National Carbon Monoxide Awareness Association

CO Safety Summit 2024

The Fire Protection Research Foundation: CO Research Updates

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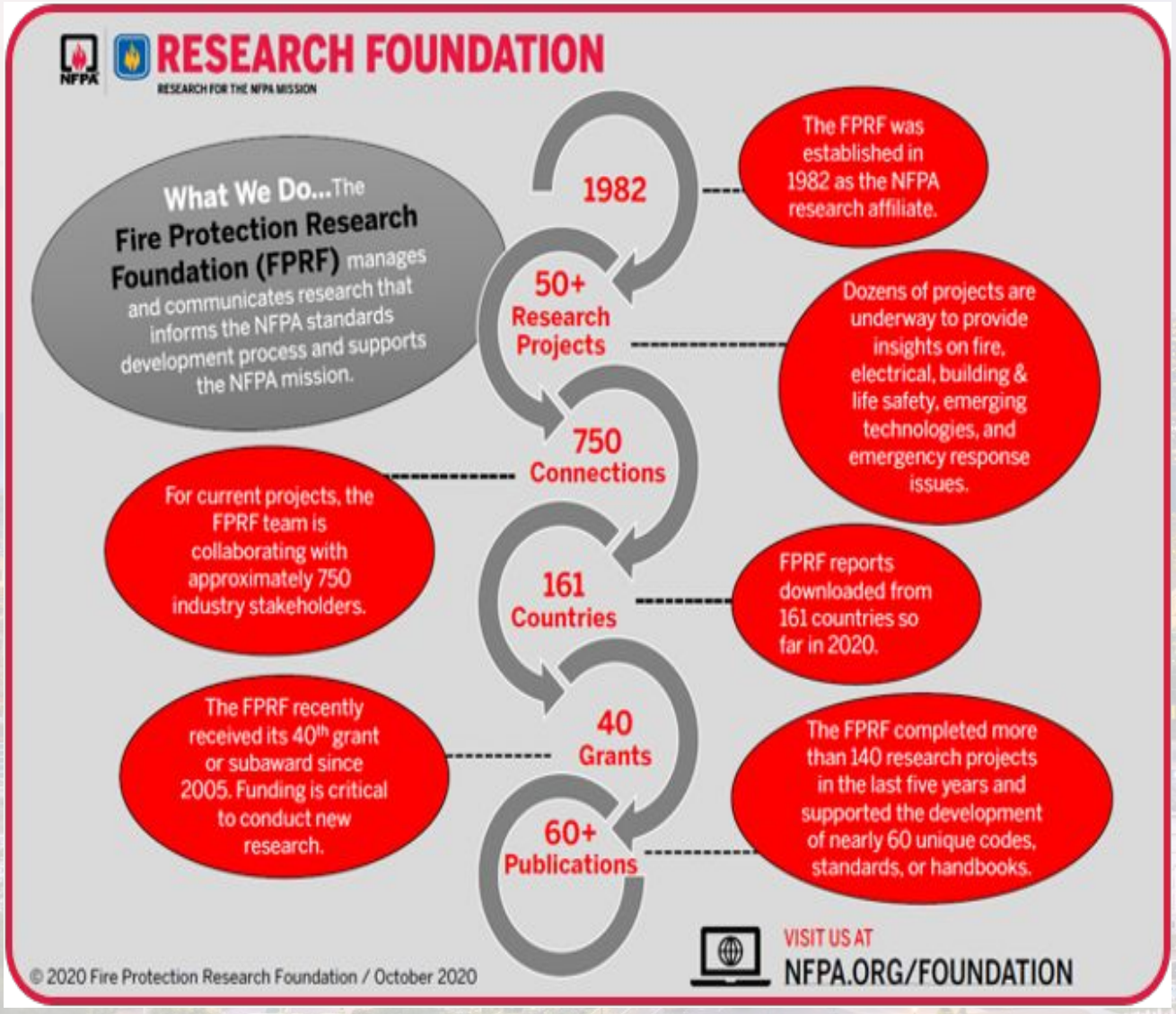


Who is the FPRF?

