ABN: 22 112 894872

Inquiry into Australia's transition to a green energy superpower

SUBMISSION TO THE

Joint Standing Committee on Trade and Investment Growth

Submitted: 22 November 2022

The Inquiry into Australia's transition to a green energy superpower

The premise on which the Inquiry is based

The inquiry seeks advice on how Australia can "transition to a green energy superpower".

The Inquiry mentions a number of areas in respect to the "transition", including:

- where trade and investment activities are already having a positive impact; and
- emerging and possible future trends.

It further seeks advice on how government agencies can assist in identifying opportunities and in assisting and subsidising new investment. It has particular interest in how activities can be assisted in areas the government has determined to be prospective. These, it says, include renewable energy, battery storage, energy supply and infrastructure, electric vehicle industry, infrastructure; advanced manufacturing, and services and technology.

The Australian Environment Foundation notes multiple failures where industries designated by governments as being highly prospective have received favourable treatment from tariffs or support through financial assistance. None have succeeded. Some of these have been in the areas now, with little supporting evidence, once again being re-affirmed as worthy of support. Thus,

- wind and solar power themselves have been nurtured with subsidies as "infant industries", with the claim that they will be (some say are) competitive, notwithstanding their on-going need for government support
- we saw Victoria's Bracks Government establish a wind turbine facility in 2007, which closed within months – and, having learned little from this fiasco, the current Victorian government is repeating it with a new facility in Geelong.
- the Rudd Government committed Australia to spend $1.3 billion in the years to 2017 on carbon capture and storage (CCS) but no successful facilities were developed in this country or anywhere in the world. New funding of $50 million over 3 years was added in 2021 plus $95.2 billion for CCS in the Latrobe Valley and a further $5.2 million for the "Technology Investment Roadmap". Chevron was given a CCS target as a condition for its gas development approval in Western Australia but failed to meet this and has now paid a *de facto* fine - buying carbon credits at between $80 and $194 million plus $40 million in "low carbon projects". Investors will factor-in such financial penalties in their future considerations involving hydrocarbon investments in Australia.
- The present and previous Governments disagree and have already put $464 million of taxpayers' money to develop Clean Hydrogen Industrial Hubs in regional Australia. Even on highly conservative assumptions, the cost of hydrogen for energy is at least five times the cost of gas.

The recent budget included additional measures as well as cancelling some projects but it is difficult to determine the net outcome in expenditure terms. Some wasteful expenditures included

- $70 million budgeted for over 5 years for a "regional hydrogen export hub".
- $270 million over 4 years was allocated to subsidise purchases of electric cars – a totally unnecessary redirection of money from the less affluent to the rich.

- Some $8 million over 3 years was allocated to seaweed farming.

These and multiple other expenditures comprise measures in response to groundless fears that burning fossil fuels is causing climate change and that Australia and other developed countries can prevent this by replacing coal, gas and oil with wind/solar and prospectively hydrogen.

With regard to government actions to arrest a supposed trend to harmful human-induced climate change, over the last fifty years numerous warnings of future climate catastrophes have been made with the time for their occurrences always having passed without any of the predictions materialising. These projected catastrophes have included higher temperatures, (which have risen far less than forecast and without adverse effect); more hurricanes (fewer have taken place); rising oceanic levels (the increase has been no more than the trend estimated over the past three hundred years); increased wildfires (the evidence for these is absent); and the disappearance of the Great Barrier Reef (all the evidence points to its stability). Bjorn Lomborg itemises many of these falsified claims of doom.

The inquiry is predicated on the belief that the rest of the world will adopt policies to replace fossil fuels, that Australia as an 'early adopter' with good assets in wind and solar will benefit, and that the forced replacement of fossil fuels by renewables will be accompanied by lower costs bringing about an "energy transition" in which Australia can become a green energy superpower.

The notion is incorrect on a number of grounds and all the evidence is showing that transitioning away from fossil fuels (and nuclear power in other countries) brings about higher prices with consequent direct cost increases to consumers. These are amplified by indirect costs of industries migrating to countries that have not encumbered themselves with the associated higher expenses. It is not even true to say that Australia has good resources in wind and solar – at least in reference to the areas that might make use of these.

Energy price developments and their background

Following the privatisations and competition policy reforms 20-30 years ago, Australia's National Electricity Market wholesale electricity prices hovered around $30-40 per MWh. They increased in the drought years of the mid noughties when hydroelectricity was in exceptionally short supply but then declined again, albeit not to their previous lows, before reaching their present levels which are three times those of the early 2000's.

Without government intercession, the post 1995 National Electricity Market had delivered low priced, reliable electricity with new plant coming on line in a timely manner in response to market opportunities. Distortions were in place as a result of spot price caps (including a cumulative price cap), retail price caps and requirements to supply unwanted customers at prices that did not take into account their full costs. In addition, the market excluded payments for spinning reserve and other features that were taken for granted under a coal dominated system but which are not provided by wind and solar. Nonetheless, these distortions were not too serious to prevent efficient markets to operate.

This pattern was broken by subsidies to renewables.

