

Misleading claims about nuclear energy

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This article is a reply to claims made by Prof. Gerry Thomas on national radio on the Australian Broadcasting Corporation's *Science Show* on 2 November 2019.¹ In her presentation with the theme that fear of ionising radiation and nuclear power is 'irrational', she made several misleading statements and serious omissions and at least one scientifically irrational statement. For example:

1. Chernobyl deaths

Thomas focused on rapid deaths from acute radiation exposure and only the least dangerous cancer, thyroid cancer.² Her prediction of about 160 cancer deaths from Chernobyl, apparently all thyroid, is dwarfed by the estimate of *all cancer deaths excluding thyroid* by a team from the International Agency for Research on Cancer (Cardis et al. 2006).³ Their prediction covers the period up to 2065. It is made up of 14,100 (95% UI 6200-32,100) for all cancers excluding leukaemia, thyroid cancer and nonmelanoma skin cancer (Cardis, Table I) plus about 1700 from leukaemia (Cardis, p.1230).

Thomas omits to mention the IARC results, which carry more scientific credibility than hers re cancers other than thyroid.⁴ Instead, the listener was led to compare her claim with the *straw person* of a popular film about Chernobyl, played at the beginning of the interview. Comparing a scientific presentation with a popular one, instead of with another scientific one, misleads listeners.

The generally poor quality of health and radiation exposure data in eastern Europe entails that even a much larger number of non-thyroid cancer deaths resulting from Chernobyl would be undetectable against the much larger background of cancers due to other causes.

2. "Nuclear has far less illness associated with it [compared with renewables]"

The studies upon which this claim is based use techniques such as ignoring the vast majority of cancers induced at Chernobyl (Item 1), omitting risks with (possibly) low probability but very high impacts (see Item 5), and exaggerating the land use of renewables and minimising the land-use of nuclear (see Item 7). For example, the claims by Brook and Bradshaw⁵, that nuclear is better than renewables on environmental, safety, health and land use grounds, have been refuted in three independent peer-reviewed responses including mine.⁶⁻⁸

3. Thomas' claim that 'green' electricity is mostly hydro, or hydro plus nuclear

Misleading! Denmark already generates about 50% of its electricity from wind, supplemented by some bioenergy from agricultural residues. It is on track towards its target of 100% renewable electricity and heat by 2035. It has no nuclear.

South Australia generates about 50% of its electricity from wind, balanced by gas turbines, a low-capacity interconnector to Victoria, a few large batteries and (soon) off-river pumped hydro. It is heading for 100% renewables by 2030. It has no nuclear.

Scotland generates the majority of its electricity from wind, supplemented by hydro and nuclear.

Germany and five US states each already generate over 30% of their electricity from renewables, mostly wind.

Nuclear power is a poor partner for wind and solar PV, because it is inflexible in operation. Better complements with fast responses are hydro (both once-through and pumped), batteries, concentrated solar thermal, open cycle gas turbines using renewable fuels and demand response.

4. Irrational claim: "If our bodies couldn't deal with radiation, we wouldn't be here"

This piece of simplistic pro-nuclear propaganda is bad science and reveals that Thomas' desire to campaign for radiation exposure and nuclear power sometimes overrides her scientific knowledge. She must know this is nonsense, yet she utters it. *Homo sapiens* continues to exist despite many harmful natural agents, e.g. malaria, poisonous snakes and mushrooms, arsenic contamination of groundwater.

5. Omission of the contribution of nuclear power to the proliferation of nuclear weapons

Several countries have already used nuclear power as a cloak to either develop nuclear weapons *ab initio* (India, Pakistan, North Korea, South Africa) or to supplement their military nuclear weapons stockpile (UK, France).

In addition, the following countries have attempted to use nuclear power as a cloak for developing nuclear weapons, but fortunately discontinued their programs before completion: Algeria, Argentina, Australia, Brazil, Libya, South Korea and Taiwan. In most cases they planned to use spent fuel from nuclear power stations, although in a few cases they followed the uranium enrichment pathway. This is documented in detail by the Institute for Science and International Security (ISIS) and the Nuclear Weapons Archive; for Australia in books by Richard Broinowski and by Wayne Reynolds.

A realistic perspective on proliferation is that the more countries that have nuclear power → the more countries have the capacity to develop nuclear weapons → the greater the risk of nuclear war.

A scientific approach to risk expresses it as the probability of an event multiplied by its impact. It's possible that the above probability may (or may not) be small, but the potential impact could be huge. Deaths and injuries from the blasts, firestorms and radiation exposures of a nuclear war could be counted in hundreds of millions, but deaths from Nuclear Winter's impact on global agriculture could be counted in billions.

Most proponents of nuclear power take an unscientific approach to risk by simply ignoring potential events that they want to believe have low probability, despite the enormous potential impacts of such events. The latter include major nuclear accidents as well as nuclear war resulting from proliferation of nuclear weapons.

6. Trivialising the risks of nuclear power

Thomas does this by using a true but trivial statement, namely that low-level radiation from coal-fired power stations is greater than from normally operating nuclear power stations, to deflect attention away from the principal radiation risks of nuclear power: exposure to low-, medium- and high-level radiation from nuclear accidents (see Item 1), managing high-level nuclear wastes, and the contribution of nuclear power to the proliferation of nuclear weapons and hence increased probability of nuclear war (Item 5).

7. Land use

Thomas mentioned that nuclear power plants are compact in terms of land use. However, this has been achieved by failing to allow for an adequate exclusion zone to reduce the impact of major nuclear accidents. Taking an exclusion zone of radius, say, 20 km (as at post-accident Fukushima), would make nuclear power quite a large land user.⁵



Chernobyl

- Some proponents of nuclear power, who are also critics of renewable energy, exaggerate the land use by renewable energy as follows:
- They count the area of land spanned by a wind farms instead of the land actually occupied. The latter is typically 1-3% of the former. Agricultural land between wind turbines is farmed.
- They ignore the fact that a large proportion of solar systems is on rooftops and so occupies no land.

Although ground-mounted solar farms generally occupy significant land, there is a move to mount future solar farms that are built on agricultural land on higher support structures, thus allowing animals to graze beneath them.

Conclusion

Thomas' interview contains several misleading statements and serious omissions and the irrational statement that "If our bodies couldn't deal with radiation, we wouldn't be here". Therefore, it has low credibility.

References:

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4. Thomas' expertise on cancer appears to be limited to thyroid cancer, a trivial part of the risk from Chernobyl.
5. Brook BW & Bradshaw CJA. Key role for nuclear energy in global biodiversity conservation. *Conservation Biology* 2015;29:702–12. doi:10.1111/cobi.12433.
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