STATEMENT FOR THE RECORD

U.S. SENATE COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS

"ADDRESSING CLIMATE CHANGE WITH ENERGY-EFFICIENT AND RESILIENT HOUSING"

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A Holistic Approach to Achieving Energy-Efficiency and Resilient Housing

Model Building Codes and the International Code Council

Modern, up-to-date building codes are at the core of climate mitigation and adaptation, through energy efficiency and emissions reduction strategies. The International Code Council and Alliance for National & Community Resilience (ANCR) are leaders in providing such solutions.

The International Code Council (ICC) is a nonprofit organization, with more than 63,000 members, that is dedicated to helping communities and the building industry provide safe, resilient, and sustainable construction through the development and use of model codes (I-Codes) and standards used in the design, construction, and compliance processes. Most U.S. states and communities, federal agencies, and many global markets choose the I-Codes to set the standards for regulating construction, plumbing and sanitation, fire prevention, and energy conservation in the built environment.

We're pleased to provide testimony on approaches to advance the energy efficiency, sustainability and resilience of our nation's housing stock and increase housing affordability and availability through leveraging the significant benefits building codes provide, advancing use of off-site construction, and community resilience benchmarking. The U.S. Department of Housing and Urban Development (HUD), U.S. Department of Agriculture (USDA) and other federal agencies have several levers to help advance these solutions including through their grant making programs.

Given that buildings account for 40 percent of total energy consumption and 13 percent of total greenhouse gas (GHG) emissions in the United States, the adoption and effective implementation of building codes will play a critical role in advancing efforts to combat climate change, build national resilience to associated severe weather, and adapt to other associated impacts. The Code Council is committed to providing communities with solutions they need to achieve their energy efficiency, GHG reduction, and climate resilience goals. The I-Codes and supporting

resources play an essential role in achieving energy efficiency and GHG reduction goals to meet the United States' Nationally Determined Contributions (NDCs) under the Paris Agreement. At the same time, building codes ensure homes are designed and constructed to help withstand the hazards they face today and the growing risks they will face in the future due to climate change.

In March 2021, the Code Council Board of Directors released a new framework, Leading the Way to Energy Efficiency: A Path Forward on Energy and Sustainability to Confront Climate Change, leveraging the success of the International Energy Conservation Code (IECC) and International Green Construction Code (IgCC), plus additional resources to help all levels of government advance their climate goals. The framework establishes a new scope and intent for future editions of the IECC that commits to continued improvement and the inclusion of zero energy pathways today and by 2030.

Leveraging the IECC

Building energy codes are an important policy tool in both climate mitigation and adaptation. Energy codes are the foundation to any effort to drive new buildings towards zero energy and zero carbon and set requirements for how renovations to existing buildings should be undertaken. Increasing levels of energy efficiency in buildings can lead to less energy demand—thus decreasing reliance on fossil fuels and enhancing the ability to achieve zero energy goals through increased renewable energy deployment. Additional buildings' policies including incentives to drive retrofits or ongoing performance requirements should be coordinated with building energy codes to assure a holistic policy approach aligned with overall energy and GHG reduction goals.

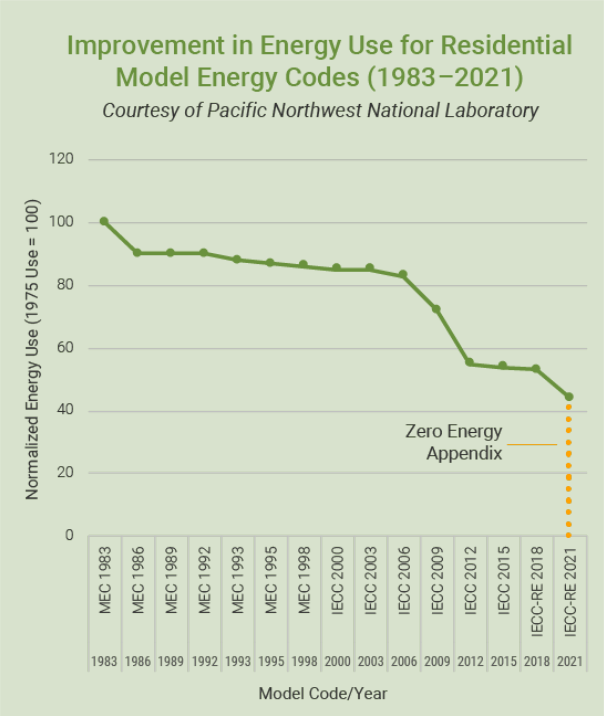

Figure 1. Improvement in Energy Use for Residential Model Energy Codes (1983-2021).