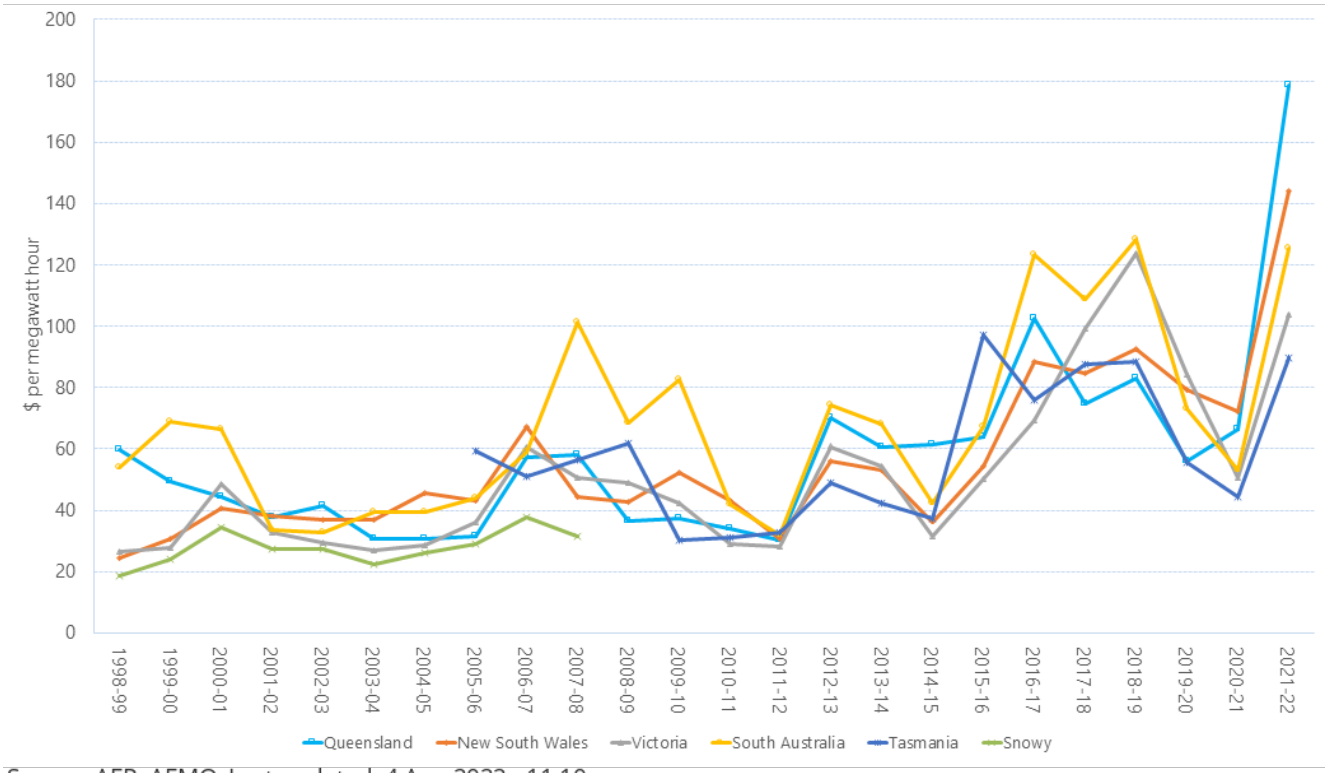
At first, renewable energy subsidies had limited distortional effect – Australia's initial federal-wide objective from 2002 required retailers to incorporate a growing level of

renewables into their supply, up to a notional 2 per cent. Failure to meet the annual total brought a penalty that could be *de facto* as high as $92 per MWh. Hence renewables (initially only wind) could negotiate a subsidy from consumers, via retailers that sometimes approached the $92 ceiling but was more often around $40-$50 per MWh, (on top of which, like all supplies, renewables received the spot price that averaged around $40 per MWh). The subsidy reflected the higher cost of the designated renewable energy.

Ten years ago, subsidised wind and solar were already having an impact. Even though they comprised only three per cent of total supply by 2010, they were forcing up costs on the "baseload" coal suppliers, which were less able to run for the extended periods for which they were designed. Pinnacle price increases took place after the announced closures of two major facilities (the Northern and Hazelwood) in 2015.

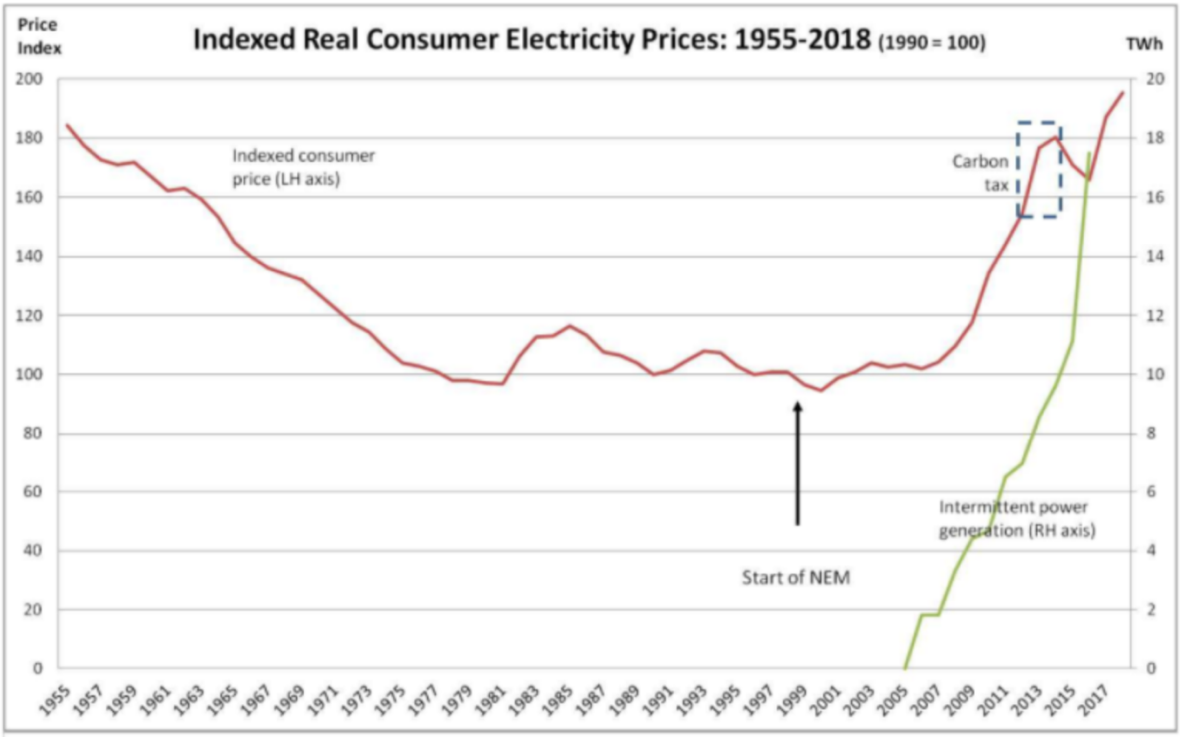
Following the Hazelwood closure, the government moved to prevent future "surprise" early closures from the increased levels of subsidised intermittent supplies but the pressures on what are now termed "legacy" plants remain. COVID and its effect on demand brought temporary price reductions. The closure of a major facility (Eraring, Yallourn) will bring a new upward plateauing of spot prices. And although generators will seek to abide by government requirements to avoid abrupt closures, it is illegal for them or any other business to operate while insolvent; hence, deferring closures will require government subsidies (already in place with Yallourn). Ironically, the facilities that are being driven out of business by government subsidies to their competitors are now being given their own subsidies to remain operational!

