IES INSIDER

ISSUE 37 - October 2019

Institutional Challenges Facing the NEM

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Introduction

Charged with keeping the lights on and getting prices down, Federal Energy Minister Angus Taylor is faced with a deluge of renewable projects at various stages of development, when he has no faith that a system dominated by renewables can be made to work.

Minister Taylor is right to be worried. The system has lately been exposed as fragile and becoming more so – witness the incident of 25 August 2018, that led to separation into sub-regions and a round of load shedding to hold the rest together. But the 25 August incident cannot be blamed on renewables either; the culprit was the deterioration in frequency control performance of coal fired plant.

The most daunting challenge facing the NEM is existential. Looking beyond the immediate challenges - the closure of Liddell and ultimately the rest of the current coal-fired fleet - how can the NEM be structured so that the physical system holds together? Even more fundamentally, are our institutions and major participants up to the task? If not, what should be done, or does it really matter?

Challenges Facing the NEM

Minister Taylor has been dubbed the Minister for Lower Prices and we all wish him well with that. Retail prices have been bloated by cash-strapped state governments fattening up and selling off monopoly network assets for a premium; by a domestic gas market made dysfunctional by private exuberance egged on by governments of all stripes; by the extent to which generation and retailing has been allowed to concentrate and vertically integrate; and by the practice of retailers to screw their most loyal customers[1].

I haven't listed renewables as a factor driving up electricity prices because in my view their impact on retail pricing to date has been ambiguous, despite repeated assertions by some in the media that renewables are the sole culprit for price rises as well reliability and security problems.

Governments are trying to address whatever issues they can to get prices under control, but the impact of most of these policy failures is now pretty much baked in. Don't expect any significant retail price reductions, although they may well stabilise for a while.

What can be safely asserted, however, is that the huge pipeline of renewable projects underway or in planning is a real threat to system reliability and security unless the market can adjust quickly and smoothly. Like it or not, it's now clear that these new technologies will come to dominate even without ongoing subsidies, but the system is nowhere near ready for them.

Our major electricity and related institutions; AEMO, AEMC, AER, ACCC, ESB, ARENA and COAG[2] are not blind to this challenge and the shape of their responses is slowly emerging. But these responses are belated and some are acknowledged as short term fixes, pending development of robust, longer term approaches.

[1] This practice is not unique to energy retailers; telcos are even worse offenders and I have personally fallen foul of all of them.

[2] Australian Energy Market Operator (AEMO), Australian Energy Market Commission (AEMC); Australian Energy Regulator (AER); Australian Competition and Consumer Commission (ACCC), Energy Security Board (ESB); Australian Renewable Energy Agency (ARENA) and Council of Australian Governments(COAG) meeting of Energy Ministers.

Challenges Facing AEMO

AEMO is facing a large bag of operational challenges but I'll focus here on the general rubric of maintaining system reliability and security. This covers related topics such as forecasting at various time horizons, frequency control and wholesale demand response, and also to coordination of generation and transmission investment (CoGATI).

Forecasting

The penetration of renewables makes forecasting difficult over days, months and a few years as wind and sun can change quickly at an operational timescale and new capacity can enter within months rather than years at an investment timescale. In any case, AEMO forecasting beyond 5 minutes has never been very good. So relying on AEMO medium term forecasts to trigger the government's reliability obligation is a very brave move.

The demand-side is also showing signs of becoming more price sensitive, due to improved control technology as well as high and volatile prices. AEMO's response? Support a wholesale demand response mechanism being examined by AEMC but only if that response is scheduled and operated just like a generator. In short, AEMO eschews anything that smacks of spontaneous demand response; it wants to manage such response either directly or through some obligated agent such as an aggregator. Of course, most of the demand side is wary of such control.

With loads becoming flexible and price responsive, a different path forward is possible. Instead of attempting to schedule or limit the flexibility of loads, dynamic pricing within the dispatch interval could harness demand-side response to correct for load and generation forecasting errors.

