



Myth Busting and Team Building: A Win-Win Approach to Advancing Residential Fire Sprinklers in Canada

Report of the CAFC Codes Committees

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A Letter from the CAFC President and Chairs of the Codes Committees

It has been no secret that the country's fire chiefs have been in support of residential sprinklers in new construction for many years. Jurisdictions where this is the norm, have limited deaths in these homes.

As such, in our view, there is no question that the presence of residential sprinklers saves lives and that if it were free, it would be done already. There is also no question that there is a cost and a risk calculation on the affordability and desirability of sprinklers for home buyers, builders, industry, planners and others. For many years, we've sat at tables where Fire Chiefs call for sprinklers and others respond the likelihood of need doesn't warrant the cost.

Our goal in this paper, is to change the conversation entirely. The report rests on the assumption that if costs, myths and misunderstandings can be resolved, we can come closer to a society in which all new residential construction and eliminate fire related deaths in new residential construction.

Many people contributed to this report. We had tremendous responses to the surveys and requests for interviews from within CAFC and from industry and other stakeholders. The CAFC Building Codes Committee led the project. Co-Chairs Ret. Deputy Chief Sean Tracey and Rt. Lt. Col Gaétan Morinville penned the report with our Executive Director Tina Saryeddine. CAFC's National Advisory Council members ensured their provincial, territorial and national affiliate perspectives were represented. CASA generously funded the work; Denise Ferraccioli of Clever Girl Creative did formatting, and Salvatore Strippoli did the translation.

We'll be interested in your reactions to this report. We hope it will start the conversation and that external partners will follow up with us to discuss some of the incentives further. You can do so by reaching out to our Executive Director, Dr. Tina Saryeddine, at tsaryeddine@cafc.ca. We look forward to hearing your thoughts.



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Executive Summary

The Canadian Association of Fire Chiefs (CAFC) has been on the record for many years with the importance of sprinklers in new residential construction. In cities where this is the norm, the loss of life and limb due to residential fires in such construction has been nearly eliminated.

Why hasn't this become the norm everywhere? Historically, the conversation on sprinklers has been binary, with some parties imploring attention to life saving benefits and others smiting under the costs. Unless we want to continue a polarized discussion, we need to change the conversation. We need solutions for sprinklering in Canada that align incentives to create a win for all players involved in advancing sprinklers in new residential construction in this country. This report provides a road map.

Beginning with the goal of advancing sprinklers in all new residential construction in Canada, the CAFC set out to understand the range of incentives that would make sprinklers an attractive proposition for relevant parties. What do we mean by incentives? Any benefit, trade-off, motivation, or encouragement that could be financial, social, political, or environmental. It may be directly sprinkler related or it may be related to how parties work together and their broader goals.

The parties involved include builders, planners, policy makers, governments, the public, industry leaders, insurers and others. The Canadian Association of Fire Chiefs (CAFC) was generously funded for this project by the Canadian Automatic Sprinkler Association. The funding was accepted since the risk of undue influence was null. The starting bias of the CAFC was already in favour of residential sprinklers.

Building on the knowledge base of the CAFC Building Codes Committee, funders, and project leads, the initiative began with a brief review of the literature. The most important finding was the 9 established building trade-offs that had been compiled by the NFPA and the Home Fire Sprinkler Coalition in the US.

These trade-offs formed the basis of a survey and webinar administered by the CAFC to its membership to understand fire chiefs' reactions to the building trade-offs. General findings from the survey included:

- **81% of chiefs were supportive of the mandatory sprinklers. A small number had reservations focused on the cost of the sprinklers on smaller rural communities without many housing starts.**
- **76% of chiefs felt that a lack of incentives was an impediment to broader sprinkler adoption.**
- **No single incentive stood out as highly favoured, but a suite of incentives should be explored. These could be left to local fire chiefs to explore with developers based on the acceptable level of risk in the community.**
- **Within the respondent sample, there were several examples of chiefs approving local developments with sprinklers.**
- **There were statements of concern for rural applications; incentives not in codes are hard to enforce; and the need to continue public education.**
- **There remains room to empower chiefs with additional information, and resources.**

The authors then held meetings with representatives of provincial and territorial associations as well as national affiliate organizations and related parties, to solicit feedback on their experiences in their jurisdictions with sprinkler policy development; working with other stakeholders and discuss trade-offs and incentives at the level of the members' relevant provincial or territorial jurisdiction.

With a clear sense of the feedback from the fire sector, key informant interviews were held with stakeholders outside of the fire sector. The results of the trade-offs survey was shared. From these discussions the authors identified several action items for the CAFC to consider going forward:

Stakeholder	Leverage Point
Builders/Developers	<ul style="list-style-type: none"> Consider trade-off cost of sprinklers for building code and development incentives Introduce consistency of requirements across jurisdictions Look at supporting builders where feasible on other code issues, to encourage sprinkler consideration
City Planners	<ul style="list-style-type: none"> Recognize capacity to build sprinklers into the development plans, engage early to realize development incentives
Building Code Officials	<ul style="list-style-type: none"> Recognize building officials are reluctant to accept alternatives unless explicitly stated in the codes Residential sprinklers should be proposed as alternatives to prescriptive requirements in the NBC
Office of Superintendent of Financial Institutions	<ul style="list-style-type: none"> Discuss how community risk approaches exceed historical experience approaches
Fire Chiefs and Firefighters	<ul style="list-style-type: none"> Clarify role in development reviews, fire cover plans, technical guidance for development planning and FUS water supply guidelines Use incentives as a suite of options for the local fire service and builders to consider based on local conditions and risk tolerance Pursue Firefighter Safety Objective in the Code
Canada Mortgage and Housing Corporation	<ul style="list-style-type: none"> Make linkage between sprinklers and National Housing Strategy Discuss sprinklers with Innovation Group, goal of affordable housing for all CAFC invited to consider innovation submission re sprinklers
Government of Canada	<ul style="list-style-type: none"> Advocate that sprinklers are part of tenets of Accessible Housing, Aging in Place, Green Technology Sprinklers as part of the Green Tax Fund
Public	<ul style="list-style-type: none"> Continue to educate on the benefits of sprinklers including key tenets of accessibility, aging in place, and environmental benefits
Fire Underwriters	<ul style="list-style-type: none"> Sprinklers help address FUS Water Supply requirements - need to expand on these and educate cities and water purveyors
Canadian Automatic Sprinkler Association (Industry)	<ul style="list-style-type: none"> Industry must be ready, and consistent in discussing home sprinklers Review costing with a view to recognizing the long-term impact of high quotes, focus on long-term goal of high sprinkler adoption Work with local fire services to educate building officials, fire services and homeowners, support public education activities, keep up the partnership with CAFC, HFSC, etc.
Canadian Fenestration Association	<ul style="list-style-type: none"> Presence of sprinklers can increase window installments on sides facing adjacent houses

The final part of the project involved identifying barriers, myths, and misunderstandings that would stand in the way of installing residential sprinklers in new construction in Canada. These included:

Barriers, Myths, & Misunderstandings	
Barriers regulatory or administrative hurdles	<ul style="list-style-type: none"> • Lack of financial incentives • Provincial or municipal restrictions/resistance • Codes Commission (shut the door on mandatory sprinklers)
Myths misconceptions propagated that undermine efforts	<ul style="list-style-type: none"> • Water damage worse than fire damage • Insurance costs will go up because of sprinklers • Sprinklers activate randomly, leak, with smoke alarm, etc. • Winter freezing • Fire department could be substituted for sprinklers
Misunderstandings information that is not true	<ul style="list-style-type: none"> • Failure to understand modern fires • Expensive to install • New construction is safer and does not need sprinklers • Municipalities require inspections • Water main issues

In conclusion, this report has identified a series of incentives, from trade-offs to environmental, economic to life saving that can advance sprinklering in Canada. It would be a victory for public safety to see these incentives implemented.

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Photo Source: homefiresprinklercanada.ca

1. Introduction

In 2004, a CAFC document entitled “*Statement of Policy*”, spoke to the desirability of sprinklers. It called on the Minister of Finance to amend the tax regime to encourage owners to implement sprinklers in the retrofit of care and nursing homes (CAFC, 2004). This incentive recognized the cost to the owner/ builder who may not wish to pay it and therefore the importance of creating an incentive if sprinklers are to become the norm.

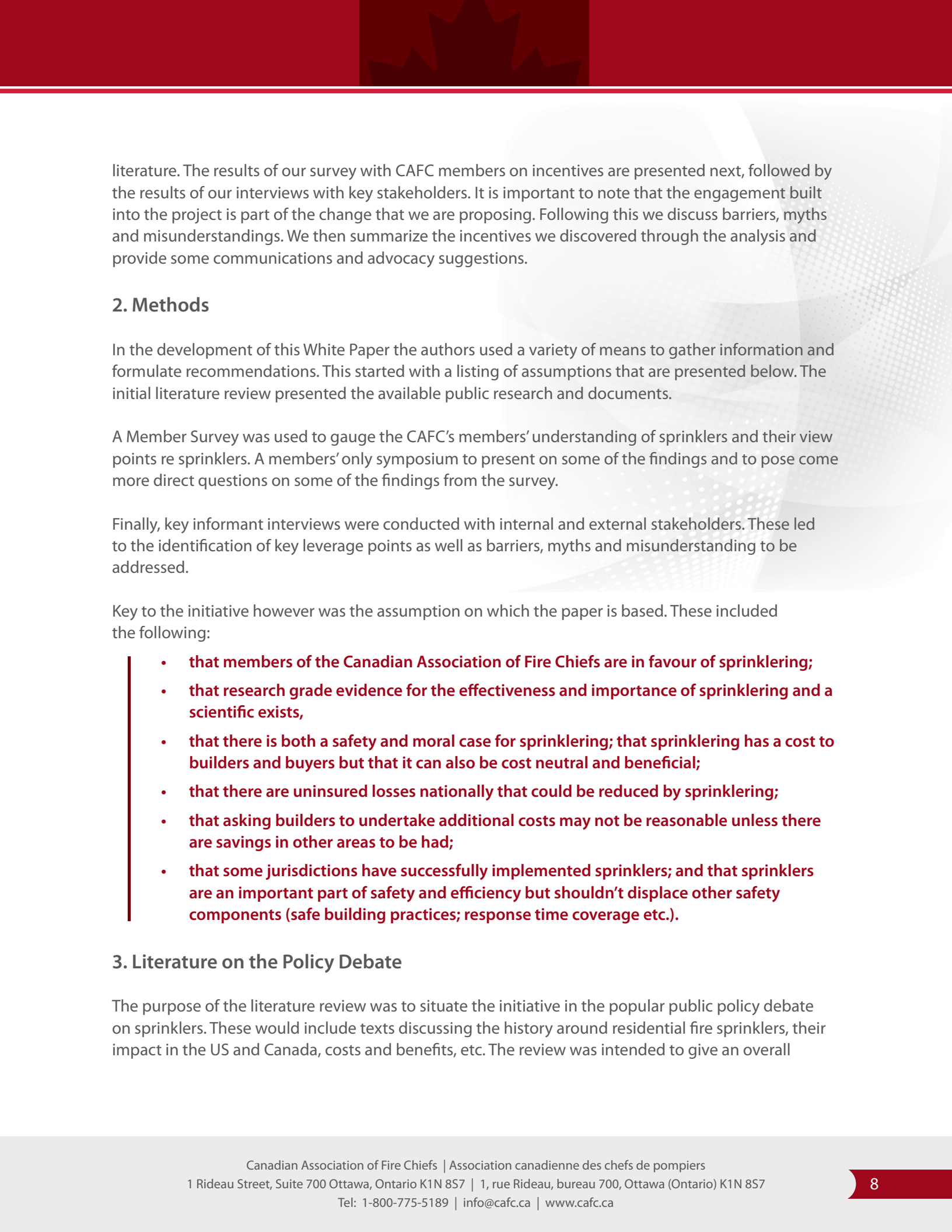
Consistent with the logic of the NFPA’s Home Fire Sprinkler initiative, and whether the notion of tax credit is the right one or not, the principle of aligning incentives to achieve results is consistent with the Deming adage that ‘all systems are perfectly designed to achieve the results they achieve’ (<https://deming.org/quotes/10141>). In other words, if we want different results, we need a different approach.

While builders, owners, or governments may understand the moral, scientific or risk management benefits of sprinklers, they may not be able to explain the business case to their boards or shareholders or within their business models. As Telfer Business Professor, Douglas E. Angus, used to say, “moral suasion is not an effective management technique”. Industry needs to be able to express the win from sprinklering from a business case perspective. They need incentives and it can be done.

Central to this paper is the question: what social, political, informational, and financial issues must be addressed to promote sprinklers and how to do it.

In a sense then, this paper takes the existing Home Fire Sprinkler initiative to the Canadian context and next phase. In addition to identifying the incentives for industry, there may be other political issues, misunderstandings, and myths within the fire sector, industry and public that create impediments. As such, this paper presents a white paper that explores the variety of financial, social, and political incentives as well as the informational issues that might encourage builders, fire sector and governments to advance sprinklering. In other words, it focusses on the range of incentives that may be put in place to make it feasible and desirable for builders, fire departments, and governments to advance sprinklers.

The paper is organized in 8 parts. Following this introduction, we will present the assumptions that we started with and the methodology that we used for this paper. We will then offer a summary of the



literature. The results of our survey with CAFC members on incentives are presented next, followed by the results of our interviews with key stakeholders. It is important to note that the engagement built into the project is part of the change that we are proposing. Following this we discuss barriers, myths and misunderstandings. We then summarize the incentives we discovered through the analysis and provide some communications and advocacy suggestions.

2. Methods

In the development of this White Paper the authors used a variety of means to gather information and formulate recommendations. This started with a listing of assumptions that are presented below. The initial literature review presented the available public research and documents.

A Member Survey was used to gauge the CAFC's members' understanding of sprinklers and their view points re sprinklers. A members' only symposium to present on some of the findings and to pose come more direct questions on some of the findings from the survey.

Finally, key informant interviews were conducted with internal and external stakeholders. These led to the identification of key leverage points as well as barriers, myths and misunderstanding to be addressed.

Key to the initiative however was the assumption on which the paper is based. These included the following:

- **that members of the Canadian Association of Fire Chiefs are in favour of sprinklering;**
- **that research grade evidence for the effectiveness and importance of sprinklering and a scientific exists,**
- **that there is both a safety and moral case for sprinklering; that sprinklering has a cost to builders and buyers but that it can also be cost neutral and beneficial;**
- **that there are uninsured losses nationally that could be reduced by sprinklering;**
- **that asking builders to undertake additional costs may not be reasonable unless there are savings in other areas to be had;**
- **that some jurisdictions have successfully implemented sprinklers; and that sprinklers are an important part of safety and efficiency but shouldn't displace other safety components (safe building practices; response time coverage etc.).**

3. Literature on the Policy Debate

The purpose of the literature review was to situate the initiative in the popular public policy debate on sprinklers. These would include texts discussing the history around residential fire sprinklers, their impact in the US and Canada, costs and benefits, etc. The review was intended to give an overall



Photo Source: homefiresprinklercanada.ca

summary of the reports that may be most likely referenced in discussions and some of their detailed findings. A synopsis is provided below with footnotes and links to where these studies may be accessed.

Historical View of Sprinklers:

Dr. John L. Bryant in his book entitled “Automatic Sprinkler and Standpipe Systems” states:



The Automatic sprinkler system, as originally developed, was intended and primarily designed for fire protection of buildings, contents of buildings, and property. Based on the excellent performance record of sprinkler systems and the automatic sprinkler, developments and research improvements have been designed to further improve the sprinkler capabilities as a tool for ensuring life safety”.

(John L. Bryant, 1990, Automatic Sprinkler and Standpipe Systems, Second Edition, National Fire Protection Association, Quincy, MA.)

The original standard for the installation of automatic systems in one- and two-family dwellings and mobile homes NFPA 13D was first introduced in 1975 (NFPA 13D Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes). By 1979, a prototype residential sprinkler had been developed and full-scale testing of this sprinkler was initiated with 60 tests fires in a two-story single-family dwellings in Los-Angeles (Moore, David A., 1980, “Field Test and Evaluation of Residential Sprinkler System”, Fire Journal, Vol. 74, No.6, pp. 44-47.).