Australian wholesale electricity prices have shown the following upward progression.

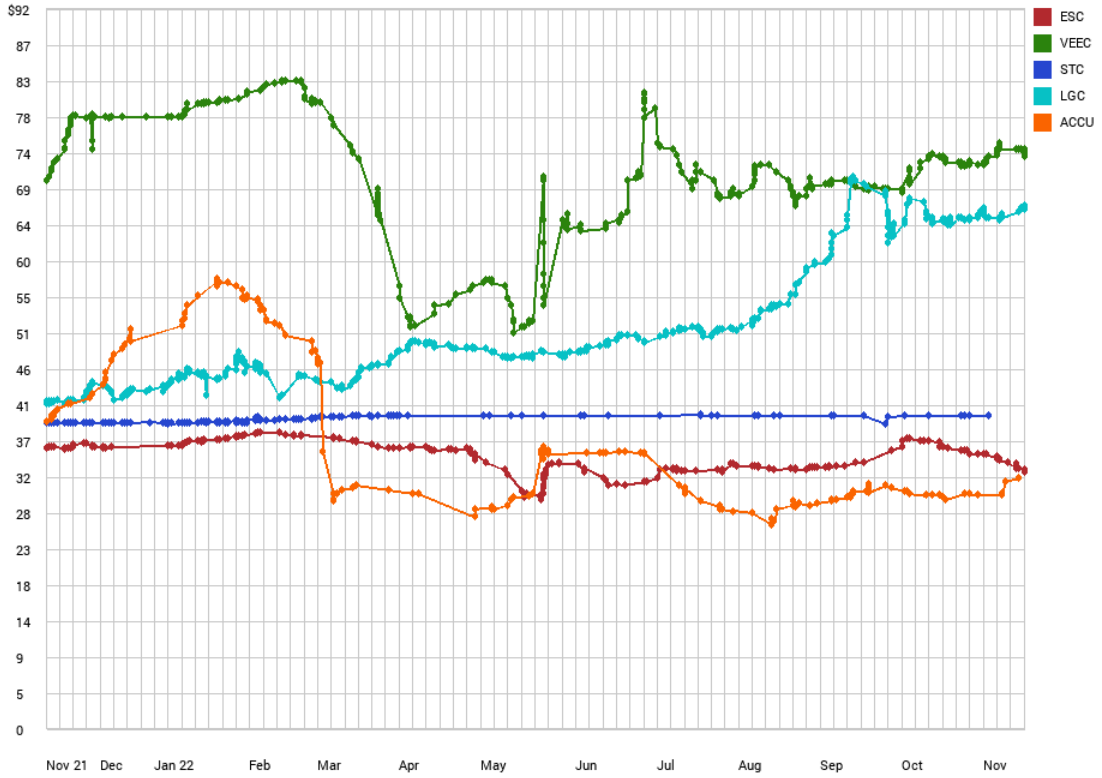


Source: AER; AEMO, Last updated: 4 Aug 2022 - 11:10 pm

The following graph shows real prices increasing rapidly with the increase in the (subsidised) renewables. Some protagonists of renewable subsidies, implausibly, call this pure coincidence or attribute the increases to the ageing fossil fuel plant.



Five schemes provide current subsidies as follows



Source: Demand Manager

The main Large Generation Certificate (LGC) subsidy for commercial solar and wind is over $60 per MWh (50 per cent more than the full market price of electricity prior to the interventions). The solar rooftop subsidy, Small Scale Technology Certificates (STC), are paid up-front for their estimated lifetime to defray the cost of rooftop installations. This payment has remained near its $40 per MWh ceiling.

Subsidies in 2020 directly received by the government designated renewable energy supplies amount to some $7 billion a year, effectively doubling the revenue that wind/solar received in recent years. These comprised:

- Commonwealth direct spending $2418 million
- Subsidies from Commonwealth renewable regulations $3087 million
- Subsidies from State Government schemes $1408 million
- **TOTAL** **$6913 million**

