification system. In 2000, Austin passed Resolution 000608-43, requiring all municipal projects over 5000 square feet to earn LEED Silver certification at minimum. The ordinance was updated in 2007. In 2008, El Paso passed the same LEED Silver requirement for new municipal facilities. Houston also signed a similar rule in 2004 with Green Building Resolution #2004-15, where all state owned buildings over 10,000 square feet would have to use LEED system to the greatest extent possible within reason, and have a target of LEED Silver certification. In 2006, Dallas required all new municipal construction over 10,000 square feet to be LEED Gold Standard and show a 20% reduction in energy from standard practice. In 2007, San Antonio passed an even more stringent ordinance than Austin and El Paso with Resolution 1208, which required all new city-funded or constructed buildings to be built to LEED Silver certification. However, Plano has the most progressive rule, a 2007 policy to finance, plan, design, construct, manage, renovate, and maintain its facilities and buildings to be sustainable. The city also uses the LEED system and requires that new construction and remodeling achieve the highest LEED level of certification possible for all city facilities.

By requiring stricter standards for public buildings, jurisdictions demonstrate their commitment to energy-efficient construction, create a more conducive environment for stricter energy code adoption for private construction, and give themselves leverage in negotiating with stakeholder groups that are
hesitant to upgrade the baseline energy code. They also save taxpayer dollars with lower energy bills, further reduce their environmental impact, and improve the air quality and comfort of public buildings.

**Local Climate Change Initiatives**

**Programs Aimed at Municipalities**

Eighteen Texan cities signed on to the US Conference of Mayors Climate Protection Agreement. Under the agreement, participating cities commit to take three steps:

- Strive to meet or beat the Kyoto Protocol targets in their own communities,
- Urge their state government and the federal government to enact policies and programs to meet or beat the greenhouse gas emission reduction target suggested for the United States in the Kyoto Protocol, and
- Urge the U.S. Congress to pass greenhouse gas reduction legislation, which would establish a national emission trading system.

The Texas cities that signed are: Arlington, Austin, Bryan, College Station, Coppell, Dallas, Denton, Edinburg, El Paso, Garland, Grapevine, Houston, Irving, Plano, Richardson, San Antonio, South Padre Island, and Texarkana.49

Another group is the ICLEI - Local Governments for Sustainability, an association of over 1,100 local governments in 68 countries who 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. ICLEI has programs in Biodiversity, Climate, EcoMobility, Management Instruments, Sustainable Procurement, Sustainable Cities and Water.50 Thirty-one Texan communities are associated with ICLEI.

Developed by the U.S. Department of Energy in 1992, the Clean Cities Program works with cities to create local voluntary partnerships to expand the use of alternative fuel vehicles and their infrastructure locally. They have a large membership, and SECO works closely with Clean City groups in Texas to help create local jobs, facilitate vehicle production, expand infrastructure, and develop “clean corridors, increase education and who strive to help clean the air.” SECO works with the following Clean Cities areas: Corpus Christi, Laredo, Victoria, Austin, Beaumont/Port Arthur, Houston/Galveston, Tyler/Longview, Dallas/Ft. Worth, San Antonio and El Paso.51

**City by City**

Some cities have produced their own climate change initiatives. The city of Austin developed the Austin Climate Protection Program, with the goal of making Austin the national leader in the struggle to combat climate change.52 Building codes have a key role in Austin’s plan. Austin aims to update building codes so that all new single-family homes are capable of meeting 100% of their energy needs with on-site generation of renewable energy by 2015. Additionally, the city aims to update building codes to increase energy efficiency in all other new buildings by 75% by 2015, require disclosure of
Another city in Texas with multiple environmental programs is San Antonio. The San Antonio Office of Environmental Policy is active in multiple wide-ranging environmental and sustainable projects. One of these projects is Casa Verde, a weatherization project to retrofit low income homes to improve energy efficiency. Additionally, City Lights is a program to help small business owners increase lighting efficiency and lower energy bills. Green Shade is a program where landscape solutions are encouraged to lower cooling costs. Finally, Mission Verde Center is an education and training center for renewable, efficient and sustainable technologies. These programs are just a sample of the multiple reports and programs being developed in San Antonio.

Both Dallas and Houston have environmental groups as well. Green Houston is the official website of the City of Houston’s Environmental Council’s Office of Environmental Programming. It provides an outreach and educational tool for both residents and non-resident and also provides information on multiple programs occurring in the Houston area. Houston has also developed a program called the Green Office Challenge, a friendly competition to move property managers and tenants toward environmental sustainability within their office buildings. Green Dallas provides information about numerous environmental issues such as air quality, energy, green building, land, recycling and composting, transportation and water. They also supply information on programs and initiatives through the city and the state.

