

# Wind farms use fossil fuels for construction and operation



Illustration: Eric Lobbecke *Source:* Supplied

**Bill Shorten should have asked a couple of questions before committing Australia to a 50 per cent renewable target. Can you build a wind turbine, or start a wind turbine, without fossil fuels?**

The answer is no and no, you cannot. So what is the point of saddling Australia with an increasing load of wind turbines? (Much is also true for solar.)

Whatever one's beliefs on the veracity and level of threat from climate change, what is the point in spending hard-earned dollars on expensive and inadequate-for-purpose technology?

The energy density of wind power is a little over one watt a square metre. As *Smaller, Faster, Lighter, Denser, Cheaper* author Robert Bryce tells, if all the coal-fired generation capacity in the US were to be replaced by wind, it would need to set aside land the size of Italy. Hydrocarbons are denser energy sources than wind. There is nothing that can overcome that fact.

James Hansen, the former NASA climate scientist, wrote in 2011: "*Suggesting that renewables will let us phase out rapidly fossil fuels is almost the equivalent of believing in the Easter bunny.*"

The other thing about renewables is that they cannot produce the intensity of heat required to not only build turbines but just about anything else that makes the modern world modern.

The material requirements of a modern wind turbine have been reviewed by the US Geological Survey (*Wind Energy in the United States and Materials Required for the Land-Based Turbine Industry From 2010 Through 2030*). On average, 1 megawatt of wind capacity requires 103 tonnes of stainless steel, 402 tonnes of concrete, 6.8 tonnes of fibreglass, three tonnes of copper and 20 tonnes of cast iron. The blades are made of fibreglass, the tower of steel and the base of concrete.

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Robert Wilson at Carbon Counter takes us through the science. Fibreglass is produced from petrochemicals, which means that a wind turbine cannot be made without the extraction of oil and natural gas. Steel is made from iron ore. To mine ore requires high energy density fuels, such as diesel. Transporting ore to steel mills requires diesel.

Converting iron ore into steel requires a blast furnace, which requires large amounts of coal or natural gas. The blast furnace is used for most steel production.

Coal is essential, not simply a result of the energy requirements of steel production but of the chemical requirements of iron ore smelting.

Cement is made in a kiln, using kiln fuel such as coal, natural gas or used tyres. About 50 per cent of emissions from cement production comes from chemical reactions in its production.

Then there is the problem of priming windmills. Large wind turbines require a large amount of energy to operate. Wind plants must use electricity from the grid, which is powered by coal, gas or nuclear power.

A host of the wind turbine functions use electricity that the turbine cannot be relied on to generate — functions such as blade-pitch control, lights, controllers, communication, sensors, metering, data collection, oil heater, pump, cooler, filtering system in gearboxes, and much more.

Wind turbines cannot be built and cannot operate on a large scale without fossil fuels.

As important, wind and solar do not have the energy densities to create an economy. Forget trains, planes and automobiles; your humble iPhones, laptops and other digital devices consume huge amounts of electricity and cannot be made with renewables. That most modern of new economy inventions, the computing cloud, requires massive amounts of electricity.

As Mark Mills wrote: *“The cloud begins with coal.”* The greenies who got into the ears of Labor leaders to convince them that the era of fossil fuels is over should think again.

Reservoirs of methane hydrates — icy deposits in which methane molecules are trapped in a lattice of water — are thought to hold more energy than all other fossil fuels combined.

The Japanese, among others, hope that the reservoirs will become a crucial part of the country’s energy profile, as *Nature* reported in April 2013. A pilot project 80km off the country’s shores has produced tens of thousands of cubic metres of gas.

As with any new resources there are risks and much work is to be done for safe extraction, but the UN Environmental Program report in March, *Frozen Heat: A Global Outlook on Methane Gas Hydrates*, was very keen to *“explore the potential impact of this untapped natural gas source on the future global energy mix”*.

Bill, you are suffering from Big Wind. You have let down the party and the nation.

[garyjohns@gmail.com](mailto:garyjohns@gmail.com) Gary Johns *The Australian* July 28, 2015 12:00AM

<http://www.theaustralian.com.au/opinion/columnists/wind-farms-use-fossil-fuels-for-construction-and-operation/story-fn8v83qk-1227459119560>

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## Comments:

**PR** 11 hours ago

I have a solution. Allow windmills only in inner city green electorates, and Byron Bay. Fund them out of local Council rates. If Greens think they are so good, let them pay for them, and have them in there back yards. Find the big business men who back the monstrosities. Put one in each of there back yards, to prove how environmentally safe they are.

Ban windmills from the countryside. Ban windmills from areas where there are birds. Ban windmills from pristine wilderness. And ban the NIMBY factor.

You will note, Greens want windmills, but not in there back yards. Industrialists just want subsidies. End of issue

1LikeReply

**Bruce** 11 hours ago

I would also like to know the environmental impacts of building batteries for, say, cars.

**James** 11 hours ago

When the alarmists are themselves alarmed enough to start endorsing nuclear power, I will start listening to them.

**David** 12 hours ago

If you believe that reaching the 50% renewable energy target is about saving the earth, then you would also believe in the Easter bunny. I too am a true believer that the Labor renewable energy strategy is based on self interest and the real beneficiaries are the union movement and Labor. Huge amounts of money are planned to be splurged on these wasteful inefficient behemoths and I bet that the unions have a plan to siphon off a comfortable amount to guarantee the longevity and prosperous future of the union movement and the Labor party. At a time when the inefficiencies and

corruption within the union movement have driven most companies to relocate overseas or close their doors, the timing for this massive renewable energy plan couldn't come at a better time to boost union membership and finances.

It is impossible not to be skeptical of the benefit of these wind towers to the union movement. At a time when membership of the unions is at a critical low, the timing for the introduction of this project is hardly a coincidence. Manufacturing in Australia is almost non existent and the unions need a huge project like this to prolong their future. My bet is that legislation will mandate that these turbines will need to be built in Australia. They will need to be installed in Australia and controlled in Australia. What a healthy environment for the unions to infect to spread their influence.

**Bruce** 12 hours ago aka Sunray

Thank you Gary, for the empirical science facts, not the UN's political science facts.

**Tristan** 11 hours ago

@Bruce There are no facts he has no technical expertise and his figures are wildly distorted to suit his IPA viewpoint. He is welcome to his opinion but that is all it is. He could not deliver this article under oath.

**Stephen** 12 hours ago

I haven't seen Bob Brown's reply to this article. I assume the Greens will have an alternate point of view. SHY, are you there ??? She said once that when the Wyalla steel mill closes because of an inability to operate within their carbon footprint, the whole mill and its workers could reopen making wind turbines.

**Tom S** 14 hours ago

It would be interesting to put a figure on the actual quantity of carbon entailed in getting a wind turbine to the point at which

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it can commence operation. I suspect the carbon 'foot print' would be immense. With all the money being poured into climate change research, someone must have done that calculation..... surely?

**Vince** 13 hours ago

@Tom S about 242 tons. That's probably as much as the damn unreliable behemoth thing weighs.

**TIM** 14 hours ago

So, wind turbines use fossil fuels?

And that's... bad?

Run it past us again, Garry.

**Tom S** 14 hours ago

@TIM Is Gary saying it's "bad" or is he saying it's pointless, expensive and ineffectual?

**Stephen** 12 hours ago

@Tom S@TIM He's quoted enough facts and figures to indicate it's BAD

**Vince** 14 hours ago

I count Gary Johns, Michael Costa and Martin Ferguson (past and present) as the only Labor persons with any common sense and decency. Perhaps they should start a new party and call it The Real Labor Party. Because the current mob have lost the plot in their stupidity in trying to compete with the loony Greens with their nation destroying policies (or lack thereof).

**Thomas** 15 hours ago

Correct Gary. You spell out the inconvenient truth about wind turbines. Not only are they grossly inefficient generators of electricity and ugly and noisy and use traditionally generated electricity to power their computers when the wind does not blow they are made largely from metals ironically only manufacturable by the use of fossil fuel. Wind turbines are decaying monuments to the stupidity of climate catastrophists and glaring symbols

of waste and inefficiency. Yet Labor wants to build more of the landscape destroying monstrosities at huge cost from any perspective,

**Christian** 15 hours ago

The average 2MW Windturbine cost around A\$ 4 million that times 11.000Turbines = 44Billion Dollars!!!

Then we have the LABOUR factor of at least + 50 percent so we have 66 Billion and that is conservative!!!

Nothing more to say....

**Tristan** 15 hours ago

@Christian which turbine, what access to price lists do you have?

**j-Cherna** 15 hours ago

@Tristan@Christian Google: The commercial wind turbine cost is about \$1-\$2 million a MW

The result is from a friendly site looking for bunnies to invest in these monsters ... Other sites quote higher cost numbers

**con** 15 hours ago

@j-Cherna@Tristan@Christian Great comment j-c

there ya go tristan take that along to the next party meeting

**Tristan** 11 hours ago

@j-Cherna@Tristan@Christian That's a big spread and incorrect

**Christian** 12 hours ago

@Tristan@Christian

these are some general number from various windturbine installers which i found on the net

**Vince** 14 hours ago

@Christian you forgot about the union factor. For that you can simply double the cost number.



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**j-Cherna** 16 hours ago

The base price of production using solar or wind turbines, in their current configuration, cannot match the cost of producing power using fossil fuel. It's simply a fact!

