



# Hours of Safety

**How Better Buildings Help Us Shelter  
In Place in Extreme Cold Events**

April 13, 2022



# What happens when extreme cold brings down the grid?

**Most appliances stop working**

**Roads may become inaccessible**

**Indoor temperatures begin to drop**



# Prolonged cold exposure can be deadly

Death toll from Texas cold snap in February rises to 210

21 People Died in Weather-Related Incidents During the Polar Vortex

*Hundreds of Deaths as Europe Struggles With Snow Amid an Intense Cold Snap*

Cold weather-related deaths reach 17 in Iowa during winter season

**More than 2 dozen deaths blamed on record-setting cold blast**

## Most Vulnerable Populations:

- Low income residents
- Renters
- Elderly residents
- Children
- Those with prior medical conditions
- Rural/isolated areas

Temp Range	Stress Scale
64 °F	Min safe temp for vulnerable populations
60-64 °F	Safe temp for healthy populations
50-60 °F	Mild cold stress
40-50 °F	Moderate cold stress
Below 40 °F	Severe cold stress

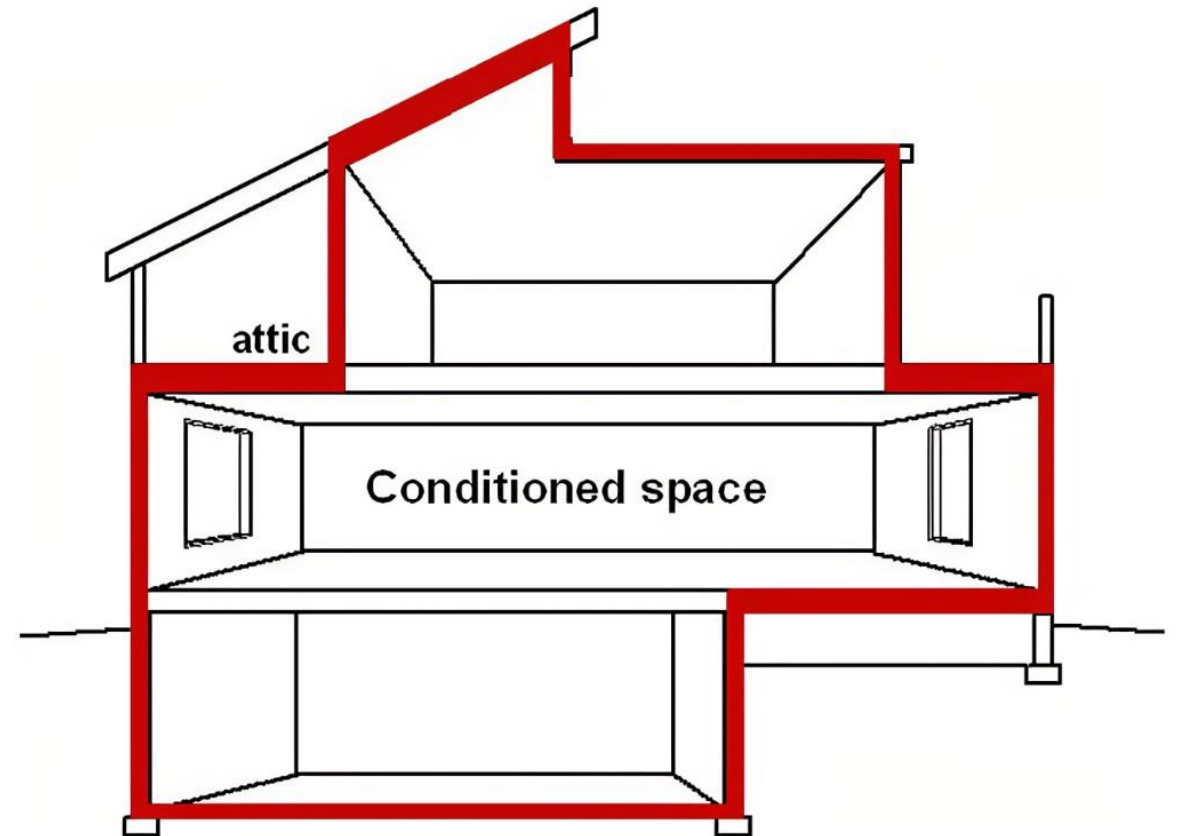
*Proposed Cold Stress Thresholds*

# Building envelopes and passive resilience

A building envelope is the outer shell that separates indoor from outdoors:

- Walls
- Roofs
- Foundations, slabs, and basements
- Windows and doors

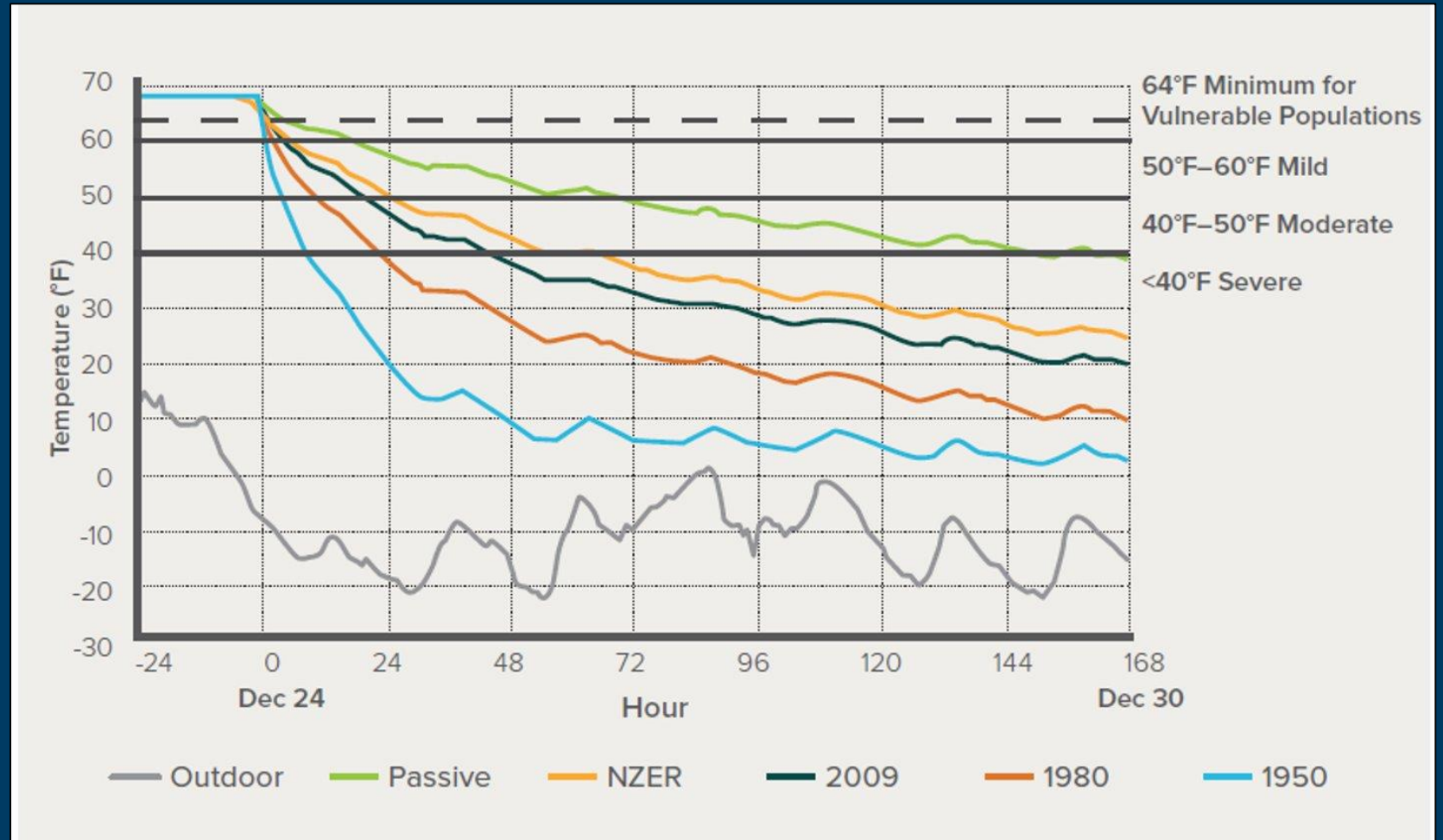
For most buildings, the envelope is your **only protection from extreme weather** once the grid goes down.



