

Michigan Gap Analysis

December 2010



Working to Create Michigan's Future Today

Prepared by the Building Codes Assistance Project and the Michigan Department of Energy, Labor, and Economic Growth for the United States Department of Energy



Building Codes Assistance Project (BCAP)

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

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Acronyms and Abbreviations

AIA – American Institute of Architects
ARRA/Recovery Act – American Recovery and Reinvestment Act of 2009
ASHRAE – American Society of Heating, Refrigerating, and Air-Conditioning Engineers
BCAP – Building Codes Assistance Project
BCC – Bureau of Construction Codes
BPI – Building Performance Institute
CEUs – Continuing education units
DCIS – Department of Consumer and Industry Services
DELEG – Michigan Department of Energy, Labor, and Economic Growth
DOE – Department of Energy
DTE – Detroit Edison Energy
ECAP – Energy Code Ambassadors Program
EECBG – Energy Efficiency and Conservation Block Grants
EPA – U.S. Environmental Protection Agency
HERS – Home Energy Rating System
IBC – International Building Code
ICC – International Code Council
IECC – International Energy Conservation Code
IgCC – International Green Construction Code
IRC – International Residential Code
JCAR – Michigan Joint Committee on Legislative Rules
LBA – Leading Builders of America
LEED – Leadership in Energy and Environmental Design
LU – Learning Units
MAHB – Michigan Association of Home Builders
MEC – Model Energy Code
MEEA – Midwest Energy Efficiency Alliance
MIOSHA – Michigan Occupational Safety and Health Administration
MSU – Michigan State University
MUEC – Michigan Uniform Energy Code
NAHB – National Association of Home Builders
NCARB – National Council of Architectural Registration Boards
OCEAN – Online Code Environment and Advocacy Network
PNNL – Pacific Northwest National Laboratory
RA – Registered Architect
RECA – Responsible Energy Codes Alliance
RESNET – Residential Energy Services Network
SEO – State Energy Office
SEP – State Energy Program
USGBC – U.S. Green Building Council
ULI – Urban Land Institute

Executive Summary

The purpose of the Michigan 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 do to achieve 100 percent compliance with the model energy codes. The report is organized into four sections: Introduction, Adoption, Implementation, and Conclusion. The Adoption and Implementation sections both conclude by listing some of the state's current best practices and making 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 Michigan's 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 12-13 percent 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 policies that influence energy codes in the state. This section covers how Michigan's Dillon's Rule status affects local adoption of the statewide building energy codes, the 2003 IECC and ASHRAE Standard 90.1-1999. It describes the roles of the Department of Energy, Labor, and Economic Growth (DELEG), as well as other state agencies, 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:

- Base the decision to adopt an updated building energy code on its amortized cost benefit, as opposed to its simple payback
- Consider going through the process to remove Dillon's Rule for the state building energy code and allow local jurisdictions to adopt and enforce a uniform advanced or green code, while safeguarding the requirement that all jurisdictions enforce at least the state required minimum
- Consider the creation of a task force specifically responsible for the update to Michigan's building energy code

With all of Michigan's population covered by its statewide building 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 24 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 DELEG. Many 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 and energy code enforcement issues.

Enforcement and building professionals in Michigan 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, 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. Through DELEG, the state has been able to fill in this gap somewhat by offering statewide training beginning in 2010. The state requires licensing for design and building professionals, but many of these licenses do not have an energy efficiency or energy code component. The state's third party infrastructure is also strong, relevant to statewide implementation, as HERS raters are needed when an inspection requires extra tools or supplies, such as a blower door test.

The Implementation section makes ten 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:

- Publicize the importance of energy codes as both a strategy for reducing energy costs, and as a way of improving security and stability, and follow these messages with information on technical resources offered by the Pacific Northwest National Laboratory (PNNL)
- Take steps to remove inconsistencies in the knowledge and importance of building energy codes among all stakeholders
- Require that all code officials performing energy code inspections participate in the relevant training every time the energy code is updated
- Require that all code officials performing energy code inspections have some kind of relevant certification for inspection and plan review
- Ensure that each jurisdiction's building department has the necessary tools and resources to enforce the code by leveraging future opportunities for funding
- Require the State Board of Residential Builders include energy efficiency and code competency as part of the requirements for contractor licensing
- Require that homebuilders and contractors earn CEUs through energy code training, each time the code is updated

- Complete a Measurement and Verification report on the compliance rate of building energy codes, and reference the U.S. DOE guidelines as a best practice for this effort

The Conclusion section provides a summary of the myriad benefits of energy code adoption and implementation in Michigan and concludes with Table 4, 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

Energy codes have arrived. As one of the principal instruments in the energy efficiency policy toolbox, 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 Recovery Act has provided states and cities with unprecedented funding and incentives to adopt the model energy code, and more places are taking advantage of these opportunities than ever before.

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 percent of total energy use and 70 percent of electricity use.¹ 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.

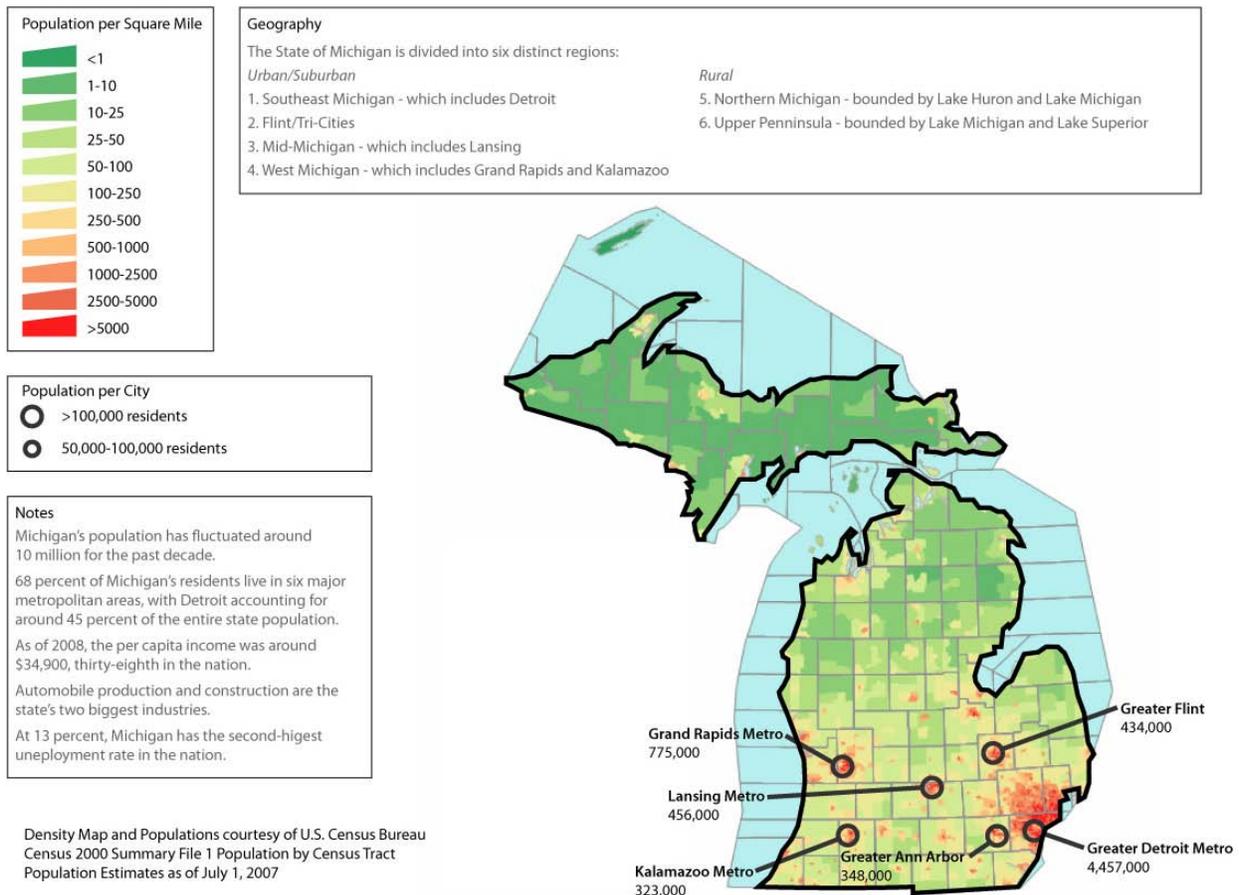
In collaboration with the U.S. Department of Energy, BCAP has undertaken a new program to improve energy code compliance in 15 states, including Michigan, by analyzing the gaps in the existing energy code infrastructure and practices and providing compliance planning assistance and on-the-ground technical 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

Michigan is a very diverse state demographically from major urban and metropolitan areas such as Detroit and Lansing to rural and heavily forested areas in the north and Upper Peninsula of the state. In 2007, Michigan had a population of just over ten million, with approximately 68% of its residents living in six metropolitan centers.