Consequently in 1980, NFPA 13 D was significantly revised to take advantage of this newly developed residential sprinkler. As reported by Fleming, the NFPA 13D 1980 edition, was developed using the following two objectives (Fleming, Russell P., 1988, “A Closer Look at the NFPA Residential Sprinkler Standards,” Sprinkler Quarterly, No 62, pp. 10-13, 42.):

- **It should be a low-cost system economical enough to be installed in dwellings on a fairly widespread basis.**
- **It should be capable of maintaining life safety in the room of fire origin for at least 10 minutes.**

To compare, the purpose of NFPA 13D, 2019 edition is:

- **The purpose of this standard shall be to provide a sprinkler system that aids in the detection and control of residential fires and thus provides improved protection against injury and life loss.**
- **A sprinkler system shall be designed and installed in accordance with this standard to prevent flashover (total involvement) in the room of fire origin, where sprinklered, and to improve the chance for occupants to escape or be evacuated.**

The objectives of this standard have been consistently the same since the advent of the new sprinkler technology in the 80s, namely: injury prevention, life loss prevention, and providing enough time for occupants to escape.


The promotion of residential sprinkler adoption across Canada and the United States has been on-going for more than 40 years. Several studies and research were performed to encourage the use of residential sprinkler based on several advantages of this technology such as preventing loss of life or injuries, protecting firefighters, reducing property damages, etc. Conversely, some research also suggests that the cost/benefit of having mandatory residential sprinkler is not justified or simply not justified by the cost of the system itself.

The Impact of Sprinklers

In the NFPA report entitled *"US Experience with Sprinklers, July 2017"* a part of the report was dedicated to sprinklers in reported U.S. home fires during 2010 to 2014. Homes in this report refers to one- or two-family homes and apartments or other multi-family homes. Properties under construction were excluded from the analysis. According to the report automatic extinguishing systems (AES) are designed to control fires until the fire department arrives. Sprinklers are a type of AES that uses water to control fires. Other types of AES use something other than water.

According to the fact sheet provided in the report, the civilian death rate of 1.4 per 1,000 reported fires was 81% lower in homes with sprinklers than in homes with no AES. The civilian injury rate of 25 per 1,000 reported fires was 31% lower in homes with sprinklers than in homes with no AES. Many of the injuries occurred in fires that were too small to activate the sprinkler or in the first moments of a fire before the sprinkler operated. The average firefighter injury rate of 13 per 1,000 reported home fires was 79% lower where sprinklers were present than in fires with no AES. Where sprinklers were present, flame damage was confined to the room of origin in 97% of fires compared to 74% of fires without AES.

Sprinklers operated in 94% of home fires in which sprinklers were present and the fire was considered large enough to activate them. They were effective at controlling the fire in 96% of fires in which they operated. Sprinklers operated effectively in 91% of the fires large enough to activate them. Only one sprinkler head operated in 88% of home fires with operating sprinklers. In 98% of fires with operating sprinklers, five or fewer sprinkler heads operated. In three out of five (62%) of fires in which sprinklers failed to operate, the system was shut off.



Combined impact of Smoke Alarms and Sprinklers was also reported. The lowest home fire death rate per 1,000 reported fires is found in homes with sprinkler systems and hardwired smoke alarms. Compared to reported home fires with no smoke alarms or AES, the death rate per 1,000 reported fires was as follows:

- **18% lower where battery-powered smoke alarms were present, but AES were not.**
- **39% lower where smoke alarms with any power source were present but AES were not.**
- **62% lower where hardwired smoke alarms were present but AES were not.**
- **88% lower where hardwired smoke alarms and any AES were present.**
- **90% lower where sprinklers and hardwired smoke alarms were present.**

Similarly, Garis and Clare from University of the Fraser Valley, British Columbia in 2013 reported:

- **The death and injury rates per 1,000 fires were significantly lower for fires that occurred in buildings that were protected by sprinkler systems.**
- **Fire department resources were required less frequently and less extensively to control fires in buildings that were protected by sprinklers.**
- **When sprinklers did control fires, they never extended beyond the building of origin, and were contained to the room of origin 1.5 times more often than fires in buildings without sprinkler protection (which reached the building of origin 24% of the time and beyond the building of origin 5% of the time).**
- **Injuries occurred less frequently in fires that took place in buildings with sprinklers, when they did occur it was more likely that the casualty was trying to fight the fire voluntarily.**
- **No fire fighter deaths were involved in the cases examined, and a serious injury to a fire fighter was not observed in the presence of a sprinkler system.**
- **When fire sprinklers alone are installed in a residence, the chances of dying in a fire are reduced by 69%, when compared to a residence without sprinklers.**
- **When smoke alarms alone are installed in a residence, a reduction in death rate of 63% can be expected, when compared to a residence without smoke alarms.**
- **When both smoke alarms and fire sprinklers are present in a home, the risk of dying in a fire is reduced by 82%, when compared to a residence without either.**

According to the two studies above, injury and death to civilians and firefighters decreases significantly when residential sprinklers are present and functional during a fire.

Notwithstanding the tragic physical and social toll, the cost of treating a burn victim is substantial. A study by Sunnybrook Health Sciences Centre in Toronto found that the average cost to treat a burn patient was \$84,678. Sunnybrook Health Science Researchers also examined coroner investigation statements and autopsy reports of Ontario adults who died in homes without fire sprinklers between



Photo Source: homefiresprinklercanada.ca

1995 and 2012. The first phase of the study, which analyzed the cost of treating patients at Sunnybrook with burn or inhalation injuries caused by residential fires, found that over a 17-year period, the treatment of burn victims cost the Ontario health care system \$96 million. When all resources were accounted for, including rehabilitation, transportation and property loss, this number increases to \$3.6 billion. The second phase of the study found that lives shortened or lost in fires cost the Canadian economy \$7.6 billion. Over a 14-year period, there was a loss of 24,051 years of life and the cost of potential years of life lost (PYLL) due to residential fires totaled \$7.6 billion.

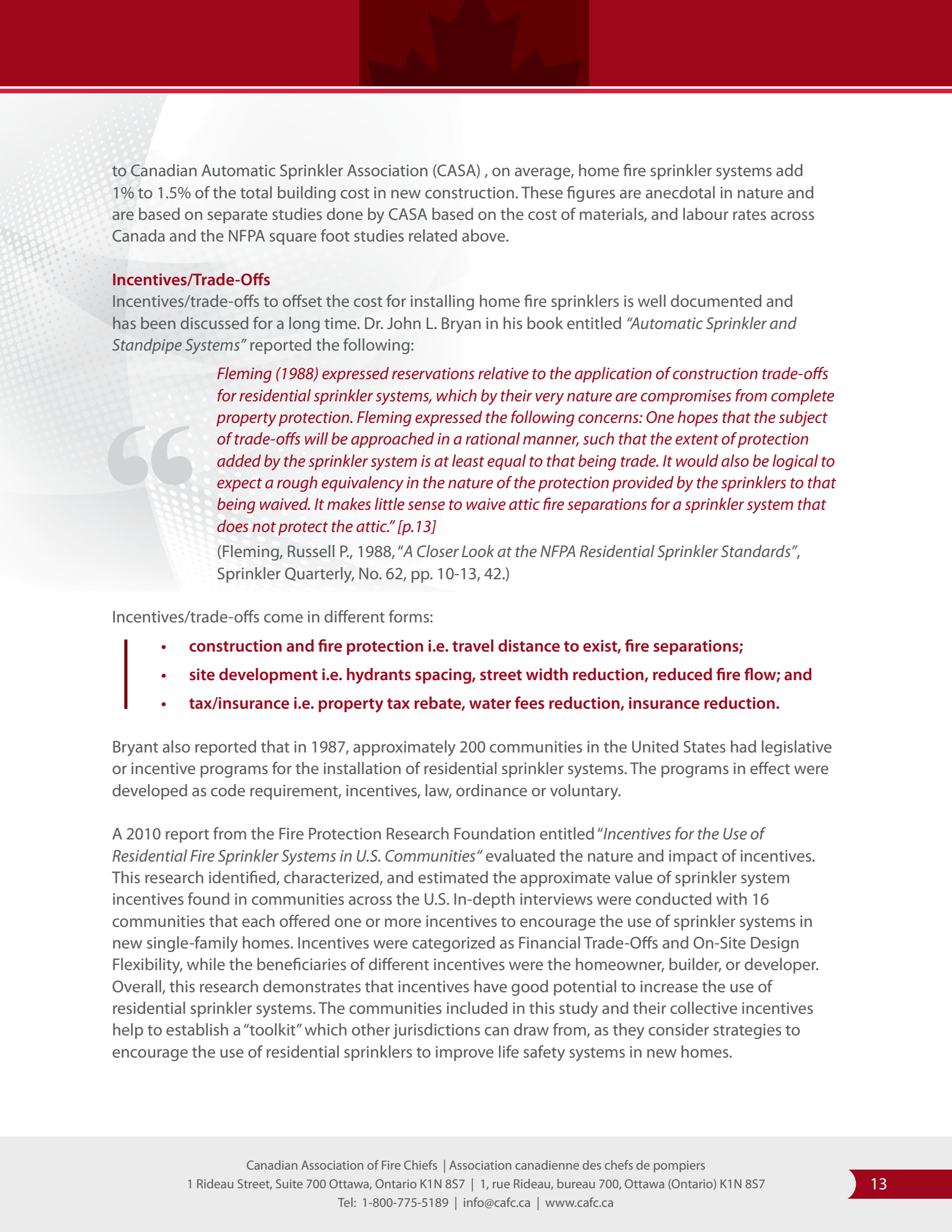
The Cost of Sprinklers

The cost of residential sprinkler is also an ongoing debate. According to many sources, costs will depend on the home location, the ability of the sprinkler industry to support the installation, familiarity of this technology, permit and inspection fees, increased water fees, testing and design fees, and additional equipment such as backflow preventers, booster pumps and holding cisterns.

In 2011 the NRC commissioned a study by Hanscomb entitled Residential Sprinkler Installation Cost Analysis Various Locations Across Canada. The study was to look at getting install costs for two typical dwelling based on stand alone sprinkler system and a multi-purpose sprinklers system. Of the 169 requests for estimates sent out only 11 contractors responded with quotes. This resulted in an extremely broad range of estimates. The study also asked for the quotes to include booster pumps, holding tanks, and a generator for a rural application - all elements not necessarily needed for the install. Costs ranged on average from \$2.50 - \$4.19 per sq ft for urban applications to \$3.04 - \$4.98 per sq ft for rural applications. The highest costs were in the Northwest Territories and the lowest costs quoted were for Quebec and Nova Scotia.

According to an updated report published by the Fire Protection Research Foundation in 2013 (a body performing research to support NFPA's mission) the average cost of installing residential fire sprinklers was found to be \$1.35 US per square foot. This is down from \$1.61 US per sprinklered square foot from the Foundation's 2008 report. The 2013 report examined 51 homes in 17 communities while the 2008 report examined 30 homes in 10 communities.

According to Home Fire Sprinkler Coalition (HFSC) of Canada , if installed during new home construction, home fire sprinklers cost 1%-2% (1%-1.5%) of the total value of the home. According



to Canadian Automatic Sprinkler Association (CASA) , on average, home fire sprinkler systems add 1% to 1.5% of the total building cost in new construction. These figures are anecdotal in nature and are based on separate studies done by CASA based on the cost of materials, and labour rates across Canada and the NFPA square foot studies related above.

Incentives/Trade-Offs

Incentives/trade-offs to offset the cost for installing home fire sprinklers is well documented and has been discussed for a long time. Dr. John L. Bryan in his book entitled “Automatic Sprinkler and Standpipe Systems” reported the following:

Fleming (1988) expressed reservations relative to the application of construction trade-offs for residential sprinkler systems, which by their very nature are compromises from complete property protection. Fleming expressed the following concerns: One hopes that the subject of trade-offs will be approached in a rational manner, such that the extent of protection added by the sprinkler system is at least equal to that being trade. It would also be logical to expect a rough equivalency in the nature of the protection provided by the sprinklers to that being waived. It makes little sense to waive attic fire separations for a sprinkler system that does not protect the attic.” [p.13]


(Fleming, Russell P., 1988, “A Closer Look at the NFPA Residential Sprinkler Standards”, Sprinkler Quarterly, No. 62, pp. 10-13, 42.)

Incentives/trade-offs come in different forms:

- **construction and fire protection i.e. travel distance to exist, fire separations;**
- **site development i.e. hydrants spacing, street width reduction, reduced fire flow; and**
- **tax/insurance i.e. property tax rebate, water fees reduction, insurance reduction.**

Bryant also reported that in 1987, approximately 200 communities in the United States had legislative or incentive programs for the installation of residential sprinkler systems. The programs in effect were developed as code requirement, incentives, law, ordinance or voluntary.

A 2010 report from the Fire Protection Research Foundation entitled “Incentives for the Use of Residential Fire Sprinkler Systems in U.S. Communities” evaluated the nature and impact of incentives. This research identified, characterized, and estimated the approximate value of sprinkler system incentives found in communities across the U.S. In-depth interviews were conducted with 16 communities that each offered one or more incentives to encourage the use of sprinkler systems in new single-family homes. Incentives were categorized as Financial Trade-Offs and On-Site Design Flexibility, while the beneficiaries of different incentives were the homeowner, builder, or developer. Overall, this research demonstrates that incentives have good potential to increase the use of residential sprinkler systems. The communities included in this study and their collective incentives help to establish a “toolkit” which other jurisdictions can draw from, as they consider strategies to encourage the use of residential sprinklers to improve life safety systems in new homes.



These incentives will form the basis later in this White Paper for a survey of CAFC members to determine their acceptability to the local fire services.

Cost Benefit Analyses

The cost and the benefit of residential sprinkler is another factor that is debated consistently. Benefits when installing a sprinkler system in a home include improving safety and avoiding injuries or deaths to both occupants and firefighters, lower direct and indirect costs during and after a fire, and lower the probability of ignition of an adjacent home and lower insurance costs among others. All these benefits must be quantified to obtain the real benefits in order to compare these benefits to the cost of installing a residential sprinkler system. One must prove that the net benefit outweighs the cost.

A benefit-cost analysis of residential fire Sprinkler systems study was performed by U.S. Department of Commerce National Institute of Standards and Technology (NIST) in 2007. This report documents a benefit-cost analysis performed to measure the expected present value of net benefits resulting from the installation of a multipurpose network fire sprinkler system in a newly constructed, single-family house. The benefits and costs associated with the installation and use of a fire sprinkler system are compared across three prototypical single-family housing types: colonial, townhouse, and ranch. The installation costs differ by housing types, with the colonial being the most expensive and the ranch the least. The benefits experienced by residents of single-family dwellings with sprinkler systems, as measured in this report, include reductions in the following: the risk of civilian fatalities and injuries, homeowner insurance premiums, uninsured direct property losses, and uninsured indirect costs. The primary costs examined are for initial purchase and installation of the sprinkler system. Maintenance and repair costs are not examined because they are negligible. Results of the benefit-cost analysis show that multipurpose network sprinkler systems are economical. Sensitivity analysis confirms the robustness of the baseline analysis. Multipurpose network systems are the lowest life-cycle cost systems because homeowners can perform their own regular inspections and maintenance, and thereby save on costs they would incur with other systems. Given that they provide a similar level of performance, in terms of fire-risk mitigation, multipurpose network systems then achieve greater cost-effectiveness over alternate system.

In 2005 Canadian Mortgage Housing Corporation (CMHC) updated previous technical reports on the comparative costs for fire safety advancements. The report entitled *"Fire Experience, Smoke Alarms and Sprinklers in Canadian Houses: CMHC Research to 2005"*. The report used fire loss statistics from Canada up to 2001 and identified that the continuous decline in fire deaths was primarily due to smoke alarms. The cost per life saved of fire sprinklers in homes was estimated to be \$38 million. The costs were based on mandatory installs, only up to 2001 for losses, and did not consider incentives that could reduce the costs of installation or other cost saving benefits that builders could use to offset install costs. Furthermore, benefits of installing a system were not considered such as the reduction in injuries to residents, reduction in firefighter fatalities and injuries, reduction in homeowner insurance premiums, reduced uninsured direct property losses, and uninsured indirect costs, etc.

