



Emergency Leaders for Climate Action

Submission to: The House Select Committee on Nuclear Energy

Addressed to: Department of the House of Representatives
PO Box 6021 Parliament House, Canberra ACT 2600

Email: nuclear.reps@aph.gov.au

Submission from: Emergency Leaders for Climate Action

Contact person: Greg Mullins AO, AFSM

Tel: 02 9356 8528

Email: info@emergencyleadersforclimateaction.org.au

27 November 2024

About Emergency Leaders for Climate Action

Emergency Leaders for Climate Action (ELCA) is a coalition of 38 former fire and emergency service leaders from every Australian state and territory demanding stronger government action on climate pollution that is driving more frequent, damaging extreme weather disasters, better resourcing for climate adaptation, community resilience, and frontline fire and emergency services.

To find out more about Emergency Leaders for Climate Action, visit:

www.emergencyleadersforclimateaction.org.au.

Executive Summary

The world is at a critical juncture in history. **Immediate, deep cuts to climate pollution are needed in order to try to stabilise global temperature increases by mid-century.**

Already Australia has experienced catastrophic emergencies exacerbated by the climate crisis, like the Black Summer fires. By mid century:

- The record extreme fire weather conditions that drove the Black Summer bushfire disaster which devastated communities all throughout Australia will constitute an “average” summer (Sanderson and Fisher 2020).
- Record-breaking floods will become more common because each degree of increased temperature enables the atmosphere to hold 7% more water, leading to more intense downpours, flash floods and riverine flooding (Bolan et al. 2024).
- Heatwaves, which kill more people than floods or bushfires, will be longer, hotter, and more common (Mason et al. 2022).
- Many communities will experience more days of hot weather, longer heat waves and more frequent and intense disasters, with the annual cost of disasters rising to an estimated \$73 billion (Commonwealth of Australia 2024, Deloitte Access Economics 2021).

Emergency Leaders for Climate Action was founded in 2019 to ensure that former fire and emergency services chiefs could express their deep concerns about the worsening climate crisis to the government, in particular that Australian action to slash climate pollution was insufficient and too slow. Climate solutions are those that can slash climate pollution immediately and this must be the relentless focus of all governments.

In this submission we detail three critical concerns about current proposals to build nuclear power stations in Australia:

1. Nuclear power station emergency planning and management has not been considered in any plans for the development of nuclear energy generation in Australia.

- There are no safety or environmental frameworks in place to manage the risks of nuclear power stations in Australia (Macdonald-Smith, 2024).
- States and territories are responsible under the Australian Constitution for emergency management, but only one jurisdiction, NSW, has a minor capability, developed to deal with emergencies at the very small Lucas Heights research reactor.
- It is not clear whether states and territories would bear the entire cost of emergency planning and response to deal with potential emergencies and

disasters resulting from the nuclear power stations and the transportation and storage of radioactive waste.

2. Building nuclear reactors in Australia will be too slow to be a genuine climate solution.

- Australia is experiencing more frequent and ferocious extreme weather events as a consequence of the climate crisis (Commonwealth of Australia, 2024). Most Australians have already experienced harm from these events and Australia's emergency service personnel are operating in increasingly unpredictable and dangerous conditions (Climate Council 2024).
- It is abundantly clear that climate pollution from the burning of fossil fuels must be slashed this decade and the next to protect Australia (Climate Council 2021).
- Indications are that nuclear reactors would be very unlikely to come online in Australia until the 2040s, way too late to contribute realistically to tackling the urgent climate crisis that we already face.
- If the Australian government pursues nuclear power stations in earnest it could delay or stymie genuine climate solutions like renewable power and storage projects that can be established now. Nuclear power stations are therefore a distraction from the urgent task of moving our power system to clean energy. Any delays to the necessary build out of clean power, like renewables and storage, will result in more dangerous climate pollution continuing to be produced at high levels, driving further increases in disasters.

3. Australia's emergency services are neither trained nor funded to respond to nuclear disasters, both at nuclear power plants or during transport of radioactive waste.