The median income in Michigan is 38th in the nation at around \$35,000. As of August 2010, Michigan had the second-highest unemployment rate at 13.1%.² Michigan's two major industries are construction and automobile production, both of which have suffered considerably in the current economic downturn. Due to industrial and economic 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



Construction Overview

Construction is a very important industry to Michigan; it is one of the two largest job providers in the state. Historically, both residential and commercial construction in the state has been very high due to

Michigan's expanding economy through the first half of the 2000's. In 2005, over 53,000 residential units were permitted for construction,³ one of the highest rates in the United States. However, as Figure 2 indicates, by 2009 that number had dropped to around 6,000 units.

With regards to commercial construction according to the Urban Land Institute's (ULI) *Emerging Trends in 2011* report, Detroit has very poor prospects for investment and development, receiving the worst scores in the nation on its prospect for commercial development.⁴

Even though the slowdown in construction is bad for the economy, it presents a unique opportunity for the

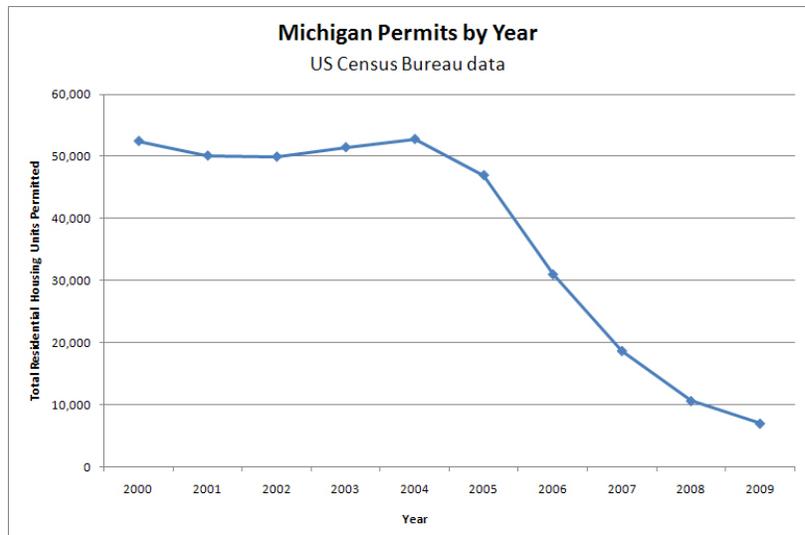


Figure 2, Single Family Construction Permits by Year, 2000-2009

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 why they are so important. The state of Michigan and its local jurisdictions can take advantage of Recovery Act stimulus funding currently available to implement energy code programs and conduct innovative and effective code training to all sectors of the construction industry. While a decline in construction activity isn't good news and causes myriad problems, slowed construction rates provide a glide path for easing all stakeholders into new practices that will increase compliance and enforcement of the new code. Finally, in a tight market, builders will be looking for ways to gain a competitive edge, keeping demand for their homes high, and being able to provide consumers with homes that have lower energy bills and smaller environmental impacts is always a plus.

Energy Portfolio

Michigan relies heavily on energy imported from other states. As Figure 3 shows, Michigan generated only about 27% of the energy it consumed in 2008. The state's primary source of energy is petroleum (30%), followed by natural gas (28%), and coal (27%).⁵ Renewables play a somewhat minor role in the state, accounting for 5% of the state's total energy consumption and 2% of the total renewable energy consumed in the United States in 2008. In 2008, the Michigan state legislature passed SB213,⁶ creating a renewable portfolio standard requiring that 10% of all electricity generation come from renewable sources, and that energy use be cut by 5.5% by 2015 through energy efficiency.⁷

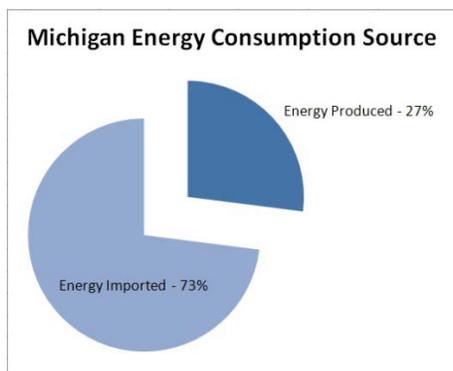


Figure 3, Energy Production vs. Importation

Reduction in statewide energy consumption will play a large role in helping Michigan achieve its renewable energy goals. Assuming the state continues to produce the same amount of energy from renewable sources, cutting back on total energy consumption will reduce the energy generated by fossil fuels in Michigan. Thus, the percentage of energy that comes from renewable sources will rise.

Residential energy costs in Michigan are slightly above the national average at 12.86 cents/kWh.⁸ This, in addition to other factors such as a low demand for cooling, has led to reduced energy consumption per capita at 39th nationwide.⁹ Nonetheless, there are always 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 International Energy Conservation Code (IECC) will significantly reduce energy consumption, lessen the demand on the electric grid, save consumers money, and help secure Michigan’s future energy.

Potential Savings from Energy Codes

As noted above, 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 Michigan, 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 savings¹⁰:

Energy Savings (Trillion Btu)			Utility Cost Savings (Based on 2006 Prices)		
by 2015	by 2020	by 2030	by 2015	by 2020	by 2030
6.5	13.1	26.8	\$49 million	\$99 million	\$202 million

When compared to the current practice of the 2003 IECC, building a new home in Michigan to the 2009 IECC will cost an additional \$965.19, on average. However, consumers living in this home will save an average of \$274.00 per year in energy costs, bringing the simple payback period to around 3 years and 6 months.¹¹ 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 \$193 and the monthly payments by \$4, and the \$19/month utility savings would create a payback of just 13 months. Given the length in time most consumers live in a home, purchasing a house in Michigan that is built to the 2009 IECC 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 required DOE to determine whether the most current model energy codes would improve energy efficiency for residential and commercial buildings. It also mandated that the DOE make a new determination within twelve months for every subsequent revision of these codes. Each state would then have two years to certify that it had revised its own energy code to meet or exceed the requirements of the latest iteration of the national models. A state could decline to adopt a residential energy code by submitting a statement to the Secretary of the DOE detailing its reasons for doing so.

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

The Recovery Act

In 2009, Congress passed the 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 International Energy Conservation Code (IECC) or equivalent for residential construction and the ASHRAE Standard 90.1-2007 or equivalent for commercial construction, as well as achieve 90 percent compliance with the codes by 2017.¹² As a stipulation for receiving SEP funds, Governor Jennifer Granholm wrote a letter to DOE assuring that state officials would begin actions to achieve these goals. Based on the governor's assurance letter and the State Energy Plan submitted by the DELEG, DOE awarded \$82 million in SEP funds to Michigan for energy efficiency and renewable energy programs.¹³

State Policy

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

Political Environment and Energy Code Adoption

All building codes in Michigan are administered by the DELEG. The Michigan Uniform Energy Code (MUEC), like the rest of the state's building codes, is promulgated by DELEG and is mandatory for all buildings in all jurisdictions in Michigan. The MUEC is divided into two parts: Part 10, which references residential energy codes, and Part 10a, which references commercial codes. Every three years the MUEC undergoes a review process by DELEG's Bureau of Construction Codes (BCC). However, DELEG generally approves the BCC update to the energy code if they determine that the incremental cost of the code will not exceed a seven-year payback period.¹⁴ If DELEG approves the code update, legislation enforcing the code is then sent to the Michigan Joint Committee on Administrative Rules (JCAR), which is made up of five members of the Michigan State Senate and House of Representatives.¹⁵ Once this update is sent to JCAR, DELEG will usually hold at least one stakeholder code hearing on the update. If JCAR approves the legislation, or if no action is taken within 60 days, legislation enforcing the code is filed with the Secretary of State and becomes law after a period of 120 days.

What's required by the IECC?

- Depending on your location (climate zone) there are requirements for insulating ceilings, walls, and sometimes, floors, foundations, basement walls, and slab edge
- Less insulation is allowed for mass walls, and more is required for steel framing
- Also dependant on climate zone, there are requirements for windows, skylights, and doors
- The building shell, also known as the building envelope, must be caulked and sealed to limit air movement
- Duct insulation
- Pipe insulation
- Duct sealing to reduce air leakage
- Heating, ventilation, air conditioning (HVAC) and water heating equipment efficiencies and control requirements for commercial buildings
- Some residential lighting requirements
- All commercial lighting
- Heated swimming pool covers and controls
- The energy code applies to all new residential and commercial buildings, as well as additions/alterations/renovations to existing buildings
- Compliance paths include prescriptive, total building envelope UA (tradeoff method), and simulated performance

Gap #1: DELEG will only approve the adoption or update to an energy code if its added costs to construction have a simple payback period of seven years or less.

