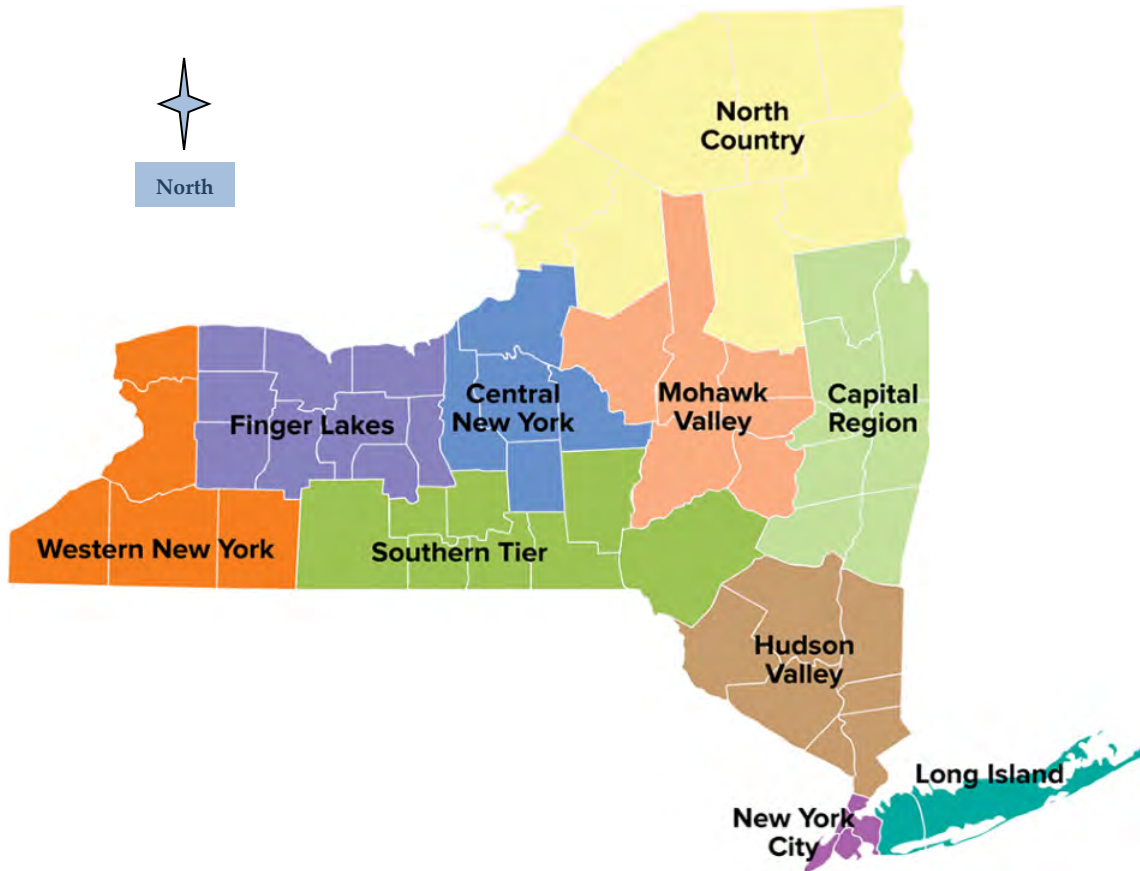


## INTRODUCTION

**New York State Builders Association (NYSBA)** has commissioned **Asterhill Research Company**, a *Research and Planning Consultant*, to compile a **Housing Market Study** to review and assess the feasibility and impact of requiring fire sprinkler systems in one and two-unit residential dwellings in NYS (excluding New York City).



### PURPOSE OF THIS REPORT

The housing study will review and assess the feasibility and impact of requiring fire sprinkler systems in one and two-unit residential dwellings in NYS (excluding New York City). The material to be reviewed and examined includes but is not limited to:

- fire fatalities in New York State over the last ten years by location and dwelling type,
- The age of existing residential single-family homes, construction methods, and cross-reference with fire fatalities,
- Fire sprinkler costs and system requirements, maintenance and long-term needs,
- Construction materials and building code changes,
- Interviews with industry experts, including sprinkler manufacturers, architects, engineers, fire marshalls, fire departments, building inspectors, builders, developers, and

- Comparison to states that implemented mandatory fire sprinkler systems in one and two-unit residential dwellings.

The essential components addressed are system cost, market demand, and impact on owners, developers/builders, municipalities, and fire-safety providers. This is accomplished by testing the market to make an evaluation. This study evaluates the feasibility and impacts of the proposed fire sprinkler system requirements.

We intend to collect market data and utilize supplemental information and data from other prior studies for this verification. Additionally, we will interview manufacturers, distributors, builders, developers, municipalities, regional/county planners, fire protection professionals, and code enforcement officers. Key aspects of this study include defining geographically and demographically the number of clients likely to consider these systems, requirements, availability, and other associated costs.

## BACKGROUND

Since the 2009 edition of the International Residential Code (IRC), the model code has required all new one and two-family dwellings and townhouses to include fire sprinkler systems. Nearly all states have removed the requirement from their residential building codes as they have adopted newer editions<sup>58</sup>. According to the National Association of Home Builders report on the Fire Sprinkler Mandate (2019), only California and Maryland have maintained this mandate. Below is a summary of the state's position on this mandate:

- 46 states have completely removed the sprinkler requirements for one- and two-family homes.
  - 20 of those states, local jurisdictions have the authority to adopt sprinkler requirements.
- 2 states have limited the requirement based on the size or height of the home.
- 42 states have also removed the sprinkler requirement for townhouses.
- 4 states require builders to give buyers an estimate to install a fire sprinkler system (mandatory option).
- California and Maryland have left the sprinkler mandate in place.
- States may avoid the sprinkler mandate in one of three ways.
  - Twenty-two states defeated the sprinkler mandate through legislation.
  - Twenty-two states defeated the sprinkler mandate through code adoption.
  - 4 states have not adopted a statewide residential code.

In New York State (UL1626), the standard for residential sprinklers for Fire-Protection Service requires that residential fire sprinklers activate quickly to suppress fires and prevent flashover in the room where the fire originates; provide sprinkler coverage during a fire for **10 minutes for multiple-story homes**, and **seven minutes for one story homes**; and perform in such a manner that the levels of carbon monoxide not exceed the lethal levels<sup>59</sup>.

In November 2021, Governor Hochul of New York State signed into law a bill requiring builders to provide prospective purchasers an estimate for installing an automatic fire sprinkler system in one and two family units<sup>57</sup>.

