



REGULATION IMPACT STATEMENT

For Decision

Assessment of the need for fire hose reels in new residential buildings in the National Construction Code

October 2013

This Regulation Impact Statement (RIS) accords with the requirements of *Best Practice Regulation: A Guide for Ministerial Councils and National Standard Setting Bodies*, as endorsed by the Council of Australian Governments in 2007. Its purpose is to inform interested parties and to assist the Australian Building Codes Board in its decision making on proposals to revise the requirements for fire hose reels in Class 2 and Class 3 buildings and Class 4 parts of buildings.

The Australian Building Codes Board

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Introduction

In 2010, the Building Codes Committee (BCC) considered a Proposal for Change (PFC) which proposed the removal of fire hose reels in all commercial buildings. The basis of this proposal was that fire hose reels were infrequently used, hazardous to untrained occupants, and expensive to install. The BCC agreed that further investigation was required and requested the ABCB Office consider the suitability of fire hose reels in buildings as part of the quantification of performance project.

In 2011, the ABCB Office undertook an evaluation of the fire hose reel provisions. This evaluation concluded that although fire hose reels are effective when used correctly, alternative fire safety technology may provide both a greater likelihood of use and efficiency. This was particularly emphasised when considering residential buildings, as the nature of occupants meant they were more susceptible to being untrained and unaware of correctly operating fire hose reels.

In April 2013, the ABCB office commissioned ARUP to conduct a qualitative fire risk assessment to determine if the provision of portable fire extinguishers installed to Australian Standard (AS) 2444, could provide an acceptable level of fire safety when compared with the current requirements. ARUP in their report concluded that the provision of portable fire extinguishers can provide an equivalent or higher level of life safety to occupants.

This Regulation Impact Statement (RIS) assesses the costs and benefits of fire hose reels in new residential buildings, noting the findings of a thesis conducted in 2009 on the “value of hose reels in residential buildings” and the ARUP “qualitative fire risk assessment”.

The Scope of this RIS is limited to Class 2 and 3 buildings and Class 4 parts of buildings except those located in alpine areas. The Scope is a reflection of the extent of current research on the use of fire hose reels and the behaviour of occupants in residential buildings. The exclusion of residential buildings located in alpine areas is due to the potential time delays fire brigades face in attending fires in these areas. In these circumstances fire hose reels are considered appropriate where trained occupants are available.

This RIS also incorporates stakeholder responses to questions asked in the Consultation RIS and accords with the requirements of Best Practice Regulation: A Guide for Ministerial Councils and National Standard Setting Bodies, as endorsed by the Council of Australian Governments in 2007.

Nature and Extent of the Problem

The nature of the problem remains unchanged from the Consultation RIS and relates to occupants of Class 2 and Class 3 buildings and Class 4 parts of buildings being able to access and operate suitable first fire attack measures to assist in safe evacuation during the developing stages of fire. These classes of buildings are residential buildings other than houses and include apartment buildings, buildings that are common places of long term or transient living, and caretaker buildings.

The problem involves human behaviour during fire events and the probability of occupants identifying and using current fire safety technology correctly while recognising the appropriate time to evacuate if attempts of suppression fail.

Currently fire hose reels are required by the National Construction Code Volume One as a first fire attack system provided for use by occupants. Fire hose reels are required to be installed where a building contains an internal fire hydrant or where the floor area of a fire compartment is greater than 500m².

Although effective when used correctly, the value of fire hose reels in buildings has been questioned on several occasions. In 2009 the ABCB endorsed a student scholarship that tested the hypothesis *“Fire hose reels in residential apartment buildings present a number of fire safety issues and thus do not provide significant value to warrant the costs associated with their installation and maintenance”*¹. The following sub-hypothesis were tested and the below table provides a summary of the key conclusions.

Table 1 – Thesis Findings

Sub Hypothesis	Conclusion
Occupants are less likely to use fire hose reels to undertake fire fighting than other first fire attack systems.	The research demonstrated that this hypothesis is correct. A significant proportion of the population believe that fire hose reels are provided for the fire brigade and trained fire wardens only. Many of the occupants surveyed were also unaware of the location of the fire hose reels.
Occupants are as successful or more successful, in fighting fire using other first fire attack systems such as fire extinguishers as compared to fire hose reels.	The research indicated that this statement is likely to be true. A correlation between levels of prior training and use of first fire attack systems and confidence in fighting fires using those systems was observed. The level of confidence in fighting small fires was shown to be greater when using fire extinguishers as compared to a fire hose reel.