- International experience shows that full time firefighters from urban fire and rescue services will be required to be first responders to emergencies at nuclear reactors. At present Australian emergency services are ill-equipped to do so.
- Civilian fire services were called in during the early stages of nuclear disasters at Chernobyl and Fukushima when onsite operators were overwhelmed by emergencies involving overheating, failure of water supplies and pumps used for cooling, and dangerous escapes and spillages (IAEA 2024b, BBC 2023, Funabashi & Kitazawa 2012).
- Should this situation arise in Australia, firefighters will be expected to put their lives on the line, as occurred in the response to the Fukushima nuclear disaster and risk losing them, as occurred in Chernobyl (IAEA, 2024a).
- There are currently no fully staffed urban fire service stations situated in locations proposed to host nuclear power stations, and it is neither feasible nor reasonable to expect volunteer bushfire fighters to be first responders to nuclear emergencies and disasters.

Australia must be focused on the urgent task of slashing climate pollution, including from our energy system. Worsening extreme weather has been experienced now by most Australians (Climate Council 2024) and has made responding to disasters even more dangerous for emergency personnel.

Nuclear power stations simply cannot be built quickly enough to address the urgent task of slashing pollution. We cannot wait decades for new power stations, we need to slash climate pollution now to protect Australians. We already have cheaper, simpler solutions like renewable power which are available and are already being used extensively in Australia. We are concerned that a decision to establish a very costly nuclear power industry would stymie, rather than drive, true and immediate climate action.

ELCA also has a number of key additional concerns about the safety of emergency services and the total lack of thought given to the significant requirements to fund and prepare emergency services to deal with potential disasters from an Australian nuclear industry. This is complex and costly work and should be considered extensively, particularly in light of worsening extreme weather events which are increasingly taxing existing emergency management and response systems.

Australia would be far safer and far better prepared for worsening extremes if the tens of billions of taxpayer dollars required for building nuclear power stations were instead invested in renewable power, transmission infrastructure, storage like pumped hydro and big batteries, community resilience projects and emergency preparation and response - as per current plans.

Australia cannot afford to waste any further time on proposals to develop nuclear power stations that are likely to delay urgent climate action therefore causing further harm to Australians.

Introduction

Emergency Leaders for Climate Action (ELCA) thanks the House Select Committee on Nuclear Energy for the opportunity to provide a submission focusing on risk management for natural disasters and the impact of climate change on nuclear energy generation.

ELCA believes that the current debate concerning nuclear power energy generation in Australia has not addressed the technical, financial and environmental problems associated with safely building and maintaining nuclear reactors preparing for or responding to emergencies involving reactors, or safely handling, transporting or disposing of the toxic wastes that they produce.

Key issues

1. Building nuclear reactors in Australia would be too slow to be a genuine climate solution.

Every delay in cutting climate pollution this decade adds to the burden of disasters that Australian communities, emergency services and governments will have to deal with now and into the future.

The impacts of climate pollution from the burning of coal, oil and gas are already being felt by communities across Australia. Since 1910, Australia's climate has warmed by 1.51°C, leading to more extreme fire weather, longer fire seasons and more intense, short duration flood-causing rainfall (Commonwealth of Australia, 2024). Climate-fuelled disasters are already costing us dearly:

- Disasters cost Australia \$38 billion annually, with costs estimated to rise to \$73 billion by 2060 (Deloitte Access Economics 2021).
- 84% of Australians have been directly affected by at least one climate-fuelled disaster since 2019 (Climate Council 2024).
- On average, an estimated 308,000 Australians experience damage to their homes from bushfires, cyclones and floods each year, and 22,261 people are forced to relocate as a result (Bernard et al. 2024).

The Black Summer Bushfires in 2019 / 2020, followed by record floods from 2020 to 2022, underline that climate change is already intensifying extreme weather events and disasters (Climate Council 2021). Because of inaction over the previous decade here

and overseas, climate pollution already in the atmosphere will lead to further warming and escalation in extreme weather disasters, so it is imperative to rapidly reduce climate pollution now in order to try and stabilise temperatures by mid-century and limit the risks that Australians will be exposed to in future. Scientific analysis shows that the lion's share of effort must occur this decade (Climate Council 2021).