Recommendation: The additional first cost of a home, due to a more stringent energy code or for any other reason, is typically rolled into a 15-year or 30-year mortgage. Therefore, DELEG should calculate the payback period based on the added cost to monthly mortgage payments instead of in one initial lump sum. Using this cost-benefit method is a realistic assessment of the cost a more stringent code to homebuyers and effectively decreases the number of years (or months) required to pay off the added cost of the code, since the additional mortgage costs are balanced against greater savings on monthly utility bills.

Energy codes in Michigan follow Dillon's Rule,¹⁶ meaning that the code is established at the state level and amendments at the local level are not allowed. Thus, cities and counties in Michigan are not allowed to adopt energy codes more stringent (or weaker) than the state code. One consequence of this type of state primacy is that it prevents local governments from adopting mandatory local green initiatives, such as adopting the 2012 IECC, ASHRAE Standard 90.1-2010, the International Green Construction Code (IgCC), or ASHRAE Standard 189.

Gap #2: Dillon's Rule prevents cities and counties in Michigan from exceeding state energy code requirements and adopting advanced codes.

Recommendation: The BCC could allow local governments to either adopt and enforce energy codes that surpass state code requirements or enforce the state-adopted code with no weakening amendments. This approach would require the elimination of Dillon's rule for the energy code which prevents local codes from deviating from the state code. Much like the standard process for updating the MUEC, DELEG would need to propose this change and JCAR would need to approve DELEG's proposal.

In 2002, the DELEG established a now defunct committee to review and update the then-current Michigan Uniform Energy Code (MUEC), resulting in the adoption of the 2003 IRC with references to the 2004 IECC supplement (Part 10 of the code), and ASHRAE Standard 90.1-1999 (Part 10a). Part 10a became effective for commercial construction in April 2003, and Part 10 was to become effective for residential construction in February 2005. However, after review and promulgation of the residential code, the Ingham County Circuit Court issued an injunction to halt implementation of the code indefinitely, in response to the lawsuit filed by the Michigan Association of Homebuilders (MAHB). After three years of litigation, the judge presiding over the complaint dissolved the lawsuit in October 2008, and the 2003 IRC with the 2004 IECC supplement became effective immediately as the energy requirements to Michigan's building code.

Gap #3: There is no task force assigned to upgrade the MUEC and MAHB has traditionally been unsupportive of updates and advances of the MUEC. MAHB is a powerful enough organization to derail the code adoption process.

Recommendation:

- a) DELEG should consider creating a task force solely responsible for the updates to and promotion of the MUEC. While the BCC does a respectable job as the administrator of all of Michigan's building codes, having a task force within BCC that focuses solely on promoting

- the energy code could expedite its update process, help raise consumer awareness and support of the code, and improve compliance.
- b) With the possible creation of this task force, the BCC should consider bringing in representatives from MAHB when making updates to the Michigan Uniform Energy Code or adopting a new version of the model energy codes. In the past, Michigan's homebuilders have been huge opponents against updates to the MUEC, and in 2005 they derailed the adoption process of the 2003 IECC. If the homebuilders are included in the code development process and are willing to make compromises from the beginning, it could keep them from trying to stop the code adoption process in the future.
 - c) When looking to include homebuilders in the code development process, some organizations outside of MAHB and NAHB will be easier to work with, including Leading Builders of America (LBA). LBA includes many of North America's largest homebuilders, who construct homes in more than one state. It would be beneficial for these homebuilders to have one standardized set of building codes to comply with, instead of a different code in each state, model energy codes included. Self-identified green homebuilders also make up a significant amount of the homebuilders in Michigan, and partnering with them during the code development process can bring thoughtful insight into energy codes.

Recent Energy Codes-related Legislation

While the current model energy codes are not yet enforced in Michigan, recent legislation will change that. In July 2010, DELEG approved an update to the MUEC which included adopting the 2009 IECC and ASHRAE Standard 90.1-2007 as mandatory statewide. After generally positive feedback at the public hearing for the code, and no action taken by the Joint Committee on Administrative Rules (JCAR) to block the code update, legislation to enact the new code as mandatory was filed with the Michigan Secretary of State on November 8, 2010. The code is slated to become effective on March 9, 2011.¹⁷

Other Michigan Building Codes

DELEG's Bureau of Construction Codes (BCC) is responsible for the administration of and updates to all of the building codes in the state of Michigan. When the BCC adopted the 2006 suite of codes published by the International Code Council (ICC), the 2002 update to MUEC was still under litigation because of the Michigan Association of Homebuilder's lawsuit. Thus, when the adoption of these codes were finalized, the BCC did not adopt 2006 IECC. This lawsuit was not repealed until 2008 and, as it stands today, energy requirements for new homes in Michigan follow the 2003 IRC Chapter 11 with the 2004 IECC supplement.

BCC has currently adopted and enforces the following codes statewide, all with Michigan-specific amendments¹⁸:

- 2006 International Building Code, ICC
- 2006 International Mechanical Code, ICC
- 2006 International Code for Existing Buildings, ICC

- 2006 International Residential Code, ICC
- 2009 International Plumbing Code, ICC
- 2008 National Electric Code
- 2004 Boiler and Vessel Pressure Code, 2005 addenda, ASME
- American National Standards Institute A10.4-2007 and A18.1-2008 (elevator code), ASME

All jurisdictions in Michigan are required to enforce these codes at the local level as they are adopted and take effect at the state level.

Energy Codes for State-funded Facilities

On April 22, 2005, Governor Granholm signed Executive Order #2005-4 requiring that all state-funded new construction and major renovation projects over \$1,000,000 be built in accordance with LEED guidelines for certification.¹⁹ The order also set a target of 10% reduction in energy use by the end of 2008 and 20% reduction in grid-based energy purchases by the end of 2015, as compared with energy use and purchases in the fiscal year ending September 30, 2002. The directive also required state agencies to purchase energy efficient products or equipment, and use green building practices in new construction. Thus far, grid-based energy purchases by state agencies have been reduced by 23%, exceeding the goal of 20% by 2015.²⁰

In October 2008, Michigan legislature enacted Public Act 295, which renewed and revised the state's energy efficiency commitments. The new law increased the reduction in grid-based energy purchases by the end of 2015 to 25%. The law also directs the Department of Management and Budget along with the Energy Office to perform several tasks to achieve this goal. The responsibilities include the following²¹:

- establish an energy analysis program to evaluate each building owned or leased by the state for ways of reducing energy use (once every 5 years),
- examine the costs and benefits of using the LEED green building standards when constructing or remodeling a state building,
- ensure that energy efficient products are used in state operations whenever possible,
- assist each state department in naming an Energy Reduction Coordinator,
- start an educational program to teach state employees how to save energy,
- reduce state government energy use during peak use periods (to begin in 2010),
- and create a web-based tracking system for state energy efficiency and conservation projects.

Statewide Climate Change Initiatives

The Michigan Climate Action Council was formed on November 14, 2007 by an executive order signed by Governor Granholm. The Council was charged with producing an inventory and forecast of greenhouse gas emissions and creating a climate action plan with recommendations for mitigating the effects of climate change, which was completed in March of 2009. The Department of Natural Resources and Environment currently houses a climate change webpage with current activities, tools, and resources. In

addition, Michigan signed on to be a member of the Midwest Greenhouse Gas Reduction Accord, which was signed by nine governors and two Canadian premiers in 2007 in recognition of the impacts that the Midwest has on climate change.²²

There are seven members of the Midwest Greenhouse Gas Reduction Accord: Iowa, Illinois, Kansas, Manitoba, Michigan, Minnesota, and Wisconsin. Four are observers: Indiana, Ohio, Ontario and South Dakota. Through the Accord, these governors agreed to establish a Midwest greenhouse gas reduction program to reduce greenhouse gas emissions in their states, as well as a working group to provide recommendations regarding the implementation of the Accord.²³ The region recognizes it can make a huge difference in climate change since it has a large manufacturing presence as well as large renewable resources. This puts them in a key position to make pivotal decisions and take significant action to address climate change.

