Exploring government responses to residential fire threats from cladding and bushfires

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Abstract
Thousands of lives and dwellings are lost every year in residential fires around the world. While the threat of building fires has been an ongoing issue, recently there have been notable contemporary challenges that governments have had to respond to. The flammable cladding crisis and an increased risk of bushfire events (manifesting from climate change) in both urban and regional areas, respectively, are two high-profile examples. Within this paper, the government response to both façade-fire threats on buildings and bushfire threats to buildings are critically reviewed in the State of Victoria (Australia). To investigate this, a desktop study was undertaken to identify significant façade-fires and bushfires over the last 20 years in Australia. Drawing on key case study events, the paper analyses available government documentation on their response to these fire events. The results of this study highlight the government responses to both large-scale bushfires and façade-fires, and in particular, where and when certain fires or fire types resulted in changes to policy. The review contributes to knowledge by providing an overview of government responses to contemporary fire risks, and highlighting where further government action and future research should be focused both in Australia and elsewhere.

Keywords
Bushfire, building fire, flammable cladding, government, policy

1 Introduction

Every year, thousands of lives and dwellings are lost (or damaged) in residential fires around the world. For example, research shows that between 2015-2019 a quarter of all reported fires in the USA occurred in homes, with an average of almost 350,000 dwelling fires, 2,620 fatalities, 11,070 fire injuries and US$7.3 billion of direct property damage per year (Ahrens and Maheshwari, 2021). Even in a smaller country like Australia there are significant numbers of devastating fire outcomes with research finding that between 2003-2017 there were on average 64 preventable residential fire deaths per year (Coates et al., 2019). While dwelling fires are not new, there has been an increasing number of fires relating to the use of flammable cladding on buildings, resulting in what is widely known as the cladding crisis (Oswald and Moore, 2022). The Grenfell Tower disaster (London, UK) in 2017 that resulted in the deaths of 72 occupants is a notable example.

There has also been an increase of lives and dwellings lost through wildfires and bushfires in many jurisdictions. For example, in Australia the 2019/20 Black Summer bushfires burnt more than 24 million hectares of land and destroyed more than 3,000 dwellings, with 33 lives lost (Filkov et al., 2020). The wildfires in California (USA) in 2020 burnt through more than 1.7 million hectares of land and destroyed more than 10,000 buildings with 31 lives lost (State of California, 2022). Across Europe there has also been an increasing number of wildfires resulting in loss of property and lives over recent decades (Lagouvardos et al., 2019, San-Miguel-Ayanz et al., 2021).

There are multiple factors contributing to the increasing frequency of building fires, including a growing population, more dwellings, where and how housing is being built, inadequate housing regulations, a building industry which fails to adhere to regulations, and a changing natural climate. It is not just the frequency of these fire events but also the scale and risk of them which is changing. In Australia more than 3,400 apartment buildings have been identified as containing flammable cladding, each with many dwelling units, highlighting the increased risk for occupants in those buildings (Oswald, 2021). The aforementioned fires in California have been reported as being twice the size of previous annual records (Anguiano, 2020). Researchers are stating that even with conservative changes to our natural climate, we are likely to see a significant increase in conditions which will drive more frequent and more severe bush fire events and the bushfire season is starting earlier and finishing later each year (Lagouvardos et al., 2019, Abram et al., 2021).

Governments have a significant role to play in the provision of safe housing and communities (Moore and Holdsworth, 2019). Typically, policy makers around the world have addressed this through the setting and updating of minimum building code requirements and through planning systems; this includes requirements not just for function of a building but to ensure it is safe for occupants. When key fire events, such as those noted above, occur, there is often a reactive update made to existing governance mechanisms where they have deemed to have fallen short and/or contributed in some way to the outcome of the event. Given that building fires present an ongoing issue, there is a need to ensure that there are critical reviews of how policy makers respond to key residential fire events. This is not just an issue in the Australian context, but globally. The aim of this paper is to explore government responses to bushfire and building fire events in Victoria (Australia). Specifically, we ask two questions to address this aim:

1. What have been the Victorian/Australian government responses to recent bushfire events?
2. What have been the Victorian government responses to recent building façade fire events?