Overview of Local Green and Above-Code Building Programs

Many jurisdictions have opted to use the LEED accreditation system as a baseline in its green and above-code building programs. For example, in 2007 the El Paso City Council unanimously adopted the Green Building Grant Program. The program provides grants for commercial projects greater than 5,000 square feet and multi-family, multi-story residential projects that obtain LEED certification. The size of the grant depends on the level of LEED certification; the maximum grant for new construction is $200,000 for LEED Platinum. If a retrofit is completed for a mixed-use multistory building to obtain LEED Platinum certification then $400,000 can be awarded given a few other minor stipulations. In 2008, Dallas unanimously adopted a green construction ordinance. Its goal was to reduce energy and water consumption in all new homes and commercial buildings constructed in the city. This legislation was pushed through by Dallas’ Green Building Task Force, which was made up of members of the residential and commercial development sectors. There are two phases to the plan: first, requiring homebuilders to construct their homes to be 15% more efficient than the base energy code (the 2006 IECC at the time) and meet four out of six high-efficiency water reduction strategies. Phase 2 would begin on October 1, 2011. It requires all homes to be built to either the LEED standard or the Green Built North Texas (GBNT) standard. This would make them 17.5% more efficient then if built to code and on par with an ENERGY STAR home with a HERS rating of less than 83. Dallas aims to become carbon neutral by 2030 and be one of the greenest cities in the United States, and this plan will help get them there.
In 2009 San Antonio adopted Ordinance 2009-03-12-0179. This mandated that all new single and multi-family residential buildings achieve a 15% efficiency rate above current municipal code by achieving this was recommend to be done through LEED for Home certification. All new commercial and industrial buildings were required to achieve a 15% efficiency rate above current municipal code again recommended by achieving LEED certification.60

In the Town of Flower Mound, multi-family, commercial, and industrial new construction and major renovation projects participating in the city’s green building program must have energy performance 25% above the minimum IECC standards or achieve LEED certification.61 The Flower Mound Green Building Program is a voluntary, incentive-based program. It encourages builders and developers to design and build energy efficient homes and commercial buildings, and promotes water conservation and waste minimization.62

At the county level, in 2008, Harris County adopted an ordinance establishing a partial tax cut for costs incurred by developers to certify buildings with the U.S. Green Building Council. The higher the certification level, the more tax break they can receive.

Other local jurisdictions use ENERGY STAR or have created their own program. The Dallas suburb of Rowlett set up a green building program in 2008 that uses ENERGY STAR instead of LEED. The program states that all new residential construction must be ENERGY STAR rated, and that residential building must have a HERS index of 83 or less.63 The City of Austin created the nation’s first green building program in 1990, the Austin Energy Green Building (AEGB) program. AEGB’s mission is “to lead the transformation of the building industry to a sustainable future.” The program encourages citizens of Central Texas to design and construct more sustainable homes and buildings. To meet their goal, AEGB developed its own rating system that allows flexibility in maintaining Austin’s climate goals. They also use the rating system to promote building code changes to reduce building energy use.64

Houston has taken a step further by creating a space to showcase green building practices. In 2009, Houston officially opened the Green Building Resource Center. Their mission is "To enable the public to experience and learn more about energy, water and material conserving design and construction, also known as Green Building." The center can provide reviews of plans to identify and add green opportunities to projects, and also houses a library, displays and samples to educate the public on green building technologies and practices. The physical space also achieved a LEED gold rating for Commercial interiors so it acts as a learning tool in itself.65

**Adoption Summary**

**Current Best Practices**

Texas sets a best practice example in its adoption of the 2009 IECC statewide for all buildings excluding single family homes. The adoption of the code was accomplished through a legislative and regulatory process.
The State of Texas and many of its local municipalities promotes programs to lead the market forward on energy efficiency and high performance buildings. These include state- and local-level tax breaks for energy-efficient construction and retrofits and LEED certifications. This helps raise the awareness and value of energy efficiency, and makes energy codes an easier sell, and the high market penetration of ENERGY STAR homes is a result.

Gaps and Recommendations

Addressing the following gaps in energy code adoption will help streamline the process in Texas and increase support for the code among all stakeholders.

**Gap #1:** SECO did not adopt the 2009 IECC as mandatory for single family homes, and will instead enforce the less stringent 2009 IRC Chapter 11. SECO should seek a legal opinion on whether it has authority to adopt the IECC for all construction or to make improvements to Chapter 11 of the IRC.

**Recommendation:** SECO must address the inconsistencies between IRC Chapter 11 and the IECC, and must bring it up to the stringency of the IECC. Otherwise, the energy code for single family homes will continue to remain below national standards. If SECO cannot address the IRC inconsistency at a state level, SECO must support the adoption of the IECC for all construction in the jurisdictions considering code improvements. Forward thinking, the 2012 IRC will likely include efficiency requirements equivalent to the IECC, so there may not be a need to take the above action for the 2012 edition of the International Codes.

**Gap #2:** There is no “carrot” or “stick” to motivate local jurisdictions to adopt the state-mandated Texas Building Energy Performance Standards. Given local political trends, many jurisdictions may see the BEPS as an unfunded mandate and choose to ignore it.

**Recommendation:** ESL is tasked to give status code adoption by cities. Using this info, SECO could assess the impact of BEPS statewide to target outreach to areas that are behind. This will allow SECO and energy code advocates to focus adoption efforts in the part of the state that does not adopt the most recent version of the BEPS on their own.

**Gap #3:** Unincorporated areas in Texas are not actively adopting the state mandatory energy code, so construction outside city lines are not consistent and can result in disparities in building quality versus neighboring incorporated jurisdictions.

