Raising the Roof on Resilience: State Actions in Building Energy Policy

Ellen M. Franconi, Ph.D., Innovative Energy Research Collaborative
Kathryn B. Janda, Ph.D., Innovative Energy Research Collaborative

ABSTRACT

Weather and climate events in the U.S. are occurring with increased frequency and escalating damage costs. Recent shifts in federal priorities regarding disaster resilience raise questions about the predictability of federal support and the long-term ability of states to prepare for future disasters. Additionally, building code adoption across the U.S. varies widely, with states adopting older or newer code versions—or none at all—resulting in a patchwork of requirements governing structural integrity, life safety, and energy efficiency. In light of these considerations, the most effective state actions for improving building resilience remain unclear.

This paper examines the role of state building energy codes and supporting programs in improving building resilience, with a focus on thermal resilience in new residential buildings. It explores the current energy–resilience policy ecosystem through seven efficiency–resilience policy examples, including activities in three states and four federally funded projects. A systems-thinking framework developed by Meadows is applied to support this assessment.

The findings show that meaningful progress is already underway, with enacted policies advancing energy codes, stretch codes, and building performance standards that strengthen regulatory systems and align building policy with broader climate goals. Viewed through the Meadows framework, this progression suggests that durable change depends not only on updates to code requirements but also on strengthening technical guidance, analytical methods, and institutional capacity that enable implementation, feedback, and continuous improvement.

Introduction

Weather and climate events in the U.S. are occurring with increased frequency and escalating damage costs. Such events can include cyclones, inland floods, landslides, droughts, heat waves, cold snaps, winter storms, severe local storms (tornadoes, hail, wind), and wildfires. In 2024, U.S. damages totaled just over $180 billion, caused by 27 disaster events, each exceeding $1 billion in damage (NOAA, 2026). The effects of acute natural hazard events are now triggering prolonged system failures, where structural shock can be followed by extended infrastructure collapse. Since modern buildings heavily rely on active systems, buildings that survive the short-duration acute event, such as a heat wave, may not be able to maintain safe indoor temperatures during multiple days of a blackout. Under these conditions, thermal resilience becomes a life-safety issue, equivalent to pro-active hazard mitigation efforts targeting collapse prevention.

Historically, the U.S. federal government and states work together to address resilience and mitigation needs. States develop and maintain comprehensive plans to prepare for, respond to, and recover from natural disasters, which often define the role of state agencies, local governments, and partners. The federal government, through agencies like the Federally Emergency Management Agency, works with states, tribes, and local communities to building capabilities to reduce risk and strengthen resilience. The Stafford Act[1] allows the President to declare disasters and authorized federal aid – including financial assistance, logistics support, and federal resources – to support state and local response and recovery efforts.

Recent shifts in federal priorities regarding disaster resilience have raised questions among states about the predictability of future federal support for resilience planning, preparedness, and disaster relief (Layne 2025). One major shift is the proposed termination of FEMA's primary pre-disaster mitigation grant program, the Building Resilient Infrastructure and Communities (BRIC) program (FEMA 2026), which would halt the release of approximately $1 billion allocated for the current funding cycle. In addition, reports indicate that FEMA has experienced significant workforce reductions, although some staff members have recently been asked to return following a lawsuit ruling (Katz 2026). Historical data also demonstrate that presidential approval of disaster declaration requests has traditionally occurred independent of political considerations; however, disaster declarations during the current presidential term have diverged from this pattern (Frank 2026). Finally, the Stafford Act still does not formally recognize extreme heat as a major disaster category. As a result, states face significant limitations in accessing federal disaster assistance for heat-related events. It also reduces funding available for proactive heat resilience planning and mitigation. This can include cooling infrastructure, urban heat adaptation, public health interventions, and grid resilience improvements.

These political developments raise concerns about the reliability of federal support, equitable access to federal funding, and states' long-term capacity to prepare for and respond to future disasters. In addition, because states cannot reliably access FEMA disaster funding for extreme heat, states need a proactive strategy to improve building thermal resilience and reduce vulnerability before extreme heat or cold disasters occur.

