BUILDING ENERGY CODES & STANDARDS REPORT

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INTRODUCTION

As public health officials uncover more evidence that a person's zip code may be the strongest determinant of health, elected officials, local leaders, and nonprofit organizations are pursuing polices to improve the conditions of the places people live, work, and go to school. In Kansas, Governor Laura Kelly in 2019 announced a new statewide energy plan to lower electricity prices and provide more renewable options for residents. Also in 2019, Kansas City, Missouri's Mayor Quinton Lucas ran on a housing platform during his campaign and rallied behind KC Tenants, a grassroots organization demanding systemic change so everyone in Kansas City has access to a safe and truly affordable home. Children's Mercy Hospital continues to expand the scope of its Environmental Health Program to improve homes and schools in greater Kansas City, whose unhealthy/unsafe conditions often lead to poor health and increased healthcare costs for residents.

Reducing energy use in buildings, which are intensive energy users with long life spans, provides a unique opportunity to significantly improve public health. According to a joint study by the American Council for an Energy-Efficient Economy (ACEEE) and the Physicians for Social Responsibility, reducing annual electricity use by 15% nationwide would save more than six lives every day, prevent nearly 30,000 asthma episodes each year, and save Americans up to $20 billion through avoided health harms annually. This is because when people and businesses save energy, less energy needs to be produced. The result is less power plant pollution.[1] Energy codes and standards limit buildings' energy use by laying out minimum energy efficiency requirements. These codes have a critical role in the intersection of health, affordable housing, and energy equity.

[1] https://aceee.org/research-report/h1801

IMPACT OF ENERGY CODES & STANDARDS

The primary outcome of energy codes and standards is to conserve energy; however, their impact goes far beyond improving the energy efficiency of buildings.

Protect individuals' health

The energy code is critical to ensuring buildings operate as intended and provide a safe, healthy and comfortable place to live and work. It helps assure the quality of indoor air by establishing proper building tightness and adequate ventilation. Proper building tightness guards occupants from outdoor pollutants, mold, mildew, and extreme temperatures.[2] Ventilation removes outdoor pollutants and indoor pollutants which can be caused by fuel-burning appliances, tobacco products, building materials and furnishings, household cleaning products, or central heating and cooling systems. High temperature and humidity levels can increase concentrations of some pollutants, such as mold. All of which can wreak havoc on humans' health, especially for more vulnerable populations.[3]

> Updated and enforced codes and standards:
>
> - Protect individuals' health
> - Increase resiliency against extreme weather
> - Promote energy equity
> - Boost economic development
> - Benefit property owners

Increase resiliency against extreme weather

The Federal Emergency Management Agency (FEMA) stated that mitigation efforts (such as building code adoption and enforcement) are one of the strongest strategies that jurisdictions can take to protect their communities against natural disasters. Energy codes contain certain safeguards to minimize the damage a flood or storm can wreak on walls, floors, ceiling insulation, windows, and ducts. When combined with other stringent buildings codes, buildings stand stronger in the face of whatever natural disaster comes their way.[4] A study conducted after Superstorm Sandy (which left 8 million New Yorkers without power) showed newer energy codes allow people to stay in their homes for more days during blackouts triggered by heat waves or cold freezes.[5] As communities continue to

[2] https://www.sierraclub.org/sites/www.sierraclub.org/files/sce-authors/u7451/codes%20life%20safety%20flier%20v8.pdf
[3] https://www.epa.gov/indoor-air-quality-iaq/introduction-indoor-air-quality#causes
[4] https://www.dupont.com/knowledge/better-building-codes-steel-our-cities-against-climate-impacts.html#
[5] https://www.aceee.org/files/proceedings/2014/data/papers/1-439.pdf

grapple with the changing planet due to climate change, updated energy codes can help ensure they are more prepared to cope with extreme weather conditions.

Promote energy equity

Individuals and families with insufficient income must too often choose between paying their utility bills and paying for other necessities. A 2016 study published by ACEEE and Energy Efficiency for All found that on average, low-income households pay twice as much of their income on utilities as the median household and three times more than higher income households.[6] Even when living in smaller homes, low-income families use more energy per square foot than their wealthier counterparts, while still experiencing hotter homes in the summer and colder homes in the winter due to poor construction and maintenance of buildings.[7] Requiring buildings to be more energy efficient not only protects individuals' and families' health, but saves households money, enabling a more consistent living environment, especially for renters.

Boost economic development

As energy codes and standards are updated and adopted, new employment opportunities become available. Meeting energy efficiency standards requires the help of additional technical experts, duct and air leakage professionals, quality control assessors, building and system commissioning agents, energy auditors, and compliance officers.[8] In addition to creating jobs, energy codes also boost the economy by allowing people to reinvest the money they are saving on utility bills. The energy code, and the provisions in it, are tested for their cost-effectiveness. *It is the only code that pays for itself.*[9] Economic analysis indicates that every dollar spent on energy code compliance and enforcement yields $6 dollars in energy savings.[10] When governments invest in energy codes, their citizens have additional money to invest in their residences and local economies.