**Recommendation:**

a. Texas should complete an assessment of these unincorporated areas, to determine the rate of construction in these areas and the status of energy code adoptions. This will give the state an idea of how much construction is “slipping through the cracks.”

b. Based on their findings, SECO should develop a strategy for energy code implementation in unincorporated areas. Ideally, all counties in Texas should formally adopt the BEPS with the intention of enforcing it in unincorporated areas.
Implementation

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

Overview of State and Local Implementation Policies

In Texas, enforcement standards and criteria are not set by the state. Instead this authority is left to local jurisdictions. As a result, energy code implementation standards vary throughout the state, making compliance tracking efforts more difficult. However, most of the larger municipalities have code enforcement infrastructure in place.

Outreach

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 state, execution of strategic outreach campaigns can improve understanding of code changes, create buy-in, and can lead to greater levels of compliance.

State’s Role in Promoting Codes

As the Texas’s point organization for energy efficiency among all sectors, SECO is responsible for adopting and promoting energy codes at the state level. Once SECO completes an update to BEPS, they make sure that information to municipalities on the new code is readily available. Upon request or invitation from municipalities, SECO will present and train officials and the building community on the energy code. In the past, SECO has put out requests for proposals and funded Texas A&M ESL to carry out much of the training. ESL conducted 2006 IECC trainings for commercial and residential energy codes. Both commercial and residential trainings provided building officials, plan reviewers, inspectors and design professionals with knowledge they needed to enforce or comply with the commercial and residential energy code provisions. Attendees learned about the purpose and scope of the energy requirements, basic building science knowledge, compliance approaches, and plan review or inspection actions that assure compliance. In this new code cycle, SECO is using some of the ARRA stimulus funding it received from DOE to conduct trainings on the 2009 IECC and IRC. In spring 2011 SECO is tendering bids for an organization(s) to carry out code training and outreach statewide.
Since SECO does not have the authority to enforce the energy code in the cities themselves, their role is limited to promoting the code amendments to code officials.

While SECO does not do consumer outreach specific to energy codes, it actively reaches out to homeowners and the general public on the benefits of energy efficiency and strategies to save energy. This, in turn, keeps the public aware of the general energy-related policies in the state, and may indirectly lead to greater support for energy codes. SECO maintains a comprehensive website containing resources and descriptions of its programs and recent activity, and much of the content is geared toward a variety of audience types.

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

The ability to do outreach is dependent on resources local governments have available. Some local jurisdictions post links to the energy code requirements on their website to make it easier for the building community to access directly. Generally, stakeholders are most engaged during the adoption process when their input is sought, for example, if energy code provisions are deliberated at public hearings.

Sometimes an energy code champion emerges from city hall. In Houston, former mayor Bill White had an ambitious goal of increasing the stringency of the 2006 IECC energy code by 15%. It was not legislated, but proposed per his request. He proposed that all city owned remodeled and new constructed buildings to be LEED certified. White has a background in mechanical engineering, which may have been a supportive driving force behind his interest in and understanding of energy issues. In his administration he focused on reducing costs and energy consumption. Typically health and safety issues usually catch City Hall’s attention according to Michael Howard of the City of Houston Code Enforcement. He had not seen a mayor take such targeted interest in code enforcement before. At code hearings Mayor White was “very helpful when we ran into blockades with the construction community on adoption the energy code” says Howard. The former mayor stepped in and gave a persuasive argument for the energy code. Without the support of Mayor White, it would have been difficult to pass the last round of energy code provisions.

**Stakeholders’ Role in Promoting Codes**

In 2001, as part of the Texas Emissions Reduction Program, ESL was assigned the role to assist with implementation of state energy standards and calculate emissions reduction benefits from energy efficiency and renewable energy initiatives. ESL is charged legislatively to review amendments to codes for localities in nonattainment areas. This amounts to 41 counties or 81% of population. However, it is up to the local jurisdiction to initiate the review process. “If they request it,” Jeff Haberl, Associate Director of ESL explains, ESL is obligated to respond, but “whether they do [request assistance]or not is a different story.” It could be the case that some jurisdictions are not going to ESL to seek an impact analysis of variance in energy code amendment adoption. Ultimate interpretation belongs to the city. Counties are also left out of this equation. Outside of municipalities, no policing action in counties exists, and ESL does not have authority to review energy code amendments.
**Gap #4**: Jurisdictional approval is not enforced, though the language for the protocol to confer with ESL is in place.

**Recommendation**: Add stringency language that local jurisdictions need to obtain ESL certification that an analysis was done on their proposed energy code amendments.

ESL also promotes the code by offering technical assistance to municipalities. Bahman Yazdani, Associate Director at ESL notes that sometimes ESL is invited to speak to city councils to explain the code and discuss benefits of new codes. They work with COGs who support stringency amendments to codes.

The Building Officials Association of Texas (BOAT), an affiliate organization of the Texas Municipal League (TML), represents approximately 98% of Texas' urban population through its 1,090-plus member cities and towns and 18 statewide chapters. BOAT promotes energy codes in a number of ways. The first is subject among building officials to “establish higher standards of uniformity and efficiency in administering and enforcing model building codes.”