¹ Freeman, M. 2009. *“The Value of Fire Hose Reels in Residential Buildings”*- Thesis report-UWS

Sub Hypothesis	Conclusion
The use of fire hose reels increases the risk to occupants to a greater degree than other first fire attack systems.	This hypothesis was not confirmed however it can be said that use of fire hose reels increases the risk to other occupants of the building as use of the fire hose requires the sole occupancy unit (SOU) door to be ajar and compromises the first line of defence that is intended to protect the majority of building occupants. When using other first attack systems (such as fire extinguishers), the SOU bounding construction is not compromised.
Fire hose reels are not the most cost effective first fire attack system.	The research demonstrated that this hypothesis is correct. A cost benefit analysis conducted as part of the thesis found that installation of fire extinguishers in lieu of fire hose reels would create a considerable cost saving to industry.

The thesis concluded that fire hose reels are not the most appropriate first fire attack system for occupants in Class 2 residential buildings. Noting the similarity of occupants of Class 3 buildings and Class 4 parts of buildings, generally occupants have a preference for fire extinguishers as a first response to fire events.

Risks of inappropriate fire hose reel use

In April 2013, the ABCB Office commissioned ARUP to undertake a qualitative fire risk assessment². The report identified a number of associated risks with fire hose reel use focusing on Class 2, and Class 3 buildings and Class 4 parts of buildings.

The risks identified included:

1. The time required to reach a fire hose reel is longer statistically than that to reach a portable fire extinguisher if provision and location of portable extinguishers complies with AS 2444.
2. The fire is likely to be relatively larger and potentially more hazardous to occupants when water is discharged from a fire hose reel when compared with the extinguishant discharged from a portable fire extinguisher due to the longer time required to bring a fire hose to the fire site.
3. An occupant is more likely to retreat to safety from the room of fire origin earlier when using a portable fire extinguisher for fire fighting because the extinguishant will eventually run out, whereas a fire hose reel has a continuous water supply which may result in the occupant developing a false sense of security and/or undue responsibility to contain the fire.

² ARUP "Qualitative Fire Risk Assessment Report", 2013

4. If the fire is within a SOU the use of a fire hose reel to fight the fire therein will render the SOU entry door ajar. With the SOU entry door being kept open by the hose, the common corridor on the fire floor may potentially be contaminated by smoke from the SOU of fire origin, affecting occupants in the common corridor who may at the time be investigating the fire, trying to assist to fight the fire, or attempting to evacuate, and exposing more occupants to smoke and other life threatening conditions. This issue is avoided if fire extinguishers are used.
5. The majority of fires scenarios in residential buildings revealed in the past fire incident statistics is associated with cooking fires or electrical faults for which using water as a fire extinguishant is not appropriate. Use of a dry chemical extinguisher is able to effectively suppress electrical fires as well providing a degree of suppression qualities to cooking fires.

The behaviour of occupants during fire events

Limited research exists which examines the use of fire hose reels in the event of fire, however anecdotal evidence suggests that the majority of occupants in residential buildings are untrained in operating fire hose reels.

In 2009, a survey³ was conducted of residents of Class 2 buildings on their knowledge and experience of first fire attack measures. The survey relied on voluntary participation of occupants of Class 2 buildings and failed to provide substantial results.

Notwithstanding, the survey provided insight on occupants knowledge of first fire attack measures, and found 87% of residents in Class 2 buildings had never received formal training in operating a fire hose reel where 56% of occupants had received training in fire extinguisher use. 72% of responses also advised they were not confident in using a fire hose reel compared to 40% who were not confident in using a fire extinguisher.

The results suggest occupants of residential buildings are unlikely to recognise fire hose reels being installed for their use and are not confident in operating them.

Objectives

The objective relates to the safety of occupants in new Class 2, and Class 3 buildings and Class 4 parts of buildings.

