Wholesale Advisory Group

Improving Forecast and Settlement Pricing Recommendations Paper

Report by the Wholesale Advisory Group

21 October 2013

Note: This paper has been prepared for the purposes of the Wholesale Advisory Group. Content should not be interpreted as representing the views or policy of the Electricity Authority.

Contents

Tables

The Wholesale Advisory Group (WAG)

The members of the WAG, as at the date of the publication of this paper, are:
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Authority request

In July 2012, the Electricity Authority (Authority) requested the input and advice of the Wholesale Advisory Group (WAG) on improving forecast and settlement pricing.

1 Conclusion and recommendations

1.1.1 The WAG recommends the Authority:

a) proceed with incremental improvements to the spot pricing process already planned or underway including existing work to improve the quality of demand and intermittent generation forecasts

b) implement new initiatives to:

   i) align the assumptions used in real-time pricing and settlement pricing as closely as possible

   ii) improve the availability of real time price information to users

c) consider the merits of other incremental improvements to the pricing process:

   i) flagging infeasibilities in forecast schedules

   ii) reducing the gate closure period

d) investigate options for the spot market design to settle on ex ante or real time prices and also consider other aspects of the design that could improve retail competition, such as zonal pricing

e) note that settlement on ex ante or real time prices could support efficiency on the supply side as well as the demand side.

2 Approach to the project

2.1.1 In requesting that the WAG consider the potential problem of the misalignment between forecast and settlement prices, the Authority's objective was:

> "To publish an economic price for reserve and electricity in advance of and during shortages so wholesale market purchasers and consumers can rely on prices published in the schedules during the widest range of supply situations. Improved forecast and settlement prices would contribute to the Authority's statutory objectives by improving competition and reliability".[1]

2.1.2 The Authority further noted that:

[1] Correspondence – letter to WAG Chair, 22 June 2012, WAG work plan: http://www.ea.govt.nz/our-work/advisory-working-groups/wag/5Jul12/

> "Being able to rely on the prices derived in forecast schedules and settling on a price derived from those provided before or during the trading period would increase investment in voluntary demand response. Greater demand response from consumers and retailers would reduce the prices experienced during tight supply conditions."

2.1.3 The WAG agreed to add improving forecasting and settlement pricing to its work plan for initial investigation. After investigating the problem in some detail, the WAG published a discussion paper ("Aligning forecast and settlement prices") on 9 July 2013.

2.2 Feedback sought in the WAG discussion paper of July 2013

2.2.1 In the discussion paper, the WAG described the problem of misalignment and the resulting efficiency losses, and sought feedback from stakeholders on two options:

a) whether the Authority should either consider in more detail a potential move to ex ante or real-time pricing (using its normal policy development process) or

b) only take an incremental approach to improving the alignment between forecast and settlement prices at this stage.

2.2.2 The WAG noted in the discussion paper that the advantages of the incremental approach could include:

a) lower implementation cost

b) lower risk of unintended consequences

c) that it would not preclude consideration of settling on ex ante or real-time prices at some later stage.

2.2.3 However, while settling on ex ante and/or real-time prices could incur significant implementation costs, it could also bring substantial economic benefits. Factors that might favour moving to ex ante or real-time pricing could include expectations that:

a) the incremental approach would not address some of the underlying causes of misalignment

b) providing participants with more certainty about what prices will be could result in more efficient operation of the power system

c) improving the scope for demand-side participation may strengthen broader confidence in the electricity market.

2.3 Submitter responses to WAG discussion paper

2.3.1 Eleven submissions were made on WAG's discussion paper, as set out in Table 1.

Table 1: Parties that made submissions on WAG discussion paper

Generator/ retailers	Electricity Users	Other
Contact Energy (Contact) Genesis Energy (Genesis) Meridian Energy (Meridian) Mighty River Power TrustPower Nova Energy (Nova)	Major Electricity Users Group (MEUG) New Zealand Steel Pacific Aluminium	EnerNOC Transpower

2.3.2 All submitters agreed that, while forecast prices predict settlement prices reasonably accurately under normal conditions, they are less accurate when the system is under stress. Submitters also agreed that addressing this misalignment would lead to an economic benefit, but nearly half the submitters were unsure if the benefit would be significant.