Frequency Control

Forecasting inaccuracy also affects the requirement for frequency control. AEMO is still grappling with poor operational security directly attributable to a deterioration in thermal generator frequency response over the past 5 years. AEMO's solution? Waiting in the AEMC wings is an AEMO proposed rule change that would encourage provision of frequency response by exempting participating generators for causer pays costs. Exempting payment for one service to encourage provision of another seems like a very indirect and economically inefficient strategy.

Implications for Wholesale Demand Response

AEMO's proposal is particularly interesting in one respect. It acknowledges that a departure from linear ramping between dispatch targets that helps frequency control is a Good Thing if you are a generator.

If you check out the AEMC's draft rule on a wholesale demand response mechanism, this is apparently not the case if you are a wholesale load or demand response service provider. Strict linear ramping is the order of the day for loads right now. However, the time will likely come when AEMO will need to recognise, embrace and constructively use the price sensitivity of loads to help stabilise the system, including providing a strong ramping capability.

CoGATI

AEMO is also deeply involved in the AEMC's CoGATI[3] review. The AMEC is marching down the road of locational pricing, which may require changes to NEMDE and surrounding systems. Similar changes would be needed to implement some sensible options for dealing with transmission loss factors which are also subject to a current AEMC rule change.

There are other changes to NEMDE[4] and surrounding systems that would improve NEM operation – technology has moved on in the more than twenty years since the market design implemented by NEMDE was first formulated.

All these changes must be managed in a robust and timely manner, at a much faster pace than in the recent past. However, even the relatively modest changes foreshadowed to support the wholesale demand response rule change[5] are expected to take about 3 years to implement. This pace is far too slow. Prototyping and testing well in advance could accelerate such changes and allow a wider variety of design choices to be considered.

[3] Coordination of Generation and Transmission Investment.

[4] National Electricity Market Dispatch Engine, the software system that schedules and prices the energy and ancillary service markets.

[5] https://www.aemc.gov.au/sites/default/files/2019-07/Draft%20determination%20-%20ERC0247%20-%20Wholesale%20demand%20response%20mechanism.pdf page vi

Challenges Facing AEMC

There are some very good things about the way the AEMC works. One is its very open operation. Another is that anyone can propose a rule change except, of course, the AEMC itself. It's a fine idea to shut them out, you might think, because AEMC staff might otherwise embark on a bunch of costly "make work" rule making adventures. Anyway, determinations on their own proposals could hardly be regarded as disinterested.

However, the current structure does have adverse consequences. One is that it is difficult to discern any clear plan for the market from the AEMC. AEMC attempts to address this by undertaking "Reviews" of broad subject areas but, at the end of the day, it can only deal with rule changes that other parties bring forward. To deal with this, the AEMC Chairman in his speeches at various venues seem to jawbone participants about the areas it thinks are of most relevance.

Without a coherent plan, AEMC is also unable to promote and be informed by market oriented research, prototyping, interactive trials and live testing prior to a rule change, even if it had the budget to do so, which it doesn't, of course. I've been told at a high level that the AEMC cannot be seen to fund research into any particular market proposal because it can't be seen to be playing favourites. The result? Major changes with multi-million-dollar consequences are signed off with little or no practical examination other than a run-over with Economics 1.01 and a legal review against the NER.

Let me give a few examples from the 5-minute settlement rule change, probably the most significant in recent years.

One major issue raised was how fast-start generators would operate under the new regime, as their incentives would be changed quite dramatically. The risk is that they might hold off commitment longer than previously, jeopardising reliability and even security. A trial with a half dozen such units operating under 5-minute settlement could have determined the validity of the concern and, if needed, point to any rule adjustment required. The matter was settled with arguments "on paper".

Another risk issue raised was that potentially large step changes in price might promote destabilising behaviour on the demand-side, so that system security issues should be addressed as part of this reform. This matter was put aside for another time. The wholesale demand response rule change attempts to require good ramping behaviour, but it does not and cannot compel good demand-side behaviour outside the rule. Again a trial of possible solutions has been passed over twice. This risk remains and is growing.

