



Is the Same Code Actually the Same Code?

The 2018 IECC That Really Gets Adopted

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Abstract

Understanding the many benefits of highly efficient energy codes may have finally hit a tipping point. Numerous states and cities have come to see advancing energy codes as a cost-effective way to improve the quality of life for residents while meeting established climate goals. Even conservative states in the Midwest have begun to review and adopt the latest model energy code. However, the adopted code is often amended, resulting in its efficiency falling short of the model 2018 International Energy Conservation Code (IECC). This gives the perception of advancing building energy efficiency, while the reality is that residents lose the full benefits of a more efficient code – benefits they rightly expect.

This paper will explore how the residential 2018 IECC was adopted in two politically similar states. Both states have “adopted” the 2018 IECC but one was heavily amended and one unamended – resulting in vastly different efficiencies. The political landscape, code adoption process and procedural hurdles of each state will be discussed. The approaches used to convey the benefits, and perceived risks, of the new code to individuals responsible for updating the code will be shared. Amended requirements, their energy impacts and the rationales used by committee members to maintain or amend code requirements will also be examined.

Introduction and Background

When it comes to building codes, it is generally assumed that the new code that was adopted contains the beneficial provisions updated from the previous code. This assumption generally holds true for every building code, with the notable exception of the energy code. The energy code adopted by a jurisdiction is often is amended, weakening the efficiency measures and robbing residents of the expected benefits gained by adopting an updated code. These weakening amendments can have significant, long-term consequences – the energy efficiency measures not installed in a home because of weakening amendments will increase the building's energy use, as well as impact the health and comfort of the occupants, each and every year for the lifetime of the building.

The residential energy codes adopted by most Midwestern states and cities are based on the model International Energy Conservation Code (IECC) published by the International Code Council (ICC). This model code is published every three years in a rigorous, open process that solicits input from a wide range of stakeholders, including engineers, federal, state and local governments, energy raters, builders and other experts in the field. Once the code is published, its efficiency relative to the previous model code is analyzed by the Pacific Northwest National Laboratory (PNNL). PNNL reports the results to the U.S. Department of Energy (DOE) who issues a final determination of efficiency improvement. The latest model energy code is the 2018 IECC, which was found to be 1.91 % more efficient than the previous version.

For most of the Midwest, the primary responsibility for adopting energy codes lies with the state. However, there are also a handful of states that are structured as home rule states, where energy codes are adopted at the local level. Even in similarly structured states, the energy code

adoption the process varies greatly across the region, resulting in a diverse landscape of adopted energy codes (Figure 1).