Governor Hochul proclaimed May 13-19, 2024, Home Fire Sprinkler Awareness Week in New York State. The Resolution states that 142 civilians died in home fires. However, only 73 fire fatalities occurred in 1 and 2 family dwellings, and the majority of those fatalities occurred in 1 and 2 family homes built before 2000<sup>60</sup>. Further, the Resolution claims that the composition of construction materials and furniture produces deadly toxic materials in less than 2 minutes. According to FEMA, the majority of fire fatalities are caused by carbon monoxide and smoke.

There is an on-going debate over mandating fire sprinkler systems in one and two-family homes. Among the issues being debated include but are not limited to:

Cost

Facts of impact

Affordability of homes

Unique Interest Lobby funding this mandate

## **METHODOLOGY**

The report's organization follows the New York State Department of Housing and Community Renewal (NYSHCR) underwriting guidelines and the United States Department of Housing and Urban Development (HUD). Most of the information is presented in tables, maps, pictures, and statistics. These indicators include but are not limited to:

- Population changes
- Household characteristics
- Housing inventories
- Fire alarm and fire sprinkler systems cost
- Economic impact

The study reaches its conclusions after analyzing and reviewing the following topic areas. Additionally, the process assesses the demographics and housing conditions and compares them to county and state data.

## **DATA SOURCES**

The U.S. Census is the primary source of **Secondary Data** used in this study. Data from the 2010 Census and Five-Year America Community Surveys from 2010 -Present were also used. The Census Data provides the most complete and reliable body of data. Third-party reports are collected, reviewed, and used to confirm the census data and provide any newer information. **Primary data** is collected from the primary market area through interviews, sampling, and observations. A list of data sources and references is provided in the Appendix.

## **ASSUMPTIONS AND LIMITATIONS**

### **Use of this Report**

- The possession of this report does not carry with it the right of publication.
- This document may not be used for any purpose or by any person or entity other than the party for whom it was prepared without the written permission of **Asterhill Research Company**.
- The information and opinions contained herein apply only to the time frame indicated in the report.

### **Findings**

- The statements of fact contained herein are believed to be accurate and correct insofar as they have been derived from sources believed to be reliable and accurate. No responsibility is assumed for legal descriptions or matters that pertain to legal expertise.
- The findings of this market study are indicators of market trends. These findings do not guarantee project success but serve as a tool to supplement one's knowledge of the market.

### **Project Compliance**

- No representations are made with regard to compliance with legal or regulating requirements applicable to this project, including zoning, environmental, or other local, state, or federal regulations, permits, and licenses.

### **Financial Analysis**

- As part of this report, financial analyses are based upon estimates, assumptions, and other public or private information developed from actual market research, knowledge of the industry, or project-specific information provided and/or obtained.
- These analyses illustrate the financial expectations given the specific set of assumptions used. If any of the assumptions are altered, different financial expectations may result.

### **Data Required by State and Federal Agencies or Other Regulatory Agencies**

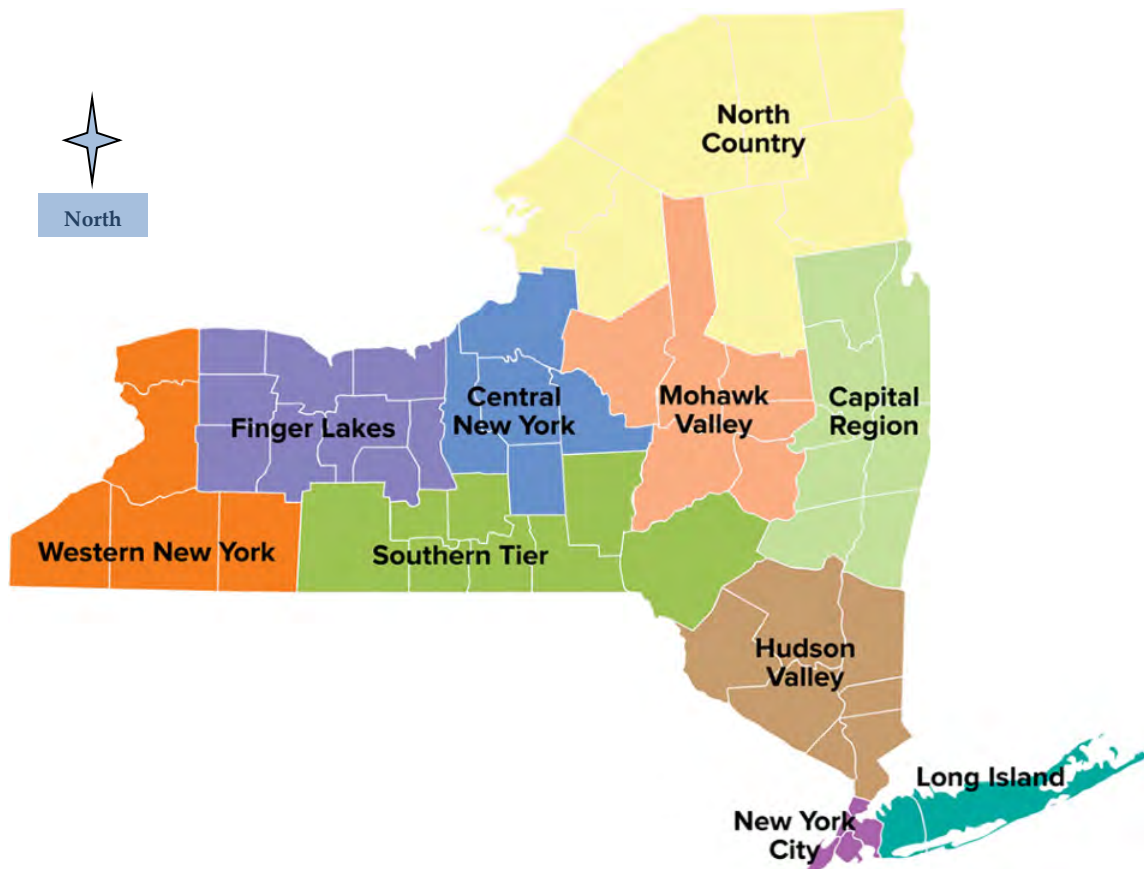
- No finance or other regulatory agencies to which the study is addressed have additional data requirements.

### **Additional Work**

- No housing financial agencies, other regulatory agencies, or developers have asked for more work outside the scope of work defined. Any additional documentation or analysis beyond the scope of this study will be performed for additional compensation.

## EXECUTIVE SUMMARY

**New York State Builder Association (NYSBA)** has commissioned **Asterhill Research Company**, a Research and Planning Consultant, to compile a Housing Study to review and assess the feasibility and impact of requiring fire sprinkler systems in one and two-unit residential dwellings in NYS (excluding New York City). This housing study reviewed population, housing, and economic trends, together with current market information, to assess the feasibility and practicality of making an automatic fire sprinkler mandatory in 1 and 2-unit residential homes. The map below illustrates the regional areas of New York State.