Fortunately, authorities like the Australian Energy Market Operator tell us it is absolutely possible to transition our energy sector in that timeframe using renewable power, backed up by storage (like batteries and pumped hydro) with some gas peaking power (AEMO 2023).

Energy experts indicate that it would take at least 15 -25 years for Australia to build a significant number of nuclear power stations (Macdonald-Smith 2024, Graham, Hayward and Foster 2024). That means that not a single nuclear reactor would contribute to reducing climate pollution in the urgent time frame required. To be clear, nuclear power stations cannot be built in time to play any role in slashing climate pollution in the urgent timeframe required.

ELCA is deeply concerned about the possibility that the Federal government should switch its focus from growing renewable power now, to nuclear power stations which will not come online for decades and then only contribute a small percentage of Australia's overall energy needs. This inherently is a proposal for halting progress in cutting climate pollution, and therefore increasing the risk of more ferocious, frequent disasters for communities and an increasingly challenging environment for emergency services. Delaying efforts to slash climate pollution this decade will only further add to burdens that communities, emergency services and governments shoulder in preparing for, responding to and recovering from escalating disasters.

2. Nuclear reactor emergency planning and management has not been considered in any plans for the development of nuclear energy generation in Australia.

There are no safety or environmental frameworks in place to manage the risks of nuclear reactors in Australia (Macdonald-Smith, 2024). Resourcing required from emergency services and local governments to prepare for and respond to nuclear disasters would be extensive.

Australian emergency services have very little experience with nuclear reactors. Fire & Rescue NSW is the only fire service in Australia with some knowledge and experience in dealing with nuclear risks, because it is responsible for dealing with emergencies at the small research reactor at Lucas Heights in Sydney's south (see NSW Government 2023). However, this reactor is significantly smaller and less powerful than the

multiple nuclear plants that are being proposed to generate electricity for the power grid. Nuclear power stations are about 150 times more powerful than the Lucas Heights research reactor, and contain over 3,000 times more uranium (ANSTO 2024a). The Lucas Heights reactor only produces low and intermediate level waste, while the proposed nuclear power stations would also produce high level waste, which is much more radioactive and dangerous to health, and difficult to handle, transport and store (Shepherd 2022, Hill & Lowe 2024).

However, the requirements of emergency services including Fire & Rescue NSW to prepare for and respond to a nuclear or radiological emergency at Lucas Heights are still extensive, and provide a snapshot of some of the actions that would be required if nuclear power stations were introduced into regions across Australia. These requirements include:

- Fire and Rescue NSW (FRNSW) as the designated combat agency for hazardous material incidents, establishing incident command, an evacuation zone, specialist Hazmat crews and equipment and decontamination activities;
- NSW Rural Fire Service supporting the FRNSW in safe zones; and
- Sutherland Shire delivering public education and advice, identifying vulnerable community members and managing evacuation centres (NSW Government 2023).

If nuclear power stations were introduced in the seven locations proposed under the federal Coalition's current plan, emergency service capability and capacity would have to be expanded significantly to prepare for and respond to nuclear emergencies far beyond what is required for the emergency management at Lucas Heights.

Further, States and Territories would be faced with significant costs purchasing land, building new fire stations, purchasing specialised fire engines and hazardous materials response equipment, then staffing the new stations with a minimum of four highly trained firefighters 24/7 on each fire engine (a total of 20 positions per fire engine).¹ These costs will be significant and should be borne by the Australian Government as potential owners and operators of the proposed nuclear reactors.

3. Australia's emergency services are not trained or funded to respond to nuclear disasters, both at plants or in the transport of radioactive waste.

¹ Based on experience and understanding of operational requirements and costs from Greg Mullins AFSM, AO, former Commissioner of Fire and Rescue NSW and Lee Johnson AFSM, former Commissioner of Queensland Fire & Emergency Services.