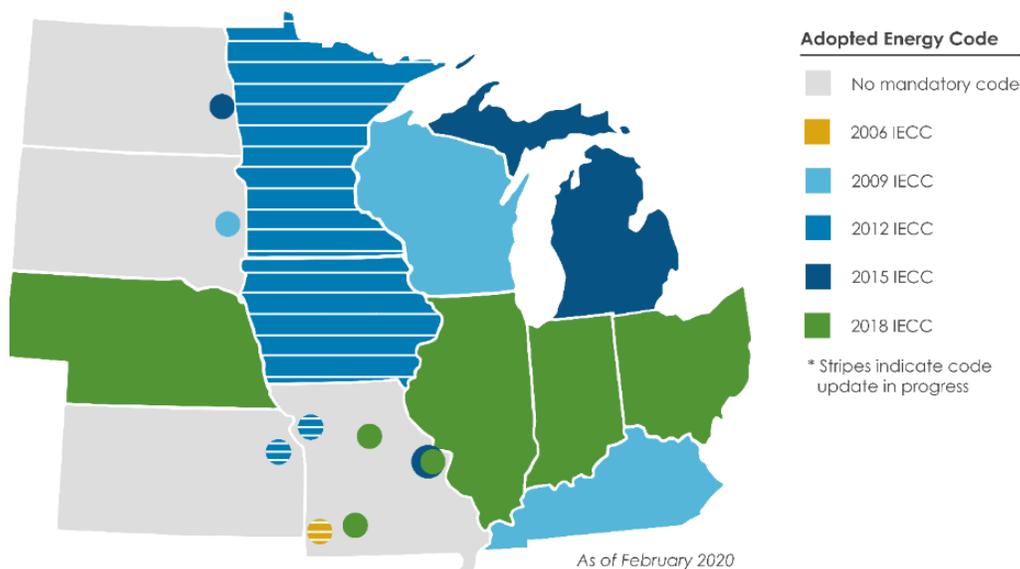


Figure 1. Map of adopted residential energy codes in the Midwest, as of February 2020.¹

Indiana

Indiana has a population of approximately 6.7 million people, and about 13% of the population lives in the largest city (Indianapolis) (Census Bureau 2020a). There are 4 cities over 100,000 and 11 cities over 50,000. There were 16,416 new permitted homes in Indiana in 2018, which is about 15% above the rolling 5-year average of 14,268 permits (Census Bureau 2020b). There are two energy code climate zones in Indiana, 4A and 5A, with about 85% of new homes permitted in the northern two-thirds of the state (climate zone 5A). The median household income is \$54,325 and the median value of owner-occupied homes is \$135,400.

Political Landscape/Code Adoption History

Indiana has had a Republican majority senate since 1978 and a Republican majority house since 2010. Indiana last had a Democratic governor in 2005. According to a recent Gallup poll, the conservative to liberal advantage in Indiana is 22 percentage points (Jones 2019). The state is home to 86,900 clean energy jobs, of which 52% are in energy efficient construction-related industries (Clean Jobs Midwest 2020).

The Indiana Residential Code is a statewide mandatory building code that applies to all municipalities in the state. The Indiana Residential Code, based on the International Residential Code, governs the construction of one- and two-family dwellings of three stories or less. Chapter 11 of the Indiana Residential Code is the energy efficiency chapter and states that the provisions

¹ Source: Midwest Energy Efficiency Alliance

of the referenced edition of the IECC are the applicable energy efficiency requirements. Therefore, for the purposes of this paper, Indiana energy code requirements will be referenced as the applicable edition of the IECC. Indiana adopted the 2009 IECC in 2012, updating from the 2003 IECC. Recently, Indiana updated to the 2018 IECC; the new code became effective December 26, 2019.

2018 IRC Adoption Process

The Fire Prevention and Building Safety Commission (Commission) is the body responsible for building code review and adoption in Indiana. The state has no requirements for regularly updating their building codes. The Commission, housed within the state's Department of Homeland Security, was tasked with updating the Indiana Residential Code after Senate Bill 393 was signed into law on March 15, 2018. (Indiana, Act No 393). This bill required the state to review and adopt a new statewide residential code before January 1, 2020.

Upon the passing of this bill, the Commission formed the Indiana Residential Code Committee (IRCC) to review and draft a new residential code. The IRCC was comprised of 11 appointed members. In addition to a member of the Commission, selected sectors of the construction industry (not including energy efficiency) were represented, including a residential remodeling contractor, three residential new construction contractors, two building officials, an architect, two fire officials and an engineer (Fire Prevention and Building Safety Commission 2018). This resulted in 5 of the 11 members, including the committee chair, being homebuilders. This group held eight public meetings over the course of seven months to hear public testimony and discuss potential amendments to the proposed code, which was based on the 2018 International Residential Code.

Testimony was given at two meetings regarding energy efficiency, including both supporters and opponents to the improved efficiency provisions of the 2018 IECC. On December 19, 2018 the Commission voted to amend many energy efficiency provisions, rendering the efficiency of the adopted code roughly equivalent to the 2009 IECC.

Once the IRCC concluded their review process of the code, the proposed rule with approved amendments was codified and presented to the Fire Prevention and Building Safety Commission. On February 5, 2019 the draft rule was adopted by the Commission and the formal rulemaking process began. The Commission held an additional public hearing on October 11, 2019 to give all interested parties an opportunity to comment on the proposed code. Comments were received and published, and the proposed code was approved by the Governor on November 26, 2019. The 2020 Indiana Residential Code became effective on December 26, 2019 (Indiana Residential Code 2020).

