NEW ZEALAND SMART GRID FORUM

Architecting a future electricity system for all New Zealanders

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29 January 2016

Emerging technology pre-workshop paper

The Smart Grid Forum was commissioned by ENA and MBIE in late 2013 to explore issues related to the development of smart grids in New Zealand. The Forum is unlike similar groups overseas in many respects: it has a diverse membership including many organisations from outside the electricity industry, has a strong consumer-focus, is lightly resourced and is not directed at the implementation of a specific government policy such as decarbonisation or technology export.

As a result of this, the Forum's work has the credibility of genuine independence and diversity. It has been influential in the development of early thinking about the impact of new technologies on the NZ power system and describing a vision of smart grid development that emphasizes customer choice and benefit over central planning and government intervention.

The Commission has been an observer to the Forum's work since its inception and we have benefitted from its involvement. Given the diversity of our membership, we have limited our comments on the *Emerging technology pre-workshop paper* and the related workshop to relevant published work from the Forum's first year. Individual forum members may, of course, make their own submissions on other topics in their own right.

Regulatory treatment of the costs and revenues associated with smart grid technologies

We note the Commission's purpose in reviewing the Input Methodologies is to identify problems and potential solutions with the existing rules and requirements under Part 4 of the Commerce Act. The pre-workshop paper focuses on the issues that emerging technologies present to the regulatory treatment of costs and revenues for electricity lines businesses. While the Forum has not discussed this topic specifically, this submission summarises relevant findings from the Forum's investigation into *Smart Grid Coordination Models and Issues* both to highlight relevant case studies that may inform the Commission's investigation and in answer to questions in the Commission's pre-workshop paper.

Case studies

The Commission's pre –workshop paper identifies 3 hypothetical scenarios which are used to elaborate how the regulatory regime would treat the costs and revenues of emerging technologies that are likely to be deployed within the next regulatory period.

The Forum carried out a number of case studies during its first year while investigating 'how to facilitate sufficient multi-party coordination to achieve national benefits not available to any one party acting alone'. We included some details of these case studies in our submission on the Commission's *Invitation to Contribute on the Problem Definition*, looking at these issues in a set of papers from different perspectives:

- Looking at lessons learned from recent market-led investments to identify potential issues - Learnings from Market Investment in Ripple Control and Smart Meters,
- Reviewing a mandated, state government-led smart metering programme - Overview of Victorian Smart Meter Programme, and
- Identifying potential issues that might require coordination and reviewing models used in liberalised markets to implement complex infrastructure involving multiple parties - Coordination Models and Issues, Discussion Paper.

The Commission's case studies highlight scenarios where EDBs invest in assets which can be used for both regulated and unregulated services – leading to questions around the allocation of capital and operating costs to the regulated service. The majority of the Forum's case studies do not have this feature: most New Zealand smart meter investments have been made by third parties under contract to retailers with unregulated costs and revenues. Ripple control infrastructure in New Zealand has traditionally been provisioned by EDBs as a tool for delivering electricity by line although since the line-energy split some relays are controlled by retailers in response to energy market prices. In the first case, costs are attributable to the regulated service, in the second the service is unregulated.

New Zealand's smart meter rollout does provide some insights as to how emerging technologies are likely to be used in the conveyance of electricity by line in the near future, which may be instructive for the Commission's investigation.

The Forum's Learnings from Market Investment in Ripple Control and Smart Meters details how the majority of New Zealand smart meters have been installed under contracts with retailers but

that WEL Networks, Counties Power, the Lines Company and SmartCo have been or are planning to replace their own accumulation meters. Even where lines companies own smart meters, advanced metering services are generally supplied by AMS and Metrix.

The report notes that

> *distributor involvement and network benefits have been more limited to date.*
>
> *Some participants attribute this to the multiple metering technologies, metering providers, and retailers with multiple data formats and contractual arrangements. Others suggest this is because distributors are unsure what the benefits of household smart meters will be, or that the distributors do not have the incentives or risk appetite to invest.* [1]

It does provide some specific examples of line company smart meter projects (see box on page 7):

> *Vector is undertaking projects with Metrix. It is exploring:*
>
> - *Using smart meter voltage profiles to improve the accuracy of information on which of its customers is supplied by which transformer*
> - *Improving its measurement of reliability measures such as frequency and duration of outages for customers, down to the low voltage level.*
> - *Using smart meter data to understand voltage fluctuations across the network.*
>
> *AMS is beginning to provide data to Vector starting with using meter voltage profiles to understand network topology. AMS is also discussing data provision with Electra.*
>
> *Counties Power reports is using data from its smart meters to avoid outages and handle faults better. Counties' meters all have a 'last gasp function' which sends a signal saying the power is out.*

These emerging cases are relevant to the IM Review in that all relate to the use of new technologies in the provision of the regulated lines service. In some cases the smart meters are owned by the distributor, in others they are owned by a third party but provide actual rather than hypothetical scenarios that can be used to clarify how the current rules treat revenues, capital costs and operating costs associated with emerging technology investments related to regulated services.