2.3.3 Many submitters thought that, while the current and planned initiatives had the potential to significantly improve alignment between forecast and settlement prices, they were not likely to be enough in themselves. These views are discussed in more detail in section 5.2.

2.3.4 A majority of submitters supported further consideration of settling on ex-ante or real time prices, and most submitters thought it would be preferable to provide participants with more certainty about spot prices ahead of, or in real time, although some of this support was qualified. These views are discussed in more detail in sections 6.2 and 6.3.

3 Addressing short-term spot price uncertainty would have significant benefits

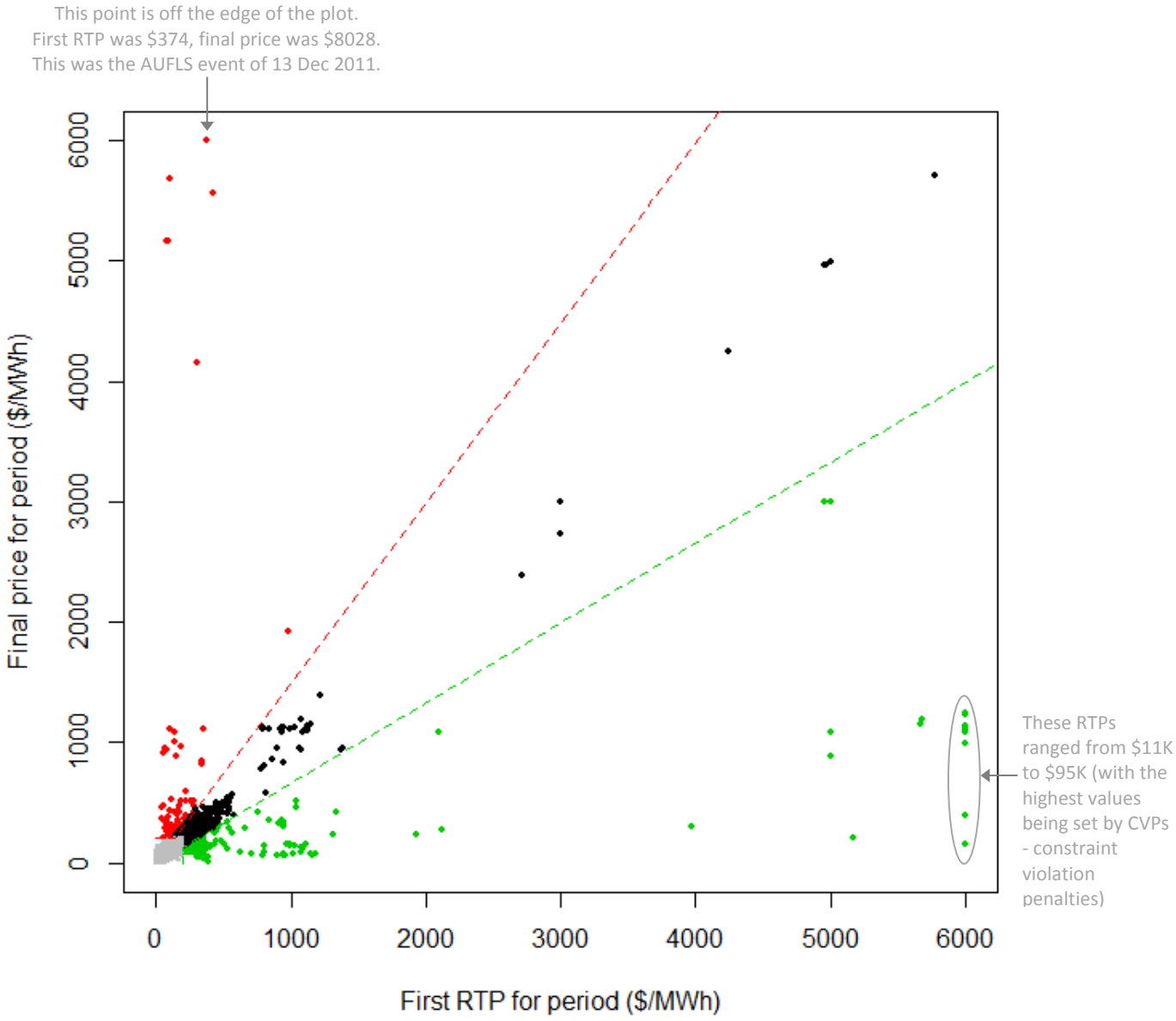
3.1 Short-term price forecasts may differ from settlement prices, particularly when the power system is stressed