Second, BOAT sponsors trainings and educational programs for building inspection department staff. They also encourage inspectors to become certified. Lastly, they seek to give the community a better understanding of why building codes and regulations are in place for the best interest of public health and safety.

In the adoption section COGs were identified as playing a role in the adoption process. Some of these advocacy efforts by nature extend beyond the adoption process. The North Central Texas COG is conducting a code survey to capture which version of the energy code is on the books in its municipalities. One possible beneficial outcome of this exercise is to share best practices of what other cities have implemented and might be models for others.

Environmental groups have also played a role in promoting energy codes in the state. The Environmental Defense Fund, Environment Texas, ICLEI, Public Citizen, Sierra Club and Texas Impact have helped advocate for adoption of higher energy code levels. The Lone Star Chapter of the Sierra Club has worked on implementation of the 2009 IECC in San Antonio, Austin, El Paso and the Rio Grande Valley; and held 2009 IECC forums in the Houston and Dallas.

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

**Enforcement Community**

The enforcement community provides the teeth behind adopted codes, as it is their responsibility to ensure that design and building professionals comply with the provisions of the energy code. In Texas enforcement is a local issue, and with each new energy code amendment, it is incumbent on cities to provide the enforcement community with access to sufficient energy code training. The state is not responsible for code enforcement.
Overview of Enforcement Infrastructure

Except for few minor exceptions, local building departments in Texas follow the same enforcement procedure. Typically energy codes are reviewed by the building department during the planning stage, when the builder or architect submits a complete set of construction documents for review. ResCheck and ComCheck are typically accepted for energy code compliance verification. For performance-based compliance, the plans must include a software simulation using IC3 (explained below) or other modeling software. Once the plans are approved, the contractor is given a construction permit, and may begin construction. Construction of the building must follow the approved drawings; before an occupancy permit can be issued, the building must pass periodic site inspections, where every aspect of the construction must consistent with the submitted and approved plans. Any change orders the builder makes must be resubmitted for plan review and continue to meet the energy code requirements, as well as pass on-site inspection. Stop-work orders may be issued by the building departments, but they are used only in the rarest of occasions.

For unincorporated areas, there is virtually no enforcement of the BEPS or any other building energy code. Most counties in Texas do not have a building department or require permitting, and as a result there is no governing body with the jurisdiction to enforce the code in unincorporated areas. Contractors can build in these areas without complying with any energy code.

**Gap #5:** Unincorporated places in Texas are essentially “code free” areas where compliance with an energy code is not required or enforced.

**Recommendation:** Based on the assessment in Recommendation #3 above, SECO should develop a strategy for code implementation in unincorporated areas, and consider the following:

a. If an individual county does not adopt its own codes or does not have a building department for compliance, SECO could assume the enforcement responsibility of the BEPS in unincorporated areas.
b. SECO could create and manage a program of 3rd party inspectors, possibly from the already strong HERS/ENERGY STAR rater community, which could enforce the BEPS in unincorporated areas.
c. SECO should investigate other innovative compliance models to address the issue of “code-free” areas.

Plan reviewers and inspectors are usually generalists because building departments have limited number of them on staff, meaning they cover everything from safety, fire, structural codes, etc. Not all code inspectors have an energy efficiency background; however some building departments conduct green building training where possible. Austin is one example of a city that offers green building training, and Michael Husted, Conservation Program Specialist at Austin Energy Green Building, says he puts an emphasis on building codes during these trainings.
Local jurisdictions may charge fees to cover the cost of enforcement of building codes, including the energy code. These fees may contribute to funding building departments or even the general fund. Depending on the municipality, the fees may support more than building inspection. This means that not all building fees are being reinvested directly into strengthening the planning and inspection process. As Figure 5 indicates, current economic conditions have caused a huge drop in building permitting, and thus fewer resources for building departments to use to provide code officials with the resources necessary for enforcement.

**Gap #6:** Building departments have fewer resources necessary for code enforcement.

**Recommendation:** Texas could do the following:

a. The state could provide assistance for plan review in complex buildings or other specific building types.

b. Continue to provide assistance to local building departments by promoting utilization of free DOE PNNL technical resources to the fullest extent.

**Gap #7:** The state does not play a crucial role in providing municipalities with the resources and support they need to establish effective enforcement infrastructures and practices.

**Recommendation:** Texas could do the following:

a. The state should help to subsidize 3rd party inspections for the energy code.
b. The state should continue to provide materials, resources and services to support energy code compliance.

c. The state could help to subsidize:
   - the use of handheld electronics to facilitate expediency of building inspections.
   - duct blaster equipment and equipment training.
   - blower door equipment and equipment training.

The budget for enforcement may be covered by green building programs or other government agencies that engage in energy savings programs. In Austin, the municipally owned utility, Austin Energy, manages the city’s green programs. The utility is involved in many aspects of energy use and policy in the city, including the energy code. Austin Energy Green Building has worked on the adoption of new energy codes, but the Planning Department handles compliance of codes. Austin Energy apports some of its green building funds to cover the planning department’s plan review and inspection personnel (building fees are fed into the general fund). At one point the planning department had one position dedicated to review the energy code. Today the workload is distributed among a handful of plan reviewers. The energy code is incorporated into their review checklist, rather than receiving separate attention.