State adoption of building energy codes can serve as an important tool for improving building thermal resilience and mitigating the impact of extreme temperatures on building occupants. Modern energy codes improve building performance through better insulation, high-efficiency space-conditioning equipment, reflective materials, improved ventilation, and tighter envelopes. These measures help maintain safer indoor temperatures, lower the risk of exposure-related illness and mortality, especially for vulnerable populations such as low-income households and older adults. Improved codes can also enhance passive survivability, allowing buildings to remain habitable for longer during power outages or grid stress events that often accompany extreme temperatures.

This paper examines state-led building energy policies, with a focus on building energy codes and complementary actions, as mechanisms for improving thermal resilience during extreme heat and cold events. In light of growing uncertainty surrounding the availability and consistency of federal disaster resilience support, the study investigates policy actions enacted in three states to advance energy efficiency–resilience objectives. In addition, four federally funded research

[1] The Stafford Act, originally passed in 1988, is an amended and renamed form of the Disaster Relief Act of 1974. Its most recent update occurred through the Disaster Recover and Reform Act of 2018, which restructured how mitigation and preparedness are funded nationwide and established the current framework for disaster response and recovery through presidential disaster declarations.

projects are examined to illustrate complementary efforts that strengthen the broader building energy policy ecosystem.

The state policy review informs a proposed efficiency–resilience policy evolution pathway developed in this paper. The research projects demonstrate how technical assistance and applied research can support implementation and address gaps within this evolving system. To support this assessment, the paper applies a systems-thinking framework developed by Meadows (1999) to identify effective policy interventions within a complex adaptive system.

Background

As climate risks intensify, the term resilient building is used with increasing frequency. Yet the concept often blends together two distinct design priorities: resilience to acute natural disasters and resilience to prolonged environmental stress and infrastructure failure. Buildings designed for natural disasters address the structural survival of the building under sudden, extreme forces. By contrast, building thermal resilience prioritizes continued habitability during extreme heat or cold, and power outages during prolonged energy infrastructure system failure. Achieving thermal resilience (also referred to as "passive survivability"), focuses less on structural fortitude and more on environmental buffering. High insulation levels, airtight envelopes, passive solar heating, shading strategies, and natural ventilation allow interiors to maintain safer temperatures even when mechanical heating or cooling systems fail. However, with the growing occurrence of acute natural hazard events triggering prolonged system failures, and modern buildings heavily relying on active systems (such as mechanical heating and cooling, ventilation, smoke control, and sump pumps), structural and thermal resilience are interdependent and reflect different components in a layered code system.

Building Codes

In general, building codes set minimum standards for how structures must be designed to ensure occupant safety and sufficient functional services. Building codes also include provisions that address natural hazards, such as high winds, flooding, earthquakes, wildfire, and heavy snow. Building codes pertain to new building construction, additions, and major renovations. In the United States, most states base their codes on model standards published by the International Code Council (ICC), which includes the International Building Code (IBC) and International Residential Code (IRC). The developing organizations publish model code updates every three years to reflect new research, engineering advances, and lessons learned from recent disasters. (DOE, 2024a)

The building energy codes referenced by the IBC and IRC are also published by the ICC as part of the International Energy Conservation Code (IECC), which contains section IECC-C for commercial buildings and section IECC-R for residential buildings (IECC 2024). The IECC specifies requirements for common commercial and residential building types across 19 global climate zone categories, including 17 relevant to the U.S. Use of building energy codes varies from state to state. Some states adopt statewide mandatory codes. Others allow local governments to adopt and enforce codes independently. A few states have limited or no statewide building energy code requirements.

States often do not adopt model energy codes verbatim but instead amend their provisions to reflect local priorities, sometimes including or excluding measures that enhance building performance but may increase upfront costs for owners (although are cost effective over the measure life). As a result, the landscape of adopted residential energy codes in the United States varies considerably. For example, current state code equivalencies include 25 states with requirements at or below the 2009 IECC, 11 states meeting or exceeding the 2021 IECC, and the remaining 14 states falling between these benchmarks (DOE 2025).[2]

Systems Thinking and Building Energy Policy

The emerging need to consider building infrastructure and resilience in a more integrated way requires linking building codes with complementary resilience-related policies to support coordinated action. As a starting point, this paper considers a focused resilience-related policy scope: the ecosystem of building energy policies aimed at achieving thermal resilience. Insights into the interactive relationships among these policy actions can be developed by applying a systems-thinking approach, such as the framework developed by Donella H. Meadows through her organization, the Sustainability Institute (Sustainability Institute 2002).