3.1.1 At present, settlement prices are determined ex post, with a series of spot price forecasts published before and close to real-time to provide guidance about what the settlement price is likely to be. These spot price forecasts include prices from the price-responsive schedule (PRS) and non-responsive schedule (NRS), as well as 'real-time' prices (RTPs), which are calculated every five minutes and published close to real time.

3.1.2 The analysis presented in the body of the discussion paper and in more detail in appendix C suggests short-term price forecasts predict settlement prices reasonably accurately under normal conditions (although improvement appears possible), but they are less reliable when the system is stressed, based on historical data. This means that spot price forecasts are least reliable in the very periods when buyers are most motivated to respond and where an efficient response to price signals is most valuable. Submitters generally agreed with this assessment.

3.1.3 Figure 1 (reproduced from the discussion paper below) shows the correlation between settlement prices for each trading period between July 2009 and March 2013 and the first RTP of the same trading period. It shows that the first RTP in a trading period was usually a reasonably accurate forecast when settlement prices were low to moderate and the system was not under stress (small grey dots) but, at other times, RTPs over-estimated (green) or under-estimated (red) the final price. The 50% variance between forecast and settlement prices (green and red dotted lines) reflect a significant error in the forecast.

Figure 1: The accuracy of the first RTP price forecast in a trading period



3.2 Causes of misalignment between forecast and settlement prices

3.2.1 Analysis presented in the body of the discussion paper and in more detail in Appendix E suggests that, for a sample of trading periods in which settlement prices were substantially greater than RTPs, the two main causes of misalignment were that:

a) RTPs restrict generator ramping to what they can deliver in a 5-minute time period while settlement pricing allows generators to ramp over a full 30-minute trading period

b) RTPs include constraints applied by the system operator during a trading period but these are excluded for calculating settlement pricing.

3.2.2 The next most important causes of misalignment between RTPs and settlement prices were found to be errors in demand forecasts and forecasts of wind and embedded generation (as outlined in appendix C of the discussion paper).

3.2.3 Table 1 (below) is reproduced from the discussion paper. It provides a summary of the reasons why spot price forecasts differ from settlement prices.

Table 2 Reasons why short-term spot price forecasts may differ from settlement prices

Aspect of the pricing process	PRS	RTP	Final pricing
Time step	30 minutes	5 minutes	30 minutes
Demand	Half-hourly forecast demand Demand-side bids	Five-minute demand estimated from SCADA	Half-hourly demand estimated from revenue meters
Grid configuration, generation availability, reserve adjustment factors	Projected conditions	Actual conditions, updated every five minutes	Actual conditions at the start of the trading period
Intermittent generation	Modelled as offered	Modelled as offered	Averaged over the half hour, and modelled as negative load
Ramp rate constraints	No	On a five-minute basis	On a half-hourly basis
Discretionary market node constraints	No	Yes	No
Determining the price when there is a need for curtailment at an	Projected capacity shortfall in SPD may result in a very high “infeasible	By real-time, curtailment will have occurred – most likely, removing any	Now that scarcity pricing has been implemented, curtailment at an

Aspect of the pricing process	PRS	RTP	Final pricing
island or national level	price" or at least a "normal" high price	capacity shortfall in SPD and considerably reducing the forecast price	island or national level will result in prices being scaled to a level reflecting VoLL[2]
Determining the price when SPD finds a local shortfall of energy or a shortfall of IR	When SPD projects a shortfall of IR or energy, the forecast price rises to a very high "infeasible price". This is not meant to be interpreted as an actual prediction of what the final price will be – rather, it flags that there may be scarcity		If the shortfall persists, then final prices are determined using the "infeasibility resolution process", which progressively relaxes constraints until there is no longer a shortfall in SPD

*Source: Based on table published by Transpower (*http://www.systemoperator.co.nz/f1950,18342185/GL-OC-209_SPD_Schedule_Inputs.pdf)

3.3 Short-term spot price uncertainty can lead to inefficient responses

3.3.1 Short-term spot price uncertainty can introduce static inefficiency by sending the wrong signals to potential short-term responders. For example, an inaccurately high forecast price may lead some parties to respond – but the settlement price may turn out to be less than the cost of their response. Conversely, an inaccurately low forecast price will not warn parties to respond – but the settlement price may turn out to exceed the value of their usage (for consumers) or the cost of their possible response (generators).

