

# Tackling Climate Change with Renewables and EVs

Dr D Weston Allen MBBS, FRACGP, Grad Dip Phys Med

**Man-made climate change** is real, but natural climate change can be worse and [faster](#). [Atmospheric carbon dioxide](#) (CO<sub>2</sub>) gradually fell from about [3,000 parts per million \(ppm\)](#) 200 million years ago to only 180ppm a million years ago, as carbon was [naturally sequestered](#), and Earth became very cold, dry and dusty. Recurring [orbital cycles](#) trigger [interglacial warm periods](#) such as our present [Holocene](#) which began nearly twelve thousand years ago. Warming [oceans release](#) CO<sub>2</sub>, pushing atmospheric levels up over 280ppm, which helps plants thrive in a warmer wetter world. The [previous interglacial](#) about 120,000 years ago was [much warmer than now](#). As temperatures fell over ten degrees Celsius (10°C) [during the last ice-age](#), CO<sub>2</sub> fell to 180ppm. Humanity thrived during the warm [Holocene Climatic Optimum](#) but [suffered](#) and endured worse [cyclonic floods](#) and [prolonged droughts](#) during the recent [Little Ice Age](#), especially when solar activity declined during the [Maunder Minimum](#) (1645-1715 AD).

Since those cold preindustrial times, the CO<sub>2</sub> level has increased 46%, from 280ppm to [410ppm](#) (0.041%), and the surface temperature has risen by [about 1°C](#). How much of that warming is due to the extra CO<sub>2</sub> is uncertain; some scientists say as much as 0.7°C was due to [increased solar activity](#) while others say [altered land use and urban heat](#) accounts for 0.27°C of 20<sup>th</sup> century warming. Adding [CO<sub>2</sub> raises surface temperatures](#) but changes in sea surface temperature also [precede](#) fluctuations in CO<sub>2</sub>, so the relationship is very complicated.

Recent warming has seen an [unprecedented increase](#) in life expectancy and quality of life globally. Exposure to cold still [kills nearly twenty times more](#) people than does heat-exposure. Another degree or so of warming would [reduce mortality](#) rates in most regions, even without adaptation. Adding CO<sub>2</sub> from fossil fuels primarily [warms winter nights at high latitudes](#) and thus reduces [temperature variability](#) and hence severe [storms](#), [tornadoes](#) and major causes of [disease and death](#). Contrary to media hype, most [extreme weather events](#) are [not increasing](#), and mortality from them [declines as wealth increases](#). The strong correlation between [national wealth and health](#) necessitates a careful cost-benefit analysis of the economic impacts of unmitigated climate change versus mitigation measures. Like most, our [Australian analysis](#) is based on climate model projections.

The most important and controversial number in climate science is the [equilibrium climate sensitivity](#) (ECS), defined as the average temperature change across Earth's surface long after the CO<sub>2</sub> level has doubled and stabilised. The [Intergovernmental Panel on Climate Change](#) (IPCC) gives a most likely value of between 1.5°C and 4.5°C. [Predictions of climate catastrophe](#) depend on climate models with high sensitivities, but their temperature projections [don't match observations](#). [Cosmic rays, sunspots, clouds, aerosols, volcanoes, ocean oscillations](#), altered land use and [vegetation](#) render climate too complex to accurately model or predict. [Observational studies](#) suggest a transient climate response of about 1.3°C and an ECS less than 1.7°C, in which case we could expect to see about [one degree](#) of further warming this century at the current rate of increase in atmospheric CO<sub>2</sub>. This is consistent with the [trend](#) in the 40-year [satellite temperature](#) data. The rate of change in climate and sea level rise does not appear to be [accelerating](#). There is [no scientific consensus](#) on future warming and how harmful or beneficial it might be.

**The economic impacts** of another degree of warming are [controversial](#). Some land would be lost to rising sea-levels ([averaging 1.7mm/yr. around Australia](#)), but arable land in the northern hemisphere would [increase greatly](#). More CO<sub>2</sub> is already [greening the planet](#) and greatly [increasing food production](#). Food-grain production in India reached [record levels](#) despite record temperatures in 2016-17. The efficient production and transport of food relies on fossil fuels. Mechanising agriculture [curbs population growth](#) by reducing the need for large farming families, lifting people out of poverty and allowing children to be educated. Affordable electricity facilitates this.

**Climate action using renewables** can adversely impact the world's [poorest people](#) and the environment. In its [2018 Special Report](#), the IPCC wants to convert up to 6 million square kilometres ([12%](#)) of Earth's agricultural and pastoral land into growing **energy crops**, but feeding American corn to cars instead of people produces [dearer food](#) and [more emissions](#)! Chipping American forests and burning them in Europe also [increases emissions](#). Forests in [the Amazon](#) and [Indonesia](#) are being destroyed to produce biofuel to save the planet! To reduce harmless CO<sub>2</sub> emissions, Europe polluted its air with [diesel fumes](#)! The mining of neodymium for [electric motors](#) and **wind turbines** [pollutes Inner Mongolian lakes](#), with [toxic](#) and [radioactive waste](#). [Thousands](#) of tons of CO<sub>2</sub> are produced in the [mining, manufacture and transport](#) of a wind turbine which may not [return its capital cost](#) over its [20-year life](#). Wind turbines