In December of 2010, the Canadian Codes Centre released the report *"Gap and Statistical Analysis on Systems"*. Prepared by Altus Group, the report was considered controversial and based on flawed

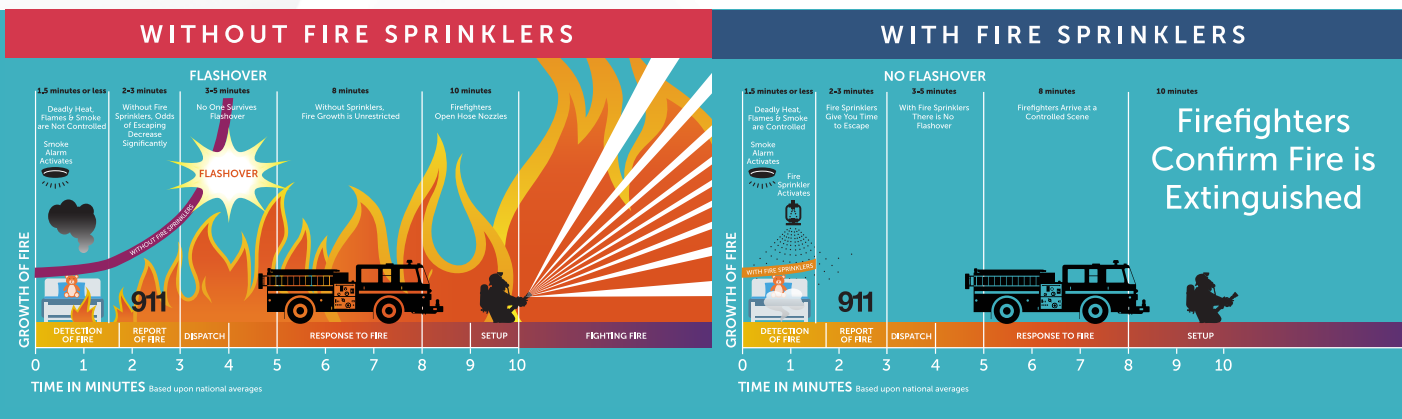


Image Source: homefiresprinklercanada.ca

methodology. It proposed a cost of \$29M for sprinkles to result in one life saved and a cost of \$2.9M for sprinklers to avert one injury. It expressed concerns about the functioning of sprinklers in cold climates. The report also included statistics on fires up to 2008, although no Canadian national statistical were known to have been published from 2003 - 2008.

The report earned significant rebuttals from the Canadian Association of Fire Chiefs (CAFC), National Fire Protection Association (NFPA), Ontario Association of Fire Chiefs (OAFC) and Alberta Fire Chiefs Association (AFCA) because the authors failed to recognize that at the time of the standard, NFPA 13D, had been around since 1975 and had specific provisions to address installations in cold weather.


NFPA Division Director of Fire Analysis & Research, John Hall, wrote:

“*There are major errors and severe flaws in every aspect of the calculation of costs and benefits of automatic fire sprinklers as applied to single-family housing. Every error and flaw is in the same direction, exaggerating costs by multiples of the best estimates of true costs and understating benefits by multiples of best estimates of true benefits.*”

The rebuttal comments cited that the overall methodology was flawed as some of the communities studied had fewer than 100 fires in one year - insufficient to create a statically meaningful report. Thus, the claim that civilian fire death rates per 100 fires are lower when no smoke alarms and no sprinklers are present than when sprinklers alone are present or when smoke alarms alone are present. The “finding” related to smoke alarms damaged the credibility of the entire statistical exercise, including the credibility of the finding about sprinklers.

Averting Firefighter Cancer and Trauma

In 2021, the National Fire Protection Association (NFPA) prepared an article linking firefighter cancer and sprinklers. While perhaps taken for granted given the prevailing image of the profession, accidents take their toll on first responders. In the most extreme and obvious cases there may be a significant injury or even a line of duty death. However, more insidiously, firefighters experience cancer rates that are higher than for the general population. They also experience Post Traumatic Stress Disorder at a much higher rate than others given the number of exposures to trauma that they experience. A death in any new residential construction that does not have a sprinkler, is a preventable death. It



occurred because a decision was made not to install a life saving technology, however unlikely the event seemed to be at the time of the decision. Consider for example, in Halifax, the tragedy of all but one member of a family, including seven children, killed in a fire that flashed. A sprinkler could have been installed in that house and all members of that family would be here today. Not only was this a national, provincial and local tragedy, it also led to traumatic responses for first responders in Halifax.

Environmental Impact

In 2010, FM Global, released a technical report, *“Environmental Impact of Automatic Fire Sprinklers”*. The report highlighted that residential fire sprinklers were an important element of green technology for modern homes. The study analyzed the results of full-scale burns of a typical North American home that was protected with a fire sprinkler system and without. The results were:

- **Greenhouse gas emissions were cut by 97.8 per cent.**
- **Water used in fire fighting was reduced between 50 per cent and 91 per cent.**
- **Fewer persistent pollutants, such as heavy metals, were found in sprinkler wastewater versus fire hose water.**
- **The high pH level and pollutant load of non-sprinkler wastewater are an environmental concern.**
- **Less materials going to landfill.**

In 2021, FM Global revisited its earlier report and confirmed no new research has been brought forward to counter the earlier findings. The company then reviewed the fire losses in the United States for the period of 2009 through 2019. FM Global deduced that during this period, more than 816,564,163 kilograms (1,800,215,826 pounds) of greenhouse gases had been released into the environment due to fires in homes that could have been protected with fire sprinklers.

The report also addressed water used in fire fighting; it estimates more than 36 billion litres (9.5 billion gallons) of water was used to extinguish these fires – water, now contaminated, that in most cases is not captured or treated and is discharged into the soil, storm drains, or watercourses. Sprinklers are proven to reduce the flows by between 50 per cent and 91 per cent and the runoff had fewer contaminants.

Nine Steps to a Safer Community

Most importantly to this report, the National Fire Protection Association’s Home Fire Sprinkler Coalition published *“9 Steps to a Safer Community”* brochure (Annex A). This brochure identifies ten common homebuilder incentives and identifies nine steps that a community can follow to home fire sprinkler systems, incentives that may work within the community, and building a relationship with the local stakeholders. The builder incentives identified in the pamphlet are similar to those identified in the NFPA report. These incentives have been presented to the CAFC members for review and consideration of what they would support. They will be discussed later in the report.

3.1 Situational Analysis

Current Level of Code Adoptions

Internationally, in the United States, both the International Residential Code (IRC) and the NFPA Building Code (NFPA 5000) require sprinklers for single family dwellings; however, this is then left to individual states or jurisdictions to opt out of these provisions. Only California, Maryland and Washington D.C. have maintained the state-wide requirement for fire sprinklers in new, one and two-family homes. Twenty-nine States prohibit statewide and new, local adoptions of fire sprinkler requirements in new, one- and two-family homes and nineteen States allow local adoptions of sprinkler requirements for new, one- and two-family homes. In the United Kingdom, Wales has a mandatory sprinkler bylaw for new home builds.


In Canada, the National Building Code (NBC) currently does specifically prescribe that sprinklers must be installed in single family dwellings. It does however state that any sprinkler system installed must be installed in accordance with NFPA standards. This includes NFPA 13D which is the standard for single family homes. It is therefore inferred that the NBC envisions that sprinklers may be used as an incentive or an alternative at the municipal level.

Currently we believe there are 34 municipal level bylaws that require some mandatory form of residential fire sprinklers in a single-family dwelling in Canada. These include 31 in British Columbia, two in Quebec (Cote St. Luc and Mont Royal) and one in Saskatchewan (Swift Current). Numerous other municipalities have had sprinklered projects proceed in their jurisdictions but under separate development permits.

In British Columbia, the National Building Code (NBC) is adapted for use as the provincial building code. Municipalities in British Columbia must have any proposed municipal bylaw approved by the province. In Ontario and Alberta, the provinces also adapt the NBC for their own use. Both provinces are deemed a 'MIN/MAX' jurisdiction which means their provincial building code act expressly prohibits a municipality from regulating a building code matter in a municipal bylaw. This essentially prohibits the introduction of municipal bylaw requiring sprinklers in these two provinces. In all jurisdictions the options remain to require sprinklers as a condition for development approval.

A change proposal for the mandatory sprinklers of single-family dwellings has been before the CCBFC since 2007 and has been discussed at length at the commission level.) In 2010 the Canadian Building and Fire Codes Commission [Centre?] commissioned a report on residential fire sprinklers from Altus Group entitled *"Gap and Statistical Analysis on Systems"*. This report was discussed in the Literature Review Section of this report. It was challenged by the CAFC and NFPA for its statistical flaws.

In 2017 the Canadian Commission on Building and Fire Codes (CCBFC) identified Fire Safety of Housing as their number six priority task out of 10 tasks. The NRC commissioned two studies. The first study by Jensen Hughes entitled Fire Safety in Housing that looked at current fire loss statistics in Canada and



their trends. It was a detailed study to inform the CCBFC on occupant and fire fighter safety and assess the overall performance of Canadian housing. The second study by Hanscomb looked at install costs across Canada. (Both studies are discussed in more detail under the Literature Review section of this report. A Joint Task Group was established to look at these reports and comments from stakeholders and provide their finding to the Executive Committee (EC) of CCBFC. The EC concluded that people are not being exposed to an unreasonable level of risk, that there is no consensus for a national code requirement to be adopted by PTs for mandatory sprinklers for residential buildings, that the number of fire deaths and injuries of occupants have halved in the past ten years and the number of firefighter deaths is not increasing, and that the overall impression was that houses were safe. The result was that the EC provided guidance to (Standing Committees) SCs regarding fire performance of floor assembly in houses and residential sprinklers, clearly stating that the CCBFC supported the rejection of all CCRs mandating residential sprinklers in houses and providing the rationale for the CCBFC decision. This rationale could then be used by the SC as the criteria to assess what type of new information would trigger another review of CCRs suggesting mandating residential sprinklers.

There are therefore no current code changes being reviewed for mandatory residential fire sprinklers in the National Building Code. Any proposed change submission to the national Building Code would face the significant hurdle of trying to overcome the statistical challenges identified by the CCBFC. Instead, a change of tact that looks at incentivizing sprinklers or identifying alternatives to prescriptive code requirements may face a greater chance of success.

In 2021, the Alberta Safety Codes Council submitted several proposed code changes that would make residential fire sprinklers an option for compliance to the NBC when dealing with secondary suites and stacked townhomes. In 2020, the CCC also commissioned a Joint Task Group to look at minimum floor performance in single family homes. This would be a comparison opportunity to benchmark the NBC to the International Residential Code (IRC) and NFPA 5000 Building Code both of which require minimum floor protection standards unless the property is protected with sprinklers.

NFPA 13D Standard

The 2015 edition of the NBC references the 2016 edition of *"NFPA 13D Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes"*. The first version of this standard was released in 1975. The standard takes advantage of low- flow residential fire sprinklers. These are life safety fixtures designed to wet walls, suppress fires, and increase the chances for occupants to self-evacuate in the event of a fire. Fire sprinklers are to be only located in rooms that statistics show have been rooms of fire origin. As well, the standard addresses prevention of freeze-ups, well- water applications, manufactured housing, and other unique challenges facing residential development.

The standard is intended to apply to single family dwellings, units with secondary suites and manufactured homes. There has been some confusion with regulatory bodies on how the standard is applied to multi-unit homes i.e. duplexes and townhouses. The intent is that these properties are constructed as separate units under local building codes so NFPA 13D would apply to each individual unit. This would require fire separations between each unit. This is sometimes causing confusion for stacked townhomes. Proposed changes to the 2022 edition of the standard that have been out for

public comment are proposing to clarify this point and may make the application of this standard more beneficial to builders of stacked townhomes.

The latest proposed edition of NFPA 13D has added an Annex that specifically details incentives that can be used when sprinklers are present.

National Education Efforts

In addition to the work of the Canadian Association of Fire Chiefs, the provincial, territorial and national affiliate associations that make up the national advisory council of the CAFC, and individual fire departments, there is active public education work being pursued by several organizations acting independently and in concert.



Photo Source: homefiresprinklercanada.ca

For example, the U.S.-based Home Fire Sprinkler Coalition (HFSC) which now includes HFSC Canada is a consortium of fire, insurance, and sprinkler organizations seeking to promote the awareness of residential fire sprinklers in new home builds. They have been active for 25 years and produce numerous public education materials focused on the fire service, home buyers, and home builders. Each year in May they host the Home Fire Sprinkler Week. They also have a separate registry of fire departments, Built for Life, that receive regular information on sprinklering.

The Canadian Automatic Sprinkler Association (CASA) represents the sprinkler installer industry in Canada. They are a member of HFSC. They advocate for the sprinkler trades, mandatory certification of sprinkler installers, and other programs that benefit their member companies.

The National Fire Protection Association (NFPA) is a founding partner and Chairs the HFSC. As an international standards development organization, they prepare the standards for the installation and maintenance of fire sprinkler systems including “*NFPA 13D Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*”. They also have a statistical division as well as a research foundation. The association has produced a number of reports in support of residential fire sprinklers.

4. Data Collection

Understanding Fire Service Perspectives on Sprinkler Impediments, Acceptance and Trade-Offs

A survey was administered by CAFC between 1 December 2020 and 16 December 2020. The membership was invited to answer 13 questions. The survey consisted of the following questions:

- **How comfortable are you in understanding the benefits of residential fire sprinklers?**
- **Prior to this survey were you aware of the public education information available on residential fire sprinklers by groups such as Home Fire Sprinkler Coalition in Canada?**
- **Do you/your fire service support the mandatory installation of residential fire sprinklers in residential properties including single family detached dwellings?**
- **What do you see are the major impediments for broader adoption of sprinklering in your jurisdiction? (Select all that apply.)**
 - o Builders unwilling put in sprinklers
 - o Lack of Incentives for sprinklering
 - o Lack of public awareness of the benefits
 - o Lack of municipal-level support
 - o Lack of provincial-level support
 - o Lack of fire service support
 - o No perceived benefit
 - o High cost to install
 - o Other (please specify)
- **Does your jurisdiction have a residential sprinkler bylaw?**
- **Is your jurisdiction in the process of enacting or preparing a residential sprinkler bylaw?**
- **Has your jurisdiction approved sprinklered developments?**
- **Were incentives offered in conjunction with the sprinklering approval?**
- **What were the nature of the incentive(s)? (Select all that apply.)**
 - o Financial Trade-Offs - Reduced or waived permit fees;
 - o Financial Trade-Offs - Reduced property taxes;
 - o Increased allowable dead-end street length;
 - o Increased maximum grades;
 - o Increased road setbacks;
 - o Reduced fire flows (reduction in water main sizes);
 - o Reduced fire hydrant spacing (spacing increased from 500 ft to 900 ft);
 - o Reduced fire ratings for building assemblies;
 - o Reduced limiting distances
 - o Reduced number of access roads;
 - o Reduced requirements for cul de sac widths;
 - o Reduced road widths (from 24 ft to 20 ft);
 - o T-Turn arounds; and
 - o Financial Trade-Offs – Other Special financial options. Please Explain.

- **Are you in favour of offering trade-off(s)/incentive(s) in your jurisdiction to have a sprinkler adoption?**
- **What trade-off(s)/incentive(s) would you support from the list? Select all that you would support:**
 - o Financial Trade-Offs - Reduced or waived fees;
 - o Financial Trade-Offs - Reduced property taxes;
 - o Financial Trade-Offs - Special financial options;
 - o Reduced fire ratings for building assemblies;
 - o Reduced fire hydrant spacing (spacing increased from 500 ft to 900 ft);
 - o Reduced road widths (from 24 ft to 20 ft);
 - o Reduced fire flows (reduction in water main sizes);
 - o Reduced requirements for cul de sac widths;
 - o Increased allowable dead-end street length;
 - o T-Turn arounds;
 - o Increased road setbacks;
 - o Reduced limiting distances;
 - o Reduced number of access roads; and
 - o Increased maximum grades.
- **Do you have any suggestions for additional incentives that may be considered that would support residential fire sprinklers?**
- **If you have sprinklered properties in your community, what benefits has your community realized as a result of the adoption?**

One hundred and five (105) members of CAFC responded to the survey, including fire chiefs from all provinces; all departments, including urban and rural, career, volunteer, and composite departments. The results are summarized as follows.

- **Understanding the Benefits of Sprinklers:** Participants understood the benefits of sprinklers. On a scale of 1 to 10, where 10 is high, the level was 8. Seventy percent (70%) acknowledged being familiar with education information related to residential sprinkler available to them prior to the survey being administered while 81% were in support of residential sprinklers.
- **Impediments to Sprinklers:** Almost 81% indicated a lack of public awareness as a major impediment to sprinklers followed by a lack of incentives, provincial support and builder unwillingness. The table below depicts the results on the major impediments to sprinklering.