The IECC has made significant progress in advancing efficiency. DOE's final determination on the 2021 IECC found a 9.4 percent site energy savings improvement and an 8.7 percent reduction in

carbon emissions for residential buildings relative to the 2018 version, saving homeowners an average of $2,320 over the life of a typical mortgage. The 2021 IECC represents a roughly 40 percent improvement in energy efficiency compared to the 2006 edition. These savings not only reduce the impact of energy use but save consumers billions of dollars on their energy bills.

According to DOE, from 2010 to 2040, model energy codes for residential and commercial buildings are projected to result in $138 billion in energy costs savings, 900 million metric tons (MMT) of avoided CO_2 emissions, and 13.5 quads of primary energy saved. In addition to energy and emissions savings, implementation of modern building energy codes like the IECC promote the creation of sustainable, green jobs that further addresses equitable outcomes. If all states updated to the 2021 IECC, nationally over 22,000 jobs would be created in the first year and over 632,000 jobs cumulatively over 30 years. However, according to the Department of Energy (DOE), 24 states' residential energy codes are currently at least 15% less efficient than the 2021 IECC.[1] Absent federal interventions, housing in these states will be built to older requirements that burden building occupants with higher than necessary energy bills every month.

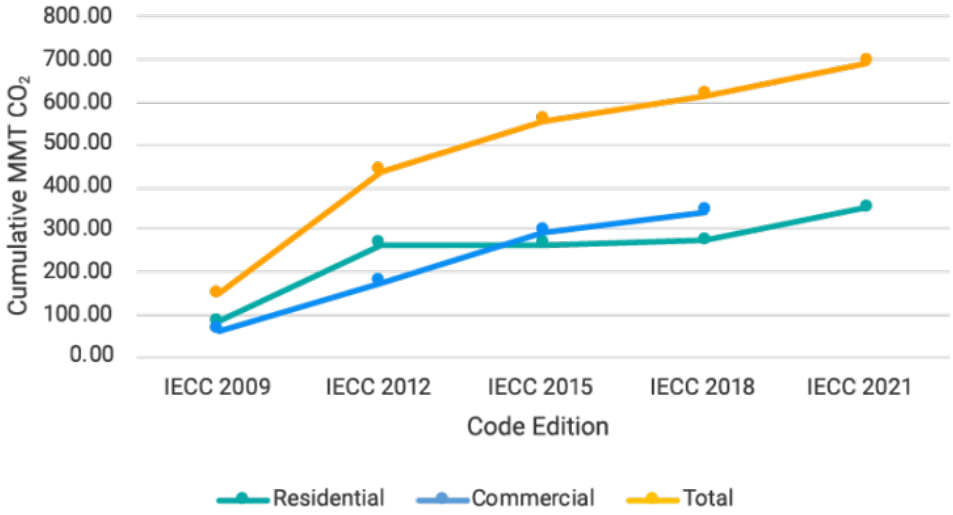

Figure 2. Cumulative CO2 Savings from Each Edition of the IECC (2009-2021).

Recognizing the noticeable inconsistency in code adoptions across the country and the importance of adopting the 2021 IECC to achieve increased energy efficiency, GHG reductions, and cost savings, the Code Council launched the Code on a Mission Challenge in 2021, a campaign to have more than one-third of the U.S. population covered by codes that meet or exceed the 2021 IECC by the end of 2023. The campaign includes a toolkit to help support adoption, including references to resources developed by DOE and the national labs.

- Given the economic and sustainability benefits, HUD should require as a minimum design requirement adherence to an up-to-date IECC for its federally assisted housing programs—including, for example, CDBG and Cranston-Gonzalez National Affordable

[1] Statistic was extracted from the Department of Energy figure entitled *Residential Energy Code: State Energy Index Relative to Current Model Code (2021 IECC)*, which was presented at the Resilient and Efficient Codes Implementation Request for Information Workshop.