The housing and feasibility study reviewed and assessed the impact of requiring fire sprinkler systems in one and two-unit residential dwellings in NYS (excluding New York City). In the 2009 edition of the International Residential Code (IRC), the model code required all new one and two-family dwellings and townhouses to include fire sprinkler systems<sup>58</sup>. **Since its introduction, 48 of 50 States have removed the code from their residential building codes or limited its requirements.**

In New York State (UL1626), the standard for **residential** sprinklers for Fire-Protection Service requires that residential fire sprinklers activate quickly to suppress fires and prevent flashover in the room where the fire originates; provide sprinkler coverage during a fire for **10 minutes for multiple-story homes**, and **seven minutes for one story homes**; and perform in such a manner

that the levels of carbon monoxide do not exceed the lethal levels<sup>59</sup>. In November 2021, Governor Hochul of New York State signed into law a bill requiring builders to provide prospective purchasers an estimate for installing an automatic fire sprinkler system in one and two family units<sup>57</sup>.

Governor Hochul proclaimed May 13-19, 2024, Home Fire Sprinkler Awareness Week in New York State. The Resolution states that 142 civilians died in home fires (2017). However, only 73 fire fatalities occurred in 1 and 2-family dwellings, and the majority of those fatalities occurred in 1 and 2-family homes built before 2000<sup>60</sup>. Additionally, when the NYC region was removed from this count, **there were only 50 fatalities or 2.5 fatalities per million in NYS**. Advocates continue to push for legislation to mandate automatic fire sprinklers in one and two-family structures. A strong lobby, including the National Fire Sprinkler Association (NFSA) and the U.S. Fire Administration (USFA), has promoted fire sprinkler systems in residential homes<sup>61,62</sup>. They state that residential fire sprinkler systems:

- Saves occupant's lives,
- Save firefighter lives and reduce injuries,
- Significantly reduces the risk of premature building collapse to firefighters by lightweight construction components when they are involved in a fire,
- Substantially reduce property loss caused by a fire, and is
- It is inexpensive to install on new construction.

It is always important to save lives in residential fires. Technological improvements, fire alarms, construction materials, and education are saving more lives.

The premise being used to justify the proposed mandate for **Automatic Fire Sprinklers Systems (AFSS)** is flawed and misrepresents the facts:

- It will cost 300% to 500% (+) more than represented,
- Will increase the cost of new homes by \$20,000 to \$30,000 more (3-5%)
- There may be additional costs from municipalities and water providers,
- System failures are due to environmental conditions and maintenance issues,
- The maintenance cost is 100% to 300% higher than represented,
- It will not reduce carbon monoxide gases,
- It will cause more smoke, making it difficult for residents to find exits,
- Cannot detect fires in walls and
- Insurance premiums will rise with the higher cost of homes.

**The decision to install an automatic fire sprinkler system should remain with the buyer of a new one or two-family residential home.**

The following discussion will review existing conditions and the claims and benefits stated by New York State, NFSA, and USFA.

### 1. POPULATION AND RESIDENTIAL STRUCTURES IN NYS

As of 2023, New York is the nation's fourth-most populous state, behind California, Texas, and Florida. Two-thirds of the state's population resides in the New York metropolitan area. New York City is the most populous city in the United States<sup>2,10</sup>, with an estimated population of 8,622,467 in 2022<sup>2</sup>. See Table 2.1 below.

NYS Regions	1	2	3	4	5	6	7	8	9	10
	Western NY	Finger lakes	Southern Tier	Central NY	North Country	Mohawk Valley	Capital	Hudson Valley	New York City	Long Island
Population 2022	1,415,124	1,203,256	648,135	781,620	347,488	613,377	1,057,512	2,391,754	8,622,467	2,913,646
% Change 2010	-0.9%	0.6%	-3.6%	-0.9%	-2.3%	-1.1%	2.4%	5.3%	6.7%	3.6%
Occupied housing units	599,238	496,731	269,528	314,630	139,452	244,898	435,291	856,494	3,282,804	965,457
Owner-occupied housing units	403,225	338,437	183,348	214,055	93,184	167,582	288,053	569,320	1,081,125	789,790
% of all occupied housing units	67.3%	68.1%	66.8%	68.0%	66.8%	68.4%	66.2%	66.5%	32.9%	81.8%
% Change from 2010	-3.4%	3.3%	-1.3%	1.9%	0.0%	-1.5%	3.3%	3.7%	7.4%	3.0%
Avg household size owner unit	2.46	2.48	2.49	2.50	2.49	2.53	2.49	2.74	2.78	3.07
Renter-occupied housing units	196,013	158,294	46,268	100,575	46,268	77,316	147,238	287,174	2,201,679	175,667
% of all occupied housing units	32.7%	31.9%	33.2%	32.0%	33.2%	31.6%	33.8%	33.5%	67.1%	18.2%
% Change from 2010	-6.4%	13.7%	3.9%	4.7%	6.5%	2.9%	9.0%	10.0%	7.9%	2.3%
Avg household size rent unit	2.09	2.05	2.05	2.09	2.16	2.17	2.02	2.52	2.45	2.56
All Vacant Housing Units	69,814	46,857	49,240	39,427	49,581	44,497	78,308	83,733	337,970	90,502

1. Source: U.S. Census 2010-2022

In New York State, 56.7% of all structures are one- and two-units. See Table 2.2 below for a breakdown by region in New York State.

NYS Regions	1	2	3	4	5	6	7	8	9	10
	Western NY	Finger lakes	Southern Tier	Central NY	North Country	Mohawk Valley	Capital	Hudson Valley	New York City	Long Island
Housing Units	669,052	543,588	318,768	354,057	189,033	289,395	513,599	940,227	3,620,774	1,055,959
1-unit, detached	62.5%	65.7%	64.0%	65.2%	66.9%	63.9%	61.0%	55.9%	9.2%	78.3%
1-unit, attached	2.8%	5.0%	1.8%	3.0%	2.9%	1.6%	3.9%	6.2%	7.1%	4.5%
2 units	14.3%	6.1%	8.7%	7.3%	5.0%	12.3%	9.6%	6.7%	12.5%	4.3%
3 or 4 units	5.4%	5.7%	5.2%	5.1%	6.2%	6.1%	7.1%	6.6%	9.1%	2.0%
5 to 9 units	4.3%	5.4%	4.2%	4.3%	3.7%	3.4%	4.6%	5.2%	6.6%	2.0%
10 to 19 units	1.9%	2.2%	2.3%	3.5%	1.6%	2.0%	3.0%	3.9%	6.5%	2.3%
20 or more units	5.4%	6.1%	4.5%	6.7%	3.1%	4.9%	5.9%	13.5%	48.7%	5.8%
Mobile home	3.4%	3.7%	9.2%	4.7%	10.6%	5.7%	4.7%	1.9%	0.1%	0.8%
Boat, R.V., van, etc.	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% of 1-2 units	79.6%	76.8%	74.5%	75.6%	74.8%	77.9%	74.6%	68.8%	28.9%	87.0%

1. Source: U.S. Census 2010-2022

In New York State, 89% of all housing structures were built before 2000, 75.3% before 1980, and 65.5% built before 1970. Table 2.3 below compares the structures built by region in New York State.