Table 1, percentage of respondents that identified each item below as:

Impediment to Sprinklers	Responses
Lack of public awareness of the benefits	80.95%
Lack of incentives for sprinklering	76.19%
Lack of provincial-level support	72.38%
Builders unwilling put in sprinklers	69.52%
Lack of municipal-level support	50.48%
High cost to install	49.52%
Other (please specify)	26.67%
Lack of fire service support	19.05%
No perceived benefit	16.19%

- Presence of Sprinklers:** Out of the 105 participants, 93% stated that they do not have a sprinkler bylaw in their respective jurisdiction (95%) indicated that they were not in the process of enacting a sprinkler bylaw or in the process of preparing a bylaw on residential sprinkler. When asked if sprinklered developments were approved in their jurisdiction, 46% of 100 respondents (5 skipped) answered in the affirmative. Eighty-three percent of 99 respondents (6 skipped) indicated that incentives to sprinklering were not offered. By contrast, 17% stated that incentives were offered to sprinklering. The following table depicts the percentage of each incentive used in decreasing order:

Table 2: percentage of respondents identifying proposed incentives:

Proposed Incentives	Responses (22 participants)
Financial trade-offs - Other Special financial options. Please Explain.	40.91%
Reduced limiting distances	36.36%
Reduced fire ratings for building assemblies	22.73%
Reduced fire hydrant spacing (spacing increased from 500 ft to 900 ft)	22.73%
Increased allowable dead-end street length	22.73%
Reduced number of access roads	27.27%
Reduced road widths (from 24 ft to 20 ft)	27.27%
Reduced fire flows (reduction in water main sizes)	18.18%
Reduced requirements for cul de sac widths	13.64%
Increased maximum grades	13.64%
T-Turn arounds	13.64%
Increased road setbacks	9.09%
Financial trade-offs - Reduced or waived permit fees	0.00%
Financial trade-offs - Reduced property taxes	0.00%



Myth-Busting & Team-Building: Creating a Win-Win for Sprinklering in Canada


Démythifier et renforcer l'esprit
d'équipe : Créer une situation
gagnant-gagnant pour l'installation
de gicleurs au Canada

- **Support for Sprinklers:** Members were asked if they would support sprinkler incentives to promote sprinkler adoption, 86% responded yes out of 103 participants (two skipped). Despite this, few if any, respondents to the survey had a sprinkler bylaw. This means that the numbers from the survey are not inflated by those municipalities with a sprinkler bylaw. Yet a large portion of respondents stated that they had approved sprinklered developments. When asked which incentives from a provided list would they support, 86 participants responded the following:

Table 3: percentage of respondents identifying proposed incentives:

Proposed Incentives	Responses (86 participants)
Financial trade-offs - Reduced or waived fees	50.00%
Reduced fire ratings for building assemblies	48.84%
Reduced limiting distances	46.51%
Increased road setbacks	41.86%
Increased allowable dead-end street length	40.70%
Financial trade-offs - Special financial options	38.37%
Reduced fire hydrant spacing (spacing increased from 500 ft to 900 ft)	38.37%
Financial trade-offs - Reduced property taxes	37.21%
Reduced requirements for cul de sac widths	31.40%
Reduced fire flows (reduction in water main sizes)	31.40%
T-Turn arounds	30.23%
Reduced number of access roads	25.58%
Reduced road widths (from 24 ft to 20 ft)	24.42%
Increased maximum grades	22.09%

From the above response, there appeared to be general support for the incentives but no single best option. From the seminar we learned that there was no single preferred incentive - varied by municipality. There was however a general lack of support for reduced road widths due to winter condition concerns in Canada.



The last two questions were open-ended questions to encourage new ideas/incentives and to try to find out the benefits encountered by sprinklering from communities that have adopted residential sprinkler in their jurisdictions. Thirty-one answered were received related to new ideas/incentives. The answers were all focused on the following:

- **Work with Insurance Companies to reduce home insurance rates. Might be the best incentive of all;**
- **Work with Fire Underwriters Survey (FUS) to influence delivery, capacity and redundancy of fire protection systems criteria; and**
- **Work with all levels of Government to influence the regulatory framework for the installation of residential sprinklers.**

While 34 responses were received on the benefits of sprinklering they did not identify all positive outcomes. The main themes were:

- **No perceived benefits, requests to shut them off due to cost of inspections, leaks;**
- **Opportunity to build in areas where fire protection prescriptive requirements cannot be met; and**
- **Safer homes, safer communities, lower fire service cost and more sustainable communities.**

Room for Continued Education

The overwhelming majority of respondents had an understanding of the benefits of residential fire sprinklers yet the same proportion were not aware of public education materials available through HFSC Canada. There is therefore room for continued education of fire service members on the benefits of sprinklers and further promotion of resources or information to guide chiefs. CAFC in 2020 joined HFSC and could look to supporting more detailed information campaigns to its members based on knowledge gaps identified in this report.

Minority View on Sprinklers

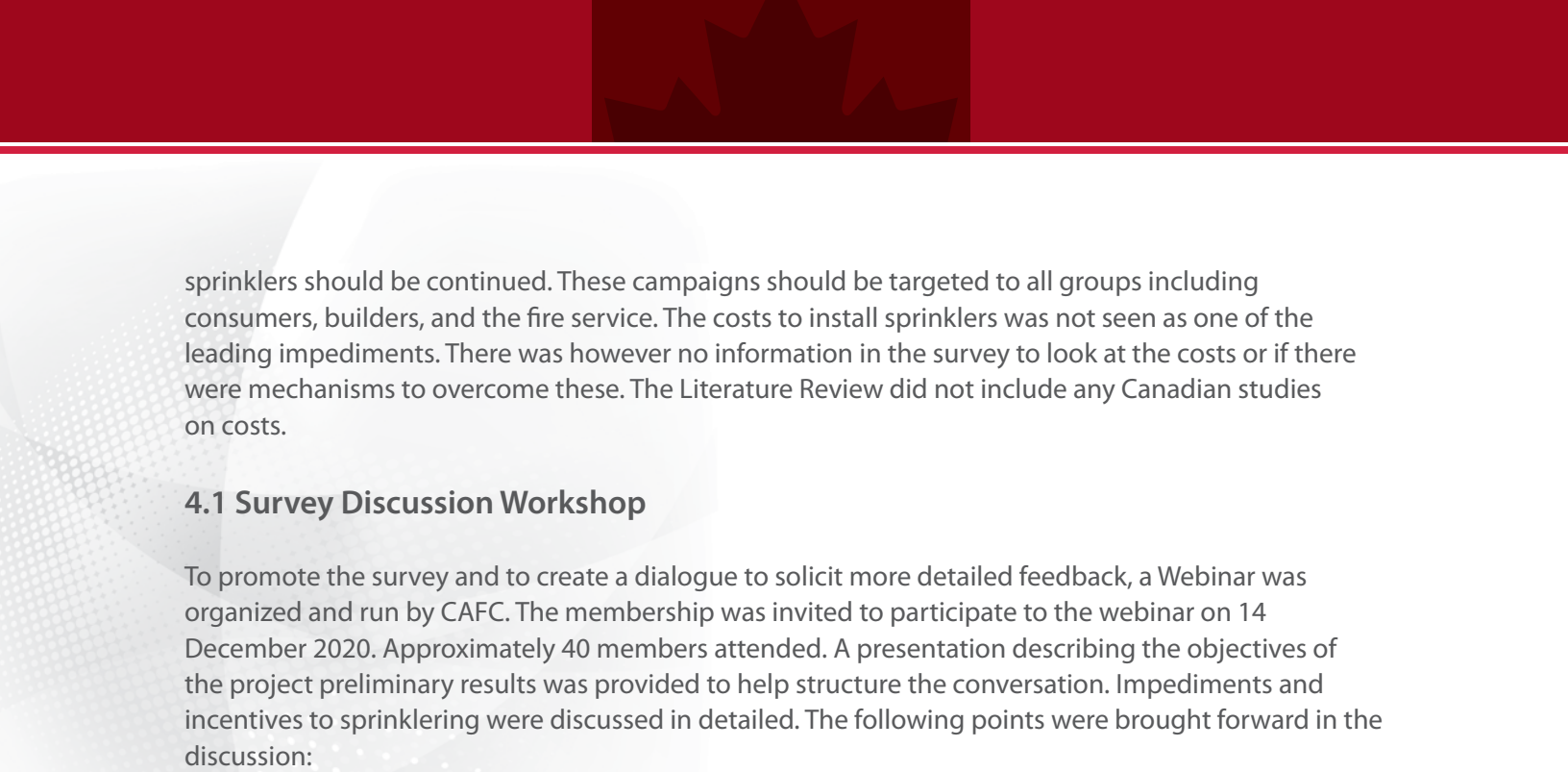
Not all fire chiefs support the mandatory installation of sprinklers of sprinklers. A number that support sprinklers was in line with the number of respondents that understood the benefits.

Absence of a Single Preferred Incentive

There was no overwhelming preferred incentive - we heard from the seminar participants that not every community may wish to follow every incentive and that local fire chiefs should look at these as a suite of options that could be negotiated with the local developers based on local conditions and risk tolerance. CAFC may need to spend some time educating on these incentives to better explain them.

Key Impediments

The top four impediments were builders being unwilling to sprinkler, lack of public awareness, lack of Incentives for sprinklering and lack of provincial support. Education campaigns on residential



sprinklers should be continued. These campaigns should be targeted to all groups including consumers, builders, and the fire service. The costs to install sprinklers was not seen as one of the leading impediments. There was however no information in the survey to look at the costs or if there were mechanisms to overcome these. The Literature Review did not include any Canadian studies on costs.

4.1 Survey Discussion Workshop

To promote the survey and to create a dialogue to solicit more detailed feedback, a Webinar was organized and run by CAFC. The membership was invited to participate to the webinar on 14 December 2020. Approximately 40 members attended. A presentation describing the objectives of the project preliminary results was provided to help structure the conversation. Impediments and incentives to sprinklering were discussed in detailed. The following points were brought forward in the discussion:

- **Concerns About Costs:** Concerns were expressed about the costs that sprinklering would impose on smaller rural locations and single-family home builds in these locations from smaller one-off home builds and the costs on rural communities. Perceived long-term maintenance costs were also discussed. It is noted here that CAFC could look at a communication strategy around rural sprinkler benefits and installations considering the large portion of CAFC members coming from rural departments. With a increasing number of Canadian jurisdictions having sprinklers voluntarily installed or mandated by bylaw, CAFC could also look at a study with CASA on the costing issues, costs on municipal services such as water supply, and other incentives.
- **Local Nature of Incentive Suitability:** Discussions occurred that some incentives might not work for the entire country (ie road width reduction might be an issue where there is a lot of snow). Rural incentives might also be different than urban incentives. A concern was raised that some of the incentives such as reduced lot line separations might go against WUI requirements. It is noted that local trade-offs or incentives should be left with the local fire chief to negotiate with the builders based on local conditions and risk tolerance. This reinforces overall belief that incentives should be kept at the local for development concerns where fire chiefs have a say on what level of risk they could responsibly accept.
- **Awareness of the Incentives:** It was suggested that the National Building Code or other widely used guidance across the country should include information on these incentives. NFPA 13D is proposing these as an Annex to the latest standard. It is noted that CAFC could consider guidance materials to fire chiefs on incentives and their benefits.
- **Use of Sprinklers to Offset a Code Requirement:** The use of sprinklers to offset a building code requirement needs to be spelled out in the code otherwise code officials are averse to accepting these. CAFC can look at the building and fire codes and identify specific code change provisions where sprinklering would be considered an acceptable alternative.

- **Each jurisdiction is different, therefore a tool/guide on development review and sprinkler incentivization available to fire chiefs and authorities could be considered:** This guide would help them make informed decisions.
- **Other Impediments and Concerns:** Cost, appearance, water damage, freeze-up, maintenance and impact on home insurance were all perceived impediments. These will be addressed in more detail in the Section Barriers, Myths, and Misunderstandings.

4.2 Interviews with National Advisory Council Members, Experts and Industry

Following the survey and survey discussion workshop, the authors reached out to the provincial, territorial and national affiliate fire chief associations who form the CAFC's National Advisory Council. Each of CAFC's policies are vetted through the National Advisory Council to ensure that national policy develops in a manner that is informed by and respectful of the work done closer to home. The goal was to solicit advice, input and develop consensus on the CAFC's position in a manner maximally supportive of the work of each association. Emails were sent out to all the NAC members on 21 January 2021 and follow-up emails sent out. The intent was to (1) understand the position of each association and (2) set up meetings with the NAC member, the PTPAC representative, and the Fire Marshal / Fire Commissioner in your province. An effort was also made to identify with the NAC representative other stakeholders in each province or territory that should be contacted in subsequent interview stages.

Yukon

Yukon has adopted the National Building Code as a minimum standard, but allows individual municipalities to adopt changes. It is currently undergoing an artificial building boom which results in long delays in home building and higher than normal costs of materials. This may create an incentive for sprinklers since if say, Whitehorse has an 18-month delay on housing stocks what does this mean for rehabilitation post fire? Does this place a greater value on the sprinkler system which help to protect the limited housing stock? How can this be addressed to show the further value of sprinkler systems? A concern identified was on **trades training and availability** in Yukon. Could industry meet the demand and install requirements? This should be explored with CASA.

New Brunswick

The New Brunswick Fire Chiefs Association **supports sprinklering in general**. NBAFC is also a member of the Maritime Fire Chiefs Association and has been supportive of sprinklering. This has included hosting an education session in 2019. The City Fredericton has also hosted a side by side burn demonstrations at the University of New Brunswick in 2014 and 2018. The challenge identified was related to **the builders' costs**. Water main and water supply were not seen as an incentive because the fire service does not get into subdivision approvals. While the feeling was that the NB Fire Marshal would be supportive of a province wide adoption, it may ultimately come down to fire safety versus the costs to install.

Nova Scotia

Nova Scotia represented the only jurisdiction contacted that had a clearly documented position regarding sprinklers. **In the summer of 2020, the Fire Service Association of Nova Scotia prepared a position Paper on residential fire sprinklers.** This position paper was developed on the heels of a multiple fatal fire that killed seven children in February 2019. Found a void of information on sprinklers. Challenges in and around providing an effective fire force to some areas in the province. Association felt there was a need to be leaders on this issue.




Photo from CBC News Article dated February 19th, 2019

In this particular fire, the first crew in responded with five firefighters even still had difficult task due to the location of the fire, the victims, and home configuration. Although the position paper has been prepared it has not proceeded further although they are looking towards an amendment of the building code in Nova Scotia.

Challenges in adoption included costs particularly in rural locations was of concern and knowledge of the technology with home builders and on water supplies. If going forward with provincial regulatory change the recommendation was made to make sure that the rural firefighter communities were on board as they held a great deal of influence. The need for more information on incentives for builders and on the insurance benefits was identified.

British Columbia

BC is the farthest along in sprinklering with 31 municipalities with bylaws regulating sprinklers in some form or another. In BC the provincial government has a concurrent authority provision that would require the province to review and approve any municipal bylaw covering an item in the building code. With the recent election, this has created a delay in the progress that has been made with sprinklers.



Despite this, success in BC has primarily been attributed to **addressing developer and builder concerns** about consistent application of the building code and NFPA sprinkler standards. They had set up a task force to review sprinklers and invited several stakeholders to the table. The developers were content to install sprinklers provided that **the same standard was consistently applied between municipalities**. They did not have to provide incentives but just be consistent in the expectations and applications. An example they cited for their model was around the California model used for environmental concerns. **Water supply has been a major issue**. The BC Engineers and Geologists have been working to clarify the expectations around water supplies for municipal fire fighting.

Ontario

Since 1997, the OAFB has publicly supported residential fire sprinklers. They have hosted a number of provincial fire sprinkler symposiums and led a provincial sprinkler coalition. Of late, the committee has languished. This is due to a perceived lack of support at the provincial government level to legislate sprinklers. ON is a MIN/MAX jurisdiction that would prevent municipal bylaws requiring sprinklers. Sprinklers can still be required for individual developments.

A key strategy used in Ontario is education for building and the Chief Building Officials on trade-offs and incentives for sprinklers. **OAFB learned that many CBOs were reluctant to deviate from the Ontario Building code** which they saw as prescriptive. Unless explicitly stated in the code they never turned their minds towards sprinklers.

In addition, OAFB learned that Home Builders saw themselves as being one of the most highly regulated industries and that if they saw potential cost benefits then they would more strongly supportive of sprinklers. For example if they could look at a fourth or fifth building where typically they may have 2 or 3 in urban infill then they would be supportive. Similarly, **lot servicing** is also a huge up-front cost on developers at 9-10K per house, if they can get more homes in a development they can off-set these.