- To enhance the safety of occupants of new Class 2, and Class 3 buildings and Class 4 parts of buildings through measures to respond effectively to fire events.
- To provide a built environment that contains the minimum necessary fire safety technology that achieves an adequate level of protection in the event of fire.

Options

Two choices are presented for consideration:

³ Freeman, M. 2009. "The Value of Fire Hose Reels in Residential Buildings"- Thesis report-UWS

Status Quo

The status quo is the default option for decision makers in considering the option to address the problem. Where the incremental impacts of the option results in more costs than benefits, or would be ineffective in addressing the problem or achieving the objectives, the RIS would recommend the status quo.

Option 1

- To require additional fire extinguishers in Class 2 and Class 3 buildings and Class 4 parts of buildings and remove the fire hose reel requirements.

The NCC would be amended to remove the requirements for fire hose reels in all new Class 2 and Class 3 buildings and Class 4 parts of buildings except in alpine areas and instead require additional type ABE fire extinguishers.

Impact Analysis

This chapter analyses the quantitative impacts of Option 1.

Costs and benefits are formally assessed through a cost benefit analysis. Where significant costs and benefits are quantified, evidence is provided to support key parameters and assumptions.

The following key parameters and assumptions have been used:

- An internal fire hydrant is installed so at least one fire hose reel is required to be installed per storey.
 - NCC Volume One 2013 E1.4
- The ratio of fire extinguishers required to compensate for fire hose reels is 2:1.
 - ARUP Qualitative Risk Assessment 2013
- The number of new Class 2 and Class 3 buildings and Class 4 parts of buildings is 4,645 annually.
 - Victorian data extrapolated across Australia.
- Due to the differences in rise in storeys the following has been assumed:
 - 50% of all new Class 2 and Class 3 buildings and Class 4 buildings are 3 storeys.
 - 30% of all new Class 2 and Class 3 buildings and Class 4 buildings are 8 storeys.
 - 20% of all new Class 2 and Class 3 buildings and Class 4 buildings are 15 storeys.

A sensitivity analysis has also been undertaken to indicate the robustness of the outcomes to changes in key parameters and assumptions.

Assessment of Costs

Status Quo

The cost to install an individual fire hose reel is \$840.00 (Rawlinsons, 2011). Additional costs are expected due to the common practice of installing fire hose reels in cabinets. The prices of such cabinets can vary in price from \$475.00 for a recessed cabinet to \$675.00 for a wall mounted fire hose reel and hydrant cabinet (Rawlinsons, 2011). For the purpose of this cost benefit analysis, the total price to install an individual fire hose reel is conservatively estimated at \$1315.00⁴ (fire hose reel installed in a recessed cabinet).

⁴ Note: This analysis recognises that not all fire hose reels are housed in cabinets. It has been assumed 25% of all fire hose reel installation will be wall mounted and as such cabinet costs have been discounted for this proportion.

Option 1

Option 1 will require two 2.5kg portable ABE fire extinguishers to be installed per storey in lieu of a fire hose reel (assuming only one fire hose reel is provided per floor). The cost to install an individual type ABE 2.5kg extinguisher is approximately \$100, therefore this would result in a total cost of \$200 per storey.

Table 2-4 summarises the total annual cost of installing fire hose reels and fire extinguishers in all new Class 2 and Class 3 buildings and Class 4 parts of buildings.

Table 2- Net Present Value Costs of Fire Hose Reels

Fire hose reels	
Hose reel wall mounted and connection to hydrant point 19 mm diameter x 36 m long	\$840
Cabinet	\$475
Expected number of hose reels housed in cabinets in new residential buildings annually	24,039
Expected number of hose reels wall mounted in new residential buildings annually	8,013
Expected total number of hose reels	32,052
Total Annual Cost	\$38,342,205
Present Value Cost*	\$288,150,576

* A discount rate of 7% over 10 years was used to calculate the Present Value.