2 The increase of building fires

The frequency of façade fires in large buildings has increased at a significant rate over the last three decades, having multiplied seven-fold globally (Bonner and Rein, 2018). Early flammable cladding fire examples include the 1990 fire at 393 Kennedy Street in Winnipeg (Canada) and the 1991 fire at Knowsley Heights in Liverpool (UK) (see White et al., 2013). Across the world, other flammable cladding fire examples have followed (see White et al., 2013, Bonner and Rein, 2018, Oswald and Moore, 2022), such as the: 1997 Eldirado Hotel fire in Reno (USA); 2004 Parque Central Complex fire in Carcas (Venezula); 2005 Windsor Tower fire in Madrid (Spain); 2010 Wooshin Golden Suites fire in Busan (South Korea); 2016 Al Sulafa Tower in Dubai (UAE); 2016 Longsheng Building fire in Nanjing (China); and 2019 Bolton Cube fire in Bolton (England)

While most of these fires did not result in loss of life, there are tragic examples, such as 29 fatalities at the 2017 Jecheon fire (South Korea), 113 people reported dead following the 2010 Shanghai fire (China), and the 72 deaths at the 2017 Grenfell Tower (UK) (Oswald and Moore, 2022). The reasons

behind the significant increase in façade fires is related to the increase in high-density urban housing in many cities and push to improve façade systems. This focus on improvement comes from sustainability pressures to produce façade systems that have both energy and thermal efficiency, as well as being aesthetic and cost-effective (Bonner and Rein, 2018, Oswald and Moore, 2022). The financial cost has played a significant role in the increase in use of flammable cladding (Oswald et al., 2021), especially considering a high-rise façade system can cost around 20-25% of the overall construction cost (Zemella and Faraguna, 2014).

In Australia, there have been various reports that have identified that there are issues with both non-compliant cladding products, as well as non-conforming building products, which are products or materials that claim to be something they are not (Australian Government, 2020b). The early government reports that investigating the cladding crisis in Australia found that the problems of widespread non-compliant flammable cladding could be attributed to poor supply and marketing of building products, as well as a broad lack of compliance in industry, and a failure to regulate (Victorian Cladding Taskforce, 2017). Hence, it is important to understand the government response to regulating building fire safety risks, which have emerged from increasing façade fire events.

Similar to the increase in building fires due to flammable cladding, there has been an increasing number of wildfires or bushfires (herein referred to as bushfires) which have caused significant residential property damage and loss of life. While bushfires have been a part of life for many communities around the world, there are a number of recent examples including: 1983 Ash Wednesday (Australia); 1987 Daxing'anling fire (China); 1997 Indonesian forest fires (Indonesia); 2016 Fort McMurray wildfire (Canada); 2017 Tubbs fire (USA); and the 2018 Attica fires (Greece).

There have been an increasing number of bushfire events in Australia. Since 1950, a changing climate has created dangerous fire conditions and the length of fire seasons have become longer, resulting in more frequent and catastrophic bushfire events. Bushfires in Australia have claimed 974 lives between 1900 and 2015 (Australian Government, 2020a), and two major events within the last 20 years demonstrate the devastation that these events can cause. Starting on 7 February 2009, the Black Saturday fires comprised approximately 400 fires across the State of Victoria, which impacted 78 communities, destroyed 2,133 homes, and killed 173 people (AIDR, 2022). These fires prompted the establishment of the 2009 Victorian Bushfires Royal Commission to investigate the fire event and its impacts and document lessons learnt (Victorian Government, 2010). The report resulted in 67 recommendations, 19 of which applied to the planning and building sectors. A more recent fire that also resulted in a Royal Commission's report (Australian Government, 2020a), as well as state inquiries in Victoria, New South Wales, and South Australia (IGEM, 2020, NSW Government, 2020, Government of South Australia, 2020a), was the 2019-2020 Black Summer fires. Over 3,000 homes were destroyed in the 2019-2020 fires that burnt over 24 million acres and killed 33 people. Since both fire events have prompted a series of changes to bushfire-related codes, standards and practices in Australia, the government's response specifically to the protection of buildings in bushfires is further explored as a point of comparison with its response to façade fires.