Consistent with these learnings, OAFB doesn't seek to change the building code in Ontario but instead focus on the **Planning Act and educating planners** on how they can benefit communities with sprinklers. OAFB makes the linkage between exposure to nanoparticles and higher rates of cancer in firefighters which sprinklers could help to alleviate.

Finally, the Ontario Chiefs are working with CASA to develop potential Fire Code changes to strengthen qualifications and enforcement aspects of the Sprinkler & Fire Protection Installer trade. Both parties agree that requiring installations to be made by certified tradespersons is essential for ensuring the reliability of these systems. Myth busting and public education is important and needs to be done. Side by side burns have been beneficial.

Quebec

An interview was held with the Association des gestionnaires en sécurité incendie et civile du Québec (AGSICQ) [Quebec Association of fire and civilian safety managers] on May 13, 2021. The main purpose of this interview was to obtain the AGSICQ's official position on the installation of residential sprinklers



Photo Source: homefiresprinklercanada.ca

in new constructions of single- and two-family homes. A secondary object was to hold a general discussion on the subject. The following were the main points discussed at the interview:

- **The AGSICQ has no official position on the installation of residential sprinklers in new constructions of single- and two-family houses.** However, if solicited, its members would probably support a proposal to that effect.
- **The Régie du Bâtiment du Québec (RBQ) is responsible for developing and updating regulations relating to the building code and the safety code.** There is a very good relationship between the AGSICQ and the RBQ, which could facilitate discussions with the RBQ regarding residential sprinklers if the members of the AGSICQ were ever to support their installation.
- **Two municipalities on Montréal Island, namely Westmount and Cité de Côte-Saint-Luc, each have a municipal by-law on the installation of residential sprinklers in new single- and two-family houses.**
- **There was discussion of an incentive program to promote the installation of sprinklers in new housing developments.** The idea of such a program was generally supported in principle, but some changes could be introduced in certain developments.
- **The benefits of residential sprinklers are not well known in Quebec, particularly in smaller centres.** What is more, French-language educational material is rare.
- **The Quebec fire safety cover plan (*schéma de couverture de risques en sécurité incendie*) is a fire risk and decision-making management tool for elected municipal officials, and also a planning tool for fire chiefs.** The fire risk management model contains one section called risk analysis. Among other things, this section addresses self-protection mechanisms as well as detection and transmission mechanisms. Residential sprinklers (being self-protection mechanisms) could be part of the solution in places where the response time cannot be met as stipulated in the Quebec Fire Safety Act.
- **A fire prevention guide is currently being developed for use across Quebec.** It presents an opportunity to promote the advantages of residential sprinklers. The obstacles to promotion and installation of sprinklers are: water damage, the appearance of the sprinklers, and an additional insurance cost to cover risks of water damage due to sprinkler discharge, whether accidental or not.

- **Water supply is at times an issue for all types of sprinklers.** One of the problems is the pressure required by the sprinkler system, which is incompatible with the municipal water supply. Often the sprinkler system requires higher water pressure than what is provided by the municipality, creating additional costs for owners to resolve the problem.

A cost-benefit study is currently being conducted on the fire prevention program in two regions of Quebec. The report is expected shortly, and may identify aspects related to the benefits of sprinklers.

Metropolitan Fire Chiefs

Metro Chief departments include Halifax, Brampton, Surrey, Quebec City, Vancouver, Calgary, Edmonton, Winnipeg, Toronto, Mississauga, Ottawa, Montreal and Halifax. Vancouver has a sprinkler bylaw that has been established since 1990. The Metro Chiefs have adopted the policy of the IAFC on residential fire sprinklers. This is enunciated at: Position (iafc.org) and was set in 2008. It supports the mandatory adoption of sprinklers in new construction as well as opposing any new regulations that prevent or discourage the installation of fire sprinklers.

Canadian Forces Fire Marshal Staff


Canadian Forces have a sprinkler policy for all new single-family dwellings which states that any residential property over 150m² is to be sprinkler protected. While not considered a substitute, on duty firefighter numbers are below a typical EFF as per NFPA standards. The Canadian Forces Housing Authority, which manages the homes for DND, convinced the department to be excluded from the policy but supported the provision of sprinklers for newly constructed multi-level units. The concern was the draw that this had on limited capital funds available to recapitalize their portfolio. CFFM follows the ISO guidelines for determining water supplies for fire fighting on bases. They have had experiences with sprinkler saves at CFB Gagetown. In the interest of improved protection, they believe research could look at partial sprinklering - i.e. where the fires are occurring such as kitchens, laundry rooms, etc. They suggested we look at the indirect costs of fire, the aftermath/impact, and having municipalities fund the sprinkler installations through a development fee levy.

Fire Service Partners and Industry

While the provincial and territorial fire chiefs associations as well as the national affiliate organizations play a key role in CAFC policy through the national advisory council, others like the International Association of Firefighters (IAFF) and Fire Underwriters Survey (FUS) also offer importance perspectives within the fire sector. In addition, the views of community and industry partners were seen as key to the project. What follows is a discussion of the interviews and key perspectives from our side of the CAFC.

International Association of Fire Fighters

In 2008, the IAFF joined the IRC's International Sprinkler Coalition and included a motion in support of sprinklers. As IAFF has said previously and as CAFC has often concurred, there is a risk that the introduction of sprinklers becomes **confused or substituted for maintaining adequate service levels**. This is a key issue that will be discussed in the myths section of the report. Sprinklers slow the spread of fire but still need fire response. This is particularly a challenge in communities where



the speed at which the communities are being developed is outpacing the community's ability to collect development fees and then build fire halls. Municipalities may try to use sprinklers to offset these risks until the new halls are built. Sprinkler effectiveness was also discussed in terms of proper placement, maintenance and ensuring there are no obstructions or renovations, through proper ongoing inspection. Insufficient priority placed on inspections by many municipalities can mean the effectiveness of sprinklers in testing may not be reproduced in real life experience. It would help to educate the public and builders on the benefits of sprinklers. Building Code changes are needed, including ensuring that a fire fighter safety objective is incorporated into the codes which would position sprinklering as a mechanism for achieving the objective. Finally, the need to provide some information on insurance premium reductions and confirm potential savings versus any issues around water damage was discussed as well as municipalities needing to have a better understanding of Fire Underwriters Survey (FUS) gradings and how these impact their fire service.

Fire Underwriters Survey

Fire Underwriters Survey has a new **Water Supply Guidelines document** out for public consultation, that has been rewritten to further encourage residential fire sprinklers. This has been due to their working with the BC Fire Chiefs Association and their support for current sprinkler adoptions within the province. Examples in this document include allowing **hydrant spacing to be increased** where sprinklers have been adopted, as well crediting water supply demand calculations by as much as 75% where sprinklers systems are installed through out the development.

The FUS approach to water supplies and fire protection deal with public fire protection. The Building Codes however deal with private or individual building protection. This is a point that may be lost on Building Officials. Fire Chiefs need to be aware of this difference and be raising these concerns with their Building Officials. To assist in this the FUS shall be making their portal more accessible with information that includes added maps on hydrant coverage, standards of cover information, and soon wildland urban fire risks. This will help Fire Chiefs to make more informed decisions on their Standards of Cover models. This may not be well understood within the municipality and so educational materials to support them would be beneficial.

During the discussion on how FUS and insurance companies work. It was revealed that Insurance Bureau of Canada's (IBC) current approach to insurance gradings in communities did not support sprinklers. In recent years, the IBC approach has not been to look at community protection gradings to determine premiums rather to look at historical losses. This policy works against Fire Chiefs and communities working to improve their community protection standards as the investments may not materialize in future insurance premium losses. The suggestion was that this may be of a greater interest for the CAFC to raise with the **Office of the Superintendent of Financial Institutions (OSFI)**, which is the insurance industry regulator. As well educational materials for the insurance industry to address the myth of water damage is needed. Fires are increasingly less frequent but are severe losses. Insurance industry is however faced with very frequent water damage losses that make the cost saving benefits of sprinklers "a wash". CAFC should therefore consider how to educate the insurance industry on the greater benefits of the sprinklers in fire loss reduction and life saving.

Canadian Automatic Sprinkler Association

In the interest of getting questions addressed about the fire sprinkler industry, CASA was interviewed. They were asked if the sprinkler industry could **address the demand** that sprinklering would present? The answer was a definite yes. This was proven in BC and AB where there is a steady stream.

When asked if there were concerns on the **qualification of installers**, it was noted that in most provinces the sprinkler fitter trade is recognized. Differences between multi-purpose and stand-alone sprinkler systems, plumber and or sprinkler fitters (if qualified) could install these systems. As for who should install the systems this was left to the individual jurisdiction. The key point was that the installers need to be trained and certified for the type of work they are performing. The voluntary role of sprinklering through incentives would be able to be supported by the industry growth.

CASA felt it was important to educate the community on the **benefit of sprinklers**. This includes addressing some of the myths around sprinklering. Where the market is “mature”, many installs the pricing has been extremely competitive. For examples markets such as Pitt Meadows, BC and other jurisdictions in the lower mainland of BC, as well as in Calgary area. A major misconception has been when a sprinkler contractor has been asked to bid on a single contract. There is often not the benefit to the contractor to take on this work the result is a higher than usual bid. Contractors working in these mature market areas have been able to use smaller crews, exercise economies of scale in purchase of materials, and therefore have more competitive bids that are in line with the estimates from the NFPA costing studies.

It also identified opportunities, such as the proposed **code changes coming from Alberta are also seen as beneficial**. As well, **proposed changes to the next NFPA 3D standard** around the definition of townhomes will also make sprinklering more positive for home builders. The proposed harmonization of the provincial codes to the NBC will also represent a good opportunity for sprinklering.

The installation of sprinklers in rural locations was discussed. This does represent a challenge because of the small number of installs. It was however stated that costs would be much more competitive as the number of installs increases. It was also stated however that it was these locations where they would have the greatest life and property saving benefit.

The issues around water meters backflow prevention valves was also briefly discussed. It is believed that many of the cities still have concerns around sizing of water lines and the associated sizing of water meters. This is believed to be a misconception.

Modern larger size water meters are now just as accurate as the smaller ones some community concerns over the loss of revenue are no longer an issue. Backflow prevention valves can be eliminated with a flow through design and there is an option for listed non-inspection backflow valves that eliminate the need for an annual inspection from an outside agency.

Window Fabricators and Distributors

On 17 June 2021, the authors had a discussion with Fenestration Canada representatives. Fenestration Canada is a not-for-profit association that supports the window fabricators and distributors in Canada. They were provided a brief background on the white paper and the CAFC's approach towards incentivization of sprinklers. This included at least one incentive currently being supported by CAFC - the potential to increase percentage of window openings in dwelling sidewalls when both homes were sprinklered. They were then asked for feedback on the approach toward sprinklers and if there were other potential incentives that could be considered.

The representatives stated that they were encouraged by the approach by CAFC and that their members would also welcome this. Although they had not been aware of the discussions to date, they were supportive of the potential to increase percentages of window openings. They did also suggest a change that was present in the Vancouver Building Bylaw that could be considered. (Vancouver has had a sprinkler bylaw for all new single-family homes since 1990.) The suggestion was VBC item which addresses the issue of window security for fall protection and windows as a means of escape. This is sometimes a conflict at the local level.

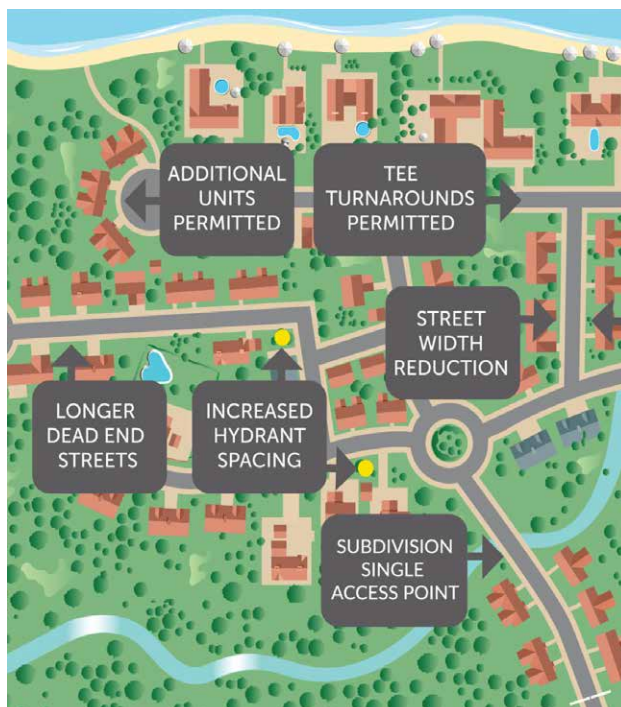
The representatives also discussed the issues around safety glass and concerns about this requirement for the protection of egress paths and how this could be potentially removed when the residence is sprinklered. The representatives shared changes that were coming to the 2020 NBC around the classification of vinyl clad windows as combustible windows. Historically vinyl clad windows had been deemed to be combustible. The changes would reflect that the vinyl windows performed as well as non-combustible clad windows in standard testing. These changes were supported by fire research performed by the National Research Council of Canada. The weak point in the window systems remained the glazed elements and not the frame. These changes would then permit expanded use of vinyl windows in non-combustible construction. These changes were before the Fire Protection Committee of the CCBFC. The authors stated that they would take this information back to the CAFC Codes Committee and inform them of the pending changes.

The authors stated that they would share the proposed changes that are coming from Alberta with Fenestration Canada and that CAFC was prepared to support these. CAFC also committed to share a copy of this final report for Fenestration Canada to share with its members.

Home Builders

Home builders were contacted by the authors about their industry perspective/history on sprinklers and building codes. The representatives stated that the biggest challenge was affordability. There are numerous interest groups each trying to add code language that affect construction of new homes. Although many of these are worthy the costs of all these initiatives could easily double the price of new home and become untenable.

The Builders and CAFC recognized that both groups have a common experience of the codes process. For both builders and fire departments, every code change matters in terms of either cost or safety.



Home Fire Sprinklers Incentives

- Offered to builders or developers in exchange for improving life safety by installing home fire sprinklers.
- Reduce construction costs and can increase builder profit.
- Permit new development in areas that otherwise may have been too restrictive or not cost effective.



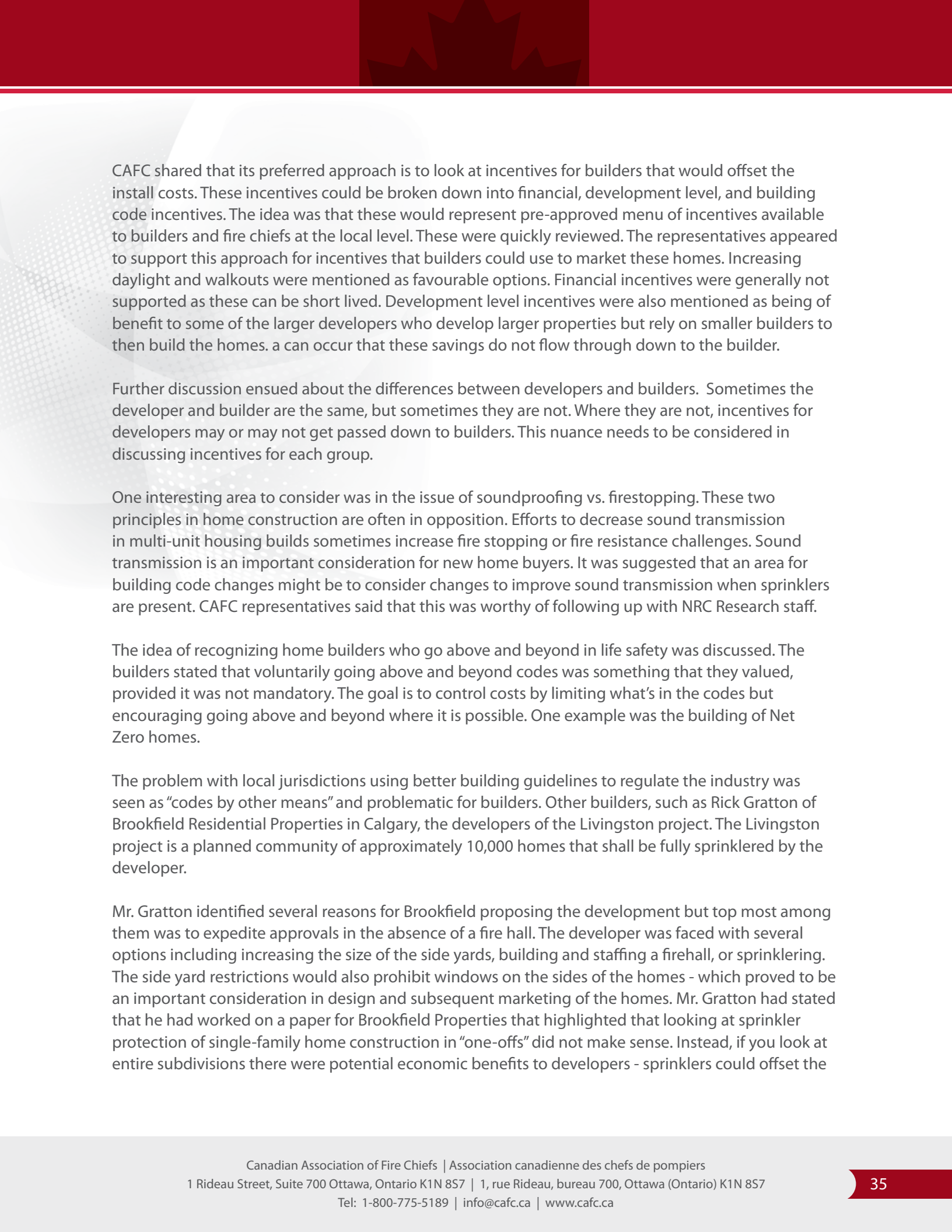
This is not true for special interest, textile or material groups that would derive a profit for their code change and/or only be concerned with a limited number of code changes.