Benefit property owners

Realtors are noticing the value of promoting home energy efficiency. In the 2019 National Association of Realtors' *Sustainability Report*, 69% of agents and brokers said energy efficiency promotion in listings was very or somewhat valuable.[11] Buyers are recognizing the benefits of energy efficiency features, and many of them are willing to pay more for these benefits. A 2015 study found that green certified homes sold for 9.5% more than non-certified homes. Even when accounting for the size difference between homes, high performance homes had a higher market value, selling at a median of

[6] https://aceee.org/research-report/u1602
[7] https://www.ase.org/blog/low-income-households-pay-lot-energy-efficiency-can-help-cut-costs
[8] https://www.energycodes.gov/resource-center/ACE/adoption/step1
[9] https://www.builderonline.com/building/building-science/energy-codes-are-life-safety-codes_o
[10] https://www.energy.gov/sites/prod/files/gcprod/documents/Energy_Code_Enforcement_Funding_Task_Force_-_Fact_Sheet.pdf
[11] https://www.nar.realtor/research-and-statistics/research-reports/realtors-and-sustainability

3.6% more per square foot.[12] Renters also consider energy efficiency when determining where to live and work, or more specifically whether to renew lease agreements. High utility bills and poor climate controls are two factors that influence tenant satisfaction and retention. To combat tenant turnover, which can cost anywhere from $1,000 to $5,000,[13] *Realtor Magazine* suggests that property managers invest in energy solutions to benefit tenants and their bottom line.[14]

[12] http://buildingnc.org/wp-content/uploads/NCBPA-2017-Inventory-Report_030918.pdf
[13] https://learn.roofstock.com/blog/our-first-tenant-turnover-experience-how-much-it-cost-and-what-we-learned
[14] https://magazine.realtor/technology/feature/article/2019/10/combat-tenant-turnover-costs-with-property-upgrades

NATIONAL ENERGY CODES & STANDARDS

Below is an overview of the national energy codes and standards. In determining these standards, the United States Department of Energy (DOE) strives to achieve the maximum practicable, cost-effective improvements in energy efficiency while providing safe, healthy buildings for individuals and families.

Development

For new construction and major renovations (residential and commercial), building energy codes and standards lay out the minimum energy efficiency requirements. DOE supports and participates in the building energy code development processes administered by American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and the International Code Council (ICC). DOE is then required by law to issue a determination as to whether the latest edition of ASHRAE Standard and the latest version of the International Energy Conservation Code (IECC) will improve building energy efficiency compared to the previous edition.[15]

IECC vs. ASHRAE Standard 90.1:

Both the IECC and ASHRAE energy standards are considered acceptable compliance paths for commercial buildings. The IECC is one of a suite of model national building codes revised every three years. It lays out minimum efficiency standards for commercial and residential buildings. Commercial provisions fall into four main sections: Building Envelope, Mechanical Systems, Electrical Power and Lighting, and Service Water Heating (residential provisions are distributed among the first three). In addition to providing its own updated recommendations, the IECC also references ASHRAE Standard 90.1 (standard for buildings except low-rise residential buildings) as an alternative compliance path for commercial buildings. ASHRAE Standard 90.1 is updated triennially on years differing from the IECC. Both ASHRAE and IECC update their codes and standards through processes involving code officials, builders, efficiency advocates, and other industry stakeholders.[16]

New construction vs. major renovations:

New construction consists of building from the ground up. Major renovations go beyond cosmetic repairs of a building and involve working with its critical systems (mechanical, electrical, plumbing, structural components, etc.). Energy codes and standards apply to both new construction and major renovations, but the enforcement mechanisms often vary, with

[15] https://www.energycodes.gov/development

[16] https://www.architectmagazine.com/technology/code-override-states-and-cities-press-ahead-on-efficiency-standards_o

major renovations being more challenging to track and regulate. Both levels of construction require a building permit (an official approval to proceed with construction) and a Certificate of Occupancy (indication the building meets its building-code requirements and can be reoccupied) from the local authority.[17] However, it is unknown how many major renovations are performed without building permits.

- Construction costs vary considerably based on location and choices in design and finishes. However, new construction adds approximately $20-30 per square foot compared to major renovations due to soft costs such as land acquisition, architectural and engineering fees, legal fees, builders risk insurance, utility taps, and miscellaneous municipal process fees.[18]

Energy codes & standards are broken down into three stages:

- Development
- Adoption
- Compliance

Adoption

DOE determines the national model codes; however, energy codes and standards are adopted and enforced by the authority having jurisdiction (AHJ), whether a state, county, or municipal agency. Some states adopt standard statewide building codes, but in home-rule states, local jurisdictions can adopt their own building codes. Jurisdictions may modify or amend codes as they see fit, but there is considerable benefit in terms of energy savings, cost-effectiveness, and assistance from the DOE, IECC and ASHRAE when maintaining the model code as written.[19] Kansas and Missouri are two of eight home rule states in the U.S.[20]

Challenges for home rule states:

Leaving code adoption up to local jurisdictions with no statewide oversight often creates a patchwork of confusing and outdated codes. The energy code can get left behind because of misunderstandings about its costs and savings, health and safety impacts, and building science principles.[21] These additional obstacles can also result in weaker energy policies. Poorer jurisdictions may opt for less efficient codes—or no codes at all—out of concerns about the costs to governments and builders. But because of the connections between energy efficiency, health, and equity, these decisions can unintentionally push costs onto residents, in the form

[17] https://www.usgbc.org/glossary/
[18] Alpert, S. (2019). BOMA KC. (E. Wolfe, Interviewer).
[19] http://www.mwalliance.org/sites/default/files/meea-research/energy_codes_101_9.17.17.pdf
[20] https://www.energycodes.gov/state-code-adoption-tracking-analysis
[21] http://www.swenergy.org/a-new-model-for-energy-codes-in-home-rule-states

of higher utility bills and higher healthcare costs. Such decisions can also reinforce social determinism and the likelihood that one's health and success is determined by their zip code. In ACEEE's 2019 State Energy Efficiency Scorecard report, each state was awarded an individual score regarding their building energy efficiency policies. The eight home rule states and two states with no statewide code received an average score of 3.25 on the eight-point scale. The remaining states and the District of Columbia had an average score of 4.93. *Kansas received a 3.5, and Missouri received a 4*.[22]

