

A solution to our electricity problems

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1. The need for an economic and reliable supply

No modern society can exist without an economic and reliable supply of electricity. It is the lifeblood of the economy and if it is absent or excessively expensive, the economy nose dives.

2. Recent events

On the night of Monday, 27 July the peak demand was not abnormally high, solar power was nonexistent, wind power was low and the DC link was fully loaded feeding hydropower from the South Island to the North Island. The system was close to its limits. If the lakes had been lower or the DC link or a major generator tripped off, the System Operator would have had to resort to forced load shedding.

The same thing happened on 4 August. On 7 August the peak demand was slightly higher but there was adequate generation available because wind power was higher and Huntly was running flat out.

The fundamental problems were a severe shortage of gas, as a result of the previous government closing down exploration, combined with the blind pursuit of net zero.¹

"Demand-side management" a.k.a. forced reductions in demand, is much talked about, there was no sign of it during these high peak demands. Before the electricity reforms all domestic water heaters in New Zealand were controlled and, if that had still been the case, the peak demand would've been about 500 MW less.

3. A lost opportunity for demand-side management

New Zealand engineers have developed a system that could supersede the old ripple control system and also help with the management of frequency – which is becoming more and more difficult because we have increased the amount of wind and solar power. The same technology could be used to dump all heat pumps for a few minutes in the event of a serious drop in frequency thus reducing



¹ <https://newzealandenergy.substack.com/p/power-matters?r=ubsbu>

the chance of needing AUFLS.² For reasons that I do not understand the Electricity Authority and Transpower have refused to consider this as a viable way of helping to manage demand and keeping the system stable.

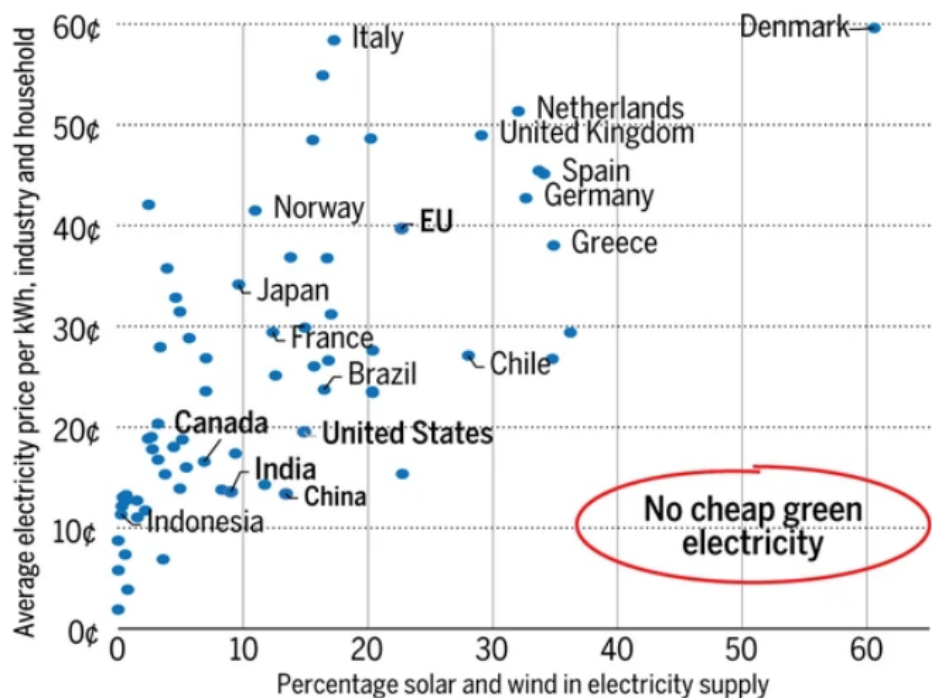
4. Net zero is a disaster

The British Conservative party and many people in Europe agree with the USA that pursuing net zero is a futile and expensive occupation because, for as long as India and China keep on building coal-fired power stations at a rapid rate, nothing that any of these countries will make the slightest difference to the climate of the world. All the money that is spent on net zero is squandered. Every country that has adopted large scale wind and solar power has seen consumer electricity prices increase.

One example of this madness is the proposal to subsidise plug-in solar — small solar panel units that households can hang off a balcony and plug straight into a wall socket. They are expensive and inefficient. This also indicates how far our power system has drifted from its fundamental objective – to provide a reliable and economic supply of electricity. An objective that seems to be forgotten by the Electricity Authority, industry leaders, and many other influential people.

ELECTRICITY COST DEPENDING ON SOLAR, WIND USE

Weighted average cost of household and industry costs, in Canadian 2024\$



SOURCE: [HTTPS://IEA.ORG/DATA-AND-STATISTICS/DATA-PRODUCT/ENERGY-PRICES](https://iea.org/data-and-statistics/data-product/energy-prices)
FINANCIAL POST

A utility-scale solar farm looks cheap only if you ignore the cost of the batteries, gas peakers, and transmission capacity needed to keep the lights on every night and on cloudy days. Once this backup is priced in, solar turns out to be expensive. Rooftop solar is worse than solar farms: roughly three times the cost. This is because of the smaller size and installation costs. Policies for boosting plug-in solar power show that the politicians promoting it are badly advised and motivated by futile virtue signalling. The same can be said for wind power.