Meadows emphasized that complex systems require understanding how multiple elements interact, how feedback loops operate, and how the goals and paradigms of the system shape outcomes. In her seminal essay *Leverage Points: Places to Intervene in a System*, Meadows (1999) identifies twelve points of intervention – places where a small, well-targeted change can produce large systematic effects. Intervention points range from the establishment of technical parameter values to high-leverage paradigms that institutionalize the purpose of the system. Policies targeting higher-leverage points tend to have greater long-term impact than technical parameters alone. Table 1 lists the twelve leverage points identified by Meadows, ordered from least to most powerful. To support this assessment, we interpret Meadows' work and apply it to building energy efficiency policies that contribute to thermal resilience. The table presents examples of interventions at each leverage point, applied to building energy codes, standards, and supporting programs that advance resilient building outcomes based on this interpretation.

Table 1. Meadows' leverage points applied to the building energy code ecosystem

Meadows' framework (listed from lower to higher impact)		Building energy code and standards examples	
Leverage point	Description	Requirement	Mechanisms
12. Constants, parameters	Technical details or numeric values that can be adjusted	Insulation R-values, window U-factors, HVAC efficiency ratings	Code provisions
11. Buffer sizes	Capacity to absorb stress or variability	Thermal capacitance, mass in walls/floors, hot water tank, onsite battery storage	Code provisions, resilience metrics

[2] As required by federal mandate, the U.S. Department of Energy (DOE) supports building energy code advancement, including completing new code adoption impact analyses and reporting results for each U.S. state.

10. Stock/flow structures	How components are physically connected and interact	Building envelope design, distribution, back-up systems, grid-interaction	Code provisions, system performance metrics, resilience metrics
9. Delays	Time lags between actions and system responses	Time between code adoption and measurable energy savings or resilience outcomes	Regular code update cycle, expedited implementation, stretch code innovation
8. Negative feedback loops	Stabilizing mechanisms that reduce deviations	Routine inspections, quality assurance checking	Code compliance site inspections, measure testing
7. Positive feedback loops	Reinforcing mechanisms that accelerate change	Incentives for high-performance building certifications or installation of advanced technologies	Incentive and rebate programs
6. Information flows	Availability, clarity, and accessibility of data	Post-occupancy monitoring, public energy-use reporting, field studies	Data, benchmarking, and disclosure programs
5. Rules	Formal regulations and standards	State energy codes, stretch codes, local building performance standards, electrification requirements	Building energy codes, stretch codes, performance standards
4. Self-organize, system structure	System's ability to adapt, innovate, and evolve	Piloting resilience measures, adapting codes to regional hazards, iterative code updates based on performance data	Stretch codes, efficiency- compliance verification, resilience metrics, collaborations
3. Goals	The objectives the system seeks to achieve	Passive survivability, climate-adaptive buildings, carbon neutrality, occupant health and safety	Codes and standards title, purpose, scope addressing multiple objectives
2. Paradigms / mindset	The underlying assumptions and worldview shaping the system	Viewing buildings as critical infrastructure for resilience, energy efficiency as a public good, prioritizing human safety during extreme events	Coordinated policies across the building life cycle addressing efficiency, resilience, public health , safety, and grid reliability
1. Transcending paradigms	The ability to question or redefine assumptions	Rethinking urban development, integrating energy and resilience planning	Integrated policy development that prioritizes reduction of systemic risk over short-term cost savings

In the Meadows framework, regulatory rules and technical specifications establish the system's structure and influence building performance. These changes are easier to implement but usually have minimal or temporary impact. Feedback mechanisms – such as benchmarking, code-compliance studies, and post-occupancy monitoring – create information flows that inform future code updates that include new and/or revised regulations. At a higher level, the establishment of policy goals and paradigms such as “passive survivability” or “climate-adaptive buildings” redefine what success looks like, guiding decisions about siting, energy efficiency, and resilience. Thinking about policy actions as a system enables policy makers to identify complementary and coordinated interventions rather than a collection of discrete, isolated elements. Key insights revealed by the framework include the following.

1. Higher-leverage interventions (Goals, Paradigms, Self-Organization) produce greater long-term impact than adjusting technical parameters alone.
2. Feedback and information flows allow continuous learning and adaptation, which is essential for integrating structural and thermal resilience into codes.
3. Complementary interventions across leverage points strengthen the building policy ecosystem, enabling resilient, climate-adaptive communities.