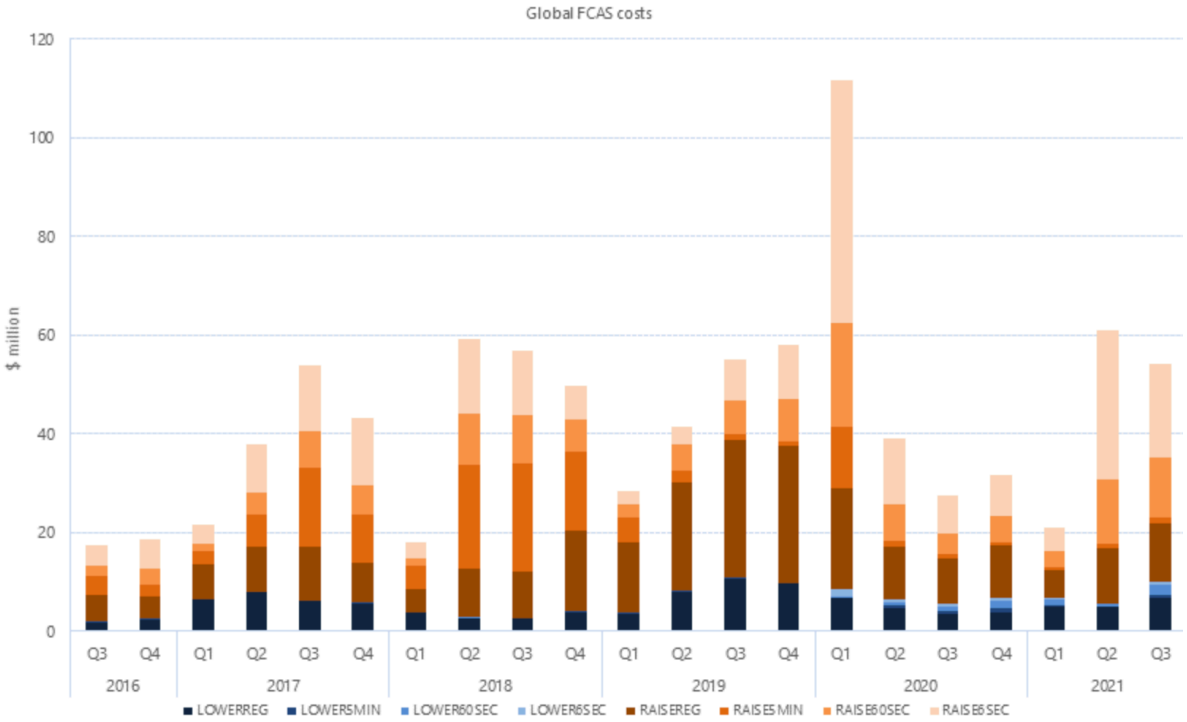
New schemes, increased budgets and higher regulatory subsidies have considerably increased these direct support measures over the past two years.

The subsidies to roof top supplies, with now over 3 million installations, have also created a "duck curve" demand, forcing considerable daily afternoon shutdowns or turndowns of coal generation. Coal generators also faced higher government charges (spuriously called coal royalties) and more onerous requirements for tapping into new coal reserves, both of which contributed to closures of the more marginal coal generators followed by sharp price increases.

The discriminatory support for renewables has been amplified by direct subsidies from government agencies and by regulations requiring new transmission to be built at the expense of consumers to facilitate delivery of renewables that are inherently more locationally dispersed. The transmission lines serving renewable supplies are also less intensively utilised and hence more costly on a per MWh basis than those supplying large scale and often co-located hydrocarbon plant.

A more recent subsidy program, the Australian Carbon Credit Units (ACCU), is ostensibly designed to support farmers to carbon-enrich soils. By arbitraging different schemes, this has become important as a support for renewables. The government is planning a further subsidy, via a penalty on the major energy users, through a 'safeguard mechanism' (requiring firms to progressively reduce their carbon dioxide emissions).

The Australian Energy Council (AEC) has drawn attention to other measures that paper over the cracks of the market malaise. One feature of this is the increased Frequency Control payments being made to businesses being forced on-line to forestall supply deficiencies. Having originally been very rare, these are now frequent with annual costs running at $250 million. The AEC's advice (written by respected electricity supply analyst, Ben Skinner) calls "this practice entirely inconsistent with the intent of (AEMO's directions) power, and if allowed to continue, will undermine the market".



source: AER

The renewable energy industry's lobby group, the Clean Energy Council, recognises that even subsidies of current magnitudes are inadequate to allow renewable electricity supply sources to expand. Among further support, the Clean Energy Council is calling for an additional, "$20 billion fund to leverage private sector investment in grid infrastructure". This is almost twice the grid's present value of $21 billion. The Government's policy, as described in *Powering Australia*, calls for a more substantial level of grid support in requiring an $80 billion level of spending.

Additional is the cost of storage. For the US, Schellenberger[1] describes the rising costs as, "taking into account continent-wide weather and seasonal variation, for the United States to be powered by solar and wind, while using batteries to ensure reliable power, the battery storage required would raise the cost to more than $23 trillion. That number is $1 trillion higher than U.S. gross domestic product was in 2019."