According to the New York Association of Realtors, the median sale price of a single-family home in New York State in 2023 was \$382,500, up 6.1% from 2022<sup>11</sup>. The average sale price in the first quarter of 2024 was \$383,500, up 6.2% from 2022. The median home value in New York State in 2022 was \$253,185, up 33% since 2010. (See Section 3 of this report).

**Table 2.3 Housing Structure Year Built by Regions in New York State 2022<sup>1</sup>**

NYS Regions	1	2	3	4	5	6	7	8	9	10
	Western NY	Finger lakes	Southern Tier	Central NY	North Country	Mohawk Valley	Capital	Hudson Valley	New York City	Long Island
<b>Specified units</b>	669,052	543,588	318,768	354,057	189,033	289,395	513,599	940,227	3,620,774	1,055,959
Built 2010 or later	3.7%	4.7%	4.0%	4.1%	5.5%	3.7%	6.6%	4.5%	5.0%	3.3%
Built 2000 to 2009	5.1%	6.8%	6.1%	6.3%	10.1%	5.4%	8.9%	7.8%	5.4%	5.7%
Built 1990 to 1999	7.2%	9.1%	9.0%	8.4%	11.1%	7.1%	10.1%	7.4%	3.8%	6.2%
Built 1980 to 1989	7.3%	10.8%	11.1%	10.8%	11.6%	8.5%	11.5%	10.6%	5.0%	7.8%
Built 1970 to 1979	10.6%	12.7%	13.0%	12.5%	10.8%	8.9%	12.4%	12.5%	6.9%	12.5%
Built 1960 to 1969	10.7%	11.6%	10.4%	11.5%	7.7%	9.8%	9.4%	13.5%	12.4%	17.0%
Built 1950 to 1959	16.8%	10.9%	10.9%	13.7%	8.4%	13.4%	9.6%	14.5%	12.8%	25.2%
Built 1940 to 1949	7.8%	5.2%	5.9%	6.2%	4.8%	7.6%	4.9%	5.9%	9.5%	8.5%
Built 1939 or earlier	30.8%	28.2%	29.6%	26.5%	29.9%	35.7%	26.4%	23.2%	39.2%	13.9%
<b>% Built before 2000</b>	<b>91.2%</b>	<b>88.5%</b>	<b>89.9%</b>	<b>89.6%</b>	<b>84.4%</b>	<b>90.9%</b>	<b>84.4%</b>	<b>87.6%</b>	<b>89.5%</b>	<b>91.0%</b>
% Built before 1980	66.1%	55.9%	56.8%	58.0%	50.9%	66.4%	50.4%	57.1%	73.9%	64.5%
% Built before 1970	55.4%	44.3%	46.4%	46.4%	43.2%	56.7%	40.9%	43.6%	61.6%	47.6%

1. Source: U.S. Census 2010-2022

## 2. FIRE FATALITIES

Since 1980, the United States has made remarkable progress in all fire safety (residential and commercial), witnessing decreased fires and fire-related deaths. This positive trend can be attributed to various factors, including improved building codes, enhanced fire suppression systems, increased awareness, and better fire prevention strategies.

According to the NFPA report, the rate of injury and death in reported home fires is higher now than it was in 1980<sup>15</sup>. While improvements have been made in fire prevention and safety measures, the data reveals that these efforts have not been sufficient to control the rising casualties. The estimated total fires in 2021 were 55% lower than in 1980, while fire death and injury estimates were 42% and 44% lower, respectively, over the same period. In 2021, local fire departments, including departments protecting towns, townships, cities, and counties, responded to an estimated 1,353,500 fires in the U.S.<sup>14</sup> These fires caused an estimated 3,800 civilian deaths, 14,700 civilian injuries, and \$15.9 billion in direct property damage. Meanwhile, direct property damage decreased by 30% compared to property damage in 2020<sup>14</sup>. 19% of all fires occurred in one- and two-family homes, and 5% of fires in apartments caused 16% of civilian fire deaths and 21% of injuries<sup>15</sup>.

Cooking was the leading cause of residential building fires, and fires resulted in death and losses, at 52%. Heating (9%) and electrical malfunction (6%) were the next major causes<sup>13</sup>. There is a direct relationship between residential fires, older homes, and individuals and



families with lower incomes<sup>23</sup>. Research indicates that older houses are often associated with fire injuries and fatalities. **Older houses were built with more flammable and toxic materials, electric systems with lesser capacities than today's standards, and fewer original electrical outlets to handle greater loads.**

According to FEMA, older houses may have other features that put them at risk for fires, including substandard appliances, faulty heating systems that lead to the use of space heaters, lack of compliance with building and/or sanitation codes, and narrow stairwells that make escape more difficult<sup>23</sup>.

In New York State, between 2019 and 2021, there were 13 firefighter fatalities. Four of these fatalities occurred at residential homes and were caused by cardiovascular events. The average age of these fatalities was 54 years old<sup>23</sup>.

**Carbon monoxide poses the greatest threat to civilians and firefighters in residential structure fires, along with heat and oxygen deprivation<sup>15,22</sup>.**

According to a study by Gilbert and Butry (2017), most fire fatalities are associated with frailty. **Older people and young children are more likely to die in a residential fire when compared to other population segments.**

**According to NFPA and emergency medical professionals, most fire fatalities are caused by carbon monoxide, which poses a more significant threat to life than oxygen deprivation and heat in residential structure fires<sup>22</sup>.**

New York State

In 2023, New York State's number of fire deaths per million was 7.75; for single-family dwellings (1 and 2 units), it was 4.0; when excluding NYC, it dropped to 3.2. In 2023, there were 155 fire fatalities in NYS, and 51.6% occurred in 1 and 2-family units, while 48.4% occurred in multi-family units (3 or more), campers, R.V., and mobile homes (See Table 2.4 below.)

