The Authority's preliminary decision of an undesirable trading situation

An economic perspective

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About the author

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Prior to his consulting career, Kieran was instrumental in establishing the (former) wholesale electricity market operator, EMCO. He was responsible for the design and implementation of the wholesale electricity market, NZEM, which went live in October 1996. After leaving EMCO, Kieran held leading roles in projects to advance the market design, including with the Electricity Governance Establishment Project and the Grid Security Project. His expertise in electricity market reform is recognised through subsequent engagements to advise on electricity market institutions and design in Australia (east and west coast markets), Canada, Columbia, the Philippines, Singapore, south-eastern United States, Vietnam, and several Pacific Island nations.

Executive summary

1. In a preliminary decision dated 30 June 2020, the Electricity Authority (Authority) concluded that an Undesirable Trading Situation (UTS) existed at the time it received a claim from seven participants on 12 December 2019. The Authority reached this preliminary view on the basis that:

   - spot market outcomes during the relevant period differed markedly from those the Authority expected, given the underlying supply and demand conditions, and the scale of this difference was large
   - Meridian priced offers to avoid the HVDC binding.

2. UTS provisions exist in market rulebooks to cover unforeseen or exceptional situations. Predictable and recurring events do not give rise to a UTS because if such outcomes cause concerns, specific rules can be written to require different behaviour. The standard of behaviour required from participants in unforeseen or exceptional situations can be imputed to the Code by figuring out the terms the rule drafters would have specified if, instead of the UTS standard, they had written a specific rule to address a gap so that normal market operation would continue during the unforeseen or rare event. That is, UTS provisions are a mechanism to enable the normal operation of existing market rules during unforeseen or exceptional situations.

3. Conversely, a UTS provision is not a by-pass for a rule change and reform. Changes to the market design, with the intent of improving outcomes from normal market operations, require a rule change supported by a regulatory statement showing that the benefits of the change would exceed its costs.

4. The events described by the Authority in its preliminary decision are neither unpredictable nor rare; the prospect of inflows to hydro storage lakes exceeding storage capacity is a well understood and planned for phenomenon. Normal market operations continued without interruption during the period investigated—the high inflows did not disrupt, impair or cause unusual conduct by the generators, nor disrupt, impair or cause unusual conduct by any other party in the wholesale electricity market. No UTS arose.

5. The outcomes observed by the Authority—generator offer prices exceeding the Authority's estimate of generator short-run costs—are regularly observed in the New Zealand wholesale market. These differences, between short-run operating costs and market prices, occur because the New Zealand market is designed to allow price discovery—to establish the price at which generators are willing to make sufficient generation available to meet demand. There is no requirement that offers reflect short-run operating costs. This design is a deliberate and considered choice, adopted because the suite of incentives created were expected to result in better outcomes for consumers over time than alternative market designs.

6. Studies—such as those undertaken by the Authority—showing that the wholesale electricity market is imperfect raise important questions about the respective roles and responsibilities of the Authority and market participants. The Authority is charged with identifying flawed design elements and developing rule changes that would further its statutory objective. Market

participants are not responsible for adjusting their actions to ameliorate perceived imperfections in the market design. The workably competitive market construct does not provide predictions as to short-run outcomes and it is contestable whether a new requirement on generators to offer at short-run costs would be for the long-term benefit of consumers.

7. The Authority's consternation at generators offering in such a way as to ensure transmission constraints do not bind echoes a long-standing market design debate; that is whether offer strategies of generators in wholesale electricity markets should reflect the predictions of 'least cost' engineering models or the dynamics of price discovery. That generators routinely offer to ensure transmission constraints do not bind is now a matter of historical record, at least in New Zealand and Australia. There are good reasons for viewing these offer strategies as in the long-run interest of consumers. In any event, the Authority does not show that offering to avoid transmission constraints binding was a material factor in relation to the offer strategies of any generator during December 2019, and this issue may be a red herring.

8. If the Authority believes that changes to the present market operation should be considered further, then the appropriate course is for it to introduce a rule change; it cannot be a principled way for defining or enforcing rules, to sanction market participants for responding to the incentives created by the market rules.

Introduction

9. In a preliminary decision dated 30 June 2020, the Electricity Authority (Authority) concluded an Undesirable Trading Situation (UTS) existed at the time it received a claim from seven participants on 12 December 2019 (Electricity Authority, 30 June 2020). The Authority reached this preliminary view on the basis that:

    - spot market outcomes during the relevant period differed markedly from those the Authority expected, given the underlying supply and demand conditions, and the scale of this difference was large
    - Meridian priced offers to avoid the HVDC binding (Electricity Authority, 30 June 2020, p. 14).

