

# Nuclear will cost us more than time: an analysis of the waste and water problem

## Australia's future is renewable, not radioactive.

From excessive water consumption to the challenges of waste management, nuclear would place an enormous burden on our environment, resources and economy.

Nuclear power was banned in Australia in 1998 by the Howard government. Even if we could do the impossible and start building nuclear reactors tomorrow, it would be well over a decade before homes could be radioactively electrified.

The latest [GenCost report from CSIRO](#) tells us renewables continue to have the lowest cost of any new-build technologies. A single nuclear reactor would cost twice as much as the equivalent energy generation from renewables – including the cost of batteries and transmission line upgrades.

Our analysis has found for just one-fifth of the Coalition's nuclear price tag, the government could install rooftop solar on every house in the country that doesn't already have it.<sup>1</sup>

Nuclear is a distraction from proven, renewable-powered solutions to the climate crisis.

Renewables, like solar and wind, are feeding into the grid *now*. They will continue to offer the most cost-effective and sustainable solutions that align with our future energy needs.

We also can't afford the economic burden or the environmental cost of waiting while climate catastrophes worsen, biodiversity is threatened, and more precious species slide further towards extinction.

### Key point 1: Water – a critical resource under strain

Australia is the driest inhabited continent. Water is precious here. Nuclear power plants consume staggering amounts of water, far outstripping other energy sources.

For a one gigawatt reactor – the equivalent of a medium-sized coal plant – the average daily consumption is around 50 million litres,<sup>2</sup> enough to:

- Fill twenty Olympic swimming pools.
- Provide drinking water for one million cows.
- Flood the entire Sydney Opera House, including the forecourt, to a depth of 2.78 metres.<sup>3</sup>

When you compare energy sources on their water use, nuclear is even worse than coal. Solar and wind are by far the most water efficient energy options:<sup>4</sup>

- Nuclear: 2.3 to 2.8 litres per kWh
- Coal: 1.9 litres per kWh
- Solar PV: 0.11 litres per kWh
- Wind: 0.004 litres per kWh

This extreme water demand would exacerbate Australia's freshwater scarcity, diminishing the water available for farmers and further harming our environment.



Nuclear's shortcomings will only get worse as temperatures increase.

Seawater and riverine cooling will be less viable and more vulnerable into the future, as rising sea and river temperatures threaten operational efficiency. We've already seen this in action overseas, resulting in [energy production losses](#) across several European countries.

Even when working as intended, seawater cooling causes [irreconcilable damage to marine life](#). We must not let our future energy supply bind itself to on-going harm to marine life including whales and coral reefs.

Air cooling, though less water-intensive, is costlier and inefficient in hot climates<sup>5</sup> like Australia's.

## Key point 2: Waste – An unsolved problem

Nuclear leaves a toxic, intergenerational legacy of radioactive waste.

There is no globally proven solution for high-level waste disposal, even from countries that have had operational nuclear reactors for many decades. Australia not only lacks experience, but we have a long history of flawed and failed attempts to manage intermediate level waste, let alone the high-level waste from power reactors.

Over a 30-year lifespan, a single one gigawatt reactor would generate:

- 300m<sup>3</sup> of high-level waste which remains dangerous for up to 100,000 years. That's enough to fill a large grain silo or five backyard swimming pools.<sup>6</sup>
- 9,000m<sup>3</sup> of intermediate and low-level waste. Equivalent to over 100,000 wheelbarrow loads or 37,500 wheelie bins.<sup>7</sup>

Moreover, uranium mining and enrichment generates massive amounts of radioactive tailings and depleted uranium, further compounding nuclear's growing and unresolved waste problem.<sup>8</sup>

For one reactor's yearly fuel needs, uranium mining produces 230,000m<sup>3</sup> of radioactive tailings, equivalent to 7.7 million Coke cans.

Nuclear doesn't add up for Australia. We don't have the time to waste and we don't need radioactive waste.

## References

<sup>1</sup> Calculations based on the [average installation cost for a 10kw solar system](#), at \$9,120 in NSW and average battery installation costs at \$13,000 ([AGL](#)). Does not include inverter costs.

<sup>2</sup> Guy Woods, Australian Commonwealth Department of Parliamentary Services, 2006, 'Water requirements of nuclear power stations'; <http://efmr.org/files/O7rn12.pdf>

<sup>3</sup> Total land area of [Sydney Opera House is 18,000sqm](#). 50,000m<sup>3</sup> divided by 18,000m<sup>2</sup> gives d = 2.78m

<sup>4</sup> Compiled from various sources: Paul Gipe, 1995, Wind Energy Comes Of Age, John Wiley & Sons. | American Wind Energy Association. | Meridian Corp., "Energy System Emissions and Materials

<sup>5</sup> Szabó 1998 | Rose 2006 | UMPNERT 2006

<sup>6</sup> ACF Analysis: One typical conventional light-water uranium reactor (1,000 MW = 1 gigawatt) operated for one year produces 25-30 tonnes of spent nuclear fuel (HLW - high-level nuclear waste). Equivalent to about 10 cubic metres. Over 30 years, that's 300m<sup>3</sup>.

<sup>7</sup> IAEA: [300m<sup>3</sup> of low and intermediate waste produced by a 1GW conventional reactor per year](#). 300m<sup>3</sup> × 30 years is 9000m<sup>3</sup>

<sup>8</sup> ACF Analysis: 10 million tonnes of tailings waste at Olympic Dam per year to produce enough uranium for 25 reactors = 400,000 tonnes of low-level radioactive tailings waste, just to produce enough uranium for one reactor for one year. This equates to approx. 230,000m<sup>3</sup>.

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