

CAN NUCLEAR SHARE THE GRID WITH WIND OR SOLAR?

No!

Nuclear could, in theory, fill in the gaps in wind and solar generation. But we must not plan to do this, because the result will not be a low-carbon grid.

Some nuclear plants can, technically, be quickly turned up and down, but there is no point in them doing so. In practice, quickly turning down a nuclear plant does not usefully save fuel or reduce plant wear. Rather, it tends to do the opposite, poisoning the fuel, stressing the plant, making operation more difficult. More importantly, the cost of nuclear power comes from building and maintaining and operating the plant, and paying the interest on money borrowed to do that. So, if a nuclear plant is likely to operate below full capacity and consequently get paid less, it won't look financially viable, so it won't get built in the first place. This is the whole point of intermittent types of generation, like wind and solar. They don't serve any useful purpose for a future world, other than to deliberately make nuclear non-viable. That's exactly the reason the fossil fuel industry promotes them. Without lots of hydro, the only economically viable way to fill in the gaps in wind and solar generation is with fossil fuel (normally gas) because fossil plant is cheap while fossil fuel is expensive, so the spasmodic energy from intermittent renewables actually saves some money in that situation. For as long as there is wind and solar generation, there will be a market for

fossil fuel, used both to fill in the gaps in generation and to manufacture intermittent infrastructure. That's precisely the reason why intermittent types of generation (like wind and solar) exist - not to generate electricity themselves, but to make sure that fossil fuel will continue to be used to generate electricity.

Imagine a nuclear plant, running continuously flat-out in the only way that is sensible for a nuclear plant, but being used merely to fill in the gaps left by wind and solar. Since the wind and solar output will sometimes go down almost to zero, the nuclear plant has to be able to produce all the grid's maximum demand on its own. The result of nuclear and intermittent renewables both supplying a grid in this way will be surplus electrical power, always equalling or exceeding what is coming from the wind and solar generation. In other words, power from wind and solar will always be completely superfluous, meaning there is no point at all, ever, in it being generated. Except of course, that it is there to deliberately sabotage the nuclear industry.

Ah, you say, but the surplus power can be turned into hydrogen (or something) and the hydrogen can be stored then burnt to generate electricity later on. And indeed, technically, such a thing is (just about) possible. But "cold" conversion of intermittent electricity

into hydrogen, plus storage, then conversion back again is extremely inefficient, multiplying the fossil carbon footprint of its original generation by a factor of at least three. Also, even in the first place, the apparent carbon footprint of electricity from wind or solar is higher than the lowest carbon footprint possible from nuclear-generated electricity. It therefore makes more sense to use surplus electricity from nuclear generation (whenever consumer demand for electricity is low) together with surplus heat from nuclear, to do efficient "hot" synthesis of hydrogen, which has a much lower carbon footprint. Can't surplus electricity from wind and solar be used along with surplus nuclear heat? Well, yes, but it's really not worth bothering to do that, because surplus electricity from nuclear is available more conveniently and right where it needs to be, next to the heat, and it may vary less abruptly. Intermittent electricity from any source has rather low value anyway, it being stuff that is inconvenient and expensive to utilise, so it doesn't make sense to spend a lot of money and emit a lot of CO₂ in order to inefficiently make it in the wrong place.

How did we get into this mess? Until recently, there was a pretence (despite ample evidence to the contrary) that what we needed was merely a reduction in the carbon footprint of our energy. Wind and solar superficially appeared to make sense in that context, because they reduced the amount of fossil fuel burnt to power the grid. Now, we recognise that fossil fuel use must

stop completely (or be fully counteracted) so it should be more obvious to everyone that nuclear and hydro (and, in some places, geothermal) are the only feasible way to do it. Furthermore, many of us can now see that wind and solar are nothing other than Trojan horses, specifically designed to wreck our progress towards low-carbon power production, not help it.

The excuse that wind and solar can ever contribute to grid decarbonisation has successfully been used for decades to direct financing and investment away from civil nuclear. Without that, we presumably would already have built a lot of nuclear generating capacity by now, instead of wasting the money and time on wind, solar, batteries, grid redesign and related self-evident absurdities.

The myth about the potential usefulness of renewables does not just cause money to be misdirected. For example, it also facilitates continuing destructive initiatives like Germany's "Atom Exit" policy, which is destroying functioning nuclear plants. It also allows deranged market mechanisms, like those set up in parts of the USA and explained in Meredith Angwin's book *Shorting the Grid*. There, wind and solar are awarded such high subsidies (by virtue of being renewable) that they can bid for slots in the grid energy market at zero or below-zero prices. This creates an environment in which nuclear cannot compete economically, so nuclear plants close and their licences immediately are lost for ever, with fossil gas generation replacing them.

Tim Rickman, March 2021.