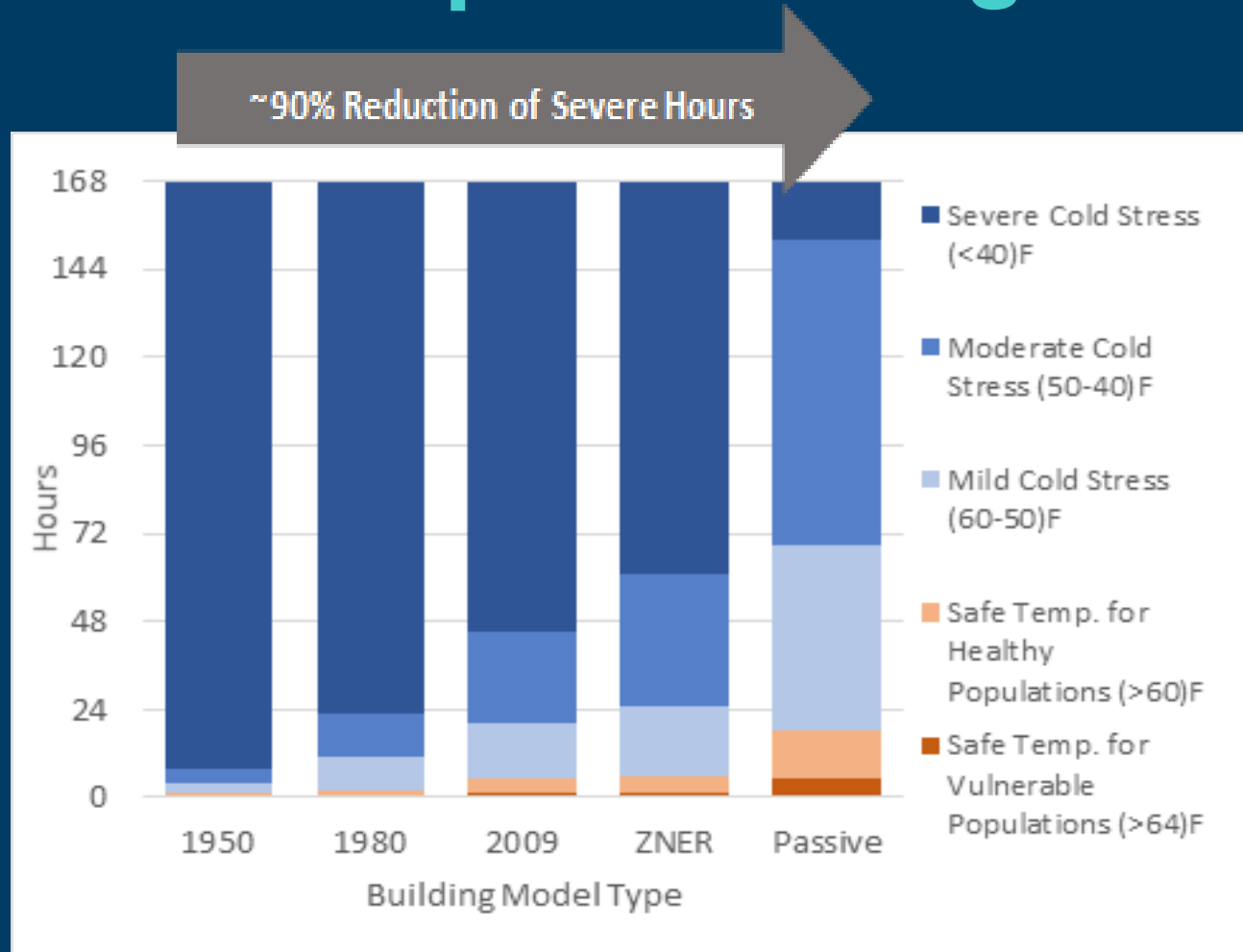
# Better building envelopes allow residents to shelter in place through outages

## RMI Modeling:

- Real weather event from Duluth, MN in 2017
- Temperature ranged between 5 to -25 °F over seven days
- Modeled a typical single family home with different levels of envelope performance:
  - 1950s era home
  - 1980s era home
  - 2009 IECC code
  - DOE Zero Energy Ready Home
  - Passive House