Key Partners in the Last Adoption Cycle

Several organizations and individuals were strong supporters of advancing energy efficiency in the most recent code adoption cycle in Indiana. The local voice was spearheaded by environmental groups, particularly the Hoosier Chapter of the Sierra Club. These groups worked to engage their volunteer base to speak out in support of advancing the energy efficiency of

residential buildings constructed in the state. Local chapters of professional organizations like the American Institute for Architects also testified in support of the state adopting the unamended 2018 IRC, along with local and regional energy raters. Additional support was expressed by national manufacturing associations, including the American Chemistry Council (ACC) and North American Insulation Manufacturers Association (NAIMA).

Those who testified in opposition to improved efficiency were mainly homebuilders. Others included representatives from the roofing industry and individual code officials.

Messaging and Pushback

The support for the adoption of the unamended 2018 IRC in Indiana focused on the building science benefits the code provides and the capacity of Indiana home builders to meet the requirements of the new code. Results from an analysis by MEEA of measure-level data from HERS rated homes in the state—61% of the homes rated in 2017—were presented to the IRCC. The analysis showed that a majority of new homes in Indiana already met key 2018 IECC energy efficiency requirements that were being weakened (RESNET 2018).

Discussion of the non-energy benefits that adopting a new code will provide residents in the state were also key, including improving indoor environmental quality and comfort and reducing energy bills. A strong emphasis was put on how improving building efficiency can lower energy bills and reduce the energy burden for low-income families. The associated environmental benefits provided by updating to the 2018 IECC were also a significant focus of the support.

Much of the pushback to the adoption of the unamended 2018 IECC was centered around the incremental cost of construction stemming from the more efficient minimum requirements of the energy code. The rulemaking process in Indiana involves an economic impact analysis for each measure being considered for adoption. If a proposed measure has a total estimated economic impact greater than \$500,000 in total in the first year after the measure is implemented, then an additional cost-benefit analysis must be performed. Supporters of the energy code adoption cited independent, third-party analysis and costs that were challenged by representatives on the IRCC and opponents of the code, who stated the changes to the code would result in significantly greater costs. Interestingly, a representative on the IRCC went so far as to postulate, without any supporting evidence, that additional energy efficiency requirements that reduce the energy use of homes will cause utilities to raise the electricity rates, leading to higher utility bills for homeowners across the state.

More broadly, the IRCC's lack of support for the energy code update appeared to be due to the misperception that the energy code is not a life-safety code. Despite supporters providing evidence on how the energy code impacts indoor air quality, resilience and other critical components of a building, representatives on the IRCC from the construction industry stated that the energy efficiency measures found in the IRC had no bearing on the health, safety and wellbeing of homeowners and occupants. The additional regulations associated with the unamended 2018 IECC were seen as burdensome, unnecessary and too costly to implement for

many of those not in support of the code adoption, despite the evidence provided that code was cost-effective and that savings would be cash flow positive for the homeowner within 10 months.

Approved Amendments and Relative Efficiency

During the initial review process, the IRCC approved several amendments to the energy chapter of the residential code, including rolling back the prescriptive insulation requirements to 2009 IECC levels. The exception was above grade wall insulation that was increased from R-13 to R-15, but still substantially below 2018 IECC levels. However, the air leakage and duct testing requirements, which are major drivers of energy efficiency and building performance, remained at 2018 IECC levels until the final IRCC meeting. Then, at the last minute, the IRCC removed the mandatory blower door testing requirements included in the code, resulting in an energy code with a drastically reduced level of efficiency.

This gutted version of the code, although by reference the 2018 IECC, is estimated to be approximately 20% less energy efficient than the model 2018 IECC (MEEA 2019). A summary of the included amendments can be found in Table 1.