Housing Act[2] and Federal Housing Administration lending programs currently subject to outdated efficiency requirements —to ensure greater emissions reductions as well as adaptation and resilience to the impacts of climate change.

Leveraging the IgCC

The IgCC is a collaborative effort of the Code Council, American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), Illuminating Engineering Society, and the U.S. Green Building Council to provide adoptable code language for communities that want to go beyond requirements contained in base codes. It is ideally positioned to serve as a stretch code for multifamily projects, building off the existing code infrastructure to deliver increased energy and water savings. The IgCC provides the design and construction industry with the single, most effective way to deliver sustainable, resilient, high-performance buildings. The continued goal of the IgCC is to build and provide criteria for energy efficiency, resource conservation, water safety, land use, site development, indoor environmental quality and building performance that can be adopted broadly.

- The Code Council urges adoption and compliance with the IgCC to support further climate mitigation and adaptation throughout the built environment for HUD funded programs and projects. HUD can advance these efforts through technical analysis of the IgCC's costs, energy, and environmental benefits, compliance support tools, technical support and training resources. The Department's doing so would help accelerate communities' efforts to becoming more energy efficient, meeting GHG emission reduction targets and enhancing climate mitigation and resilience.

Building Codes as a Path to Resilience

To date, energy codes have primarily been focused on reducing energy costs, energy use, and GHG emissions. However, as climate adaptation becomes a priority, energy codes are also being recognized for their contributions to resilience. Climate change is expected to result in an increase in extreme temperature events. Through provisions for efficient building envelopes and heating, ventilation, air-conditioning and refrigeration equipment plus guidance on shading and reducing solar heat gain, energy codes can reduce the impacts of such extreme events. Additionally, during these extreme events, the energy grid may become strained. Reduced energy demand to obtain comfortable temperatures through increased building efficiency can also enhance resilience of the energy grid.

Incorporating measures related to passive survivability can help support resilience on two ends--reducing energy demands through increased efficiency thus reducing grid strain and keeping buildings occupiable for longer periods reducing shelter or other emergency services needs. Urban Green Council and Atelier Ten looked at passive survivability potential in New York City's existing building stock. The study found that during a winter blackout a typical high-rise apartment would drop to 45°F within three days and continue to fall. Buildings that met building codes in place at that time (ASHRAE 90.1-2007 and 2009 IECC) remained about 10°F warmer than older buildings. Subsequent improvements in the code likely lead to even greater improvements

[2] The Cranston-Gonzalez National Affordable Housing Act programs, which are currently required to meet the minimum requirements of the IECC, include the Public Housing Capital Fund, Choice Neighborhoods Implementation/Planning Grants, Supportive Housing for the Elderly program, Supportive Housing for Persons with Disabilities program, and HOME Investment Partnerships (HOME) program.

in performance relative to the existing building stock. In a summer blackout, a typical high-rise apartment would reach 95°F by the fourth day and peak at over 100°F. Code compliant buildings provided a few additional degrees of relief.

In addition to energy efficiency, building codes address multiple other important climate factors including water use, materials and waste, indoor air quality including ventilation and filtration, and sustainable economic growth and job creation. They also help protect occupants from the devastating impacts of climate change. While the perils covered by building codes can vary, they generally address climate-based risks including flooding, hurricanes, wildfire, and extreme snow through the provision of either performance or prescriptive requirements for structural loads, material properties, enclosure characteristics, and other design requirements.

Current codes that support energy efficiency and savings also support social resilience. In the U.S., low-income households face energy burdens two to three times that of median households. Of all U.S. households, 25% (30.6 million) face a high energy burden (i.e., pay more than 6% of income on energy bills) and 13% (15.9 million) of U.S. households face a severe energy burden (i.e., pay more than 10% of income on energy). These burdens are disproportionately experienced by black, Latinx, and older Americans.

