

Submission on Normal Frequency Management Strategy

To: Electricity Authority

From: City Financial

To whom it may concern,

Introduction

City Financial is an independent fund manager based in the UK. In New Zealand we manage funds that trade electricity derivatives in New Zealand and Australia. Increasingly we are also looking at ways in which we can work with load to be more flexible and participate into existing and new physical and derivative markets.

Support the strategic review

As such we strongly support the Normal Frequency Keeping Strategic Review and the potential to increase competition and make frequency services accessible to new, more innovative, providers.

However, we are concerned that the review proposed is less 'strategic' than it is a justification for a tactical decision that has already been made. We are concerned about the flaws in logic in section 4 that, seem to us, to lead to a preliminary decision.

From sections 4.1 to 4.3 of the Authority's review paper:

- 4.1 outlines three questions that seem to form the basis of the remainder of the document, yet are introduced as only a subset of the questions to be answered.
- 4.2 then makes the point that these questions and tradeoffs are complex and difficult to answer
- 4.3 is important - in an effort to make the tradeoffs more tractable the Authority simplifies all this down to the degree to which you can substitute one supply-side technology for another.

Then, 4.5 gives a rather weak justification which says "if we've ended up missing some stuff, we'll do it in a later review". This begs the question, is this a strategic review or not?

There is no assessment of whether the questions in 4.1 are the key ones. There is no presentation of what the complexities, uncertainties and variables mentioned in 4.2 are. There is no assessment of what is excluded from the assessment as a result of the Authority making its "simplification" in 4.3, and therefore what things are now being left until a later review.

If the Authority's conclusion is that demand-side technologies are excluded, or the future of technology is too uncertain - and will be dealt with in a later review - then the Authority needs to be explicit about that.

Robust analysis

As investors, however, we stress the importance of designing markets and trading arrangements carefully and properly. Investors and innovators respond best to good analysis and data. Robust analysis into the required services, the implied demand and potential

supply is critical to successful design of any new arrangements. While we realise this is the start of a review, there has been little empirical evidence collated so far. This is not unexpected at this early stage, but the Authority seems to be coming to some initial conclusions that are potentially unjustified; for example, the conclusion reached in paragraph 4.28 despite no quantification of the relative costs having yet been done.

Encourage participation

As the Authority is aware technology is changing the ability and the cost for demand to participate in energy and ancillary service markets. Consequently, the Authority should be cognisant that the future providers of ancillary services may not be the incumbent energy suppliers. We encourage the Authority to be inclusive in consultation on normal frequency management and not form opinions on who may or may not be a provider of services. We reiterate our desire to potentially participate in any future arrangements with demand side solutions.

Dynamic Efficiency

Dynamic efficiency needs to be considered on an, at least, equivalent basis to static efficiency. This means making any future arrangements genuinely accessible and technology ambivalent, or having the ability for the arrangements to transform to accept new technology. In services as data rich and technically dense as frequency management the Authority needs to be particularly wary of information asymmetry and differential transaction costs.

Ultimately, investment and innovation needs the fundamentals of supply and demand, and therefore price and price volatility, to be robust, observable and independently forecastable. Building long run datasets¹ now will not only assist good decision making and design but also build confidence for potential new entrants into future arrangements.

Specific questions

(a) Do you have any comments on how governor availability costs availability costs wear and tear costs capacity carrying costs compare between MFK and governor response?

We don't have any comments on the relative costs between frequency keeping and frequency response, except that these costs need to be properly quantified before decisions are made. We also suggest that the Authority now consider the possibility that load could eventually provide both frequency keeping and frequency response characteristics.

(b) Do you have any comments on the extent to which MFK can be substituted by governor response?

This is a very open question and difficult to answer. To answer it requires a certain degree of pedantry.

However, the first points we'd like to make are that:

- inertia also influences frequency, and
- the term governor response risks presupposing that only the supply side can provide this service; which is why we are using the term frequency response.

¹ For example, time series over appropriate periodicity of frequency performance (peak/average deviation, peak/average time error), peak/average volume deviation from dispatch solutions, volumes of MFK procured, peak/average volume of governor response, etc.

We make the point about inertia as inertia has traditionally been thought of as non-discretionary. This point is worth challenging. Power electronic speed controllers are frequently used to dampen the mechanical shock effects on both motors and generators. While this application is used to reduce the inertial response of machinery on the power system it also means that, theoretically, inertial response can be dispatchable. In theory, at least, consumers and generators could elect to install higher inertia plant than they might have otherwise, if they had an incentive to do so.

To be clear, inertia slows frequency deviations, frequency response makes an active contribution to stabilise frequency to a predefined characteristic and frequency keeping actively reduces frequency error (or alternatively time error) to zero to a predefined characteristic. Increasingly, with technology, these elements of frequency management can be provided by more types of generation and load.

None of these elements have sufficient response capacity to avoid system failure and the fourth element of frequency management is dispatch (and, in fact, MFK is an automatic dispatch functionality (automatic generator control, or AGC) managed to a frequency keeping characteristic). The best way to think of the resulting frequency is as a composite of four frequency functions that influence over different time periods.

In this context, there is limited ability to substitute between inertia, frequency response, frequency keeping and speed of dispatch. Very rapid dispatch is unstable while too slow frequency response can lead to frequency deviations that cannot be recovered. Within the physical bound of minimum fast, stable response then each element can substitute for another. However, technology could be changing the ability to substitute dramatically.

(c) Do you think that there are likely to be net benefits in progressing to a procured governor response service through tendering, given the technical challenges identified in this paper?

We consider it likely that there are net benefits in a more dynamic definition of the service required; and being open to interchangeable services with potential new entrants. However, if we assume that technology will make even complex, real-time, dynamic problems economically solvable then a static optimisation at a point in time seems like a transitional stage, at best.

Such a transitional stage may have net benefits but the Authority will need to think longer term about where a procurement stage fits in the evolution of frequency management to properly assess net benefits.

(d) Which option or options in section 5 do you agree with and which do you not, and why?

We don't think this question can be answered at this stage. A strategic review should be focused on the extent to which the review provides options that cater for different future scenarios, rather than which options submitters agree with. Given the contribution technology could make in the foreseeable future none of the options presented, as we understand them, seem to be anything but a transitional solution. Whether or not such a transitional solution (which any one of the options presented could be) is warranted needs to be asked in a longer strategic context; i.e. do we need a short run, quick win, low cost transition that is easy to move on from, or a longer more considered transition that starts to encourage innovation, or should we be thinking about more advanced solutions now?

(e) Are there any other features or options you would like to suggest?

See our answer to question (b) above but essentially:

- Consider the role of technology and inertia in frequency management,
- Consider that inertia response, frequency response, frequency keeping and fast dispatch can potentially be provided by load,
- Consider that more dynamic solutions may encourage more early innovation,
- Ensure that any future arrangements are genuinely accessible to new entrants.

(f) Do you have any comments on the indicative analysis of governor response costs in Appendix E?

We have no comments on Appendix E. However, we reiterate that frequency response may be provided by load and demand management technology in the foreseeable future. We would like to be involved in discussions about how this might be done and what it might cost.

(g) Are there any other issues you wish to bring to the Authority's attention?

We are concerned that the strategic review isn't strategic enough. We suggest the options being considered now should be put in a longer-term strategic context.

We are also concerned that there has been insufficient empirical analysis. We recognise that the strategic review is at an early stage but the Authority appears to be making initial decisions and asking submitters to make initial decisions.

Sincerely,



David Waterworth

Strategist, Asia-Pacific Energy, Cumulus, City Financial