When emergencies at the Chernobyl and Fukushima nuclear power stations were unfolding it was civilian fire services, alongside military personnel who were called in to help contain the unfolding disasters. On 11 March 2011, a magnitude 9.0 earthquake triggered a tsunami that flooded the Fukushima Daiichi nuclear plant, cutting off electricity supply and causing a hydrogen explosion, meltdowns of reactor cores and problems cooling spent fuel rod pools (BBC 2023, Funabashi & Kitazawa 2012). Onsite staff from Tokyo Electric Power Company (TEPCO) were overwhelmed and hundreds of civilian firefighters and the military were called in to deliver water to cooling ponds by helicopter, by using fire engine pumps and ladders, and by using concrete pumping machines (Howitt 2023, IAEA 2015).

Prior to the Fukushima disaster, in 1986 there was a major nuclear disaster at an atomic energy plant in Chernobyl, Ukraine, then part of the USSR. Control was lost during a low power testing procedure, resulting in a fire, explosion, then meltdown of the reactor core (IAEA, 2024b). Of the first responding firefighters, 28 died within 3 months from the effects of irradiation (IAEA, 2024a).

In the event of a nuclear emergency or disaster in Australia, local urban fire and rescue services will be required to be first responders to any emergencies at nuclear reactors. At present they are ill-equipped to do so.

There are no emergency services capable of response near proposed nuclear sites.

There are currently no fully staffed urban fire service stations situated in locations proposed to host nuclear power plants. Most of the sites chosen for proposed nuclear reactors are well outside urban areas which means that urban, full time fire service stations would not be able to respond fast enough to a nuclear emergency.²

Volunteer fire service should not be drawn on to combat a nuclear disaster.

Volunteer bushfire services that currently protect the proposed sites do not have the capability to safely and effectively respond to emergencies at nuclear power plants, and volunteers should never be placed in the position of being asked to.³

² Based on experience and understanding of operational requirements and costs from Greg Mullins AFSM, AO, former Commissioner of Fire and Rescue NSW and Lee Johnson AFSM, former Commissioner of Queensland Fire & Emergency Services.

³ Based on experience and understanding of operational requirements and costs from Greg Mullins AFSM, AO, former Commissioner of Fire and Rescue NSW and Lee Johnson AFSM, former Commissioner of Queensland Fire & Emergency Services.

Emergency services are already stretched responding to climate-fuelled disasters.

For emergency services and local governments, the risk management of nuclear reactors would come on top of the escalating climate-fuelled disasters including floods, fires and destructive storms already impacting communities across Australia (see Emergency Leaders for Climate Action 2024). During the Black Summer bushfires the capability and capacity of local fire and emergency services in NSW, Victoria and South Australia has stretched (Commonwealth of Australia, 2020) With climate fuelled disasters becoming more frequent and intense - often hitting the same regions one after the other - emergency services may become overwhelmed (Commonwealth of Australia 2020; Dawkins, 2022).

Some of the regions that have been proposed as sites for nuclear reactors are already experiencing climate impacts, requiring activations of disaster recovery funding arrangements multiple times between 2019 and 2024 (National Emergency Management Agency 2024). For example, the local government area of Latrobe in Victoria (Loy Yang power station) has required disaster funding assistance 12 times during this period. Lithgow, NSW (Mt Piper Power station) has received this assistance 10 times, and South Burnett, Queensland (Tarong power station) nine. Six of the seven proposed nuclear power station sites are either located in areas of bushfire risk or border them, according to state-based bushfire prone area maps (QFD 2024, NSWRF 2024, Western Australian Government 2024, Victorian Government 2024). Placing nuclear reactors in areas that are already experiencing disasters - often one after the other - would potentially create an additional burden on emergency services that they are not currently resourced for.

Governments should be investing more in supporting communities and emergency services to prepare for climate risks here, not on a nuclear scheme.