Compliance

Code officials, as well as other professionals involved in compliance verification, must ensure buildings comply with the energy code. Code enforcement is complementary to compliance, and strategies vary according to a state or local government's regulatory authority and available resources. Builders can choose between two primary compliance paths: prescriptive and performance.[23]

Prescriptive:
A fast, definitive, and conservative approach to code compliance. It includes a comprehensive checklist of the building components and characteristics that can affect energy consumption. It is most often used for small-scale projects.[24]

Performance:
Uses energy modeling software to calculate the annual energy consumption and costs of a building. Instead of setting minimum standards for individual building components, the goal is a building using custom systems with an Energy Use Intensity (EUI) equivalent to, or better than, one built to the prescriptive code.[25]

Recent codes

Between the 1980s and 2006, energy codes were truly minimal, and the DOE pursued marginal improvements. Beginning in 2004, the DOE successfully advocated for a major rewrite of the IECC; this became the 2006 IECC, though the emphasis was on format and not code stringency. Both the 2009 and 2012 versions included provisions that resulted in substantial improvements in energy efficiency compared to the 2006 code.[26] Below is additional information regarding the most recent versions:

2012 IECC:
The 2012 IECC built upon the 2009 code and was reformatted so the provisions for residential

[22] https://aceee.org/research-report/u1908
[23] https://www.energycodes.gov/resource-center/ace/compliance/step2
[24] https://www.wbdg.org/resources/energy-codes-and-standards
[25] http://www.swenergy.org/press-release?PressID=195
[26] https://www.energy.gov/sites/prod/files/2013/12/f6/iecc_overview.pdf

and commercial buildings completely stand alone.[27] Additional major changes included a mandatory blower door test to determine a home's air leakage rate, more stringent duct leakage testing, insulation requirements for domestic hot water systems, and increased insulation requirements for residential and commercial buildings. It is approximately 30% more efficient than the 2006 IECC.[28]

2015 IECC:
In terms of overall energy savings, the 2015 IECC is not significantly different than the 2012 version. However, it aimed to be more user-friendly in order to make it easier to realize the targeted energy savings. One major change of the 2015 IECC was giving residential builders the option of complying by meeting a target Energy Rating Index (ERI).[29]

2018 IECC:
There were only minor improvements in efficiency of the 2018 IECC over the 2015 version. However, efficiency advocates saw this as an accomplishment due to several proposals that would have significantly weakened the code: nearly all were defeated.[30] Some changes to the 2018 code included clarification on how the ERI path is calculated and requiring commercial buildings (including multi-family) to have more efficient showerheads.[31]

[27] https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-21435.pdf
[28] https://www.energy.gov/sites/prod/files/2013/12/f6/iecc_overview.pdf
[29] https://www.imt.org/what-to-expect-under-the-2015-iecc-part-1/
[30] https://www.nrdc.org/experts/lauren-urbanek/2018-building-energy-code-holds-line-efficiency
[31] http://energyoutlook.naseo.org/Data/Sites/13/media/presentations/Haack-ICF.pdf

BEST PRACTICES & MODEL IMPLEMENTORS

Highlighted below are actions organizations, states, and cities have taken to address discrepancies and misunderstandings surrounding energy codes and to improve efficiency standards in home rule and non-home rule states. Other communities may choose not to replicate these examples exactly, but they can serve as a model as they develop policies and programs to meet the needs of their residents.

Legislate compliance

At the local, state, and federal levels, legislative action has been taken to require energy code adoption and encourage real estate owners to improve the energy efficiency of their buildings. A combined approach of requiring and incentivizing improvements may motivate some owners to go beyond minimum standards.

Colorado (home rule state):

In 2019, Colorado passed HB19-1260, a short and simple bipartisan bill, requiring jurisdictions to update to one of the three most recent versions of the energy code when updating other building codes. This bill gained bi-partisan support, rural and urban support, and builder and environmental sector support because it is flexible and never expires. The legislation also requires every municipality to report their building and energy codes to the Colorado Energy Office by January 1, 2020.[32]

- In 2018, Denver passed a revised green roof ordinance that offers a wide range of green roof policies related to energy efficiency, renewable energy, or green space for new and existing buildings 25,000 sq. ft. and larger.[33] Similar to HB19-1260, this flexible ordinance offers a variety of options for building owners.

US Tax Code. 179D - Energy-Efficient Commercial Building Tax Deduction:

179D offers building owners a tax deduction of up to $1.80 per square foot for next-level energy-efficient improvements that exceed ASHRAE Standard 90.1 (currently version 2007) by 50%. The tax deduction helps real estate owners who might not otherwise have the necessary capital to make the decision to design, retrofit, and operate energy-efficient structures.[34]

- Despite sweeping changes to the tax code in 2017, 179D remained the only federal incentive for commercial buildings to become energy efficient. Since its inception in

[32] http://www.swenergy.org/press-release?PressID=195
[33] https://crej.com/news/green-roof-ordinance-final-rules-for-existing-building-roof-replacements/
[34]https://www.boma.org/BOMA/Advocacy/2019_Federal_Legislative_Priorities/Energy_Efficient_Commercial_Buildings_Tax_Deduction/BOMA/Advocacy/179D.aspx?hkey=39c20133-3488-47dc-abb3-e12951460daa

2005, 179D has been extended various times, most recently retroactively for 2017; however, the provision is now expired.