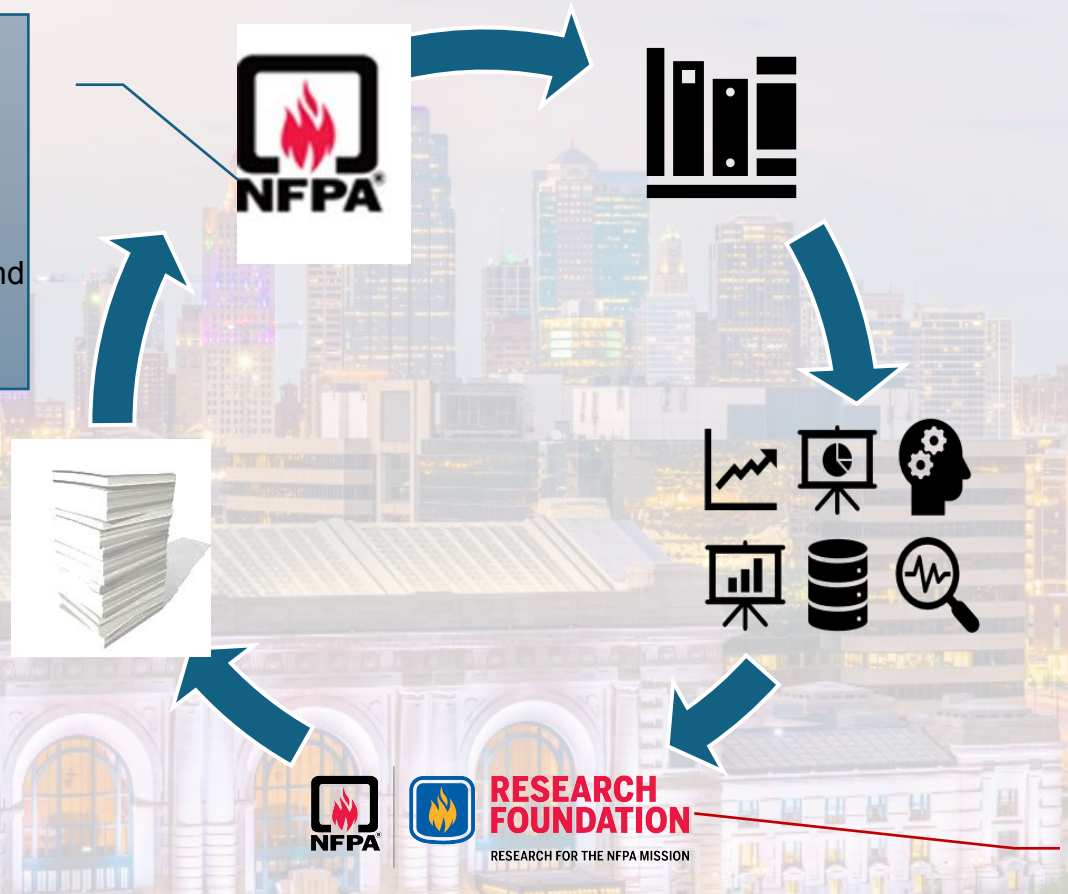
Independent charitable organization

- Formed by NFPA in 1982
- Intended to provide data to support the needs of NFPA codes & standards
- Research funds come primarily from:
  - Private and public sector consortia
  - Grants and government sources (e.g. DHS S&T, DOD, FEMA AFG, NIOSH, NIST, NSF, etc.)
  - Multiple other sources (including NFPA)

Relationship between NFPA and FPRF

NFPA vision: Be the leading global advocate for the elimination of death, injury, property, and economic loss due to fire, electrical and related hazards.

NFPA mission: To help save lives and reduce loss with information, knowledge, and passion.



Mission: The Research Foundation's mission is to plan, manage and communicate research in support of the NFPA mission.

Vision: To be the premier global research delivery organization for the elimination of death, injury, property and economic loss due to fire, electrical and related hazards.

FPRF

- Independent non-profit organization
- Formed by NFPA in 1982
- Intended to provide data to support the needs of NFPA codes & standards
- Research funds come primarily from:
  - Private/public sector consortia
  - Grants/gov't sources,
  - Other sources (including NFPA)

Develop guidance that gets accepted into broad practice

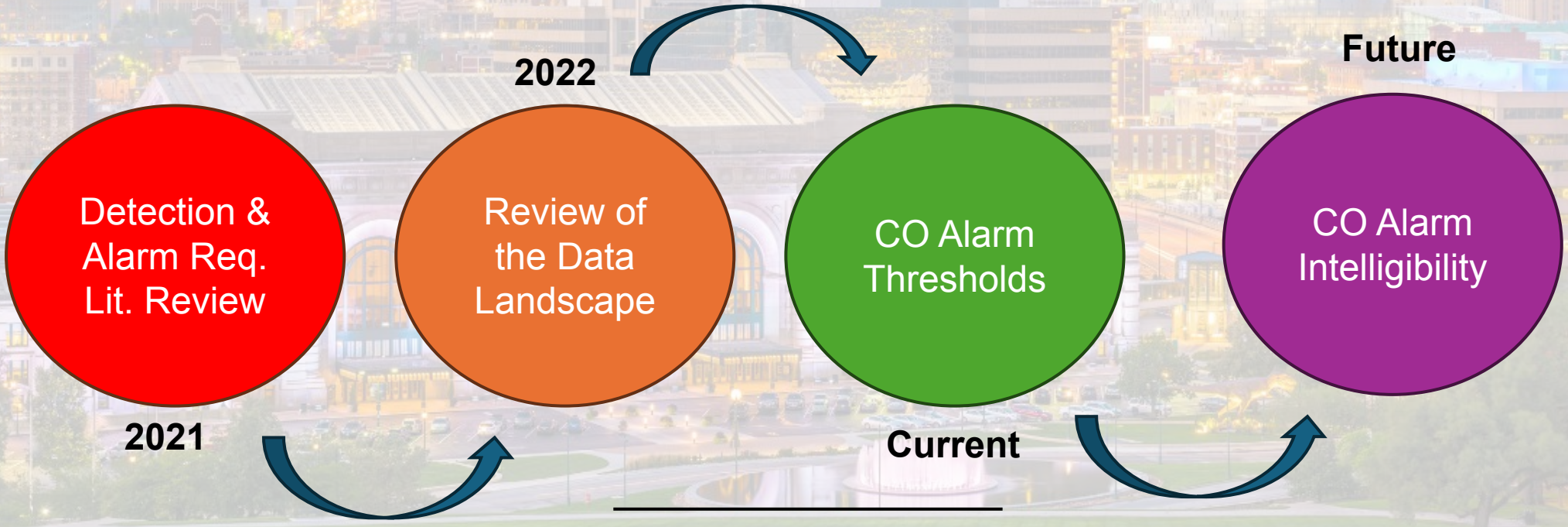
Inform Changes to Relevant Codes & Standards

Incorporate Findings into Training

Develop Educational Materials and Media Kits

Agenda

- History of past FPRF CO research & Impacts
- Ongoing CO research
- Future CO Research