3.3.2 If short-term spot price forecasts are unreliable this will discourage some demand-side parties from responding to them. After buyers have observed several forecast errors, they may conclude that the benefits of responding do not justify the cost and may cease to respond to short-term price forecasts. They may also conclude that that it is unsustainable to remain exposed to the spot price and choose to hedge against their spot exposure despite this being a more expensive alternative. Short-term spot price uncertainty may also discourage the introduction of new types of demand-side response. These outcomes would increase the demand for and price of

[2] The Value of Lost Load

financial instruments and inefficiently bring forward plans for investment in new generation or transmission assets.

3.3.3 Generators may also be affected by short-term spot price uncertainty. They need accurate spot price forecasts in order to make unit commitment and short-term water management decisions.

3.4 Addressing spot price misalignment would have significant benefits

3.4.1 Efficient demand-side participation could be supported by reducing the level of misalignment between forecast and settlement prices. Indicative analysis published in WAG's discussion paper suggested that doing so could unlock enough demand-side and embedded generation response capacity to avoid the need for 30 MW of new peaking generation (point estimate, with a range of about 10-100 MW) and the associated network infrastructure. The gross economic benefit is estimated as $27M PV, with a range of $5-110M PV.

3.4.2 There is also potential for improved alignment between forecast prices (outside the gate closure period) and settlement prices to support more efficient decisions, in terms of:

a) thermal unit commitment

b) short-term water management

c) transmission investment

d) demand-side response that requires a lead time of more than half an hour.

3.4.3 This benefit has not been quantified but could be material.

4 Pricing misalignment should be addressed

4.1.1 The WAG's analysis suggests that the problem of misalignment between spot price forecasts and settlement prices is material. Therefore, the WAG recommends the Authority proceed with incremental improvements to the spot pricing process (some already planned or underway), and consider the merits of two more projects that could deliver incremental improvements.

4.1.2 In addition, the WAG recommends that the Authority investigate options for the spot market design to settle on ex ante or real time prices, but also consider other aspects of the design that could improve retail competition, such as zonal pricing.

4.1.3 The WAG's recommendations in relation to incremental improvements are discussed in section 5, while spot market design options (including settling on ex ante or real time prices) are discussed in section 6.

4.1.4 The WAG also recommends that the Authority note that the Authority's original problem definition, which focused on investment in demand-side response, should be widened. Improving pricing alignment could improve efficiency for both the supply **and** the demand sides of the market.

5 Incremental improvements to the spot pricing process

5.1 Discussion paper proposal

5.1.1 The discussion paper noted that one option to improve the alignment between forecast and settlement prices was to take an incremental approach. This approach would involve:

a) progressing initiatives that are already in the pipeline that are expected to improve pricing alignment

b) the Authority considering later whether any further action might be required.

5.1.2 The WAG noted in the discussion paper that the following initiatives were already planned or underway:

a) The Authority's plans to review the treatment of intermittent generation in the pricing process.

b) The Authority's plans to consider removing the "HVDC dead band" constraint in settlement pricing

c) The dispatchable demand initiative, which will not reduce price misalignment, but will assist some consumers to manage the consequences of misalignment.

d) The introduction of Transpower's new Ion revenue meters, which will be able to provide more accurate and reliable load measurements in real-time and will eventually replace the SCADA load measurements used in real-time pricing.

e) The system operator's review of its short-term demand forecast, which is used by the system operator in PRS for conforming loads.

f) The Authority's plans to review gate closure arrangements. This initiative would seek to achieve more efficient dispatch, but could also impact the

accuracy of price forecasts (in some ways positively, in other ways negatively).