Table 3- Net Present Value Costs of Fire Extinguishers

Fire extinguishers	
2x Dry chemical, capacity 2.50 kg wall mounted with bracket	\$200
Expected number of fire extinguishers in new residential buildings annually	64,104
Total Annual Cost	\$6,410,400
Present Value Cost*	\$48,175,645

* A discount rate of 7% over 10 years was used to calculate the Present Value

Table 4- Net Present Value Installation Costs

Fire extinguishers	
Fire hose reels	\$288,150,576
Fire extinguishers	\$48,175,645
Installation cost saving of fire extinguishers	\$239,974,931

* A discount rate of 7% over 10 years was used to calculate the Present Value

Maintenance

Maintenance and replacement costs have been revised since the Consultation RIS as a result of a number of stakeholder submissions.

Australian Standard AS1851-2012 – Routine service of fire protection systems and equipment establishes the frequency intervals for carrying out regular servicing of fire protection systems and equipment. In accordance with the Standard, the following frequency intervals apply:

Fire Hose Reels

- Six Monthly
- Yearly

Fire extinguishers:

- Six Monthly
- Yearly
- Five yearly

The estimated costs for undertaking the above activities are detailed in the following table.

Table 5- Maintenance Cost of 1 x 19mm Fire Hose Reel

Six monthly service	Yearly service
\$6.60	\$16.50

Table 6- Maintenance Cost of 1 x 2.5Kg AB (E) Dry Chemical Fire Extinguisher

Six monthly service	Yearly service	Five yearly service
\$6.60	\$6.60	\$90.00*

*The routine service schedules for fire extinguishers contained in AS1851-2012 (and previous editions) requires fire extinguishers to be pressure tested every five years. This service requires the contents to be removed, the cylinder to be pressure tested and new extinguishing agent to be provided. As a result the cost of this service is significantly higher than the six monthly and yearly services.

Based on the above costs the typical cost of undertaking routine service on each piece of equipment over a 5 year period will be in accordance with the following table:

Table 7- Maintenance Cost Comparison

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
19mm hose reel	\$23.10	\$23.10	\$23.10	\$23.10	\$23.10	\$115.50
1 x 2.5Kg ABE fire extinguisher	\$13.20	\$13.20	\$13.20	\$13.20	\$96.60	\$149.40

Table 8 – Net Present Cost of Maintenance

	Cost of Maintenance (Every 5 years)	Present Value Cost of Maintenance	Expected Quantity Required	Total Cost (Over 40 years)
Maintenance of fire hose reels	\$115.50	\$2,476	32,052	\$79,374,156
Maintenance of fire extinguishers	149.50	\$3,187	64,104	\$181,174,371
Cost Difference				-\$101,800,215

Table 9- Summary of Costs

Summary of Costs			
	Annual Cost	Maintenance Cost	Total
Fire hose reels	\$288,150,576	\$79,374,156	\$367,524,732
Fire extinguishers	\$48,175,645	\$181,174,371	\$229,350,016
Total cost saving of fire extinguishers	+\$239,974,931	-\$101,800,215	+\$138,174,716

* A discount rate of 7% over 10 years was used to calculate the Present Value

Stakeholders expressed concern that the Consultation RIS did not account for theft and misuse of fire extinguishers. There was general consensus that this is occasionally an issue in residential buildings although the frequency of theft occurring nationally was uncertain.

Theft of fire extinguishers will be covered by insurance and hence is not covered in the costing. From a life safety perspective, the time between theft and replacement is likely to be small, as is the frequency of theft occurring. New residential buildings, particularly apartments, are significantly more secure than existing older apartment buildings and it is not uncommon for them to be secure from the general public.

Assessment of Benefits

The fire prevention benefits of both fire extinguishers and fire hose reels will be equivalent when used correctly, however, available evidence suggests there are risks associated with untrained occupants operating fire hose reels which are not evident in fire extinguisher use.

The risks include –

- The risk of injury or death to untrained building occupants through incorrect use of a fire hose reel (e.g. the fire hose reel is used on the incorrect class of fire).
 - ABE fire extinguishers are suitable across multiple classes of fire, including fires resulting from electrical faults- a known major cause of fire in new residential buildings.

- The risk of injury or death to untrained building occupants through engaging in fire fighting for too long (i.e. due to untrained building occupants inability to identify when a fire has passed its infancy and the unlimited water supply associated with a fire hose reel).
 - Fire extinguishers have a limited amount of extinguishant which results in a behavioural response by occupants to evacuate the building.
- The risk of injury or death to occupants in other parts of the building through smoke spill from a sole-occupancy unit into public corridors as a result of the entry door of a SOU being left ajar by a fire hose.
 - Fire extinguishers do not obstruct the SOU door. This allows the user to fight the fire while containing the smoke from common corridors.