In its behaviour, AEMC seems rather too aware of the interests of large incumbents. For example, in its draft determination on a wholesale demand response mechanism, the AEMC places much weight on minimising the cost of the change to existing retailers. While this seems reasonable, one consequence of this mindset is that AEMC can and does reject proposals on the basis that incumbent retailers might incur expense or inconvenience in making system changes or adjusting risk management processes.

It would be reasonable and indeed highly desirable to allow more than one approach to demand response, including ones which only agile new entrants might be prepared to take up. A mindset of not pandering to established interests to the exclusion of newer, more agile and more innovative participants would see a robust market evolve much more quickly.

Challenges Facing AER

Along with most of the electricity industry, I was surprised and shocked to read that the AER is taking a group of South Australian wind generators to court for their role in the blackouts of 2016 in that state.

The key facts seem to be known; a one in 50-year storm event, dozens of toppled transmission towers and repeated faults along a critical transmission line. Protection settings on the wind farms reclosed several times but were programmed to cease trying after a specific number of attempts to protect the equipment. The issue is technically complex, but lessons were learned, changes made, and a repeat of the same problem is unlikely.

So what is the court case about? Did the wind farms violate some technical requirement? Perhaps, but I doubt the requirement was explicit and the violation wilful. A casual observer, perhaps unfairly, might more easily conclude that AEMO was asleep at the wheel in not knowing of or asking about these settings. The fact that these were windfarms

could be seen as incidental; the real problem was procedural.

Seen in this light, the AER's court case seems unfocussed, if not misguided or even mischievous. Perhaps the AER has taken to heart the Prime Minister's edict that public servants should bend their efforts to the government's will, whether they think it's smart to do so or not.

While AER does a workmanlike job in all the circumstances, this is not the only time that it seems to have made a bad call. Another case is the enforceable undertaking that generators should strictly follow their scheduled ramp rates, a longstanding AEMO mantra. Generators were thereby encouraged to widen their governor dead bands to avoid becoming non-compliant. This has led directly to poor frequency control and a risk to security. Only now is AEMO proposing a rule change that recognises that departure from schedule, if correctly motivated, can be beneficial to system security rather than detrimental.

Challenges Facing ACCC

ACCC has a role in consumer protection and also, critically, in attempting to maintain a workable degree of competition in a given market. The level of competition in the electricity sector has certainly declined over time, through both vertical and horizontal consolidation, to a level where even the current business-friendly government thinks that competition is inadequate. To understand how this came about, we need to go to Australian competition law.

Section 45 of the Competition and Consumer Act *prohibits contracts, arrangements, understandings or concerted practices that have the purpose, effect or likely effect of* ***substantially lessening*** *competition in a market.*

To understand how this works, imagine a market which begins with, say, 16 nearly equal sized participants. The NEM began at something like this level. If each one decides to merge with another, competition is certainly lessened but by most criteria is still workable with 8 entities, so not reduced substantially.

Suppose they consolidate again to four entities. Competition is certainly lessened, but substantially? Maybe not for certain. So a big tick for that one. Now consolidate again, to only two entities. Is two all that much worse than four? No – they're both uncompetitive. Hey, it's no monopoly! Another big tick. Australian law will often tolerate two dominant players (e.g. airlines and groceries) and three or four is considered fine (e.g. banking and electricity).

What's going on here? The law is framed around relative changes in competition, not absolute levels. So, we have the classic boiling frog syndrome; everything seems to just fine in the world out there, but we wake up one morning to find ourselves cooked. And it's no accident that the law is framed that way because some economist back when, and no doubt still, thinks that scale economies in Australia are more important than competition. In most cases, experience suggests that this idea is a fallacy. The ACCC seems to have woken up to this, but rather too late.

It's unlikely that a perceived lack of enough competition in the NEM could be enough to prompt a change in Australian competition law. The so called "big stick" energy sector legislation currently before the parliament still has a long way to run and is not a good idea in any case. So, the practical approach is to give a high weight to supporting competition and new entrants as the electricity market rules evolve.