5.1.3 It was also noted that there may be the potential to improve the accuracy of real time prices (as forecasts of settlement prices) by changing the treatment of ramp rate constraints and market node constraints in the real time pricing process to be more consistent with settlement pricing (or vice versa).

5.1.4 The WAG considered that, despite all these initiatives, it was possible that substantial potential for misalignment will remain – particularly during times of system stress. For example, there would still be misalignment between the demand and embedded generation inputs used in real time prices and those used in settlement prices.

5.2 Submitter feedback

5.2.1 Most submitters supported at least the pursuit of incremental initiatives.

5.2.2 Key points made in support of the incremental initiatives included:

a) There would be a relatively low risk of unintended adverse consequences (Contact, Meridian, TrustPower)

b) If any unintended adverse consequences arose, incremental changes are more likely to be able to be reversed quickly and relatively cheaply (Nova, TrustPower)

c) Incremental changes are likely to have lower implementation costs (Meridian).

5.2.3 Genesis was not convinced that an incremental approach alone would resolve the problem, and noted that any incremental changes needed to be carefully considered so that they did not inadvertently restrict a more comprehensive longer-term market solution.

5.2.4 EnerNOC thought an incremental approach was not likely to achieve much, because the potential for settlement prices to be wildly different would still remain, and hence so would the risks to potential participants. Incremental improvements would not address the fundamental pricing uncertainty problem well enough to allow participation by cost-effective longer-lead-time resources.

5.2.5 Most submitters supported the Authority investigating improving the accuracy of real-time prices by improving alignment between ramp rate constraints and market node constraints used in real-time pricing and those

used in settlement pricing. However, some submitters qualified their support:

a) EnerNOC submitted that, even if real-time prices were completely 'accurate', it would not make things much better for demand response. It noted that the situation would be similar to that in the Australian National Electricity Market (NEM), where the price that matters – the one that affects payments – may only be determined near the end of the trading interval to which it applies. In addition, EnerNOC submitted that it would do nothing to facilitate participation by resources which require some degree of advance notice.

b) MEUG and New Zealand Steel submitted that further work should be done to identify any unintended consequences.

c) Anne Herrington's (Smart Power) feedback from smaller commercial companies paying spot prices for electricity is that they often absorb price increases as their electricity costs are a small component of operating costs and therefore they are tolerant of the existing level of spot price uncertainty. However, Transpower and EnerNoc suggested that demand elasticity will increase as technology enables smaller consumers to automate their response to prices.

5.2.6 Some submitters were uncertain about the benefit of better aligning ramp rate constraints and market node constraints:

a) Genesis felt that improving demand forecasting accuracy could deliver more benefits.

b) Nova submitted that it depended on the definition of accuracy and whether you aligned real-time prices to settlement prices or vice versa.

c) Transpower noted that there is scope to look at changing the purpose of real-time prices to better forecast settlement pricing, but this would involve changes to initial conditions and discretionary constraints.

5.2.7 Other incremental initiatives for improving alignment between forecast and settlement prices were suggested in submissions. These included:

a) improving demand forecasting (Genesis and Mighty River Power)

b) improving wind forecasting (Genesis)

c) improving bid quality at non-conforming nodes (Transpower)

d) ensuring real-time prices are reliably published every five minutes (particularly at times of spot market 'stress') (MEUG and New Zealand Steel)

e) reducing the gate closure window (Meridian)

f) capping to remove infeasible prices (particularly if other initiatives cannot be progressed quickly) (New Zealand Steel).

5.2.8 Although many submitters thought that initiatives planned or underway had the potential to significantly improve the alignment between forecast and settlement prices, they thought they were not likely to be enough in themselves. Therefore, some submitters supported the Authority continuing to investigate, in parallel, whether settlement should occur on ex-ante or real time prices. This is discussed further in section 6.

5.3 WAG recommends proceeding with some of the incremental improvements

5.3.1 The WAG recommends proceeding with three incremental improvements at this time:

a) existing work to improve the quality of demand and intermittent generation forecasts

b) new initiatives to align the assumptions used in real-time pricing and settlement pricing

c) new initiatives to improve the availability of real time prices.

