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MM TECHNOLOGY'S RESPONSE TO AEMO'S DRAFT 2021 INPUTS ASSUMPTIONS AND SCENARIOS REPORT

1. Introduction

Prior to responding to the main discussion in the document, we want to comment on some matters of transparency and accuracy that may arise as more renewable energy storage capacity enters the NEM.

The key Fuel-Technology Category table below tabulates generation sources for the NEM has included batteries, whilst at the same time, evidently, also including (within the same table) the underlying energy source, be it either solar or wind power.

In most cases the charging source is discretely tied to the battery being charged and as a consequence there is potential double counting of the generation capacity available to the NEM.

The issue is complex, as the energy source may at times be feeding direct to the NEM grid and at other times may be charging its tied battery or rarely it could be (depending on relative sizes) doing both.

As can be seen, this is not an inconsequential issue, with committed battery storage conservatively estimated to be around 6100MW, by around 2040. Recent press announcements lead to predictions of higher battery storage during the planning horizon of AEMO's ISP2022 with individual batteries to 500MW or more in size being planned.

Summary Table: NEM Scheduled, Semi-scheduled & Non-scheduled Generation (MW) - Existing and New Developments by Fuel-Technology Category

| Summary Status | Fuel - Technology Category | | | | | | | | | | |
|------------------------------------|----------------------------|-------|-------|-----------|--------|--------|-------|---------|-----------------|-------|--------|
| | Coal | CCGT | OCGT | Gas other | Solar* | Wind | Water | Biomass | Battery Storage | Other | Total |
| Existing | 23,061 | 3,041 | 6,960 | 2,356 | 3,561 | 6,739 | 7,981 | 609 | 211 | 204 | 54,722 |
| Announced Withdrawal | 2,000 | 208 | - | 480 | - | - | - | - | - | - | 2,688 |
| Existing less Announced Withdrawal | 21,061 | 2,833 | 6,960 | 1,876 | 3,561 | 6,739 | 7,981 | 609 | 211 | 204 | 52,034 |
| Upgrade / Expansion | 160 | - | - | - | - | - | - | - | 50 | - | 210 |
| Committed | - | - | - | - | 1,726 | 2,058 | 2,040 | - | 43 | 24 | 5,891 |
| Proposed | 151 | 845 | 2,002 | 765 | 25,728 | 19,787 | 5,729 | 191 | 6,106 | 84 | 61,388 |
| Withdrawn | - | - | - | - | - | - | - | - | - | - | - |

Notes:

Existing summary status includes *Announced Withdrawal*.

Committed summary status includes *Committed*.

Solar Fuel-Technology category excludes Rooftop PV installations.

The same potential issue probably does not apply to pumped hydro storage, which in most cases will draw its pump-cycle power from the NEM. For medium period storage (when it is finally developed) it potentially will be an issue however, so for short term and medium term storage, a protocol needs to be developed with the objective of not double counting generation capacity available to the NEM once renewable energy is stored prior to being sent to market.

Another driver for seriously addressing this issue, is that the future NEM market is probably going to have to pay different prices for different time periods of renewables storage - a realisation that may, in time, be made by the ESB in planning the future post NEM 2025 market.

2. Presentation.

AEMO is committed to a two-year planning cycle for ISP's with the last produced in 2020 and the next in 2022. It is submitted that the first item in the Draft Inputs should be a synopsis of the preceding ISP demand and supply scenarios and a reconciliation be undertaken of the actual outcome of the previous year projections/assumptions against the actual outcome.

Currently this discussion does not take place until page 32.

The plan inputs are presented as an amalgam of Demand and Supply factors, whilst it is appreciated that the final agreed scenario or scenarios will be a mixture of demand and supply factors. It is recommended, for understanding and transparency, that the discussions leading to the scenario outcomes should have separate demand and supply factor discussions. For example, generation emissions are a function of supply not demand.

3. Factors Insufficiently Recognised

3.1 The Number of Australians Returning From Overseas In 2020 - 2022

Draft 2021 Inputs recognise the severe downward impact of Covid 19 on net migration inflows to Australia, which typically have amounted to inward population flows exceeding 230,000 people per year. In 2020 the flows reduced to only those migrants entering the country by March/April 2020 when the Australian border was effectively closed.

The larger inward flows of overseas based "expat Australians" are not seemingly acknowledged in the inputs. Of particular concern, this significant inward flow of presumably affluent returning Australians is not mentioned in the Slow Growth Scenario. This inward flow to Australia now exceeds 430,000 people with upwards of another 40,000 or more still wanting to return to Australia. This flow may continue if conditions worsen in Europe or the USA.

One impact of this inflow has been on continued housing demand, which eventually will follow through to increased electricity demand - albeit this is not yet evident in current demand still impacted by Covid.

3.2 Medium Term Storage and The Demand For Gas

The absence of an acceptable economic solution for medium term renewables storage and the consequent need for more gas plant, as the coal fired fleet retires from the NEM is not apparent in the Inputs.