History of past FPRF CO research & Impacts

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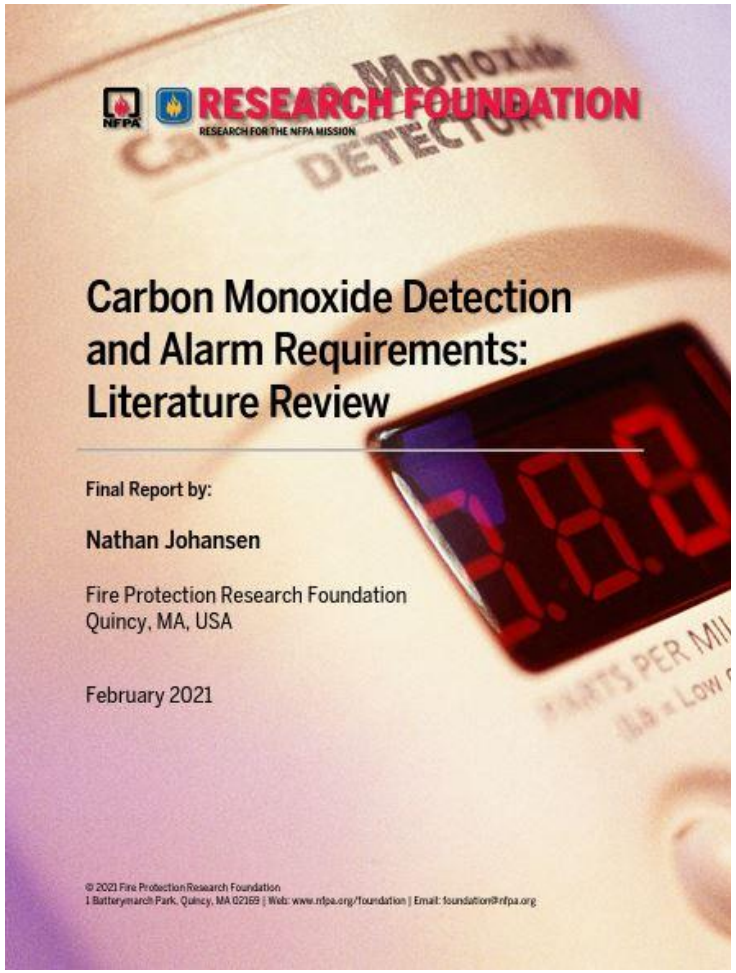

- **Problem:** Technical Committees need information to determine if the current CO detection requirements are adequate and consistent across the range of occupancies (new and existing) that the codes regulate.
- **Goals:**
  (1) summarize existing requirements for the installation of CO detection devices through a literature review and a consolidation of all available pertinent non-fire CO data.
  (2) Review of short and long-term health effects of CO poisoning

CO Detection and Alarm Requirements Literature Review - Findings

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Table 1: Code CO Requirement Summary

Occupancy		NFPA 5000 (2021)	NFPA 101 (2021)	IFC (2021)
Assembly	New	Rooms containing fuel burning appliances/fireplaces, occupiable spaces served by fuel burning HVAC systems, spaces adjacent to garages; NOT required in in garages, spaces next to open/mechanically ventilated garages.	Rooms containing fuel burning appliances/fireplaces, occupiable spaces served by fuel burning HVAC systems, spaces adjacent to garages; NOT required in in garages, spaces next to open/mechanically ventilated garages.	/
	Existing	/	/	/
Educational	New	Rooms with fuel-burning sources, served by fuel burning HVAC system, or next to garage; NOT required in garage, spaces next to open parking structure, or mechanically ventilated garage	Rooms with fuel-burning sources, served by fuel burning HVAC system, or next to garage; NOT required in garage, spaces next to open parking structure, or mechanically ventilated garage	915.1-2
	Existing	/	/	^
Daycare	New	Sleeping units that are next to fuel burning equipment or enclosed parking structure	Sleeping units that are next to fuel burning equipment or enclosed parking structure	915.1-2
	Existing	/	/	^
Healthcare	New	Rooms containing fireplace	Rooms containing fireplace	915.1-2
	Existing	/	^	^
Detached One- and Two-Family Dwellings	New	Dwelling units with attached garage, or contains fuel burning equipment; detector shall be placed outside each sleeping room, each occupiable level; NOT required in garage, space next to open or mechanically ventilated garage	Dwelling units with attached garage, or contains fuel burning equipment; detector shall be placed outside each sleeping room, each occupiable level; NOT required in garage, space next to open or mechanically ventilated garage	R315.2 IRC
	Existing	/	/	^

CO Detection and Alarm Requirements Literature Review - Findings

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				Assembly		Education		Daycare		Healthcare		Residential Home		Lodging/ Rooming		Hotels/ Dormitories		Apartment Buildings		Residential Board & Care	
State	Incorporation by Reference	Edition	Enforcement/ Notes	N	E	N	E	N	E	N	E	N	E	N	E	N	E	N	E	N	E
Minnesota	2020 Minnesota Fire Code/International Fire Code (IFC)	2018	Statewide incorporation by reference/Enforcement			X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Mississippi	International Fire Code (IFC)	2015	Statewide incorporation by reference/Enforcement			X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Missouri	International Fire Code (IFC)	2015	Local incorporation by reference																		
Montana	International Fire Code (IFC) International Building Code (IBC)	2012	Statewide incorporation by reference /Enforcement					X	X	X	X	X	X	X	X	X	X	X	X	X	X
Nebraska	NFPA 101 - Life Safety Code	2000	Statewide incorporation by reference /Enforcement									X						X			
Nevada	International Fire Code (IFC)	2018	Statewide incorporation by reference /Enforcement			X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
New Hampshire	NFPA 1	2015	Statewide incorporation by reference /Enforcement					X		X	X	X	X	X		X		X		X	
New Jersey	International Fire Code (IFC)	2018	Statewide incorporation by reference /Enforcement	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
New Mexico	International Fire Code (IFC)	2015	Statewide incorporation by reference /Enforcement; possible local amendments that more stringent			X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
New York	2020 New York Fire Code/International Fire Code (IFC)	2018	Statewide incorporation by reference /Enforcement	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
North Carolina	International Fire Code (IFC)	2015	Statewide incorporation by reference /Enforcement			X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
North Dakota	International Fire Code (IFC)	2018	Statewide incorporation by reference ,Local amendments permitted			X		X	X	X	X	X	X	X	X	X	X	X	X	X	X

https://www.ncsl.org/environment-and-natural-resources/carbon-monoxide-detector-requirements-laws-and-regulations#:%7E:text=Beginning%20in%20January%202016%2C%20carbon,as%20a%20by product%20of%20combustion