² AUFLS - Automatic under frequency load shedding

5. Wind and solar increase power prices

Another example of the lack of reality is that reports from Transpower, MBIE, and others all make the same underlying assumption: that New Zealand can build a power system dominated by wind and solar and still, somehow, avoid power cuts at all times and at a reasonable cost. All their predictions rely on batteries – which are seriously expensive³ – and “demand-side management”.

Domestic water heater control apart, “demand-side management” means draining home batteries and electric vehicles when the grid cannot meet the demand, and expecting industry, commerce, and households to do without when the grid supply is insufficient. There is no working example anywhere in the world of demand-side management being used in the way that these reports assume — it is a pious hope, not a proven option. What will actually happen is that dairy farmers and factories, hospitals, data centres and anyone else that is critically reliant on a continuous supply will start up their existing emergency diesels and, if necessary, buy new ones. We will have joined the Third World.

6. Problems with the market

The underlying issue is that New Zealand's electricity market design was based on the belief that a short-term spot market with hedging would magically deliver a reliable and economic supply in the long-term even though this was not its prime objective. This belief has become an article of faith in spite of the fact that we had to reduce electricity demand from industry and the smelter to keep the lights on in 2024. Under this market, the way to make a profit is to keep the system on the edge of a shortage⁴. This guarantees problems in a dry year.

What we need is a nationally coordinated market with the prime objective of providing a reliable and economic supply based on long-term contracts with generators. New generation would be secured on the basis of international competitive tenders for long-term generation that will deliver power when it's needed, not just when the wind happens to blow and/or the sun shines. Under this market, wind and solar would have to compete on genuinely equal terms, because the system coordinator would factor in their true cost by including the cost of the backup capacity and extra transmission they require, rather than passing this cost onto all consumers⁵.

If we do nothing, the electricity spot market will constantly switch between long periods of low prices punctuated by runaway prices when wind and solar power are not available in large quantities. Developers of wind and solar power are likely to go bust and gentailers who have over-sold hedges will be in trouble. Consumer prices will increase steadily. Not a pleasant prospect.

³ <https://www.technologyreview.com/2018/07/27/141282/the-25-trillion-reason-we-cant-rely-on-batteries-to-clean-up-the-grid/>

⁴ Parting statements from two gentailer CEOs

⁵ <https://thegwpf.org/publications/power-systems-expert-calls-for-a-new-electricity-market/>

7. Conclusion

Four changes are needed to put the system on a sound footing.

- First, abandon the net-zero target, because the pursuit of net zero increases electricity prices and drives out industry.
- Second, restructure the electricity market along the lines above, so long-term benefits — not short-term spot prices — drive investment decisions.
- Third, expedite exploration and development of new gas fields such as Kawera⁶, north of Taranaki.
- Fourth, build new despatchable generation – more geothermal and hydro plus a new coal-fired power station. Hampton Downs, close to the Waikato River, with Maramarua coal transported by ropeway or conveyor has already been identified as a plausible site. At the same time, seriously evaluate nuclear power: factory-built reactors of around 300 MW are expected to be commercially available within a decade, and would provide reliable, low cost generation⁷.

The payoff would be substantial: something in the order of \$4–8 billion a year saved by abandoning net zero. This would give us a cheaper and more reliable electricity supply plus the associated economic boost with plenty left over for building our resilience against an ever-changing climate. It will also reduce living costs because net zero increases the cost of almost everything we buy. The cost of electricity and transport will certainly be reduced by a noticeable amount. A country that isn't rationing power during dry years, or subsidising the least efficient forms of solar generation, will prosper.

Those people who still believe that if we reduce our emissions of man-made greenhouse gases, our climate will improve, are likely to object strongly to dumping net zero. What we need to point out is that nothing that New Zealand does can change the climate of the world – and hence the climate of New Zealand. They also need to understand that of the 195 countries that signed the Paris Agreement, only 18 have reported on progress. Fifteen out of the 18 admitted that they had failed to meet their targets⁸. It's safe to assume that the remainder are also backsliding.

All over the world, governments and others are beginning to realise the impossible cost and ultimate futility of net zero and many are resiling from it. New Zealand has an opportunity to set an example to the rest of the world!

Bryan Leyland is a power systems engineer with more than 60 year's experience in New Zealand and internationally.

⁶ <https://newsroom.co.nz/2023/12/07/todd-energy-applies-for-offshore-gas-mining-permit/>

⁷ <https://smrintel.com/smr-cost-per-kwh/>

⁸ <https://www.statista.com/chart/26102/emission-reduction-goal-and-projected-achievements-by-country/>