Although the risks associated with fire cannot be eliminated, it is expected that fire extinguishers will provide a more effective means of first fire attack that is a lot safer for occupants to utilise.

Net Present Value

Comparing the cost of installation and maintenance of both fire hose reels and fire extinguishers, the Option presents a net benefit of \$138,174,716 and an equivalent or higher level of life safety.

Sensitivity analysis

A sensitivity analysis has been conducted on the net present values by varying the parameters around the major assumptions.

The aggregate construction costs imposed by the amendments to the NCC and associated benefits can vary if the assumptions used to quantify these costs/benefits change.

These include:

- **Installation costs:** Fire hose reel installation costs may vary particularly between States and Territories, where labour rates vary. Therefore a variation of $\pm 10\%$ will be assessed.
- **Number of new buildings:** Datasets to obtain a national figure of new Class 2 and Class 3 buildings and Class 4 parts is not available. Victorian data has been used and extrapolated to estimate the number of new buildings. This number may vary.
- **Discount rate:** A discount rate of 3% and 11% will also be assessed.
- **Number of fire extinguishers required:** Option 1 requires fire extinguishers to be installed in accordance with AS2444. Depending on the design of the building, the number of extinguishers may vary. Therefore a variation of 1 and 3 extinguishers required will be assessed.

Table 5- Net Present Value Sensitivity Analysis

Parameter	Net Present Value		
	Hose reels	Fire extinguishers	Cost saving of Option 1
Discount rate			
Low (3%)	\$491,757,076	\$423,435,878	+\$68,321,198
High (11%)	\$298,733,818	\$146,557,312	+\$152,176,506
Installation cost			
Low (-10%)	\$338,709,674	\$224,532,451	+\$114,177,223
High (+10%)	\$396,339,789	\$234,167,580	+\$162,172,209
Number of new buildings			
Low (-10%)	\$330,772,258	\$206,415,015	+\$124,357,243
High (+10%)	\$404,277,204	\$252,285,018	+\$151,992,186
Number of fire extinguishers required in lieu of a fire hose reels			
Low (1)	\$367,524,732	\$114,675,008	+\$252,849,724
High (3)	\$367,524,732	\$344,025,024	+\$23,499,708

Under all examined levels of the key parameters, Option 1 offers considerable cost savings.

Consultation

Consultation is the cornerstone of the Australian Building Codes Board (ABCB) and their commitment to create a contemporary and relevant construction code that delivers good societal outcomes for health, safety, amenity and sustainability in the built environment.

The ABCB believes meaningful consultation can promote trust between industry, the community and government, providing transparency to allow stakeholders to see and judge the quality of government actions and regulatory decisions. Consultation also provides an opportunity for stakeholders to participate in the development of policy solutions and encourages broad ownership of solutions. Furthermore, an appropriate consultation process can lead to the revision and modification of preliminary recommendations before a final decision is made, thereby delivering a better outcome for all.

Stakeholders

Comments were received from five stakeholders in response to the Consultation RIS, deriving from: State and Territory administrations, an industry group, and an individual. The responses were mixed, however all stakeholders agreed that the proposal to remove fire hose reels from residential buildings was worthy of exploration and presented clear economic benefit if found to provide an equivalent level of life safety. A summary of the responses is below.

The Consultation RIS asked stakeholders whether the scope of the proposal was appropriate.

The Queensland building administration supports the scope and suggests that it is not a surprise that occupants of residential buildings are untrained.

The New South Wales building administration note the original scope of the proposal was covering all commercial buildings and request clarification of why the scope has been limited to residential buildings.

New South Wales building administration also submit that consideration should be given to requiring fire hose reels in areas where fire brigades are not able to attend or a delayed.

FPA Australia considers that the current scope is appropriate as it relates to buildings where occupant characteristics and building use are such that training on the appropriate use of fire hose reels is unlikely. They suggest the transient nature of the occupants is such that awareness and training issues is perpetual.