CO Detection and Alarm Requirements Literature Review – Impacts on NFPA 101 (‘24)

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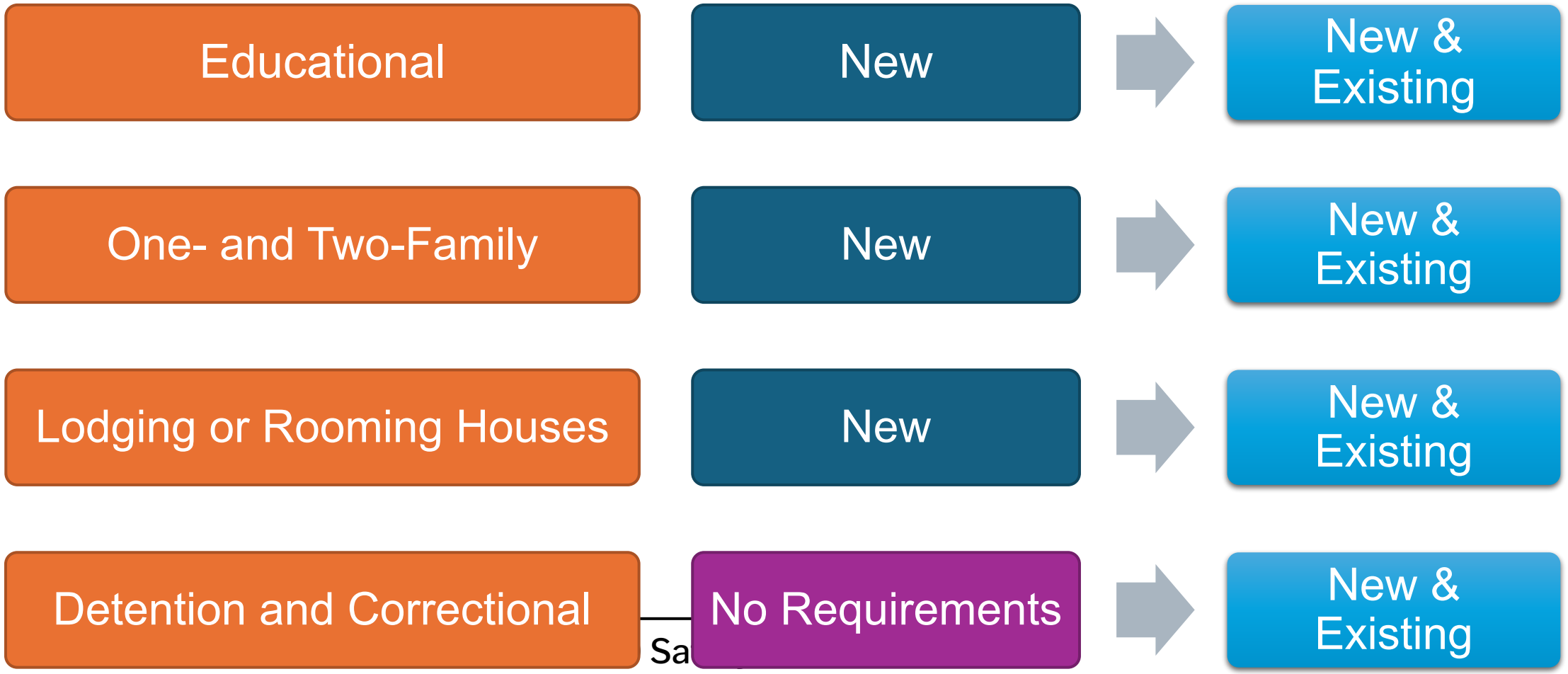

CO Detection and Alarm Requirements Literature Review – Impacts on IFC('24)

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2021 IFC

New & Existing:

- Group I-1
- Group I-2
- Group I-4
- Group R
- Classrooms within Group E

2024 IFC Changes

All new and existing buildings

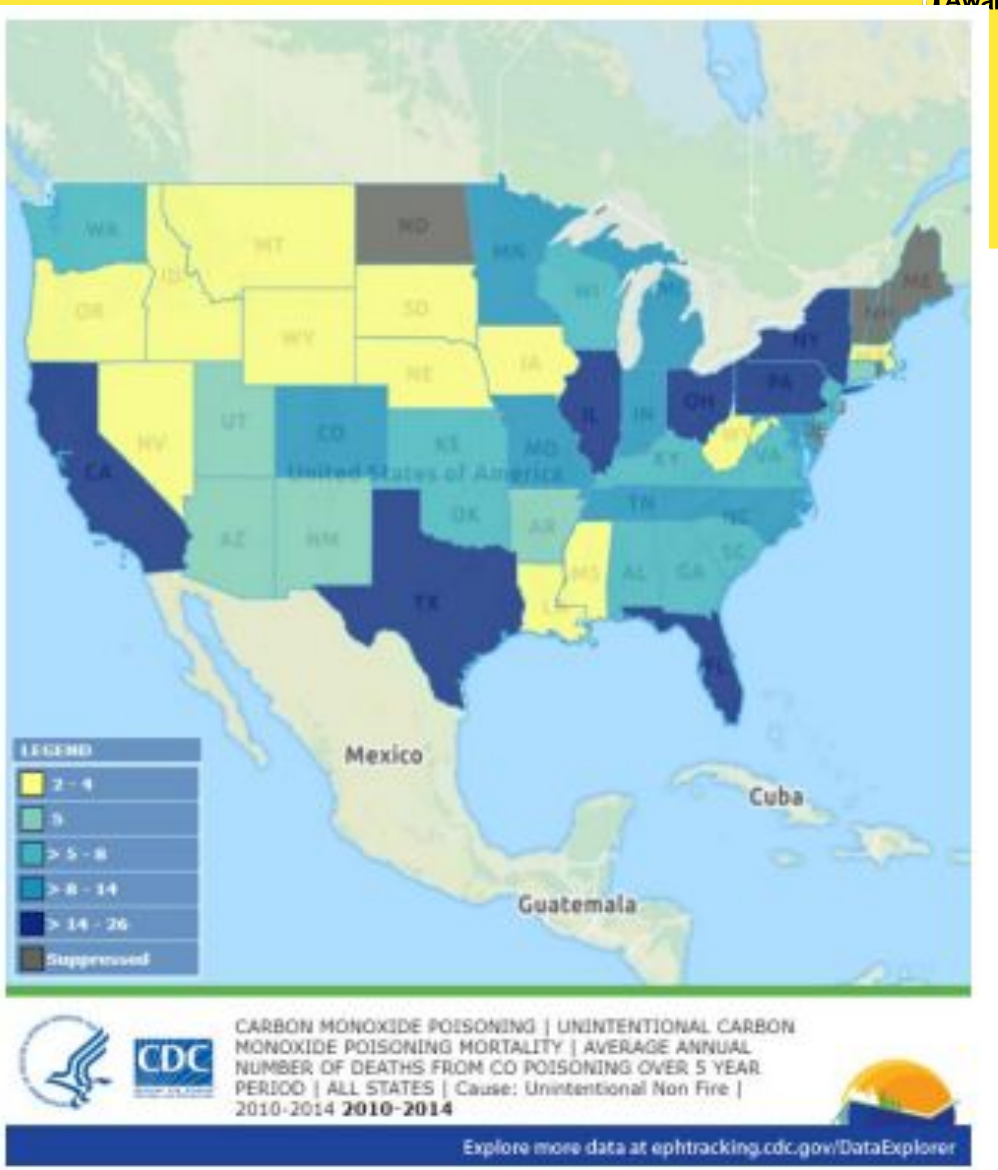
Except: Normally unoccupied Group S, Group F & Group U.

CO Detection and Alarm Requirements Literature Review – Data Collection Findings

National Carbon Monoxide Awareness Association

- CDC
- NFPA
- NFIRS
- The Jenkins Foundation
- CPSC

CDC


LEGEND
2 - 4
5
> 5 - 8
> 8 - 14
> 14 - 26
Suppressed
Mexico
Cuba
Guatemala
CDC
CARBON MONOXIDE POISONING | UNINTENTIONAL CARBON MONOXIDE POISONING MORTALITY | AVERAGE ANNUAL NUMBER OF DEATHS FROM CO POISONING OVER 5 YEAR PERIOD | ALL STATES | Cause: Unintentional Non Fire | 2010-2014 2010-2014
Explore more data at ephtracking.cdc.gov/DataExplorer