- Building Owners and Managers Association International (BOMA) urges Congress to make 179D a permanent part of the tax code. If made permanent, they would like to increase the tax deduction, update the ASHRAE Standard 90.1 to a newer version, and increase opportunities for owners of existing buildings.

Communicate benefits and necessity

To address the incorrect perception that energy codes are nonessential and merely "nice to have," several organizations strive to create more awareness that energy codes are truly lifesaving.

Midwest Energy Efficiency Alliance (MEEA):
MEEA, a collaborative network that advances energy efficiency in the Midwest, communicates that energy codes exist to protect building occupants and communities. Outdated or unenforced energy codes can lead to buildings with poor indoor air quality, dangerous mold growth and rotting structural members, which not only cost the owner more money in higher operating costs, but also impact occupants' health.[35]

Southwest Energy Efficiency Project (SWEEP):
SWEEP, which promotes greater energy efficiency in its six-state region, stresses that the energy code works in tandem with the other model building codes to ensure the health and safety of the people inside. The energy code affects buildings' moisture management (rot, mold, and mildew), indoor air quality, fire safety, extreme weather protection, and resiliency.[36]

Provide training for industry professionals

Training is critical to the design, building, and enforcement communities. However, local code officials often lack adequate resources to provide additional training on energy efficiency and building science.[37] To encourage code adoption and compliance, states have pursued various routes to ensure training is available.

Colorado (home rule state):
The Colorado Energy Office (CEO) has statutory requirements to make energy code training available in Colorado. CEO provides city staffers and private sector professionals with training and technical assistance to help them adopt, implement, and comply with new codes. The program is currently funded through general state funds and is provided by an external

[35] https://www.sierraclub.org/sites/www.sierraclub.org/files/sce-authors/u7451/codes%20life%20safety%20flier%20v8.pdf
[36] https://www.builderonline.com/building/building-science/energy-codes-are-life-safety-codes_o
[37] https://www.marc.org/Environment/Energy/pdf/reecswhitepaper-full.aspx

vendor. Training is prioritized for smaller jurisdictions with fewer resources. To maximize training dollars, Xcel Energy provides training if the jurisdiction is in their territory.[38]

Arizona (home rule state):
The Salt River Project, a private utility serving about 1 million customers in the Phoenix metropolitan area, has an employee dedicated to encouraging jurisdictions to adopt newer energy codes and assist with training. Salt River Project can count some of the energy savings from code adoption towards its energy efficiency goals.[39]

The City Energy Project Assessment Methodology for Energy Code Compliance in Medium to Large Cities:
Historically, the DOE has focused on statewide code compliance protocols. The City Energy Project methodology is designed to assist cities in identifying residential and commercial energy code compliance issues and specific areas that each jurisdiction should focus on in order to improve their compliance rates.[40] While the tool is available online at no cost, Institute for Market Transformation (IMT) works with some cities directly to complete the assessment or develop a request for proposal if they would like an outside organization to complete the assessment. The goal of the tool is to help cities determine their general compliance rate and identify specific, targeted recommendations to improve compliance. IMT stated lack of training and staff time are often the biggest barriers to successful use.[41]

Code adoption and compliance best practices:

- Legislate compliance
- Communicate benefits and necessity
- Provide training for industry professionals
- Coordinate collaboration among jurisdictions
- Adopt building energy benchmarking
- Require energy disclosure at time of sale and rent
- Utilize equity driven approaches

Coordinate collaboration among jurisdictions

In lieu of any statewide oversight, MEEA and SWEEP encourage neighboring jurisdictions in home rule states to form code collaboratives that work together on energy code initiatives.

[38] Burke, K. (2019). Colorado Energy Office. (E. Wolfe, Interviewer).
[39] Brinker, C. (2019). Southwest Energy Efficiency Project. (E. Wolfe, Interviewer).
[40] https://www.imt.org/resources/the-city-energy-project-assessment-methodology-for-energy-code-compliance-i/
[41] Cheslak, K. (2019). Institute for Market Transformation. (E. Wolfe, Interviewer).

MEEA:
Several states in MEEA's thirteen-state region (including Missouri) participate in code collaboratives to identify potential opportunities and resources for improving energy code adoption and compliance.

SWEEP:
SWEEP helped both Colorado & Nevada form collaboratives consisting of energy code stakeholders (building officials, advocates, raters, suppliers, state energy office, etc.). They meet quarterly and work together to review new codes, identify a common set of amendments, and set a timeline for adoption.

Adopt building energy benchmarking

Because building energy benchmarking is crucial to achieving reductions in energy consumption (you can't change what you don't measure), several jurisdictions have adopted benchmarking policies.