3 Research Methodology

In order to address the research questions, an initial desktop review was undertaken to document significant building façade fires and bushfires since 2000 in the state of Victoria (Australia). While building façade fires and bushfires have periodically occurred in Victoria, and across Australia, their

prevalence has increased in recent decades due to changes to building design and construction and a changing climate (as discussed above). In this context 'significant' referred to a:
• building which had a fire with a rapid spread on the façade of a tall multi-occupancy building (over eight floors)
• bushfire resulting in the loss of residential property, lives and a Royal Commission review.

This desktop analysis identified four events which met the above criteria within the timeframe that occurred within the State of Victoria. This included the Lacrosse façade fire in 2014, the Neo-200 façade fire in 2019, and the Black Saturday bushfire in 2009 and Black Summer bushfire in 2019-20. These key fire events provide the focus of this research by exploring them as case studies. Case study analysis allows the researcher to ask why, how, what and so what with the intent to uncover critical elements that make up specific cases (Burnett, 2009). Due to the depth of analysis required for case study research, the focus is more often on fewer case studies, incorporating a richer analysis than typical quantitative research (Guthrie, 2010). Limitations of such research include dealing with researcher bias, assumptions and boundary issues on the case studies (Burnett, 2009).

Specifically, a document analysis was undertaken. To identify these documents a multi-pronged search approach was applied. As a starting point a desktop review was undertaken to identify key government documents which related to the design, construction, and safety of residential buildings as well as any reviews into the key fire events noted above. In Australia, regulation of minimum quality and performance of new and renovated dwellings is set within the National Construction Code documents (previously the Building Code of Australia). Current and previous versions of these Codes were sourced. A search of government (federal and Victorian state government) were then undertaken using keywords such as "façade fires", "wild fires", "forest fires", "bush fires" "building fires", "cladding fire", "combustible cladding", "flammable cladding", "Black Summer" and "Black Saturday". This provided a list of current and previous policy documents. These were filtered to ensure they were relevant for the time-period of analysis (since 2000). A wider internet search was undertaken using similar search terms and including additional terms such as "Australian Government" and "Victorian State Government" was also undertaken to cross check all relevant policy and review documents had been identified.

In total 76 documents were identified. All documents underwent an initial review by the research team to check the policy or review document was relevant. To be relevant the document needed to be applicable for the state of Victoria, be from between 2000-2020 and address relevant issues (e.g. design, safety) for façade fires or bushfires. The relevant documents were then examined to identify the following key themes: 1) the current state of play in relation to façade or bushfire and dwellings and 2) what, if anything, had changed or been updated from the previous policy documents. Once all documents were analysed, the data was analysed chronologically in order to document and capture changes in the policies, reviews and other key documents over time. In this way, the government response was able to be mapped across time.

4 Findings

The following section reports the findings on changes that have occurred due to both flammable cladding and bushfire events in the state of Victoria (Australia).

4.1 Building standards following facade fires

In 2014, flammable cladding on a 23-storey apartment building (called Lacrosse) in Melbourne's CBD contributed to a rapid external fire spread. While there were no fatalities, the rapid spread of

the fire caused damage and serious concern. This led to desktop study by the Victorian Building Authority, to investigate the non-complaint use of aluminium composite panels (ACP) in the CBD and inner city. The findings of the desktop study revealed that out of 170 buildings over half were found to have non-compliant external wall cladding materials (VBA, 2016).