NFPA

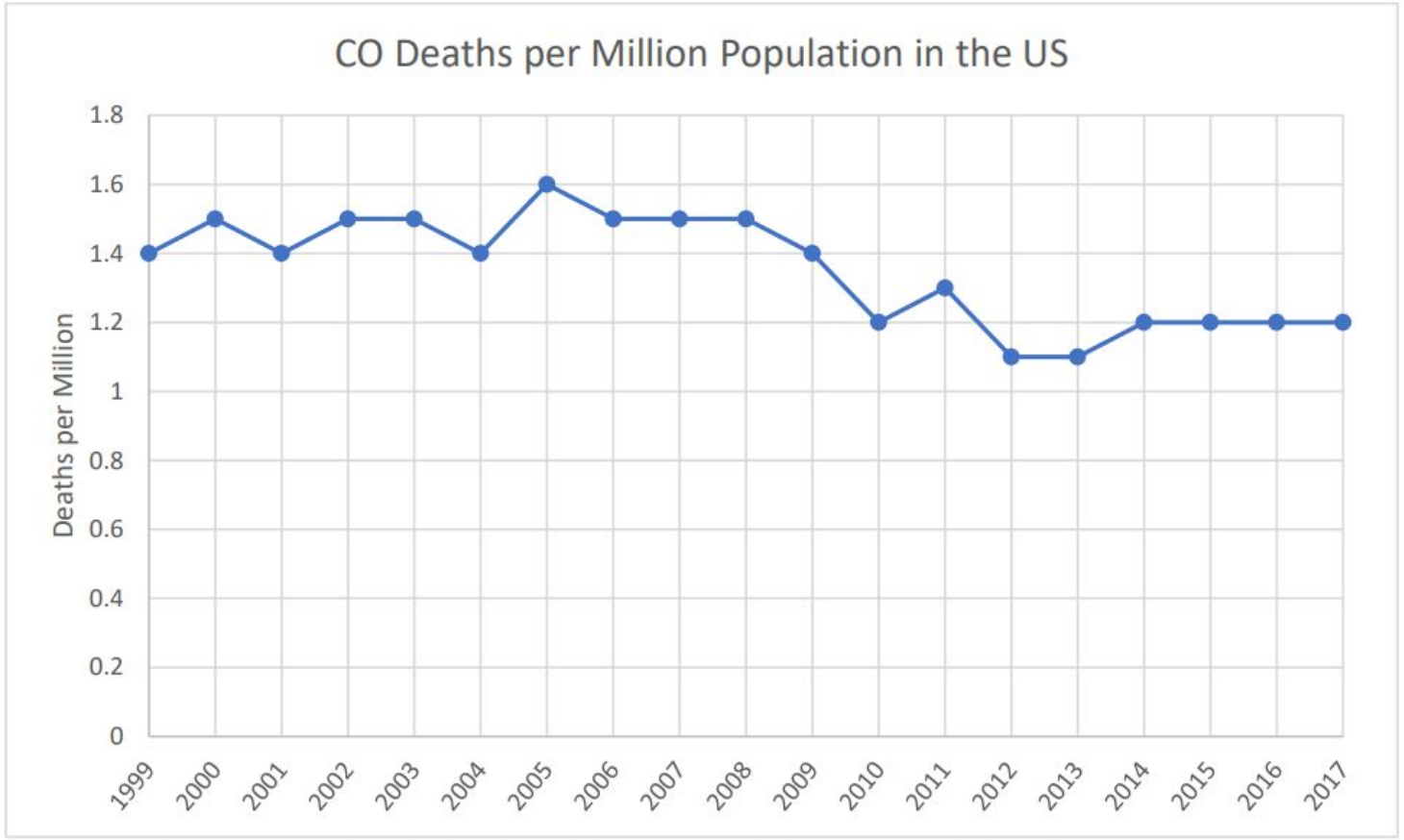


Figure 8: US CO Age Adjusted Death Rate per Million by Year[1] - Data Courtesy: Ahrens 2020

NFIRS

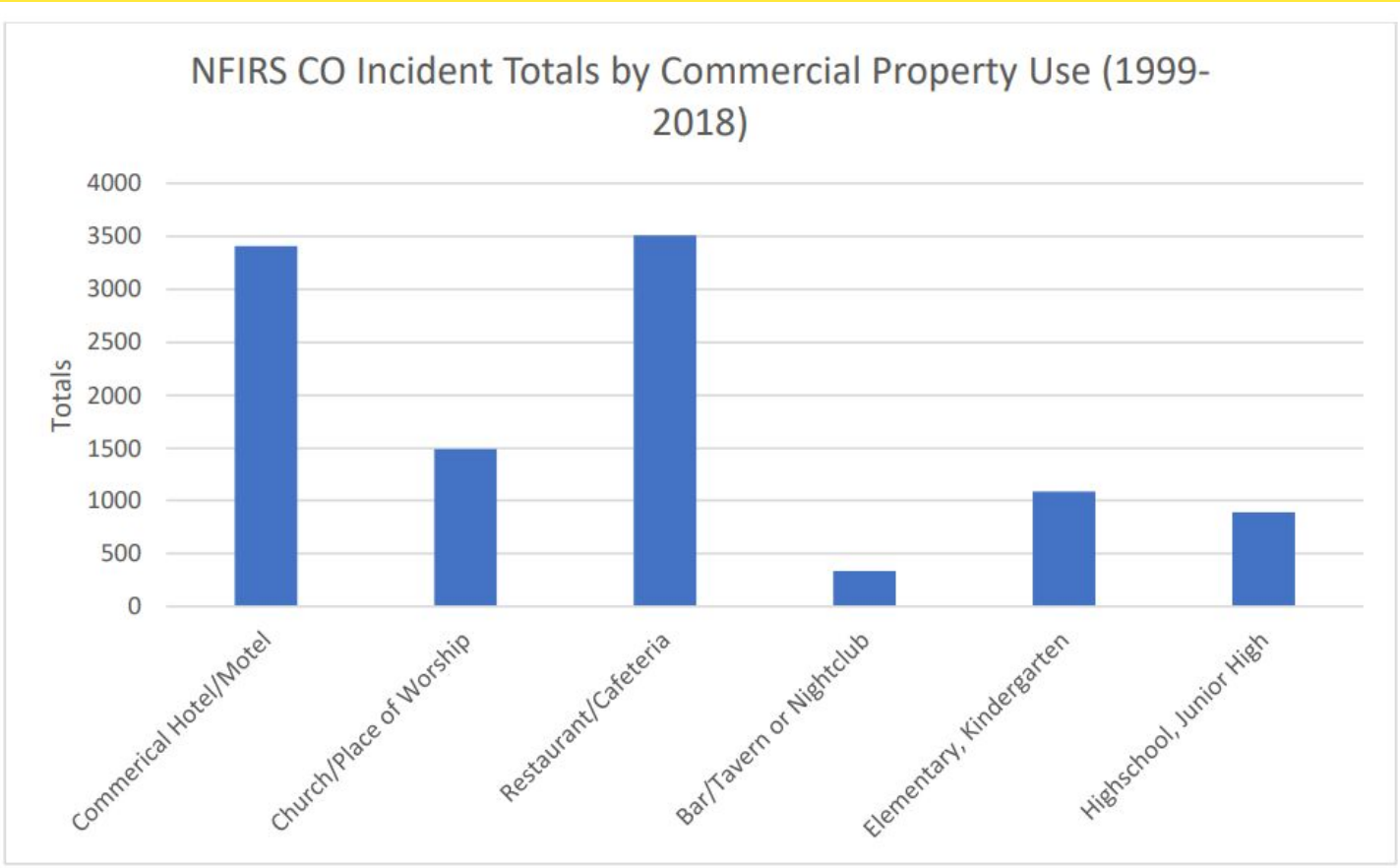


Figure 9: NFIRS CO Incident Totals in Commercial Occupancies (1999-2018)[34]- Data Courtesy: NFIRS 2020