State Initiatives Supporting Building Energy Resilience

We apply the Meadows framework to state policy actions to characterize the ecosystem of building energy code policies addressing thermal resilience. The assessment includes (1) policy actions undertaken in three states and (2) emerging efforts advanced through four federally funded research projects. Collectively, these seven examples illustrate how thermal resilience is being addressed through state policy, the Meadows leverage points they engage, and opportunities to further integrate resilience considerations into building energy code systems.

Example State Actions

Example efforts taken across three states, Massachusetts, New York, and California, highlight implemented policies integrating resilience considerations into building energy codes and standards. The examples are intended to be illustrative rather than exhaustive.

Massachusetts: Code innovation through stretch code adoption
Massachusetts represents a state with a mature energy-code regime where thermal resilience emerges indirectly from very strong envelope and efficiency requirements, rather than being an explicit policy objective. The state updates and maintains three tiers of energy codes: the Base Code, the Stretch Code, and the Specialized Stretch Code. The default code is the Base Code, which references IECC 2021 (IECC 2021). The stretch codes are opt-in codes requiring a municipal vote. The Stretch Code exceeds the state Base Code envelope and HVAC equipment efficiency levels and aligns with passive design principles, which support improved thermal resilience. The Specialized Stretch Code includes requirements beyond the Stretch Code. It is specifically designed to further align new construction with the state’s 2050 net-zero greenhouse gas target. It requires electric-ready wiring for solar, EVs, and HVAC systems (DOER 2026a). Approximately three-fourths of Massachusetts municipalities, covering 93% the state’s population, have voluntarily adopted a stretch energy code (DOER 2026b). High adoption rate is driven by the associated benefits including access to funding and code implementation support, in addition to long term annual cost savings. Stretch code adoption is one of five qualifying criteria for a municipality to be designated a “Green Community”, which unlocks access to funding for municipal efficiency projects, infrastructure upgrades, and technical assistance

(DOER 2026c). Complementary support is provided through Mass Save (Commonwealth of Massachusetts, 2023), a utility-funded program that supports code enforcement through compliance tools, guidance, and inspector training. Mass Save also provides incentives to homeowners, which further reinforces code adoption benefits. The Massachusetts Department of Energy Resources (DOER) is the central agency for energy code evolution and compliance support. Under its direction, Massachusetts has created a strong energy code system that continuously links energy code evolution, incentives, and compliance support. In addition, because stretch codes are adopted locally, they promote experimentation and policy learning, which helps the adaptation and strengthening of the building energy code policy system.

New York: Code and climate law integration with emerging resilience framing. New York represents a state in an efficiency-resilience transition stage where climate law is actively reshaping energy codes, pushing electrification and beginning to connect building performance with resilience outcomes. The Climate Leadership and Community Protection Act (Climate Act) establishes mandatory decarbonization targets to achieve a net-zero economy by 2050 (New York State 2026). It also requires state planning to address public health impacts of climate change, urban heat exposure, and environmental justice (New York State Planning Board 2020). The Climate Act provisions directly influence building energy code evolution. The Energy Conservation Construction Code of New York State (ECCCNYS) references the most current published version of the IECC energy codes (2024 IECC) with amendments added to improve envelope and equipment efficiency and increase electrification (New York State Department of State 2025). The ECCCNYS provides incentives for Passive House[3] construction for single family and multifamily buildings, including tax abatement, cost rebates, and zoning flexibility benefits. These Climate Act-driven provisions push heat pump installations to improve cooling system efficiency, encourage the elimination of fossil-fuel heating systems in new buildings, and facilitate pairing electric back-up power and renewables. New York has also invested in workforce capacity, training, and technical assistance through the New York State Energy Research and Development Authority (NYSERDA) and local authorities, which strengthens the system structure for code enforcement (NYSERDA 2026). NYSERDA also provides programs supporting cooling access, building retrofits, and energy affordability programs that explicitly target health impacts of extreme heat and low-income housing heat risk.