If we rely solely on wind and solar in the current domestic form to get to 50% renewables the \$60Billion will fall way short,

Its over to Labor to explain how they'll get to 50% and not increase the price of electricity - don't hold your breath there will be nothing forth coming because its another pie in the sky thought bubble to add to the \$50Billion in spending outlined in Mr Shortens budget in reply speech.

Harsh reality, but we are a long distance from economical renewables, so Abbott's formula is looking far more realistic and viable which relies on cleaning up existing fossil fuel power plants and concentrating on advancing the science into renewables towards viability coupled to economies of scale ...

It seems that the Coalition has learned that the current set up of solar and wind is not viable, whereas Labor dreams on spurred on by the Greens and their impractical view of the world.

**Thomas** 15 hours ago

Labor needs to acknowledge that it is as wrong on its so called "climate policy" as it was on its opposition to boat turn backs. It is however a slow learner as demonstrated by its years of fatal and costly policy folly on border protection. The Prime Minister as usual provides correct and commendable policy.

**Richard** 16 hours ago

Careful Gary! More truth telling as per this article and guest appearances on The Bolt Report and you might find yourself feted by the ALP as was Martin Ferguson on the

weekend: "This conference condemns Martin Ferguson (substitute Gary Johns) whose self-serving public commentary is not in the interest of the party, party members or the Labour movement. Martin Ferguson (substitute Gary Johns) does not deserve to be considered a Labor elder and must be condemned as a disgraced former Labor politician."

**Tristan** 15 hours ago

@Richard Just a shame there's no truth in it actually

**Thomas** 15 hours ago

There is absolute truth in Gary's article but an inconvenient one for Labor. However Labor never let's the truth get in the way of a bad policy.

**Peter** 14 hours ago

@Tristan@Richard Give us all a break Tristan - the facts seem to speak for themselves!

**Vince** 13 hours ago

@Peter@Tristan@Richard it appears "facts" is not a word in Tristan's book. I'm guessing "Gaia", "tipping point", "AGW", "extreme" and "climate change" are his most oft used words.

**Philip** 13 hours ago

@Richard Martin should be proud to be condemned by that lot!

**holy quail** 16 hours ago

Thanks Gary, info kept for ALP Trivia Nights and to rebut the loopy Left mates I have.

**Kirsten** 16 hours ago

I've been in Maui for 5 days.....drive by a bank of windmills (turbines) each day.

Still haven't seen one of them moving !!!

**j-Cherna** 15 hours ago

@Kirsten same in Spain and Europe - most are down and not working. I

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questioned why and was told the money was in getting subsidies to manufacture and install ... once up they cost too much to run.

**Steven** 11 hours ago

@j-Cherna@Kirsten Agree, We drove through central Spain a few months ago and there were hundreds and hundreds of turbines surrounding a large city. Not one was turning... NOT ONE!!

**Vince** 13 hours ago

@Kirsten have you seen the bank of them in the UK that are rusting and fallen apart? Totally redundant in short time.

**kerry** 16 hours ago

The only wind that the Greens and Labour are capable of generating is methane. But of course they buy only solar and wind renewables so they can sleep at night. Jones puts the true facts succinctly.

**Philip** 13 hours ago

@kerry yep Bill Shorton policy is full of gas.

**Chris** 16 hours ago

Australia comprises about 5% of the worlds landmass, and is responsible for about 1.4% of Carbon emissions, so we are hugely on the "PC" side of human responsibility for greenhouse emissions and possible global warming. It is not an issue that should worry us in the least.

**Ed** 16 hours ago

What's new, Bill is full of BS which might be good for producing some electricity, probably lots of electricity if he keeps talking up RET.

**j-Cherna** 15 hours ago

@Ed BS BS works backwards and forwards - try it.

**Robert** 18 hours ago

So there is a carbon debt to build the wind farms.

Then a running carbon debt to keep them going.

Then a carbon gain for wind versus fossil fuels.

I wonder what the payback period is?

A very good article.

**Lisa** 9 hours ago

Equally wonder what the setup cost and payback period is for a new coal fired plant, taking into account in that equation the destruction of land, diesel to drive the coal large distances by train to the plants etc. feel like Gary needs to gather additional facts and compare apples with apples

**Michael** 18 hours ago

Wind and solar are useful but only as supplements - and unreliable ones at that. This RET nonsense is just political fantasy land. Cold showers are more use to this discussion.

**stewart** 18 hours ago

Wind turbines and their wind farms are the biggest con job on the western world ever achieved by the GREEN environmentalists. Feed in Tariff's and subsidies are just government meddling that the consumer has to pay for. If wind turbines were so good and efficient with free power (the wind) why do they NEED SUBSIDIES?????????

May be because the wind doesn't blow consistently and wind turbines only produce anywhere near rated output around 27% of the time. They are also shut down when there is no wind or high winds. You don't receive an income from a non-producing wind turbine, due to no or little wind.

Funnily enough it is the Socialists (ALP, & Greens) who seem to have a world

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conscience about CO2 yet cannot bring themselves to admit that ever increasing population is driving Climate Change, and their green climate scientists just keep fiddling the books and adjusting the algorithms to prove their predictions.

In 2010/1 the Antarctic had the coldest recorded temperature (-94.5C) since records were kept!!!

And of course the health risks from living close to a wind farm is just shouted down.

**Tristan** 15 hours ago

@stewart Check your facts, every power station in Australia was built and funded with 100% tax payers money. Some of the gas fired power stations built in the early 2000's will perhaps never run again because they were built based on information from faulty forecasting from.. you guessed it government agencies.

Every wind farm in Australia is privately held and has been built with 100% company money. Remember the REC is not from the public purse.

**Philip** 13 hours ago

@Tristan@stewart Subsidized by the taxpayer into those private companies!

**PR** 11 hours ago

@Tristan@stewart Tristan, you are joking right? Simple test, wind farms have not been banned. TA just won't allow tax payers money to be spent on them anymore. The result is no more wind farms.

In my district, there are new power stations, mainly gas. They were paid for by companies who had to pay a tax for the right to build them. Despite this, these private stations were built.

Please stop making stuff up.

**Tristan** 11 hours ago

@PR@Tristan@stewart The companies that built those power stations if you live in NSW were built by a company that is owned by the state government. I'm not making stuff up check you facts. The only two I can think of that were built by private companies are Mortlake in Victoria and Tallawarra in NSW.

**Grant** 18 hours ago

Every cost associated with electricity generation and distribution gets foisted onto the retail consumer. Transgrid is to spend borrowed money to build wind farm grid connection hubs. REC's paid for by the retail distributor (therefore you and I). Gary Johns has generated much debate with his article. This is a good thing. But, unfortunately, our politicians find it too easy to play with our money and, when this happens in the billions, there is great danger. Voters have to pull the politicians up. The idealist Greens live in a weird, surreal, different world. Labor should be more cautious.

**DavidJ** 19 hours ago

Gary, you make too much sense for the renewable fanatics to be able to comprehend. They have their beliefs and noting on earth is going to change them, even if they cause world mayhem and poverty. It is scary that the Left and the Greens seem to have hypnotized the nation into a false belief and we are headed for disaster. BS is desperate and in my view would say anything for a vote.

**MrSceptic** 19 hours ago

The claim about the benefits of wind power are overblown. Most wind turbines would not operate unless the government has put aside some arbitrary amount. Without that minimum figure wind power generation is not feasible. Those in the renewable energy industry saying it will create jobs just are old-fashioned rent seekers wrapped up in new clothes.

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**Tristan** 15 hours ago

@MrSceptic Again check your facts the REC does not come from the public purse... No money is set aside for renewable energy by the government.

**Angelo** 15 hours ago

@Tristan@MrSceptic What rot. The government legislates that electricity retailers purchase renewable certificates that cover the percentages required. You may not see that on your electricity bill, but check the LRET and SRES charges on a commercial industrial bill. And not to mention the state charges (VEET). The charges are in your bills, the retailers are just not itemising them.

**Graeme** 19 hours ago

Isn't it a pity that the tree hugging inner city folk don't get out a bit and see the real world, I am sure they think that their paper, phones and most other consumables just come from the shops and do not have to be manufactured by someone somewhere using fossil fuel energy, I would also suggest that if you asked them where milk came from they would say the supermarket.

**Glenn** 20 hours ago

What a negative piece of journalism but then I expect that from this Murdoch owned newspaper. God knows why I continue to subscribe to it - that will change in the very near future!

**Frank** 18 hours ago

@Glenn The truth hurts doesn't it, Glenn.

**Glen** 17 hours ago

@Glenn Sometimes the truth hurts

**Terence** 17 hours ago

@Glenn

What's negative about telling the truth? What's negative about not squandering the money of taxpayers and their childrens'

children? Obviously reality is confronting to you.

**Jon** 17 hours ago

@Glenn I take it you mean Glenn that it is an article that does not pander to the climate change fanatics and their fanciful views of a world of free energy.

**David** 16 hours ago

Address the argument and its facts, and not just some emotive venting.

**Shane** 16 hours ago

@Glenn So Glenn, what was said that isn't true?

**Tristan** 15 hours ago

@Shane@Glenn What isn't true? the fact that wind turbines generate 1 watt per square meter is plainly not true otherwise the largest wind turbine would only produce 0.009 MW when the average wind turbine produces 3 MW. Do the math.

**Nicholas** 16 hours ago

@Glenn Allow me to help you....because the truth has an irresistible appeal Glen, even for those who struggle to see it. That's why you subscribed.