Improving the codes process is an area where perhaps some builders and fire departments could collaborate. In addition, builder representatives and fire departments representatives could help the Codes Commission understand that not all stakeholders bare the same burden or impacts as others at the table because of (1) the cumulative impact of all changes and (2) the cost implications or lack of profit incentives that others would have. Treating all stakeholders the same may actually create a fairness, affordability and public safety problem. Shared concerns about the research process and cross committee reviews were also discussed.

At the same time, the builder representatives made clear they were not averse to addressing code changes when the research supports these needs. The example given was on stair riser configuration in the code. This change was supported but had considerable costs on the design and footprint of home construction. Sprinklers however have not been supported because of the numerous studies showing low cost-benefit analysis and because home buyers haven't requested them.

Builders have also been clear in their messaging that affordability for home buyers is paramount. Since home buyers pay for builder costs, builders are more than willing to install extras requested by the homeowners. The real question is whether home buyers will pay for features like sprinklers.

To date, home buyers are more interested in the sellable features like aesthetic upgrades. As such finding ways to reframe or market the sprinkler discussion in terms of "sellable" features for buyers, i.e. more windows, potential for walk-outs etc., might be a viable strategy for increasing uptake of sprinklers in new homes.



CAFC shared that its preferred approach is to look at incentives for builders that would offset the install costs. These incentives could be broken down into financial, development level, and building code incentives. The idea was that these would represent pre-approved menu of incentives available to builders and fire chiefs at the local level. These were quickly reviewed. The representatives appeared to support this approach for incentives that builders could use to market these homes. Increasing daylight and walkouts were mentioned as favourable options. Financial incentives were generally not supported as these can be short lived. Development level incentives were also mentioned as being of benefit to some of the larger developers who develop larger properties but rely on smaller builders to then build the homes. It can occur that these savings do not flow through down to the builder.

Further discussion ensued about the differences between developers and builders. Sometimes the developer and builder are the same, but sometimes they are not. Where they are not, incentives for developers may or may not get passed down to builders. This nuance needs to be considered in discussing incentives for each group.

One interesting area to consider was in the issue of soundproofing vs. firestopping. These two principles in home construction are often in opposition. Efforts to decrease sound transmission in multi-unit housing builds sometimes increase fire stopping or fire resistance challenges. Sound transmission is an important consideration for new home buyers. It was suggested that an area for building code changes might be to consider changes to improve sound transmission when sprinklers are present. CAFC representatives said that this was worthy of following up with NRC Research staff.

The idea of recognizing home builders who go above and beyond in life safety was discussed. The builders stated that voluntarily going above and beyond codes was something that they valued, provided it was not mandatory. The goal is to control costs by limiting what's in the codes but encouraging going above and beyond where it is possible. One example was the building of Net Zero homes.

The problem with local jurisdictions using better building guidelines to regulate the industry was seen as “codes by other means” and problematic for builders. Other builders, such as Rick Gratton of Brookfield Residential Properties in Calgary, the developers of the Livingston project. The Livingston project is a planned community of approximately 10,000 homes that shall be fully sprinklered by the developer.

Mr. Gratton identified several reasons for Brookfield proposing the development but top most among them was to expedite approvals in the absence of a fire hall. The developer was faced with several options including increasing the size of the side yards, building and staffing a firehall, or sprinklering. The side yard restrictions would also prohibit windows on the sides of the homes - which proved to be an important consideration in design and subsequent marketing of the homes. Mr. Gratton had stated that he had worked on a paper for Brookfield Properties that highlighted that looking at sprinkler protection of single-family home construction in “one-offs” did not make sense. Instead, if you look at entire subdivisions there were potential economic benefits to developers - sprinklers could offset the



Photos Source: homefiresprinklercanada.ca



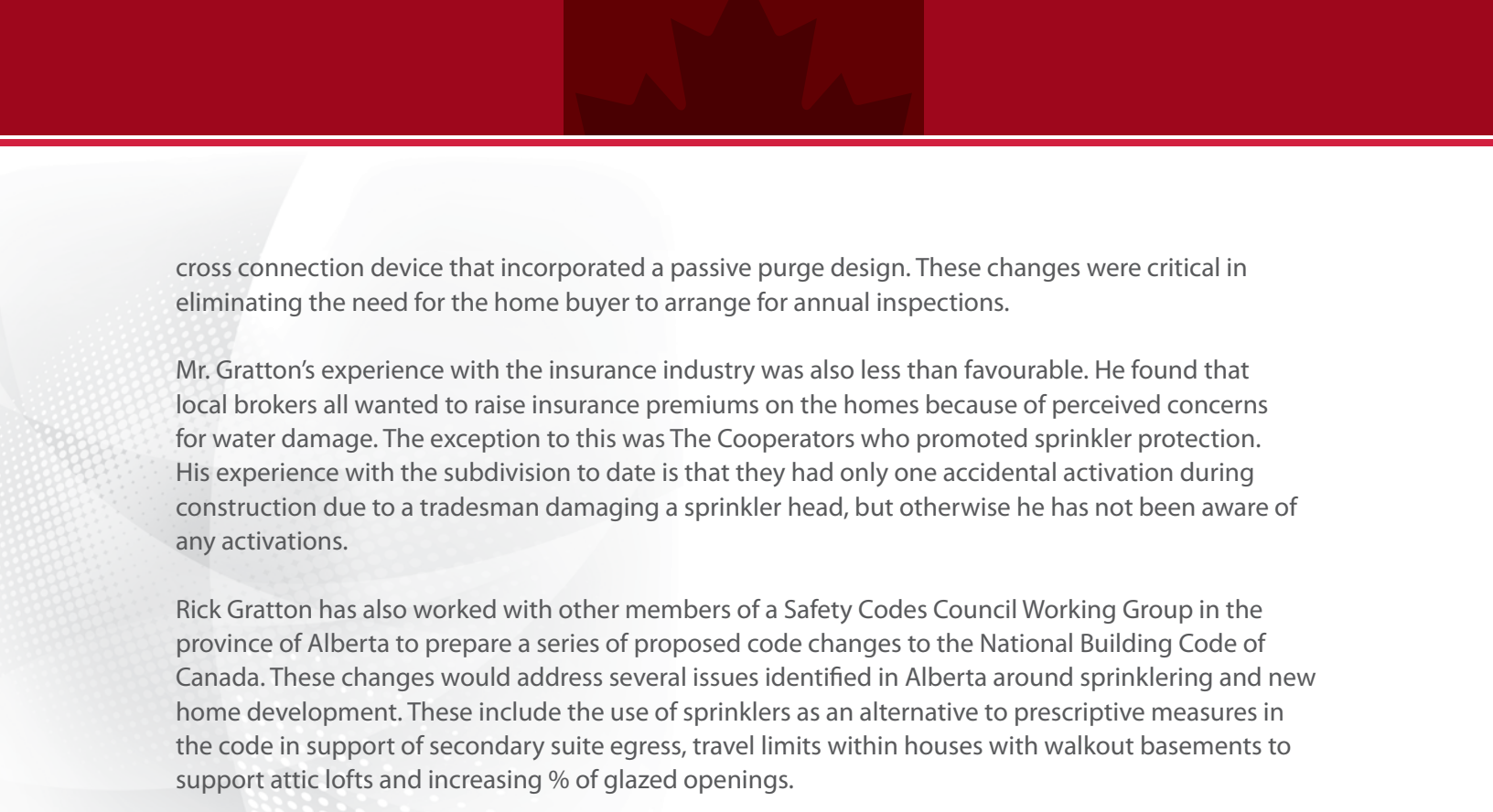
added cost and could even be cost-beneficial to developers. Livingston was a prime opportunity to prove this.

For this to work, the Fire Service must have discussions with the Building Departments and local building officials and safety codes officers must receive training and education on the inspection and acceptance of NFPA 13D systems. These are valuable lessons for other departments going forward. In Calgary's case, NFPA and industry helped in the delivery of training. The sign-off of the designs and acceptance by the building departments need to contain the costs.

In Calgary's case the sign-off by the system designer was approved by the city as "installed by design" avoiding the costly expense have having each install approved by an engineer. Mr. Gratton also stressed the need for continued homeowner education. Specifically, that homeowners cannot paint the sprinkler cover plates, and that the homeowners cannot modify the sprinkler systems without approval of a professional. They addressed this by providing homeowners with information via a USB stick drive and warning labels on the systems.

To offset the cost to the individual builders to build each of the homes within the development, Brookfield reduced the lot fees to these builders to offset the perceived added cost to the builders for the installations. Mr. Gratton also noted that install costs were approximately \$2.50 per square foot; however, the costs to the multifamily units were more. This increase in cost was due to the definition of a townhouse in NFPA 13d that required a alternate solution to utilize this standard for stacked townhouses. Note: This is an issue that the next edition of NFPA 13D has resolved however, it may take several years for the NBC to adopt this.

Other unique challenges the Brookfield had to overcome were around water supplies to the individual units. Standard community design utilized 3/4-inch water services to the homes, sprinklers needed 1-inch lines. The city had recently acquired a stock of 5/8-inch meters for their new installs, this needed to be addressed. (Development planning in the future should always consider 1 inch water lines and water meters to make the choice to install sprinklers more economical.) Also of concern was the reduced accuracy of these larger meters. This was resolved. A further concern from the city water division was the need for back flow preventers. Brookfield was able to utilize a non-testable, listed



cross connection device that incorporated a passive purge design. These changes were critical in eliminating the need for the home buyer to arrange for annual inspections.

Mr. Gratton's experience with the insurance industry was also less than favourable. He found that local brokers all wanted to raise insurance premiums on the homes because of perceived concerns for water damage. The exception to this was The Cooperators who promoted sprinkler protection. His experience with the subdivision to date is that they had only one accidental activation during construction due to a tradesman damaging a sprinkler head, but otherwise he has not been aware of any activations.

Rick Gratton has also worked with other members of a Safety Codes Council Working Group in the province of Alberta to prepare a series of proposed code changes to the National Building Code of Canada. These changes would address several issues identified in Alberta around sprinklering and new home development. These include the use of sprinklers as an alternative to prescriptive measures in the code in support of secondary suite egress, travel limits within houses with walkout basements to support attic lofts and increasing % of glazed openings.

Mr. Gratton's advice was that the sprinkler lobby groups need to change their tack with regards to sprinkler protection, much as this initiative is doing. Every code cycle new requests are submitted to mandate residential sprinklers, and they are rejected due to the cost benefit analysis. These groups need to talk with developers and Fire services to discuss incentives such as sub division design, water supply savings in a fire, climate change, reduction in fire fighter cancer deaths and injuries. Fire service and industry needs a different approach.

4.3 Summary

- **Builders can be receptive to sprinklers if the requirements were consistent - not penalizing one area over the other.**
- **The reality of a market economy is that once demand for sprinklers is established prices for the installation costs will come down. This has been evidenced in markets like Pitt Meadows, BC for example.**
- **Look at writing in changes to the codes that specifically show where residential fire sprinklers may be considered as an alternative under the code.**
- **Look at engaging with Planners and Developers as stakeholders as early as possible.**
- **Builders are heavily regulated - if there are advantages to them then they would support this - incentivization will work.**
- **Need public education programs to increase awareness - including in areas where sprinklers have been installed.**

5. Barriers, Myths and Misunderstandings


During the stakeholder interviews, and drawing on our own experiences, we identified current impediments to greater sprinkler adoptions. These have been categorized as barriers, myths, and misunderstandings. Barriers are regulatory or administrative hurdles that prohibit sprinklers or make the installations cost prohibitive. Myths are misconceptions about sprinklers that undermine support for sprinklers. Misunderstandings are the promotion of materials that have subsequently been disproven but persist due to lack of education. We list these below.

Barriers

- **Provincial Building Code Act Restrictions:** Ontario and Alberta prohibit the introduction of municipal bylaws that would regulate matters addressed in the provincial building code. In these provinces a municipality cannot introduce a bylaw requiring mandatory installation of sprinklers. A municipality can however make sprinklers a condition for individual subdivision approval under the municipal planning regulations.
- **Municipal Resistance to Sprinklers:** Local politicians are hesitant to look at sprinkler bylaws primarily due to being unaware of potential benefits or working closely with builders/developers who see sprinklers in a negative light. By working to educate these policy makers on the benefits of sprinklers and on incentives available to their municipality it is believed that this barrier can be minimized.
- **Code Change Submission Process:** The code change has been attempted numerous times by the fire service. Most recently the Executive Committee of the CCBFC, following a report from a Joint Task Group looking at several reports CCBFC commissioned, has issued direction to the standing committees that all code change requests for sprinklers shall be rejected. The number of lives lost to fire has plateaued and the cost benefit analyses do not support sprinklers. This decision is not supported by the fire service as it fails to consider the entire societal benefits of sprinklers plus it did not consider incentives to reduce or eliminate install costs. Regardless, such a firm no requires the fire service to seek alternative measures to increase sprinkler adoptions.
- **Lack of Financial Incentives:** There are no federal or provincial financial incentives or tax breaks to offset the install costs to builders that choose to sprinkler.

Addressing Myths

- **When one sprinkler head goes off, they all go off.** The entertainment industry and how they portray sprinklers is the major perpetrator here. This perpetrates the myth that the water damage will be greater than the fire damage. This is easily refuted with education on how sprinklers operate and that it is only the head closest to the fire that ever activates. Public education displays such as side-by-side burns for example help to overcome this myth.
- **When the smoke alarm activates so will my sprinkler.** Understanding how sprinklers work is key. Sprinklers work by a fusible link and only the sprinkler head nearest the fire will activate when that fusible link is melted. Burning toast will not set off the sprinklers.



Education of homeowners and others on how sprinklers function is important. This includes homeowners living with sprinkler systems to ensure they never disconnect these systems.

- **Sprinklers will leak.** Home sprinkler systems are installed by trained and certified tradesmen using listed products. The systems have been proven to be reliable. There is no data suggesting sprinkler systems are any less reliable. Sprinkler systems are also monitored and any flow on the system would alert the homeowner.
- **Water damage will be worse than fire damage.** This is again not based on any reported information. The reality is that the fire service will respond 6 or more minutes after their notification of a fire with hose lines flowing 250 gallons per minute inside plus exterior hoses. Sprinklers active before the fire department arrives containing or extinguishing the fire and keeping it to the room of origin at flow rate a fraction of what the fire service will use.
- **My insurance will increase due to potential water damage.** The myth is often propagated based on someone someone knew who had a discussion with an insurance broker. The belief is that insurers will increase premiums due to water damage potential from sprinklers. This is refuted when people have a better understanding of these systems. Insurance providers such as The Cooperators in Canada and State Farm in the US have taken a leadership role in advocating for sprinklers through their roles with HFSC and in offering discounts for homeowners with sprinkler systems.
- **In the winter, the sprinklers will freeze.** This myth is particularly challenging for Canadian installations. Many Canadians will have known someone or have personally experienced frozen pipes. This is best refuted by increasing the awareness of the design standard and the materials in NFPA 13D and highly that other cold-weather climates have sprinkler mandates.
- **The Fire Department will arrive in time to put the fire out.** This myth is tied to the lack of understanding about the devastating changes of modern fires. It is challenging to refute this as it leads Canadian Fire Chiefs to argue against their own services and the timeliness of their response. The best way to refute this is to again point out the rapidity of modern fires and that the fire services will still respond but to verify that all is safe.