However, it was not until the 2017 Grenfell Tower fire disaster in the UK, when greater action was undertaken with the formation of the Victorian Cladding Taskforce (DELWP, 2017). The main purpose of the taskforce was to investigate the extent of non-compliant external wall cladding across the State of Victoria and to make recommendations for improvements to building fire safety (Victorian Cladding Taskforce, 2017). The Victorian Cladding Taskforce produced an interim report in November 2017 that found there were system failures in the construction industry, which had led to significant safety risks and widespread use of non-compliant flammable cladding. In early 2018, a report was published that was commissioned by the Building Ministers' Forum (BMF), the group of Australian Government, State and Territory Ministers responsible for building and construction. This report concluded that the compliance and enforcement systems have not been adequate to prevent serious problems from emerging and that they needed to be changed as a matter of urgency (Shergold and Weir, 2018). They provided 24 recommendations for system improvements in the building industry.

The BMF also agreed to use the available laws and powers to reduce the use of ACP with a polyethylene core, until there was confidence in the testing and labelling of cladding products. This was followed by a guideline that was published which banned the use of ACP products with a core of over 30 percent polyethylene and EPS products on new multi-storey building work (see Wynne, 2018). Further, following a request from building ministers, there was an out of cycle amendment to Volume 1 of the 2016 National Construction Code (NCC).

These changes to the NCC included (see National Construction Code, 2018):

- a new Verification Method (CV3) to test external wall assemblies for fire spread. CV3 references a new testing standard AS 5113-2016: 'Classification of external walls of buildings based on reaction-to-fire performance.'
- clarifying language on the use of external wall claddings and attachments within the code;
- revision of the NCC's evidence of suitability provisions (including for cladding materials); and
- increased stringency for the sprinkler protection on balconies of multi-storey residential buildings through a revised AS 2118: 2017 'Automatic fire sprinkler systems'.

The Building Amendment (Registration of Building Trades and Other Matters) Act 2018 was also amended to make provisions in relation to certain wall cladding products (see Victorian Legislation, 2018). This legislative change introduced new testing powers, and the power to suspend practitioners immediately on public interest grounds (Victorian Legislation, 2018). It also provided a framework for cladding rectification agreements between an owner (or owners' corporation), the lender and the council (Victorian Legislation, 2018). These agreements revolved around a loan agreement to fund the cladding works for affected buildings. These affected buildings with non-compliant cladding were identified through a government-driven state-wide audit.

On the 4th of February 2019, another tall building in Melbourne's CBD, the Neo-200 was engulfed in flames, with flammable cladding again contributing to the rapid spread. There were no fatalities or serious injuries on this occasion. Four days later, Ministers agreed in principle a national ban on the unsafe use of combustible ACPS in new construction, following a cost-benefit analysis. This ban took effect in February 2021 (Wynne, 2021). The creation of the government body Cladding Safety

Victoria (CSV) also transpired through the 'Cladding Safety Victoria Act 2020' (State Government of Victoria, 2020). The primary purpose of CSV is to administer a cladding rectification program for affected buildings and owners.

4.2 Building standards following bushfires

While Australia has a number of building construction standards relevant to bushfire[1], the focus here is on AS3959, a standard first published in 1991 that stipulates requirements for the construction of buildings in bushfire-prone areas (Standards Australia, 2009). Its original scope focused on improving the performance of the exterior of buildings subjected primarily to burning debris; however, since then has been further developed to address bushfire attack from burning embers, radiant heat, and/or flame contact exposure. Many of the changes to this standard occurred as a result of the 2009 Black Saturday fires in Victoria.