Recently, ESL developed the International Code Compliant Calculator (IC3) as an alternative to ResCheck and ComCheck for showing compliance with the BEPS. It is currently accepted by building departments in Dallas, Plano, San Antonio, and Waco, and is free to download from ESL. Yazdani explains that IC3 is simpler than ResCheck because it is a “true performance calculator.” Additionally, since Austin does not conduct plan review for single family homes or duplexes, other than zoning review, Austin developed its own web-based tool with ESL’s assistance, called Texas Climate Vision (TCV), an offshoot of IC3. It is similar to ResCheck and builders use it to simulate a model and confirm the energy efficiency of house plans. After construction is complete, certified third-party inspectors certify the home’s construction as meeting or exceeding the energy code. Based on the IC3 database, once a month, Austin Energy, receives a report on all inspected homes and their energy savings.

Certification and/or Licensing

With the passage of Senate Bill 5 in 2001, the state of Texas requires that all code officials that perform energy compliance inspections must be certified by the ICC in the related energy plans examiner or inspector credential. The state has not been able to enforce this requirement stringently, but it is certainly a step in the right direction and nonetheless has led to the certification of many code inspectors.

**Gap #8**: Texas has not effectively enforced its requirement that all code officials performing energy inspections be ICC certified.

**Recommendation**: Texas could do the following:

a. The state should assess how many code officials have obtained the energy certification required by SB5 and have updated the certification to be current with updated adoptions.
b. The state legislature should give SECO the authority to enforce that all building departments require ICC certifications for code inspectors performing energy inspections, and to take action against those that ignore the SB5 requirement.

c. The state could modify state law to require that certifications be kept current with updates to the code and that CEU’s be maintained annually.

d. The state could develop and maintain its own database of certification information and require code officials register with the state.

In addition to the statewide mandate, many municipal building departments encourage or require ICC energy inspector and plans examiner certification on their own. For example, in the city of Farmers Branch all of the code officials that perform energy inspections are certified by the ICC, and the city intends to make sure new staff is certified. In a larger city like Houston, code officials are actually paid more if they have an ICC certification, such as designation for energy review and inspection. The city will reimburse its employees for certification and maintenance fees. The state of Texas has at least 300 ICC certified energy code inspectors and plans inspectors.68

Training and CEUs

While Texas does not have a specific Training or CEU requirement for code officials statewide, ICC-certified code officials must maintain their accreditation through continuing education. The state does not have a commission to focus on developing and providing training, so the Building Officials Association of Texas (BOAT) has created one on their own, according to BOAT president Jim Olk. These training initiatives, called Building Professional Institutes, are weeklong series of training sessions held in January and May in Houston and Arlington. The BOAT Building Professional Institutes cover BEPS adoption and enforcement, and BOAT estimates that they educate 1,500-1,600 building officials each year.

In addition to the BOAT training initiatives, Texas A&M’s ESL has also been an active provider of training. These trainings are generally a half day long, offer ICC continuing education credits, and are given throughout the state in order to get the most participation. Historically ESL gets the necessary funding from SECO, and the training is free to any stakeholder who wishes to attend. When they don’t have SECO funding, ESL charges a small fee.

Most building departments recognize the importance of building energy code training, and many of the larger municipalities make sure to offer training to their code officials once a new code is adopted. However, many of the smaller jurisdictions, especially in rural areas of the state, lack the infrastructure necessary to train all of their code officials on the new version of its code. While BOAT and ESL reach many of the code officials through the state, there are still some left without adequate training after the adoption of a new code.

Gap #9: It has been difficult for stakeholders in Texas to reach out to all code officials in Texas, especially in rural parts of the state.

Recommendation: Texas could do the following:
a. The state should provide incentives or subsidies for training to promote participation (especially important given the busy schedules of contractors).
b. The state should provide a calendar of events and market training events to affected parties.
c. The state could subsidize travel for code officials who live significantly far away from the closest training location to them.
d. The state should consider offering training courses that can be completed online by those who cannot make the classes in person.

Third Party Infrastructure

As current economic conditions have caused a huge downturn in construction and professional opportunities for code officials, building departments as a whole have been generally been reluctant to outsource code inspections to third parties, with a few exceptions. On occasion, builders use a Home Energy Rating System (HERS) rating to demonstrate compliance with the energy code, but this is often in addition to the typical city-level inspection. Third parties play an especially active role when building departments do not have the tools necessary to complete a site inspection.

The Residential Energy Services Network (RESNET) provides federally recognized third-party rating standards for building energy performance. Its website allows homeowners to learn about energy audits and rating processes, as well as easily locate certified energy auditors, raters, and qualified contractors and builders. According to RESNET, there are currently 79 certified HERS raters in Texas. Raters must complete the required RESNET HERS training to be included on this list. In addition, the ENERGY STAR website lists 902 companies and organizations that employ qualified raters in the state, although many companies are on both lists.