Table 2.4 New York State Fire Fatalities<sup>1</sup>

Description/Year	2024 <sup>2</sup>	2023	2022	2021	2020	2019	2018	2017	2016	2015	Average
Total Fire Fatalities	48	155	144	122	114	126	142	142	120	129	124
Multi-family Unit 3+, Campers/R.V./Trailer	25	75	60	55	45	50	52	69	34	53	52
1- and 2-family	23	80	84	67	69	76	90	73	86	76	72
% of Total FF	47.9%	51.6%	58.3%	54.9%	60.5%	60.3%	63.4%	51.4%	71.7%	58.9%	58.3%
Fire Fatalities Excluding NYC Region 7	16	64	70	62	63						55.0
% of Total FF	33.3%	41.3%	48.6%	50.8%	55.3%						44.3%
1. Source: FEMA ( <a href="https://apps.usfa.fema.gov/civilian-fatalities/incident/reports">https://apps.usfa.fema.gov/civilian-fatalities/incident/reports</a> ) 2. 2024-January through May 2024 (5 months)											

In Table 2.5, the fire fatalities are broken down by regions in NYS. The annual fire fatalities are 3.2 per million, excluding the NYC Region.

Table 2.5 NYS Fire Fatalities By Region and Year for 1 and 2 Family Dwellings <sup>1</sup>								
	2024 <sup>2</sup>	2023	2022	2021	2020	2019	Total	%
NYS Population	n/a	19,994,379	19,994,379	20,114,745	19,514,849	19,752,319		
Capital Region	1	7	4	4	5	3	24	6.0%
Central Region	3	4	9	5	2	6	29	7.3%
Finger Lakes Region	3	6	8	8	5	12	42	10.6%
Hudson Valley Region	2	10	5	1	19	7	44	11.1%
Long Island Region	1	12	13	17	8	8	59	14.8%
Mohawk Valley Region	0	4	5	4	9	5	27	6.8%
<b>NYC Region</b>	<b>7</b>	<b>16</b>	<b>14</b>	<b>5</b>	<b>6</b>	<b>14</b>	<b>62</b>	<b>15.6%</b>
North Country Region	0	1	2	1	1	10	15	3.8%
Southern Tier Region	1	4	6	6	5	4	26	6.5%
Western NY Region	5	16	18	15	9	7	70	17.6%
<b>Total Annually</b>	<b>23</b>	<b>80</b>	<b>84</b>	<b>66</b>	<b>69</b>	<b>76</b>	<b>398</b>	<b>100.0%</b>
<i>% of Total</i>	<i>5.8%</i>	<i>20.1%</i>	<i>21.1%</i>	<i>16.6%</i>	<i>17.3%</i>	<i>19.1%</i>	<i>100.0%</i>	
<i>Deaths per Million NYS</i>	<i>n/a</i>	<i>4.00</i>	<i>4.20</i>	<i>3.28</i>	<i>3.54</i>	<i>3.85</i>	<i>3.77</i>	
<i>Deaths per Million NYS Excluding NYC</i>	<i>n/a</i>	<i>3.20</i>	<i>3.50</i>	<i>3.03</i>	<i>3.23</i>	<i>3.14</i>	<i>3.22</i>	
1. Source: FEMA ( <a href="https://apps.usfa.fema.gov/civilian-fatalities/incident/reports">https://apps.usfa.fema.gov/civilian-fatalities/incident/reports</a> ) 2. January through April 2024								

A review of fire fatalities between 2019 and 2023 found that the **mean dwelling was built around 1932. No fire fatalities occurred between 2019 and 2023 in homes built after 2000.** Most firefighter fatalities and injuries occurred from roof and floor failures. Over 40% of the fatalities were elderly and/or children under 14 years of age, as they are the most vulnerable groups.

### 3. FIRE ALARM AND FIRE SPRINKLER SYSTEMS

The most common **fire detection device is a smoke detector**. A smoke detector senses smoke, heat, and carbon monoxide, typically as an indicator of fire<sup>31</sup>. According to FEMA, smoke alarms were reported as present in 33% of residential fatal fires and 44% of **residential non-fatal fires**<sup>16</sup>. In **25% of residential fatal fires, no smoke alarms were present**<sup>16</sup>, and in 43% of these fire fatalities, firefighters could not determine if a smoke alarm was present<sup>16</sup>.

**About 65% of the time, working smoke alarms were absent or did not work in fatal residential fires.**

Most modern smoke alarms utilize these different types of smoke alarm technologies. **Combination smoke alarms** utilize ionization, photoelectric, and



carbon monoxide detection. For best protection, smoke and fire detection technologies (ionization, photoelectric, and carbon monoxide) should be used in all homes, including existing and new residential structures.

Since the 1990s, the NFPA has recommended fire code standards nationwide. NFPA sets the standards for technical aspects of sprinklers installed in the USA. Building codes specifying which buildings require sprinklers are left to local jurisdictions<sup>30</sup>.

**A fire sprinkler system** is an active fire protection method consisting of a water supply system providing adequate pressure and flow rate to a water distribution piping system to which fire sprinklers are connected<sup>30</sup>.

**A fire sprinkler system** is an active fire protection process consisting of a water (or other alternative materials) supply providing sufficient pressure and flow rate to a distribution system (pipes) and fire sprinkler heads<sup>30</sup>. There are several fire sprinkler types, including wet pipe (the most common), dry pipe, deluge, pre-action, foam water, water spray, and water mist. Fire sprinkler heads are heat-activated when the ambient temperature rises from 135 to 175 degrees<sup>63</sup>.



### **Smoke and carbon monoxide will not activate a fire sprinkler head.**

In a dry sprinkler system, the activated sprinkler head causes the air pressure in the pipes to drop, opening a dry pipe valve near the system riser that holds back the water. **The water floods the pipes and sprays through the open sprinkler, which can take up to 60 seconds.**

## **4. COSTS**

The cost of smoke alarms and residential fire sprinkler systems can vary depending on several factors. The average size of an existing single-family home in the United States is 2,014 square feet, with a mean price per square foot of \$203.61 (\$410,070), and in New York State, it is 1,490 square feet, with a mean price per square foot of \$421.49<sup>37</sup>. According to the National Association of Home Builders, the average size of a new single-family home is 2,561 square feet (2021), and Statista reports the average size is 2,522 (2023). Table 2.6 below estimates the average cost of a new single-family home (2024) with and without a fire sprinkler system in the different regions of New York State.

Table 2.6 Estimated Cost of Building New Home in New York State												
		Albany	Syracuse	Rochester	White Plain	Hicksville	Utica	NYC	Watertown	Binghamton	Buffalo	NYS Average
New Single-Family SF		2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550
Sub-Total		533,514	533,514	537,606	628,052	653,647	511,584	731,518	529,094	529,094	576,290	576,391
Overhead (7%)		37,346	37,346	37,632	43,964	45,755	35,811	51,206	37,037	37,037	40,340	40,347
Profit (6%)		32,011	32,011	32,256	37,683	39,219	30,695	43,891	31,746	31,746	34,577	34,583
<b>Grand Total<sup>1</sup></b>		<b>602,871</b>	<b>602,871</b>	<b>607,495</b>	<b>709,699</b>	<b>738,621</b>	<b>578,090</b>	<b>826,615</b>	<b>597,876</b>	<b>597,876</b>	<b>651,208</b>	<b>651,322</b>
With Sprinklers <sup>2</sup>		622,757	622,757	627,516	733,078	762,941	597,170	853,848	617,584	617,584	672,663	672,790
1. The estimate for constructing a new home is based on information from Cost To Build.net for the select cities in the different regions of New York State. The assumptions for the proposed new home are 2550sf, 3 bedrooms, 2-story structure, full basement, 450sf garage, rear deck, 2 full bathrooms, average finishings and flooring, 6/12 roof, and smoke alarms included. 2. Fire Sprinkler Cost assumes water supply is available in the municipality with sufficient pressure.												