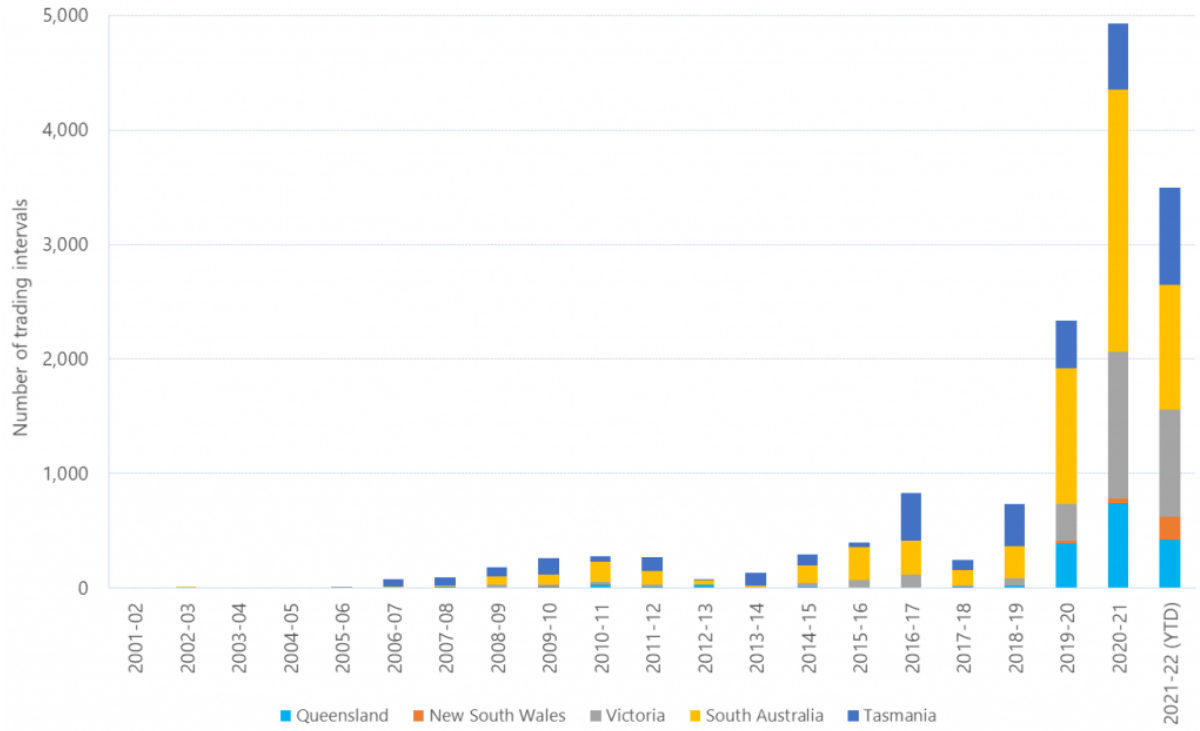
Schellenberger points to studies showing an accelerating cost of renewables as they increase their market share. For example, in Germany, with wind at 20 percent of electricity, it brings a 60 percent cost to the grid but when wind is 40 percent of electricity, it brings a doubling of grid costs. This is because other power plants must be on stand-by for when the wind dies down, extra power lines have to be built to remote renewable energy locations, and other extra equipment and personnel are required to support fundamentally unreliable and often unpredictable forms of energy.

For Australia, Watt Clarity estimates the battery cost to firm up a system that is 100 per cent renewable is the equivalent of 70,000 Hornsdale Tesla batteries or $6.3 trillion That is more than twice the nation's GDP for a system that would also be prone to a great deal more breakdowns than has been experienced under the present coal dominant supply.

[1] *Apocalypse Never: Why Environmental Alarmism Hurts Us All*)

Having previously efficiently augmented supply when it was needed and without political direction, there is now no generation (or transmission) facility that has been or can be built without government assistance. Government intervention has destroyed the efficient, market responsive low-cost electricity market created as a result of the competition reforms and privatisations introduced in the decade and a half from 1985.

One illustration and manifestation of the present market malaise is the increase in periods where prices are below zero.



Source: AER

Zero prices are unsustainable except for those suppliers (wind and solar) which are subsidised and thereby able to cover (usually by contracting in advance) their low or negative market payments. The persistence of these subsidies and their augmentation is, or should be, the death-knell of the pipe-dream fuelled by vested interests and green zeal that the renewable energy "infant industry" will ever be mature and competitive.

Operationalising a renewables dependent system

The Australian Energy Market Operator (AEMO), in an attempt to decarbonise the electricity market has developed its Integrated System Plan (ISP), which it says it takes into account:

- consumer-led distributed energy investments in solar, storage and controllable demand side responses,
- the capital and fuel costs of generation, storage, transmission, distribution and consumer-led responses,
- State and Commonwealth energy and environmental policies, including "net zero by 2050", state-based renewable energy targets and Renewable Energy Zones.

In fact, the ISP is founded upon two principal pillars. First, global warming requires decisions by Australian governments to promote increased use of fuels with minimal emissions of

carbon dioxide and other greenhouse gases. Secondly, that wind and solar are, in any event, the cheapest form of electricity and will prevail over hydrocarbons supply.

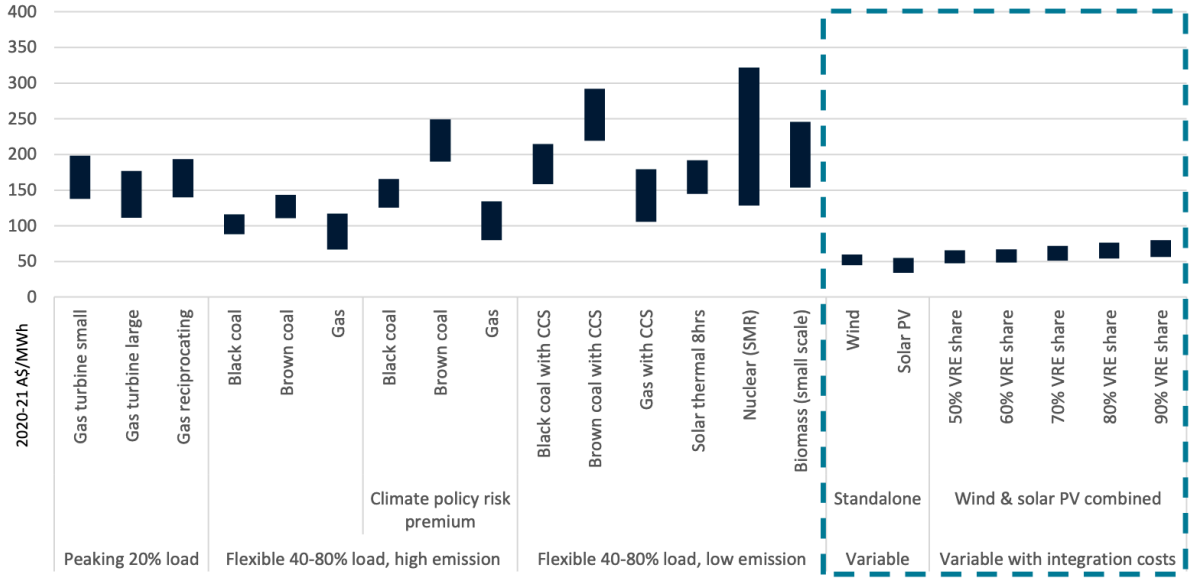
In addition, the ISP considers it likely that hydrogen-based fuels – green hydrogen derived from water – will supplant other fuel sources during the course of the next three decades. There is no evidence that hydrogen will become competitive as a power source and, as explained by Plimer and Montford, every likelihood that it will not.