10. This report views the Authority's reasoning and preliminary views through the lens of economic analysis.

11. I structure my report into three primary sections:

    - The first section considers the economic rationale for the UTS provisions and how they fit with the Authority's other functions.
    - The second section considers whether the difference in expectations formed by the Authority and its observed market outcomes support a conclusion of a UTS.
    - The third section considers whether generator offers to avoid price separation across a transmission constraint support a conclusion of a UTS.

12. In concluding, I consider whether the combination of the offers by generators and the difference in outcomes support a conclusion of a UTS.

The economic tests embedded in the UTS rule

The rulebook determines the efficiency of an organised market

13. A feature of organised markets, like New Zealand's wholesale electricity market, is that the "market" is the "rulebook". The Code exists, as do the rulebooks of other organised markets, to reduce the economic cost of carrying out exchange transactions. To improve well-being, individuals and firms engage in exchange with others. Economists call the gains from such co-operation, or exchange, "gains from trade"; the term is synonymous with a net gain in economic welfare, as measured in the "standard cost-benefit analysis [the Authority adopts] when assessing net benefits to electricity consumers" (Electricity Authority, 2011, para. A.10).

14. Costs that reduce the potential gains from transacting in the wholesale market encompass more than simply the fees and charges incurred by an organisation to complete a transaction. The costs include all of those costs that have come to be known in the economics literature as "transaction costs". Dahlman crystallised the concept of transaction costs by describing them as "search and information costs, bargaining and decision costs, policing and enforcement costs" (Dahlman, April 1979, p. 148).

15. The rulebooks of organised markets reduce these transaction costs, and hence increase the gains from trade, by addressing many real-world hurdles to mutually acceptable transactions. These hurdles are addressed by requiring those who trade to meet the requirements specified in the rules. The Authority characterised the role of the rulebook in these terms when explaining the economic rationale of the UTS provisions to the High Court (Bay of Plenty Energy Limited v the Electricity Authority, 2012, p. 90):

> … In voluntary marketplaces, market providers strive to attract buyers and sellers by adopting rules that promote operationally efficient trading and rules aimed at giving buyers and sellers confidence in the market.
>
> In particular, market providers adopt rules aimed at giving buyers confidence that suppliers' goods and services are what they say they are, contract terms are transparent and prices are competitively determined. Likewise, market providers adopt rules aimed at giving sellers confidence that buyers are genuine and will meet their payment terms. Undesirable practices by a few buyers and sellers harm other market users, and they also harm the market provider by deterring some parties from using the market.

The economic rationale for the UTS provision

Unforeseen or rare situations

16. In its explanation to the High Court, the Authority reasoned that (Bay of Plenty Energy Limited v the Electricity Authority, 2012, p. 90):

UTS provisions are adopted by market providers because they cannot foresee all future eventualities and hence cater for these in the market's rules. Also, some practices are particularly difficult to specify in the rules, and so are better covered by generic UTS-type rules.

17. The Authority's explanation of the rationale for the UTS provision aligns with the economic literature analysing the effects of rules and standards on transaction costs and behaviour.[1] Economists distinguish between "rules" and "standards". Legal commands that provide greater specification in advance are referred to as "rules", and legal commands expressed in more general or imprecise terms, such as the UTS, are referred to as "standards" (Kaplow, Rules Versus Standards: An Economic Analysis, 1992, p. 557). Thus, to illustrate, an environment rule might list hazardous substances that may not be released into the water supply whereas a standard may proscribe releases of hazardous substances, leaving the determination of which substances are hazardous to adjudication after releases have occurred (Kaplow, General Characteristics of Rules, 1999, p. 508).

18. Hence, the initial cost of formulating rules will be greater than the cost of formulating standards. In the example of hazardous substances, writing a rule listing hazardous substances would require studies to determine which substances are hazardous. However, it is less costly for parties to interpret rules (compared to standards) when deciding how to conduct themselves and less costly for regulators to apply rules to past behaviour. If, to further the example, a rule specified the substances that may not be discharged, the parties need only consult the list to apply the rule; however, substantial inquiry may be necessary under a standard of not releasing hazardous substances. For the same reasons, rules will tend to produce behaviour more in conformity with the legal requirement than would equivalent standards. This is because those subject to the rules can learn the legal requirements more cheaply and accurately in advance and will therefore tend to behave more in accord with those requirements.