**Smoke alarms are included in most new residential construction costs** and are required by local building codes. Their costs will vary from \$10 -\$100 each, depending on the type, quantity, and functions, plus installation labor. Most new home construction for one and two-single-family homes have **hardwired systems with battery backups**. The cost ranges from \$0.94 to \$1.18 per square foot. Other features such as smart/wireless, voice, lights, and weather alerts are available on smoke alarms and may add \$0.10 to \$0.35 per square foot cost<sup>45</sup>. The typical cost to replace a battery in a smoke alarm is \$2-3. NFPA and local building codes recommend installing smoke alarms in bedrooms, hallways, living areas, bathrooms, kitchens, attics, garages, and basements. See Table 2.7 for a breakdown of smoke alarms by type and estimated installation labor. It is generally assumed that a smoke detector will function for at least 10 years.

Table 2.7 Smoke Alarm Cost			
Type	Average price	Total installed cost* (per unit)	Details
Ionization	\$10 – \$40	\$110 – \$290	Detects flaming fires
Photoelectric	\$20 – \$70	\$120 – \$330	Detects smoldering fires
Dual sensor	\$40 – \$100+	\$140 – \$360+	Combines ionization and photoelectric detection
Smart	\$50 – \$150	\$150 – \$410+	Includes Wi-Fi, security service, & smart device connectivity
Combination smoke & CO Detector	\$40 – \$100+	\$140 – \$360+	Combine a smoke alarm with a carbon monoxide alarm
Source: <a href="http://homeguide.com">homeguide.com</a>			

According to the National Fire Sprinkler Association, wet residential fire sprinklers are estimated to cost \$1-\$3 per square foot in new construction. What is not clearly defined is what this includes and does not include. Table 2.8 below provides the cost of the components of a wet fire sprinkler system.

Table 2.8 Components of A Wet Fire Sprinkler System		
Component	Description	Cost Range
Sprinkler Heads	Mounted on pipes, these automatically release water when activated by heat, targeting the fire directly. The heads come in different types, such as pendant, upright, sidewall, and concealed.	\$12-35 each
Pipes	The network of pipes distributes water throughout the building, connecting to the sprinkler heads.	Copper Pipe ½": \$1.10 to \$3.60/lf Ptec: \$1.20-\$2.30/lf
Water Supply	A reliable water supply source, such as a municipal water connection or a dedicated water storage tank, ensures an adequate water flow for the sprinkler system to operate effectively. In rural areas without public water, a tank/reservoir is needed to provide sufficient water supply to power the sprinkler head (1-2) for at least 10+ minutes.	Water Storage Tank 300+ gallon: \$1,200-\$3,000+ each
Water Pumps	A water pump is often needed to maintain sufficient water supply to sprinkler heads 15-25+ gpm.	\$600-\$1,200 each
Valves and Fittings	Control valves regulate water flow, and check valves prevent backflow in certain system designs. Fittings, such as elbows and tees, facilitate pipe connections and changes in direction.	n/a
Alarm Devices	Smoke or heat detectors trigger alarms when they sense a fire, alerting occupants and initiating the sprinkler system, providing an early warning.	Included in new construction
Control Panel	The control panel monitors the system's status, displays alarms, and manages water flow. It allows manual intervention and communicates with other fire safety systems in the building.	\$1,000+
Water Motor Gong	An audible water motor gong sounds when water flows through the system, providing an additional alarm signal.	n/a
Pressure Gauges	Pressure gauges measure the water pressure in the system, enabling proper maintenance and ensuring the system is ready for operation.	\$10-\$15 each
Backflow Preventor	Backflow preventers prevent loss of water pressure in the sprinkle system	\$500-\$2,000 each
Waterflow Switches	Waterflow switches detect the flow of water in the system and activate alarms or alert monitoring services.	\$150-\$1,200each
Maintenance	Annual maintenance of the fire sprinkle system requires a visual inspection and testing.	\$250-\$1,000/Yr.
Source: Granger.com		

The cost of a fire sprinkler system will vary based on the type of sprinkler heads chosen, piping material and size, need for water tanks, operating pumps, backflow preventers, and other components. Table 2.9 reviews the cost of building a new residential home with and without a wet fire sprinkler system by region in New York State.

The **estimated cost to purchase and install a wet fire sprinkler system** in a new residential home in New York State will range from \$7.73 to \$9.17 (excluding NYC). Potential additional costs such as permits, storage tanks, pumps, and more will raise that cost **from \$9.68 to \$11.76**. Maintenance of the fire sprinkler system is estimated to cost at least **\$250 or higher annually**.

Table 2.9 reviews the cost of building a new residential home with and without a wet fire sprinkler system by region in New York State.

In cold climates, **fire sprinkler systems become vulnerable to freezing**, making them less effective and responsive and increasing the risk of severe water damage from bursting pipes<sup>46,47</sup>. Winterizing these systems is critical, adding to the annual maintenance cost. **Cold weather can cause your fire protection system to cease functioning or cause significant water damage.**

Table 2.9 Estimated Cost to Build New Home and Fire Sprinkler System in New York State