**Stephen** 14 hours ago

@Glenn No journalism here, Mr Johns, my former local member when I lived in Brisvegas, is offering his opinion. Like many, you seem to think that the word "OPINION" that is at the top of this page is a synonym for "JOURNALISM".

Let me help you understand -

"OPINION" - noun, a personal view, attitude or appraisal

"JOURNALISM" - news reports presented factually without analysis.

In essence Glenn, journalism cannot be positive or negative, the only way way it could become positive or negative is if it were a news report presented with



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analysis, but then it wouldn't be journalism any more would it, it would be something else.

I would suggest that Mr Johns has presented information he has discovered doing research on this topic and presented it here without analysis, potentially imbued with his view, attitude and a little bit of appraisal. Makes me believe this is could be his opinion on this matter.

That's my opinion on this anyway, for what it's worth.

**Philip** 13 hours ago

@Glenn Shame as you will lose a source of real information and be left with the fairy tales from the ABC.

**John** 20 hours ago

Thanks Mr. Johns, a great informative article.

**Chris** 20 hours ago

Good on Bill. Just another reason never to vote for him or his party.

**Russell** 20 hours ago

One other thing: wind turbines cannot operate once the wind speed reaches a certain level. Thus on very stormy days they have to be shut down. And if it happens at night...whoops, where's the solar power? But that's ok.

Bill wants us all to freeze and starve in the dark. That's his plan to stop the boats.

**Jason** 17 hours ago

@Russell Actually, that might work! When people start to realise that even a cave with a generator in Afghanistan is a technological wonderland compared to what the lefties have planned for Australia, they might not get on the boats in the first place!

**Stephen** 21 hours ago

If you take away the Government Subsidies, accelerated depreciation, loans

and handouts a wind farm cannot generate enough marketable electricity to pay the interest in the money they spent to build with the operating and maintenance costs.

As a business without the handouts they would be insolvent

Old wind farms are left to rot when the subsidies move on to the next one

**Noel** 22 hours ago

At last some sense into the cost of clean energy. The cost of mining, ore transport, smelting, forging, machining, transporting, assembling and many more incidental costs far exceeds the supposed savings of clean energy. furthermore, the carbon dioxide emitted from the mining and manufacture of these units will be greater than any gain they could achieve.

Wind machines as a means of reducing emissions is a myth.

**Steve** 20 hours ago

@Noel Not to forget the cost of removing and replacing these monstrosities when their use by date comes up.

**Terence** 17 hours ago

@Noel

The truth about wind machines is that they chew up the hard-earned of taxpayers so Labor/Union can get Green votes. When you invest in a risky enterprise the first rule of business is - always use the money of others!

**Paul** 16 hours ago

@Noel They're not even clean when they operate because they need constant backup from open cycle gas plant and diesel plant.

**greg** 22 hours ago

I recall reading about a Mafia controlled large scale solar farm, supposedly generating renewable energy. With the subsidies available in Europe for renewable energy, they could generate

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solar electricity at NIGHT by using diesel generators to power spot lights onto the solar panels. A fool and his (our) money is easily parted.

**Berwin** 22 hours ago

A farmer can be prosecuted for killing a so called endangered bird species that is destroying his crops yet these wind turbines chop up and kill thousands of these same endangered species every year. Not a word of horror or even complaint from the tree hugging inner city latte-sipping greens and their uneducated intellectual fellow traveller mates. Wind turbines are a blight on the landscape and the environment as well as being "lead" in everyones' wallet.

**John** 22 hours ago

Global warming? It was so cold in Sydney this morning, I saw a Labor politician with his hands in his OWN pockets!

**Russell** 20 hours ago

@John brillante comment John.

**Damien** 19 hours ago

A rare sight indeed.....

**bob** 18 hours ago

@John Well done mate I just p....d myself

**Nigel** 18 hours ago

@John My Chuckle of the day - thanks John

**Shane** 16 hours ago

@John Outstanding...

**boon4321** 14 hours ago

@John clever.

**John** 22 hours ago

The obvious way to generate clean and low cost electricity is to go nuclear, it is just simple and of all countries Australia is best placed to do this. The drawback is a fair bit of water is required, so we will also

need to build more dams. These could also be used to generate electricity, win, win. But the politics will win over common sense.

**John** 21 hours ago

@John When you look at the list of countries worldwide that currently use nuclear power or plan to, Australia is in a dwindling minority of countries that don't even plan to, and most others on that list are very poor with no prospect of having the capability. We have the capability, the resources, the space, the seismic stability and the political stability to make the harnessing of nuclear power a no-brainer for us. When most of Europe, Asia and South America and of course North America (including Mexico) and South Africa use nuclear power, when Indonesia, Malaysia, much of the rest of Africa and South America have plans to, how is it that WE can be so beholden to, so under the thumb of our nuclear-phobic green hysterics that we can't overrule them and use this most advanced, cleanest and plentiful energy? It's time to stop listening to the luddites and go nuclear, just like the rest of the world is.

**Glenda** 18 hours ago

@John It will be interesting if the review Wetherill is holding in SA into all aspects of the nuclear industry from mining to disposal comes out in favour of a nuclear industry in Australia.

Most sensible people would see that as a catalyst to discussion and planning but that will not be the case with the scare campaigns that will be run.

**Jason** 21 hours ago

John - Where do you put the nuclear waste would you be happy to store it in your own back years since it's clean?

**Geoff** 19 hours ago

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@Jason No, we can put nuclear waste underground in geologically stable, isolated, arid areas. No shortage of those in Australia.

**Glenn** 19 hours ago

@Jason Stupid question. It would be put on massive concrete floors deep underground in geological stable areas which are all over Australia, not in someone's back yard in Sydney. Only a mindless, thoughtless Greenie would come up with a childish argument like that.

**Lutz** 19 hours ago

@Jason The nuclear waste issue is a green-driven fallacy. All waste is reprocessed. Read up on it.

**Damien** 19 hours ago

It's not clean obviously but Australia is blessed with vast areas of uninhabited and stable rock areas to bury it deeply and safely. In fact we could make billions by storing a heap of the world's oversupply of waste. It's not that hard to encase it in absolute safety these days. Anything else is scare-mongering....

**Glenda** 18 hours ago

@Jason Bob Hawke saw a billion dollar international industry with storage in seismic stable areas of Australia for the world! But the ALP shut him down!

**karl** 17 hours ago

@Jason Jason, you are still thinking about pictures of 44g drums with a skull and crossbones from 1980's doomsday films. The waste these days is minimal or indeed, reprocessed down to nothing. Hint for the day-if you read about nuclear waste on Wikipedia, Guardian, Fairfax or the ABC then it was probably not true.

**toby** 15 hours ago

@Jason you don't know much about this topic i assume? Best then to say nothing? If the newest reactors were being used in

France since they started with their nuclear program.....all the waste ever produced would fit inside 1 basketball court.

**Phil D** 20 hours ago

@John Good idea John but whose backyard will they be built in?

**Erzsebet** 17 hours ago

@Phil D@John Sydney, NSW, already stores nuclear waste, perhaps another state can share the nuclear benefits and burdens.

**Jason** 17 hours ago

@Phil D@John They can build it in mine. For a fee, of course.

**Peter** 23 hours ago

People will want solar panels with battery back up on their homes to negate the risk of all the stuffing around going on about power supply, whether it's from privatisation, a carbon tax or any other reason.

**Terence** 22 hours ago

@Peter

Batteries cannot be manufactured without mining operations and blast furnaces but no-one wants mining operations (or coal or iron ore mines) to be in existence - (in our country)! Our society is built on technology and technological advances help us make a better and better functioning society but everyone wants to live in hippie wonderland where the reality of technology and energy doesn't exist. But they don't want to live places (like Africa or Pakistan) where technology is still in the stone age. They want to have their cake and eat it too.

**John** 14 hours ago

@Terence@Peter yes it's funny how most of our inner city greenies have a fairly high disposable income and are some of our highest consumers yet they want to shut down all industry, they seem to be

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deficient in the logic department just like they are with economics as they (greens/Get Up) seem to have a cargo cult mentality.

**Peter** 11 hours ago

@Terence @Peter My point is that all this changing of policy will make the conventional grid less reliable.

**Peter** 23 hours ago

Lots of assertions and very few facts.

1. No-one is talking about 100% renewable energy, they are talking about 50% renewable electricity or in Australia's case about 15% of total energy.

2. High temperatures are not achievable with electricity. Completely false. Electric arc and plasma furnaces are much hotter than blast furnaces. About half the steel in the US is produced in electric arc furnaces.

3. To achieve 50% renewable electricity Australia needs about 7,000 additional wind turbines. Germany already has 28,000. The US will generate enough wind power in 2017 to power Australia.

We would also need a bit under 25 GW of solar. Italy installed 9GW of solar in one year, China is installing 20 GW per year and India is planning to install 100 GW in 7 years, so we can't install 23GW in 15 years? Given that the output per panel over that time will be nearly double the figure available to Italy in 2011-12. You are saying we can't do in 15 years what they did in 18 months.

4. All power stations need power to operate just as your car needs an alternator and battery. The power to run a wind turbine can come from hydro, other wind farms, solar, batteries charged by renewables etc. not to mention the 50% remaining thermal power stations. The power used by a wind turbine to operate is a smaller % of its output than that of a coal fired station which when you include the

power to mine transport and process the coal is between 7 and 15% of the nominal output of the power station.

