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THE CASE AGAINST SOLAR FARMS IN THE CENTRAL WEST REZ

COSTS

Wind and solar farms in REZs are promoted as a means of transitioning from electricity produced from fossil fuel to that produced by renewable energy. Unfortunately this transition will not be without cost. An evaluation of these costs can be summarised as follows. Wind farms can be viewed as a necessary evil, whereas solar farms are both unnecessary and more evil.

Both are evil in that they and associated transmission infrastructure industrialise and visually pollute the rural landscape.

Both create schisms in local communities in that the people who host these projects benefit financially, whereas their neighbours suffer both a loss of visual amenity and the consequent fall in property value.

Neither bring any long term economic benefit to local communities because the labour requirement for their operation and maintenance is very low. Furthermore the money spent on construction goes towards the purchase of overseas manufactured components and the wages of a mainly itinerant workforce. Even the money spent on leasing the site will not necessarily remain in the community if the owners, particularly of solar arms, choose to live elsewhere.

Solar farms are more evil in that the area covered by panels cannot be used for farming purposes. Solar farms are often promoted on the basis that livestock can continue to graze under the panels, but this practice is problematic and not widely adopted in Australia.

Solar farms are evil in that the area under the panels will be clear felled of all mature trees.It is difficult to see how this area could be rehabilitated to its original state when the solar farm is decommissioned.

Solar farms are more evil in that the vegetation growth under the panels creates a fire hazard. The enclosure of solar farms with 2m high chain wire fencing, the restrictive layout of the panels, the possibility of electrocution and toxic fumes from burning components create an extremely hazardous environment for fire fighting. RFS captains will be reluctant to expose crews to this risk. A fire can therefore spread unchecked across the entire solar farm with control limited to fighting the fire on a much larger front once it escapes from the solar farm,

It is not only the containment of fires that is a problem .Solar farms are approved on the basis that they do not impinge on the business activities of adjoining farmers. Farmers usually carry public liability insurance of $20 million. This amount will be totally inadequate for a claim made by a solar farm. Insurance will either be rejected or be prohibitively expensive for adjoining landholders.

INTEGRATION OF RENEWABLE ENERGY INTO THE ELECTRICITY GRID

To further explore the relative merits of wind and solar farms it is necessary to examine how well these methods of producing electricity match actual grid demand. The attached graph depicts average consumption throughout the day versus the average production of both wind and solar The area under each graph is 100 units and so the daily output of either wind or solar at 100 units will equal consumption of 100 units.

The divergence of solar output from the demand curve is clearly evident and will require 62 units of electricity to be stored and then returned to equalise supply and demand; that is to "firm" solar output. This figure corresponds to the output of rooftop solar (no batteries)

where approximately 40% of production is consumed on site with the remaining 60% exported to the grid.
These graphs do not take into account the inherent variability of both wind and solar output. More rather than less storage will be required. Hopefully there is some synergy in that the wind will blow on cloudy days and the sun shines when there is no wind. A mix of wind and solar should make electricity production more stable.The much greater amount of storage required for solar will bias the proportion of electricity production towards wind. Added to this is the reduced production of solar (1/3rd) during the winter months at NSW latitudes. The more solar in the system the greater this winter deficit will become.
Pumped hydro is the ideal method of electricity storage. However it is expensive and suitable sites for its operation are limited. Batteries are the next best option. Even though their price has fallen markedly, at current prices firmed solar electricity is prohibitively expensive. While rooftop solar has boomed the uptake of batteries has been minimal because of cost. Also consider a 400MW solar farm producing 2,000MWh of electricity per day. Using a 60% storage requirement to fully firm this output will require 1,200MWh of storage. Compare this to the original SA Hornsdale "big" battery at 130MWh.
These storage issues have been highlighted recently with the decision that rooftop solar may have to be "disincentivized" because of "congestion" in the electricity grid. Paradoxically this is at the same time that solar farms are being promoted in REZs. This problem is not a congestion problem. It is a storage problem.Solar electricity producers both rooftop and farm have not been prepared to outlay money to purchase the required battery capacity to firm output.
So why are solar farms required but rooftop solar needs to be curtailed. In a word money. Solar farms are a private enterprise built for profit. Rooftop solar undercuts this business model and so should be discouraged. Transmission line companies will encourage solar farms because they profit from the transmission of electricity from these farms. Unfortunately the electricity consumer must ultimately pay for all the construction costs of solar farms, associated battery and transmission line costs, their maintenance and running costs and their profit.
The solution? Rooftop solar if fully exploited has the capacity to supply all of Australia's grid requirements (2018 figures from a study commissioned by the CEFC). It will continue to expand even if batteries are unaffordable and so produce a glut of electricity in the middle of the day. This is exactly the same time that solar farms are producing electricity which if not firmed through battery storage will be unsaleable.Solar farms will not be economic under these conditions.
It is predicted that battery prices will continue to fall significantly. If and when this happens rooftop solar owners, both residential and commercial, will install batteries and become largely self sufficient.They will only require power on cloudy days and in the middle of winter; times at which solar farm production is at its lowest. Again solar farms will be uneconomic under these conditions.
Supporters of solar farms suggest that the glut of power production in the middle of the day could be used to charge Battery Electric Vehicles. Unfortunately owners of BEVs will prefer to trickle charge their vehicles when parked at night. Daytime "fast" charging will involve a wait of up to 30 minutes. Add to this a queue time for available charging bays, which will be compounded by the reduced range of BEVs that need to be refueled 3 times more often than conventional vehicles.
Green hydrogen is also being promoted as an ideal means of storing electricity, particularly for longer periods compared to the short term nature of battery storage. However it is inefficient {1/2 that of battery storage), expensive, dangerous and an unproven technology. There are huge problems with hydrogen storage and transportation If solar and wind farms can be built on the premise that hydrogen will become practical and economic, then coal fired power stations can be built on the premise that clean coal/carbon capture technology will become practical and economic. Even if green hydrogen proves to be viable WA with far superior wind and solar assets and available land will out compete NSW.