		Albany	Syracuse	Rochester	White Plain	Hicksville	Utica	NYC	Watertown	Binghamton	Buffalo	NYS Average
New Single-Family SF		2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550	2,550
Grand Total <sup>1</sup>		602,871	602,871	607,495	709,699	738,621	578,090	826,615	597,876	597,876	651,208	651,322
With Sprinklers <sup>2</sup>		622,757	622,757	627,516	733,078	762,941	597,170	853,848	617,584	617,584	672,663	672,790
Sprinklers \$\$ <sup>2</sup>		19,886	19,886	20,021	23,379	24,320	19,080	27,233	19,708	19,708	21,455	21,468
Cost per square foot (no-Sprinklers)		236.42	236.42	238.23	278.31	289.66	226.70	324.16	234.46	234.46	255.38	255.42
Cost per square foot (w/Sprinklers)		244.22	244.22	246.08	287.48	299.19	234.18	334.84	242.19	242.19	263.79	263.84
Sprinkler cost per SF		7.80	7.80	7.85	9.17	9.54	7.48	10.68	7.73	7.73	8.41	8.42
Other potential Sprinkler costs <sup>3</sup>												
Permits <sup>4</sup>	0.075%	467	467	471	550	572	448	640	463	463	504	505
Water Supply Storage <sup>5</sup>	12.50%	2,486	2,486	2,503	2,922	3,040	2,385	3,404	2,463	2,463	2,682	2,683
Water Pump <sup>6</sup>	700	700	700	700	700	700	700	700	700	700	700	700
Backflow Preventers	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350
Maintenance per Year	250-500											
Estimated Other Cost		5,003	5,003	5,023	5,522	5,662	4,883	6,094	4,977	4,977	5,236	5,238
\$/sf		1.96	1.96	1.97	2.17	2.22	1.91	2.39	1.95	1.95	2.05	2.05
Estimated total cost of Sprinkler System		24,889	24,889	25,045	28,901	29,982	23,963	33,327	24,684	24,684	26,692	26,706
\$/sf		9.76	9.76	9.82	11.33	11.76	9.40	13.07	9.68	9.68	10.47	10.47
<ol style="list-style-type: none"> <li>The estimate for the construction of a new home is based on information from Cost To Build.net for the select cities in the different regions of New York State. The assumptions for the proposed new home are 2550sf, 3 bedrooms, 2-story structure, full basement, 450sf garage, rear deck, 2 full bathrooms, average finishings and flooring, 6/12 roof, and smoke alarms included.</li> <li>Fire Sprinkler Cost assumes water supply is available in the municipality with sufficient pressure.</li> <li>Other Potential Costs are estimated costs.</li> <li>Permits as required by a municipality</li> <li>Water Supply Storage is for 300-400-gallon containers to provide 8-10 minutes of water to the fire sprinkler system.</li> <li>Water Pump 15-40 gallons per minute to supply fire sprinkler system</li> </ol>												

## 5. CONSTRUCTION MATERIALS AND BUILDING CODES

**Construction materials and building codes** have evolved over the past 100 years, impacting fire safety in the United States and New York State. This evolution has created safer, healthier, and more energy-efficient housing. Many of the fire risks associated with older housing have been mitigated, but new challenges have also emerged.

The use of lead paints, asbestos, and other toxins in housing has been stopped. Homes have become more energy-efficient with improved insulation, roofing, and windows. That effort to increase energy efficiency has led homes to need mechanical air exchangers to

maintain air quality. Greater use of engineered materials has strived to keep homes affordable and improve structural integrity. **The key takeaways are:**

- As material changes, risks such as asbestos and lead are limited, and new dangers emerge, such as toxic gases from plastic and other materials.
- Airtight buildings present risk and require air exchangers and ventilation.
- **Centralized heating systems offer the risk of carbon monoxide poisoning, which can be recognized with carbon monoxide detectors and not fire sprinkler systems.**

**The history of building codes** in the United States dates back to the 1600's in Boston. The "Building Acts" prohibited the use of combustible materials in building homes<sup>55</sup>. Modern building codes were developed with the creation of the National Board of Fire Underwriters (NBFU) in 1866<sup>55</sup>. In 1921, the Department of Commerce created the "Building Code Committee," with the International Conference of Building Officials (ICBO) publishing the first building codes.

The completed versions of the I-Codes are documents essentially lobbied to state and local governments for adoption as law. **Local jurisdictions have the authority to adopt the codes, reject specific provisions, or introduce more stringent versions.** The 2009 IRC included a controversial mandate for all new homes to include fire sprinkler systems. Many in the building industry saw this as an **expensive regulation not based on society's concerns or needs but on the desires of specific interested parties in the home building industry.** Over a decade later, most governments still reject this recommended mandate<sup>55,56</sup>.

## 6. INTERVIEWS

Professionals connected with the review, design, construction, and building of new 1 and 2-family dwellings were contacted and interviewed. Participants were identified in all the regions of NYS except NYC. They were asked:

- What they thought about Automatic Fire Sprinkler Systems (AFSS),
- Were they aware that NYS State Law mandates builders to provide an estimate of installing an AFSS for all new construction,
- Do they know the costs of an ASFF,
- What they thought the impacts would be on communities and
- Do they know NYS potentially wants to make AFSS mandatory for all new 1 and 2-family dwellings?

Several new homeowners (constructing new homes) were interviewed, and they found the cost too high and unacceptable. They were unaware of the existing law and felt the choice should be theirs and not the State's.

Most architects and engineers are aware that the current state law requires quotes, but many of their clients reject AFSS when proposing new construction. They felt AFSS had merit, but it was a great overreach by the State to mandate it.

Municipalities varied by region. In more densely populated areas, AFSS could have a positive impact, but the cost of such systems would have a negative impact. They were unclear about the impact on them, water providers, and services. In the less populated areas of the State, there were questions of practicality, such as environmental concerns, water availability, and how such a mandate would impact them.

Fire departments understood the potential benefits but recognized the cost burden on homeowners and the water and environmental problems.

Builders and developers were the most outspoken group. They cite that the additional cost burden would drive potential purchasers to choose other avenues to bypass such a mandate. This mandate would harm their businesses.

**When informed of the fire fatality facts, all the participants thought that more efforts should be made to ensure that there were working smoke and carbon monoxide alarms in one—and two-family dwellings, and that alone would save more lives.**

## 7. ANALYSIS AND CONCLUSIONS

Residential fire sprinkler systems save lives in residential buildings<sup>62</sup>. This fact is well documented in multi-family structures. According to FEMA and USFA, fire sprinkler systems save firefighters' lives, reduce premature building collapse, and reduce property damage<sup>62</sup>. The **data supporting these conclusions is drawn primarily from multi-family properties**. Additionally, it is not mentioned that **most fire fatalities in 1 and 2-family units were structures built before 2000**.

Governor Hochul of New York State proclaimed May 13-19, 2024, as Home Fire Sprinkler Awareness Week in the State of New York<sup>60</sup>. The Resolution claims that 142 civilians died in home fires, the most in the nation; however, California and Texas had significantly more fatalities. In 2017, there were 142 fire fatalities; only 73 were in 1 and 2-family home structures, and when NYC is excluded, this drop to 50 fire fatalities, equal to 2.5 per million in New York State. Additionally, the majority of these fatalities were in residential structures built before 2000, and over 42% were seniors and children.