California: Advanced code integrating energy, heat risk, and grid resilience. California represents a highly integrated and mature energy code system where climate law, grid policy, and building standards are tightly coupled, with an increasing resilience framing. The state's building energy code, Title 24, Part 6, is strongly shaped by statutory climate mandates (CEC 2025). These include the California Global Warming Solutions Act (AB 32) and its extensions that establish binding greenhouse gas reduction and carbon neutrality goals, as well as SB 100, which requires a transition to 100% clean electricity (CEC 2021). In response, Title 24 has progressively shifted toward all-electric readiness, high-efficiency heat pump technologies, rooftop solar requirements, and increasing support for battery storage and demand flexibility. In addition, extreme heat, wildfire smoke, and wildfire-related power shutoffs have highlighted the increasing need to embed resilience performance outcomes through efficiency, electrification, and grid-interactive design. High-performance envelopes, cool roof requirements, and ventilation

---

[3] This refers to the Passive House building standard published by the Passive House Institute US (PHIUS). More information is available at https://www.phius.org .

provisions improve thermal comfort and indoor environmental quality during extreme heat and wildfire smoke events, while tighter buildings reduce uncontrolled infiltration. At the same time, solar-plus-storage pathways and demand-responsive technologies improve the ability of buildings to maintain critical functions during Public Safety Power Shutoffs and grid emergencies. Implementation is reinforced through a strong supporting ecosystem led by the California Energy Commission (CEC) and the California Public Utilities Commission (CPUC 2026), along with utility incentive programs and workforce training that accelerate adoption of emerging technologies. California also advances innovation through a "code-to-market" pipeline, where pilot programs, stretch standards, and utility demonstrations test technologies such as heat pumps, smart controls, and distributed storage before they are incorporated into mandatory code requirements (ETCC 2026). Together, this system makes California's energy code one of the most policy-integrated in the United States, linking decarbonization, grid modernization, and emerging climate resilience outcomes within a single regulatory framework.

Summary of State Actions

Table 2. State examples of policy focus and Meadows' leverage points

State	Policy focus	Leverage points
Massachusetts	Municipal stretch energy codes, electrification policies, innovation, incentives	Parameters, rules, feedback loops, information flows
New York	Advanced energy codes, Passive House incentives, electrification, public health, decarbonization	Parameters, rules, feedback loops, information flows, goals, emerging paradigm shift
California	Advanced design, load flexibility, electrification, grid-interactive design, public health, decarbonization, resilience framing	Parameters, rules, feedback loops, information flows, goals, paradigm shift

Infrastructure Investment and Jobs Act Projects

The second set of policy initiatives feature four projects approved for federal funding through the Infrastructure Investment and Jobs Act (IIJA) Resilient and Efficient Codes Implementation initiative aimed at advancing resilient building energy codes (DOE 2024b). DOE assigned Pacific Northwest National Laboratory (PNNL) to be the program administrator. PNNL also provided project technical assistance upon request and approval. The example initiatives illustrate emerging efforts.

Connecticut Climate Resilient Energy Code. The goal of the Connecticut Climate Resilient Energy Code (CT CREC) project, led by the Clean Energy Group, is to enhance energy security for vulnerable residents of affordable multifamily housing while serving as a model climate-resilient energy code for the nation. Its objectives are to improve indoor conditions during periods of extreme temperatures, enable residents to shelter in place more safely during extended power outages, and minimize disruptions to electricity-dependent home medical devices. The CT CREC integrates new, comprehensive, efficiency-resilience code language into the 2021 IECC. Key requirements include a high-performance building envelope, controlled ventilation, critical-load wiring, heat-island mitigation measures, solar photovoltaic and battery storage systems, and emergency power systems. The sizing of emergency power systems is tied to maintaining habitable conditions and serving critical loads (CEG 2025). The project scope includes a code cost-impact analysis that evaluates the monetary benefits of energy-efficient design measures and improved health outcomes. IIJA funding supported the project through nearly its entire duration and expanded the scope to include contributions from expert advisors and engagement with stakeholders. Technical assistance provided by PNNL included prototype building performance modeling. Simulation results were used to align prescriptive code requirements with the project's habitability and shelter-in-place objectives (NBI 2025). The draft CT CREC document is currently under review. The final code document and updated impact analysis are still pending, with remaining completion costs to be covered by funding provided by a Connecticut-sponsored grant program.