5. Area of wind farms is large but on average roads turbine pads and ancillaries take up about 200 sq.m per turbine. the rest can still be used for farming. The total required for Australia with current generation turbines is therefore about 14 sq.km. The Latrobe valley power precinct is 130 sq.km. The area required for the 4-6,000 gas wells + water storage treatment + pipelines + compressor stations etc. required to run 2GW of CSG powered CCGT plants is more than the area required for a windfarm of similar output.

6. All systems have overbuild and backup. Australia's coal power stations run at about 50% net of their nameplate capacity after accounting for energy used for mining transport and processing of coal. Gas and hydro are lower, in fact lower than wind, because they are there as backup, just as they will be for wind, solar, geothermal, wave and whatever other renewable technology comes along.

In summary, it is easily doable, the US, China and Germany will all be there before us and probably India and possibly even the UK with their massive offshore wind investments and France, which is increasing renewables at the expense of nuclear.

**Brendan** 22 hours ago

@Peter Oh no - Spain has already learnt that difficult lesson. So why give up a competitive advantage of cheap energy, for some vague ideal future? If RET is the answer, let it compete in the market - if it is any good it will struggle like all good ideas then take off. Hope this helps you.

**Russell** 20 hours ago

@Brendan@Peter Good heavens Brendan. A real economist who believes in genuine market forces rather than promotion of rent



# Wind farms use fossil fuels for construction and operation

seeking. If solar, wind or any other "renewable" is to be introduced it should be seeking to reduce its costs without subsidy below that of coal. Once that happens and it is genuinely competitive it will take over. Suggesting the price of coal has to be artificially inflated by tax so renewables can compete is equivalent to imposing very high tariffs on motor vehicles so local manufacturing can compete. Economists are horrified by the latter but unlike Brendan far too many support the former.

**Peter** 16 hours ago

@Brendan@Peter Because the cheap energy you are talking about does not exist. A new coal powered station is not cheap will not operate at more than about 65% capacity because people don't need power 100% of the time and forgetting about global warming there are substantial health and pollution costs from building coal mines transporting coal and burning it. If a pollution tax was added just to pay these costs and all power stations paid commercial rates for their cooling water then power from a new coal power station would cost more than \$100 per MW.hr which is more than the going rate for wind and more than recent contracts in the US, India and the Middle East for solar.

We can benefit from Spain and Germany's pioneering work by getting renewables for less than half the cost they paid

**Daniel** 22 hours ago

@Peter Thanks Peter.

**Peter** 22 hours ago

@Peter We should never under estimate technological progress. It will always surprise.

**Victoria** 21 hours ago

@Peter So right. So put all that research, development and commitment into something that is inherently efficient to

start with. And goodness knows where you would go with renewables. Why do wind turbine companies need tax payer funding - because the whole of life of a turbine is an inefficient and ineffective way of producing energy. If we had put anywhere near the effort over the last 50 years into Nuclear we would have energy sources suitable to their locale, We would not require huge carbon intensive construction to connect the grid to the power source. Never underestimate technological progress - but start with the right theory. The wind turbine has little improved in efficiency from the 300 year old wind mill when compared to the rate of efficiency increase in nearly any other renewable technology.

**Andrew** 16 hours ago

@Victoria@Peter Like coal mining. So efficient they still lose 75% of the power generated in transmission. So efficient

**Andrew** 22 hours ago

@Peter Whether it is "easily doable" is not the question. The question is whether it is economically doable? The answer is "No" because if it was it would have been done. The renewable "industry" is about harvesting public money by way of subsidy, not producing energy.

BTW I note you have addressed the issue of how energy intensive it is to produce these eagle smashers.

In fact most of Europe is turning off renewables. The USA relies on fracking and China builds more coal fired powers stations then a greenie could contemplate in a nightmare.

**Peter** 16 hours ago

@Andrew@Peter Andrew Europe is not turning off renewables it is rightly reducing over generous subsidies. Germany increases renewable output every year as does France, Spain Portugal Denmark and even the UK. Germany 32%

# Wind farms use fossil fuels for construction and operation

renewables in the first half even though it is phasing out nuclear. France has just passed a new energy law which is expected to reduce nuclear from 70% to 50% to be replaced by renewables.

**Barry** 22 hours ago

@Peter It is easily doable if you have a spare \$70 billion to \$100 billion available which could find a better home if given a sporting chance for things like the most efficient electricity distribution, improved lifestyle choices, improved primary health options more efficient and effective education systems with less inefficient Universities and the correct amount for NDIS etc etc.

**Robert** 21 hours ago

@Peter I understand in Germany there is a huge number of people who can no longer afford to pay their expensive (thanks to renewables) power bills. They are resorting to cutting down trees in the forests. LOL

**John** 13 hours ago

@Robert@Peter And a lot of industry is relocating to America where there is cheaper energy.

**John** 21 hours ago

@Peter I don't think anyone is saying it isn't doable. The question is what it will cost, and who is to pay, and Labor has no answer (although I think we know who will pay).

**Cath** 21 hours ago

@Peter And where does the power come from to run the 3 phase EAC?

"Electric arc steelmaking is only economical where there is plentiful electricity, with a well-developed electrical grid. In many locations, mills operate during off-peak hours when utilities have surplus power generating capacity and the price of electricity is less."

We generate more power than we use with solar, but our foray into small wind highlighted the issues with relying on something so fickle (in this country) and with moving parts. Wind turbines are not the answer and in 20 years when they majority start wearing out, new ones will not be getting installed. Short sighted tokenism.

**Peter** 15 hours ago

@Cath@Peter I am not an evangelist, I agree that small wind is uneconomic for most applications, I used to be in favour of high efficiency coal (which we don't have and will not build because it is uneconomical.) and I am still a fan of nuclear.

We already have backup in the system from hydro and gas and as I have said elsewhere, spreading thousand of renewable installations over thousands of km's makes the renewable output much smoother and reliable.

Even if we have a 100% coal grid there will still be storage in the form of hydro, pumped hydro and now even batteries as Ergon and SA power are doing, because it is cheaper to have batteries at a substation than upgrade feeders and transformers and run peaking stations for 100-200 hours per year and it is cheaper to build a 2 GW coal station and 500MW of pumped hydro than build a 2.5GW coal station where the last generator will operate at 10% utilisation.

However the facts are these. Renewables are falling at 5-7% per year coal stations are not. Coal does not pay for any of its pollution costs. Contracts are being awarded every day around the world for renewable power at less than the cost of unabated coal and 1/3rd the cost of the only newly planned nuclear plant where the cost are known. Therefore the only way new coal fired power stations will be built in Australia in preference to

# Wind farms use fossil fuels for construction and operation

renewables will be if somebody subsidises them.

**Dico Ergo Cogito** 20 hours ago

@Peter Thanks Peter.

**Murray** 18 hours ago

@Dico Ergo Cogito@Peter For what?

**Geoff** 19 hours ago

@Peter Hold on Peter; you side-stepped the extensive use of coal/carbon as a reductant for iron ores (and many other metal ores).

Will you volunteer to work at the first steelworks to use hydrogen as a reductant, or will some working class schmuck get that assignment.

**Peter** 15 hours ago

@Geoff @Peter no i didn't we are talking about coal fired electricity not metallurgical coal

**Glenn** 19 hours ago

@Peter Electric arc furnaces are not powered by either wind or solar power.

**Peter** 15 hours ago

@Glenn@Peter the furnace does not know where its power comes from if wind generators are connected to the grid they are contributing to the furnace

**Tristan** 15 hours ago

@Glenn@Peter Yes they are you can't choose where your electricity comes from, so if a wind farm was operating then likely some of that electricity came from the wind.

**Chris** 19 hours ago

@Peter Your assertion about electric furnaces is only partially correct... but you have missed a couple of points about the feasibility of electrically powered smelting.

First: Aluminium smelting (for example) on an industrial scale requires prodigious amounts of energy -- and it has to be reliably available. Smelters have to be located close to a power plant... and they often have their own dedicated power station.

Second: To be globally competitive the electricity has to be cheap. Which pretty much rules out wind and solar, even if the first point didn't.

The economic reality is that most aluminium smelters are powered by either hydro or nuclear - neither of which is likely in Australia.

**Jennifer** 23 hours ago

Labor no longer exists. Infiltrated by greenpeace operatives. Labor Green should rename themselves the Watermelon Party.

Prius needs a double smelted aluminium engine. It's energy consumption to produce, like windmills, is enormous and outweighs the CO2 savings. As we don't have smelters here, so add in shipping transport costs.

Who's pushing this dumb wheel barrow anyway? Goldman Sachs had a vested interest, China makes them, are we the dumb patsy's ready to pay in triplicate and become the Greek Island of the Southern Hemisphere?

Why? Because industry superfunds linked to things like Pacific Hydro investments in wind mills need propping up by our taxes. It lost big time recently.

That's what they've been up to and they're continuing to try to hoodwink us all.

The Watermelons would sell Australia down the river.

**Geoff** 19 hours ago

@Jennifer FYI, Australia still has four operating aluminium smelters at Portland

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(Vic), Bell Bay (Tas), Tomago (NSW) and Boyne Island (Qld), despite the Green/Labor vision of moving the emissions and jobs overseas.

Much of the aluminium produced is exported to Japan/Asia, and some returns as cars or other finished goods.

**Loaded Dog** 23 hours ago

Solar panels is inefficient and a squander of scarce resources. Panels are dangerous to dispose of and require constant maintenance and replacement. Indeed the energy and wasting required to produce them results in a net loss after disposal is accounted for. A better way is to mirror the sun's rays into creating steam for turbines as is done in Spain.