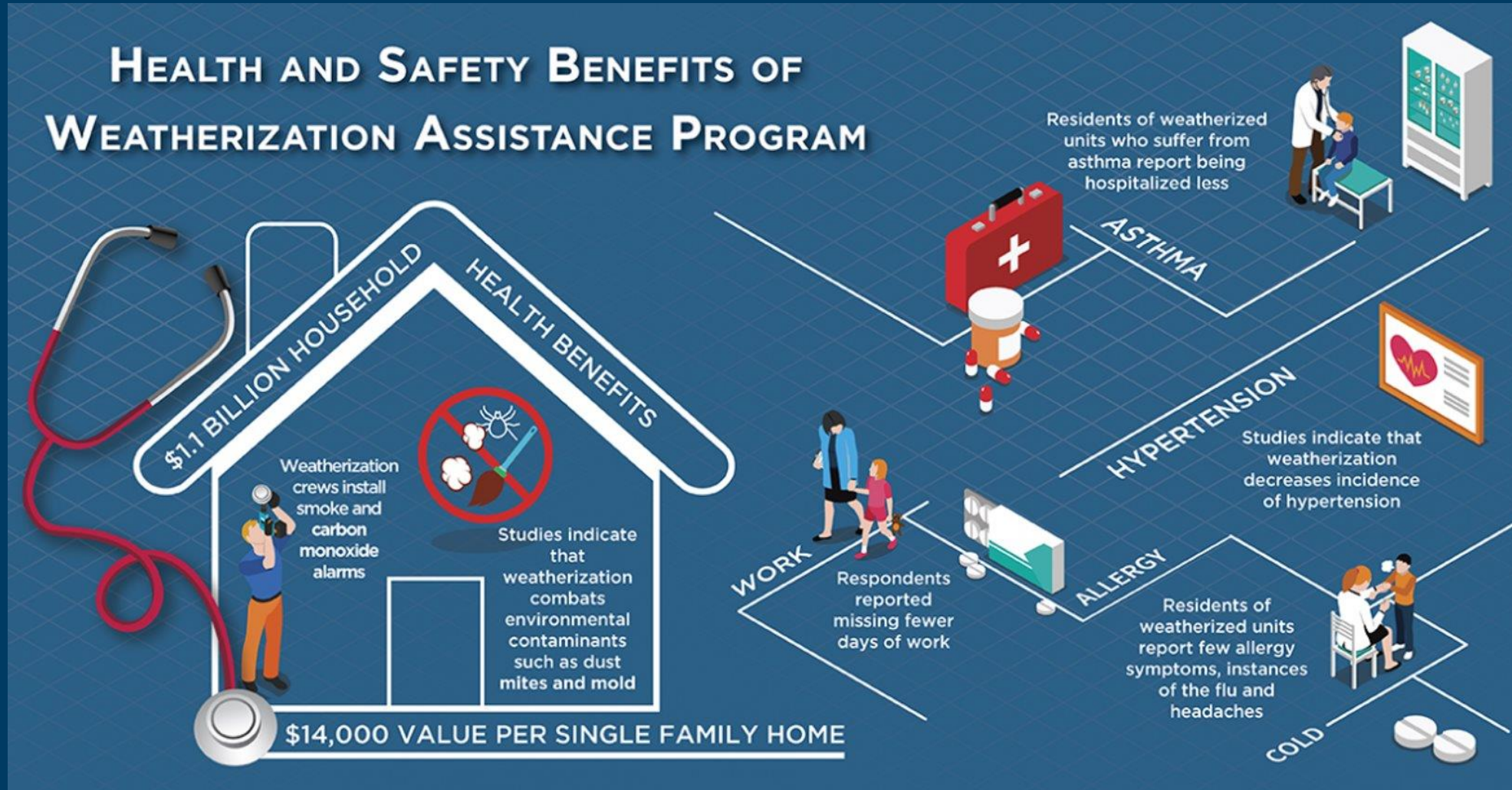
# Better building envelopes allow residents to shelter in place through outages



Modeled Home	Hours of Safety (40 °F threshold)
1950s era home	8
1980s era home	23
2009 IECC Code	45
DOE Zero Energy Ready Home (ZERH)	61
Passive House	152