Table 1. Major Indiana amendments to 2018 IECC

Code Measure (Section)	2020 Indiana Residential Code Requirement (Code Section)	2018 IRC Model Code Requirement (Code Section)
Table 1102.1.2		
Fenestration U-factor	0.35 (CZ 4&5)	0.32 (CZ 4) 0.30 (CZ 5)
Skylight U-factor	0.60	0.55
Ceiling R-value	38	49
Wood Frame Wall R-value	15 (CZ 4) 20 or 13+5 (CZ 5)	20 or 13+5 (CZ 4&5)
Mass Wall R-value	5/10 (CZ 4)	8/13 (CZ 4)
Floor R-value	19 (CZ 4)	30 (CZ 4)
Basement Wall R-value	10/13 (CZ 5)	15/19 (CZ 5)
Crawl Space R-value	10/13 (CZ 5)	15/19 (CZ 5)
Other Requirements		
Air Leakage Testing (1102.4.1.2)	Building or dwelling unit must be visually inspected for verification of compliance, or may be tested and verified of having an air leakage rate of ≤ 5 ACH50	Building or dwelling unit must be tested and verified of having an air leakage rate of ≤ 3 ACH50
Building framing cavities (1103.3.5)	Building framing cavities shall not be used as supply ducts or plenums.	Building framing cavities shall not be used as supply or return ducts or plenums.

Nebraska

Nebraska has a population of about 1.9 million people and about 21% of the population lives in the largest city (Omaha) (Census Bureau 2020c). There are 2 cities over 100,000 and 1 city over 50,000. There were 4,900 new permitted homes in Nebraska in 2018, which is slightly below the rolling 5-year average of 5,080 (Census Bureau 2020b). There is a single energy code climate zone in Nebraska: 5A. The median household income is \$59,116 and the median value of owner-occupied homes is \$147,800.

Clean energy jobs account for over 19,000 jobs in Nebraska, a majority of which are in the energy efficiency space. Jobs in the construction industry related to energy efficiency are relatively abundant, with nearly 9,200 Nebraskans employed in the field (Clean Jobs Midwest 2020a).

Political Landscape/ Code Adoption History

Unique in the United States, Nebraska's state legislature is a non-partisan unicameral. The legislative branch of the state's government consists of 49 senators that make up the single chamber of the legislature. In 2019, there were 30 Republican affiliated senators, 18 Democratic affiliated senators and 1 independent. While the ideologies of the state senators can vary greatly, the unicameral is officially non-partisan. Nebraska last had a Democratic governor in 1999. According to a recent Gallup poll, the conservative to liberal advantage in Nebraska is 14 percentage points (Jones 2019). Nebraska adopted the 2009 IECC in 2010 as the mandatory statewide energy code, updating from the 2003 IECC. On May 8, 2019, the Nebraska legislature voted to update to the 2018 IECC, and it became effective July 1, 2020.

2018 IECC Adoption Process

Unlike most states, Nebraska's statewide energy code is adopted through a legislative process, meaning in order to change the energy code, a bill must be introduced. On January 17, 2019, freshman Senator Megan Hunt introduced LB 405 (Nebraska, Legislative Bill 405), a bill to update the state's energy code from the 2009 IECC to the unamended 2018 IECC. The bill was then referred to the Urban Affairs Committee for review. The Committee, made up of 7 senators, held a public meeting on February 12, 2019 to hear testimony in support and in opposition to the bill.

Testimony in support of the bill was given by a range of stakeholders, including the Nebraska Code Officials Association, home builders, energy raters, the League of Municipalities, professional associations and others. There were only two testifiers in opposition, both associated with the Metropolitan Omaha Homebuilders Association. At the conclusion of testimony, the bill was voted out of committee, with 4 senators voting in support of the bill, and two voting "present." There were no votes in opposition.