19. Rules therefore tend to be preferable when the activities of concern are frequent, and standards do best when behaviour varies so greatly that any particular scenario is relatively rare (Kaplow, General Characteristics of Rules, 1999, p. 510). The greater the frequency of the behaviour to be governed, the more valuable it will be to formulate the rule with greater care. Conversely, to the extent that an adjudication is relevant to only a single case, or if the event of concern might never arise, it would not be valuable to expend substantial resources considering the myriad of factors necessary to write a precise rule (Kaplow, General Characteristics of Rules, 1999, p. 511).

20. This explanation of the economic reasoning for a UTS standard is reflected in the examples of what might constitute a UTS, set out in section 5.1(2) of the Code. Examples (a) to (d) relate to manipulation, deception, unwarranted speculation and breaches of the law. It would not be feasible to specify in advance all forms of such behaviour that might be harmful. As a United States Court observed (Cargill v Hardin, 1971) "[t]he methods and techniques of manipulation are limited only by the ingenuity of man". Example (e) covers situations that threaten orderly

[1] The Authority's reasoning and understanding of the history of UTS provisions in organised markets closely matches the explanation I set out in a report to the Authority in 2011 (Murray, 2011).

trading or proper settlement that were not foreseen and addressed in the existing detailed rules, such as the rules for prudential requirements. Example (d) refers explicitly to exceptional or unforeseen circumstances contrary to the public interest.

Restoring normal operations

21. In its submission to the High Court, the Authority added further context, observing that under clause 5.5 of the Code the Authority is required to restore normal operation of the wholesale market as soon as possible after a UTS and so the normal operation of the market could not constitute a UTS (Bay of Plenty Energy Limited v the Electricity Authority, 2012, para. 88). The Authority repeats this inference in its preliminary decision paper (Electricity Authority, 30 June 2020, p. 18).

22. As the UTS cannot constitute the normal operation of the market, it must describe an event or an outcome that would not result from the normal operation of the market. That is, a UTS is a situation that would not have been permitted to arise, if the rule drafters who wrote the UTS standard had instead written a specific rule addressing the unforeseen or rare event so that normal market operation would continue during that situation.

23. This implication of the inference drawn by the Authority aligns with the simple test for interpreting standards developed in the economics literature. Professor Cooter, of Berkeley University, phrases the test as follows: "Impute the terms to the contract that the parties would have agreed to if they had bargained over all the relevant risks" (Cooter & Ulen, 2007, p. 221). In his influential book, Economic Analysis of Law, Judge Richard Posner presents a similar test (Posner, 1992, pp. 252 - 253).

24. The language used by Professor Cooter in describing the test is more applicable to the original UTS provision, which was negotiated as an element of the multilateral contract, NZEM (Murray, 2011, p. 6). However, nothing of economic substance is lost from the test by expressing it in terms of the Code; that is, impute to the Code the terms the rule drafters would have specified if instead of the UTS standard they had written a specific rule so that normal market operation would continue during the unforeseen or rare event. That is, UTS provisions are a mechanism to enable the normal operation of existing market rules during unforeseen or exceptional situations, and not a mechanism to affect market changes.

25. Returning to the example, if an environmental regulator, having written a standard proscribing the release of hazardous substances, subsequently investigates the release of a substance (perhaps due to an unusual event) and determines that substance was hazardous, the test would impute into the standard that the identified substance should not be released into the water supply. However, the standard would not permit the regulator to import other requirements for maintaining water supply.

Economic tests for a UTS

26. Hence, this discussion of the economic rationale for a UTS provides two tests for whether a situation gives rise to a UTS:

- The event or circumstance is (or events and circumstances in combination are) unforeseen or rare; predictable and recurring events would not give rise to a UTS because if such outcomes give rise to concerns, specific rules could be written to require different behaviour.
- The standard of behaviour required from participants can be imputed to the Code by figuring out the terms the rule drafters would have specified if, instead of the UTS standard, they had written a specific rule to fill a gap so that normal market operation would continue during the unforeseen or rare event.

Authority's past approach to UTS consistent with these tests

27. The Authority previously found that a UTS arose in March 2011. The decision by the Authority is consistent with the economic tests I describe above.

28. On 26 March 2011, Genesis had offered its Huntly generation at around $20,000/MWh, which resulted in spot market prices of around $20,000/MWh in the upper North Island region for about eight hours. The Authority determined that the "electricity market was squeezed and resulted in an exceptional and unforeseen circumstance" (Electricity Authority, 2011, p. 1). In arriving at this conclusion, the Authority emphasised that Transpower's demand forecast errors meant market participants were unable to adjust their behaviour or manage their risk on the hedge market.