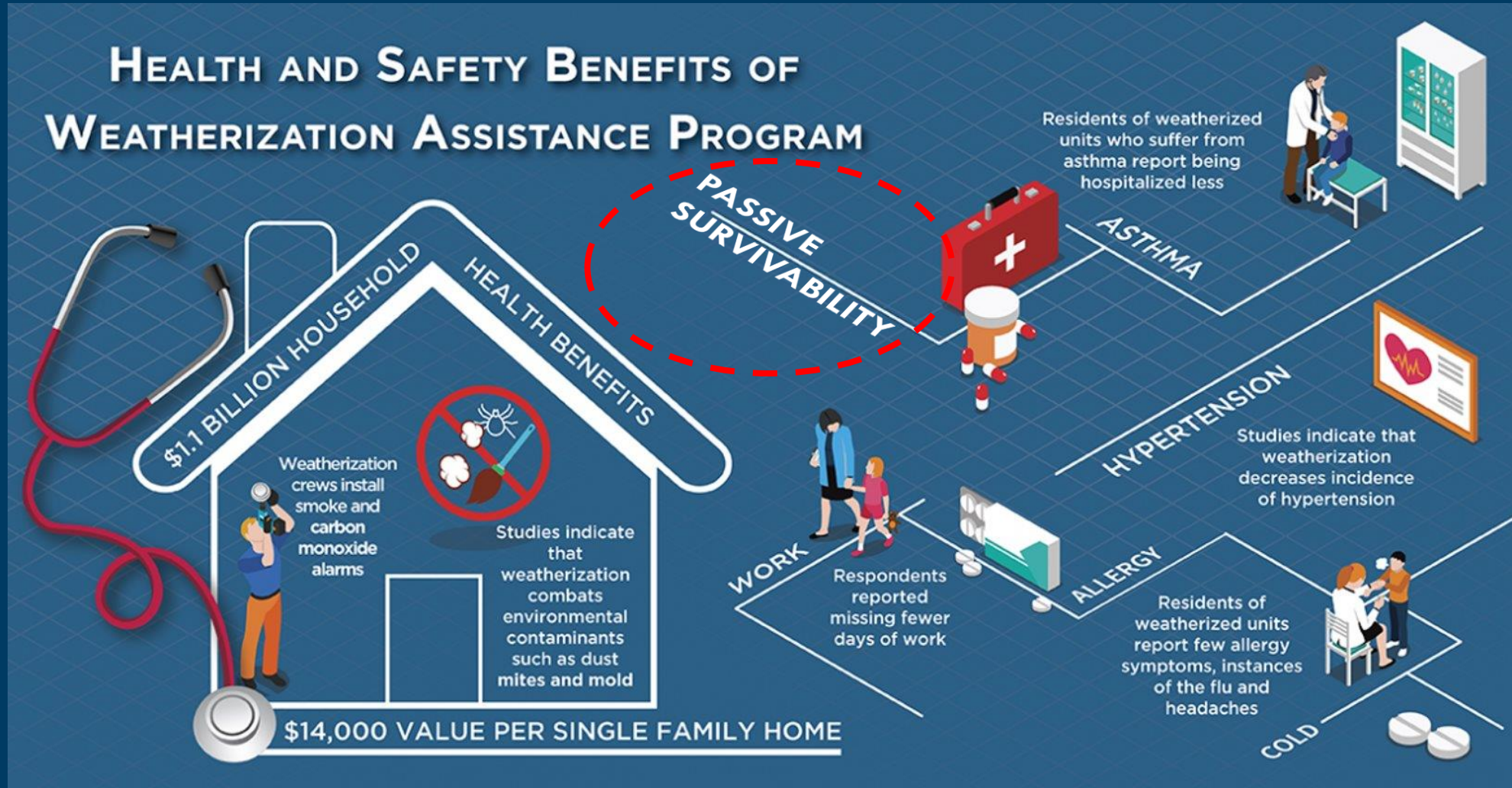


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# It'll take time to deploy the Hours of Safety concept

- ❑ Better understand the health impacts/risks of sustained cold exposure
- ❑ Define correlation between various building characteristics and hours of safety for...
  - Different weather events (hot vs cold, short vs sustained duration)
  - Different building types
  - Different at-risk populations
- ❑ Create a standard Hours of Safety metric calculated using existing data streams
- ❑ Crafting guidelines for city/state adoption and utilization

# Congress can support home resilience now

1. **Continue to scale-up funding for home retrofits** and ensure programs and incentives for weatherization, health and safety, clean energy, and affordability can be easily stacked together to create holistic, one-stop-shop retrofit programs.
2. **Support High Efficiency Home Rebate Program in reconciliation:** As envelopes tighten, IAQ becomes more of a concern, so it will be important to also support electrification. This program also provides funding for insulation and air sealing.





## For more information...

<https://rmi.org/insight/hours-of-safety-in-cold-weather/>

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