Upon passing out of the Urban Affairs Committee, the bill progressed through the mandatory three rounds of debate on the senate floor: General File, Select File and Final Reading. The bill passed through the first two rounds with little discussion. At the Final Reading on May 2, 2019, there was a surprising twist. In Nebraska, Final Reading is typically a pro-forma process. However,

this time a lengthy debate broke out, with a number of senators expressing their opposition to the bill. Even with substantial pushback, Senator Hunt was able to rally the needed majority and the bill was passed. Governor Ricketts signed the bill into law six days later, on May 8.

Key Partners in the Last Adoption Cycle

Support for the energy code adoption in Nebraska grew out of the state's Energy Codes Compliance Collaborative (Collaborative). This well-established group, comprised of home builders, energy raters, code officials, government officials, regional organizations and other stakeholders, has been working on improving energy code compliance and related issues in the state since 2013. When the opportunity to advance the energy code was identified, an ad hoc group (group) was formed (self-selected Collaborative members and other stakeholders) to investigate the possibility of updating the Nebraska Energy Code – the Collaborative itself focuses on improving compliance and is not involved in adoption.

The group felt that the time was right to update the code and that by utilizing their local knowledge and experience, they could quickly organize a formidable group of supporters. Freshman Senator Megan Hunt was identified as a potential sponsor for the bill and, despite her limited knowledge of building energy codes, she was able to successfully navigate the legislative process, engage the appropriate stakeholders and shepherd the bill into law.

Messaging and Pushback

A wide array of groups provided testimony in support of updating the statewide energy code, each presenting a range of reasons why the state should move forward with the adoption of the 2018 IECC. Because many of the Senators responsible for the code adoption process had little or no experience with energy codes, an extensive amount of energy code education was needed. In addition to the potential energy savings and associated reduction in utility bill costs that residents would see if the 2018 IECC were adopted unamended, a strong emphasis was put on the health, resilience and environmental benefits of updating the energy code. It was felt that these non-energy benefits would resonate stronger with senators than discussing the energy related benefits alone.

There was much less pushback on the adoption of the unamended code than expected. Stakeholders that traditionally oppose changes to the energy code were absent or remained neutral until the very end of the adoption process. Opposition testimony was received from only two stakeholders during the initial public hearing, and, until the final reading of the bill, very little debate was had on the proposed code update.

The debate that happened at Final Reading did not focus on the incremental cost of updating the code, as is usually the case. Instead, much of the pushback seemed to stem from a general lack of understanding of the development and purview of the International Energy Conservation Code. Some senators rose in opposition to the code because it was an "international" standard and therefore suspect. Other senators opposed the update because these were additional regulations being imposed by out of state entities. To give a sense of the energy code debate environment, it may be instructive to note that at the time of the "international" energy code

debate, the unicameral had already adopted the entire 2018 family of building codes published by the *International Codes Council* (*italics added*), except for energy code.

A primary area of concern raised was requiring blower door testing for all homes built to the proposed code. Because the state had adopted the 2009 IECC, which does not require blower door testing, there was concern due to a perceived lack of capacity for the state to perform these types of tests and the impact requiring performance testing would have on the cost of new homes.

Approved Amendments and Relative Efficiency

Nebraska adopted the 2018 IECC without amendments as the statewide code for residential and commercial buildings. The energy code statute, however, does allow municipalities in the state to amend the statewide code, so long as they provide justification for why they are making the amendments. As of this writing, one city, Omaha, has completed the adoption of the 2018 IECC but included a few weakening amendments, including the removal of mandatory blower door testing. However, in an illustrative example of the dangers of modifying the code, the envelope leakage requirement (ACH50) does not appear to have been changed. As the code currently reads, builders must meet the 3ACH50 requirement, and therefore its associated requirement for whole house ventilation. However, with no blower door test to demonstrate compliance, or non-compliance, it is unclear how Omaha inspectors will be enforcing these code requirements.

Comparing the Codes

Although Indiana and Nebraska both adopted the 2018 IECC by reference, the two states have drastically different approaches to code adoption and ended up with two vastly different codes in practice. Table 2 compares the two processes and results.