29. The Authority resolved the UTS by figuring out the options available to market participants if they had had time to respond—that is, the economic alternatives available to buyers (Electricity Authority, 2011, p. 47):

> In a situation where there is a willing buyer and a willing seller, a net pivotal generator should be able to price up to the economic alternative of the buyer, which would approximate the LRMC of a new entrant generation option or the opportunity cost of electricity for consumers (i.e. the price at which demand response occurs). As noted earlier, the Code restricts the remedies for a UTS to only those interventions necessary to correct the UTS. The UTS Committee considers that setting a cap on Huntly offer prices at SRMC would go further than just correcting the squeeze component of the UTS, while setting a cap on Huntly offer prices above $3,000/MWh would not go far enough to correct the squeeze.

30. The Authority's decision did not substitute into the Code an alternative pricing process—for example, by limiting generator offers to a view of marginal costs—or by imagining competitors that did not exist. Rather, the Authority attempted to replicate the outcome of price discovery between a willing buyer and a willing seller under the existing Code, had the exceptional and unforeseen circumstances not impeded that price discovery process.

The UTS is not an alternative market change mechanism

31. The economic tests described above delineate situations where normal market operations do not continue due to unforeseen or rare events. Importantly, the economic tests for a UTS do not envisage the Authority altering 'normal market operations'; that is, a UTS provision is not a by-

pass for a rule change to create a new (and from the Authority's perspective, a better) normal operation of the wholesale market.

32. The Authority clearly should be concerned when its analysis leads it to consider that outcomes in the wholesale electricity market diverge from those it would expect from an efficient market. Parliament has tasked the Authority with improving the market rules to increase the gains from trade. The Electricity Industry Act 2010 (section 32) provides for the Authority to amend the Code consistent with the objective of the Authority to promote:[2]

- competition in the electricity industry
- the reliable supply of electricity to consumers
- the efficient operation of the electricity industry.

33. Parliament also requires the Authority to prepare a regulatory statement before amending the Code. The regulatory statement must evaluate the costs and benefits of its proposed amendment (Electricity Industry Act, section 39). This process, of preparing a cost-benefit assessment of changes to complex rules relative to the existing rules, is important. Often in regulatory reform debates, the costs of reform—including unintended consequences—are ignored or dismissed as being easily outweighed by the perceived benefits. As Coase observed (Coase R. , 1960, pp. 42 - 43):

> Analysis in terms of divergences between private and social product concentrates attention on particular deficiencies in the system and tends to nourish the belief that any measure which will remove the deficiency is necessarily desirable. It diverts attention from those other changes in the system which are inevitably associated with the corrective measure, changes which may well produce more harm than the original deficiency.

34. A careful consideration of the costs and benefits of a proposed change to the market rules not only fosters better rule making but is also essential for achieving higher-level objectives such as policy coherence, credibility and accountability. These policy objectives are at risk in circumstances where a regulator's short-term imperatives may differ from its long-run objectives. Without a binding commitment to the long-term implications of a change to the market, a regulator may use its discretion to switch to what appears a better policy (in the short-term).

35. Achieving policy credibility is a prerequisite for the success of market design in the long-term interests of consumers. This is because the success of an organised market depends on its success in changing the behaviour of market participants in a manner that is welfare enhancing. But behaviour and incentives will not be modified in ways that improve welfare unless interventions to change the market are credible and predictable.

36. Electricity wholesale markets are especially vulnerable to behavioural uncertainty by regulators for two reasons:

[2] The Authority may also amend the Code as necessary or desirable to perform its functions and to give effect to any matter specifically referred to in the Act for inclusion in the Code.

- Technology is characterised by large specific, fixed, and often long-lived, assets—meaning investment in the sector cannot readily be switched to an alternative use if market rules change unfavourably.
- Services are consumed by almost everyone.

37. Taken together, these characteristics make electricity market design inherently political because:

- almost the entire population consumes the services, and hence politicians and interest groups are sensitive to price and service levels
- significant fixed costs provide regulators and political stakeholders considerable leeway to act opportunistically.

38. These characteristics mean regulators face strong incentives to adopt short-run policies that may harm their long-run objectives. In the absence of safeguards against regulatory appropriation, businesses will protect themselves from this risk by under-investing. Investment that does occur would require higher rates-of-return, or would be undertaken from entities well connected 'politically'. Sustained under-investment would imply higher costs in the future.