Overview of Green and Above-Code Programs

Of the 5,156 LEED certified buildings in the country, Michigan has 199, or just over 3.8% of the national total.²⁴ For LEED registered buildings Michigan accounts for 343 of the national 18,029, or 1.9% of the national total.²⁵ Regionally speaking, Michigan is about average in the number of LEED certified and registered buildings, behind Midwest front runners Ohio and Illinois.

Why Climate Change Initiatives Matter

Michigan is concerned with the potential impacts of climate change on the environment and the economy. Since building energy use accounts for roughly 40 percent of energy use in the nation—and in Michigan, much of that energy comes from non-renewable sources—energy codes are a vital tool for reducing energy use and, thus, greenhouse gas emissions, not to mention saving money.

Energy savings built into new construction will accrue over the life of the building. Considering that buildings typically last from 50-100 years, adopting energy codes not only impacts new building energy performance, but also the energy performance of existing buildings until 2060 and beyond. This makes energy codes an important long-term policy for mitigating climate change and supporting the Michigan economy.

The EPA Energy Star Homes is another way to gauge Michigan's green building practices. There are 5,853 Energy Star homes in Michigan, accounting for about 0.5% of the nation's total, 1,184 of which were constructed in 2009. Michigan also has 246 Energy Star partner builders in the state, 108 of which signed up for the program after 2008.²⁶ It appears the market for Energy Star homes is slowly rising; with just over 40% of participating builders signing up after 2008 and approximately one fifth of the homes constructed in 2009.

Michigan provides many incentives for renewable energy use, including Biomass Energy Program Grants, Renewable Energy Renaissance Zones, and the Refundable Photovoltaic Manufacturing Tax Credit. These programs all provide tax breaks or grants to build renewable energy generation in the state.²⁷ Michigan also has multiple energy efficiency programs, including Energy Efficiency Grants, the Residential Energy-Efficient Appliance Rebate Program and an Energy Efficient Home Improvements Tax Credit. The grant program is geared towards large facilities like businesses and schools, while the tax credit and appliance program are designed to make Michigan homes more efficient through improving insulation and windows or replacing old appliances with more efficient ones.²⁸ Another program

Michigan sponsors is the Rebuild Michigan program, which promotes increased energy efficiency on a community-wide basis. It strives to create partnerships between local governments, schools, universities, businesses, non-profit organizations and public housing authorities. A community, with an array of partners, can identify energy saving opportunities, establish goals, and work to implement an energy action plan for the community. Through assistance from the state, the program is able to provide technical assistance and financing information to support cost-effective projects.²⁹

The newly passed Public Act 295 (October 2008) also created a state renewable portfolio standard, revised the state's net metering law, and formed the Wind Energy Resource Zone Board to investigate state wind resources, electricity transmission, and siting issues.³⁰ The Act also requires all electric providers (other than alternative electric suppliers) and rate-regulated natural gas utilities to file energy optimization programs with the Michigan Public Service Commission. One objective of the legislation is to reduce long-term costs to utility ratepayers by delaying the need for constructing additional power plants.³¹ Michigan utilities also provide over 50 utility rebate programs that encompass residential, commercial, and industrial interests and are offered by multiple utilities - including electricity and natural gas - that extend across the state.³²

Why Green and Above-Code Programs Matter

Green and advanced codes and standards help to transform the marketplace by bringing high performing buildings into the mainstream. They also raise awareness of energy- and resource-efficient design for the public, as well as design and building professionals and code officials. Finally, they raise the ceiling for building energy performance, which, in turn, accelerates and shapes the development and adoption of future model codes.

Local Policy

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

Energy Codes for Municipally-funded Facilities

A few cities in Michigan have advanced code requirements for state- and local-funded buildings, most of which use the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) as a benchmark:

Auburn Hills

The Auburn Hills city council adopted the Auburn Hills Green Building Policy that encourages all applicable municipal and private development projects to achieve LEED certification. The council also approved Auburn Hills' membership in the USGBC.³³ In 2009, the East Lansing city council adopted a resolution establishing a green building policy for the city. The policy required that new municipal

construction over 5,000 sq ft must achieve a minimum of a LEED silver certification. The policy also required buildings receiving municipal funding or incentives of up to 15% of the total project to meet certain LEED certification standards as well.³⁴

Grand Rapids

In 2006, the Grand Rapids city commission adopted Policy 600-16, requiring all new municipal buildings over 10,000 sq ft and \$1 million to be LEED certified. It also required renovations and building operations of municipal structures should follow LEED guidelines.³⁵

Rochester Hills

In 2006, the Town of Rochester Hills developed a Master Land Use Plan. The plan required new construction and major renovations of municipal buildings to achieve LEED certification.³⁶

Local Climate Change Initiatives

Thirty-one cities in Michigan have signed onto the U.S. Conference of Mayors Climate Protection Agreement. Under the Agreement, participating cities commit to take three steps: First, strive to meet or beat the Kyoto Protocol targets in their own communities. Second, urge their state governments, 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. Finally, they must urge the U.S. Congress to pass greenhouse gas reduction legislation, which would establish a national emission trading system.³⁷

Multiple communities in Michigan are also participating with the organization ICLEI - Local Governments for Sustainability, including Ann Arbor, Clinton County, Ferndale, Grand Rapids, Grand Traverse County, Traverse City and Washtenaw County. ICLEI is an association of over 1,100 local governments in 68 countries that have made a commitment to sustainable development. ICLEI provides technical consulting, training, and information services to build capacity, share knowledge, and support local government in the implementation of sustainable development at the local level. Their basic premise is that locally designed initiatives can provide an effective and cost-efficient way to achieve local, national, and global sustainability objectives. ICLEI has programs in Biodiversity, Climate, EcoMobility, Management Instruments, Sustainable Procurement, Sustainable Cities and Water.³⁸

Overview of Local Green and Above-Code Building Programs

Many cities and townships in Michigan have adopted green building code and zoning policies, most of which are based off of the LEED system. The LEED policies seem to fall into two categories: those that encourage green building design and those that go a step further and provide incentives for it. In 2009, the Clawson City Council adopted Ordinance 670 encouraging LEED certification of development projects in the city. The Sterling Heights Zoning Code requires the local Plan Review Committee to encourage the incorporation of LEED green building standards into the design and construction of new construction projects. In 2007, the Novi City Council passed a resolution adopting LEED as the rating system of choice for the city, and it also encouraged LEED and green building policies. Also, in 2008, the Township of Groveland adopted Ordinance 164, encouraging LEED certification of planned development

construction. Finally, as mentioned previously, Auburn Hills encourages both municipal and private development to achieve LEED certification.³⁹

Another group of local LEED policies tries to encourage green building development through incentives. In 2008, the Ypsilanti City Council adopted Ordinance 2008-378 granting development projects pursuing LEED certification in town center zones up to three stories and 35 feet of additional building height. This local ordinance incentivizes LEED certification by allowing a developer up to three stories of additional development.

Adoption Summary

Current Best Practices

Michigan sets a best practice example in that it adopts and regularly updates its residential and commercial building energy codes --with the exception of the last code cycle due to a multi-year lawsuit- and that the update of the state energy code is accomplished through a regulatory process. During this process, the state gathers and assesses views and interests of the building community as well as assigns roles to stakeholders within the compliance infrastructure.

Michigan 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, as well as for LEED certifications. This helps raise the awareness and value of energy efficiency, and makes energy codes an easier sell.

Gaps and Recommendations

As mentioned above, addressing the following gaps in energy code adoption will help streamline the process in Michigan and increase support for the code among all stakeholders.

Gap #1: DELEG will only approve the adoption or update to an energy code if its added costs to construction have a simple payback period of seven years or less.

Recommendation: Currently, it is DELEG policy that the state will update the MUEC to incorporate the latest version of the IECC when a cost-benefit analysis demonstrates a simple payback period of seven years or less. While this policy is not unprecedented and did not prevent the inclusion of the 2009 IECC into the state code, DELEG should consider changing the cost benefit analysis to reflect the fact that most homebuyers amortize incremental cost. A more accurate method of calculating the costs and benefits of improved energy efficiency effectively reduces the payback period. Home mortgages amortize the increased incremental cost as part of entire cost of a home, thus changing the payback period from multiple years to a matter of months. As stated previously, the average incremental cost of building a home to the 2009 IECC in Michigan is about \$965, and with energy savings of \$274 per year, the simple payback is 3.5 years. However, if this figure is rolled into a 30 year mortgage, the additional \$965 a consumer would pay for an up-to-code home would only increase the down payment by

\$193, the monthly payments by \$4, and reduce monthly utility bills by \$19, bringing the payback period to 13 months.

Gap #2: Dillon’s Rule prevents cities and counties in Michigan from exceeding state energy code requirements and adopting advanced codes.

