

## Workgroup Summary

# Codes and Standards

### Overarching Goal:

Create safer communities by supporting the adoption, implementation and enforcement of the current minimum codes and standards, as created by a national consensus process, including in the WUI and under-served and vulnerable populations in rural and urban areas; and provide affordable and safe housing.

### Issue:

State and local governments are responsible for promoting the use and enforcement of current codes and standards. The federal government can help by incentivizing compliance and providing funding to state and local jurisdictions for code implementation, inspection, and enforcement. This will increase fire and life safety in communities, especially in the WUI and among underserved and vulnerable populations.

### Structure Fires

A 2019 National Institute for Building Sciences report found that model building codes improve building resilience to natural disasters and save \$11 for every \$1 invested. All nationally recognized modern building and fire codes require the use of life-saving technology like smoke alarms, carbon monoxide alarms, and automatic fire sprinkler systems. Nevertheless, the U.S. Department of Housing and Urban Development estimates that there are approximately 570,000 multifamily public housing units that were constructed before the sprinkler requirement was established. A significant portion of these units lack the protection offered by fire sprinklers putting millions of Americans at risk.

Through linking data with the Centers for Disease Control and Prevention's (CDC's) Social Vulnerability Index, we can see that socioeconomic status, household composition, racial and ethnic makeup, and housing status all play a role in a community's vulnerability to fire and the risks faced by firefighters. Fire disproportionately impacts our most vulnerable populations: older adults, children, people of color, low-income populations and people with disabilities. This is an equity issue. The single most significant impact on civilian loss of life due to fire is ensuring that any housing funded by the government is built and maintained with the minimum national building code.

In buildings with automatic fire sprinkler systems, the civilian fire death rate is 90% lower than non-sprinklered buildings and the injury rate is 32% lower.<sup>7</sup> Furthermore, property damage decreases significantly in buildings protected by fire sprinklers. Nearly three out of five home fire deaths are caused by fires in properties without smoke alarms or smoke alarms that failed to operate.

Residential fires burn hotter and faster than they did in the past. In a fire today, you have the least time to safely exit your home than at any point in history. The severity of these fires has grown incredibly. Fire-related fatalities in 1- and 2-family homes have increased by 20% since 1980. In the period between 2012 and 2019, this increase is 30%. There are several factors leading to the increased severity of residential fires. Homes constructed today tend to be larger than in the past, leading to more complex escape routes and increased evacuation times. New homes tend to have open spaces, making it easier for smoke and fire to spread. Modern furnishings are made from synthetics and plastics that burn hotter and release more toxins than traditional materials. Positive evolutions in construction have led to lighter building materials and more energy-efficient homes, but they have also led to heat capture. Green building materials such as energy-efficient residential exterior walls can pose new fire safety risks. New technologies, such as lithium-ion batteries and residential battery energy storage systems (ESS), can be new ignition sources in the home. All of this leads to faster fire propagation, shorter time to flashover, rapid changes in fire dynamics, shorter escape times, shorter time to collapse, and other new and unknown hazards. Depending on where

you live in the nation, local fire department response time from the initial notification could be 6 or more minutes. In modern homes, flashover can occur in 3 to 5 minutes.

## **Wildfire**

Globally, we are experiencing extreme weather events and significant shifts in temperature. Wildfires encountered by today's fire service are unlike those of a generation ago. Severe droughts and longer periods of hot weather alternating with bouts of heavy precipitation contribute to vegetation growth. Fluctuations between an overabundance of rain and severe droughts with extreme high temperatures result in that vegetation becoming dead and dry, contributing to fire intensity and spread. To further exacerbate this situation, many communities in the WUI are facing water shortages, impacting their ability to conduct fire suppression. These impacts, along with the decisions our society has made about using and managing landscapes, have created today's wildfire disaster potential.

According to the National Interagency Coordination Center, in 2022, there were 68,988 wildfires in the U.S., which burned over 7.57 million acres and destroyed 2,717 structures, of which 1,261 were residences. Despite this, FEMA reports only 25% of hazard-prone jurisdictions in the U.S. have adopted the latest 2 editions of hazard-resistant building codes.

A McClatchy analysis of the 2018 Camp Fire in California found that a 2008 building code designed for California's fire-prone regions requiring fire-resistant roofs, siding and other safeguards appears to have protected more than 100 homes in the path of that fire. Of the 350 single-family homes in the path of the Camp Fire that were built after 2008, 51% were left undamaged by the fire. By contrast, only 18% of the 12,100 homes built before 2008 escaped damage.