kill millions of [bats](#) and birds, especially [raptors](#), every year across the globe. [Wind farms](#) can reduce air flow and agricultural production by aggravating local warming. The **photovoltaic (PV) solar** industry is a leading [emitter](#) of hexafluoroethane, nitrogen trifluoride and sulphur hexafluoride, all potent greenhouse gases. PV panels require the most materials per unit of power produced, posing a future [waste disposal](#) problem after their 20-year life. Subsidised solar [disadvantages the poor](#) paying higher power prices. [Battery storage](#) also has environmental and social impacts: 53% of the world's reserves of lithium are in Chile, where mining it at the Salar de Atacama salt flats raises [environmental concerns](#), and 60% of the cobalt required for lithium-ion batteries comes from the [politically unstable](#) Democratic Republic of the Congo where mining often [involves child labour](#).

**Wind and solar** still provide less than [10% of Australia's electricity](#). As more intermittent, unreliable renewables are added to the grid, more expensive infrastructure is required to maintain supply, and so the [price of electricity increases](#). South Australia has the most renewables and the [highest power prices](#) in the world; its wholesale price of \$98/MWh (34% above that in Qld) spikes to [\\$14,500/MWh](#) when the wind stops. A [state-wide blackout](#) occurred when wind farms supplying 48% of the state's energy had to shut down in high winds. It now has the world's [largest battery](#), a [\\$90 million](#) Tesla 100-megawatt behemoth, but would need 160 of them to keep the state lit for just one windless day. The total annual production of Tesla's [Gigafactory](#) could store just three minutes' worth of annual U.S. electricity demand. Solar power makes most sense when demand matches supply, such as [air-conditioning school classrooms](#). **Pumped hydro** makes more sense than limited-life batteries. [Snowy 2.0](#) will provide 175 hours of storage at 2,000 megawatts, roughly equal to the [Liddell](#) coal-fired power station due to close in 2022, but it could cost [\\$6 billion](#) or [twice that](#) of a coal-fired power station. Using renewables alone in Australia, affordable power is not reliable and reliable power is not affordable.

**Electric vehicles (EVs)** are being promoted to reduce emissions. This makes sense in a compact country like Norway where electricity is [99% hydro](#) and [relatively cheap](#). Manufacturing [any new car](#) produces enormous emissions and [68% more](#) for an EV. A [Hyundai Kona Electric](#) is about [25% heavier](#) and costs [more than twice](#) as much as the petrol version. Its 64kWh battery, capable of taking it up to 440km, takes nearly 27 hours to charge from a regular power point, over 8 hours using a 32Amp home charger or an hour at a 100kW charger, if you can find one. A [Tesla EV with a 500km range](#) could require a three-phase upgrade to the home's electricity system costing nearly \$10,000 plus \$50,000 to upgrade the local electricity substation and network supply. Electrifying our entire transport system with wind and solar would cost over [\\$600 billion](#) or \$24,000 per person. Storing enough solar power to run a house and charge an EV overnight could cost as much as the EV [for the batteries alone](#)! Overnight charging from a [grid supplied by fossil fuels](#) (when there is no solar and little wind) can actually [increase emissions](#).

Australia produces [about 1.1%](#) of global CO<sub>2</sub> emissions, about the same as [China's annual increase](#), so whatever we do is purely tokenistic; reducing our emissions to zero would have no measurable effect on the reef, rainfall or bushfires. Whereas expensive intermittent power pushes industry offshore, along with jobs and emissions, investing in reliable and affordable power [strengthens industry and trade](#). If we want reliable and affordable power to build a strong economy, we should invest in high efficiency low emissions ([HELE](#)) coal-fired power plants or even cleaner and [more efficient](#) combined-cycle [gas-fired plants](#). A major coal exporter and the [world's largest gas exporter](#) should have the world's cheapest electricity. If we want the [safest energy source](#) by far with the [smallest footprint](#) and lowest lifetime emissions, we should invest in [nuclear power](#). France produces [71.6% of its electricity](#), more than any other country, from nuclear energy; [Germany](#) has much dearer electricity and nearly twice the per-capita emissions. Australia is geologically stable and has the world's [largest uranium reserves](#), the [best technology](#) for enriching it and the space to store radioactive waste. Nuclear power plants [compete economically with unsubsidised renewables](#) and have at least three times the lifespan.

After the docudrama *An Inconvenient Truth* was shown in schools, [one in four NSW children](#) aged 10-14 honestly believed that the world would end before they grew up! Some now think that 'tackling climate change' is [more important than attending school](#). Reminiscent of the [children's crusade of 1212](#), placard-waving climate warriors marching to save the planet (on 15 March) were egged on by adults who should know better. Our children and grandchildren may have more to fear from misguided climate action than from climate change itself.

**About the Author:** Dr Allen has critiqued publications on both sides of the climate debate, including [The Weather Makers](#) and [Slaying the Sky Dragon](#), and co-authored a review of [Climate Change and Health](#). He has PV solar and a solar HWS on his home in northern NSW and no vested interests in any energy-related companies. Now in his 70s, he still cycles to work, to tennis, to the shops, to visit family etc. He has a very low carbon footprint but no illusions about thereby saving the planet.