Recommendation: Michigan should remove the state-level requirement that limits all local jurisdictions to enforcing the state adopted building code, also known as Dillon’s Rule. Local jurisdictions should have the opportunity to exceed state minimums by adding strengthening amendments to their energy codes or adopting more stringent codes. Simultaneously, Michigan could require that all jurisdictions enforce, at a minimum, the state-adopted energy code, without weakening amendments. An excellent example of how this problem can be solved is in Massachusetts, where there is a mandatory baseline code, as well as an even more efficient code, called their “Stretch Code”⁴⁰. Local jurisdictions in Massachusetts are required to adopt and enforce the state energy code at a minimum, but may adopt and enforce the stretch code instead.

Gap #3: There is no task force assigned to upgrade the MUEC and MAHB has traditionally been unsupportive of updates and advances of the MUEC. MAHB is a powerful enough organization to derail the code adoption process.

Recommendation:

- a) DELEG should consider creating a task force solely responsible for the updates to and promotion of the MUEC. While the BCC does a respectable job as the administrator of all of Michigan’s building codes, having a task force within BCC that focuses solely on promoting the energy code could expedite its update process, help raise consumer awareness and support of the code, and improve compliance.
- b) With the possible creation of this task force, the BCC should consider bringing in representatives from MAHB when making updates to the Michigan Uniform Energy Code or adopting a new version of the model energy codes. In the past, Michigan’s homebuilders have been huge opponents against updates to the MUEC, and in 2005 they derailed the adoption process of the 2003 IECC. If the homebuilders are included in the code development process and are willing to make compromises from the beginning, it could keep them from trying to stop the code adoption process in the future.
- c) When looking to include homebuilders in the code development process, some organizations outside of MAHB and NAHB will be easier to work with, including Leading Builders of America (LBA). LBA includes many of North America’s largest homebuilders, who construct homes in more than one state. It would be beneficial for these homebuilders to have one standardized set of building codes to comply with, instead of a different code in each state, model energy codes included. Self-identified green homebuilders also make up a significant amount of the homebuilders in Michigan, and partnering with them during the code development process can bring thoughtful insight into energy codes.

Implementation

While energy code adoption is the necessary first step in the energy codes process, it does not guarantee compliance. To achieve the desired energy and financial savings available through energy codes, states and cities must carry out energy code implementation, a term used to describe all of the activities needed to prepare state energy offices, local building departments, the building industry, and other stakeholders 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

Building code implementation is very much a “top-down” infrastructure in Michigan, beginning with the Bureau of Construction Codes (BCC). Code enforcement standards are set by the state in Act 230 of 1972⁴¹, and the BCC is ultimately responsible for the enforcement of the MUEC for every new building in Michigan. However, any local jurisdiction can - and most of the larger cities do - opt out of having the BCC enforce these codes and form their own building departments. Local building departments are still required to follow the same enforcement procedures set by the BCC at the state level. This helps to ensure consistency with the code implementation process – something builders strongly support.

Outreach

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

State’s Role in Promoting Codes

As the regulatory body with the authority to mandate a statewide code change, DELEG is responsible for publicizing updates or changes to the MUEC. Efforts to inform affected stakeholders of code changes have been effective. Most recently, DELEG held a well-attended stakeholder meeting which presented the changes to the 2010 version of the MUEC, effective March 2011. In addition, the BCC has been successful in keeping its page on DELEG’s web site up-to-date with the new code requirements. Because all building departments are required to enforce this code immediately after it becomes effective statewide, most of the building industry throughout the state have made themselves well aware of the required changes the code will bring. Since the MUEC update is not a voluntary code change, DELEG can

focus on promoting important educational opportunities, such as new code training, rather than spending time and resources convincing local governments to adopt the code.

Local Government's Role in Promoting Codes

Michigan updates all of its codes every three years. Local building departments typically provide information regarding the current required code on their websites and provide state contacts and links to the DELEG and BCC web pages.

Stakeholders' Role in Promoting Codes

A number of stakeholder organizations play a large role in the promotion of energy codes in Michigan, at both the national and state levels. Below are some of the major contributors in the state:

Midwest Energy Efficiency Alliance (MEEA)

As the energy efficiency partnership for all of the states in the Midwest, MEEA is a strong supporter of advancing building energy codes in Michigan. This is usually done through on-the-ground advocacy efforts during the adoption and development stages of the code. During the 2002 MUEC update process and the ensuing lawsuits from the homebuilder associations in Michigan, MEEA played an active role in support of the code, and the lawsuit was eventually overruled in 2008. Most recently, MEEA prepared a codes needs analysis report for all the states in the Midwest, including Michigan.

Michigan State University (MSU) School of Planning, Design, and Construction

Michigan State University is a huge supporter of energy codes at the technical assistance level in the state. In the past, MSU staff has been instrumental in developing and delivering training to code officials, builders, architects and engineers. MSU has become the point organization on technical assistance on the energy code throughout Michigan. The organization has the potential to analyze future codes to estimate energy and cost savings.

Responsible Energy Codes Alliance (RECA)

Headquartered in Washington, D.C., RECA works on a national level as the association of product manufacturers in support of codes to improve energy efficiency in buildings.⁴² Generally, RECA will work with other advocacy groups to promote the adoption and implementation of energy codes whenever a state is in the code change process. Most recently, RECA sent a letter of support to DELEG backing their proposal to adopt the 2009 IECC statewide, and offered its assistance as necessary.

Dow Chemical Corporation

As a leading manufacturer of home construction materials, Dow Chemical is committed to improving energy efficiency in homes. Headquartered in Midland, Michigan, Dow has significant reach in the state as well as the rest of the country. In the past, Dow has been an avid supporter of energy codes, providing advocacy and technical assistance where possible and necessary.

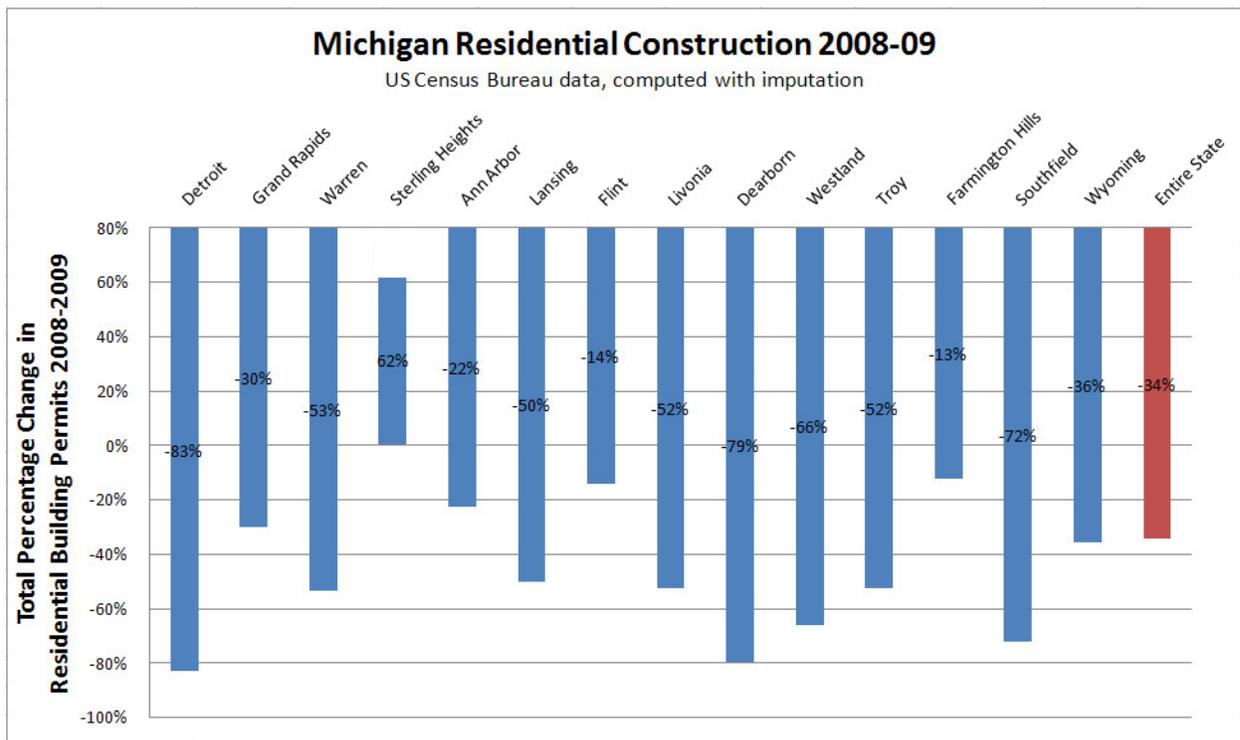
Enforcement Community

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

Overview of Enforcement Infrastructure

In Michigan, building permit criteria are set by the state. Permits are issued by the relevant local building department, after the necessary plan review and inspection. Construction documents submitted for plan review must follow the guidelines set in Section 106 of the International Building Code (IBC), and stamped by an architect and/or structural engineer licensed by the state. The drawings must be used to show compliance with each mandatory building code. Because these requirements are written into the state-level code, construction documents for all buildings in the Michigan must follow this same process to obtain a construction permit, whether it is submitted to a state or local building department. This means that permits obtained for buildings in local jurisdictions, as well as state-funded buildings and buildings with no local building departments that submit permit applications to DELEG, must all follow the same compliance and enforcement procedures.