5.3.2 The Authority is already working on initiatives to improve the quality of demand and intermittent generation forecasts. The WAG endorses this initiative. In particular, the WAG notes that:

a) Analysis done for the WAG subsequent to the publication of the discussion paper indicates that wind forecasts provided by generators are less accurate than simple persistence forecasts 2.5-hours out, noting that this method is required by the Code to predict wind generation within 2 hours. Genesis noted that inaccurate wind generation forecasts are a significant factor leading to uncertainty in settlement prices, and that wind capacity can fluctuate from 400MW to zero within a very short period of time which has a clear effect on participant's certainty.

b) The WAG's subsequent analysis also showed that at times a simple persistence forecast of load was more accurate than the bids provided 2.5 hours out by some industrial consumers.

c) Both Genesis and Mighty River Power submitted that demand forecasts can be very inaccurate and improving demand forecasts could be very beneficial.

5.3.3 The WAG understands that RTPs were originally intended to represent true system marginal costs with the intention that they might eventually be used for settlement. However, the primary use of RTPs now appears to be for forecasting settlement prices. Therefore, the WAG recommends that the Authority begin work on a new initiative to achieve alignment between the assumptions used in real-time pricing and those used in settlement pricing as far as possible.

5.3.4 MEUG and New Zealand Steel submitted that the number of missing RTPs was unacceptably high and the Code should require RTPs to be published every five minutes. The WAG considers that missing RTPs could result in participants making inefficient decisions and therefore recommends that the Authority implement a new initiative to improve the availability of real time prices.

5.4 WAG considers the merits of other incremental improvements need to be considered further

5.4.1 The WAG considers that two potential incremental initiatives suggested by submitters may have merit, but it acknowledges that further work is needed to assess whether these initiatives would have a positive net benefit. These two initiatives are to:

a) provide real prices when there is an infeasibility

b) reduce the gate closure period.

5.4.2 New Zealand Steel submitted that, if misalignment cannot be addressed at an early date, the Authority should investigate the option of capping prices when the model detects an infeasibility. The WAG notes that, while this issue would be addressed if the market were to settle on ex ante or real time prices (see section 6), it considers the issue is important in its own right

5.4.3 However, rather than capping infeasible prices, the WAG recommends the Authority, as a matter of urgency, implement a project to flag the existence of infeasibilities in all forecast schedules to alert participants that some or all

of the prices in the schedule are not real. The existence of prices based on CVPs can scare parties (especially those new to the workings of the wholesale market) into actions they might otherwise not take.

5.4.4 Meridian considered that reducing the gate closure window should be implemented to help address misalignment between forecast and settlement prices. The WAG considers that relaxing gate closure restrictions may reduce the misalignment between forecast and settlement prices. However, the group acknowledges that allowing participants to change their bids and offers less than two hours before real-time would reduce the risks and costs of those with uncertain capability/load at the expense of those that need time to respond to changing market conditions.

6 Settlement on ex ante or real-time prices

6.1 Discussion paper proposal

6.1.1 The discussion paper noted that, in parallel to progressing incremental improvements to the spot pricing process, the Authority could consider what would be involved in changing the spot market design so that settlement occurred on ex ante or real-time prices. It noted that settling on ex ante or real-time prices would provide participants with more certainty about spot prices ahead of, or close to, real time and therefore could support more effective demand-side management, and assist generation decisions where lead time is required (e.g. for committing thermal units).

6.1.2 The paper also noted that settlement prices are generally determined before, or *shortly* after, electricity is consumed in most other jurisdictions, including parts of the United States, the Australian NEM, and the electricity markets in Singapore and Alberta.

6.2 Submitter feedback

6.2.1 A majority of submitters provided at least qualified support for considering settling on ex ante or real-time prices. However, submitters emphasised that the options needed to be carefully explored (including undertaking cost benefit analysis) before committing to any changes. Submitters who provided support also noted:

a) Efficient demand-side participation would be best facilitated by introducing some form of *ex ante* pricing. The further ahead *ex ante* prices can be set, the more demand response participation can be

expected. EnerNOC considered that a day-ahead market would allow the broadest participation, but that a 2-hour-ahead market could be almost as good (estimating that it would allow 75% of the participation of a day-ahead market based on its international experience and local knowledge).

b) Changing to settling on ex ante or real-time prices would be non-trivial as it could alter basic elements of the current design and an ex ante market would necessitate a balancing market (Transpower).

c) While the options would provide the greatest certainty to participants, care needed to be taken to ensure that pricing errors and high spring washers were able to be dealt with (TrustPower).

