

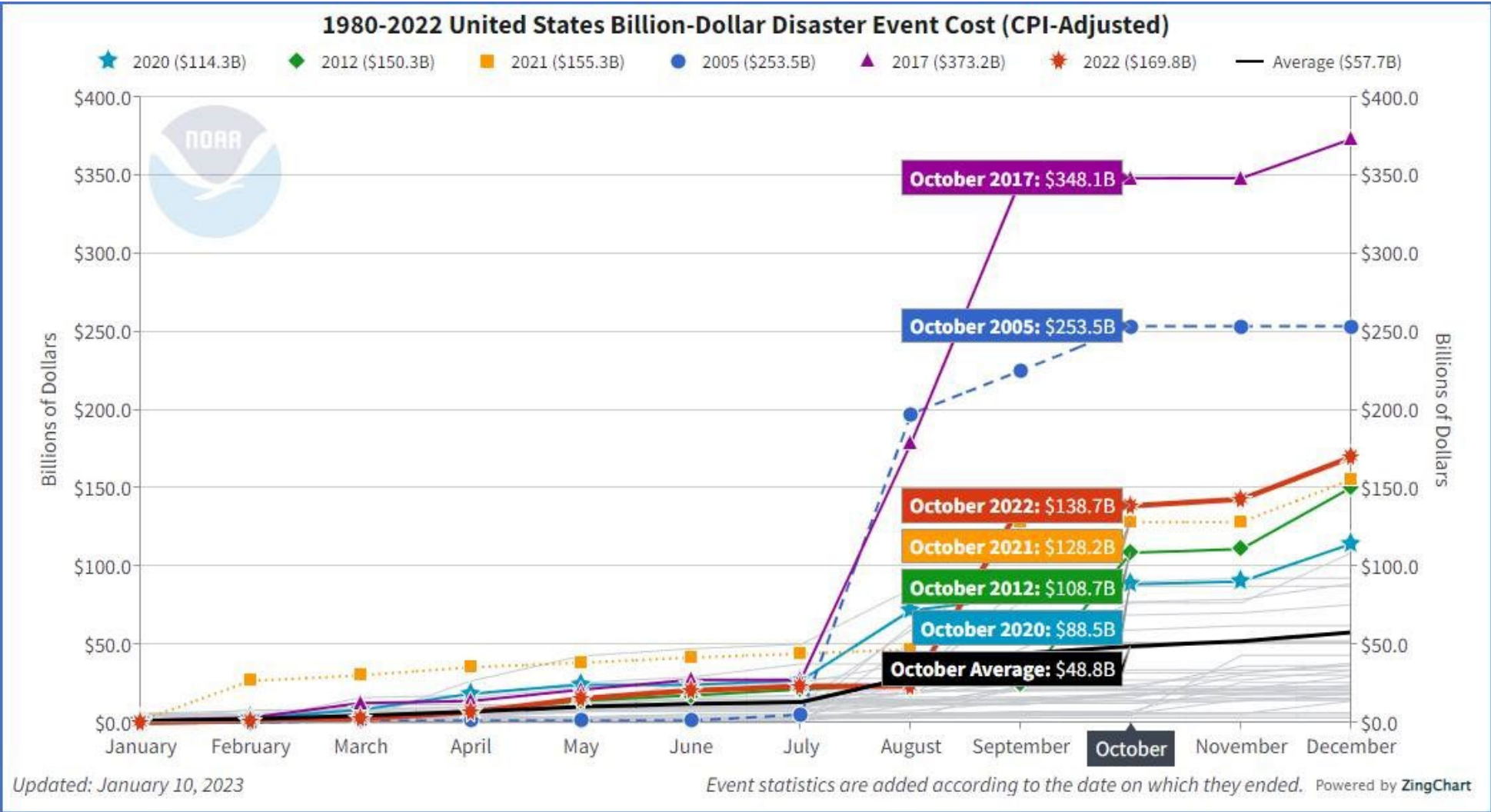
# Resiliency for Health



AN OVERVIEW

# The Impacts of Climate Change

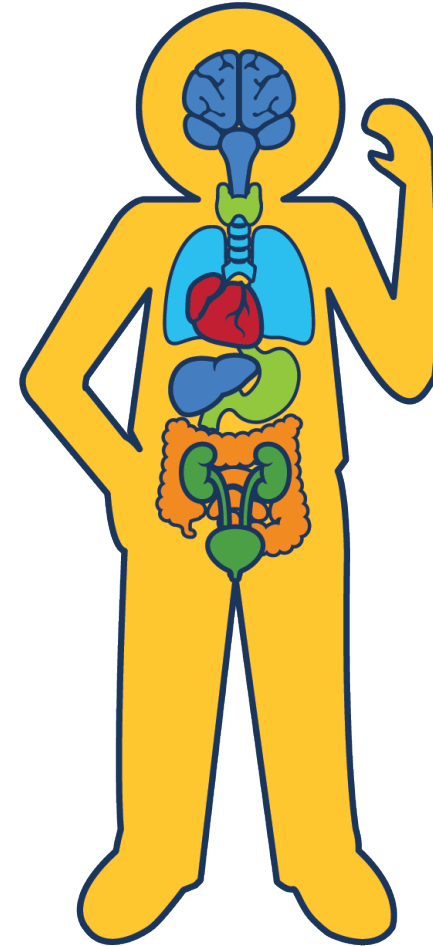
# Change in Weather Patterns



Source: [www.ncei.noaa.gov](http://www.ncei.noaa.gov)

# Impact on Human Health

- Heat-related illness and death
- Cardiovascular illness
- Asthma and allergy related illnesses
- Water-related and food-related infections
- Drowning and injury
- Stress-related disorders



Adapted from: National Institute of Environmental Health Sciences



# Impacts on the Built Environment





# Sustainable Design Approaches

## CLIMATE CHANGE MITIGATION

(Focus on reducing  
carbon emissions)

## CLIMATE CHANGE RESILIENCE

(Focus on design measures that  
factor in the projected climate)



# We Let the Past Shape the Present





**Where do we need to  
“catch-up” in regard to  
climate change?**

# Wildland Urban Interface (WUI)

**“...exists where humans and their development meet or intermix with wildland fuel.”**



# The Direct Impact of Climate Change

- The more we build in the WUI, the more people we put at risk
- Most building codes do not consider the threat from wildfire, yet 1/3 of the population lives within the WUI
  - WUI codes have been developed by NFPA, ICC and California
- Dated fire test standards (based on fire occurring within a building) are used to determine if a building material can be used for the outer walls of buildings in an area threatened by wildfire!



# We Don't Understand Water





# Tightened Enclosures Can Lead to Mold

**Increase in Airtightness is driven by:**

- Energy-code compliance
- Sustainable rating systems
- Decarbonization efforts

**BUT....**

- Air flow carries moisture
- Vapor drive carries moisture
- Misplaced impermeable layers trap moisture



**Trapped moisture → Mold growth → Big problems**

# How does climate change affect things?



# New Conditions Create New Material Responses

More extreme weather is causing our built environments to experience:

- Prolonged power outages
- Exposure to extreme temperatures
- Water intrusion
- Material damage
- Potential exposure to harsh cleaners/hazardous materials during cleanup
- Internal stressors (chemicals, molds, particles, etc.)