Figure 4. Construction Decline in Communities of 50,000 or More



Once construction is complete, the building must obtain an occupancy permit by passing a visual site inspection. Like construction permits, the BCC handles the site inspection for all buildings that are built outside of a local building department's jurisdiction. During the visual site inspection, the code official is required to confirm that all aspects of the home or building comply with the MUEC, including passing a blower door test in single family homes. Any part of the building that does not meet code must be addressed before an occupancy permit is issued. As a last resort, a building department can issue a stop-work order on the project.

As Figure 4 shows, residential construction was down in nearly every major city in Michigan from 2008 to 2009, and was down 34% in the entire state. Since this economic downturn, government cutbacks and a significant decrease in revenue from building permits has left building departments throughout Michigan with significantly less funding than they have had in the past. Insufficient funding has created gaps in the enforcement of building energy codes in the state as identified by stakeholders.

Awareness of the Recovery Act 90% Compliance Target

Most building officials are aware of the building energy code and its requirements; many are not familiar with the Recovery Act's target of 90% compliance with the 2009 IECC and ASHRAE Standard 90.1-2007 by 2017. As a result, many local jurisdictions will not be prepared or supportive of the idea of being audited by an outside organization in order to demonstrate targeted compliance levels. Furthermore, this kind of enhanced compliance tracking may be seen as an unfunded mandate imposed on the local jurisdictions by the state or federal government.

Gap #4: Most building officials, as well as other stakeholders in Michigan, are unaware of the Recovery Act mandate that the state must meet 90% compliance with the current model energy codes, and that new construction may be audited to make sure that this requirement is met.

Recommendation: In light of the new federal emphasis on compliance, the state should publicize the importance of energy codes as both a strategy for reducing energy costs for building and home owners, and as a way of improving security and stability of energy supplies. The state should follow these messages with information on technical resources offered by the Pacific Northwest National Laboratory (PNNL) (see Appendix A), and new methodology for collecting compliance data and tracking results by jurisdiction.

Energy Code Familiarity and Importance

According to our research, most code officials in Michigan recognize the value of the MUEC and are familiar enough with its requirements to enforce it, but there are still significant numbers of code officials throughout the state's jurisdictions that are not enforcing the code. This is largely due to the fact that building departments throughout the state vary in size, expertise, and available resources. Their areas of enforcement responsibility vary, too, covering cities and townships, counties, or, in some cases, the entire state. Whether the energy code is not enough of a priority, or its requirements are understood or not, some code officials just do not enforce it. Inconsistency in enforcing the MUEC is a major gap or challenge throughout the state. It causes compliance to vary across jurisdictions.

Gap #5: Inconsistencies throughout the state in resources and in the knowledge and importance of the current statewide building energy code have created varying levels of compliance throughout the state.

Recommendation:

- a) Improve consistency across jurisdictions by tracking compliance results as well as collecting data on training received and certifications awarded to building inspectors. The state can highlight “star” performers and devote special efforts to bring lagging jurisdictions up to state standards.
- b) Provide assistance for plan review in complex buildings or other specific building types.
- c) Develop and maintain an energy certification program.
- d) Provide compliance materials, such as checklists, for use at the local building department level.
- e) Investigate opportunities for sharing and utilizing regional resources.
- f) Provide materials, resources and services to support energy code compliance.
- g) Provide incentives for contractors that strive to meet and exceed the code, such as expedited permitting, reduced fees, or permit fee rebates.
- h) Seek partnerships with manufacturers and big box retailers to promote energy efficient products and services.
- i) Subsidize the use of handheld electronics to facilitate expediency of building inspections.
- j) Subsidize duct blaster equipment and equipment training.
- k) Subsidize blower door equipment and equipment training.
- l) assess current infrastructure to determine the need for state-level assistance for local building departments.

Training

Because the 2004 IECC and the 2003 IRC with amendments are Michigan’s current energy codes, the adoption of the more stringent 2009 IECC will entail increasingly complex requirements that must be enforced. Much of what was optional or used in a trade-off method in Michigan’s old energy code will become a required part of the new energy code, and energy inspectors throughout the state will have to familiarize themselves with these new requirements. In the past, DELEG has offered training to building officials throughout the state. Currently, energy code-specific training is not required for these code officials, and participation has varied as a result. The state has not yet begun training for the 2009 IECC/ASHRAE Standard 90.1-2007 updated to the MUEC, but DELEG and Michigan State University will be administering new training over the next few months. In order to ensure a successful and timely transition to the new MUEC, it is important that participation in the training be high and be widely available.

Gap #6: In the past, many of the prescriptive requirements of the 2009 IECC and ASHRAE Standard 90.1-2009 were only used occasionally as trade-off options for compliance. Code officials need training on the requirements of the new code.

Recommendation: Because code officials, across-the-board, need training, DELEG should strive to offer training on the new MUEC that is accessible to all code officials across the state. The state should continue its established process for regularly providing training in response to updates to the code.

Gap #7: Energy code training is voluntary. It is not required as a prerequisite for maintaining employment as a code official.

Recommendation: Michigan should respond to the increasingly complex and important issues surrounding energy use in the US by

- a) Continue to provide both code officials and building professionals with adequate training, especially when the codes and standards change.
- b) Provide incentives or subsidies for training to promote participation (especially important given the busy schedules of contractors).
- c) Market training events to all affected parties.

Available Staff and Resources

In 2008 there were approximately 1,200 building officials in the state of Michigan. Over the past two years however, due to the economic downturn and near halt of construction in the state, building departments in Michigan have seen a huge reduction in funding and resources available to enforce codes. This has made access to the tools and training necessary to enforce codes more difficult to come by. As the state begins work on its current contract through the U.S. Department of Energy and pursues future funding opportunities, it must look to provide local building departments with the resources they would normally receive through building permit fees.

Gap #8: Current economic conditions have reduced resources for DELEG and local building departments and impacted efforts to consistently enforce the code.

Recommendation: As Michigan looks to future funding opportunities for assisting energy code compliance, the state should ensure that each jurisdiction receives sufficient resources and funding for code enforcement. Funding can be raised using strategies such as public benefit funds, increasing building permit fees, and penalty fees for repeated noncompliance.

Certification and/or Licensing

All code officials in Michigan are required to have some kind of inspector certification, either by the ICC or another professional organization. However, code officials are not required to have certification in specific disciplines, such as plumbing, structural, or energy conservation. Thus, the state lacks a requirement for certification in energy code inspections, and this means that although code officials are inspecting for the energy provisions of the MUEC, they lack expertise in energy code inspections afforded by energy certification. According to the ICC, there are only six code officials in the entire state of Michigan with energy-specific ICC certifications.⁴³

Gap #9: There is no requirement for energy code training (referenced above) and the state lacks an energy code certification requirement for code officials.

Recommendation: Michigan could require that all code officials who conduct plan reviews and site inspections for compliance with the MUEC have a relevant energy code certification. Obtaining the credentials and expertise that come with the energy-specific ICC certification creates local “energy codes experts,” a vital resource as the state strives to meet national and statewide enforcement and compliance goals. The state could follow an example of this type of requirement set by major cities in the United States, including Chicago, IL, San Antonio, TX, and Seattle, WA.

Training and CEUs

Much like the licensing requirements in Michigan, all code officials are required by the state to maintain their credentials by earning Continuing Education Units (CEUs) from training. Training is often offered by the state, either as free or subsidized courses, but units may also be earned through private training. As previously mentioned, the state does not require that any specific course be completed by its code officials.

Gap #10: Competence with the energy code varies between code officials and building departments with no state-required minimums or system for tracking energy code training.

Recommendation: In addition to requiring that code officials attend training and attain an energy code certification, Michigan could require that these officials maintain their certification with relevant training and CEUs. The state could track compliance with this requirement by jurisdiction.