The current presence of the coal fired fleet and generator management's determination to idle plant through the middle of the day, when solar renewable energy is flooding the market is masking the future increased demand requirement for gas, as the coal fired fleet departs the NEM.

This reality combined with an overly optimistic ability of batteries to provide NEM grid back-up is leading to a potential under investment in the requirement for renewable energy back-up plant as well as a low estimate of the future gas requirement of the NEM.

This is a serious issue, given declining East Coast gas supply along with the Federal Government's desire for a gas led Covid recovery plan. This position is made more serious by AEMO still pursuing and planning for a level of renewables penetration in the NEM that has not yet been achieved elsewhere even in the case of fully integrated and variably fuelled networks in Europe. Germany is decommissioning both brown and black coal fired plant by a tender process which is drawing in for closure even recently commissioned plant however gas consumption is rising,

Germany is also de-commissioning the last of its local nuclear generation capacity, whilst still retaining the ability to import nuclear fuelled electricity from France or England

At the time that AGL first confirmed the planned closure of Liddell, it also gave undertakings to the Federal Government to replace the dispatchable capacity lost to the NEM from Liddell's departure from the NEM. These undertakings have not been fulfilled except with a minor 100MW upgrade to Macquarie Power Station.

The Federal Government has now committed to gas as a transition fuel and also to build a new 1000MW gas station using its 100% owned Snowy Hydro Corporation, if private industry do not commit to new dispatchable energy. Their nominated sites at Liddell and Kurri Kurri do not have access to an adequate gas supply, but this option is a further indication of significantly increased gas demand.

It is not known how this Federal Government initiative to retain easily dispatchable generation capacity (albeit still not matching Liddell's 1600 effective MW) in the NEM will sit within the recently announced NSW region electricity generation policy, which favours renewables over gas.

AEMO and the NSW Government in their drive to a renewable generation future are down-playing the closure of Liddell and the need to retain dispatchable capacity in the NEM. A realistic measure of the required dispatchable capacity is the amount of RERT insurance purchased by AEMO to cover summer peak periods each year.

4. Formal Response

MM Technology would like to be involved in any future workshops on hydrogen.

AEMO's Draft Inputs Assumptions and Scenarios Report is a large and complex document.

MM Technology recommends significant simplification. Currently stakeholders can seek any future outcome they may desire from the document.

Greater emphasis and AEMO commitment should be given to the Central Scenario.

The table below provides a response in relation to the transition criteria and is our response to Matters for consultation.

| Transition Criteria | MMTechnology's Comments |
|--------------------------|---|
| 1 Sustainable Growth | Growth assumptions should be adjusted for Covid - it can now be assumed the World demand impact could last at least five years. |
| 2 Slow Growth | The most likely outcome is this criteria will apply for the first half of the ISP2022 period and the second half will be sustained growth. |
| 3 Diversified Technology | Federal Government intervention has not, to date, been reflected in lower contract prices, which after a brief Covid slump have recovered so that contract prices remain in the range AUD 8-10/Gj, or well in excess of the preferred AUD 4/GJ desired by manufactures using gas for the planned Covid recovery. |
| | A significant volume of gas will also be required to provide back-up to intermitant renewable generation in the NEM particularly as the coal fired fleet retires. |
| | CCS is a very expensive technology that buries an Oxygen molecule as well as carbon. It is only viable when using already developed voids like those available after oil or gas extraction |
| 4 Export Superpower | Need to build up necessary skills and usage protocols, which would be best achieved in a blue hydrogen development phase |
| | Insufficient acknowledgement has been made in relation to the electrolysis route to green hydrogen production water availability. The water requirement (9.1 litres of pure water per kg of hydrogen). |
| | Our dry continent development options should therefore focus on North Queensland focusing on the Port of Townsville and Tasmania (which some serious hydrogen developers are already doing), noting that Tasmania will have a freight disadvantage into Asia of up to AUD 7 dollars per export tonne. |
| | In respect of the NEM "per se" hydrogen developments should be encouraged in respect of renewables storage from 2-16 hours. This is critical to renewables viability as the coal fired fleet retires. Some relief may be available depending on how long it takes to develop sufficient deep pumped hydro storage |
| | Gas usage will decline if medium term renewables storage can be developed using hydrogen. |
| | Direct link to Asia proposals like SunCable (that will sustain large line losses to Singapore) should not be considerations for the NEM unless they can make a positive contribution to the NEM |
| | Green steel developments may not be a consideration until 2030 albeit small trial plants are also planned for Europe prior 2025. |



5. Conclusion

At the time of responding, the NEM market remains in a state of uncertainty. Whilst pushing for change, the ESB seems content that the coal fired fleet, which brings more to the NEM than energy, is going to be pushed out by not accelerating a change to the market.

The other conundrum facing AEMO is that the additional renewables generation is not going to be built to supply a market that goes negative on a regular basis. The market factors dominate all other factors.

MM Technology has no objection to this response being published.

Yours sincerely,

Jeff Jamieson
MM Technology