Minneapolis, Minnesota (non-home rule state):
In 2013, the Minneapolis City Council adopted an ordinance requiring commercial buildings 50,000 sq. ft. and larger and city-owned buildings 25,000 sq. ft. and larger to annually benchmark their energy consumption. In addition to submitting their building data into ENERGY STAR Portfolio Manager, owners must provide proof of an ASHRAE Level 1 Energy Audit every five years (some exemptions apply). The ordinance allows building owners and the City to determine opportunities for improvement, recognize high performers, and determine progress towards the City's Climate Action Plan goals. The Minneapolis Health Department enforces the ordinance.[42]

- The ordinance has achieved a 95% compliance rate. In order to support building owners and maximize the impact of the ordinance, the Minneapolis Sustainability Office is in the process of hiring an additional staff member that will be dedicated to educating the community on building energy efficiency policies and available resources.[43]

Hennepin County, Minnesota:
Benchmarking implementation requires policy development, outreach, technical assistance, quality assurance/quality control, and efforts to maximize energy efficiency (approximately 1.5 FTE, if there is sufficient volunteer support for outreach and technical assistance). Hennepin County formed the Efficient Buildings Collaborative to create a standardized process for small to mid-size cities in Minnesota as they adopt and implement building energy benchmarking

[42] http://www.minneapolismn.gov/environment/energybenchmarking
[43] Havey, K. (2019). Division of Sustainability, City of Minneapolis. (B. P. Wolfe, Interviewer).

and disclosure policies. Ongoing, cities can purchase supportive services by contracting directly with a third party, Overlay Consulting.[44]

Require energy disclosure at time of sale and rent

To illuminate the value of home energy, several cities and states have adopted policies requiring building owners to disclose utility costs, energy audit/assessment results, or energy efficiency features when a property is listed for sale or rent.

Approaches to transparency:

There is a variety of energy-related documentation that can be required in real estate listings, not unlike produce verifications in the food industry (see below).[45] When choosing what to require for a specific city or state, it is important to consider local certification programs already available and to ask local building experts to refine the list of fields that are most applicable to the local real estate market.[46]

- **Green Certifications (e.g. USDA Organic Sticker):** Recognizes homes for achieving a minimum threshold of energy features or performance. Green certification programs include the U.S. Green Building Council LEED Certified Homes, EPA's ENERGY STAR Certified New Homes, National Green Building Standard New Green Homes, and Passive House.
- **Energy Labels (e.g. Nutrition Facts/Label):** Any home can provide verified energy information through an energy label. Labels provide a numeric score or rating to compare homes to an average or accepted standard. For example, the RESNET HERS Index compares a home's assets to those of a home with a new code, and the DOE's Home Energy Score compares a home's estimated energy use to that of average homes.
- **Verified Energy Improvements (e.g. Reduced Fat Products):** Verified energy improvements do not guarantee a minimum threshold or that a level of performance was achieved, but they show investments have been made into the home. For example, homes that have undergone improvements through the Home Performance with ENERGY STAR program can showcase their investment through the program's "Certificate of Completion."

[44] https://www.hennepin.us/benchmarking
[45] https://www.elevateenergy.org/wp/wp-content/uploads/Home-Energy-Information-Guide-Taking-Verified-Data-Through-The-MLS-To-The-Consumer.pdf
[46] http://www.mwalliance.org/sites/default/files/meea-research/green-fields-factsheet7.30.19.pdf?current=/taxonomy/term/11

Minneapolis, Minnesota:
The Minneapolis City Council recently approved three policies to enhance residential energy awareness:

- **Residential Energy Benchmarking**: Expanded existing commercial ordinance to cover residential buildings 50,000 square feet and larger.
- **Time of Rent Energy Disclosure:** A requirement for residential building owners to disclose average energy cost per square foot.
- **Time of Sale Energy Disclosure:** A requirement to include energy efficiency characteristics (information on the home's insulation, heating system, and windows) as part of the already-required Truth in Sale of Housing (TISH) report.[47]

Utilize equity driven approaches

Utilities are a major component of housing and living costs, but renters and low-income families often live in older, less energy-efficient homes and do not have access to lifesaving and cost-saving energy efficiency programs. Increasingly, cities and states are taking steps to address energy inequity through community-based, targeted energy efficiency efforts to meet the needs of their residents.

Engage energy burdened communities:
Some cities structure their public engagement strategies in ways that increase feedback from residents living in energy inefficient housing. Sustainable DC, which is led by the Department of Energy & Environment and the Office of Planning, is a collaborative effort to make DC the most sustainable city in the nation. To engage marginalized residents in planning and implementing initiatives, city staff partnered with community organizations to restructure neighborhood meetings to be more casual and held in familiar venues near public transit. They also give formal decision-making roles to community leaders and residents in neighborhoods facing disproportionately high climate-related risks.[48] The U.S. EPA's National Environmental Justice Advisory Committee (NEJAC) also developed a Model Plan for Public Participation which includes critical elements for conducting public participation in policy development.[49]

Adopt policies that strengthen low-income programs:
Several states have adopted legislation or regulations establishing a savings goal or minimum required level of spending on low-income energy efficiency programs. In 2008, Massachusetts's Green Communities Act required that a minimum of 10% of electric utility budgets and 20% of gas utility budgets serve income-qualified residents. These programs are delivered by the Low-Income Energy Affordability Network (LEAN). In 2017, LEAN was

[47] http://news.minneapolismn.gov/2019/02/15/minneapolis-require-residential-energy-disclosure/
[48] https://aceee.org/local-policy/city-scorecard
[49] https://www.energy.gov/lm/downloads/national-environmental-justice-advisory-committee-nejac-model-plan

expected to oversee the delivery of approximately $120 million in ratepayer and federal funds to low-income weatherization and energy efficiency programs.[50]

[50] https://aceee.org/research-report/u1908

CURRENT STATE IN KANSAS CITY MSA, KANSAS, MISSOURI

Due to Kansas and Missouri being home rule states, energy codes and standards vary greatly across jurisdictions, with several smaller and rural areas lacking energy codes entirely. Below are examples of progress that has been made in the Kansas City metropolitan area, Kansas, and Missouri to address discrepancies and misunderstandings surrounding energy codes and to improve energy efficiency.