Addressing Misunderstandings

- **Modern Fires:** Modern contents and modern home design factors have proven to lead to fires that burn hotter, lead more quickly to untenable conditions, and are more toxic in their by-products than fires of just 20-30 years ago. This is not reflected in current Building Code provisions. Furthermore, the public is generally not aware of the facts. Public Education campaigns such as side-by-side burns with sprinklers have helped to dispel this.
- **Not Just About Cost per Lives Saved:** Arguments that such as the CMHC Technical Document that solely focus on one dimension such as number of civilian lives saved pre sprinkler installation do not give a complete picture. Modern contents when they burn produce more toxic by-products. This has become evident in the increasing number of fire fighter cancers.

- **New Construction is Safer:** An analysis of fire loss statistics does not support this claim. Although building codes have advanced, we have also seen changes in home design since the 1950s that influence fire growth. Furthermore, the homes themselves do not create the fires but the occupants do. Modern construction methods such as the prevalence of light weight trusses create a greater risk to firefighters. A point proven through National Research Council of Canada studies that identified floor failures in as little as six minutes into a basement fire. These same NRC studies showed that when sprinklers were present at no time did the homes become untenable in a fire.
- **Expensive to Install:** This can be the result of “one off” quotes for installations. Sprinkler contractors without experience in residential installations are contacted for installation quotes. These can be higher than the costs identified in this report and in North American surveys. In reality we know that when there is a “mature market” with a larger number of sprinkler installs happening then costs can be reduced significantly. This paper is also proposing incentives that builders can pursue at the local level that further reduce installation costs.
- **Larger Size Water Mains Reduce Accuracy of Water Meters:** One issue of concern that is often raised in discussing sprinklers is around the size of the water supply needed to serve the dwelling. This also affects the decision on water meter size and therefore the accuracy of these and whether the sprinkler system’s flow needs to be metered.
- **With Smoke Alarms you Don’t Need Sprinklers:** Although the number of lives lost per year in fires has reduced the number of deaths per year in residential fires has plateaued off. Smoke alarms will alert a resident to a fire; however, the occupant must be able to self-evacuate in as little as 1 ½ minutes before the fire becomes deadly. This is significantly less than 20-30 years ago. Sprinkler buy the added time needed for residents to self-evacuate.
- **Municipalities Requiring Inspections:** This would be an added cost on homeowners as municipalities would require inspection of either the backflow prevention valve or the sprinkler system itself. NFPA 13D does not require annual inspections and instead places this on the homeowner to test. Sprinkler systems for single family homes can be designed to be either a stand-alone system or a multi-purpose system. The stand-alone system is often required to have a dedicated backflow prevention valve. Selecting a listed non-inspection valve or design of the system as a “flow through system” negates the need for the back flow valve.

To overcome these three challenge areas, it is important to continually educate on the benefits of sprinklers and to promote credible information on home fire sprinklers in an easily accessible forum. The Home Fire Sprinkler Coalition and its Canadian branch have been attempting to do this. HFSC celebrated its 25th anniversary in 2021. The aim of this group is to increase the awareness of sprinklers.

Based on early work in this study and recognizing the need to increase public education on sprinklers, CAFC joined HFSC in 2020. The third week in May each year is Home Fire Sprinkler Week. CAFC has been active in retweeting the information on the campaign in 2021 through its “Fire Chiefs Ask” platform.

6. Incentivizing Residential Sprinklers

Leveraging Trade-Offs for Builders

The members' survey identified several incentives that could be considered. The respondents did not appear to show overwhelming support for any single incentive. Overall, the concept of incentives was supported. In follow-up discussion in the symposium, it was suggested that the lack of a single supported incentive was because each fire chief had a different view or tolerance and a unique view of their communities. It is also believed that the concept of offering a pre-defined suite of incentives to builders might not be widely supported at the local level because there was a lack of detailed understanding of these incentives and concern over the assumption of increased risks should the incentives be adopted. Instead focus should be presenting a menu of incentives, defining these, and presenting them to fire chiefs as a set of supported items pre-approved by their peers.

Helping Builders Manage Risk

It also came out in stakeholder discussions that Building Officials tended to operate more in a prescriptive application of the codes. They did not wish to exercise judgment in approving a building code trade-off for sprinklers. Unless an alternative was spelled out in the codes then they would likely not consider these. The problem is that the incentives discussed may not be addressed under the building code but under local municipal planning guidelines. Many of the incentives such as hydrant spacing, road design, etc. are addressed in municipal planning documents. There is no set of pre-approved municipal planning guidelines.

Helping Builders Increase Sellability

Positioning elements that home builders can sell or promote for their homes is a potential route to sprinklers. Financial incentives for the public or builders were not favoured as highly since the experience was that these programs were short lived as support disappeared when funding was removed.

It should be noted that proposed changes to the 2022 edition of NFPA 13D shall include a new *Annex B Incentives for Residential Fire Sprinkler Use - Advantages for Builders, Developers, and Communities*. This is an attempt to have potential incentives available for local decision makers. As these cannot be put into the building codes, they have at least been made available as an Annex in the standard.

6.1 Financial Incentives

Since 2010, the CAFC has promoted sprinklers and proposed tax incentives for property owners to install fire sprinklers. These however were for commercial properties looking to retrofit with sprinklers and not for single family homes.

A review of federal government tax or policy areas covering sprinklers found no existing programs that would qualify either single family home buyers or builders for choosing to build with sprinklers. The question is under which department should such an appeal be made. An appeal for a federal income



Photos Source: homefiresprinklercanada.ca

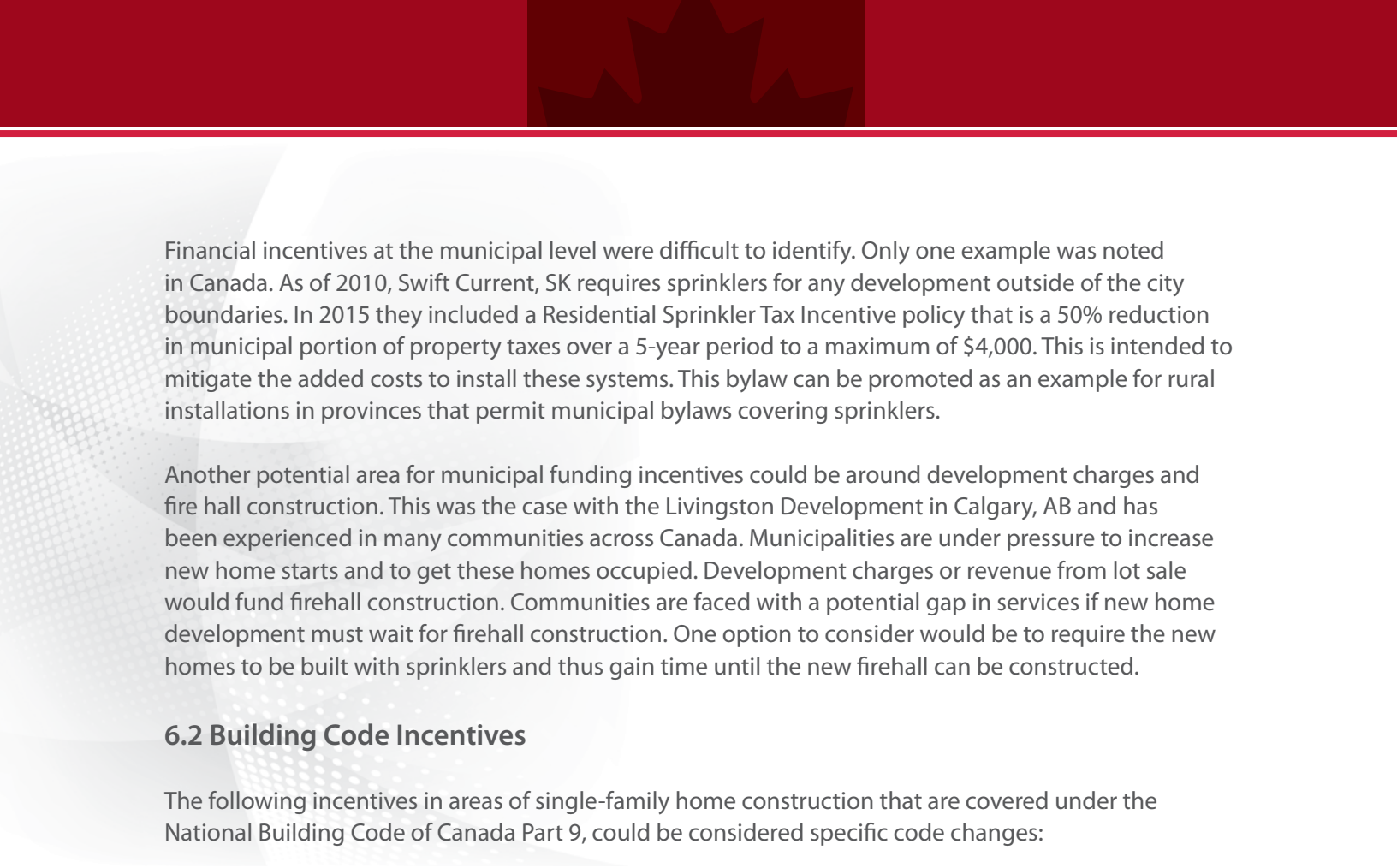
tax break would need to be created from scratch and would entail a dedication of significant resources from CAFC during its advocacy week on the hill. Previous efforts to focus on commercial retrofit have not been successful.

CAFC should look at opportunities with Canada Mortgage and Housing Corporation (CMHC). CMHC has identified six elements of a National Housing Strategy. It is believed that residential fire sprinklers can represent value-added in two of these areas: Community Housing Sustainability; and Sustainable Housing and Communities. CMHC co-funds selected projects that address one or more of their national strategy initiatives. Currently, projects submitted for CMHC funding support have the cost of voluntarily sprinklering removed from the umbrella funding supported by CMHC as it is perceived as optional.

The example for this was a project by Kwantlen First Nations to build new band housing for its members. After observing a side-by-side sprinkler burn demonstration by the Township of Langley Fire Service the band choose to protect these homes with sprinklers. The sprinklers were above the requirements of the BC Building Code, and NBC building code but in line with requirements of the responding fire service and Township of Langley. The added cost for the sprinkler protection was not recognized by CMHC and therefore not covered by the CMHC funding support. The band had to seek additional funding for this requirement.

A proposal should be submitted to CMHC that identifies how sprinklers may fit into their strategy for accessibility and to help Canadians age in place. Builders' costs could be covered under the financial support from CMHC. Additionally, it would benefit homeowners of sprinklered properties because they are accessibility and livability programs which are current focused programs for CMHC.

Furthermore, CMHC's Green Home program offers a premium refund of up to 25% to borrowers who either buy, build, or renovate for energy efficiency using CMHC-insured financing. Including sprinklering costs under either the accessibility and aging in place or environmental umbrellas would permit these costs to be covered. CAFC should look to explore this opportunity with CMHC by promoting the FM Global report that sprinklers are part indeed "green".



Financial incentives at the municipal level were difficult to identify. Only one example was noted in Canada. As of 2010, Swift Current, SK requires sprinklers for any development outside of the city boundaries. In 2015 they included a Residential Sprinkler Tax Incentive policy that is a 50% reduction in municipal portion of property taxes over a 5-year period to a maximum of \$4,000. This is intended to mitigate the added costs to install these systems. This bylaw can be promoted as an example for rural installations in provinces that permit municipal bylaws covering sprinklers.

Another potential area for municipal funding incentives could be around development charges and fire hall construction. This was the case with the Livingston Development in Calgary, AB and has been experienced in many communities across Canada. Municipalities are under pressure to increase new home starts and to get these homes occupied. Development charges or revenue from lot sale would fund firehall construction. Communities are faced with a potential gap in services if new home development must wait for firehall construction. One option to consider would be to require the new homes to be built with sprinklers and thus gain time until the new firehall can be constructed.

6.2 Building Code Incentives

The following incentives in areas of single-family home construction that are covered under the National Building Code of Canada Part 9, could be considered specific code changes:

Limiting Distances - NBC Subsection 9.10.5

The identification of building code requirements based on a municipal fire department's response time/capability has been used in the National Building Code (NBC) Subsection 9.10.15. in defining requirements for limiting distance between single family dwellings since 1960. The requirement was refined to refer to a 10-minute parameter in the 2010 version of the NBC (and is consistent with the NBC 2015 requirement). The time is from receipt of notification of a fire by the fire department until the first fire department vehicle arrives at the building and is identified as 10 min. If the planned fire department response is within this 10-minute parameter, the limiting distance can be reduced by half.

This time does not consider the time frame from ignition of the fire until it is reported. The opportunity is to identify that if all exposed properties are protected with sprinklers the 10-minute time can be waived. As well, the idea that fenestration ratio (the number of windows you can have between properties) can be increased should be explored with developers. This would be a significant potential marketing benefit for them.

Sprinklers to Encourage Secondary Suites and Stacked Townhomes

As a result of the Livingston development project in Calgary, where the developer is building multiple sprinklered residential units, the local builder has worked with the City of Calgary, and Alberta Safety Codes Council to propose several changes to the 2025 National Building Code of Canada. These have been forwarded by them on to the Canadian Codes Commission.

These changes are not specifically intended to promote sprinklers but to identify areas in the NBC where prescriptive provisions can be lessened when the property is sprinklered. In discussions with

Ontario, it was identified that adding specific provisions into the code to identify where sprinklers can be used was encouraged to garner greater support from Building Officials.


The proposals address the potential for the increased interest in secondary suites and to make these less restrictive. By permitting the prescriptive requirements to be lessened when sprinklers are present will make this a more cost affordable alternative for new home buyers as they can look at the development of a secondary suite to offset their new home purchase price. This is wise when you consider the increased cost for home ownership and the demand for more rental accommodation. As well, it will permit some options that benefit stacked townhomes. This would make these more profitable for builders.

The changes have been presented for the CAFC Building Code committee for review. Feedback received was that the codes made technical sense and would be supported. The committee members also believed that the Cost-Benefit analysis of these changes did not go far enough. It did not recognize the greater life saving and cost benefit that sprinklers would bring to these properties. The consensus of the Code Committee was that CAFC should support these changes as they had the potential to greatly increase voluntary sprinklering by builders.

These proposals address:

- **9.9.4.4 Openings near unenclosed exterior exit stairs and ramps.** Not required to be wired glass if the property is fully sprinklered.
- **9.9.4.6 Openings near exit doors.** Not required to be wired glass if the property is fully sprinklered.
- **9.9.9.1 Travel limit to exits or egress doors.** Can travel down one storey if sprinklered.
- **9.10.4.5 Walk-out basements not considered a storey.** If fully sprinklered throughout.
- **9.10.11.2 Firewalls not required.** Between two units if a secondary suite is present if fully sprinklered.
- **9.10.15.4 Glazed openings in exposing building face.** Permitted to be doubled if the building is sprinklered throughout.
- **9.10.15.5 Construction of exposing building face.** Considered to not require fire resistive cladding if the property is protected by a full sprinkler system. (These would only be considered if the entire subdivision was protected with sprinklers.)

Note: proposed changes regarding minimum floor performance are being discussed at the Joint Task Group level at the Canadian Codes Centre and could appear in the NBC 2025 edition. The code provisions being considered for minimum floor performance would be like IRC provisions or require a minimum fire resistance rating. In the case of the IRC there is an alternative available if the property is protected by a sprinkler system. This is one more potential benefit for home builders for sprinklering and should be explored with CHBA.



In discussions with the CHBA the opportunity to review soundproofing versus fire protection requirements in multi-unit residential construction was suggested as an opportunity. This would require further research and consultation with fire resistance researchers at the NRC.

In addition to these provisions above a line-by-line review of Part 9 of the Building Code by the CAFC's Code Committee could identify other potential change submissions where sprinklers are an alternative to prescribe code requirements. This would help overcome reluctance by building officials to permit sprinklers as alternative solutions.

Sprinklers to Increase Percentage of Side-Wall Windows in Houses

Discussions with both Fenestration Canada and CHBA showed support for the concept of allowing a greater percentage of window openings on the side-walls of properties when the property was protected by sprinklers. Section 9.10.15. of the NBC should be reviewed to more clearly permit increasing the percentage of window openings allowed when the property is sprinklered. The wording in the code is now clear and can benefit from a further review.