The cost of introducing a nuclear power industry in Australia is estimated to be between \$166 and \$600 billion (Smart Energy Council, 2024). Even a fraction of this investment allocated to community disaster preparation and resilience would make an enormous difference to reducing the vulnerability of disaster-prone communities.

It is estimated that for every dollar invested in disaster resilience there is a \$9.60 return on investment (Actuaries Institute 2023). Worsening disasters are likely to cost Australians \$73 billion by 2060 (Deloitte Access Economics 2021). Noting the return on investment of disaster preparedness funding, the Australian Government should scale

this funding to meet the needs of disaster-affected communities as the impacts of climate change worsen in the near future.

Recommendations

1. The most effective action the Australian government can take to prevent further escalation in climate-fuelled disasters is to rapidly phase out polluting coal, oil and gas. Building nuclear power stations in Australia in 15-20 years' time is not a credible or realistic alternative to stepping up existing efforts to drastically and urgently reduce dangerous climate pollution this decade.
2. More frequent and intense heatwaves, bushfires, storms and floods, driven by climate change, are already straining emergency services at all levels of government. The Australian Government should focus on supporting investment in energy projects that can slash pollution immediately.
3. A major capability uplift for state and territory professional urban fire services, paid for by the Australian Government, must be factored into the total cost of establishing any nuclear power plants in Australia. In previous nuclear disasters, firefighters were expected to deal with unprecedented situations that resulted in many losing their lives. Australian fire services are neither trained nor equipped to deal with emergencies like Chernobyl or Fukushima.
4. Rather than invest in nuclear power stations that increase the risks for communities that surround them and that will do nothing in the next two decades to reduce climate pollution that is driving worsening disasters and extreme weather events, the Australian Government should instead commit to raising investment in clean energy and storage, disaster preparedness and resilience in line with the escalating costs of disaster recovery.

References

Actuaries Institute 2023 Funding for Flood Costs: Affordability, Availability and Public Policy Options accessed 17/11/2024 from

<https://www.actuaries.asn.au/docs/thought-leadership-reports/funding-costs-for-floods.pdf>

ANSTO (2024a) *How safe is OPAL?* Australia's Nuclear Science and Technology Organisation. accessed 14/11/2024

<https://www.ansto.gov.au/about/how-we-work/how-safe-is-opal>.

ANSTO (2024b) *Managing waste* Australia's Nuclear Science and Technology Organisation. accessed 14/11/2024

<https://www.ansto.gov.au/education/nuclear-facts/managing-waste>.

Australian Energy Market Operator (AEMO) 2023 2023 Electricity Statement of Opportunities: A 10-year reliability outlook for the National Electricity Market Including the 2023 Energy Adequacy Assessment Projection, accessed on 22/11/2024 from

https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/nem_esoo/2023/2023-electricity-statement-of-opportunities.pdf

BBC 2023 Fukushima disaster: What happened at the nuclear plant?, British Broadcasting Corporation accessed on 12/11/2024 from

<https://www.bbc.com/news/world-asia-56252695>

Bernard A, Perales F, and Charles-Edwards E, 2024 Climate migration in Australia: Level and socio-economic predictors Queensland Centre for Population Research accessed on 18/11/2024

https://www.researchgate.net/profile/Aude-Bernard/publication/380214709_Climate_migration_in_Australia_Level_and_socio-economic_predictors/links/6631f4ba08aa54017acfc89/Climate-migration-in-Australia-Level-and-socio-economic-predictors.pdf

Bolan S, Padhye L, Jasemizad T, Govarthanan M, Karmegam N, Wijesekara H, Amarasiri D, Hou D, Zhou P, Kumar Biswal B, Balasubramanian R, Wang H, Siddique K, Rinklebe J, Kirkham M, Bolan N, 2024 Impacts of climate change on the fate of contaminants through extreme weather events, *Science of The Total Environment*, Volume 909, 168388, ISSN 0048-9697, <https://doi.org/10.1016/j.scitotenv.2023.168388>.