Solar panels cannot will not produce the 22,000 volts of 3 phase required by the \$billions of industrial hardware. The obvious solution for base load and minimizing pollution is nuclear.

**Jan** 23 hours ago

@Loaded Dog They are reducing my electricity usage and costs substantially and have had no problems with maintenance.

**Russell** 23 hours ago

@Jan That's because you put your hand in my pocket so you could purchase the highly subsidised solar systems.

**Jan** 22 hours ago

Yes I did but they weren't highly subsidised when I bought them.

**Victoria** 20 hours ago

@Jan I assume you are talking of personal solar panels. Probably fine for your house but you have probably created more carbon having your panels built that you have saved depending on mainstream energy sources in your grid. Of course the carbon produced building your panel(s) was someone else's problem. Home panels

very different from huge farms. Even small farms - like one at an island I visited recently supporting about 150 - 250 people at any one time - decrease in efficiency very quickly without constant maintenance - and given the technology and carbon inputs to build and dispose of - are actually very inefficient to start with. They need constant maintenance and washing and given the water has to be produced to wash them from a desalination plant that requires a pile of energy to remove salt to create the fresh water to remove the salt from the solar panels - well guess what ..... a catch 22 situation.

**Loaded Dog** 13 hours ago

I doubt your arithmetic Jan. You have not accounted for all costs including the social opportunity costs of the manufacture and disposal. In addition you must have received a subsidy that others have paid. I was referring to the macro economy et al ...

**Peter** 23 hours ago

@Loaded Dog Loaded. The latest generation solar panels run at 1500V and it is stepped up to whatever voltage you want through a transformer just as the 3,000V at a coal fired generators terminals is stepped up to 500kV through exactly the same type of transformers.

The latest proposal for nuclear power in the UK is guaranteed an equivalent price or Pds95 per MW.hr. + inflation for 30 years. Building nuclear power stations in the UK is much cheaper than here for a whole lot of reasons that I won't detail now. Suffice to say that we would need about \$250-300 per MW.hr to make Nuclear viable here. You can get any number of renewable developers to build you wind + pumped hydro for about \$150/MW.hr.

I am not anti-nuclear it will just never be economical in Australia unless there is a



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huge breakthrough in the technology. Yes I know Thorium, Mini-reactors etc etc but these technologies have been nearly there for the last 20-40 years. In the meantime Concentrated solar thermal, PV and wind just keep getting cheaper,

**toby** 22 hours ago

@Peter@Loaded Dog. Peter, do you think wind energy actually cuts emissions in any meaningful way in a country like Australia that uses coal for much of its energy needs? You sound very informed on this topic so pls take this as a genuine question.

Also given the real life expectancy of a wind tower is currently around 15 years, even if they last 25 years as rated aren't we just creating a never ending cost? Coal, gas and nuclear last decades and can be upgraded.

The stresses on wind frames are enormous and require constant supervision to catch problems early....are these costs built in to all the "equations"?

Should we be concerned about our raptors? They sure are in the USA!

We have been told that wind will not require subsidies for decades now, and yet they still require a RET imposed to increase supply and feed in tariffs and a guarantee that their energy is bought? Surely if they work so well we need to do ntg but let market forces operate?

I have friends in big business who invest in these wind farms who openly acknowledge that without government assistance they make no economic sense....and many acknowledge they do little to curtail emissions.

**toby** 15 hours ago

@Peter@Loaded Dog Peter please answer my question above, i am genuinely interested if you believe wind cuts co2 emissions? You do sound well informed

and somebody worth listening to so I do hope you respond.

**Peter** 3 hours ago

@toby@Peter@Loaded Dog Toby I am sorry work intervened.

Wind towers are designed to last 20-25 years and are reliable enough that investors are guaranteeing a fixed price for power for 20 years. No thermal station on earth will do that. It is possible to design them to last longer and many already do just like the design life of a car is 150-200,000 km but many last 3 times as long. The stresses on the frames are nowhere near that of the stresses on an aeroplane wing and airliners regularly last 30-40 years even in frontline service

The reality at the moment is that just like phones and computers the technology is changing so fast that in many cases in Europe it is less expensive to take down two or three old wind turbines before they have worn out and replace them with a single new unit which will generate 3-5 times the power per year from the same site.

Coal gas and nuclear can be upgraded just as wind turbines can, but at tremendous cost. Hazlewood turns only about 20% of the heat from coal into electricity, modern ultra-supercritical plants generate more than twice as much per tonne of coal and they have been available for 10 years. No-one in Australia is even hinting at upgrading our old inefficient power stations to the latest technology. Similarly nuclear power companies are saying that they will not upgrade their power stations unless they get at least 20 years extension of their operating licence to pay for it and even then 8 or more units are closing down in the US because power costs are just too low to guarantee a return. Even gas is in trouble. A few years ago I was very enthusiastic about combined cycle gas plants which have start up times of 40-50

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minutes and 60%+ efficiency. They are closing down throughout Europe because at current gas prices they are too expensive to run even though some are only 3 to 4 years old

The reason that alternative power requires subsidies is that they are competing with power stations that a) aren't paying for their pollution costs and b) most were sold at well below replacement cost to the current owners. There are also many hidden subsidies in low cost rail, guaranteed coal to some NSW stations at a little over half the market rate, Brown coal to Victorian stations at 60c per tonne etc. etc. community and government costs of many 10's of millions for fighting fires, providing security etc.

Re birds. Yes turbines kill birds and there are now rules for siting and operating them that reduce (unfortunately not eliminate) the hazard However pollution from coal powered power stations, collisions with vehicles, buildings and existing power lines not to mention cats all kill orders of magnitude more birds than wind turbines.

**Right! said Fred** 22 hours ago

@Peter@Loaded Dog Would the CFMEU have anything to do with Nuclear Power Stations or anything else being built costing more to build in Australia?

**Peter** 16 hours ago

@Right! said Fred@Peter@Loaded Dog Even it were fully imported labour, the cost of the cooling system and its maintenance is much higher here, the freight on very large and expensive components, the lower duty cycle because we can't export the power etc. etc. and particularly higher financing costs mean that the delivered power cost about 30%-50% even if the construction wage bill was exactly the same

**Loaded Dog** 13 hours ago

Unfortunately very little economic construction is viable in Australia. The Labor Party Desal came in at 7 \$billion in Victoria. It was also built on a flood prone area.

**Shane** 16 hours ago

@Peter@Loaded Dog Perhaps the labour superfunds could invest their members money in Nuclear technologies. The puppets will just do what their told and everyone wins.

**John** 13 hours ago

@Loaded Dog The plants that use the sun to produce steam do not get hot enough to produce enough steam to turn the turbines until midday and then only produce for around four to five hours, to overcome this they use gas to preheat the water but this is very inefficient use of gas as if it was used in a gas turbine it would produce more energy than the solar plant.

**Loaded Dog** 13 hours ago

Not in accordance with the facts John.

**Terry** 23 hours ago

It has to be about base load power 24/7 with an end goal of 100% renewable.

The best cost effective and safest renewable is Hydro electricity which also gives us water storage. Next is Geothermal but has proven elusive to develop to base load capability. Nuclear is proven but expensive to build and has a perceived danger threat attached making approval difficult. Fossil fuels such as coal and gas are abundant. Coal is cheap (it already belongs to the State) abundant and suitable. We should continue with the latest clean coal technology to give us cheap energy the surplus going to industry such as electric car manufacturing. If we can replace all cars by 2030 with electric cars powered by clean coal electricity that would be a real achievement instead of a pipe dream chewing up money.

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In the meantime we could begin the transformation to renewables starting with dams and a good look at geothermal technology and also a future with nuclear power (distant).

**mike** 23 hours ago

@Terryvery confusing piece. Say, how do we create water where we live?

**Greg** 23 hours ago

@Terry Yeah a few problems.....hydro and thermal only ok if close by, in Brisbane neither is an option due to lack of mountains and rain, and thermal store. Replacing all cars by 2030.....what about all the batteries, charging infrastructure etc.? Totally unrealistic without massive expenditure and revolutionary batter tech advancement.

What about use the cheapest most readily available store, pay off the foreign debt, and save like hell in the future fund to be able to adapt if and when the heating starts again. Because, if China India etc don't change then nothing we do matters at all. We are simple pissing into the wind.

**Peter** 19 hours ago

@Greg@Terry Easy Terry 90% of the rain that falls in the north flows out to sea wasted, imagine if we could harvest some of that for hydro electric

**Russell** 23 hours ago

@Terry Try and build a dam in the current political situation. The Party most likely to benefit from the construction of Dams is the Greens who vehemently oppose even the thought of building a Dam. I agree, Hydro is the best renewable energy source. BUILD MORE DAMS. But try and get a Dam proposal past GET UP, GreenPeace, Wilderness Society, et al will be protesting at the mere thought.

**Andrew** 22 hours ago

@Russell@Terry Amen to that brother.

Geoff 19 hours ago

@Terry So let's build the Tully-Millstream hydro (near Cairns). The feral Greens will move to Cairns to protest, and canny investors can pounce when Nimbin house prices tank.

**John** 13 hours ago

@Terry Greens will not allow dams to be built.

**Jonathan** 23 hours ago

The ALP's renewable energy policy has nothing to do with powering Australia for the future. It's all about the politics of regaining votes in a handful of inner city electorates from the Greens.

