



NUCLEAR FOR CLIMATE AUSTRALIA

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To ABC Late Night Live

I really ask Phillip Adams to reconsider his opposition to nuclear energy.

He displayed this most clearly with his friend and colleague Professor Ian Lowe in his Late Night Live broadcast of Monday, 16th August.

I base my request on four key established benefits of nuclear energy.

Its is the lowest emissions source of electrical energy on a reliable 24/7 basis regardless of weather conditions.

OECD nations with nuclear fleets have amongst the lowest cost electricity on a system wide basis. This is evident in the USA, Canada, France and South Korea

Nuclear energy has by far the lowest environmental footprint especially when located on coastlines and uses a mere fraction of the resources required of systems using wind and solar.

Lastly, nuclear energy has an established track record as being the safest form of energy on the planet with fewer lives lost per unit of output than any other source.

At 4 minutes into the broadcast Philip Adams disputed James Lovelock's observation that coal is worse for the environment than nuclear energy. Adams made no attempt to justify his position. His opinion is in opposition to the recommendations of the IPCC wherein:

All the IPCC scenarios require more nuclear power

*The **four pathways (P1-P4)** examined by the IPCC show the importance of studying different societal approaches. Pathway P3 in particular is based on the continuation of technological and societal development as observed historically. The use of nuclear power increases in all four pathways in relation to 2010, by between **59 and 106%** by 2030 and by between **98 and 501%** by 2050. Pathway P3 also shows the most notable rise in nuclear generation (**+501%**) by 2050. This means that, if current trends continue, compliance with climate objectives will require **a six-fold increase in global nuclear capabilities.***

Lastly, it should be noted that the four IPCC model pathways lead to negative emissions from 2050.

Further on Ian Lowe is entirely incorrect in claiming that renewables are superior to nuclear energy by virtue of the amount of conventional energy required to build them. This is completely incorrect when we correlate the materials intensity of a generator to the energy required to build it.

As reported by the US Department of Energy 2015 Quadrennial Technology Review of Energy Technologies, nuclear power plants require just 920 tonnes of material per terawatt hour produced, solar energy uses 16,447 tonnes or 18 times that of nuclear and wind uses 10,260 or



eleven times. More recent studies by the European Commission in its “Raw materials demand for wind and solar PV technologies in the transition towards a decarbonised energy system” arrive at similar high values for wind and solar.

Materials required by energy storage technologies such as batteries and pumped hydro plus backup “ghost” systems like gas turbines have to be added to the renewables account. The huge materials differences confirm that nuclear energy is by far the most environmentally sustainable source of generation. This should come as no surprise. When we industrialise our environment to gather up low grade intermittent energy, it takes huge amounts of materials to turn this into useful energy.

When the discussion turned to nuclear “waste” Ian Lowe limited his observations to the South Australian Royal Commission and the failed citizens jury. Ian Lowe knows full well that used fuel from nuclear power plants need not be consigned to any burial or re-use until 40 or so years after extraction. This period is required to enable the decay heat to reduce sufficiently and for the investment in the existing storage facilities to be fully realised.

The solutions to nuclear “waste” or slightly used nuclear fuel are clear. We can either consign it permanently to deep geological repositories of the type being built by Sweden and Finland. Note however these facilities make provision for its long term recovery and for subsequent burnup in fast spectrum Generation IV reactors. This is our alternative route whereby we “close” the nuclear fuel cycle by creating virtually limitless amounts of nuclear fuel and energy. Russia, China and India are all currently pursuing this route by building actual plants such as the BN 800 reactor. France will resume this task around 2040 and other nations such as Canada, the USA and the UK will likely follow.

Coming now to the quite misleading comments were those made by Ian Lowe about the comparative “price” of energy.

It was highly misleading to quote a value, presumably the Levelised Cost of Electricity figure for nuclear energy at 16 cents per kilowatt hour when the majority of values quoted by the International Energy Agency lay between 10.5 and 7.5 cents. This assumes we are quoting Australian dollars and a currency conversion of 1.4. There is no quoted value by the IEA that corresponds to Ian Lowe’s figure. Lowe has also devalued the wind and solar figures considerably with those of the IEA quoting 8.4 cents and wind at 5.6 cents.

What is most misleading about Lowe’s values is that they fail to take account of system effects. Wind and solar both need storage, ancillary services, backup and a lot of additional transmission. When these are included we see that a system that uses nuclear energy can provide energy at around half the cost of wind and solar. This was outlined in the publication by the OECD/NEA “The costs of decarbonisation: System Costs with High Shares of Nuclear and Renewables”. Research carried out in Australia by Electric Power Consulting and Nuclear for Climate Australia came to similar conclusions.

Finally I come to the significant error by Ian Lowe where he claims that no progress on Generation IV or Small Modular Reactors has been made in the last 10 years. There are currently some 70 designs for small and advanced Gen IV nuclear power plants at various stages of development

I'll quote a number of examples of current or near term use:

1. Chinese HTR-PM high temperature Gen IV gas cooled SMR has completed high temperature tests and is about to go on-line.
2. Sodium fast spectrum Gen IV nuclear power plant to be built in Wyoming on the site of an old coal plant. Its jointly designed by General Electric and TerraPower owned by Bill Gates. Parties to the agreement include Bill Gates, Warren Buffet, the US Dept of Energy, Pacific Corp and the State of Wyoming.
3. NuScale is a Small Modular Reactor that has completed licensing of its design and is now securing funding for the initial deployment of six units in the USA
4. BWRX 300 is a Small Modular Reactor designed by General Electric that is a scaled down version of existing approved designs and will likely be in service in Canada by 2028.
5. The Chinese government intends to finish building a prototype Generation IV molten salt nuclear reactor in the desert city of Wuwei in the coming months, with plans to establish a number of larger-scale plants in similar settings. In 2011, the Chinese government approved plans for a thorium molten salt reactor and tasked its scientists with developing the technology to run it. Now, as reported by the South China Morning Post, construction on the 2-MW prototype reactor is due to wrap up next month, and the first tests could begin as soon as September this year.
6. The Russian floating small modular nuclear power plant Akademik Lomonosov was connected to the grid in October 2019. This is now being followed by Russia's first SMR power plant on land. The plant is scheduled to operate in the Russian Arctic town of Usk-Kuyga from 2028.
7. Gen IV fast spectrum reactors in operation include the BN 800 and BN 600 in Russia. The SVBR-100 lead cooled fast spectrum reactor is currently under construction also within Russia.

The IPCC, OECD and International Energy Agency all support the use of nuclear energy to generate the vast amounts of electricity to take over from fossil fuel use in transport and industries such as steel making. Nuclear energy has demonstrated that it can be rolled out more quickly than renewables. If we are to address emissions reductions we can't afford to gamble with renewable energy sources that have a track record of failure in achieving deep emissions reductions.

As a long term listener to Late Night Live it would be greatly appreciated if Phillip Adams could revisit this topic and fully explore all aspect of the benefits and future of nuclear energy to address emissions reductions.

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