Because building departments in Michigan have had a significant lack of funding in recent years, energy code training has been sparse. No training has been offered yet on the 2009 IECC and ASHRAE Standard 90.1-2007, which will be incorporated into the 2011 update to the MUEC. However, a recent Department of Energy grant has allowed the DELEG to provide energy code training in 2011-2012.

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 reluctant to outsource code inspections to third parties. On occasion, builders use a Home Energy Rating System (HERS) rating to demonstrate compliance with the energy code, but these third party inspections have dropped significantly over the past two years. When construction is more active, building departments have sometimes been supportive of third party inspections, especially when they did not have the tools necessary to complete a site inspection, such as a blower door.

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 35 certified HERS raters in Michigan.⁴⁴ Raters must complete the required RESNET HERS training to be included on this list. In addition, the ENERGY STAR website lists 249 companies, and organizations that employ qualified raters, in the state, although many companies are on both lists.⁴⁵

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

Generally speaking, architects in Michigan are supportive of energy codes and do not struggle to comply from a design standpoint. The American Institute of Architects (AIA) has significant reach to its approximately 1,700 members 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 varies among homebuilders in Michigan. Collectively, the Michigan Association of Homebuilders (MAHB) is not a supportive organization of the MUEC, but this does not apply to all homebuilders individually. Michigan State University has offered code training and outreach in the past, and many leave these sessions with a better understanding of the MUEC; some even realize that the barriers to compliance are not as great as they had originally believed.

With the adoption of the new version of the MUEC, interest in the code will once again be high from the design and construction community. According to our research, professionals throughout the state are eager to learn the requirements of the new code, and have their technical questions answered. This will be especially important as the current economic downturn has shifted much of the construction focus from new buildings to renovations of existing ones. Architects, engineers, and contractors alike will be interested in learning how the MUEC applies to renovations, which standards must be followed, and how to best satisfy the requirements for existing buildings.

Certification and Licensing

In order to become an architect in Michigan, 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.

The State Board of Residential Builders and Maintenance & Alteration Contractors manages homebuilder licensure in Michigan. In order to become a residential contractor, one must complete sixty hours of education requirements in the following areas:⁴⁶

- Business Management, Estimating, and Job Costing
- Design and Building Science
- Contracts, Liability, and Risk Management
- Marketing and Sales
- Project Management and Scheduling
- The Michigan Residential Code
- Michigan Occupational Safety and Health Administration Construction Safety Standards
- Eighteen hours in elective course requirements

Once this coursework is completed, applicants are required to pass a cumulative exam, and then the builder may register with the state builders association.

Gap #11: Homebuilder and residential contractor requirements only cover code basics, and do not delve specifically into energy efficiency or energy codes.

Recommendation: Michigan could require that the State Board of Residential Builders include energy efficiency as part of the education requirements, and energy code competency as part of the cumulative exam. This will ensure that new contractors entering the workforce have at least a working knowledge of the MUEC.

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. In Michigan, even Registered Architects (RAs) who are not AIA members are still required to earn LUs in sustainability.

As of 2009, homebuilders must also maintain their certifications through Continuing Education Units (CEUs). According to Public Act 157 of 2007, all registered contractors must earn 3 CEUs per code cycle. Additionally, contractors licensed after 2009 must earn 21 CEUs every 3 years throughout the first 6 years of their licensure. These CEUs must be earned in the following areas⁴⁷:

- State Building Codes and Laws
- Safety
- Construction and Business Management

Much like code official training, these CEUs can be earned from a large variety of course offerings from the Michigan Occupational Safety and Health Administration (MIOSHA), the BCC, universities, community colleges, and high schools. There are no specific requirements for which courses satisfy CEUs, so long as they fall into their appropriate categories from above.

Gap #12: While homebuilders are required to earn CEUs in state building codes and laws, there is no specific requirement for training in energy codes.

Recommendation:

- a) DELEG could require that homebuilders in Michigan 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.
- 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 ever more stringent, it is increasingly important for the enforcement and building communities to take extra steps beyond code to ensure that compliant buildings achieve their predicted energy savings, as many buildings fall short of their potential. The solution to underperforming buildings is measurement and verification, or the process of measuring energy performance and verifying that it matches the expected outcome. On the micro level, this process—known as commissioning for large commercial construction and performance testing for residential construction—involves blower door tests, duct blaster tests, and other performance measurements. On the macro level, it can involve state agencies, utilities, building science professionals, advocacy

organizations, and other stakeholders compiling and analyzing building performance statistics to measure compliance and gauge implementation effectiveness.

Past and Current M&V Activities

Currently Michigan has no data on compliance with its energy code. As a result, the state currently lacks a method for tracking the effectiveness of its energy code program. Michigan is currently gearing up to meet the U.S. Department of Energy Building Energy Code Program's compliance tracking guidelines.

Gap #13: Michigan currently has no data on building energy code compliance throughout the state.

Recommendation:

- a) Michigan 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.

Implementation Summary

Current Best Practices

The State's response to the 2010 Department of Energy Request for Proposal for Energy Code Adoption, Implementation, and Training has shown promise for implementation efforts in Michigan. The approved proposal will support code education, training, and technical assistance, development of a database of new construction in order to track compliance, along with development of a five-year strategic plan.

Michigan's existing energy codes protocol provides the state with a significant advantage in tackling the challenges of improving code compliance. Currently, DELEG sets code compliance and enforcement at the state level, mandatory everywhere in the state. Local governments are allowed to create their own building departments at the city or county level, and to charge fees to cover the cost of inspection. However, local governments must follow the same enforcement standards set by the state. DELEG is responsible for the code enforcement process for any jurisdiction that lacks the infrastructure for a local building department.

The overarching goal in Michigan should be to address key gaps in the knowledge, compliance, and enforcement of the MUEC among all of the stakeholders throughout the state. DELEG already has the

infrastructure in place, and continuing to support energy code training and outreach will ensure that all code officials, contractors, and designers involved in the process are on the same page.

Gaps and 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: Most building officials, as well as other stakeholders in Michigan, are unaware of the Recovery Act mandate that the state must meet 90% compliance with the current model energy codes, and that new construction may be audited to make sure that this requirement is met.

Recommendation: In light of the new federal emphasis on compliance, the state should publicize the importance of energy codes as both a strategy for reducing energy costs for building and home owners, and as a way of improving security and stability of energy supplies. The state should follow these messages with information on technical resources offered by the Pacific Northwest National Laboratory (PNNL) (please see Appendix A), and new methodology for collecting compliance data and tracking results by jurisdiction.

Gap #5: Inconsistencies throughout the state in resources and in the knowledge and importance of the current statewide building energy code have created varying levels of compliance throughout the state.

Recommendation:

- a) Improve consistency across jurisdictions by tracking compliance results as well as collecting data on training received and certifications awarded to building inspectors. The state can highlight “star” performers and devote special efforts to bring lagging jurisdictions up to state standards.
- b) Provide assistance for plan review in complex buildings or other specific building types.
- c) Develop and maintain an energy certification program.
- d) Provide compliance materials, such as checklists, for use at the local building department level.
- e) Investigate opportunities for sharing and utilizing regional resources.
- f) Provide materials, resources and services to support energy code compliance.
- g) Provide incentives for contractors that strive to meet and exceed the code, such as expedited permitting, reduced fees, or permit fee rebates.
- h) Seek partnerships with manufacturers and big box retailers to promote energy efficient products and services.
- i) Subsidize the use of handheld electronics to facilitate expediency of building inspections.
- j) Subsidize duct blaster equipment and equipment training.
- k) Subsidize blower door equipment and equipment training.

- l) Assess current infrastructure to determine the need for state-level assistance for local building departments.

Training should be a top priority in order to keep code officials up to date code requirements and enforcement strategies. Training will also keep builders and contractors informed of the practices required to comply with the code. Michigan can improve the effectiveness of code officials and the awareness of designers and contractors.

Gap #6: In the past, many of the prescriptive requirements of the 2009 IECC and ASHRAE Standard 90.1-2009 were only used occasionally as trade-off options for compliance. Code officials need training on the requirements of the new code.

Recommendation: Because code officials, across-the-board, need training, DELEG should strive to offer training on the new MUEC that is accessible to all code officials across the state. The state should continue its established process for regularly providing training in response to updates to the code.

Gap #7: Energy code training is voluntary. It is not required as a prerequisite for maintaining employment as a code official.

Recommendation: Michigan should respond to the increasingly complex and important issues surrounding energy use in the US by

- a) Continue to provide both code officials and building professionals with adequate training, especially when the codes and standards change.
- b) Provide incentives or subsidies for training to promote participation (especially important given the busy schedules of contractors).
- c) Market training events to all affected parties.