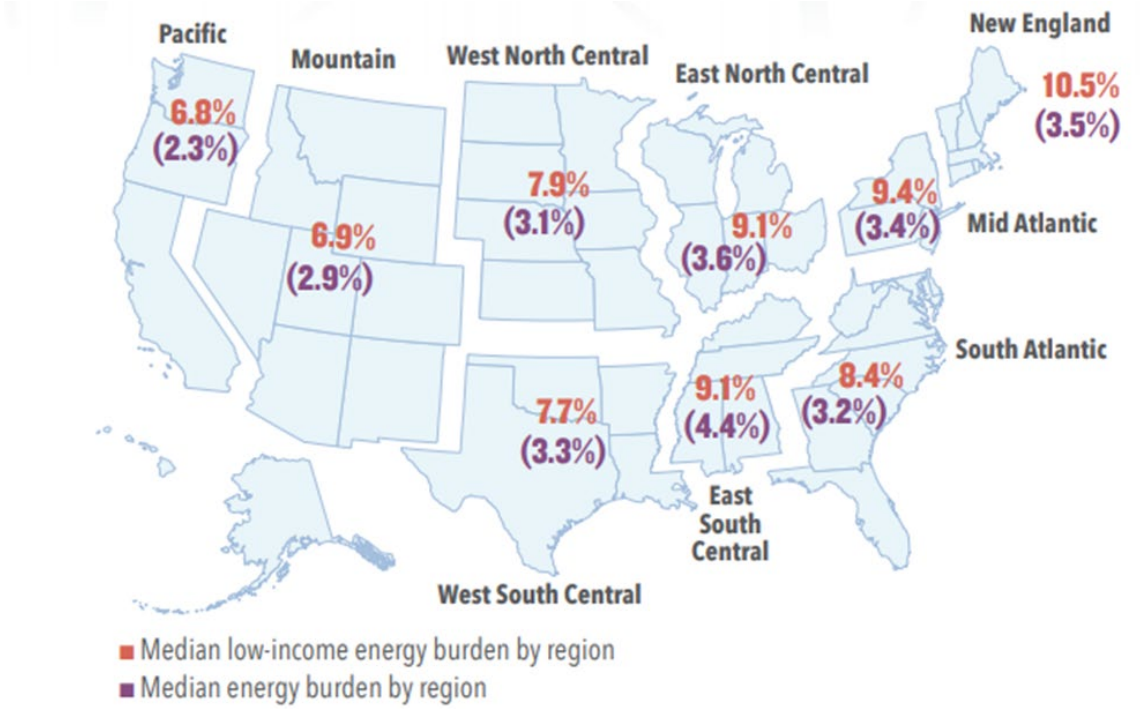

Figure 3. Median low-income (< 200% FPL) energy burdens by region (red) compared to median energy burdens by region (purple).

Building codes and weatherization or retrofit programs provide important mechanisms for reducing energy burdens. Importantly, such efforts can improve quality of life and health outcomes while providing economic stimulus and job creation. Reducing the energy burden through energy efficiency measures provided in energy codes can help reduce one potential source of vulnerability, especially for those underserved populations experiencing increased energy burdens.

Building codes are a fundamental contributor to community resilience. A community cannot be resilient without resilient buildings and the codes that support their development. Resilience in the built environment starts with strong, regularly adopted, and properly administered building codes.

- The resilience benefits energy codes provide offer further support for HUD's requiring as a minimum design requirement adherence to an up-to-date IECC for its federally assisted housing programs—including, for example, CDBG and Cranston-Gonzalez National Affordable Housing Act and Federal Housing Administration lending programs currently subject to outdated efficiency requirements.

Building Codes Save

Building codes represent a highly cost-effective strategy to help protect communities from the risks posed by natural and man-made events. A FEMA-supported study by the congressionally-established National Institute of Building Sciences (NIBS) found that the regular adoption of building codes provides an $11 benefit for every $1 invested. A separate 2020 FEMA study, *Building Codes Save: A Nationwide Study*, found that currently 65 percent of counties, cities, and towns across the U.S. have not adopted modern building codes, only 50 percent of cumulative post-2000 construction adhered to the I-Codes, and 30 percent of new construction in recent years is occurring in communities with no codes at all or codes that are more than 20 years outdated. These are alarming statistics in light of the increasing frequency and magnitude of hazard events across the country. The FEMA study also found that the I-Codes could help communities avoid $132 billion to $171 billion in cumulative losses through 2040 and save more than $600 billion by 2060 if all new buildings across the U.S. were built to modern editions of the International Building Code (IBC) and International Residential Code (IRC).