CPSC

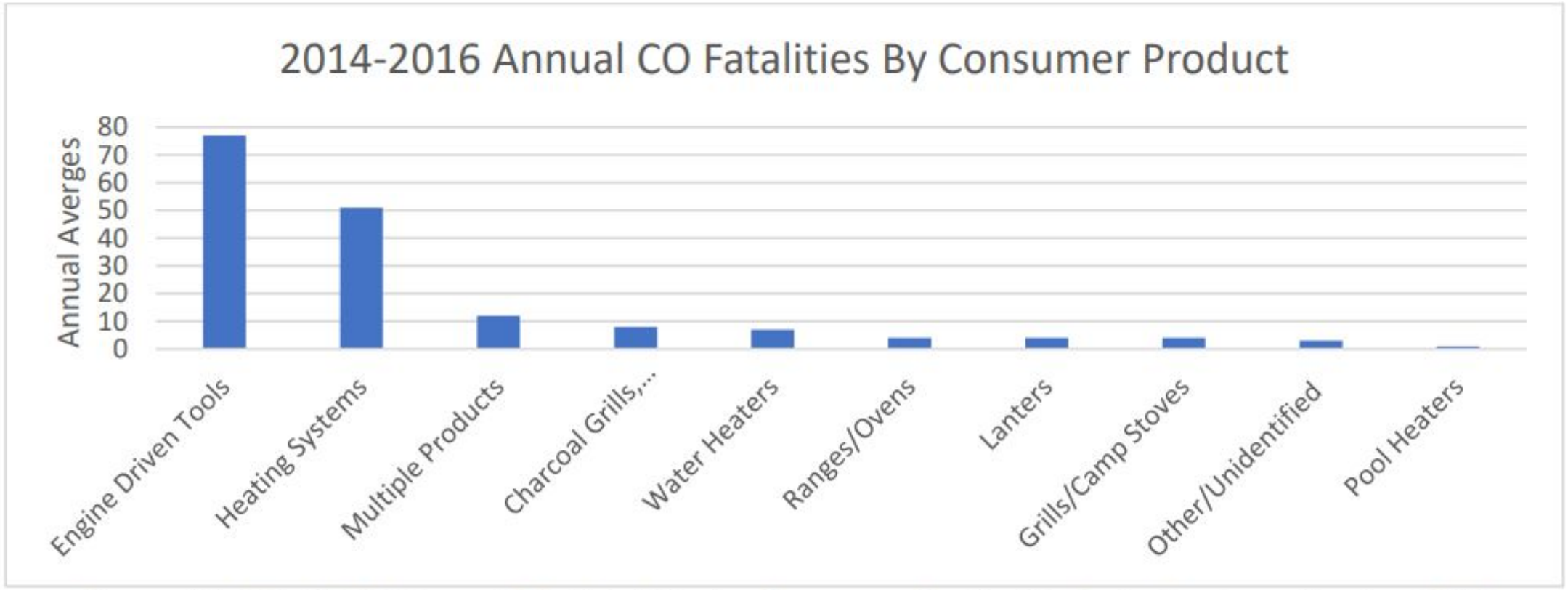


Figure 14: 2014-2016 Annual CO Fatalities by Consumer Product[19] - Data Courtesy: Hnatov 2019

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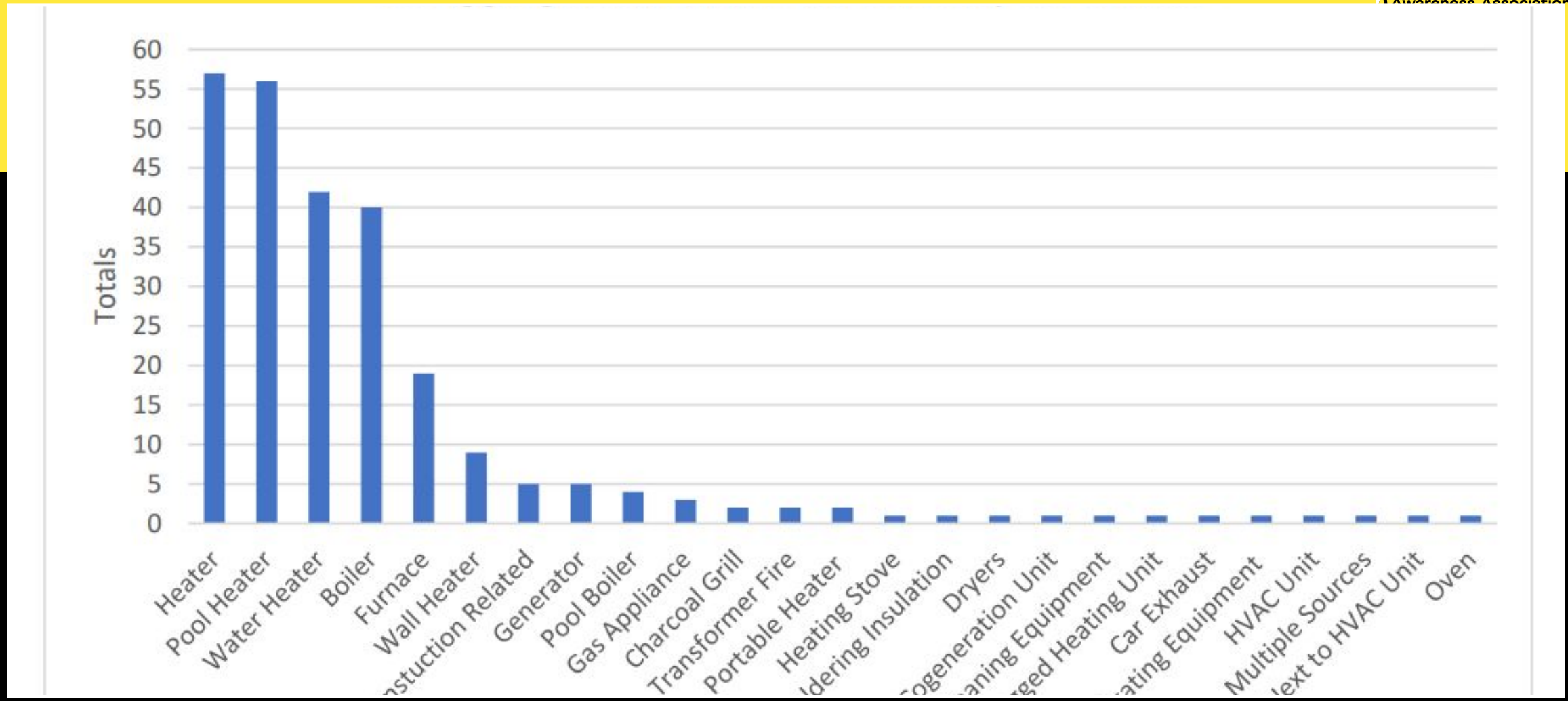