Kansas City metropolitan area

The DOE State Energy Program under the American Recovery and Reinvestment Act of 2009 (ARRA) provided $3.2 billion in funding to cities, communities, states, U.S. territories, and Native American tribes to develop, promote, implement, and manage energy efficiency and conservation projects that ultimately created jobs. Entities that received funds (which included jurisdictions in Kansas & Missouri) had to achieve 90% compliance with the 2009 IECC or ASHRAE 90.1-2007 (or later versions) by 2017 and measure compliance each year after.[51]

Regional Energy Efficiency and Conservation Strategy (REECS):

In 2009, Mid-America Regional Council (MARC) formed a partnership with a consortium of city and county governments made up of eleven of the fourteen jurisdictions in the Kansas City metro that received funds through ARRA. The goal of REECS was to help the region conserve energy and use it wisely, as well as provide training and guidance on updated energy codes. In 2012, REECS published a final report documenting their key findings, accomplishments, and future recommendations. In addition to other accomplishments, several participating jurisdictions adopted the 2009 and 2012 IECC.

- During the project, REECS coordinated for a representative from MEEA to work with the Home Builders Association of Greater Kansas City (HBA) to walk through the 2012 IECC to lower HBA's initial estimated increased cost to construct new single-family homes. Based on input from the HBA, MEEA estimated that the incremental cost of construction to build to the 2012 over the 2006 IECC would be $3,000 for a 2,400 square foot home with a full basement, resulting in annual energy savings of $570, and a simple payback period of 5.5 years.[52]

Metropolitan Kansas City Chapter of the ICC

The Chapter was formed to promote safety relating to the construction and use of buildings and is comprised of building officials, inspectors, contractors, architects, engineers, and

[51] https://www.energy.gov/eere/wipo/energy-efficiency-and-conservation-block-grant-program
[52] https://www.marc.org/Environment/Energy/pdf/REECS-Final-Report.aspx

industry professionals from Kansas and Missouri. In January of 2020, the Chapter provided training on residential and commercial provisions in the 2018 IECC.[53]

Building energy benchmarking:
In 2015, the City of Kansas City, Missouri passed the Energy Empowerment Ordinance. This ordinance requires city-owned and operated buildings over 10,000 sq. ft. and privately-owned commercial, institutional, and multifamily buildings larger than 50,000 sq. ft. to record energy and water consumption data into ENERGY STAR Portfolio Manager.[54] See Missouri section below for more information.

2018 suite of codes by the ICC:
In the form of a metro code adoption taskforce, the Johnson County Board of Code Review (which recommends updates to the county's building codes every six years) is working with the City of Kansas City Missouri to draft a 2018 I-Codes adoption package. They hope to publish the final draft for public comment in January 2020. However, due to Kansas and Missouri being home rule sates, jurisdictions can adopt and amend the codes as they choose.[55]

Kansas

Kansas technically adopted the 2006 IECC for commercial and industrial buildings; however, it is voluntary and unenforceable. The state has not adopted statewide energy or building codes for residential buildings. The Energy Division of the Kansas Corporation Commission has nominal oversight of energy codes, but no power to change or enforce them. In 2016, they conducted a survey of building codes adopted in select cities and counties. Below are additional actions Kansas has taken to address discrepancies and misunderstandings surrounding energy codes and to improve the energy efficiency of buildings.[56]

Energy efficiency building codes working group:
To comply with ARRA requirements in 2009, a working group was established. The group held several meetings in 2009, 2010, and 2011 and endorsed an approach that encouraged voluntary code adoption by local jurisdictions and the development of effective equivalency options for builders and owners.

Time of sale disclosure:
K.S.A. 66-1228 requires the person building or selling a previously unoccupied new residential building (single family or multi-family unit of four units or less) to disclose certain energy

[53] http://www.metrokcicc.org/
[54] http://www.mwalliance.org/initiatives/policy/missouri/missouri-benchmarking-policies
[55] Fardipour, A. (2019). Johnson County Kansas Building Official. (E. Wolfe, Interviewer).
[56] https://kcc.ks.gov/kansas-energy-office/ks-building-energy-codes

efficiency characteristics using the Kansas Energy Efficiency Disclosure form (which utilizes 2006 IECC standards) to the buyer or prospective buyers at any time upon request.

Johnson County code adoption:
The county and more than half of its eighteen cities have adopted the 2012 IECC. The cities of DeSoto, Lenexa, Olathe, & Shawnee have adopted the 2018 IECC.[57]

- **Johnson County Building Officials Association:** Code officials from various jurisdictions collaborate with one another to ensure their jurisdiction adopts codes and procedures that promote uniformity within Johnson County.
- **Training for industry professionals:** The Johnson County Contractor Licensing program offers a variety of classes and education (commercial & residential) for continuing education credit. Classes are available to anyone and touch on a variety of topics including energy efficiency and the IECC.[58]
- **City of Mission, Kansas Sustainability Scorecard:** The City of Mission developed this voluntary program to reward those making sustainable choices in new construction, redevelopment, or renovations. If a project scores high enough, the Sustainability Commission will award it a certification at one of four levels: Bronze, Silver, Gold, or Platinum.[59]

City of Lawrence code adoption:
The City of Lawrence, located in Douglas County, adopted in the 2018 IECC, which became effective in July of 2019.[60]

Missouri

The state has not adopted statewide energy or building codes. In 2010, two bills were proposed that would have adopted a statewide energy code; however, both failed to advance beyond legislative committees. The energy codes adopted by jurisdictions throughout the state are listed on the State of Missouri Data Portal. Eastern Missouri communities are generally on the 2003 I-codes and are moving or have moved to the 2009 version, while western communities are generally on the 2006 I-codes and moving to the 2012 version.[61] Below are actions Missouri has taken to address discrepancies and misunderstandings surrounding energy codes and to improve the energy efficiency of buildings.