The recently released FEMA *Building Codes Strategy* aims to drive coordination and prioritize activities that advance the adoption and enforcement of hazard resistant building codes across all of the federal assistance programs administered by the agency. The interagency Mitigation Framework Leadership Group (MitFLG) in its *National Mitigation Investment Strategy* recommended, "[u]p-to-date building codes and standard criteria should be required in federal and state grants and programs." HUD should follow FEMA's lead and require hazard resistant codes as minimum requirements in its grant making programs as well.

Requiring current hazard-resistant codes could prevent roughly $14,000 in losses per building in areas where codes have not been updated in the past two decades, an $11 to $1 return on investment in many of these areas that will mitigate loss of life and injuries, property damage, business interruptions, as well as first responder and annual homeownership costs. Ensuring that future construction within these jurisdictions is resilient and energy efficient provides corresponding loss avoidance benefits equivalent to preserving 15,000 new homes, and avoiding 1.5 MMT of CO_2 emissions, per year. The loss avoidance benefit of constructing buildings to wildfire resistant codes has the equivalent value of preserving about 4,800 new homes, and avoiding 500,000 metric tons of CO_2 emissions, per year.

Research shows that disasters hit underserved communities the hardest because they are more likely to live in homes built in hazard-prone areas or homes with lower quality construction. Consequently, low- and middle-income families are at greater risk of damage to or loss of their homes and are at higher risk of being displaced by a disaster. Disasters strike with both a physical and a financial shock, and only about 4 in 10 Americans can afford to cover an unanticipated $1,000 expense. That's about one-third of the average FEMA-verified (not actual) losses post-Hurricane Harvey.

- HUD should set minimum resilience requirements based on adherence to the current IBC and IRC for all federally supported housing, including, for example, CDBG, CDBG-DR and CDBG-MIT as well as Cranston-Gonzalez and FHA programs current subject to energy conservation requirements; building programs; NAHA programs; and new construction of single family and low-rise multifamily homes backed by FHA mortgages. Buildings built to strong energy codes will not realize climate benefits if they are damaged or destroyed because they were not constructed to withstand hazard risk. Absent stronger codes, thousands of federally supported buildings will sustain avoidable damage, in many instances, irreparably so, at the significant environmental costs associated with building new replacements and reconstruction.

Standards for Off-site Construction

Off-site construction or pre-fabrication, the design and delivery of housing using an industrialized and manufactured-style approach, has been identified as a core strategy in addressing multiple building industry and societal challenges – including sustainability and access to affordable housing. With national housing costs rising 52 percent from 2017 to 2022, off-site construction offers an affordable solution, capable of curbing construction timelines and reducing costs. Off-site construction can deliver projects 20 to 50 percent faster than traditional methods, which can provide cost savings of up to 20 percent. In addition to affordability benefits, off-site construction can reduce material waste while enhancing building quality and improving the safety of builders. To further support affordability and efficiency goals, HUD should advance the use of off-site construction in their federal housing assistance projects.

Currently, 39 states, plus Washington, D.C., regulate off-site construction at the state level. State programs are responsible for plan review and inspection of off-site construction components. However, these programs vary significantly from state to state—some states allow third-parties agencies to conduct both plan review and in-factory inspections whereas others only allow state employees to perform these functions. There is also inconsistency in the types of projects and components covered in each state—some only cover residential construction and others just commercial, and some include closed panels where others only cover volumetric modules. Varying requirements increases costs for manufacturers and the resulting variation in construction practices can make code enforcement more difficult.

To incentivize increased use of off-site construction, building regulatory programs must be designed to effectively inspect and approve factory-built components. To address the gap in consistency of current compliance processes, the International Code Council and Modular

Building Institute (MBI) have developed ICC/MBI Standard 1200-2021: Standard for Off-Site Construction: Planning, Design, Fabrication, and Assembly and ICC/MBI Standard 1205: Standard for Off-Site Construction: Inspection and Regulatory Compliance. The standards can integrate with any building codes used and include procedures for plan review and in-factory inspection and approval. Off-site construction can also provide opportunities for more expedient rebuilding post-disaster.