In summary solar farms do not make economic sense at either high or low battery prices. Solar should be left to rooftops and integrated with increased output from wind farms. Wind farms concentrated on the slopes and tablelands of NSW will all be subject to the same prevailing weather conditions and wind patterns. The best wind assets in NSW are to be found offshore {south coast) and with a different weather and wind pattern, should complement production from REZs. Against this is the increased cost of offshore wind farms and the perception that coastal views are more important than rural views.It is feasible as exampled by Victoria's plans for the massive Star of the South offshore wind farm.
A massive increase in energy storage will be required to make renewable energy "work". Big batteries should be built to firm output from wind farms. With rooftop solar, batteries would be better installed on site. With electricity produced and consumed on site no transmission upgrades will be required. It will also make the grid less susceptible to outages caused by major equipment and transmission line failure.

PLANNING EXPERTISE
In relation to the rollout of REZs the community needs to have confidence that the planning decisions made are well researched and optimised for the benefit of all NSW citizens. This may be difficult in the Central West given previous planning outcomes..
Cobbora Coal Mine. Despite testing that revealed poor coal quality and water supply issues, the government compulsory acquired farmland (44,000h) at inflated prices for this project. Residents (80 families) were evicted and their lives thrown into turmoil. An attempt was made to onsell the project to private enterprise but this failed. Eventually and only quite recently it was decided that the land would be sold back to farmers. There is now a proposal to build a major transmission line through this area making it ideal for wind and solar farms.
Wellington Solar Farm. The NSW Government Guidelines for large scale solar farms specifically mention visibility and topography, residences, agricultural land use and cumulative impacts as key issues in site selection. This solar farm was approved despite fronting a major arterial road, in close proximity to Wellington township, on rich red farming country and in an area with many existing/proposed solar farms.
Decommissioning and Rehabilitation. Wind and solar farms have been approved on assurances that when they are decommissioned the site will be rehabilitated to its original condition. Yet no bond money has been set aside for this purpose. If these projects, particularly solar farms, go bankrupt (real or manufactured) then the government will be held accountable for the clean up since this was stipulated in the approval process.

RECOMMENDATIONS
1. Prioritise wind farms over solar farms for available transmission capacity in REZs. That is impose a moratorium on solar farms.
2. Prioritise the implementation of offshore wind farms to smooth the inherent variability of wind farm output in REZs.
3. Levy an annual fee on all wind and solar farms for their eventual decommissioning and rehabilitation costs.
4.Compensate landowners in the vicinity of wind and solar farms with an annual payment for the life of these projects; commensurate with the loss of visual amenity and property value. This will create an incentive for developers to site these projects so as to minimise their impact on neighbouring landowners.
5. Limit the public liability of landowners adjoining wind and solar farms to $20 million.
6. Encourage the adoption of subsidised residential battery storage with the proviso that a portion of the stored power is available to be fed back into the grid when required. Eg 70% of stored power could be withdrawn down to a limit of 30% of battery capacity.

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