Design/Construction Community

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

Overview of Design/Construction Community Infrastructure

The American Institute of Architects (AIA) has significant reach to its approximately 300 firms with membership in the state, announcing new codes and offering training. Most architects are eager to know what the specific new requirements to the codes are, and the best ways to comply.
Support for implementation of building energy codes is generally strong among homebuilders, even though they don’t always back the adoption of the most stringent energy codes. The Texas Association of Builders (TAB) is very vocal in the state because they are affected by the downturn in the economy and concerned about job losses. TAB has a strong presence in the state with 34 chapters and 10,000 members in 2004, and often communicates with local homebuilder chapters and individual homebuilders themselves on the variety of building energy codes throughout Texas. TAB has also worked with SECO, Sierra Club, Public Citizen, and other stakeholders to raise energy code awareness and offer training. Ned Muñoz, Vice President of Regulatory Affairs and General Counsel at TAB, strongly advocates for enforcement of building energy codes in unincorporated areas of the state, believing that not creating an even “playing field” is detrimental to the housing market.

Many of the residential builders who have survived and begun to stabilize have done so by becoming ENERGY STAR partners and prioritizing funds to train their employees on building to this standard. This sets them apart in the marketplace. These builders must bring in HERS raters at their own cost, but are able to recoup the additional investment through a higher sale price for consumers who want a better quality home with lower operational costs. Design firms have found similar success with LEED, and for many large commercial builders, it has become the standard. Although residential and commercial builders are beholden to the demands of their clients, they can take the initiative to build to higher standards and influence their clients’ priorities.

With the adoption of the new version of the BEPS, interest in the code from the design and construction community will continue to increase. According to our research, professionals throughout the state are eager to learn the requirements of the new code, and have their technical questions answered. Architects, engineers, and contractors alike will be interested in learning how the BEPS applies to both new construction and renovations, which standards must be followed, and how to best satisfy the requirements of the code.

**Certification and Licensing**

In order to become an architect in Texas, one must become accredited by the National Council of Architectural Registration Boards (NCARB). NCARB certification requires a significant investment in professional development, including successful completion of multiple exams. While professional development activities and exams focus on the practice of architecture as a whole, sustainable design and energy efficiency make up a significant portion; the idea being that energy efficiency should be incorporated into building design. Most architects certified by NCARB join the American Institute of Architects (AIA), which has no requirement for certification besides being a registered architect, but has training requirements for maintaining membership.

In 2003, the Texas State Legislature created the Texas Residential Construction Commission (TRCC), a regulatory body with the purpose of serving as a homebuilder registration database as well as a dispute-resolution forum for homeowners. Unfortunately however, TRCC did not gain support from consumers, and the entire body was shut down in 2010. As a result, homebuilders and residential contractors are not required to take certification exams or training, they are only required to register with the Texas
Comptroller of Public Accounts. Non-specialized contractors are allowed to enter the workforce as a non-licensed professional without any formal education or training in their field.

**Gap #10:** No registration, licensing or certification requirements for homebuilders or residential contractors exist.

**Recommendation:** Texas could do the following:

a. The state could use lessons learned from the now defunct Texas Residential Construction Commission, and create another commission that would have specific educational or examination requirements for residential contractors. Furthermore, these requirements should be amended to include energy efficiency and code knowledge, in order to ensure that all homebuilders are aware of the current energy codes.

b. The state could require that all proposed plans include a certification of energy code compliancy by a licensed contractor, engineer or architect, to be registered with the state.

**Training and CEUs**

In order to maintain membership with the AIA, all architects are required to earn a specific number of Learning Units (LUs). A portion of these credits must be earned in sustainable design, of which energy efficiency is a major factor. Training to earn these LUs are sometimes provided by or subsidized by the state or local jurisdiction, but architects are usually financially responsible for earning these credits. However, Registered Architects (RAs) in Texas who are not AIA members do not have LU requirements in Sustainability set by the state.

As mentioned above, there are no licensing or certification requirements for homebuilders and residential contractors in Texas; consequently, there are no training or CEU requirements either. That being said, the National Association of Homebuilders (NAHB) does offer a set of builder certifications and training in energy efficiency, and TAB has worked with other organizations to provide homebuilder training in the past on energy codes. These trainings have been well-attended and successful in some cases, but they have not gained as much traction as the code official-focused training offered by organizations at the state level.

**Gap #11:** There are no requirements for CEUs in energy efficiency or codes for homebuilders and non-AIA member architects.

**Recommendation:** Texas could do the following:

a. The state could require that homebuilders earn CEUs from courses that cover the energy code specifically, among other codes, especially after a code update cycle. This will ensure that homebuilders stay up-to-date on the current energy code, even after a new version is released. (see Recommendation #10)

b. The state could have a certification board or equivalent that oversees the credentialing and continuing education credits of trades such as HVAC, plumbing and electric.

c. The state could oversee energy code training that is specific to each professional trade.
d. The state should utilize community colleges and technical schools to effectively provide job training, professional development, continuing education, and retraining programs to workers.

e. The state should continue to partner with community and technical colleges to promote energy efficiency training related to energy code compliance.

f. The state could subsidize tuition for energy efficiency training related to energy code compliance.