The Chief Officer of the Metropolitan Fire Brigade (MFB) supports the scope of the proposal being limited to Class 2 and 3 buildings and Class 4 parts of buildings due to the smoke separation afforded by the SOUs to the residential corridors. The Chief Officer however, suggests that the removal of fire hose reels should only be in those buildings containing automatic fire sprinkler systems. This is on the belief that the sprinkler system may control and minimise the fire size within an SOU and provide occupants a greater chance to extinguish with the contents of a fire extinguisher.

ABCB Office response:

The scope of the proposal was limited to residential buildings as occupants are more likely to be untrained in operating fire hose reels and more likely to stay to protect personal property, creating greater risk. Other classes of commercial buildings are likely to have trained fire wardens and occupants are less likely to have personal belongings meaning occupants' attention may be directed to evacuation rather than fighting fire. The ABCB office suggests further investigation is required to include other classes of buildings.

The removal of fire hose reels will not apply to alpine areas where fire brigades may face time delays. In areas that are not serviced by a fire brigade, under current requirements fire hose reels are only required where a fire compartment is greater than 500m² or where there is a voluntarily installed fire hydrant. It is expected that this would be a rare occurrence and the majority of buildings in these areas would not currently be required to have fire hose reels.

The justification by the MFB to reduce Scope is not consistent with the intended use of first fire attack measures. Both fire hose reels and fire extinguishers are intended for occupants to extinguish small fires prior to the sprinkler system activating.

The Consultation RIS asked stakeholders whether they agreed with the findings of the thesis. Comments have been tabulated below:

Sub Hypothesis and Thesis Conclusion	Comments
<p>Occupants are less likely to use fire hose reels to undertake fire fighting than other first fire attack systems.</p>	<p>Building Code Queensland submit it is not surprising that occupants are unaware fire hose reels are for public use, given members of the public do not receive any guidance or training in the use of a fire hose reel. They believe it makes sense that a person confronted with a fire would grab an implement more portable and perhaps easier to use to put out a fire in its early stages.</p> <p>FPA Australia supports the view that without dedicated training, most occupants of Class 2 and 3 buildings and Class 4 parts of buildings are unlikely to recognise fire hose reels are intended for occupants use.</p> <p>MFB submit if the research is accurate, then greater awareness on the use of installed fire equipment installed intended for occupant use.</p> <p>ABCB Office response: Stakeholders generally agree that occupants are less likely to recognise fire hose reels as being provided for their use compared with fire extinguishers.</p> <p>While education and awareness of fire safety features may be effective in increasing occupant’s knowledge of fire safety, the transient nature of occupants needs to be considered in combination with the significant cost saving fire extinguishers will generate with no decrease in life safety.</p>
<p>Occupants are as successful or more successful, in fighting fire using other first fire attack systems such as fire extinguishers as compared to fire hose reels.</p>	<p>FPA Australia agrees with the thesis conclusion that it is likely occupants of these buildings are likely to be more confident and therefore more successful using a portable fire extinguisher than a fire hose reel given the likely inconsistency in prior experience or training for fire hose reel use.</p> <p>MFB believe that given the fire hose reels comprise of an infinite supply when compared to fire extinguishers the success rate may be in</p>

Sub Hypothesis and Thesis Conclusion	Comments
	<p>favour of fire hose reels.</p> <p>ABCB Office response: The Arup report suggests that an infinite amount of water increases the risk to occupants in the event of fire as the occupants may continue to fight the fire beyond their capabilities. As extinguishers have a finite amount of extinguishant, once dispensed occupants are triggered to evacuate.</p>
<p>The use of fire hose reels increases the risk to occupants to a greater degree than other first fire attack systems.</p>	<p>Building Codes Queensland agrees with this statement and highlights the safety issue of using water from a fire hose reel on a grease or electrical fire which then amplifies the fire instead of extinguishing it. They submit use of a powder ABE fire extinguisher would prevent these instances from occurring.</p> <p>FPA Australia considers that this conclusion is somewhat subjective. The FPA agree it is true use of a fixed fire hose reel would necessitate the SOU door being ajar. They suggest that if portable fire extinguishers are also located in a corridor serving SOU's in lieu of within every SOU, the door to the SOU would still need to be opened to retrieve the fire extinguisher; in this case they believe it may be conceivable that the SOU door may be held open in any case by the occupants. They suggest an alternative option to overcome this would be to require fire extinguishers in every SOU.</p> <p>MFB believe that this conclusion assumes the occupant must enter the SOU to fight the fire and assumes they leave the fire hose reel when they retreat. They suggest that the advantage of fire hose reels is that it leads the occupant to an exit upon retreat if the hose is followed.</p> <p>ABCB Office response: One of the advantages of portable fire extinguishers is it's portability without the need to obstruct the SOU door. Whether the occupant fights the fire inside or outside of the SOU, using a fire hose reel will obstruct the SOU door, increasing the possibility of smoke entering the corridor. While it is correct the occupant will be required to retrieve the extinguisher and re-enter the SOU, due to the required self-closing mechanism on the door it is less likely the door will be continuously open</p>