Table 2. Energy Code Adoption in Indiana vs Nebraska

	Indiana	Nebraska
Code Adoption Process	Administrative	Legislative
Number of Deciders	11	49
Number of Hearings/Debates	9	4
Ability to Make Last Minute Changes	Yes	No
Mandatory Code Adoption Cycle in Place	No	No
Number of Amendments	21	0
Efficiency Equivalent	2009	2018

Because both states have no requirements to regularly update their statewide energy codes, the results of this latest adoption are likely to have long-lasting effects. For the sake of discussion, Figure 2 shows the difference in cumulative energy savings in Indiana over the next 10 years between the code as adopted and the model energy code that could have been adopted. The difference is staggering: approximately 30,000,000 MMBTU, or enough energy to power over 250,000 Indiana homes for a full year.

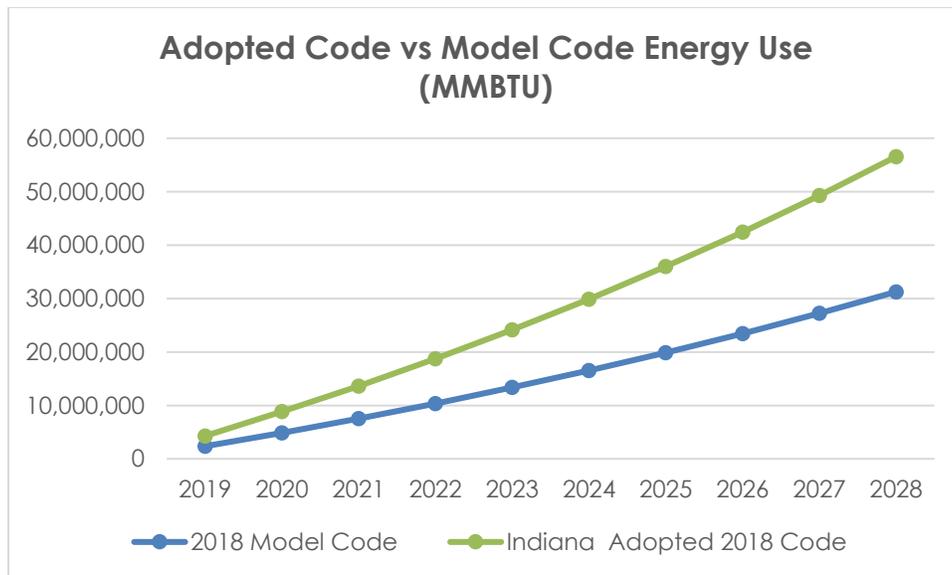


Figure 2. Projected Energy Use - MMBTU (2019-2028)

Key Takeaways

Messages That Resonate

The energy code can be seen as somewhat of a niche subject area, but it directly impacts the health, comfort and productivity of where people spend 90% of their time. Effectively framing the messaging on how these policies impact homeowners, renters, builders and other stakeholders is critical to conveying the holistic benefits of updating energy codes (U.S. EPA 1989).

Discussing the energy code in the context of the non-energy benefits building energy efficiency provides to residents is an effective way to demonstrate the value these codes have, particularly to the vast majority of stakeholders who reasonably assume the people responsible for the safety of the built environment are acting in their best interests. Emphasis placed on how the energy code impacts indoor environmental quality—and in turn, the health and wellbeing of homeowners and renters—seemed to relay relatable and impactful messaging to stakeholders, as opposed to discussing the structural or technical benefits a new energy code provides. Given the high profile of extreme weather, resilience also was an impactful talking point. Studies have shown that code compliant buildings survive extreme weather better and allow people to safely shelter in place longer. (Colker 2019). Because the energy code not only supports grid sustainability, but also provides significant steps towards established climate and sustainability goals, the non-energy benefit messaging seemed to resonate with a wide range of stakeholders.

Demonstrating the impact energy codes have on lowering utility bills for future homeowners is more contentious, but the energy burden is important to convey when discussing the benefits of

the code. This messaging particularly resonates when discussed in the context of low-income households, where energy burdens are often the highest.