Resilient Southwest Collaborative. This regional initiative brings together southwestern states and municipalities, including eleven cities located in Arizona and New Mexico, to develop new building code requirements to address shared climate risk concerns (NBI 2024). The intent of the Resilient Southwest Collaboration (RSWC)[4] is to include provisions that address local extreme heat, drought, and wildfire hazards. A complementary goal for the collaboration is to transform regional construction practices to preserve affordability and regional characteristics while proactively and responsibly protecting and conserving the region's environment and natural resources. The initial project efforts include the establishment of an advisory group and panel and the compilation of their recommendations for the technical scope and content of a regional resilience code. In addition, the IIJA funding affords the development of implementation resources and enhanced training opportunities, as well as engagement with community and building stakeholders. Currently, the IIJA funding is on hold, but the collaborative continues its work with the cities in the Southwest.

NASEO Building Codes and Resilience Field Study[5]. The National Association of State Energy Officials (NASEO) leads a data collection effort involving market characterization studies in two states, Arizona and Florida[6,7] The project aims to establish a new, nationally replicable methodology for assessing energy related construction practices that improve the durability of residential buildings (NASEO 2023). The field study procedures will expand upon already established methods used to assess building construction practices. The effort will strengthen the information infrastructure of the building energy policy system by generating empirical data that links energy-related construction practices provisions to home durability outcomes. Recent accomplishments include the identification of key building components for

---

[4] K. Berry (New Buildings Institute), telephone communication with author, February 18, 2026. This conversation provided the basis for the summary described in this section.
[5]The project is in the process of rescoping and will tentatively be called "Establishing and Testing a Residential Building Construction and Durability Market Characterization Study Methodology" The summary reflects the modified scope.
[6]S. Fazeli (NASEO), email exchange, July 9, 2026. This communication provided updated information regarding the project scope and tentative new title.
[7] C Wu and A. Winslow (Northeast Energy Efficiency Partnerships), telephone communication with author, February 27, 2026. This conversation provided general information about the project.

implementation inspection, including the associated validation approach (e.g., visible inspection, spot metering, or data collection). In addition, state stakeholder meetings have been held to collect feedback on and refine the data collection methodology.

City of Annapolis and Anne Arundel County Building Energy and Resilience Performance Standard (MD BERPS). The project, initiated and led by the Resilience Authority for the City of Annapolis and Anne Arundel County in Maryland, involves the expansion of Maryland's existing Building Performance Standard to encourage increased building resiliency, and the translation of resiliency gains into insurance credits.[8] A key motivation for the project is the increasing cost of insurance for building property owners due to local flooding risk across the county's extensive 500-mile coastline. The project team includes five partner cities, located in Vermont, California, Colorado, Massachusetts, and New York, as well as expert consulting firms and the regional non-profit efficiency organization - the Northeast Energy Efficiency Partnerships (NEEP). The updated draft code provisions introduce new feedback loops between building performance data and regulatory frameworks. The approach includes shifting building performance standards policy from prescriptive design requirements to outcome-based metrics, requiring buildings to meet specified performance thresholds and resilience credits over time. The draft code also includes placeholder language that allows other jurisdictions to conveniently customize the code to address local hazards and include the ratified resilience mitigation measures, their assigned points, and compliance thresholds. As of Fall 2025, the IIJA project was declared terminated by its federal sponsors, although the project team is currently challenging its contract disruption. In the meantime, the team is seeking alternative funding options.

Summary of IIJA Project Initiatives

Table 3. IIJA Examples of Policy Initiatives and Leverage Points

Project	New energy code policy contributions	Leverage points
CT CREC	Thermal resilience energy code, habitability thresholds, metrics	Parameters, rules, goals
RSWRBC	Collaborative adaption of code to address local hazards	Parameters, feedback loops, information flows, system structure, paradigm shift
NASEO field study	Field testing of energy construction practices effecting thermal conditions	Feedback loops, information flows, system structure
MD BERPS	Alignment of regulations with resilience outcomes	Parameters, feedback loops, information flows, rules, goals

[8] K. Alexander and G. Cohee (Annapolis and Anne Arundel County Resilience Authority), telephone communication with author, March 11, 2026. This conversation provided the basis for the summary described in this section.

Discussion

The absence of a single, nationwide building energy code in the U.S. has resulted in a diverse landscape of state-adopted energy codes. Many states have yet to adopt modern energy codes, with some current requirements reflecting efficiency levels equivalent to or below those of the 2009 IECC (DOE 2025). However, as extreme temperatures and other natural hazards intensify, and as federal priorities shift in their support of state resilience efforts, building energy codes are becoming an increasingly important policy tool for protecting residents. The policy examples examined in this paper provide insight into the motivations driving states to expand code objectives beyond energy efficiency to include thermal resilience and other climate-related considerations. Key drivers include decarbonization plans and mandates, clean electricity targets, mitigation of local natural hazard risks, public health concerns, and grid stress.