## **Fire Risks From Emerging Technology**

Current building and fire codes are based on three-year cycles. State adoption of these national model codes can lag further behind. This creates the scenario where new technologies, such as large-capacity electrical storage battery systems, or building materials utilized to promote building energy performances, are out-pacing the ability of the national codes to keep pace with fire protection designs and requirements. This lag in the ability of the model codes to keep pace with technology has impacted the fire service's ability to develop appropriate response models or tactical protocols.

## **Accomplishments:**

### **Promotion of the adoption, implementation, and enforcement of fire and building codes/standards**

- ▶ Multiple organizations issued position statements on single-exit stairwells:
  - ▶ International Association of Fire Fighters and Metro Chiefs Joint Statement
  - ▶ International Association of Fire Chiefs Life Safety Section
  - ▶ National Association of State Fire Marshals
  - ▶ National Fallen Firefighters Foundation
- ▶ NFPA hosted a two-day Single Exit Stair Symposium in September 2024.
- ▶ USFA continues to work with FEMA to incorporate fire as a hazard type and as a disaster type into the ecosystem of FEMA resources.
- ▶ USFA, in collaboration with FEMA Office of Resilience, are establishing dedicated staff with building code expertise to focus on adding "fire" to the FEMA array of building code resources.
- ▶ USFA participates in FEMA's Building Codes Task Force to implement FEMA's Building Code Strategy.
- ▶ USFA participates in the Mitigation Framework Leadership Group's National Initiative to Advance Building Codes, which has entered its second year of implementation.

- ▶ USFA published the Home Fire Fatalities and Social Vulnerability Explorer (<https://gis-fema.hub.arcgis.com/pages/structure-fire>) and the Property and Community WUI Awareness Explorers (<https://gis-fema.hub.arcgis.com/pages/wui-awareness>) to the FEMA Geospatial Resource Center to raise awareness of fire hazards and to support community risk reduction and code adoption efforts.

### **Fire Codes Study and Building Code Adoption Tracking (BCAT)**

- ▶ USFA is conducting a Building Codes Save: Fire Hazards Pilot Study with plans to conduct an expanded national study.
  - ▶ The pilot study is evaluating data and methods for calculating the losses avoided by adopting structure fire-resistant building codes and the International Wildland-Urban Interface Code (IWUIC). The pilot study will lead to a nationwide analysis, and the results will help encourage the adoption of structure fire- and wildland fire-resistant building codes and standards.
- ▶ USFA is working with FEMA to expand its Building Code Adoption Tracking (BCAT) system to make it more detailed and to better incorporate fire and wildfire.

### **Closing data and research gaps regarding Codes and Standards**

- ▶ USFA continuing to move forward with the new NERIS system to improve fire and emergency services data collection, analysis, and report dissemination.
- ▶ USFA pursuing projects to document the history of building codes in the United States.
- ▶ Energy Storage Systems
  - ▶ USFA created an EV and Energy Transitions Workgroup as part of the U.S. Fire Administrator's Summit.
  - ▶ USFA conducted webinar available internationally and hosted on USFA website on battery fires including consumer products, EVs, and ESS.
  - ▶ IAFF worked with DOE on Residential ESS Research and issued a report ([https://www.iaff.org/wp-content/uploads/IAFF\\_DOE\\_ResidentialESSConsiderations\\_Final.pdf](https://www.iaff.org/wp-content/uploads/IAFF_DOE_ResidentialESSConsiderations_Final.pdf)).
  - ▶ IAFF hosting three one-day in-person workshops on Lithium-ion batteries including standard references.
    - ▶ San Francisco, CA
    - ▶ Orlando, FL
    - ▶ Long Beach, CA
  - ▶ Seven in-person workshops from IAFF included ESS/codes and standards.
  - ▶ NFPA is considering the development of a comprehensive standard, proposed as NFPA 800, Battery Safety Code, to provide uniform, minimum requirements to address fire, electrical, life safety, and property protection from battery hazards. Requirements are anticipated to include fire, explosion, and other dangerous conditions related to battery technologies as experienced through the lifecycle of a battery: raw materials and battery production through storage, use, and end of life. Comments on the proposal closed July 12, 2024, and a decision is forthcoming.
  - ▶ ICC Ad-Hoc Battery Energy Storage Committee.
- ▶ EV and Modern vehicle fuel loads in modern parking garages. Required fire protection and suppression fire response.
  - ▶ USFA drafting *Electric Vehicle Fire/Rescue Response Operations*, Health and Safety Guide in collaboration with NHTSA and the IAFF.

- ▶ Residential construction: Emerging construction products, i.e., T-studs, etc.
  - ▶ Energy efficient homes, specific to insulation and impact on fire performance.
    - ▶ IAFF Research Project on Energy Efficient Residential Exterior Walls Meeting Fire Safety (<http://www.iaff.org/building-construction-and-fire-safety-code/energy/>).