Sub Hypothesis and Thesis Conclusion	Comments
	during fire fighting attempts.
Fire hose reels are not the most cost effective first fire attack system.	<p>FPA believe the RIS and the associated Arup report appear to present the case for cost effectiveness on the basis that portable fire extinguishers be provided at locations consistent with AS2444.</p> <p>They believe this creates a situation where in some Class 2 and 3 buildings and Class 4 parts, portable fire extinguishers would be located outside SOU's (where the travel distances exceeds 15m) in high numbers than fire hose reels.</p> <p>NSW building administration agrees the Option will present a significant cost saving, although question whether there is sufficient justification to has been provided to remove them from all residential buildings.</p> <p>NSW building administration submit that portable fire extinguishers are more at risk of theft or vandalism and as a consequence question whether portable fire extinguishers will provide an equivalent level of fire safety when compared to fire hose reels.</p> <p>MFB also believe the research has not accounted for the theft or misuse of fire extinguishers.</p> <p>ABCB Office response: The number of extinguishers is dependent on the design of the apartment building. The central estimate by Arup of 2:1 extinguishers to fire hose reels is considered somewhat conservative in favour of fire hose reels, however the sensitivity analysis demonstrates the impact of if the ratio was 3:1.</p>

Do you agree with these findings? Please provide justification to support your response.

NSW are hesitant in providing a position on the thesis findings. They question the sample size, how the survey was conducted, and how many buildings were covered in the survey. They request the thesis be made available as an appendix to the final RIS.

FPA discussions with members and students enrolled in competencies relating to fire hose reel and portable fire extinguishers suggest that it is likely that such claims are generally representative of the community exposure to fire hose reels and fire extinguisher training and use.

They submit that many occupants of Class 2, and 3 buildings and Class 4 parts of buildings are unaware that:

- (a) Fire hose reels exist; or
- (b) Fire hose reels are provided for initial occupant attack. Anecdotally the prevailing perception in these buildings is that fire hose reels are provided for the responding fire brigade.

However these occupants are generally aware that portable fire extinguishers are available for their use if they choose to respond.

FPA Australia agrees that in Class 2 and 3 buildings and Class 4 parts, portable fire extinguishers are more versatile than fire hose reels and would eliminate the false sense of security that occupants of these buildings and parts may encounter using a fire hose reel.

The Chief Officer for the MFB generally agrees with the findings from Arup, however provides the following comments:

1. Any delay expected to reach a fire hose reel opposed to a fire extinguisher would be expected to be insignificant.
2. Upon retreat, the benefit of a fire hose reel is that it leads occupants to an exit. A disadvantage for fire hose reels and fire extinguishers are the majority of fires associated to residential buildings are associated with kitchen fires which may result in use of an extinguishing medium that is not appropriate to the fire type.

ABCB Office response:

The thesis will be made publically available online at the time of the final RIS publication. The sample size of the thesis conclusions was small; hence ARUP were engaged to provide a qualitative fire risk analysis. In combination there is strong evidence to support the Option.

Are there alternative cost-effective measures that could be implemented?

FPA Australia considers that the Option being analysed is appropriate from a cost perspective, subject to the number and location of additional portable fire extinguishers that would be required.