Following the 2009 fires, new amendments to AS3959 were made. First, a new method of classifying exposure severity of particular buildings was added: the Bushfire Attack Level (BAL). The new BAL provided a way of measuring the severity of a building's potential exposure to ember attacks, radiant heat and direct flame contact based on a number of factors, including the likely Fire Danger Index (FDI), vegetation classification, vegetation height and fuel loads, effective slope, and distance of the site from vegetation (depending upon whether the simplified or more detailed BAL method is used). The BAL classifies buildings into six different bushfire intensity exposure levels, and for each, a different set of construction requirements are listed. Requirements are specified for floors, external walls (including vents and joints), doors, windows, roofs, decks and other elements; and the higher the BAL, the more restrictive the construction requirements and materials that may be used. For example, exposed timbers are unable to be used at the higher BALs. Further emphasis on the danger associated with ember attacks was also introduced to AS3959 via further amendments – recommending additional requirements for the protection of certain building elements more vulnerable to embers (e.g., windows, doors and roof lights/sky lights). Prior to the addition of the BAL classification in 2009, the AS3959 contained a simpler classification method, referred to as 'levels of construction'. Pre-2009 AS3959 was based on bushfire attack categories which placed buildings into one of three severity levels – moderate, high and extreme – based on only two conditions: the slope of the property and its distance from vegetation types.

The changes from the 1991 and 1999 editions to the 2009 edition of AS3959 are consistent with Recommendation 47 of the Victorian Bushfires Royal Commission's (VBRC) findings, published in July 2010 (Victorian Government, 2010), which recommended immediate implementation of requirements to protect buildings against ember attack. Both the risk assessment updates made to the BAL and the additional requirements for vulnerable building elements were implemented to increase the protection of buildings from the exposure threats (e.g., ember, flame and radiation) most likely for that building site.

The 2010 Royal Commission's report (Victorian Government, 2010) also recommended (Rec 48) that the Australian Building Codes Board amend its performance requirements to incorporate measures to reduce the risk from ember attack and work with Standards Australia on continuous review and development of AS3959, among other recommendations. In turn, changes were made to the NCC (ABCB, 2010), a set of national performance-based codes which refer to Australian Standards, e.g., AS3959. The 2010 edition of NCC was updated to include a list of the BAL criteria

[1] Baker et al. (2020) provides a detailed review of the regulatory controls for buildings in wildfire-prone areas of Australia.

and the annual exceedance probability for design bushfire actions and a reference to AS3959, as examples. Also, free online access was given to AS3959-2009 and any other bushfire-related Australian standards referred to in Australia's Building Code.

The aftermath of the 2019-2020 Black Summer Fires revealed devastating consequences to communities within the affected regions, including the destruction of over 3,000 homes. The 2020 Royal Commission's report on the Black Summer fires (Australian Government, 2020a) includes one recommendation for the NCC (19.4) calling for: a) the assessment of the effectiveness of AS3959 and b) an evaluation of whether the NCC should be amended to specifically include "making buildings more resilience to natural hazards" as an objective. Increasing the resilience of buildings here refers to whether the NCC should be updated to include the protection of property as an explicit objective, in line with AS3959, in addition to the NCC's current objectives of protection of life and neighbouring buildings. Additionally, as the NCC is updated every 3 years, the 2022 public draft is currently out for comment, and among the more significant amendments is bushfire protection for non-residential buildings.

In addition to the 2020 Royal Commission's report, several states also performed their own bushfire inquiries (e.g., NSW, Victoria and South Australia). Each contain recommendations for strategies to decrease the impacts of fires on communities, including changes to legislation (see Owens & O'Kane, 2020; Government of South Australia, 2020b; Inspector-General for Emergency Management 2020). While it is unclear how state amendments to national building codes/standards may address these recommendations, new and focused state agencies on recovery and resilience (e.g., Resilience NSW[2] and Bushfire Recovery Victoria[3]) have been established as a result of the 2019-2020 fires.

5 Discussion

Recent façade and bushfire events have led to changes in the Australian NCC as well as various Australian Standards. When these fire events occur, it can be observed that they do not always lead to significant legislative changes. For example, the 2003 Eastern Victorian alpine bushfires (which lasted two months but had no human fatalities) did not directly lead to recommendations for legislative changes (State Government of Victoria, 2003). Similarly, when the Lacrosse cladding fire occurred in 2014, there was a government desktop study undertaken, but there were no significant legislative changes. In contrast, the Australian Standard 3959 was amended following the 2009 Black Saturday bushfires; and following the deadly Grenfell Tower disaster there was greater government action, through the BMF and the formation of the Victorian Cladding Taskforce, despite the fire event being in the UK (and not Australia). The Neo-200 fire in Melbourne shows that there does not necessarily need to be a loss of life for new government legislation to be introduced. Since the Neo-200 fire (4th of February 2019) is likely to have contributed to the decision (in principle) by ministers to have a national ban on unsafe use of combustible ACPs in new construction (on the 8th of February 2019).