AEMO draws heavily upon the research of CSIRO which has produced a detailed body of work which purports to prove that wind/solar have lower costs than coal and gas.

CSIRO's conclusions are highly disputable. If they were true, we would not see the increased development of coal and gas plant in third world countries were wind and solar benefit less from favourable treatment. By their actions, the key rapidly growing countries including China, India, Indonesia and Vietnam are rejecting measures that would force the substitution of coal and gas by wind/solar. In adopting such market-based energy policies, these countries are becoming more competitive than those in the "first world". Energy intensive industries are therefore migrating to them.

Nor, if wind/solar were competitive, would we see the need and continued existence of Australian subsidies to renewables – if renewables were cheaper than their alternatives, the subsidies would be bid down to zero.

CSIRO's price estimates are as below:



Far more accurate are those developed by Solstice, illustrated below.

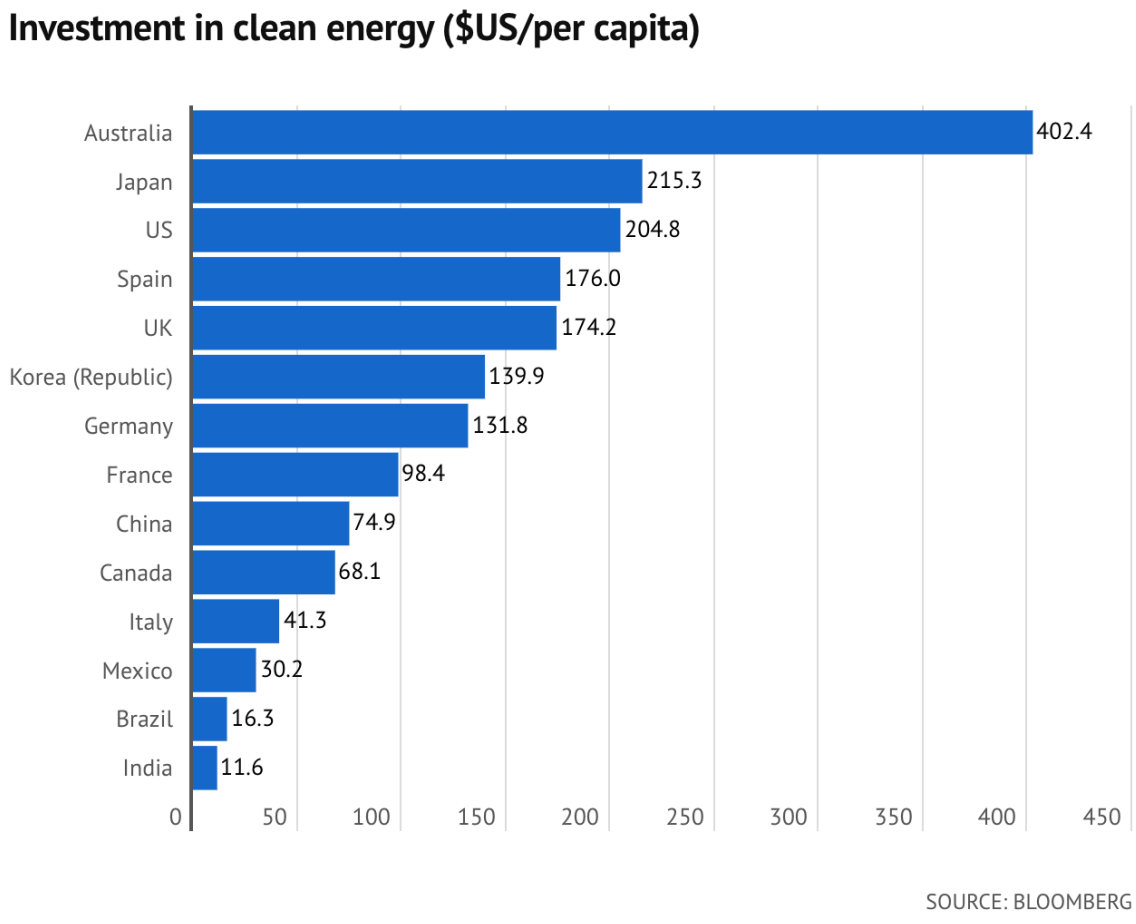
LRMC Dissection (2017 pricing)	UoM	CAPEX	Fuel	Fixed O&M	Variable O&M	CO_{2e} T&S	CO_{2e} Permits	Tax	Total
		$/MWh	$/MWh	$/MWh	$/MWh	$/MWh	$/MWh	$/MWh	$/MWh
650MW Black coal HELE USC	Low	17	11	6	2	-	-	4	40
(87-90% Capacity Factor, $0/tCO2e)	High	22	35	11	4	-	-	6	78
650MW Black coal HELE USC+CCS	Low	26	13	7	5	10	-	8	69
(86-89% Capacity Factor, $0/tCO2e)	High	54	48	21	9	19	-	14	165
650MW Black coal HELE USC+CCS	Low	26	13	7	5	10	3	8	72
(86-89% Capacity Factor, $25/tCO2e)	High	54	48	21	9	19	3	14	168
650MW NG CCGT	Low	9	55	1	2	-	-	2	69
(82-84% Capacity Factor, $0/tCO2e)	High	14	86	5	7	-	-	3	115
650MW NG CCGT+CCS	Low	20	63	2	5	4	-	6	100
(81-84% Capacity Factor, $0/tCO2e)	High	28	103	9	12	7	-	7	167
650MW NG CCGT +CCS	Low	20	63	2	5	4	2	6	102
(81-84% Capacity Factor, $25/tCO2e)	High	28	103	9	12	7	2	7	169
650MW Variable Solar PV FFP	Low	62	-	12	-	-	-	16	90
(17-23% Capacity Factor)	High	127	-	17	2	-	-	26	171
650MW Variable Wind	Low	42	-	12	-	-	-	10	64
(34-39% Capacity Factor)	High	68	-	18	15	-	-	14	115
650MW OCGT	Low	49	106	5	7	-	-	12	179
(5-10% Capacity Factor)	High	148	204	30	12	-	-	36	430
650MW Solar+Battery	Low	263	-	17	5	-	-	44	328
(96% Capacity Factor)	High	782	-	22	7	-	-	102	913
650MW Wind + Battery	Low	156	-	16	4	-	-	36	211
(96% Capacity Factor)	High	577	-	23	20	-	-	73	693
650MW Solar plus HELE USC	Low	47	9	9	1	-	-	8	74
(87-90% Capacity Factor $0/t CO2e)	High	58	29	15	4	-	-	10	116
650MW Solar plus HELE USC+CCS	Low	47	10	10	4	7	-	11	89
(86-89% Capacity Factor $0/t CO2e)	High	91	40	24	8	16	-	19	197
650MW Solar plus HELE USC+CCS	Low	47	10	10	4	7	2	11	91
(86-89% Capacity Factor $25/t CO2e)	High	91	40	24	8	16	2	19	199
650MW Wind plus HELE USC	Low	48	7	11	1	-	-	8	75
(87-90% Capacity Factor $0/t CO2e)	High	61	23	19	8	-	-	10	121
650MW Wind plus USC+CCS	Low	48	8	12	3	6	-	11	88
(86-89% Capacity Factor $0/t CO2e)	High	94	31	28	11	12	-	19	196
650MW Wind plus USC+CCS	Low	48	8	12	3	6	2	11	90
(86-89% Capacity Factor $25/t CO2e)	High	94	31	28	11	12	2	19	198
650MW Solar plus CCGT	Low	40	55	5	1	-	-	6	107
(82-84% Capacity Factor $0/t CO2e)	High	52	115	8	6	-	-	8	189
650MW Solar plus CCGT+CCS	Low	46	63	6	3	3	-	9	130
(81-84% Capacity Factor $0/t CO2e)	High	67	137	12	10	6	-	12	245
650MW Solar plus CCGT+CCS	Low	46	63	6	3	3	2	9	132
(81-84% Capacity Factor $25/t CO2e)	High	67	137	12	10	6	2	12	246
650MW Wind plus CCGT	Low	41	44	7	1	-	-	6	99
(82-84% Capacity Factor $0/t CO2e)	High	55	91	13	10	-	-	8	176
650MW Wind plus CCGT+CCS	Low	47	50	8	3	2	-	9	119
(81-84% Capacity Factor $0/t CO2e)	High	70	108	17	13	5	-	12	225
650MW Wind plus CCGT+CCS	Low	47	50	8	3	2	1	9	120
(81-84% Capacity Factor $25/t CO2e)	High	70	108	17	13	5	1	12	226

