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7th September 2019

Energy Security Board
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Dear Board Members

Response to Post 2025 Market Design Issues

I have worked as an energy market specialist mainly in the UK and Australia, and to a lesser extent North America, New Zealand and mainland Europe. I have worked "on, in and around" the NEM and the SWIS in WA since emigrating to Australia in 1997.

The transition to a low-carbon energy system is well underway. This work on the Post 2025 Market Design is vitally important, with profound implications for Australia's future. In particular, the market design has a pivotal role in supporting our international trade and competitiveness at the same time as delivering essential services on reasonable terms.

My objective here is to highlight potential gaps in the process and the thinking behind it. I have addressed my comments to the six matters raised at the end of the issues paper.

What scenarios and shocks should be used? How should these be used to test market design?

In some sense, this process is trying to hit a moving target. One major area of risk that would "shock" the design is the withdrawal of large demand loads as we transition from a mainly fossil fuelled system to a largely renewable one. Some of these loads are of an equivalent scale to large generation and can similarly affect the ability to manage system reliability.

Another "shock" that does not appear to have been contemplated is a cybersecurity breach aimed at disrupting the power system. This risk increases with greater numbers of distributed, connected assets. This is part of a larger challenge, being the apparent lack of a digital strategy for the NEM as whole, for which cybersecurity would be a key element. This makes consideration of how this might evolve or be affected in the future somewhat challenging within this process.

A third potential shock is input-cost inflation caused by the sheer amount of infrastructure investment required. This could be exacerbated by backlogs created by regulatory and investor uncertainty. Inflationary impacts potentially vary between scenarios and should therefore be taken into consideration in the modelling.

How can market and economic modelling best be used to evaluate individual components of market design or the end-to-end market design?

Game theory modelling could assist in assessing the impact of issues such as: which generators and loads could exit or enter the market; how they might be expected to behave under different future scenarios; and overall market performance.

One of the key considerations is how to model pricing. One approach would take into account supply/demand balances and market dynamics. On the other hand, price could be simply modelled as a function of capital costs and return on capital invested. However, the latter approach would not be capable of differentiating between, say a Capacity Market design vs the System Marginal Pricing framework as exists in the NEM currently.

Is the assessment framework appropriate to evaluate the effectiveness of future market designs? What else should be considered for inclusion in the assessment framework?

The institutional changes required to deliver different market designs could vary quite markedly. There is a risk to this process of institutional bias towards incremental change in preference to transformational change, which might not be in the long term national interest.

To mitigate against this risk the assessment framework should incorporate Regulatory Impact Statements to provide comparative cost-benefit analyses of the institutional changes required.

The other risk I anticipate is that implicit assumptions on the future "system" are limited by current thinking. Three examples illustrate this point:

- A market design in which some areas operate as separate microgrids (ie not connected to the bulk supply system) is potentially more economically efficient and resilient than a "default" design based on a fully interconnected system;
- In a distributed digital future, the "optimal" system might involve a mix of AC and DC networks; and
- System reliability is often viewed in terms of bulk supply only (ie the performance of the HV transmission system). With increasingly distributed energy lassets, it is important to look at reliability over the entire system, including the low voltage grid.

To mitigate against this broad area of risk, I would recommend dedicating an entire workstream to documenting the assumptions underpinning each market design and testing whether those assumptions support the scenarios modelled and their intended/expected outcomes.

Have we identified all of the potential challenges and risks to the current market? If not, what would you add?

I see 3 key challenges/risks to the current market that might not have been fully contemplated:

- The lack of data available to market operators and regulators. For instance, rooftop solar is now having a material impact on bulk supply but is difficult to forecast due to lack of access to actual solar output data. The lack of data on Quality of Supply such as grid voltage levels also make it difficult to provide accurate forecasts of hosting capacity.

Information asymmetries exist in any regulated system, but are only likely to increase with the changing nature of the market and infrastructure;

- The current network regulations and incentives potentially inhibit the growth in distributed energy assets and could be misaligned to the modelling scenarios. This includes factors such as the current network pricing regime, prevailing perceived incentives towards capital vs operating expenditure, and the instruments available to regulators to oversee an effective transition to a new market design; and
- Rapid technological advancement is blurring the distinction between generation, network and demand management services, such that the current market participant classifications and restrictions may inhibit innovation and transformation. For example, a micro grid could be better served by a vertically integrated "Gen/Net/Tailer". Similarly, firming services might be delivered more economically by a Transmission Network Service Provider acting on behalf of a corridor of new generators than each investing in their own firming capacity.

Which of these challenges and risks will be most material when considering future market designs and why?

That is difficult to assess before undertaking the analysis and therefore poses a significant challenge for the ESB. It is important to "run the numbers" over the whole picture. If any aspect is left out, the rationale should be documented.

Which (if any) overseas electricity markets offer useful examples of how to, or how not to, respond to the challenges outlined in this paper?

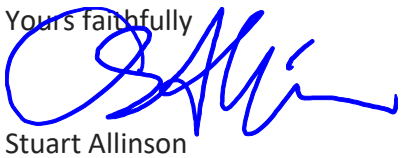
It is worth reviewing what the UK market is doing in terms of its digital strategy, which OFGEM sees as an essential component of future market design.

I wish to point out that I am a Member of the Climate Change Authority. All the above views are my own and do not represent the views of the Authority or any other Member.

I also support emerging energy technologies in a professional capacity as a mentor and board member.

I would be happy to discuss these matters with you further if that would assist in this important work.

Yours faithfully



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