Pushback

Resistance to advancing the energy code struck similar chords in both adoption cycles. A strong focus of the opposition's messaging was concentrated on the increased cost of construction. Parties involved in the residential construction industry often dismiss the benefits of higher efficiency and only focus on the increased costs. The builder's focus is on first costs, which is understandable since first costs have the greatest impact on their business model and their involvement in the home typically ends once the home is occupied. This is compounded by the fact that energy efficiency features are often undervalued by the market, making it challenging to fully monetize the benefits of energy efficient construction.

On the other hand, homeowners care deeply about efficiency, comfort and a healthy indoor environment. And advocates typically look at the long-term societal benefits of improved efficiency, particularly for low-income households. This misalignment of costs and benefits – a split incentive if you will – is at the core of much of the debate on how changes to code requirements (particularly to the energy code) impact the established new home marketplace. Add to this that additional regulations—particularly in more conservative areas—are seen as burdensome and unnecessary, and the pushback on energy code requirements becomes even more intense.

Perhaps, ultimately, pushback to changes in the energy code are centered on the erroneous belief that energy code is not a life-safety code. Or perhaps the dismissal of the energy code as a life-safety code is due to the fact that the life-safety impacts of the energy code are often not seen until years after the home is occupied. This, of course, does not diminish the fact that the energy code is a life-safety code, as studies have shown, it merely allows opponents to ignore the reality (Turner and Vaughn 2013). Through education on building science and best practices, this viewpoint is changing; however, there is still a long way to go in modifying this perception.

Coalition Building

The code adoption in Nebraska benefited from having an active energy codes compliance collaborative comprised of a strong coalition of local groups that had been working together on energy codes issues for years. Through their experience in the Collaborative, these groups were able to identify an opportunity to advance the energy code in the state and join together to form a coalition eager to support the effort. Having a pre-existing network of energy code stakeholders that meets regularly was critical to identifying and acting on an opportunity to move the energy code forward.

Another key ingredient was identifying and supporting an energy code champion in the state. In Nebraska, who that person had to be was determined early in the process, since nothing would happen unless a senator was willing to introduce a bill to update the code. Identifying an individual in a position to advocate for these policies is critical and can play a significant role in

a successful code adoption, particularly in states and cities that do not regularly update these policies.

Nevertheless, despite a strong coalition, an energy codes champion and bulletproof messaging, the deck is often not stacked in favor of advancing energy codes. Administrative boards rarely include efficiency advocates or members protecting the interests of the eventual homeowner. The fact that political will plays a significant role in the advancement of the energy efficiency policies cannot be overstated.

Conclusions

As noted in the study, there are many disadvantages, some quite serious, to modifying the model energy code. The model code is vetted by industry experts and fully integrated with the entire family of codes. Buildings operate as an integrated system; consequently, modifying any part of the code can, without the benefit of full analysis, lead to a cascade of conflicts and unintended consequences. Nevertheless, specific amendments can also have direct links to specific consequences. For example, no longer requiring a blower door test has a direct connection to underventilation, which leads to moisture, mold and health issues for building occupants. Not to mention, weakening amendments to the energy code cost consumers money. Building occupants will pay higher out-of-pocket energy costs for the entire life of the building.

As states and municipalities continue to grapple with how best to address the impacts from climate change, improved building energy codes are increasingly seen as effective policies with multiple demonstrable benefits. In some instances, progressive states will adopt model codes or improving amendments, advancing building energy efficiency². However, as this study shows, in the Midwest it is rare that a model energy code is adopted without significant weakening amendments. And therein lies the danger: if a jurisdiction “adopts” the latest model code, citizens rightly believe that they are now on the cutting edge of building energy efficiency—when the truth is, by modifying the code, building efficiency may have barely improved, if at all. This disingenuous practice is widespread in the Midwest and the people the code is designed to protect—building occupants—need to be aware of the practice and its costs.

² Notable examples of states that improve model energy codes include Massachusetts, New York, and Washington. While these states are relevant to the national conversation about building energy codes, they are outside the scope of this study.

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