The MFB suggest an alternative option to address the problem of kitchen fires in residential buildings is the installation of dry chemical fire extinguishers with fire blankets within each SOU.

ABCB Office:

The alternative measure of requiring dry chemical fire extinguishers and fire blankets in every SOU is not deemed cost effective and its worth from a fire safety perspective has not been justified.

Are the costs an accurate reflection of industry practice?

NSW building administration asks whether the installation cost includes the cost of any required fire stopping at penetrations in fire resisting components.

They also comment that the costs may not be reflective of current industry practice, where fire hose reels are often installed in dedicated cupboards (as opposed to hose reel cabinets). The costs of such installations should also be considered.

An individual working in the industry believes the cost of fire hose reels are underestimated and suggests the RIS should consider the saleable floor space lost as a result of fire hose reel cabinets. They also believe that the assumption that a FHR will be in a cabinet in a class 2 building is not realistic and the standard of presentation in the foyer level in most buildings would warrant the hose reel being located within a walled recess and a door.

FPA Australia submits the following:

In relation to the costs of fire hose reels:

- These costs are slightly up but this reasonably allows for the installation in some situations that are more onerous or costly than others and therefore provides a reasonable average price.

In relation to the costs of portable fire extinguishers:

- Individual costs of portable fire extinguishers quoted in the RIS, is considered reasonable.

ABCB Office response:

It is noted that the benefit of removing fire hose reels is conservatively estimated and the actual benefit may be higher.

Are the costs associated with maintenance an accurate reflection of industry practice?

FPA Australia submits that each state and territory in Australia has differing regulatory requirements for maintenance of fire safety equipment and systems. Accordingly maintenance cost may vary.

FPA Australia considers that the RIS does not appropriately consider this reality and simply referencing a single estimated figure for maintenance does not account for the full spectrum of maintenance costs throughout the expected life of the fire hose reel or fire extinguisher.

FPA Australia provides additional comments in relation to the impacts of the proposed change

The MFB recognises that fire extinguishers have a tendency to be missing. Either not being replaced or stolen. They suggest this cost has not considered been considered within the costing example.

ABCB Office response:

Maintenance has been revised since the consultation RIS and reflects the costs provided by FPA Australia. From a cost point of view, theft has not been further considered and it is likely the cost of replacement will be covered by insurance. From a life safety point of view, extinguishers are required to be maintained frequently and if theft is an on-going issue, there are anti-theft cabinets available to building owners/managers. New apartment buildings are also much more secure than existing older buildings and it is not uncommon for new apartment buildings to be inaccessible by the general public.

Conclusion

The problem relates to occupants of Class 2 and Class 3 buildings and Class 4 parts of buildings being able to access suitable first fire attack measures to assist in safe evacuation during the developing stages of fire.

The problem involves behavioural issues and the probability of occupants both recognising first fire attack measures while using them appropriately. When used correctly both fire hose reels and portable fire extinguishers provide an acceptable level of safety when used as a first fire attack measure. There is evidence to suggest however, that the majority of occupants in Class 2 buildings are not formally trained in operating a fire hose reel and lack the confidence in operating the equipment should the need arise.

In the absence of fire hose reels, ARUP observed the problem can be avoided if fire extinguishers were installed in accordance with AS2444.

One option was considered in addition to retaining the Status Quo- to require additional fire extinguishers in Class 2 and Class 3 buildings and Class 4 parts of buildings and removed the fire hose reel requirements.

A mix of support and resistance towards the Option was received from stakeholders; however, all stakeholders agree there is a clear economic benefit of implementing fire extinguishers if an equivalent level of life safety is demonstrated.

The Arup qualitative fire risk assessment report demonstrates that Option 1 offers improved fire prevention outcomes by reducing risks associated with untrained building occupants fighting fire. The quantified benefits of the Option are the cost reductions associated with installing fire extinguishers in lieu of fire hose reels. This benefit was observed to present a Net Present Value of \$239,974,931. Implementation of this Option also involves a net cost of \$101,800,215 as a result of additional maintenance and replacement of fire extinguishers.

Overall the Option presents a net benefit of \$138,174,716.

Option 1 would result in substantial cost savings and provide an acceptable level of fire safety to residents and is therefore recommended. This could be implemented in NCC 2014.