

Submission in Response to Energy Security Board Capacity Mechanism High-level Design Paper

This submission is prompted by the broad scope of the Executive Summary and addresses relevant issues which have led to the necessity for a capacity mechanism.

Power System Security

The achievement of power system security is ultimately a matter of sound engineering. By definition this must recognize responsibility to the community including optimum economic benefit.

Inevitably it must involve compromise without prejudice to the end result. In the present context there are several competing interests which include:

- . climate change concerns
- . commercial interests of existing market participants
- . access to domestic resources and threats to export markets
- . available low emission sources of electricity
- . concepts of transmission adequacy
- . individual interests in land use
- . long term strategic risk

Climate Change Concerns

These are largely ideological and appear to stem from a theory raised by a delegate to a meeting of atmospheric physicists in Austria in 1985. It was taken up by the UN through their then newly appointed Intergovernmental Panel on Climate Change who, over a sequence of Assessment Reports, transformed the hypothesis into an established fact that anthropogenic carbon emissions, particularly carbon dioxide, cause global warming which in turn is the cause of climate change. The basis for his theory has been disputed, as has the promotion by IPCC.

To assert that, by reducing emissions, climate variations will be prevented is at least presumptive. A recurring theme of informed commentary is that the contribution of anthropogenic emissions is in the order of 3 to 5%, and climate scientists have not revealed what other causes, if any, they have included in their computations of temperature rise and the contributions of each. The proposition that CO₂ concentration causes temperature rise has been disproved by mathematical analysis of physical records which showed the reverse to be true.

It seems far more likely that other factors such as abnormal variations in the temperature of the earth's core, ocean currents and orbital variations are major contributors. Evidence of

“lithospheric dripping” in the Andes, researched by University of Toronto is the latest addition(1).
To pretend that we are able to control such forces is illusory.

(1) “Earths Crust is Dripping Under the Andes”, Science Alert , 20 July 2022]

Commercial Interests of Existing Market Participants

The pursuit and acclamation of policies centred on emissions reduction have unsettled the established power industry based primarily on fossil fuels. Curtailment of supply has been blamed on the failure of ageing plant but in the face of a rapidly diminishing market the operators will have deferred investment in the replacement or major maintenance of plant which has residual economic life, spurred on by the exigencies of inappropriate market rules within which they operate.

The ability of AEMO to require consumers to reduce load at peak times, or in contingency conditions is built into many supply contracts albeit with financial compensation . In continuous industries it can have the effect of shutting down all or part of the plant for periods well in excess of the duration of the contingency, and becomes a factor in the pricing of products. It **was never envisaged as a remedy for ongoing weakness in the ability to supply due to lack of planning or management.** Had that been the intent it would have deterred the establishment of many continuous industries and, if it persists, would be expected to cause them to cease production.

Access to Domestic Resources and Threats to Export Markets

Coal, gas and oil are the most readily recognized domestic resource. Prior to Russian incursion into Ukraine, reinforced by the effect of international sanctions, there was a reasonable balance of supply and demand. Those nations who needed to import fuel were able to and there was a market for those who wished to export. The latter committed themselves to the extent that they are now unable to meet domestic demand, but threats to sovereign risk in the event of perceived inability to satisfy contractual commitments deter them, and governments, from imposing export quotas.

Available Low Emission Sources of Electricity

Weather dependent sources such as wind and solar are very attractive because of the zero cost of primary energy. However their relative value is limited by the fact that they have capacity factors of between 25 and 30% compared with around 75% for traditional gas and coal fired plant.

Nuclear generation is under severe restraint by federal and state laws which originated from fears of misuse of by-products in nuclear weapons, exacerbated by major plant failures in US, Japan and Russia. More recent research has incorporated lessons learned and the prospect of a commercially attractive fusion process is hopefully imminent. The local availability of uranium is a major advantage.

Small modular reactors offer a controllable source, flexible in location and enjoying the advantage of incremental development to match load growth. Location at the sites of coal fired stations due for decommissioning would have the obvious benefit of immediate access to transmission infrastructure, as well as providing the opportunity of retraining of displaced operating staff.

Pumped storage is a practical option although expensive for a limited resource and liable to disruption in the planning and construction phase.

Battery storage has a valid place in relation to small loads including system stability controls, but is not a viable solution to variations in bulk demand.

Hydrogen appears to offer the highest potential but it is a process under development and should be regarded as such when considered as a contender for short term inclusion and long term reliability. Problems of safe storage and transport have to be resolved and there is the possibility of intervention by climate change activists if they align the fact that the only product of combustion of hydrogen is water vapour which was, for several years, cited as having the highest radiative effect in atmospheric temperature rise.

Concepts of Transmission Adequacy.

Transmission is not, as alleged, the cause of problems with the transport of electricity presently generated by renewables. Transmission is a facility for moving electricity from the point of generation to the point from which it is distributed. It is therefore inappropriate to commission new transmission plant until there is certainty on the commissioning of the generating plant and the timing should be the joint responsibility of the proposed generators and the carriers. **The lead time for both will be variable depending among other factors on the location and the interests of the land owners, therefore the project planning process must be coordinated throughout the connection process.**

It is likely that some of the blame for non availability are opportunistic references to historic delays in the development of the SA-NI interconnector and the second from Victoria to NSW, both of which have been under discussion for many years. These are largely incidental to renewables as their purpose was to interconnect single large sources of generation as well as reinforcing security.

Individual Interests in Land Use

It is almost axiomatic that sites for renewables are in open country in which individuals will have a special and longstanding self- interest.

Dams for either gravity fed or pumped storage generation have a major impact on land use and general amenity in addition to concerns for loss of flora and fauna.

Both solar and wind farms either fully occupy or widely disrupt farming activity.

Major offshore wind farms overseas have attracted strong adverse comment from offshore fisheries.

Transmission lines arguably have the least impact on existing residents or other parties, yet they regularly attract trenchant opposition on the grounds of visibility and for loss of access. In fact the latter is often enhanced by construction tracks which must be durable for all-weather inspection and maintenance and often give improved access for fire- fighting and forestry.

Long Term National Strategic Risk

Risks to the security of the electricity network associated with the widespread development and reliance on renewables are:

- . timing of development related to decommissioning of large base load plant
- . high maintenance costs to offset environmental degradation
- . a succession of renewables farms reaching their relatively short economic life
- . supply chain problems in both spares and the acquisition of ongoing new plant sourced from China or other alien source.
- . vulnerability in the distribution system through increased harmonic generation by inverters, plus complexity of control and communications equipment, not least through alien cyber disruption.
- . the possibility of triggers being built into equipment allowing partial or entire system shutdown of generation, transmission and distribution by remote agencies.
- . achievement of net zero without any discernible effect on the climate, but an expensive legacy of stranded assets and no solution to ongoing unreliable supply.

In Conclusion

The common factor in this discussion is the unknown and unproven effect of carbon emissions reduction. A serious, urgent and concentrated resolution, together with realignment of current practices would resolve most, if not all, of the concerns mentioned above.

It would also rectify the effects of a policy vacuum over at least two decades. In the meantime gas offers the best short term support and longer term contribution.

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