6.3 Development Level Incentives

Development level incentives include changes in design of subdivisions, or the site approval plans for a project. These need to be identified upfront at development planning stages for the developer to realize any cost savings and need to affect all residences in the development.

The problem with these development incentives being more universally used is that many fire chiefs are not engaged in the approval stage of these projects with the planning community. FCs should be encouraged to be engaged in development plan approval to take advantage of some of these requirements.

Additionally, these are not well defined by prescriptive requirements in code or other documents. Each municipality is up to its own in determining their standards on development. The City of Calgary has a design guideline for its developments, but the authors are not aware of similar guidelines in other municipalities. Under the US codes framework, NFPA standards would be available for adoption that would address many of these standards for development design.

In the absence of a framework in Canada for these adoptions the NFPA standards like NFPA 1141 Standard for Fire Protection Infrastructure for Land Development in Wildland, Rural, and Suburban Areas is just a benchmark for communities to consider. It is recommended that the CAFC look at the development of a resource for Fire Chiefs on development plan approvals. This guide could be based on best practices such as the City of Calgary guideline, and NFPA 1141 and would address topics such as access roads, building setbacks, water supply for firefighting, sprinkler incentives, etc. Such a guideline could also advise on wildland urban interface design - another issue fire chiefs in many communities are facing.



Based on feedback received from the members survey, the webinar, and stakeholder engagement, the development level incentives below could be supported as part of a suite incentives CAFC supports. Local fire chiefs can then choose from this menu when working with builders and select those that they are most comfortable with based on their local conditions and risk tolerance.

It should be noted that in many communities cost savings for development-level incentives are accrued by larger developers. These developers in turn sell-off the lots to home builders. The flow through of the savings should be in a reduced charge to these builders but this may not be readily apparent. It is therefore important to consider both developers and builders when negotiating sprinkler incentives at the development level.

⇒ **Increased Road Setbacks**

When planning for rural properties one issue in municipal guidelines is the determining of road setbacks or lengths of laneways. This can be a problem for the length of hose lays needed to reach the property. Sprinklering gains the added time for occupant safety and property loss reduction to compensate for the added time for the longer hose lay.

⇒ **Increased Allowable Dead-End Street Lengths**

Delays in turn around result in longer response times and thus greater risk to residents and higher property loss. Current design requirements are accepted for 90m. Can permit a longer distance given all properties on the route are sprinklered.

⇒ **Reduced Fire Hydrant Spacing (spacing increased from 500 ft to 900 ft)**

FUS Water Supply for Public Fire Protection specifies the methodology for determining required fire flows as well as suggestions for hydrant numbers and placement. This document also credits a 50% and 25% increase for hydrant spacing when NFPA 13 or NFPA 13R/13D sprinkler systems are installed in all buildings in a development.

⇒ **Reduced Fire Flows (reduction in water main sizes)**

FUS Water Supply for Public Fire Protection determines the fire fighting flows for specific buildings within a development area. The demand for the entire area would be based on the greatest flows required for this area. If buildings are protected by sprinklers the fire fighting flows can be reduced by up to 75%. This can result in significantly smaller diameter piping in the distribution system as well reduced requirements for fire pumps to maintain the required pressure. This can be a significant saving in infrastructure costs before a single home is even sold in the community. The right-sizing of the distribution can also reduce maintenance costs in the treatment of water to avoid water aging and in hydrant testing.

⇒ **T-Turn Arounds Permitted as Opposed to a Cul De Sac**

As an alternative to a cul de sac, the designer can consider a T-turn around. Studies have identified that this can result in the potential for one additional lot in a development over a standard cul de sac design.

⇒ **Reduced Number of Access Roads**

NFPA 1141 specifies the number of access roads for a subdivision based on the number of houses. This is analogous to exiting from a building in an emergency. The greater the occupancy the more the required exits. The NFPA 1141 standard requires if there are 100 houses or less then a subdivision needs 1 access route, 101-600 need two separate access routes, if over 600 need three. NFPA 1141 is not referenced in building or fire codes or in provincial regulations as it applies to subdivision design and is therefore a municipal-level decision.

⇒ **Increased Maximum Grades**

This would be based on local conditions. What the FC is willing to accept. The general reasoning for regulating road maximum grades goes to the design standards for fire apparatus. Requiring sprinklers can permit higher road grades thus slower response.

7. Communication and Advocacy

All of the learnings in this report lend themselves to individual communication and dissemination plans. The CAFC will take these on as part of a phase II and III to this project. In this section, we offer a few communications aspects that may be used as a starting point:

Education of Fire Chiefs

The survey found that fire Chiefs were not aware of the pub-ed resources available for sprinklers. CAFC to look at opportunities to promote these resources such as those from HFSC Canada to Fire Chiefs. Consider development of a Technical Guidance Note or similar resource for Fire Chiefs that explains every acceptable incentive for residential fire sprinklers. This would also include notes on municipal design standards that do not appear in the NBC and where these incentives fit into this e.g. hydrant spacing, fire flow calculations, numbers of access routes, etc.

There is an opportunity to empower Fire Chiefs on their role and responsibility in development review - residential fire sprinklers should be considered as an option for any new subdivision and be standing topic in any new Fire Cover Plan for that community. CAFC should also consider a resource document for Fire Chiefs on development design that would encourage residential fire sprinklers. This could be based on the Calgary document and NFPA 1141.

Fire Chiefs and fire planning consultants are encouraged to make home sprinklers a discussion point in any Community Risk reduction strategy or Stand of Cover document. This encourages communities to discuss and address this. Ensures that the fire services response capabilities are discussed whenever any new development plan is reviewed.

The proper installation and maintenance of sprinkler systems is important to ensure their reliability and effectiveness. For this reason, the association should support the mandatory certification of sprinkler installers and maintainers in their provinces.



Photo Source: homefiresprinklercanada.ca

FUS

Dialogue with FUS to see where changes can be made to the FUS Water Supply Guidelines to give greater credit for sprinklers in reducing firefighting flow rates. Also, consider working with FUS to produce a Technical Guidance Note or similar resource for CAFC members that discusses the calculation of firefighting flow rates for residential developments. The current FUS Water Supply Guideline is not well known and is a complicated document that can benefit from some simple guideline or examples that a local fire chief or municipality can more clearly understand.

Office of the Superintendent of Financial Institutions


The recent deregulation of the insurance industry has resulted in some changes that have impacted residential fire sprinkler benefits and the fire service even greater. In discussion with FUS it was identified that currently insurers determine insurance premiums not based on risk within a community but on their losses on a national level. The concern is that there is no direct correlation to sprinklering and to a home owner's premium. More broadly this is a concern to the fire service because it undermines efforts in the community to reduce their risk by improving their fire department. This is therefore a disincentive to investing in public protection at the local level. This is a strategic level issue that CAFC could take up during its advocacy week by approaching the Office of the Superintendent of Financial Institutions.

Canadian Home Builders Association

CAFC should approach the Canadian Home Builders Association with the background of the report and express the CAFC's willingness to jointly explore and promote placing incentives into the National Building Code (NBC). This could include working with CHBA and provincial branches to educate on sprinklers and potential incentives. This would be a rethink on the current perception of fire chiefs and builders as diametrically opposed. CAFC can also look at specific code wording for code change proposals where sprinklers can be used to offset prescriptive requirements in the code. CAFC could investigate a program that recognizes builders that have gone the extra mile. This can be done at the CAFC Annual meeting or as part of the CHBA annual awards.

Develop Code Change Proposals

CAFC to develop a series of Code change proposals in collaboration with interested stakeholders to promote residential sprinklers. These Code change proposals would be written as permission. It



would relax some provisions in the Code if residential sprinklers were to be used instead (rating of fire separations, limiting distances, access to roads, turn around for fire apparatus, etc.).

The clarification of wording on the application of NFPA 13D to multi-unit residential and stacked townhomes should be reviewed and be the subject of a separate code change. Waiting for the latest NFPA 13D standard to be adopted could be 2030 or later, resulting in many years of new builds not being protected.

In addition, CAFC should support the current change proposals that benefit secondary suites that have been put forward by Alberta. It is believed that these will have further success in promoting sprinklers.

Canada Mortgage and Housing Corporation (CMHC)

CAFC should consider a campaign for the promotion of residential fire sprinklers with current financial incentives with CMHC. Fire sprinklers can fit into two potential programs promoted by CMHC: increased livability and the green programs. This would include ensuring that sprinklers are recognized in each of these programs. CMHC also provides funding support to First Nations home starts as well as support for affordable housing. Currently residential fire sprinklers are not supported as part of the basic funding support from CMHC. Project leaders wanting to sprinkler must fund these projects with additional funds outside of the CMHC funding umbrella. Getting CMHC to recognize the benefits and long-term cost savings that sprinkler present will mean that sprinklers can be included within the funding envelop of CMHC.

Sprinklers as Green Technology

In March 2010, FM Global released its report *“Environmental Impact of Automatic Fire Sprinklers”*. FM Global is a multi-national insurer and product certifier. This document was recently revisited by FM Global in May 2021. They report that since their first report was released in 2010 an estimated 1.8 billion pounds of greenhouse gases have been released into the atmosphere from house fires due to a lack of residential fire sprinklers. Gases that could have been reduced by 97% if sprinklers were present!

The study examined the relationship of automatic fire sprinkler technology to environmental sustainability. The work includes the evaluation of risk factors, such as fires, on the total life cycle carbon emissions of a typical single or two-family home. Comparisons of the total greenhouse gas productions, quantity of water required to extinguish the fire, quality of water runoff, potential impact of wastewater runoff on groundwater and surface water, and mass of material requiring disposal between the two tests were made. The results showed that in addition to providing life safety and limiting property damage, the use of automatic fire sprinklers is a key factor in achieving sustainability.

This report should be promoted as a major piece of green technology. CAFC could consider opportunities for funding support either through CMHC or others of sprinklering.

Sprinklers Impact Accessibility and Aging in Place

CMHC has identified several key programs going forward. These include increasing accessibility of housing as well as aging in place. Accessibility to housing would be making more units available for citizens in need such as public housing units and units for First Nations communities. These units are in limited supplies in many communities and are also used by essential workers. Experience has also shown that these units have a greater proportion of residents with limited financial means or mobility impairments. Due to their limited stock demand for these units are high. Any loss of these units can also have a disproportionately higher impact on the community. Sprinklers, although an increase in capital costs to build these units, result in lower insurance premiums. In addition to obvious life saving benefits, sprinklers increase available evacuation times, have lower insurance premiums, and reduce property damage. Most often after a fire the unit is occupiable the same night. That is not the case with an unsprinklered unit where the unit is lost for several months or permanently destroyed. Sprinklers make sense to invest up front to ensure long term savings plus increased life safety.

Another key tenet of CHMC programs is to support aging in place. Sprinklers again ensure that fires are either suppressed or contained to provide an increased evacuation time for those with mobility impairments. Sprinklers should be pursued with CMHC as a key element of ensuring individuals can age successfully in place.

8. Conclusion

This White Paper has drawn from a variety of sources from across Canada and has sought to create a dialogue about sprinklers. It has resulted in a consensus from the Canadian fire service that residential fire sprinklers should be promoted through incentivizing their use.

The very effort of the member survey, the seminar, and the discussion with stakeholders has increased discussion at the local level on sprinklers.

By reaching out to the external stakeholder organizations CAFC has put aside the confrontational approach for sprinkler adoption for a team building approach. This has generated trust and mutual understanding between the groups. The result is that an increasing number of Canadian homeowners could benefit by being protected with residential fire sprinklers due to a broader acceptance of sprinklers. The cost of these installs offset or eliminated using incentives.

The paper has also identified several strategies and target groups CAFC could pursue to further promote residential fire sprinklers.

The acceptance of residential fire sprinklers shall not occur overnight. Instead, this is a complex issue affecting many stakeholders. This paper has attempted to identify the continued existence of barriers, myths, and misunderstanding that hinder progress. In response to these a set of strategies have been identified for CAFC to pursue in reaching its sprinkling objectives.

Appendix A

9 Steps to a Safer Community

COMMON HOMEBUILDER INCENTIVES:

- **Street-Width Reduction:** Traffic lanes may be narrowed, substantially reducing the amount of pavement in every linear foot of street in the development.
- **Longer Dead-End Streets:** Dead-end streets may be increased in length, allowing additional house lots to be built.
- **Tee Turnarounds Permitted:** The permitted use of tee turnarounds in sprinklered developments can create at least one additional lot per cul-de-sac.
- **Increased Street Grades and Building Setbacks:** Steeper street grades and building locations are allowed further from where the homes' access leaves the main road.
- **Additional Units Permitted:** Development plans allow homes to be closer together.
- **Expansion of Existing Water Supply May Not Be Needed:** Required fire flows for fully sprinklered developments can be greatly reduced compared to non-sprinklered developments.
- **Increased Hydrant Spacing:** Supply mains may be reduced and hydrant spacing can be increased.
- **Subdivision Single Access Point:** A fully sprinklered subdivision allows for a single public access road. This decreases infrastructure costs and significantly increases the number of single family dwellings allowed.
- **Gated Communities:** Gated communities delay fire department access. A fully sprinklered subdivision provides mitigation for this impact, allowing developers to utilize this security option when desired.
- **Reduced Basement Windows:** Fire sprinklers reduce the number of required rescue openings in every basement sleeping room.



Home Fire Sprinkler[®]
COALITION
Protect What You Value Most[™]
HomeFireSprinkler.org

9

STEPS TO A SAFER COMMUNITY

UNDERSTANDING HOME FIRE SPRINKLERS: NFPA 13D

STEP

1



WHAT ARE HOME FIRE SPRINKLER INCENTIVES

STEP

2



HOW DO INCENTIVES BENEFIT DEVELOPERS AND COMMUNITIES

STEP

3



HOME FIRE SPRINKLERS AND COMMUNITY RISK REDUCTION

STEP

4



YOUR NEW HOUSING FORECAST

STEP

5



WHO ARE YOUR STAKEHOLDERS

STEP

6



WHAT INCENTIVES WILL WORK IN YOUR COMMUNITY

STEP

7



FREE RESOURCES TO PRESENT TO STAKEHOLDERS

STEP

8



AGREEING ON AN INCENTIVE OFFER

STEP

9



Visit HomeFireSprinkler.org/CRR for more information on how to increase fire sprinkler use in your community

Appendix B

Committee Members

The CAFC would like to acknowledge the members of the Building Codes Committee who worked with the authors and staff to provide oversight to the initiative.

Members	Department	Location
Brian McBain	ULC	Middle Sackville, NS
Retired Deputy Chief Brian Smith	Retired	Middle Sackville, NS
Assistant Chief Chantal Bibeau (Co-Chair)	Service de Sécurité Incendie de Montréal	Montreal, QC
Chief Colin Lahey	Burlington Fire Department	Burlington, ON
RET Chief FP Gaétan Morinville (Co-Chair)	Dept. of National Defense	Ottawa, ON
Chief Ian Josephson	Chilliwack Fire Department	Chilliwack, BC
Chief John Fredericks	Yellowknife Fire Division	Yellowknife, NWT
Retired Chief John Siggers	Halifax Regional Fire & Emerg.	Edmonton, AB
Deputy Chief Ken Hubbard	Airdrie Fire Department	Airdrie, AB
Kevan D. Jess	SouthFire Resources	St. Albert, AB
Chief Keven Lefebvre	Leduc County Fire Services	St. Albert, AB
Deputy Chief Rick Cheung	City of Vancouver	Vancouver, BC
Deputy Chief Russel Croome	Edmonton Fire Rescue Services	Edmonton, AB
Fire Marshal Sean Cunningham	Parkland County Fire Services	Parkland County, AB
RET Dept. Chief Sean Tracey (Co-Chair)	Formerly Ottawa Fire Services	Ottawa, ON
Shayne Mintz	NFPA (now retired)	Blue Mountains, ON
Assistant Chief Steve Robinson	Kamloops Fire Rescue	Kamloops, BC
Chief Thomas Doherty	Campbell River Fire Department	Campbell River, BC
Deputy Chief Todd Binkley	Brantford Fire Department	Brantford, ON
Chief Trevor Dackow	RM of Morris Fire Department	Morris, MB
Assistant Chief Yvonne Raymer	Saskatoon Fire Department	Saskatoon, SK
Tina Saryeddine, Anabel Therrien and Rhea Laverdure, CAFC Staff		Ottawa, ON