Considering the increasing frequency of façade and bushfire events, it is becoming more important to not only respond to deadly events, but also be proactive in learning from near miss events. While there is no loss of life in near miss events, reacting to these events too, may help reduce the risk of the next fire event that could result in fatalities. Within safety science, a near miss can be seen as a 'free lesson', where strong action can be undertaken to avoid a similar future event that instead leads

[2] See: https://www.nsw.gov.au/resilience-nsw
[3] See: https://www.vic.gov.au/bushfire-recovery-victoria

to more deadly consequences. This perspective is often adopted within workplace health and safety, but is arguably also relevant to residential fire events, especially as their frequency increases.

The action that has been taken through legislative changes has included new severity exposure measures for buildings (BAL in AS 3959), external wall fire testing (AS 5113) and sprinkler regulation revisions (AS 2118) to protect against the various threats associated with bushfires and flammable cladding. While these appear to be good steps forward, there needs to be an assessment of their effectiveness. Thus, future research should consider investigating the effectiveness of new changes in AS5113 and AS2118, as well as following on from the NCC recommendation in 2020 Royal Commission's report to assess the effectiveness of AS3959.

There also should be broader policy consideration that goes beyond individual building standards and focuses on the building system as a whole. This would add another perspective on how to prevent and protect against future fire events. The increasing fire events will likely need more than amendments to various standards, but greater systemic changes in the way the construction industry prevents risks to the public. Throughout time, there have been systemic construction failings in asbestos, structural collapse, widespread leaking buildings and fire safety (Oswald and Moore, 2022). While updating new standards may reduce the threats from flammable cladding, there could be other future construction materials or products that could cause public safety risks, without careful consideration of the broader construction system. Future research should consider how to reduce risks of systemic failings through the construction supply chain, as well as considering how to make buildings more resilient to the changing climate and increasing bushfire events.

6 Conclusions and Further Research

The increase in façade-fire and bushfire events is a serious concern for the built environment. Governments will have a critical role in reducing fire safety risks for public residents. This research study explored the government response to major bushfire and façade-fire events, revealing that significant legislative action does not always follow significant fire events. The regulatory changes that have occurred typically involve updating and adding building standards (e.g. AS 5113). While these appear to be a good step forward, it is necessary for future research to evaluate the effectiveness of the various changes in building codes.

It is also recommended that there should also be greater consideration for the broader construction system, so that the focus is not only about implementing new regulations; but also, on how these regulations are policed, and how policy could shape the construction industry to build more resilient structures that provide a greater level of protection for the residents. This policy would need to consider, for example, how to ensure all construction products and materials new to the market are safe to use, as well as how to enforce compliance and promote best practices. This would help provide residential homes that are more robust in terms of occupant health and safety. As façade-fires and bushfires increase in frequency, it is recommended that further research into shaping policy for a safer residential living is undertaken to aid policy makers.

7 References

ABCB 2010. BCA 2010. Building Code of Australia. Class 1 and Class 10 buildings. Housing provisions volume two. Canberra: Australian Building Codes Board.

ABRAM, N. J., HENLEY, B. J., SEN GUPTA, A., LIPPMANN, T. J. R., CLARKE, H., DOWDY, A. J., SHARPLES, J. J., NOLAN, R. H., ZHANG, T., WOOSTER, M. J., WURTZEL, J. B.,

MEISSNER, K. J., PITMAN, A. J., UKKOLA, A. M., MURPHY, B. P., TAPPER, N. J. & BOER, M. M. 2021. Connections of climate change and variability to large and extreme forest fires in southeast Australia. *Communications Earth & Environment,* 2**,** 8.