Gap #8: Current economic conditions have reduced resources for DELEG and local building departments and impacted efforts to consistently enforce the code.

Recommendation: As Michigan looks to future funding opportunities for assisting energy code compliance, the state should ensure that each jurisdiction receives sufficient resources and funding for code enforcement. Funding can be raised using strategies such as public benefit funds, increasing building permit fees, and penalty fees for repeated noncompliance.

Gap #9: There is no requirement for energy code training (referenced above) and the state lacks an energy code certification requirement for code officials.

Recommendation: Michigan could require that all code officials who conduct plan reviews and site inspections for compliance with the MUEC have a relevant energy code certification. Obtaining the credentials and expertise that come with the energy-specific ICC certification creates local “energy codes experts,” a vital resource as the state strives to meet national and statewide enforcement and compliance goals. The state could follow an example of this type of requirement set by major cities in the United States, including Chicago, IL, San Antonio, TX, and Seattle, WA.

Gap #10: Competence with the energy code varies between code officials and building departments with no state-required minimums or system for tracking energy code training.

Recommendation: In addition to requiring that code officials attend training and attain an energy code certification, Michigan could require that these officials maintain their certification with relevant training and CEUs. The state could track compliance with this requirement by jurisdiction.

Gap #11: Homebuilder and residential contractor requirements only cover code basics, and do not delve specifically into energy efficiency or energy codes.

Recommendation: Michigan could require that the State Board of Residential Builders include energy efficiency as part of the education requirements, and energy code competency as part of the cumulative exam. This will ensure that new contractors entering the workforce have at least a working knowledge of the MUEC.

Gap #12: While homebuilders are required to earn CEUs in state building codes and laws, there is no specific requirement for training in energy codes.

Recommendation:

- a) DELEG could require that homebuilders in Michigan 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.
- 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.
 - a) The state could oversee energy code training that is specific to each professional trade.
 - b) The state should utilize community colleges and technical schools to effectively provide job training, professional development, continuing education, and retraining programs to workers.
 - c) The state should continue to partner with community and technical colleges to promote energy efficiency training related to energy code compliance.
 - d) The state could subsidize tuition for energy efficiency training related to energy code compliance.

As part of Michigan's recent DOE proposal, the state will institute a new program for compliance M&V.

Gap #13: Michigan currently has no data on building energy code compliance throughout the state.

Recommendation:

- a) Michigan 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 easiest and most cost-effective ways for Michigan to secure its energy future. Not only will energy codes help consumers save money on their energy bills, but compliance also reduces the load on the electric grid, resulting in a cleaner environment and a protected and diverse energy supply. In many parts of the state, the necessary commitment and institutional infrastructure is already in place. Key to the state's success will be removing the inconsistencies between the energy code program and Recovery Act requirements and requiring energy efficiency certification and CEUs to help ensure acceptable compliance rates.

Through continued communication and authority as the organization responsible for the implementation of the statewide energy codes, DELEG can pave the way towards energy efficiency gains through building energy codes. Together with other state agencies and the cooperation of local governments, DELEG can 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 work with partners at the local level to ensure that building departments are aware of the updates to the energy codes and are enforcing them properly. Additionally, they can approach design and construction communities to encourage more awareness and familiarity of the code and promote the benefits of energy efficiency. By intensifying support behind the implementation of the model energy code, Michigan will ensure that it achieves the low cost benefits attainable and meets national and state energy goals.

The recommendations made as a result of this gap analysis, summarized below in Figure 5, are meant to guide Michigan in meeting these goals through new approaches for code adoption and implementation and to 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 ensure that new construction in the Michigan achieves 100% compliance to model energy codes now and in the future.

By participating in BCAP's Compliance Planning Assistance Program, the Michigan Department of Energy, Labor, and Economic Growth has taken the first big step in addressing energy code compliance and enforcement throughout the state and helping to secure Michigan's energy future. By identifying the gaps in energy code implementation, BCAP and DELEG can begin to form a plan to streamline efforts in the state. By continuing in this direction, Michigan should get even closer to the goal of 90% compliance with the energy code. The true winners however will be the residents of the state, who will see lower energy bills and greater interior comfort for the lifetime of building occupancy.

Figure 5. Recommendations Table

Adoption	Page
State Policy	
DELEG should use an amortized incremental cost when analyzing the benefit of a new energy code	16, 22
The state should exclude building codes from Dillon’s Rule	16, 23
DELEG could create a task force solely responsible for administering the energy code	16, 23
The BCC should consider bringing homebuilders in to the MUEC update and development process	17, 23
Implementation	
Page	
Outreach	
DELEG should continue outreach at the local level on the importance and benefits of energy codes	32, 35
The state could explore ways to share resources and best practices regionally	32, 35
The state should consider encouraging community colleges to prepare students for energy sector jobs	33, 36
Training	
The state could require a that code officials attain energy efficiency CEUs	30, 37
The state could provide incentives for training participation	29, 35
Enforcement Community	
DELEG should reach out to local building departments informing them of the Recovery Act Requirements	27, 35
DELEG should require that all energy inspectors maintain certification credentials and expertise	30, 36
DELEG should make sure that upcoming and future training opportunities are available to all code officials	29, 36
The state could provide resources necessary for proper energy inspection	29, 35
The state could encourage support mechanisms for and regulations governing 3 rd Party Inspections	32, 35
Design/Construction Community	
The state should require energy code knowledge as a prerequisite for contractor certification	32, 37
The state should require continuing education for all certified contractors in the state	33, 37
The state could oversee certification of CEUs for energy code familiarity and practice	33, 37
All professional organizations could require energy efficiency as part of membership credentials	33, 37
The state could oversee and provide trade-specific energy efficiency and code training	33, 37
Compliance Measurement & Verification	
The state should review DOE guidance on measuring energy code compliance	34, 37
The state should develop a mechanism for ongoing M&V after its initial assessment for the DOE contract	34, 37

Appendix A

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

Resource Guides for Code Officials

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

Energy Code Compliance Training Materials:

1. Commercial PowerPoint Training with links to videos
http://www.energycodes.gov/becu/documents/Commercial_90_Percent_Eval_Inspect_Training.pdf
2. Residential PowerPoint Training with links to videos
http://www.energycodes.gov/becu/documents/Residential_90_Percent_Eval_Inspect_Training.pdf
3. DOE Guidance for State Compliance Measurement Efforts
<http://www.energycodes.gov/arra/documents/MeasuringStateCompliance.pdf>

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
http://www.energycodes.gov/comcheck/documents/com_software_users_guide_2004_2006_and_2009_IECC.pdf

2. REScheck Software Guide
http://www.energycodes.gov/rescheck/documents/rescheck_users_guide_1008.pdf

Plan Check and Field Inspection

1. Commercial Plan Review Quick Reference Guide
http://www.energycodes.gov/training/pdfs/comm_review_guide1.pdf
2. Residential Plan Review Quick Reference Guide
http://www.energycodes.gov/rescheck/documents/res_review_guide.pdf
3. Code Notes
<http://www.energycodes.gov/help/notes.stm>

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- ¹⁴ http://www.mwalliance.org/sites/default/files/uploads/MEEA_2010_Midwest%20Energy%20Codes%20Needs%20Analysis%20Report.pdf
- ¹⁵ <http://council.legislature.mi.gov/jcar.html>
- ¹⁶ <http://bcap-ocean.org/resource/dillon%E2%80%99s-rule>
- ¹⁷ <http://www.michigan.gov/dleg/0,1607,7-154-10575---,00.html>
- ¹⁸ http://www.michigan.gov/documents/dleg/dleg_bcc_overview_243877_7.pdf
- ¹⁹ <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1852#VT>
- ²⁰ http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MI05R&re=1&ee=1
- ²¹ http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MI05R&re=1&ee=1
- ²² <http://bcap-ocean.org/state-country/Michigan>
- ²³ <http://www.midwesternaccord.org/>
- ²⁴ <http://www.usgbc.org/LEED/Project/CertifiedProjectList.aspx>
- ²⁵ <http://www.usgbc.org/LEED/Project/RegisteredProjectList.aspx>
- ²⁶ http://www.energystar.gov/index.cfm?fuseaction=new_homes_partners.showStateResults&s_code=MI
- ²⁷ <http://www.dsireusa.org/incentives/index.cfm?re=1&ee=1&spv=0&st=0&srp=1&state=MI>
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- ⁴⁰ <http://bcap-ocean.org/code-information/massachusetts-stretch-code-appendix-120aa-voluntary>
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⁴² <http://reca-codes.org/>

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