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Recommendations

- Research future data collections
  - There are many unknowns
  - Not all the information is consolidated in an effective way
  - Data sets have their own limitations
- CO diffusion through various building materials
  - More accurately predict CO diffusion
- CO levels

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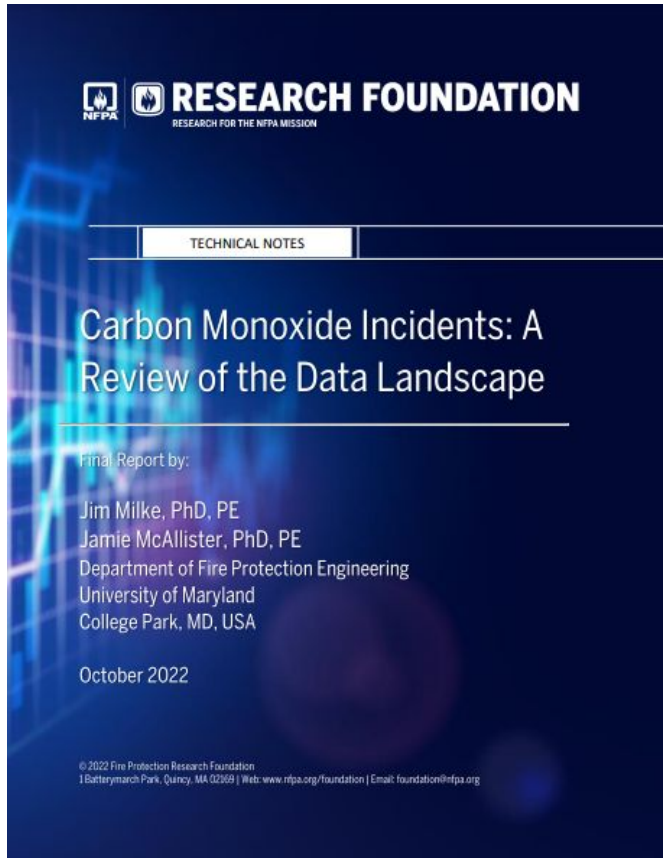
CO: A Review of the Data Landscape



Research Goals:

1) Review and present the CO incident data landscape to clarify the sources of information, how the data is compiled and what the data represents.

2) Identify, summarize & analyze case studies of non-fire CO incidents specific to commercial-type occupancies

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Databases Analyzed

Source	Database
Centers for Disease Control and Prevention (CDC)	National Environmental Public Health Tracking
Centers for Disease Control and Prevention (CDC)	WONDER (Death Rate Datasets)
Consumer Product Safety Commission (CPSC)	National Electronic Injury Surveillance System (NEISS)
Institute of Health Metrics and Evaluation (IHME)	Global Health Data Exchange Registry
National Transportation Safety Board (NTSB)	Aviation Accident Database & Synopses
National Highway Transportation Safety Administration (NHTSA)	Fatality Analysis Reporting System
Occupational Safety and Health Administration (OSHA)	Collection of Accident Data related to CO poisonings
United States Fire Administration (USFA)	National Fire Incident Reporting System

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Findings

- While all databases show that incidents are occurring in commercial occupancies
- The limited datasets do not allow for:
  - a national-level appreciation of CO incident occurrences or frequencies.
  - a comprehensive view of injuries and deaths resulting from CO exposure correlated by occupancy type.
- The frequency of injuries occurring in all types of commercial occupancies is unknown; this is a critical piece of information needed to determine if current requirements for CO detection are adequate.
- There is no dataset which details the location of the victim relative to the CO source.
  - No way to determine, using these datasets alone, if current CO detection placement criteria, e.g., detector in space with CO source, is adequate.

A Review of the Carbon Monoxide Alarm and Detection Thresholds

National Carbon Monoxide Awareness Association

AFAA
IAFC
HONEYWELL
JCI
NEMA
SIEMENS
UEITEST

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End of 2024

Future Project: CO Alarm Usability

Questions remain around alarm usability

How to get involved?

Submit a research idea to FPRF

- Visit www.nfpa.org/foundation
- Submit research idea via online submission portal

FPRF Research Planning Councils

- Detection and Signaling Research Council
- Automatic Sprinkler Research Council
- Electrical Safety Research Advisory Council

FPRF Research Consortiums

- Energy Storage Research Consortium
- Property Insurance Research Group
- Facilities Research Consortium

Sponsor FPRF projects, webinars, or events

- Provide input on project scope and direction
- Provide input over the course of the project
- Get early access to results
- Brand visibility

Serve on a project technical panel

Let FPRF know your areas of expertise and interest in being considered as a future panelists

Apply to be the research lead for FPRF Projects

Bid on FPRF “Requests for Proposals” to have the opportunity to become a contractor on FPRF projects

Partner with FPRF

Partner with FPRF on future research through our advisory services program

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Thank you!

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All resources available at www.nfpa.org/foundation