Taken together, these policy actions suggest an efficiency–resilience policy evolution pathway. Along this pathway, foundational energy efficiency measures are progressively expanded through resilience-focused provisions and ultimately integrated into a broader climate resilience framework that encompasses building performance, occupant safety, and long-term adaptation objectives.

Foundational policy actions. Foundational efficiency-resilience policy actions leverage established energy-code frameworks to improve building performance while indirectly supporting resilience goals. The system is further strengthened through incentives that encourage widespread adoption of stretch codes, driving innovation, code evolution, and improved compliance. The approach uses positive feedback loops to encourage the use of new parameters to address goals not yet explicitly established for the system.

Transitional policy actions. Additional policy advancements, motivated by climate-related hazards and public health concerns, more explicitly incorporate passive survivability provisions in adopted energy code. Examples include requiring compliance with Passive House standards and adding provisions that facilitate the integration of clean energy and backup power systems. Such provisions reflect changes made to the rules comprising the energy code system. Feedback mechanisms, such as incentives and compliance verification, combined with information flows such as workforce training and technical assistance, make the system more adaptive and reinforce resilience objectives.

Integrated policy actions. Long-lasting advancements further expand the purpose of energy codes to include safe indoor conditions during prolonged grid outages. This shifts the goals of the code and influences the development of supporting provisions. Emerging requirements may address electric readiness, demand-responsive technologies, and electric backup power systems. Additional provisions can also be tailored to local hazard conditions. For example, regions facing extreme heat may adopt cool roofs and high-efficiency cooling equipment, while wildfire-prone areas may require ducted ventilation systems with controllable airflow to reduce smoke exposure. At the highest impact level, paradigm shifts are occurring as states enact broader climate-focused legislation and establish new government entities to coordinate resilience efforts across policy programs and identify shared funding opportunities.

Conclusions

Climate change is reshaping the risks that buildings must withstand, from prolonged heat waves and wildfire smoke events to grid disruptions and extreme weather. As these hazards intensify, building energy codes are evolving beyond their traditional role of improving efficiency to become instruments of climate resilience.

The examples examined in this paper demonstrate that meaningful progress is already underway. The featured enacted policies are advancing energy codes, stretch codes, and building performance standards that strengthen regulatory frameworks and align building policy with broader climate goals. Although federal funding for IIJA initiatives supporting building resilience—including research collaborations, resilience code development, and field studies—may have been delayed or discontinued in some cases, similar collective actions may be achieved through regional partnerships and the pooling of state resources. Collaboration among states facing common climate-related hazards can facilitate the exchange of technical expertise, development of model code provisions, workforce training, and coordinated research efforts while reducing the burden on individual jurisdictions.

Taken together, the findings suggest that strengthening building resilience requires a systems-oriented policy approach that aligns planning frameworks, regulatory codes, implementation programs, and performance evaluation. Policies that address only a single stage of the building life cycle may produce incremental improvements, but broader and more durable resilience outcomes are achieved when interventions occur across multiple leverage points within the system. By applying systems thinking to building policy design, states and local jurisdictions can better coordinate regulatory frameworks, technical standards, and implementation programs to support resilient buildings and communities in the face of increasing climate-related hazards. The findings further suggest that while many states have independently developed robust approaches to advancing thermal resilience through energy codes, continued collaboration across jurisdictions may accelerate innovation, improve consistency in resilience practices, and strengthen collective capacity to address shared climate challenges.

References

CEC (California Energy Commission). 2021. *California Building Decarbonization Assessment*. Publication No. CEC-400-2021-006. Sacramento

CEC (California Energy Commission). 2025 Building Energy Efficiency Standards for Residential and Nonresidential Buildings: Title 24, Part 6, and Associated Administrative Regulations in Part 1. Publication No. CEC-400-2025-010. Sacramento.