The ALP is silly enough to let the Greens control their policies. The Greens fooled Rudd and Gillard into opening the doors to 50,000 unlawful immigrants, drowning 1200 others and wasting billions in unworkable emissions schemes that made no difference to world emissions.

This new renewable energy policy will cost taxpayers billions and no doubt will never work as intended and will make no difference to world carbon emissions.

**Greg** 23 hours ago

"UN Environmental Program report in March... was very keen to "explore the potential impact of this untapped natural gas source on the future global energy mix". After the green loonies have all but shut down the CSG industry, does anyone think they are going to allow the development of a methane hydrate industry? This will be just the next battlefield for them.

**tim** 23 hours ago

Talk about dog whistling. This isn't about either or. This is about increasing the % of energy generated from the renewable sector. No one has ever said the coal

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component should stop. Predictable hysterical response from the hard right.

**mike** 23 hours ago

@tim we're going to go bankrupt subsidising wind farms. Money needs to go into battery/ storage so that when the wind/sun don't shine, we have a store of power. Simply generating fine-weather power is the wrong focus entirely.

**tim** 23 hours ago

@mike@tim Going to go bankrupt.....good to see you have got your hysteria in check. Wind, solar and solar storage, geothermal, hydro. Again this is not just about wind.

**Ian** 23 hours ago

@tim Gary Johns is from the "hard right"? Who knew?

**Greebo** 22 hours ago

@Ian@tim Not even Gary himself, I suspect.

**Elio** 23 hours ago

@tim I suggest you check the Greens desire for Australia to be 100% renewable in the future and their official policy is to be 90% by 2030. The Greens absolutely want the coal industry shut down.

**tim** 23 hours ago

@Elio@tim Last time I looked the Greens weren't in power and even Labor won't be that stupid to do deals with them again if they happen to get into power which will be highly unlikely.

**Elio** 19 hours ago

@tim@Elio Last time Labor were in power it was only because of a deal with the Greens. And yes, Labor are THAT stupid.

**Andrew** 22 hours ago

@tim But Tim, yes they have. The green movement has expressed the desire to

close the coal industry overnight by whatever means is available to them.

**John** 23 hours ago

Shorten's Quixotic tilting at windmills, saddling us with astronomical prices for unreliable wind-generated electricity, is the ultimate example of Labor sending Australia the Bill for their own vanity causes. Labor gets to posture and preen among the similarly-deluded, while the rest of us pick up the tab. Forget it, Bill. We have hundreds of years of coal, and there's been no significant global warming this century, showing up 'climate change' for a scam. Get over it.

**Glenton** 23 hours ago

@John Agree. Clean coal technology is surely a more worthy cause. And worth spending money on instead of fantasy renewables conjured up at the ongoing socialist hand ringing latte sessions!

**john** 1 day ago

Big Wind Shorten's renewables will out-do Back of Envelope Rudd's \$60 billion NBN cash-trash.

**Quentin** 1 day ago

It's a dismal commentary on my side of politics that Shorten has failed to learn from the staggering waste on the never-used Victorian Desal plant (\$24 billion over 20 years), the billions wasted on feed-in solar subsidies (now withdrawn), many more billions wasted already on wind turbines (which can't power a single house 24/7) but which do enrich a tiny number of large landowners at the expense of their neighbours.

I doubt that Shorten has any idea of the environmental impact of turbines: a large plant covers 200-300 sq kms, with hundreds of km of roads and expensive grid connections. Gillard promised \$1 billion to wind spivs just for grid connections...



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And all for unwanted, useless, intermittent, grid-destabilising power.

**Swee** 22 hours ago

@Quentin I think it is beginning to dawn on Bill that his grand announcement on the 50% RET is problematic - big time.

Mark Butler is not going to be popular with Bill. But perhaps this is part of the Left's clever strategy.

**Geoff** 19 hours ago

@Quentin Maybe the answer is to send Bill Shorten a pack of beer coasters and a pencil. At least he can do a Rudd-standard analysis of some policies.

**Barry** 1 day ago

Has the earth been going for a few million years and was there an ice age or three and was coal made from a previous warmer period. Just asking!

Thanks Gary for the brilliant analysis and reality check. First time I have heard of the methane hydrates. Seems that we have many options yet to be heard of.

I recall the old farm "Freelight" - An exact mini replica of today's giant windmills. My father climbing the 40 foot tower with the generator around his neck to place on the tower and the TV picture going in and out or shrinking dependent upon the reliability or variability of the power and the battery level dependent on the wind.. It went for a while and then disappeared in to history replaced by a diesel generator and then by a SWER 240 system from the grid which was paradise compared to diesel motors which started at the turning on of alight and when the brushes on the commutators got a bit dicky refused to turn off and meant getting out of bed and walking in pyjamas for 100 metres to the shearing shed to switch the diesel generator off and the walk back without tripping over the obstacle course.

Please tell me Gary that I don't have to go back to that.

**Graham** 1 day ago

Whether global warming is real or not, I don't altogether rubbish the idea of renewable energy. However, the truth must be told about the cost - not some airy fairy statements which the Greens and Labor would want us to believe. And it must cost extra - nothing is for free. I just hate it when Labor and the Greens say that this alternative energy will produce myriads of jobs - just prove it. Sure there will be some employment in making the stuff, but not Australian workers. Even with the Chinese making this stuff, it costs a motza. If we have to buy Australian, it will cost heaps more by the time the unions skim off paybacks etc. The number of employees cast off when the power stations close may be able to get a job making these things. Just provide the true costs and be done with it.

**Paul** 1 day ago

Good on you Gary - someone at last is pointing out the obvious. Modern society runs on steel, aluminium and glass, none of which can be produced using alternative energy. It simply does not produce the megawatts required. And CO2 ? The more the better as it increases crop yield.

**Dico Ergo Cogito** 19 hours ago

@Paul said "steel, aluminium and glass, none of which can be produced using alternative energy".

Electricity is electricity no matter how it is produced. Perhaps you don't realise that the Manapouri power station at the bottom of NZ is a hydroelectric power station that supplies all the power needed for the nearby aluminium refinery (near Bluff.)

**Paul** 12 hours ago

@Dico Ergo Cogito @Paul You may not have noticed that the world is sadly short

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of a swathe of conveniently located hydro sources. Oils ain't oils and electricity is not electricity. The megawatts required for heavy industry have never been produced by solar or wind farms. Real power requires real heat. Leave solar and wind to provide a light in the chookhouse.

**Dave** 1 day ago

If those who claim humanity is in peril because of carbon fuel consumption were genuine, they would be flocking to support the only option that would substantially reduce it. In fact they argue vehemently against nuclear power, using arguments that do not stand honest appraisal. The whole climate debate is driven by and is a cover for a not so hidden political agenda.

**karl** 1 day ago

Seems today's getup activists are having trouble coming up with facts with which to pull apart the main thrust of gary's article. Darryl and tristran will have to come back to us after little lunch is finished at whatever school they are currently attending and enlighten us with something other than name calling.

**Loaded Dog** 23 hours ago

Darryl and Tristan are the aliases of the Getup cliché generation robots. Highly unlikely that they are powered by renewables.

**Susan** 1 day ago

In history, society had witches and fairies at the bottom of the garden; now it has coal - and renewables. Good v Evil.

**bob** 1 day ago

My granny reckons, 'that global warming' is a good thing if it's cheaper than electricity!

**Loaded Dog** 23 hours ago

Would certainly save on heating costs during the frigid summer that we experienced. Does anybody else suspect

that Tim Flannery has taken global warming with him after the bureau of ALP climate propaganda was revamped?

**Sydney** 1 day ago

Please let reality happen concerning this Global Warming rubbish. The world has been hoodwinked by Al Gore and others who have had massive financial gains from their trickery. It is a good thing to reduce the pollution of the world but let those who are causing the pollution bear the cost.

**Richard** 1 day ago

Some questions for Bill Shorten:-

Is climate change a real and imminent threat? Or is the pause in global warming since 1998 proof enough that climate change models are unduly alarmist. Where is the evidence?

Is the world heading for a little ice age?

As a really small producer of CO2 compared to world volumes, is it important for Australia to lead the world and allow cost burdens to cripple our industries which all move off shore to somewhere else where they do not bother worrying about climate change?

Is it smarter to go nuclear? Europe does, and this is where much of their clean power comes from.

Would it not be smarter to allow technology time to develop so that renewables are introduced when they are cost competitive, rather than cost prohibitive?

What is the great rush for? What does it actually achieve? What will it cost?

**boon4321** 19 hours ago

@Richard I dont think Bill Shorten is going to respond but here are a few answers...

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"Is climate change a real and imminent threat? Or is the pause in global warming since 1998 proof enough that climate change models are unduly alarmist."

- the scientific evidence (not talking about blogs and opinion pieces) overwhelmingly says it is real and a threat. The temp record says warming continues in the ocean and on land - note the 9/10 record warm years this century.

"Is the world heading for a little ice age? "

- No. Climate science does not predict this.

"As a really small producer of CO2 compared to world volumes, is it important for Australia to lead the world...'

- We do not lead the world in emissions reductions, or development of renewables.

"Is it smarter to go nuclear?"

- Let's have a factual discussion and see where it fits in the energy mix. Most public arguments for and against are out of date.

"What is the great rush for?"

- Based on current and projected global emissions, it doesn't seem like any country, especially Australia, is in a rush.