6.2.2 Contact and Nova were unsure that there would be advantages from settling on ex ante or real time prices. Contact was concerned that the advantages derived from achieving certainty would be outweighed by the disadvantages from a loss of pricing accuracy. Nova thought that considering these options was likely to mean less emphasis was placed on improving ex-post and real time data issues.

6.2.3 Meridian considered there would be no advantages in this approach because it would effectively lock in inaccuracies and would have associated implementation costs and risk of unintended consequences.

6.3 Certainty versus accuracy

6.3.1 The discussion paper also discussed the trade-off between ‘certainty’ (i.e. do forecasts reliably predict settlement prices) and accuracy (i.e. do settlement prices reflect the marginal prices associated with the system conditions at the time).

6.3.2 In a general sense, setting prices for a product or service in advance provides purchasers notice of their potential costs (ie increased certainty). However, providing advance notice of prices requires suppliers to estimate their costs and quantities (ie less accurate).

6.3.3 The WAG noted in the discussion paper that it considered that market design in New Zealand has traditionally prioritised accuracy, sometimes at the expense of certainty. The WAG noted that, while providing accurate prices aids efficiency, providing certainty can increase competition, which also promotes greater efficiency. The WAG asked submitters for feedback on the relative importance of certainty and accuracy in enhancing efficiency.

6.3.4 All submitters supported providing participants more certainty about prices ahead of, or in, real time, at least on a qualified basis. Submitters whose support was qualified was subject to:

a) their view that accuracy is ultimately more important than certainty (Meridian)

b) trade-offs between certainty and accuracy (Mighty River Power)

c) the consequences of such a change being scoped and a cost benefit analysis developed (New Zealand Steel)

d) whether the benefits of certainty outweigh the costs of achieving it (Transpower).

6.3.5 Submitters were split on whether accuracy or certainty was more important:

a) Meridian and Mighty River Power thought accuracy was more important. Meridian submitted that highly accurate forecasts will improve certainty, while Mighty River Power noted that although accuracy was more important, the costs of achieving greater accuracy needed to be weighed up carefully.

b) EnerNOC, New Zealand Steel and Genesis submitted that certainty was more important. EnerNOC submitted that providing actionable forecast information to participants was crucial to a well-functioning market, and there was little benefit if settlement price information was perfectly accurate but only available after the point when users could react to it. In addition, EnerNOC noted that demand response resources were especially dependent on the availability of reliable price forecast information, because the opportunity cost of reacting to poor forecasts was typically higher for these resources than for generators. Genesis thought that in trade-off situations, certainty should be emphasised over accuracy because suppliers and users cannot make informed decisions without certainty. New Zealand Steel noted that while certainty is more important, accuracy needs to be within an acceptable level.

c) MEUG, Pacific Aluminium and TrustPower thought that greater efficiency may be achieved by moving towards more certainty as settlement prices were already quite accurate.

d) Contact and Nova submitted that both certainty and accuracy were important. Contact said that certainty and accuracy were not mutually

exclusive and a balance could be achieved. Nova felt there was scope for improving both under current arrangements.

6.3.6 Transpower submitted that it might be better to characterise it as a 'precision' versus certainty trade-off. Under current arrangements there are very granular and precise signals, but these may not necessarily be more accurate than a less granular and less precise design. Transpower also noted that while there are many benefits from a precise full nodal model, notably for dispatch and security, there may be competition and other benefits from reduced price risk that outweigh negative efficiency impacts associated with a less precise pricing model.

6.3.7 The WAG's view of the trade-off between certainty and accuracy has not changed significantly since the discussion paper. However, the WAG agrees with Transpower that it may be useful to consider the trade-off between certainty and precision, rather than accuracy. One aspect where this trade-off is relevant is the consideration of zonal versus nodal pricing.

6.4 WAG recommends further investigation of the spot market design

6.4.1 The WAG notes there is majority support from submitters for the Authority considering (in parallel to incremental initiatives) options for settling on ex ante or real time prices and considers it is appropriate to do so.