CEG (Clean Energy Group). 2025. *Draft Connecticut Climate Resilient Energy Code.* https://www.cleanegroup.org/publication/draft-ct-climate-resilient-energy-code/

CPUC (California Public Utilities Commission). 2026. *TECH Clean California*. Accessed June 15, 2026. https://www.techcleanca.com

DOE (U.S. Department of Energy). 2025. "State Portal: Building Energy Codes Program." U.S. DOE. December 31, 2025, https://www.ncei.noaa.gov/access/billions/ . Accessed February 23, 2026.

DOE (U.S. Department of Energy). 2024a. *Building Energy Codes Program.* https://www.energy.gov/eere/buildings/building-energy-codes-program

DOE (U.S. Department of Energy). 2024b. *Resilient and Efficient Codes Implementation (RECI) program overview.* energycodes.gov/RECI

ETCC (Emerging Technologies Coordinating Council). 2026. *Oversight and Technology Adoption.* Accessed June 15, 2026. https://www.etcc-ca.com/oversight-and-technology-adoption

FEMA (Federal Energy Management Agency). 2026. Building Resilient Infrastructure and Communities (BRIC). Accessed June 15, 2026. https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities

Frank, T. 2026. "It's 3 times harder for blue states to get disaster funding under Trump." *Politico*. March 26. www.politico.com/news/2026/03/23/trump-denies-disaster-aid-for-democratic-led-states-00831199

ICC (International Code Council). *2024 International Energy Conservation Code (IECC).* Country Club Hills, IL: International Code Council, 2024.

ICC (International Code Council). *2021 International Energy Conservation Code (IECC).* Country Club Hills, IL: International Code Council, 2021.

Katz, E. 2026. "FEMA brings back employees it recently let go as it looks to 'stablize' its workforce." *Government Executive*. May 4. www.govexec.com/workforce/2026/05/fema-brings-back-employees-recently-let-go/413308/

Layne, N. 2025. "FEMA should take new name, states should bear costs, DHS head Noem says." *Reuters.* May 20. www.reuters.com/business/environment/fema-should-take-new-name-states-should-bear-costs-dhs-head-noem-says-2025-05-20/?utm_source=chatgpt.com

DOER (Massachusetts Department of Energy Resources). 2026a. *Building Energy Code.* Commonwealth of Massachusetts. Accessed June 7, 2026. https://www.mass.gov/info-details/building-energy-code.

DOER (Massachusetts Department of Energy Resources). 2026b. *Massachusetts Building Energy Code Adoption by Municipality.* Commonwealth of Massachusetts. Accessed June 7, 2026. https://www.mass.gov/info-details/massachusetts-building-energy-code-adoption-by-municipality.

Massachusetts Department of Energy Resources. 2026. *Being a Green Community.* Commonwealth of Massachusetts. Accessed June 7, 2026. https://www.mass.gov/info-details/being-a-green-community.

Meadows, Donella. (1999). *Leverage points: Places to intervene in a system.* donellameadows.org/archives/leverage-points-places-to-intervene-in-a-system/

NASEO (National Association of State Energy Officials). 2023. *Building codes and resilience field study.* www.naseo.org/issues/buildings/building-energy-codes

NBI (New Buildings Institute). 2024. *Resilient Southwest Building Code Collaborative.* https://resilientsouthwest.org/

NBI (New Buildings Institute). 2025. "Assessing the Benefits of Climate Resilient Codes," NBI, accessed June 15, 2026. https://newbuildings.org/ct-cre-code

New York State. 2026. *New York's Climate Leadership and Community Protection Act*. Accessed June 15, 2026. https://climate.ny.gov/

New York State Department of State**.** 2025. *2025 Energy Conservation Construction Code of New York State (ECCCNYS).* Albany, NY: New York State Department of State, 2025.

NOAA (National Oceanic and Atmospheric Administration), 2026. "Billion-Dollar Weather and Climate Disasters." *NOAA*. February 23. www.ncei.noaa.gov/access/billions/ .

NYSERDA (New York State Energy Research and Development Authority)**.** 2026. *Energy Code Training and Support Services.* Accessed June 15, 2026. https://www.nyserda.ny.gov/All-Programs/Clean-Resilient-Building-Codes/Energy-Code-Training-and-Support-Services

Sustainability Institute. (2002). *Guidelines for applying systems thinking to policy design.* https://donellameadows.org

AI Assistance Disclosure

AI-assisted tools used: ChatGPT.
Used for: research assistance and proofreading.
Extent: citation research, document summaries, light editing.
Human review: The authors reviewed and verified all content and citations.