2015 Comprehensive State Energy Plan:
In 2014, Governor Jay Nixon signed Executive Order 14-06 which directed the Missouri

[57] Souders, M. (2019). City of Lenexa Building Official. (E. Wolfe, Interviewer).
[58] https://www.jocogov.org/dept/planning-and-codes/cls/education-and-classes
[59] https://www.missionks.org/files/documents/SustainabilityScorecardandSupplementalDec20181573032950120718PM.pdf
[60] http://lawrenceks.org/pds/2015constructioncodes/
[61] https://energy.mo.gov/energy-codes

Department of Economic Development, Division of Energy (DED-DE) to develop the state's first comprehensive energy plan by May 2015. After conducting their analysis and soliciting public input, the plan identified recommendations to create more jobs, grow the economy, improve the reliability and resilience of energy systems, and keep utility bills affordable.[62]

Building energy benchmarking:
Following on to the Kansas City benchmarking ordinance, in 2017, the City of St. Louis passed the Building Energy Awareness Ordinance which requires city-owned and operated buildings and privately-owned buildings 50,000 sq. ft. and larger to also record energy and water consumption data into ENERGY STAR Portfolio Manager.

- As of March 2019, only 60% of buildings reported benchmarking data to the City of Kansas City Missouri. City officials hoped at least 80% would comply. However, the KCMO Sustainability Office is actively working to address issues regarding the ordinance. In St. Louis, which had just one year of reporting results, compliance was similar.[63]

Time of sale energy disclosure:
In 2015, the Missouri DOE began administering the Missouri Home Energy Certification program. This voluntary program is designed to promote energy efficient single-family homes (new and existing). It uses the Green Building Registry (GBR) to generate a custom-designed Missouri scorecard to certify qualifying homes with a Gold or Silver certification.[64]

Missouri Residential Energy Code Support Program:
To comply with ARRA requirements, in 2016, the Missouri DOE partnered with MEEA to collect data about residential construction practices as they relate to the energy code. As a result of the study, Ameren Missouri funded a three-year program to improve understanding and support compliance with local residential energy codes. The program includes:

- **Training for industry professionals:** At low-to-no cost, home builders, code officials, and other industry professionals can participate in a variety of workshops and trainings (both in the field and classroom-style) covering everything from new codes and standards to building techniques.[65]
- **Missouri Energy Codes Collaborative:** MEEA works with local stakeholders in the collaborative to identify common areas of interest and establish its own goals. Areas of interest include common builder challenges, impediments to enforcement, and

[62] https://energy.mo.gov/sites/energy/files/Executive_Summary_FINAL_10.05.2015.pdf
[63] https://energynews.us/2019/03/19/midwest/in-kansas-city-building-owners-slow-to-comply-with-energy-benchmarking-rule/
[64] https://energy.mo.gov/GreenBuildingRegistryMO
[65] https://www.amerenmissourisavings.com/codesupport

coordination of other code support efforts. Currently, the program is only focused on residential buildings; however, there has been discussion around forming a commercial sub-committee.[66]

City of St. Louis adoption of the 2018 suite of codes by the ICC:
On August 1, 2018, the City of St. Louis became one of the first municipalities nationwide to adopt the 2018 suite of codes by the ICC without major amendments. The new codes were a major upgrade from the 2009 codes previously used and significantly improved energy-efficiency requirements for residential and commercial buildings.

- Amendments to the residential code were a compromise between the Sierra Club and the Home Builders Association of St. Louis and Eastern Missouri. Both organizations, along with members of the St. Louis Energy Coalition, provided input to the city's Building Division and Public Safety Committee during the lengthy planning process.[67]

City of Columbia adoption of the 2015 IECC:
In 2016, the Columbia City Council voted to adopt the 2015 IECC as written to regulate energy use in residential and commercial buildings.[68]

Missouri Energy Efficiency for All (EEFA):
Missouri EEFA works to improve efficiency and affordability in low-income multifamily housing through engaging utilities and building power within local communities. In December of 2018, they secured a new and expanded Multifamily Low-Income program as part of Ameren Missouri's energy efficiency portfolio. The program will invest $26 million over a six-year timeframe pursuing deep retrofits in buildings delivering benefits for building owners and residents. They also help lead the Missouri's Energy Efficiency Advisory Collaborative.[69]

[66] Blanding, I. (2019). Midwest Energy Efficiency Alliance. (E. Wolfe, Interviewer).
[67] https://nextstl.com/2018/08/key-changes-to-city-building-codes-effective-immediately/
[68] http://www.mwalliance.org/blog/columbia-mo-adopts-2015-energy-code
[69] https://www.energyefficiencyforall.org/states/missouri/

DEFINITIONS

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE): A global society advancing human well-being through sustainable technology for the built environment. The Society and its members focus on building systems, energy efficiency, indoor air quality, refrigeration and sustainability within the industry.