These numbers are based on the ex-generator costs, which understate the true price disadvantage of wind/solar. This is because large scale solar and wind also carry higher transmission costs. Their intrinsically lower density power and irregularity means they need some threefold the transmission capacity that coal requires.

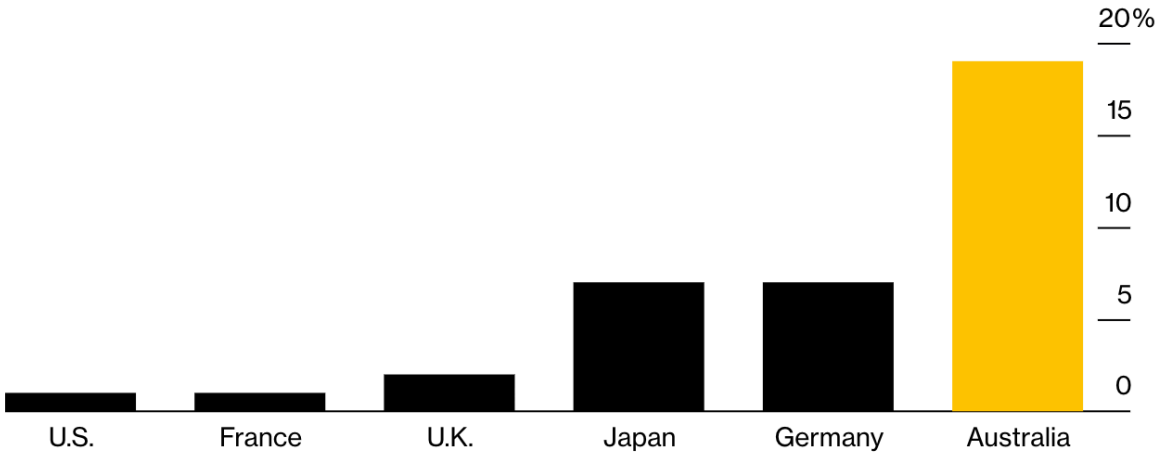
Even though coal and gas generation is cheaper than wind/solar, the injection of those subsidised "must run" supplies damages the economics of coal plant which is designed to be baseload. With its heavy capital intensity, lengthy start up and impairment if operated under a frequent stop-start regime, it is uneconomic if obliged to operate as a backfill for intermittent supplies. New coal plant would struggle to adapt to the "duck curve" demand resulting from the growth of subsidised roof top renewables flattening afternoon prices and forcing coal plant into unprofitable operations that result in closures when significant new maintenance expenditures are required.

The ISP's conclusions discuss a "once-in-a-century transformation in the way society considers and consumes energy … replacing legacy assets with low-cost renewables, adding batteries and other new forms of firming capacity, and reconfiguring the grid to support two-way energy flow to new power sources in new locations. It is doing so at world-leading pace, while continuing to provide reliable, secure and affordable electricity to consumers." In fact, these developments, unlike previous historic transitions are being driven not by the market adopting of new technologies but by government subsidies forcing replacement of the "legacy" technologies by others that are, manifestly, higher cost than those they supersede. Were this not the case, the need for subsidies would disappear.