# Changing Emphasis and Assumptions



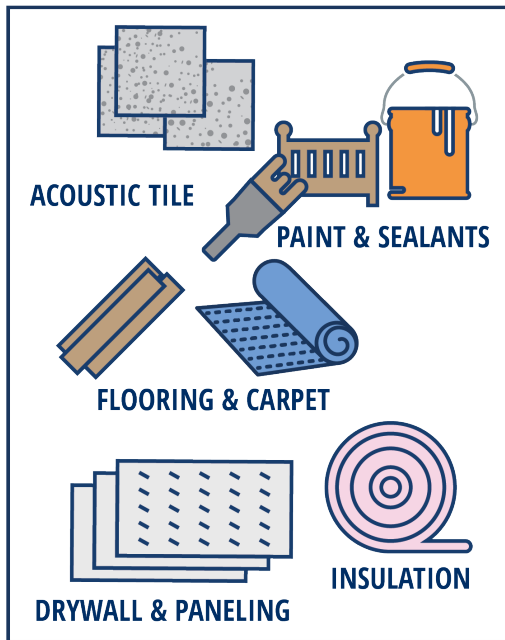
A fire starting from **within**  
a structure



**Embers** igniting the exterior  
of a structure

# Recent Weatherization Study

Source common building products found in modern homes and test them at both **ambient (23°C)** and **elevated (35°C)** temperatures.



Standardized samples (5cmx5cm)



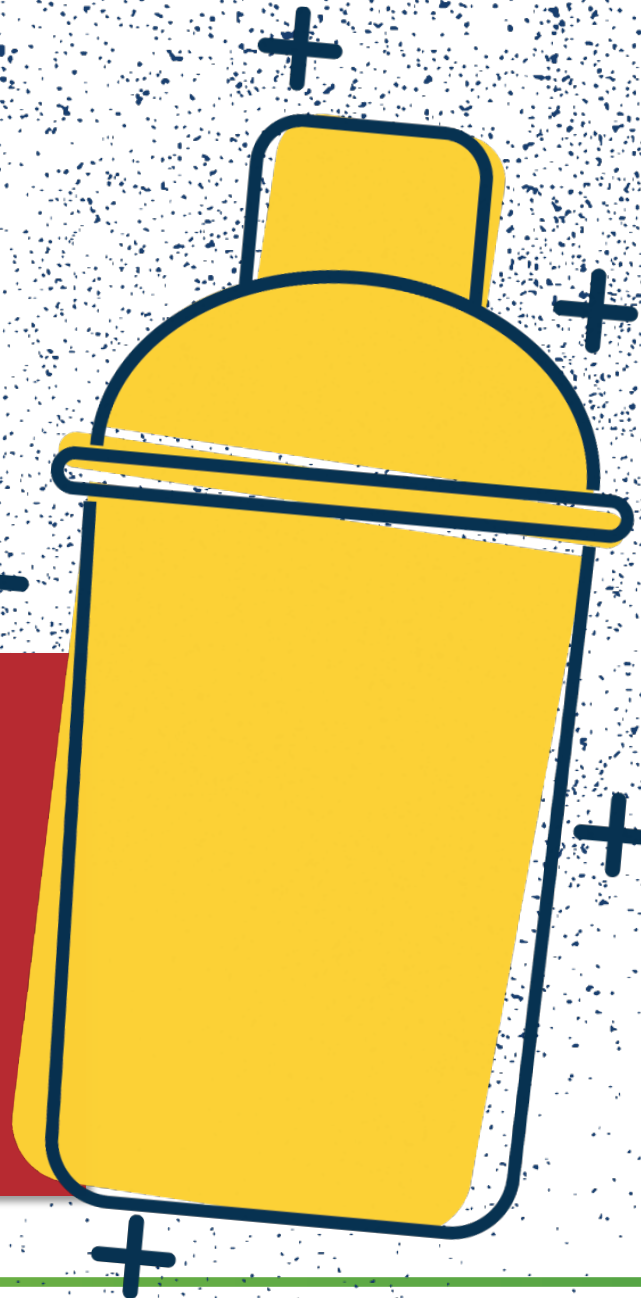
Microchamber (outside and inside)



Gas chromatography mass spectrometry with thermal desorption



**The Real World Has  
A Very Complex  
Mixture of  
Pollutants**





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