**John** 13 hours ago

@boon4321@Richard "the scientific evidence (not talking about blogs and opinion pieces) overwhelmingly says it is real and a threat. The temp record says warming continues in the ocean and on land - note the 9/10 record warm years this century."

Can you point to a page/paragraph in the IPCC report that shows this evidence?

It is the opinion of one section of government funded Climate scientists who rely on climate models. (all wrong)

Yes we are warming, it has been warming for over 300 years with little acceleration since the additional CO2 has been added.

**boon4321** 10 hours ago

@John Evidence that climate change is real... if you really want to look at the IPCC report i would suggest starting with section 1.3 of the synthesis report. Depending on your scientific literacy, you may be better going to the journal articles.

An easier intro would be going to a site like CSIRO or NASA ... there are many reputable institutions with lay summaries of the AGW.

*"It is the opinion of one section of government funded Climate scientists who rely on climate models. (all wrong)"*

- well its more than one section, it is a consensus approaching 100%.

*" it has been warming for over 300 years with little acceleration since the additional CO2 has been added"*

- that is a minority view not shared by more than a few climate scientists.

Where do you get your ideas from may I ask??

**Peter** 33 minutes ago

@Richard 1.The pause is over if it ever started 2014 hottest year ever 2015 YTD much hotter

2. No

3. As one of the richest countries on earth with the highest per capita emissions in the OECD should we not do our fair share

4. Europe is closing more nuclear plants than it is opening and the few that are being built will produce power at about 3 times the cost of wind and solar over their life. The currently proposed plant in the UK will receive E100 billion in subsidies over its life for one plant.

5. The two countries that are still building a lot of coal China and India are finding that even without accounting for the health

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costs from coal dust and power station pollution, (heavy metals NOx SOx etc.) renewable bids are within 10-15% of new coal. Not only that renewable prices are fixed for 20 years This is not the case with coal fired power stations because the operators are at the whim of energy market.

In conclusion it is a 15 year program that will leave us behind most of Europe, China Canada and the USA. It requires that we install as many solar panels in 15 years as Italy did in 18 months or 1/3rd as many wind turbines in 15 years as India is planning in seven. No rush not too hard and over time will be cheaper than installing and operating the same amount of fossil fuel energy

**Logical** 1 day ago

Bill Shorten has hung his promises on a bag of hot air. I'm not sure what's worse i.e. that Bill actually believes the promises, or he thinks we do.

**Rod** 1 day ago

I'll be interested to see how all the delegates arrive at the climate summit in 2030. Good luck arriving in the single seat solar planes made of recycled materials. Paragliders perhaps ?

**Anne** 1 day ago

At a rough guess I'd say most of them will arrive in great big jets up the point end of the plane then be driven by limousine to 5 star hotels. Their consciences will be clear no doubt by using extra money to pay for carbon offsets (what a joke) and possibly using their towels twice although all that really does is save hotels money. The whole laughable meeting will be paid for by everybody else too and Nature will keep doing whatever it feels like anyway.

**Terry** 21 hours ago

@Anne Their consciences will be clear because they know that AGW is a scam.

It helps to promote the UN's Agenda 21 and the NWO. For a picture of the proposed future of the world look back to the old USSR.

**Loaded Dog** 23 hours ago

The could have Astral travelled.

**lindsay** 1 day ago

Oh Comrade Gary. Remember what they did to Martin Ferguson.

**Darryl** 1 day ago

Gary - what a lot of hot air. The debate on renewable energy is just too simplistic. Our transition to a new energy future requires long term policy to guide transition to new technologies from electric vehicle charging, micro-grids to smart storage and smart metering. Plus a diversified portfolio of renewable energy whilst retaining some (target 50%) gas and coal generation. It can be achieved in 15 years with new investments in smart systems off setting traditional and allowing the retirement of end of life assets. Can we please turn our minds to an informed debate?

**K** 1 day ago

@Darryl So where is the debate and where is the information. All I ever see are motherhood statements such as yours and no analysis of anything.

Any time anyone raises their suspicions about the veracity of the global warming cults claims and puts an alternative view we get the religion like arguments. Never debate.

**Wayne** 1 day ago

@Darryl. Seems you missed your chance to start a debate. Gary wrote a very interesting article articulating his argument, his comments sounded logical and referred to seemingly reliable sources. You on the other hand came out with the

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usual fact free Green drivel. Where were your arguments and facts?

**Rick** 1 day ago

@Darryl Our transition to a new energy future is simple and requires no long term planning by government. All government needs to do is get out of the way. Scrap the RET and all other taxpayer subsidies of energy. Scrap the de facto ban on building dams and ensure there is an appropriate regulatory environment to enable private money to build nuclear power plants if they ever become economically viable.

**Terry** 23 hours ago

@Darryl But it cannot be done cost effectively.

Business will not invest when they can't turn a profit.

The taxpayers can't afford to subsidise all you say.

Households still cannot afford rooftop solar without subsidisation after all these years.

Currently we sending ourselves broke by trying to transition to somewhere that no one knows the end game.

What will be 100% renewable look like? Someone needs to define 100% renewable.

**Swee** 22 hours ago

@Terry@Darryl Someone needs to define 50% RET. Is it 100% capacity to meet peak demand, but running 50% of the time (optimistic if the sun shines 50% of the time and wind turbines produce 30% of the time)? Or is it 50% capacity to meet peak demand running 50% of the time (in which case, is it only 25% RET?)? I would ask Bill, but I suspect he does not know either.

**tim** 22 hours ago

@Darryl Well said Daryl. Gary continues to panda to the hard right to drum up a bit

of controversy. No one has ever said get rid of coal.

**Victoria** 20 hours ago

@Darryl And let the market rule Darryl, not your political beliefs. Let the market attain the suitable solution to renewable energy not the unknowing (that is not rude, insulting) tax payer. If the large % of Australians are as concerned about global warming as some polls are presented, then the push to buy will make the market respond as it has been ever thus. New technology is presented and people choose to buy for whatever reasons. But stop pontificating on what is some stupid political promise and stop promising tax payers money on what is a commercial opportunity. The swing to sustainability is huge - it does not need propping up to satisfy a political argument. Answer any tender in this world for any service or product and a section will ask what your sustainability approaches and accreditations are. Give up and trust the people to care not just you.

**Thomas** 1 day ago

You are so right. The Snowy Mountains Scheme would never have been built without fossil fuelled vehicles and migrants brought to this country by oil powered ships. It should never have been built and should be demolished immediately.

**Scott** 23 hours ago

You are comparing apples & oranges. Sure the snowy scheme is a resounding success. The technology is completely different to wind farms. The Snowy Mountains Scheme would never have a chance of being built today. The greens would find an endangered snow frog and tie the whole lot up in red & green tape until it became unviable, or too much of a political hot potato.

**JJ** 1 day ago



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It is probable that history will make fools of us all. I would just add that overall technology marches on. And that meddling in the market via "targets" code for innovation sapping bureaucratic stasis, will inevitably make us poorer and less prepared for the next big thing. What if there are breakthroughs in any areas not "liked" by this clique of hand wringers? Must we always commit to stupid

**Erzsebet** 1 day ago

Exactly who are all these mystery renewable energy capitalists, working the system, to get their claws on all these taxpayer-funded government subsidies? Are they Australian citizens, or foreign entities?

**David Baku** 1 day ago

One small correction on the cement production. One tonne of cement comes from 1.7 tonnes of materials and the 700 kgs lost, is carbon dioxide that goes up the stack. China produces 1.7 billion tonnes of cement every year. This means almost 1.2 billion tonnes of CO2 up the stack in china. Makes our carbon footprint a tad inconsequential.

**karl** 1 day ago

Would like to know the source that says it takes 700kg of carbon dioxide to make 1000kg of cement. That sounds implausible.

**Alexander** 22 hours ago

@karl not so implausible if you have ever visited a cement plant. The cement is produced in a huge tube about 100m long, heated to 1300 degrees.

**David Baku** 12 hours ago

@karl I was the CEO of a one million plus tonne of cement plant. I assure you it is correct. The calcium carbonate in the limestone turns itself into co2 and cement.

**Clare** 1 day ago

At last: something the Warmist Clans should read and maybe they'd understand the stupidity and pointlessness of trying to 'save the planet' by using so called renewable energy.

**David Baku** 1 day ago

@Clare Correct Ms Clare They should read but will they.

**Tony** 1 day ago

@Clare I expect they know it full well. How much of China's investment in 'renewables' is supported, read funded, by outside dollars. China is still a recipient of aid funds and they are ever willing to receive funds donated by those who are desperate to give cash away.

**Paul** 1 day ago

Excellent article, Gary. Two further points you omitted were that renewables cause volatility in power supply that can only be smoothed out by gas or diesel plant, and they also create fluctuations in the network frequency which have to be ironed out by either the most CO2-intensive gas plant (OCGT) or diesel plant.

**horse2go** 1 day ago

Of course and very well said. This sensible opinion will not unfortunately be, as it should, the last word on the subject. Of that I am sure.

**Tristan** 1 day ago

Just another clot [sic] from The Australian who doesn't let the facts get in the way of a non-story. Fundamentally he doesn't compare the significant auxiliary loads of a coal fired power station - about the output of ten wind turbines every second. All of which go's straight up the chimney and into the atmosphere.