6.4.2 However, the WAG recommends that, while investigating the potential for settlement on ex ante or real time prices, the Authority also considers other elements of the spot market design that could improve competition for the long term benefit of consumers. For instance, the WAG suggests that the pros and cons of zonal pricing be considered. While zonal pricing may reduce the precision of the pricing process, it could increase competition enough (due to reduced price risk) to outweigh the negative efficiency impacts.

7 Explanation of how the WAG's recommendations are consistent with the Authority's statutory objective and the Code amendment principles

7.1 WAG's recommendations are consistent with the Authority's statutory objective

7.1.1 The WAG considers that its recommendations are consistent with the Authority's statutory objective, which is to promote competition in, reliable

supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers.

7.1.2 The WAG considers that the following initiatives recommended by WAG will improve alignment between forecast and settlement prices, which in turn will promote the efficient operation of the electricity market:

a) existing work to improve the quality of demand and intermittent generation forecasts

b) aligning the assumptions used in real-time pricing with those used in settlement pricing

c) improving the availability of real time prices.

7.1.3 In particular, the WAG considers that these initiatives would provide parties who can respond to short-term spot price forecasts (such as the PRS, NRS and real-time prices) with more reliable predictions of settlement prices. These parties would then be able to respond appropriately to the prices in these spot price forecasts. This should improve competition by encouraging more demand-response, thus increasing competition in the spot market, especially at times of system stress, and the result would be more allocatively efficient.

7.1.4 The WAG considers there are similar benefits by flagging infeasibilities in forecast schedules and by reducing the gate closure period. However, the WAG recommends the Authority further consider the merits of these options before proceeding with them.

7.1.5 Finally, the WAG recommends that the Authority consider whether there are similar benefits from settling on ex ante or real time prices. The WAG considers that settling on ex ante or real time prices could improve efficiency by improving certainty for participants, which may more than offset any reduction in efficiency due to reduced precision. However, this should be explored through more detailed analysis.

7.2 WAG's recommendations are consistent with the Code amendment principles

7.2.1 The WAG considers that its recommendations are consistent with the Authority's Code amendment principles.

7.2.2 In particular, the recommendations (if followed) should lead to outcomes that are *lawful* (Principle 1) and would *improve the efficiency of the*

electricity industry for the long-term benefit of consumers (Principle 2) as discussed in section 7.1 above.

7.2.3 Net economic benefits have not been *quantified* in detail (Principle 3) by the WAG. However, indicative analysis undertaken for the WAG's discussion paper suggested that reducing the level of misalignment between forecast and settlement prices could unlock enough demand-side and embedded generation response capacity to lead to a gross economic benefit of between $5m and $110m in present value terms.[3]

7.2.4 There is also potential for improved alignment between forecast prices (outside the gate closure period) and settlement prices to support more efficient decisions, in terms of thermal commitment, short-term water management and demand-side response that requires a longer lead time. Therefore, the WAG expects that the potential gross economic benefits could be even higher. The WAG has not estimated the costs of implementing each of the initiatives, but considers that the costs of implementing some of the initiatives (particularly the initiatives under the incremental approach) could be relatively low.

8 Next steps

8.1.1 If the Authority agrees with the WAG's recommendations, then the WAG suggests the Authority:

a) proceed with incremental improvements to the spot pricing process already planned or underway including existing work to improve the quality of demand and intermittent generation forecasts

b) implement new initiatives to:

   i) align the assumptions used in real-time pricing with those used in settlement pricing as far as possible

   ii) improve the availability of real time price information to users

c) consider the merits of other incremental improvements to the pricing process:

   i) flagging infeasibilities in forecast schedules

   ii) reducing the gate closure period

[3] This analysis is provided in detail in Appendix D of the WAG's discussion paper: *Aligning forecast and settlement prices*.

d) investigate options for the spot market design to settle on ex ante or real time prices and also consider other aspects of the design, such as zonal pricing, that could improve retail competition

e) note that settlement on ex ante or real time prices could support efficiency improvements on both the supply and demand side.

8.1.2 The WAG would welcome an opportunity to have input into these processes, and undertakes to make itself available to provide advice to the Authority as required through the course of the Authority's future work on this matter.

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John Hancock
Chair, Wholesale Advisory Group