**Any fire fatality is a tragedy. Misrepresenting the facts creates a false premise for legislation and future building codes, ultimately costing consumers the right to homeownership and saddling them with higher taxes, fees, and building costs.**



### **Fire Fatality Facts in New York State:**

- Between 2015 and 2019, there were **33 states with a higher rate of fire deaths per million people in the State than New York State**, including Maryland, Pennsylvania, North Carolina, and more (See Appendix for list)<sup>65</sup>.
- Between 2019 and 2024, there was an average of 64 fire fatalities per year in NYS (excluding NYC) in 1 and 2-family units<sup>15</sup>.
  - Averaging 3.2 fire fatalities per million people in NYS
- The majority of fire fatalities victims are the elderly, children, and low-income individuals and families.
  - **40% of the fatalities were seniors and children**
- All of the fire fatalities occurred in residential structures built before 2000, with an average dwelling built in 1932.
- **42% of residential fatal fires could not determine the presence of smoke alarms**<sup>64</sup>.
- **33% of residential fatal fires reported smoke alarms**<sup>64</sup>.
  - 16% present and operating
  - 7% present but didn't operate
- Fires in 1 and 2-family housing accounted for 87% of fatal residential fires in which no smoke alarm was present<sup>64</sup>.
  - Multi-family housing accounted for just 7% of these fires because they are subject to more stringent code enforcement<sup>64</sup>.

### **Cost of Residential Fire Sprinkler Systems**

There is an ongoing debate over the cost of residential fire sprinkler systems. According to the NFPA cost assessment report (2023), the average cost of a fire sprinkler system per square foot ranges from **\$1.35-1.61**. However, the report says it could be as high as \$2.47 per square foot (for a dwelling with 8,500 square feet)<sup>66</sup>. Other sources such as the American Fire Sprinkler Association, NFSA, Homeguide.com, Angie, and more represent the cost of such a system to range between **\$1.35 to \$3.00** per square for a 1 and 2-unit residences.

### **The costs represented by NFSA, AFSA, and other sources do not explain what is included in the costs.**

According to builders and national cost estimating databases, the average cost to install an automatic fire sprinkler system (in New York State and excluding New York City) will range from **\$7.73 to \$9.54** per square foot for a new single-family home with 2,550 square feet (**\$19,708 to \$23,379**). Subject to the location of the water supply and local fees, that cost can rise from **\$9.68 to \$11.76** per square foot (**\$24,684 to \$29,982**).

Consumers can expect to incur additional costs beyond the basic fire sprinkler system, including but not limited to:

- Permits for fire sprinkler systems by local municipalities and water supply entities,
- Water storage storage onsite to supply water for at least 10 minutes,
- Water pumps to deliver water to the fire sprinklers,
- Backflow preventers,
- Switching and monitoring devices,
- System maintenance and testing,
- And more.

#### Environment Factors

According to the National Weather Service, all of New York is subject to cold weather and temperatures below 40 degrees. Upstate New York will experience temperatures below 40 degrees for 6-8 months of the year and downstate for 3-4 months. Cold weather and temperature make fire sprinkler systems vulnerable.

**Fire sprinkler systems are vulnerable to freezing conditions, making the system less effective and increasing the risk of severe water damage from bursting pipes.<sup>46</sup>**

The areas of most concern for frozen sprinkler systems are entryways, attics, skylights, floors, and entryways where the temperatures drop below 40 degrees.

#### Inflation and Affordability

In 2013, Governor Hochu announced a statewide strategy to address the housing crisis and her plan to build 800,000 new homes<sup>67</sup>. The plan calls for more affordable housing, focusing on rental units, workforce, and first-time buyers housing<sup>67</sup>. According to the consumer price index, prices in New York State are 16.94% higher today since 2020, peaking at 6.1% in 2022<sup>68</sup>. That is an average of 4% per year.

In New York State, there was a shortage of one and two-family units for sale in 2023. In every county in the State, there was a decline in homes for sale. Overall, the "Home for Sale" supply declined by 20% between 2022 and 2023<sup>70</sup>. Sellers achieved an average of 101.3% of the asking price. Home prices (statewide) rose by 41.6% between 2019 and 2023<sup>70</sup>. Mortgage interest rates have risen by 293% since 2020<sup>71</sup>. In January 2021, mortgage interest rates were 2.65%, and they rose to a high of 7.79% in October 2023<sup>71</sup>. Based on the average cost of new homes in New York State, the rise in mortgage interest rates would increase the monthly payment by more than \$1,800.

**Inflation and the rise in mortgage interest rates are already making it difficult for buyers to purchase a new home. Requiring buyers of new homes to install fire sprinkler systems will mandate a 3-5% increase in the purchase price. Thus, purchasing a new home will be unattainable for many individuals and families.**

**As with other housing issues in New York State, these buyers will seek out other states to build their new homes.**

### **Smoke Alarms**

Since the 1970s, smoke alarm technologies have evolved and become widely used in residential homes. All building codes today require smoke alarms. Smoke alarms detect smoke and alert residents, and:

- Provide critical life safety in residential fire situations,
- Photoelectric smoke alarms are generally more responsive to fires that begin with a long period of smoldering,
- Combination smoke alarms can detect carbon monoxide (CO), the greatest threat to residents,
- Hardwire systems have battery backup and can be linked to 911, thus reducing response time,
- A wireless system is linked to the entire home and 911, and
- 33% of residential fatal fires reported smoke alarms. FEMA estimates saving 95%-98% of potential fire fatalities in residential homes with working smoke alarms.

**Increasing the number of working smoke fire alarms in multi-family and single-family homes will save more lives.**

### **Fire Sprinkler Systems**

Fire sprinkler systems have a long history of use in industrial, commercial, and multi-family structures, especially when they work properly and are well-maintained. The use of these systems increased when the IRC became the only code from which municipalities could choose in 2000, and the three legacy organizations officially dissolved in 2002<sup>55</sup>.

**In 2009, the IRC included a controversial mandate for all new homes to include fire sprinkler systems. Many saw this as an expensive regulation not based on society's concerns or needs but on the desires of specific interested parties in the home building industry and politicians. Over a decade later, most governments still reject this recommended mandate<sup>55,56</sup>.**

- Fire sprinkler systems are **expensive and add 3-5% to the cost of a new one and 2-family home,**
- **Fire sprinkler systems cannot detect smoke and carbon monoxide,**
- **Activated heads create more smoke,** making exits harder to find for occupants to exit the structure,
- **Fire sprinkler systems have system failures from:**
  - Inadequate water supplies in the systems
  - Insufficient pressure in the system:
    - Air
    - Water
  - Cold weather issues:
    - Freezing water in lines
    - Freezing valve openings
- **Requires annual maintenance servicing and system testing**

### **Conclusion**

Mandating residential fire sprinkler systems for new one—and two-family homes is an unnecessary cost burden for individuals and families in New York State.

### **Buyers should have the right to choose and not to have New York State mandate residential fire sprinkler systems.**

Special interest groups, the NFPA, and state leadership have used outdated information and inaccurately presented data to promote and mandate residential fire sprinkler systems. Tax credits, grants, and other financial incentives should be available to motivate new home buyers, as these are offered for commercial property owners as outlined in the CARES Act<sup>72</sup>.