AHRENS, M. & MAHESHWARI, R. 2021. Home structure fires. Quincy, Massachusetts: National Fire Protection Association.

AIDR. 2022. *Bushfire - Black Saturday* [Online]. Melbourne: Australian Institute for Disaster Resilience,. Available: https://knowledge.aidr.org.au/resources/bushfire-black-saturday-victoria-2009/ [Accessed 16/01/2022].

ANGUIANO, D. 2020. California's wildfire hell: how 2020 became the state's worst ever fire season. *The Guardian,*.

AUSTRALIAN GOVERNMENT 2020a. Royal Commission into National Natural Disaster Arrangements. Canberra: Commonwealth of Australia,.

AUSTRALIAN GOVERNMENT 2020b. Senate Economics References Committee's Inquiry into Non-Conforming Building Products, Government Response to the Final Report: Non-conforming building products – the need for a coherent and robust regulatory regime. Canberra: Australian Government.

BAKER, G., WEBB, A., & WHITING, P. 2020. Regulatory Controls for Buildings in Wildfire-Prone Areas of Australia. Fire Technology, 56(5), 1903–1935.

BONNER, M. & REIN, G. 2018. Flammability and Multi-objective Performance of Building Façades: Towards Optimum Design. *International Journal of High-Rise Buildings,* 7**,** 363-374.

BURNETT, J. 2009. *Doing Your Social Science Dissertation.,* London, SAGE Ltd.

COATES, L., KAANDORP, G., HARRIS, J., VAN LEEUWEN, J., AVCI, A., EVANS, J., GEORGE, S., GISSING, A., VAN DEN HONERT, R. & HAYNES, K. 2019. Preventable residential fire fatalities in Australia July 2003 to June 20017. Canberra: Bushfire and Natural Hazards CRC.

DELWP 2017. Cladding Taskforce to commence pilot audit. *In:* DEPARTMENT OF ENVIRONMENT, L., WATER AND PLANNING, (ed.). Melbourne: Victorian Government,.

FILKOV, A. I., NGO, T., MATTHEWS, S., TELFER, S. & PENMAN, T. D. 2020. Impact of Australia's catastrophic 2019/20 bushfire season on communities and environment. Retrospective analysis and current trends. *Journal of Safety Science and Resilience,* 1**,** 44-56.

FREY, B. 2018. Content Analysis. *In:* SAGE (ed.) *The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation.* Thousand Oaks,, California.

GOVERNMENT OF SOUTH AUSTRALIA 2020a. Independent Review into South Australia's 2019-20 Bushfire Season. Adelaide: Government of South Australia,.

GOVERNMENT OF SOUTH AUSTRALIA 2020b. Independent Review of South Australia's 2019-20 Bushfire Season.

GUTHRIE, G. 2010. *Basic research methods: An entry to social science research.,* New Delhi, SAGE India.

IGEM 2020. Inquiry into the 2019–20 Victorian fire season. Phase 1 Community and sector preparedness for and response to the 2019–20 fire season. *In:* INSPECTOR-GENERAL FOR EMERGENCY MANAGEMENT (ed.). Melbourne: Victorian Government,.

INSPECTOR-GENERAL FOR EMERGENCY MANAGEMENT (2020). *Inquiry into the 2019-20 Victorian Fire Season Phase 1: Community and sector preparedness for and response to the 2019-20 season* (p. 380).

LAGOUVARDOS, K., KOTRONI, V., GIANNAROS, T. M. & DAFIS, S. 2019. Meteorological Conditions Conducive to the Rapid Spread of the Deadly Wildfire in Eastern Attica, Greece. *Bulletin of the American Meteorological Society,* 100**,** 2137-2145.