Challenges Facing ESB

A product of the Finkel Review, the ESB sits astride all the major electricity institutions with the aim of improving coordination in the sector. The ESB has published a number of status exports and has pursued specific targets, such as developing an Integrated System Plan (ISP), promoting the successor to the NEG and increasing the level of interconnection in the system.

One of the ESB's more interesting but somewhat unheralded initiatives is the work on the post-2025 market design for the national electricity market.

The ESB's initial paper sets out an outline of the project objectives and approach as well as an indicative timeline. It notes that, while a full range of market solutions to supplying various NEM services will be canvassed, centralised provision and operation will sometimes be preferred. One senses AEMO's hand at work here.

A more recently published issues paper provides a little more meat. Notably, there are string sections at various

points which ask – what happens in these arrangements don't work? One can sense we're being lined up for a highly interventionist approach.

Of course, the ESB's concerns about security and reliability are real and pressing. One can only hope that the wherewithal be found to prototype and trial several divergent approaches before settling on a final design.

Recognition by ESB of the need for a fit-for-purpose market design is commendable. However, a more agile process is called for and the ESB would do well to revise its approach to get more options and trials happening on the ground, sooner rather than later.

Challenges Facing ARENA

During the Abbot era ARENA led a precarious existence but has survived and indeed prospered despite that. It appears to support a range of useful projects, although I would argue that some are on the margin of what a government agency should fund.

For example, the case for public funding support for pumped storage feasibility studies is doubtful. While good pumped storage projects will be welcomed into the NEM, the technology is long established and such studies ought to be fully funded by project proponents.

On the other hand, the NEM is in need of research into market mechanisms that deal not only with operations with high renewable penetration, but also those which improve the market generally. AEMO is sponsoring and managing some, such as self forecasting of renewables and the operation of Virtual Power Plants (VPPs). However, ARENA's remit renders it less able to deal with research into and trials on arrangements that would have potential benefits for the market as a whole.

The ARENA remit and funding model needs to be widened to cover sponsorship of research into the market as a whole, not just elements affecting renewables. This should be co-ordinated with the ESB's post 2025 market design project.

Challenges Facing COAG Energy Council

The COAG Energy Council is the conduit through which government energy policy finds expression in the NEM.

Setting that issue aside, a key role for COAG in future will be to ensure that NEM institutional arrangements support rather than hinder the technology and market transition now underway.

This Insider has identified two related matters deserving of immediate COAG attention:

- Widen the remit of ARENA to cover general research, development and demonstration of possible improvements to the NEM. Research projects could and should cover different ways of addressing a given task, with no pre-conceptions as to how market incumbents might view them.
- Oversee the ESB's post 2025 market development project to ensure that the workplan is re-designed to be more agile by supporting research into, prototyping and trialling of different market concepts before a design is settled.

PostScript

As this article was about to go out, there have been extensive reports in the financial press about the Australian Financial Review's Energy Summit held this month (October). Here are a few snippets I noticed, relevant to this article.

In a burst of self-awareness, the AEMC has commented that it needs to become more agile – the latest buzzword, along with "resilience". That comment, of course, applies in spades to the whole governing process, as I've outlined in this article.

AEMO is talking of the joys of a short-term forward market, as it has for some time, because other markets have them ad they've worked (along with a high degree of "modulation", or price oversight). While a reasonable idea twenty years ago, it remains to be seen how useful such a market is when most plant is so uncertain in its output when viewed a day ahead. In the NEM of the future a high level of short-term flexibility is likely to be a better solution, one that won't be achieved with current AEMO and AEMC mindsets.

Finally, a distribution network is making a play to manage centralised storage on behalf of retail customers, to replace small customer storage systems. No surprise there, but will it wash? The concept of a network actively playing in the NEM on behalf of its customers is certainly novel, but hardly

consistent with the role of a regulated entity earning a fixed rate of return. Maybe they can do it, as it seems we might all be tightly controlled and regulated in the end.

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