Climate Council 2021 Aim High Go Fast: Why emissions need to plummet this decade accessed on 22/11/2024 from

<https://www.climatecouncil.org.au/wp-content/uploads/2021/04/aim-high-go-fast-why-emissions-must-plummet-climate-council-report.pdf>

Climate Council 2024 Survey results: Climate-fuelled disasters cause Australians to fear permanent loss of homes accessed on 18/11/2024 from

<https://www.climatecouncil.org.au/resources/survey-results-climate-fuelled-disasters-cause-australians-to-fear-permanent-loss-of-homes/>

Commonwealth of Australia 2024 State of the Climate 2024, CSIRO and the Bureau of Meteorology accessed on 18/11/2024 from:

https://www.csiro.au/-/media/Environment/SOTC-2024/24-00239_REPORT_StateoftheClimate2024_241022.pdf

Commonwealth of Australia 2020 Royal Commission into National Natural Disaster Arrangements Report accessed on 5/11/2024 from

<https://www.royalcommission.gov.au/system/files/2020-12/Royal%20Commission%20into%20National%20Natural%20Disaster%20Arrangements%20-%20Report%20%20%5BAccessible%5D.pdf>

Dawkins R 2022 How to build resilience in the face of compounding extreme events, CSIRO accessed on 18/11/2024 from

<https://www.csiro.au/en/news/all/articles/2022/april/compound-risk-extreme-events>

Deloitte Access Economics 2021 Special report: Update to the economic costs of natural disasters in Australia Australian Business Roundtable for Disaster Resilience & Safer Communities accessed on 18/11/2024 from:

https://australianbusinessroundtable.com.au/assets/documents/Special%20report:%20Update%20to%20the%20economic%20costs%20of%20natural%20disasters%20in%20Australia/Special%20report%20_Update%20to%20the%20economic%20costs%20of%20natural%20disasters%20in%20Australia.pdf

Emergency Leaders for Climate Action 2024 Too close to home: How we keep communities safer from escalating climate impacts accessed 17/11/24 from

<https://www.climatecouncil.org.au/wp-content/uploads/2024/06/Too-Close-to-Home-ELCA-and-Climate-Council-report.pdf>

Funabashi, Y., & Kitazawa, K. 2012 Fukushima in review: A complex disaster, a disastrous response. *Bulletin of the Atomic Scientists*, 68(2), 9-21.

<https://doi.org/10.1177/0096340212440359>

Funabashi, Y., & Dickson, M. F. 2023 Fukushima: Lessons learned from a devastating “near-miss.” *Bulletin of the Atomic Scientists*, 79(3), 161–165.

<https://doi.org/10.1080/00963402.2023.2200121>

Graham, P, Hayward, J. and Foster, J. (2024) ‘GenCost 2023-24: Final report’. Accessed: <https://www.csiro.au/en/research/technology-space/energy/GenCost>.

Hill R, & Lowe I, 2024 Nuclear energy creates the most dangerous form of radioactive waste. Where does Peter Dutton plan to put it? *The Conversation*. Accessed on

17/11/2024 from

<https://theconversation.com/nuclear-energy-creates-the-most-dangerous-form-of-radioactive-waste-where-does-peter-dutton-plan-to-put-it-233213>

Howitt, A (2023) Responding to the nuclear accident at Fukushima Daiichi.

https://www.hks.harvard.edu/sites/default/files/centers/research-initiatives/crisisleadership/files/Tohoku%20Disaster_Taubman%20Center_2012%2011%2014_red_web_Part%202.pdf. Accessed 18 November 2024

International Atomic Energy Agency [IAEA] (2024a) Chernobyl frequently asked questions. <https://www.iaea.org/newscenter/focus/chernobyl/faqs>. Accessed 19 November 2024.

International Atomic Energy Agency [IAEA] (2015) The Fukushima Daiichi Accident. Report by the Director General. IAEA. Vienna, Austria.

International Atomic Energy Agency [IAEA] (2024b) The 1986 Chernobyl nuclear power plant accident. <https://www.iaea.org/topics/chnobyl>. Accessed 19 November 2024.