### **Model codes**

- ▶ Congress continues to work on the Pro Codes Act which ensures that a standard does not lose its copyright protection by virtue of having been incorporated by reference into law or regulation, provided that the standard is available for free viewing on a publicly accessible website. This legislation is critical to supporting the work of NFPA, ICC, and other standards developers.

### **Testing and research needs**

- ▶ USFA Memorandum of Understanding with NIST signed.
- ▶ USFA and national organizations continuing national discussions on the need for fire labs (NRTLs) to address lack of fire and life safety research and testing.

### **National-level housing fire and life safety initiatives**

- ▶ Multiple sprinkler related bills reintroduced in Congress.
  - ▶ High-Rise Fire Sprinkler Incentive Act
  - ▶ Public Housing Fire Safety Act
- ▶ The Fire Grants and Safety Act was signed into law reauthorizing the U.S. Fire Administration and raising the authorization level for the agency by about \$20 million.
  - ▶ Additional funding for the agency helps to support USFA's work to improve fire and life safety in America.
- ▶ In recent years, the HUD budget has continued to acknowledge the risk of fire in HUD housing and has proposed funding to support various fire and life safety initiatives.
  - ▶ Increased funding for HUD for fire safety through the federal appropriations process helps to support HUD in improving fire and life safety in HUD-funded housing.
- ▶ USFA and fire service organizations continue to meet with HUD on fire safety concerns including additional technology.

### **Recommendations:**

- ▶ The federal government should adopt current minimum standards and codes and set an example of designing their buildings to be the latest in codes and standards.
- ▶ Promote the adoption, implementation, and enforcement of fire and building codes/standards as created by national consensus processes.
  - ▶ Provide a database of all jurisdictions that have adopted the minimum building and fire codes.
  - ▶ Provide a database and repository of information on the jurisdictions that have adopted codes and standards above the minimum.
- ▶ Work with FEMA to amend the document "Building Codes Save: A Nationwide Study" (November 2020) to include structural fires and fires in the wildland urban interface.
- ▶ Provide current research or identify research that shows the cost benefit of adopting modern building codes and how that integrates into a comprehensive fire prevention and response approach to life safety.

- ▶ Research the data gap to tell the right story — the Fire Service story — regarding Codes and Standards. Establish a workgroup to identify specific areas of research gaps related to, but not limited to:
  - ▶ Energy Storage Systems
  - ▶ EV and Modern vehicle fuel loads in modern parking garages. Required fire protection and suppression fire response.
  - ▶ Residential construction: Emerging construction products, i.e., T-studs, etc.
  - ▶ Energy efficient homes, specific to insulation and impact on fire performance.
  - ▶ Net Zero homes
  - ▶ The evaluation of the applicability of current Test Standards, i.e., NFPA 285, ASTM E119, NFPA 13R, etc.
  - ▶ Automated Storage Systems
  - ▶ Plastic building materials
- ▶ Create a voice from the fire service to explain the benefit and value of the local standards to state and local officials.
  - ▶ Teach fire service personnel how to get involved in the process.
- ▶ USFA initiate efforts to meet with the community planners and developers of the model codes to promote fire service participation and to reduce barriers for participation.
- ▶ USFA engage with NIST to identify building code testing and research needs of the fire service and define steps on how to move forward.
- ▶ U.S. Fire Administrator appoint a Commission or Ad Hoc Committee to develop recommendations for USFA to meet the intent of Section 12 of the Fire Prevention and Control Act to review, identify, and recommend processes, that may allow the Administrator to utilize the authority to review, evaluate, and suggest improvement in State and local fire prevention codes, building codes, and any relevant Federal or private codes and regulations. This Commission shall consider resources internally or externally available and/or additional funding requirements to meet the intent of the Act specific to Section 12. To potentially counter the efforts at State governments to evaluate code changes based on cost, the Fire Administrator, or designee, shall consider the human impact of code requirements, standards, or provisions in terms of comfort and habitability for residents or employees, as well as the fire prevention and control value or potential of each such requirement, standard or provision.
- ▶ The USFA Codes and Standards resource page should include up-to-date code and state-level standards including:
  - ▶ A page with Codes and Standards for each state and local level.
  - ▶ Statistics on the costs of not adhering to Codes and Standards (greater loss of property and more significant loss of life).
  - ▶ Links to relevant studies.
- ▶ Coordinate with other research partners to develop a research agenda to test broader theories in building codes for life safety cost/benefit.
- ▶ Encourage federally funded housing fire and life safety initiatives to implement current law and add fire sprinklers.