We commend HUD for its leadership in supporting development of an off-site construction research roadmap due for release this summer.

- HUD should work to advance the Department's use of off-site construction, through the adoption and endorsement of off-site construction standards, to further realize the affordability and sustainability benefits for federally funded projects. In addition to supporting Standards 1200 and 1205 for off-site construction through its communications and outreach channels, HUD should permit states and territories to use CDBG-DR and CDBG-MIT funding for the adoption and implementation of these standards and incentivize these activities by making HUD infrastructure grantees more competitive where they implemented these or equivalent standards. Supporting the research needs identified, adoption of codes and standards that support consistency and encouraging the use of off-site construction in its funded projects will help achievement of the Administration's affordability and sustainability goals.

Resilience Benchmarking

The Alliance for National and Community Resilience, or ANCR, was established by the Code Council and U.S. Resiliency Council to support communities in understanding and improving their resilience. ANCR has been developing Community Resilience Benchmarks (CRB) — identifying 19 community functions or 'links' covering the social, organizational, and infrastructural aspects of communities that influence their resilience and is developing benchmarks for each of the identified functions. To be resilient, communities must address the resilience of each of these functions. An adverse event reveals the importance of both a coordinated approach to resilience across multiple community functions and the impacts that can occur across the local economy.

Resilience planning is an essential component of assuring communities are prepared for the evolving risks presented by climate change. The ANCR CRB process recognizes the importance of addressing the shocks and stresses a community faces today and those they are likely to face in the future. Resilience benchmarking is an important tool in the planning process to establish community priorities, identify metrics and monitor progress. The CRB process can also assist in attracting new businesses and residents while also potentially impacting bond ratings or the community's competitiveness for grants to support enhanced resilience. Community resilience can only be achieved through a holistic approach that captures the impacts and influences of multiple systems and services and the experiences and perspectives from the diversity of a community's members.

ANCR has completed development of the Buildings, Housing, and Water Benchmarks and has piloted them with the communities of Martinsville, Virginia and Oakland Park, Florida. The

benchmarks were developed through the engagement of subject matter experts and reflect the core principles for resilience in a specific topical area. The Buildings Benchmark incorporates requirements on the adoption and enforcement of building codes, the identification and mitigation of vulnerable buildings and critical facilities and incentive programs to drive increased resilience of the building stock. The Housing Benchmark addresses the affordability and availability of housing, including the conduct of a housing stock assessment and implementing policies and programs to assure that community housing needs are met. Taken together, the Buildings and Housing Benchmarks provide direction on the strategies to achieve resilient communities.

- HUD should encourage communities to undertake a holistic resilience planning process through the incorporation of community resilience benchmarking by making these activities eligible for CDBG-DR and CDBG-MIT funding..

Gap in Consistency

In March, the Federal Emergency Management Agency rated each state's building codes on how well they help newly built and retrofitted homes stand up to disaster. Thirty-nine states landed in the lowest category of resistance to hazards, meaning less than 25 percent of communities in each state have building codes that provide adequate resilience. Nineteen states scored zero out of 100, meaning no communities had codes that met these criteria, leaving residents vulnerable.

Disasters are becoming more frequent and intense, attributed to climate change, and continues to leave homes destroyed and lives stranded. Since 1980, major hurricanes, wildfires, and flooding have caused more than $2 trillion in damage. And every year, the federal government invests billions to help communities rebuild. Yet some of these investments are lost once again to subsequent disasters, fueled by climate change, because many states do not have requirements for resiliency. This is especially worrisome for federally assisted housing programs, which defer to local construction requirements; that means they may follow building codes that are decades old, if they exist at all – again, roughly two-thirds of the country does not have hazard-resistant codes.