In response to the climate hysteria governments, at least of developed nations, have moved to penalise and facilitate the replacement of hydrocarbon energy sources. Australia has harmed itself far more than any other nation in forcing a substitution of renewables for low cost, reliable coal. This is demonstrated by the following two charts that show the increase in variable power electricity installations all of which have depended upon subsidies.



Share of solar rooftop installations in total dwellings



BNEF, OECD
Note: 2018 data

Determining "clean" energy expenditures to be a form of investment is mistaken. The subsidised expenditures displace investments that were put in place commercially. As such they are "malinvestments" and their damage is compounded to the degree to which public funding through agencies like the "Green Bank", the Clean Energy Finance Corporation, in the words of its CEO "crowd in" private capital attracted by the institution's government support. Each dollar of CEFC finance committed in 2018-19 was matched by more than $3 from the private sector.

To facilitate further such developments, an increased governmental participation and direction of the market is envisaged. Crucial to supporting these developments is a rapid increase in transmission lines to facilitate flows of energy between regions thereby ironing out different availabilities of wind and solar as well as facilitating transfers of variable power resources to firm-up the availability of the increasingly dominant intermittent sources.

Collateral damage is caused by the costs to the environment of the shift to renewables. Mark Mills[2] puts this as follows, "The energy transition, as it's being conceived today, will create a need for tens of gigatons of materials for solar and wind generation, grid storage, and car batteries. The IEA terms this a "shift from a fuel-intensive to a material-intensive energy system." The agency estimates that an energy plan more ambitious than implied by the 2015 Paris Agreement, but one that remains far short of eliminating the use of fossil fuels, would increase demand for minerals such as lithium, graphite, nickel, and cobalt rare earths by 4,200%, 2,500%, 1,900% and 700%, respectively, by 2040."

Mills asks, "Can the world meet the minerals and mining demands of these collective goals?"

Not only is the cost of wind/solar generated electricity in excess of that of coal and gas in a well-managed system, but the replacement of coal and gas in developed world economies will not have as marked an effect on aggregate emission levels as western governments hope.

[2] https://issues.org/environmental-economic-costs-minerals-solar-wind-batteries-mills/#.YfcYTtq-mBE.link

Paradoxically, on the assumption, intrinsic to Australian governments' energy policies, that the developed world countries will not see lower living standards from their penalising commercially provided energy sources, a diminution of the developed world's energy-intensive industries will have little effect on net global emissions. This is because those energy policies would amount to a *relocation* of production and emissions rather than a *reduction*.

Australia, unlike most other developed economies, is a net exporter of products incorporating energy-producing greenhouse gas emissions. Australia's closure of its own energy-intensive industries, like smelting, would reduce its own energy usage by some 25 per cent and greenhouse gas emissions by rather more. At huge cost to the nation, this would go a considerable distance to meeting a national "net zero" goal but it would not significantly reduce global emissions.

Planning the future

The Wall Street Journal has estimated that Europe's failed energy transition will require a $1 trillion bail out by taxpayers. We agree with the Journal's conclusion that, "when it comes to green energy, the motto is pay, and pay again."

Contrary to the assumptions made in setting up this inquiry, the notion of "transitioning to a green energy superpower" is oxymoronic.

As evidenced by its on-going and increasing requirements for subsidies, "green" energy from wind and solar is high cost and unreliable compared with electricity generated from fossil fuels (or nuclear power). There is no evidence that hydrogen as a fuel would be any better.

Australia's attempt to rely on wind and solar can only bring about economic distress with deteriorating living standards and damage to the nation's future security. We must, instead, embark upon a program of reform to bring about a gradual restoration of the low-cost efficient electricity market supply that prevailed before political favouring of renewable energy overrode commercial forces. This involves

- Eliminating all subsidies to new facilities, including from regulations and from budgetary sources, and accelerate the phase down of subsidies to existing facilities.
- Restoring discipline in AEMO market interventions so that they are strictly limited and subject to review
- Requiring all new generators to supply their own transmission, eliminating the tortuous central planning process whereby consumers pick up the costs
- On the basis of constitutional provisions that require freedom of trade and national agreements that outlaw state preferences, penalising state governments that engage in subsidies to renewable energy including requirements that customers finance the build-out of Renewable Energy Zones
- Informing financial institutions that the government opposes discriminatory policies
- Requiring remediation bonds from all plant including wind generators and commercial and rooftop solar.

Australia has great resources in fossil fuels and in uranium and could restore its former domestic energy competitiveness by dismantling these restraints. Only in that way can Australia enjoy the prosperity its wealth offers and become a genuine energy superpower.

ABOUT THE AUSTRALIAN ENVIRONMENT FOUNDATION

The Australian Environment Foundation (AEF) is a not-for-profit, membership based environmental organisation that has no political affiliations.

It is dedicated to informing and educating Australians about environmental issues and solutions to environmental problems that enhance the wellbeing of all Australians and preserve the rule of law, property rights and the freedoms of the individual on which that wellbeing is based.

The Foundation takes an evidence-based, solution-focused approach to environmental issues. In this respect we support the great 19th Century biologist, Thomas Henry Huxley, who said, 'The deepest sin against mankind is to believe things without evidence'.

The process by which the evidence is evaluated, however, has to be completely transparent, open to participation by all, rational, and rigorous—with a full and proper recognition of the inherent limits to knowledge in all centralised decision making.

Many of the AEF's members are practical environmentalists – people who actively use and also care for the environment in their day-to-day lives. They appreciate that successful environmental protection and sustainable resource use are generally compatible. People are an integral part of the natural environment and provide the only means to protect and enhance it for the benefit of all.

For more information on the AEF please go to https://www.australianenvironment.org/