MOORE, T. & HOLDSWORTH, S. 2019. The Built Environment and Energy Efficiency in Australia: Current State of Play and Where to Next. *In:* RAJAGOPALAN, P., ANDAMON, M. M. & MOORE, T. (eds.) *Energy Performance in the Australian Built Environment.* Singapore: Springer.

NATIONAL CONSTRUCTION CODE 2018. NCC 2016 Volume One Amendment 1, Building Code of Australia, Class 2 to Class 9 Buildings. Canberra: Australian Building Codes Board,.

NEUENDORF, K. 2017. The Content Analysis Guidebook. Second ed. Thousand Oaks, California.

NSW GOVERNMENT 2020. Final Report of the NSW Bushfire Inquiry. Sydney: NSW Government,.

OWENS, D., & O'KANE, M. (2020). *Final Report of the NSW Bushfire Inquiry* (p. 436). New South Wales.

OSWALD, D. & MOORE, T. 2022. *Constructing a Consumer-Focused Industry: Cracks, Cladding and Crisis in the Residential Construction Sector,* London, Routledge.

OSWALD, D., MOORE, T. & LOCKREY, S. 2021. Flammable cladding and the effects on homeowner well-being. *Housing Studies***,** 1-20.

OSWALD, D. 2021. Homeowner vulnerability in residential buildings with flammable cladding, Safety Science, 136, 105185

SAN-MIGUEL-AYANZ, J., DURRANT, T., BOCA, R., MAIANTI, P., LIBERTA`, G., ARTES VIVANCOS, T., JACOME FELIX OOM, D., BRANCO, A., DE RIGO, D., FERRARI, D., PFEIFFER, H., GRECCHI, R., NUIJTEN, D., ONIDA, M. & LOFFLER, P. 2021. Forest fires in Europe, Middle East and North Africa 2020. Luxembourge: EU Science Hub.

SHERGOLD, P. & WEIR, B. 2018. Building Confidence – Improving the effectiveness of compliance and enforcement systems for the building and construction industry across Australia. Canberra: The Building Ministers Forum.

STANDARDS AUSTRALIA 2009. AS3959: 2009 Construction of Buildings in Bushfire-Prone Areas. Sydney: Standards Australia,.

STATE GOVERNMENT OF VICTORIA, 2003, Report of the Inquiry into the 2002-2003 Victorian Bushfires, Chapter 3, Authorised by the Victorian Government, Printed by McLaren Press

STATE GOVERNMENT OF VICTORIA 2020. Cladding Safety Victoria Act 2020, Authorised by the Chief Parliamentary Counsel. Melbourne: Victorian Government,.

STATE OF CALIFORNIA. 2022. *2020 Incident Archive* [Online]. California: State of California,. Available: https://www.fire.ca.gov/incidents/2020/ [Accessed 14/01/2022].

VBA 2016. VBA Releases External Wall Cladding Audit Report. Melbourne: Victorian Building Authority,.

VICTORIAN CLADDING TASKFORCE 2017. Victorian Cladding Taskforce: Interim Report, November 2017 Melbourne: Department of Environment, Land, Water and Planning,.

VICTORIAN GOVERNMENT 2010. 2009 Victorian Bushfires Royal Commission Final Report. Melbourne: Victorian Government,.

VICTORIAN LEGISLATION 2018. Building Amendment (Registration of Building Trades and Other Matters) Act 2018. Melbourne: Victorian Government,.

WHITE, N., DELICHATSIOS, M., AHRENS, M. & KIMBALL, A. Fire hazards of exterior wall assemblies containing combustible components. MATEC Web of Conferences, 2013. EDP Sciences, 02005.

WYNNE, R. 2018. Minister's Guideline MG-14: Issue of building permits where building work involves the use of certain cladding products Melbourne: Victorian Government,.

WYNNE, R. 2021. Banning Dangerous Cladding And Keeping Victorians Safe, Media Release, 1st February 2021. Melbourne: Victorian Government,.

ZEMELLA, G. & FARAGUNA, A. 2014. *Evolutionary optimisation of facade design: A New approach for the design of building envelopes*, Springer.