ASHRAE Level 1 Energy Audit: The basic starting point for building energy optimization. It consists of an initial review of the property's utility bills and a brief site survey of the building, its systems, and its modes of operation. The primary objective of the audit is to provide a savings and cost analysis of low-cost/no-cost measures. It may also provide a list of more capital-intensive improvements that merit further consideration.

ASHRAE Standard 90.1: Standard that provides the minimum requirements for energy-efficient design of most buildings, except low-rise residential buildings. It offers, in detail the minimum energy-efficient requirements for design and construction of new buildings and their systems, new portions of buildings and their systems, and new systems and equipment in existing buildings, as well as criteria for determining compliance with these requirements.

Building energy benchmarking: A mechanism to measure energy performance of a single building over time, relative to other similar buildings, or to modeled simulations of a reference building built to a specific standard (such as an energy code).

The City Energy Project is a joint project of National Resource Defense Council and IMT, and is a national initiative to create healthier and more prosperous American cities by improving the energy efficiency of buildings. Working in partnership, the Project and participating cities support innovative, practical solutions that cut energy waste, boost local economies, and reduce harmful pollution. The pioneering actions of the 20 cities involved in the City Energy Project will be models for communities nationwide and around the world.

ENERGY STAR for commercial and industrial buildings: Program in which the EPA partners with businesses and public-sector organizations to transform the way commercial buildings and industrial plants use energy.

Energy Rating Index (ERI): An optional compliance path incorporated in the IECC since 2015. The most used ERI in the U.S. is the Residential Energy Services Network (RESNET) HERS Index, which is the industry standard for measuring a home's energy efficiency and the nationally recognized system for inspecting, testing and calculating a home's energy performance. The 2015 and 2018 IECC specify an ERI target score for each climate zone.

- RESNET HERS Index: The U.S. DOE determined a typical resale home scores 130 on the HERS Index while a home built to the 2006 IECC is awarded a rating of 100. A net zero energy home scores an ERI of 0. A certified RESNET HERS Rater does an energy rating on a home to calculate its score.

Energy Star Portfolio Manager: An interactive energy management tool, created by the EPA, that allows building owners to securely track and assess energy and water consumption across a building portfolio. Portfolio Manager can help set investment priorities, identify under-performing buildings, verify efficiency improvements, and apply for ENERGY STAR certification for superior energy performance.

- ENERGY STAR certification: Like a lightbulb or refrigerator, a building can earn an earn ENERGY STAR certification for being an energy-efficient top performer that saves money without sacrificing performance. To be certified, a building must meet strict energy performance standards set by EPA.

Green Building Registry (GBR): Created by Earth Advantage, this platform is designed to automatically pull home energy data from qualified sources like the U.S. Department of Energy (DOE) Home Energy Score™ (HES or HEScore), Residential Energy Services Network (RESNET), and other qualified certification and energy efficiency programs.

Home Energy Score: A score developed by the DOE that provides homeowners, buyers, and renters directly comparable and credible information about a home's energy use. Like a miles-per-gallon rating for a car, the score is based on a standard assessment of energy-related assets to easily compare energy use across the housing market. DOE-trained assessors can provide the Home Energy Score within an energy audit, home inspection package, or as a standalone product.

Home Performance with ENERGY STAR: Program that connects homeowners with experienced and trusted contractors that can help them understand their home's energy use and identify home improvements that increase energy performance, improve comfort and health, and lower utility bills.

Home-rule: A delegation of power from the state to its sub-units of governments (including counties, municipalities, towns, or villages). That power is limited to specific fields and subject to constant judicial interpretation but creates local autonomy and limits the degree of state interference in local affairs. The powers and limits of home rule authority are defined state-by-state. They can be defined by each state's constitution and/or statutes enacted by its legislature.

International Code Council (ICC): A nonprofit association that provides a wide range of building safety solutions including product evaluation, accreditation, certification, codification, and training. It

develops model codes and standards used worldwide to construct safe, sustainable, affordable and resilient structures.

International Energy Conservation Code (IECC): Code officials recognize the need for a modern, up-to-date energy code addressing the design of energy-efficient buildings through requirements emphasizing performance. The ICC is designed to meet these needs through model code regulations that will result in the optimal utilization of fossil fuel and nondepletable resources in all communities. It contains separate provisions for commercial and low-rise residential buildings (three stories or less in height above grade).

National Green Building Standard (NGBS) New Green Home: Certification provides independent, third-party verification that a home, apartment building, or land development is designed and built to achieve high performance in six key areas: site design, resource efficiency, water efficiency, energy efficiency, indoor environmental quality, and building operation & maintenance.

Passive House: A voluntary standard for energy efficiency in a building, which reduces the building's ecological footprint. It results in ultra-low energy buildings that require little energy for space heating or cooling. Passive building principles can be applied to all building types – from single-family homes to multifamily apartment buildings, offices, and skyscrapers.

Truth in Sale of Housing (TISH) report: Evaluation required in certain Minnesota cities for any sale of a single-family house, duplex, townhouse, or first-time condo conversion. The report is focused on risks to life or health and usually made up of recommended and required fixes. Evaluations are completed by a licensed evaluator.

U.S. Green Building Council (USGBC) LEED Certified Home: Leadership in Energy and Environmental Design (LEED), is the most widely used green building rating system in the world. Available for virtually all building, community and home project types, LEED provides a framework to create healthy, highly efficient and cost-saving green buildings.

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