**Randal** 1 day ago

@Tristan Strangely dissonant sounding. The author is not attempting an exhaustive comparison of windmill vs. coal energy

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production costs and benefits, but shooting down the commonly held belief that windmill energy production itself is renewable. But now that you mention it, this trait you mention of coal-fired stations is a major reason why windmills don't decrease CO2 emissions. Not only does it take significant CO2 emissions to create a windmill, but because it cannot operate as baseload power, other (fossil fuel or nuclear) plants must be on standby -- they have to be running at all times since they cannot be turned "on" in an instant. And, as you point out, "auxillary loads" for fossil fuel plants result in yet more CO2 emissions, and fossil fuel use. Which is the point of the article.

**Tristan** 1 day ago

What do you think coal fired power stations are made of? Disingenuous Luddites

**Anne** 1 day ago

No. Luddites subscribed to not using improved technology and power stations improved a lot of technology. Smashing power driven looms didn't exactly stop the industrial revolution nor did the mythical Ned Ludd. Being a smart Alec isn't particularly impressive.

**Suzie** 1 day ago

@Tristan Yes; that is a very good point Tristan. I think this is where this article misses the mark - it is focussed on the environmental cost of production more than operation. The real concern with wind (and solar) is the variable nature of their power generation and the lack of viable technologies in storing power. In relation to the latter, there seems to be deathly silence on battery waste, useful life and solutions which operate at grid-level capacity. Until that is solved, I don't think wind and solar are really viable solutions, although there is certainly still great potential with renewable energy sources.

**Terry** 23 hours ago

@Tristan Coal??

**Peter** 22 hours ago

@Randal@Tristan If you only have one windfarm or one solar plant the output is very intermittent but if you have thousands of installations spread over thousands of kilometres then overall output rises and falls much more predictably and can easily be supported with hydro, (pumped hydro as well later) and the existing gas plants

In SA is at 40% renewable and is shutting down coal fired stations and is importing far less power from Victoria than it used to.

Texan studies have shown that the hot energy consuming spinning reserves used to back up slow ramping coal stations actually cost more to run than cold hydro and fast ramping OCGT to back up wind and solar so in fact wind and solar do reduce the running time of thermal stations and therefore CO2 emissions.

**Stuart** 1 day ago

@Tristan Huh?

**Randal** 1 day ago

Anyone have a link to how much of a windmill's lifetime (using reasonable assumptions of course) is needed in order to produce more energy than it has consumed?

**Wayne** 1 day ago

See @Myron below, "I recall Professor Bjorn Lomborg has been pointing out how the truth is that the 'carbon footprint' of wind turbines is so bad that over their design life they do not generate enough 'free' (cough) electricity to even offset the conventional energy required to make them (steel, concrete etc) in the first place." You could probably Google it to confirm the quote but it doesn't sound

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unbelievable, particularly after reading the article by Gary.

**Paul** 1 day ago

@Randal As a slight aside, a university study a couple of years back investigated the total energy consumed over a vehicle lifetime, from mining, shipping, production, driving, servicing, and finally scrapping. Turned out that a Prius used far more energy over its lifetime than a Humvee.

**Peter** 22 hours ago

@Randal Yep Siemens recently published a study that says it has recovered its entire energy cost for manufacture and installation of a wind turbine in 12 months. Siemens also makes gas turbines so it doesn't care which technology you use. Some people are claiming that the new GE spaceframe tower and advanced turbine will return its energy cost in 3-6 months

**toby** 22 hours ago

@Peter@Randal is this because they get to depreciate 50% of the cost in the first year and 100% by year 5? Does it also require it to be running at 100% capacity when in reality they run at closer to 30%? Does it include the cost of removal when they "die" on average after about 15 years despite also being rated to last 20-25 years?

**Peter** 3 hours ago

@toby@Peter@Randal No Toby, it is at expected output over a year which they contract to provide, it has nothing to do with depreciation rates it is energy in vs energy out. Re replacement, let's talk about a level playing field, how come many of the coal mines in the world suddenly run out of money when it comes to returning the site to its previous state. How come there is not one nuclear power station in the world which has enough funds set aside to cover decommissioning let alone storage of waste for thousands of

years. If fusion comes along and replaces all wind turbines there will be about 30sq km of land that is permanently ruined in Australia, this is less than a few % of the land ruined by coal mining let alone CSG.

**Darren** 1 day ago

Ah, facts, the antithesis of all Green-Left policies. The new Green Alchemists are trying their hardest to convince us that these "disruptive" renewable technologies will replace evil fossil fuels within the next decade or two. The only thing keeping their kite in the air is billions of dollars in government subsidies. Paid for by the world's taxpayers and developing nations.

**Antonio** 1 day ago

The once great Labor Party has become the submissive plaything of the Greens. In order to keep the Greens onside for their preferences, Labor has had to embrace an increasingly leftist /inner-city, green agenda - clearly not in the best interest of the nation.

The Labor Party needs to totally eschew the Greens - preference them last - so that they can regain the left of centre space in Australia's political landscape. Failure to do this will consign Labor to an insignificant socialist rump. Keep up your good work Gary.

**Myron** 1 day ago

Thank you Gary. We have to SHOUT this from the rooftops. The simplistic uninformed debate when the ALP 50% renewables came up on Q&A in Brisbane tonight was just so sickening, I really despair. I recall Professor Bjorn Lomborg has been pointing out how the truth is that the 'carbon footprint' of wind turbines is so bad that over their design life they do not generate enough 'free' (cough) electricity to even offset the conventional energy required to make them (steel, concrete etc) in the first place. This is exactly what Gary has now provided this great detail on.

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For heaven's sake, the community and their elected Government have to grow a brain and THINK. This is complete madness for the latte-sipping folk to promote and believe. The West is being dragged to its knees economically with this utter stupidity. Enough!!

**Terry** 23 hours ago

@Myron Most of us have known this from day 1. We have been shouted down and called deniers. But the truth is there for all to see if we look. We have been let down by media who simply don't understand the facts. Thank-you Garry Johns and Graham Lloyd who are starting to report the real facts.

**Loaded Dog** 1 day ago

I would not expect anybody who brayed for 50% renewables to have any understanding of base load or the costs of construction, maintenance and disposal of hippy supplements to serious electricity generation. Excellent article Gary. Properly researched and analyzed as usual.

**Tristan** 1 day ago

He's not going to take you out to dinner no matter how much you like his appalling ill-informed fish and chip wrapper.

**Michael** 1 day ago

Hi Tristan. It must be truly appalling. To have information presented to you that flies in the face of all you hold close to your heart. Gary Johns can't help you there; it's your problem alone to deal with. As for ill-informed, you'll no doubt take great delight in putting forward the contradictory information you have at your fingertips in order to educate Gary and the rest of us. Please detail the correct figures regarding the resources that go into the manufacture and operation of wind turbines. I can't wait to be disabused of Gary's shoddy figures. Regarding fish & chips, I'm wondering how your 01:00am online version can be used to wrap your

lunch. Did you print the page onto old newspaper?

**Peter** 22 hours ago

@Loaded Dog Properly researched? Wrong on almost every so called fact. Energy ROI on modern wind turbines 2000%! Area needed for 50% renewables less than the Latrobe Valley power precinct. Energy consumed by wind turbines during operation a smaller proportion of power output than coal, electric furnaces don't exist, etc., etc., etc..

**Kevin** 17 hours ago

@Peter@Loaded Dog The EROI for a wind turbine is approximately 1800%. But when you take into account the foundations, roads, link to the grid and constant maintenance, plus the electricity requirements to make the thing work, this falls to about 1200%. Then you have to take into account the necessity to keep fossil-fuelled generators to step in within a few seconds, when the wind doesn't blow, which is often, given the variability of the wind, the EROI falls even further. If you add storage it falls below the required EROI for a civilisation such as our own. The fact that wind accounts for a derisory percentage of electricity produced worldwide is proof of its incapability. I'd say that you were totally wrong.

**Peter** 3 hours ago

@Kevin@Peter@Loaded Dog Kevin The EROI takes into account the foundations etc. The maintenance and operating cost including operating power are less as a % of delivered power than that of a thermal power station. As I keep saying all systems require storage or backup even France imports power on cold mornings and hot summer days and it has quite extensive hydro and pumped storage as well as 70% nuclear.

Your comment that wind supplies a derisory % of power around the world is

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like saying in 1960 that no-one would seriously consider natural gas for baseload power and yet now in the US it delivers more power than coal. Wind turbine capacity factors are improving all the time and cost per MW.hr delivered have halved in the last 5-6 years and will continue to do so. In the next 2-3 years world output of wind power will exceed world output of nuclear. Are you saying that nuclear power contributes a derisory amount of power to the grid.

South Australia imports less power from Victoria than it ever has and yet it is closing its coal fired power stations and it has no hydro and no storage so your comment that renewables require seconds level sync with thermal was never true and is becoming less so every day as capacity factors increase and forecasting of both load and weather allow more and more time to ramp up and down the better and more efficient hydro and thermal stations that we will need. The Fraunhofer Institute believes that Germany will be able to get to 60% renewables before needing to spend serious money on storage and as a % of its grid it has less hydro with smaller dams than we have. That figure will be further diluted as more of their wind comes from high capacity factor farms and thermal storage and load shifting become better developed.

**Loaded Dog** 13 hours ago

Your computations have imitated the punter who loses a wad on every race but one. On the race that they did win they bet \$2.00 and collected \$4.00. They then relate how they had a big win at the races where they doubled their money @Peter.

**Peter** 3 hours ago

@Loaded Dog Facts Loaded facts?