Compliance Measurement and Verification

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

Past and Current Activities

Currently Texas does not have a complete set of BEPS compliance data for the entire state. As a result, the state lacks a method for tracking the effectiveness of its energy code program. Texas is gearing up to meet the U.S. Department of Energy Building Energy Code Program’s compliance tracking guidelines.

**Gap #12:** Texas currently has no data on building energy code compliance throughout the state.

**Recommendation:** Texas should do the following when completing their M&V data:

a. The state should use the U.S. DOE guidelines in order to get an accurate determination of the current rates of compliance with the energy code throughout the state. This will help give state and local agencies a better idea of how effective compliance and enforcement has been and will shine light on best practices and areas for improvement.

b. The state should review DOE’s guidance on measuring energy code compliance and research the current pilot projects underway in neighboring states.

c. The M&V strategy should allow for long term reevaluation of targeted cities to track compliance over time.

d. The M&V plan should account for further work needed to resolve deficiencies that are discovered and reevaluation for these problem areas over time.

While Texas does not have compliance data for the entire state, the city of Austin has begun tracking compliance with their energy code. As part of the construction process for a new home, TCV simulates a model of the proposed house from its submitted construction documents. The software then estimates
the energy efficiency of the simulated house and calculates the reduction in harmful emissions based on energy savings. After construction is complete, HERS raters certify the home’s construction as meeting or exceeding the energy code. Once a month, Austin Energy, receives a report on all inspected homes and their energy savings.

**Implementation Summary**

**Current Best Practices**

The passage of SB5 and its impact today continues to be a best practice for energy code implementation in Texas. The bill has not only created the passage of the Building Energy Performance Standards as a statewide mandate, but set up state level mechanisms for greater compliance and enforcement. For example, by SB5, all code officials who complete energy inspections must technically be professionally certified to do so. Looking to the future of SB5 and its impact, Texas could leverage the legislation to set code enforcement criteria at the state level. This would be the next step in achieving greater code compliance from the state level, down.

The support for energy codes statewide from stakeholders like SECO, ESL, TAB and BOAT is another best practice for energy codes in the state. While SECO has no authority to enforce the BEPS, the office advocates for stringent enforcement and together with organizations like ESL, provides the necessary training to code officials on energy codes statewide. ESL also serves as the technical resource to individual building departments, analyzing local codes for stringency and answering any questions code officials have on code specifics. TAB differs from environmental organizations on the stringency of energy codes, but advocates for code consistency throughout all of Texas, including unincorporated areas, and assists in energy code compliance and training with other stakeholder groups. BOAT brings together code officials at its Building Professional Institutes to discuss enforcement.

The existing ENERGY STAR infrastructure in Texas can also play a role as a best practice for code implementation. No state builds more ENERGY STAR homes than Texas does annually, but the existing community of raters doesn’t have to stay limited to energy codes. As many building departments are slow to recover from the “great recession,” they can look to HERS raters to fill in some of the resource gaps. Especially in unincorporated areas with no code enforcement structure, SECO and counties can leverage the existing HERS raters into a 3rd party inspection service to make sure that new construction outside of city lines meets at least the BEPS.

Finally, SECO has most recently received a grant from DOE/PNNL to promote online training and certification courses and update ESL’s IC3 software.

**Recommendations**

As mentioned above, addressing the following gaps in energy code implementation will help ensure consistency in energy code knowledge and requirements among all stakeholders, increasing support and motivation for compliance.
**Gap #4:** Jurisdictional approval is not enforced, though the language for the protocol to confer with ESL is in place.

**Recommendation:** Add stringency language that local jurisdictions need to obtain ESL certification that an analysis was done on their proposed energy code amendments.

**Gap #5:** Unincorporated places in Texas are essentially “code free” areas where compliance with an energy code is not required or enforced.

**Recommendation:** Based on the assessment in Recommendation #3 above, SECO should develop a strategy for code implementation in unincorporated areas, and consider the following:

a. If an individual county does not adopt its own codes or does not have a building department for compliance, SECO could assume the enforcement responsibility of the BEPS in unincorporated areas.

b. SECO could create and manage a program of 3rd party inspectors, possibly from the already strong HERS/ENERGY STAR rater community, which could enforce the BEPS in unincorporated areas.

c. SECO should investigate other innovative compliance models to address the issue of “code-free” areas.

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**Recommendation:** Texas could do the following:

a. The state could provide assistance for plan review in complex buildings or other specific building types.

b. Continue to provide assistance to local building departments by promoting utilization of free DOE PNNL technical resources to the fullest extent.

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c. The state could help to subsidize:
   - the use of handheld electronics to facilitate expediency of building inspections.
   - duct blaster equipment and equipment training.
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**Gap #8:** Texas has not effectively enforced its requirement that all code officials performing energy inspections be ICC certified.
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a. The state should assess how many code officials have obtained the energy certification required by SB5 and have updated the certification to be current with updated adoptions.
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a. The state should provide incentives or subsidies for training to promote participation (especially important given the busy schedules of contractors).
b. The state should provide a calendar of events and market training events to affected parties.
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d. The state should consider offering training courses that can be completed online by those who cannot make the classes in person.