The Role of HUD

HUD has the authority and capability to set requirements for the design, construction, and operation of federally funded housing to ensure effective climate mitigation and adaptation. Implementing up-to-date codes that incorporate energy efficiency and resilience measures in federally funded housing will reap considerable benefits during emergency response and recovery, for social and economic resilience, and for climate mitigation and adaptation. The Code Council recognizes HUD is currently considering updates to its minimum energy conservation requirements, but there is increased risk of stranding federal investments if HUD does not set consistent resilience and hazard-resistant standards based on current model building codes. Investments are continually lost to subsequent disasters, fueled by climate change, because many states do not have requirements that address resiliency and hazard-resistance.

HUD can ensure both climate resilience and sustainability outcomes if the Department explicitly set up-to-date code requirements for funded projects under the Community Development Block Grant (CDBG), Cranston-Gonzalez programs, and new construction of single family and low-rise multifamily homes backed by FHA mortgages. Projects receiving FEMA funding are already required to adhere to up-to-date international codes and standards. Homes must be built to withstand the changing climate, especially federally supported housing in disaster-prone areas.

CDBG-Disaster Recovery (CDBG-DR) and CDBG-Mitigation (CDBG-MIT) funding provide valuable funding to communities recovering from the impacts of disasters. However, requirements for the latest rounds of funding do not adequately reflect the resilience benefits provided by hazard resistant codes—providing only requirements to, "incorporate mitigation measures when carrying out activities to construct, reconstruct or rehabilitate residential or non-residential structures with CDBG-DR funds...to meet this alternative requirement, grantees must demonstrate that they have incorporated mitigation measures into CDBG-DR activities as a construction standard to create communities that are more resilient to the impacts of recurring natural disasters and the impacts of climate change." At the same time, the requirements are very explicit about naming specific sustainability requirements to follow. Equal specificity should be paid to the resilience and sustainability features of HUD funded activities, particularly in areas receiving federal funds because of disaster damage. Congress should authorize the CDBG-DR and CDBG-MIT programs allowing for the development of consistent requirements that include a code-based minimum resilience requirement for projects using these funds.

Requiring current codes for HUD and other federal housing projects ensures that these investments are maximized and provide the necessary safety and resilience required to withstand the impacts of climate change. HUD must move quickly to adopt resiliency standards to ensure equitable outcomes for those most at risk from the impacts of climate change.

- **Conclusion**

Building codes play an essential role in enhancing resilience in response to the changing climate and supporting community needs in achieving their energy efficiency and GHG emission reductions targets. While codes are adopted at the state and local level, the federal government has the opportunity to incentivize their use and protect federal investments in our nation's housing stock. Based on the discussion above, the Code Council offers the following recommendations:

- HUD should set minimum sustainability and resilience requirements based on up-to-date model, consensus-based hazard-resistant building codes and energy codes—including the IRC, IBC, and IECC—for all federally supported housing. This includes specific code requirements for CDBG, CDBG-DR and CDBG-MIT programs; Cranston-Gonzalez programs; and new construction of single family and low-rise multifamily homes backed by FHA mortgages.

- The Code Council urges adoption and compliance with the IgCC to support further climate mitigation and adaptation throughout the built environment for HUD funded programs and projects.
- HUD should support the widespread deployment of off-site construction to achieve affordability, availability, and sustainability goals. HUD should encourage federally assisted housing providers to use off-site construction through incentives or prioritization of projects. Use of the standards to achieve consistency in regulation of off-site construction and support of ongoing research to capture additional benefits can be advanced by providing grants for communities to support adoption. HUD is encouraged to incentivize adoption of the 1200 and 1205 offsite standards by m give additional credit to states grant applicants that adopt Standards 1200 and 1205 for off-site construction.
- Congress should permanently authorize the CDBG-DR and CDBG-MIT programs including requirements for use of minimum resiliency and energy conservation standards tied to current consensus-based model codes and standards in funded projects, including the IBC, IRC, and IECC.
- HUD should encourage communities to undertake a holistic resilience planning process that examines its building stock and housing policies and how they contribute or detract from the community's overall resilience and how it influences or is influenced by the resilience of other community functions. This can be done by providing CDBG-DR and CDBG-MIT funding to support community resiliency benchmarking, using ANCR's CRBs.
- HUD and other federal agencies should align with FEMA in developing a government-wide strategy to support the adoption and use of hazard resistant building codes.