MacDonald-Smith A Nuclear awakening ‘a decade or two late’, says AER Financial Review accessed on 18/11/2024 from

<https://www.afr.com/companies/energy/nuclear-awakening-a-decade-or-two-late-says-aer-20240716-p5ju8q>

Mason, H., C King, J., E Peden, A. et al. Systematic review of the impact of heatwaves on health service demand in Australia. *BMC Health Serv Res* 22, 960 (2022).

<https://doi.org/10.1186/s12913-022-08341-3>

National Emergency Management Agency (2024a) DRFA activation history by location 2024 Sept 01, accessed on 5/11/2024 from

<https://data.gov.au/dataset/ds-dga-10ba7303-e3af-41b4-98b5-e04db77caea8/distribution/dist-dga-462acfff-f2e0-4446-a0fb-f20f8a19f487/details?q=>

NSW Government 2023 Lucas Heights Emergency Subplan: a subplan of NSW State Emergency Management Plan accessed on from

<https://www.nsw.gov.au/sites/default/files/noindex/2023-07/emergency-management-subplan-lucas-heights.pdf>

New South Wales Rural Fire Service (NSWRFS) 2024 Check if you're in bushfire prone land accessed on 5/11/2024 from

<https://www.rfs.nsw.gov.au/plan-and-prepare/building-in-a-bush-fire-area/planning-for-bush-fire-protection/bush-fire-prone-land/check-bfpl>

Queensland Fire Department (QFD) 2024 Postcode checker accessed on 12/11/2024 from

<https://www.fire.qld.gov.au/postcode-checker>

Sanderson B M and Fisher R A (2020) A Fiery Wake-up Call for Climate Science. Nature Climate Change. <https://doi.org/10.1038/s41558-020-0707-2>

Shepherd, T 2022 Most of Australia's nuclear waste comes from Lucas Heights – should it stay there? The Guardian accessed 17/11/2024 from

<https://www.theguardian.com/australia-news/2022/oct/17/most-of-australias-nuclear-waste-comes-from-lucas-heights-should-it-stay-there>

Smart Energy Council (2024) *Nuclear Fallout: 116-600 billion to build 7 nuclear reactors*. Available at:

<https://smartenergy.org.au/blog/2024/06/22/nuclear-fallout-116-600-billion-to-build-7-nuclear-reactors/> (Accessed: 4 November 2024).

Victorian Government 2024a VicPlan accessed on 5/11/2024 from

<https://mapshare.vic.gov.au/vicplan/>

Western Australian Government 2024 Map of bushfire prone areas, accessed on 5/11/2024 from <https://maps.slip.wa.gov.au/landgate/bushfireprone/>

Appendix

The local government areas of Latrobe, Victoria (Loy Yang power station), Lithgow, NSW (Mt Piper Power station), Singleton, NSW (Liddell power station) and South Burnett, Queensland (Tarong power station) - all proposed sites for nuclear reactors - have required disaster recovery funding multiple times between 2019 and 2024 (Table 1) (National Emergency Management Agency 2024).

Table 1: Number and type of disasters impacting local government areas proposed to host nuclear reactors^{4 5}

Local government area	Number of Disaster Relief Funding Arrangement activations from 2019 to 2024	Type of disasters
Latrobe (Vic)	12	2x bushfires 2x bushfires and storms 3x floods 1x floods and storms 4x storms
Lithgow (NSW)	10	2x bushfires 6x floods 1x floods and storms 1x storms
Singleton (NSW)	8	4x bushfires 4x floods
South Burnett (QLD)	9	2x bushfires 4x floods 1x flood and rainfall 1x storms 1x cyclones

⁴ The local government area of Banana (QLD) has experienced two disasters requiring recovery funding during this period and Port Augusta one. Collie in Western Australia has not experienced any since 2019.

⁵ It is important to note that disaster relief funding arrangement activations do not cover all extreme weather events, and the figures presented here are likely to be underestimates of the number of extreme weather events impacting each region.