**Gap #10:** No registration, licensing or certification requirements for homebuilders or residential contractors exist.

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a. The state could use lessons learned from the now defunct Texas Residential Construction Commission and create another commission which would have specific educational or examination requirements for residential contractors. Furthermore, these requirements should be amended to include energy efficiency and code knowledge, in order to ensure that all homebuilders are aware of the current energy codes.
b. The state could require that all proposed plans include a certification of energy code compliancy by a licensed contractor, engineer or architect, to be registered with the state.

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**Recommendation:** Texas could do the following:

a. The state could require that homebuilders earn CEUs from courses that cover the energy code specifically, among other codes, especially after a code update cycle. This will ensure
that homebuilders stay up-do-date on the current energy code, even after a new version is released. (see Recommendation #10)
b. The state could have a certification board or equivalent that oversees the credentialing and continuing education credits of trades such as HVAC, plumbing and electric.
c. The state could oversee energy code training that is specific to each professional trade.
d. The state should utilize community colleges and technical schools to effectively provide job training, professional development, continuing education, and retraining programs to workers.
e. The state should continue to partner with community and technical colleges to promote energy efficiency training related to energy code compliance.
f. The state could subsidize tuition for energy efficiency training related to energy code compliance.

Gap #12: Texas currently has no data on building energy code compliance throughout the state.

Recommendation: Texas should do the following when completing their M&V data:
a. The state should use the U.S. DOE guidelines in order to get an accurate determination of the current rates of compliance with the energy code throughout the state. This will help give state and local agencies a better idea of how effective compliance and enforcement has been and will shine light on best practices and areas for improvement.
b. The state should review DOE’s guidance on measuring energy code compliance and research the current pilot projects underway in neighboring states
c. The M&V strategy should allow for long term reevaluation of targeted cities to track compliance over time.
d. The M&V plan should account for further work needed to resolve deficiencies that are discovered and reevaluation for these problem areas over time.
Conclusion

Building energy codes are one of the most cost-effective ways for Texas to secure its energy future. Not only will they help consumers save money on their energy bill, code compliance will reduce the load on the grid, resulting in a cleaner environment and a protected and diverse energy supply. In many parts of the state the attitude and the infrastructure is already in place, but stressing that the code is mandatory statewide, especially in unincorporated areas, ensuring high compliance rates, and creating a demand for compliance will help Texas continued in the right direction toward greater energy efficiency.

Through continued communication and assumed authority as the organization responsible for the implementation of the statewide energy codes, SECO can help pave the way toward energy efficiency through codes. Together with other state-level stakeholders, SECO can continue to provide the training and resources necessary to keep the building community up-to-speed on the current energy code and its requirements. They can also shape the local building departments to take an even more active role in energy code enforcement and county building departments to enforce the BEPS in unincorporated areas, and the design and construction communities to encourage more awareness and familiarity of the code and the benefits of energy efficiency. By intensifying the implementation of the model energy code, Texas will ensure that it reaps all of the benefits they have the potential to provide.

The recommendations made as a result of this gap analysis, summarized below in figure 6, are meant to guide the stakeholders in Texas to meet these goals for code adoption and implementation and help in the development of a compliance action plan. Though some recommendations may require increased funding over extended periods of time, an action plan will help make sure that new construction in Texas achieves 100% compliance to model energy codes now and in the future.
### Figure 6. Recommendations Chart

<table>
<thead>
<tr>
<th>Adoption</th>
<th>State Policy</th>
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<tr>
<td>Address amendments to Chapter 11 of the IRC or adopt the IECC into the BEPS</td>
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<tr>
<td>Assess the impact of the BEPS and approach local jurisdictions that are behind</td>
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<tr>
<td>Assess the construction in unincorporated areas</td>
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<td>Add stringency language that local jurisdictions need to obtain ESL certification that an analysis was done on their proposed energy code amendments</td>
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<td>Develop a strategy for code implementation in unincorporated areas</td>
<td>35, 44</td>
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<tr>
<td>Provide assistance for plan review and promote U.S. DOE technical resources</td>
<td>36, 44</td>
</tr>
<tr>
<td>Help subsidize 3rd party inspections, training on equipment, the electronic equipment itself and other services to support energy code compliance</td>
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</tr>
<tr>
<td>Enforce state requirements that all code officials performing energy inspection should be ICC certified</td>
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<tr>
<td>Provide incentives, especially targeting stakeholders in rural areas</td>
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<th>Design/Construction Community</th>
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<td>Specify educational requirements for residential contractors or energy code compliance of plans by a licensed contractor</td>
<td>40, 45</td>
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<tr>
<td>Require CEUs in energy efficiency or codes for builders and architects</td>
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<th>Compliance Measurement &amp; Verification</th>
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<tr>
<td>Collect data on building energy code compliance statewide</td>
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Appendix A: Additional PNNL Resource List

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

Resource Guides for Code Officials
1. ICC/DOE BECP Resource Guide for Code Officials: a comprehensive and easy to read collection of the best resources available from ICC and DOE.
   http://www.energycodes.gov/publications/resourceguides/

Energy Code Compliance Training Materials:
1. Commercial PowerPoint Training with links to videos
2. Residential PowerPoint Training with links to videos

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

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

Users Guides
1. COMcheck Software Guide
2. REScheck Software Guide

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