The role of Research, Development & Demonstration in innovation

Paragraph 143 in the Commission's pre-workshop paper asks whether additional R&D or innovation incentives are needed.

Expert advice to the Forum from John Scott has been that the practical difficulties of evolving operating models and integrating new technologies and operating practices should not be underestimated and can take a long time. Electricity networks will need new skills and capabilities to integrate smart solutions and technologies but practical trials will be needed to demonstrate

[1] Smart Grid Forum, Learnings from Market Investment in Ripple Control and Smart Meters, P. 6

how smart solutions can work and how they can become part of "business as usual" before they are capable of deployment at scale.

One conclusion of the Forum's Learnings from Market Investment in Ripple Control and Smart Meters report was the need to understand and communicate network benefits because

> *The line companies are in the early days of understanding the benefits of smart metering (and potentially other smart grid technologies). At this stage sharing experiences is important especially for the smaller companies that may not have the capabilities and scale economies to capture the benefits.* [2]

More fundamentally however

> *Even within the larger lines companies there are widely different views on the usefulness of smart metering ranging from optimism on the future benefits of smart metering, to views that 'we cannot see any benefits for us from household smart meters that we cannot achieve ourselves through our own systems.'* [3]

Differences in opinion about the usefulness of individual smart grid technologies and techniques amongst lines companies will be even greater than those related to smart metering given that the smart grid is less mature and more varied. In this respect it is important that regulated companies are not discouraged from discovering which technologies and techniques to exploit and how to do so efficiently. The Forum's overarching conclusion in studying smart metering takeup was that emerging technologies are fast-changing and will require a trial and error approach[4].

The relevance of this conclusion to the Commission's Review is that the IMs must mimic the competitive market where companies offset the costs of a failed technology pilot or trial against the benefits of successful pilots put into production.

Members were keen to distinguish between the "R&D" in paragraph 143 of the Commission's paper and "RD&D" in securing the benefits of new operating models. Evidence from John Scott and wider experience in the UK[5] and elsewhere is that Demonstration (the second "D" in RD&D) of emerging technologies is a critical part of collectively-funded policy which needs to be encouraged so that results can be shared. Ensuring such research and its results is open to all lines companies (and any other interested parties) would be an efficient mechanism to accommodate the differences in opinion about the usefulnesses of specific smart grid technologies and techniques.

"Effective experience sharing and facilitating multi-party initiatives" was also a recommendation of the Smart Grid Forum's first year-end report to the Minister of Energy "[6]. The supporting investigation that led to this recommendation highlighted the risk that in projects with multiple beneficiaries, unless one party benefits sufficiently, an efficient project may not go ahead.

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[2] Ibid, P. 12
[3] Ibid, P. 8
[4] Ibid, P. 17
[5] For example, the expert authors of the 2015 Global Apollo Programme report highlight that Smart Grids should be a priority area for RD&D expenditure (or incentives) to combat change – see http://cep.lse.ac.uk/pubs/download/special/Global_Apollo_Programme_Report.pdf . Similar thinking supported Ofgem's explicit use of demonstration projects obligations and sharing intellectual property in the Low Carbon Networks Fund (see section 1 of its Governance Document at https://www.ofgem.gov.uk/sites/default/files/docs/2015/04/lcnf_gov_doc_v7_-_final_clean_0.pdf)
[6] Page 12 - http://www.mbie.govt.nz/info-services/sectors-industries/energy/electricity-market/nz-smart-grid-forum/meeting-7/150619-first-year-report-to-minister-final.pdf

The same concern applies to the rebundling of prices. While paragraph 20 of the Commission's paper is clear about the scope of its regulatory powers, some members remain concerned that the majority of residential customers pay bundled retail prices which do not signal the full benefit of real-time demand response across distribution, transmission and generation and that many consumers are oblivious to the fact that it would be profitable for them to invest in energy management technologies and practices to control their demand efficiently.

Falling consumer technology costs and improved capabilities in energy management solutions mean that automated demand response could be profitable for orders of magnitude more customers, particularly homes and small businesses, than was the case even 5 years ago. If customers took up these solutions, the scope of electricity lines services would reduce - to the long term benefit of consumers. Given the Purpose of Part 52A, it would be helpful to understand how the Commission sees its regulatory role in ensuring that the *quantity* of regulated goods and services is efficient given the emerging nature of these technologies and limited awareness of the opportunities they create.

As ever, many thanks for involving the Forum in the Commission's work on emerging technologies. Please let me know if you would like further detail on any of the material covered in this submission and I would be happy to organise a teleconference or face-face interaction with Forum members for the Commission if that would be helpful as the IM Review progresses.

With best wishes

John Hancock
Secretariat – on behalf of the Smart Grid Forum