39. If the UTS provision afforded the Authority a broad and loosely-textured discretion, it would increase the scope for subjectivity, and hence for arbitrariness, and undermine confidence in the market. Fortunately, as discussed above, the economic tests bind the Authority to figuring out how the existing market (not the market it or others might prefer) should operate during unforeseen or rare events. Changes to the market design, with the intent of improving outcomes from normal market operations, require a rule change supported by a regulatory statement showing that the benefits of the change would exceed its costs.

A comment on Authority's peer review

40. The Authority invited Mr John Small to review the approach taken by the Authority in arriving at its preliminary review and its analysis. Unfortunately, Mr Small assumes away the UTS test and replaces it with a different test; his commentary, therefore, assists neither the Authority nor submitters in evaluating whether the Authority's preliminary view is correct.

41. Mr Small advised the Authority that market participants "should be able to expect workable competition between generators". He says that (Electricity Authority, 10 June 2020, p. 102):

> Workable competition has precedent in our case law, where it includes the idea that markets have a tendency towards strong competition.

42. Mr Small provides no citation for this statement. It is possible that Mr Small is referring to the *Wellington Airport* case in which the meaning of workable competition was discussed at some length. The judgement includes a discussion of the tendencies in outcomes of workably competitive markets (Wellington International Airport Ltd & Ors v Commerce Commission, 2013, para. 22). However, the Court does not conclude that markets have a tendency to any particular level of competition. The economic history of markets is varied—some markets fail, some continue for decades without becoming workably competitive, others become less competitive over time, and some become intensely competitive (McMillan, 2002).

43. In his review, Mr Small states that he will "assume that when buyers observe conduct that is inconsistent with workable competition, they will lose confidence in the integrity of the relevant market" (Electricity Authority, 30 June 2020, p. 102). The second part of this sentence is Mr Small's restatement of the UTS test, which refers to "confidence in, or the integrity of, the wholesale market". My understanding of the term "integrity", as it is applied in other markets with similar tests, is that it refers to issues such as honesty. However, I do not perceive Mr Small as intending to limit the scope of the UTS to matters of integrity; I take him as intending to refer to confidence in the wholesale market.

44. The assumption made by Mr Small—that a buyer observing conduct inconsistent with workable competition will lose confidence in the market—is critical. His assumption assumes away the task faced by the Authority; that is, to establish whether the matters it observes constitute a UTS. Mr Small substitutes in place of the UTS a test of whether the outcomes observed by the Authority are consistent with outcomes of workable competition.

45. The idea that workably competitive markets give rise to predictions about particular spot market outcomes in the short-run is directly inconsistent with the *Wellington Airport* case. The Court held that workably competitive markets encompass a broad range of market behaviour, and it will be commonplace to observe behaviour along that spectrum at any given time (Wellington International Airport Ltd & Ors v Commerce Commission, 2013, para. 19):

> Of course, firms may earn higher than normal rates of return for extended periods. On the other hand, firms may earn rates of return less than they expected and less than commensurate with the risks faced by their owners when they made their investments. They may even make losses for extended periods. **Prices in workably competitive markets may never exactly reflect efficient costs,** including a normal rate of return. (emphasis added)

46. As prices may never exactly reflect efficient costs, all markets may constantly be in a UTS, or never in a UTS, under Mr Small's substitute test, depending upon the point on the spectrum of behaviour in workably competitive markets against which behaviour is assessed. Curiously, Mr Small agrees that there was no apparent change in participation in the futures market, the only test of market confidence applied by the Authority (Electricity Authority, 30 June 2020, p. 103). However, this empirical result does not prompt him to reconsider his assumed test for a UTS.

47. The remainder of Mr Small's commentary reviews the method used by the Authority to quantify the difference between the expectations it had formed and what it observed in the market. Whether the differences between the Authority's expectations of what an efficient market might achieve, and the outcomes it observes from its market design, constitute a UTS does not turn on the quantification method. Hence Mr Small's commentary does not assist in assessing whether the Authority's preliminary view is correct.

48. In the following section I consider whether the Authority's preliminary decision answers the economic tests embedded in the UTS.

The Authority assesses short-run outcomes against its expectation of efficient markets

Some market outcomes differ from Authority's expectation

49. In its preliminary decision, the Authority does not repeat the rationale for the UTS provision that it explained to the High Court, except for the inference that a UTS could not constitute the normal operation of the market (see paragraphs 15 - 16 and 21 above). Rather, the Authority explains that it has formed expectations about market outcomes it considers would be welfare enhancing given changes in supply and demand conditions (Electricity Authority, 30 June 2020, pp. 12 - 13). These expectations include:

    - offer prices falling when generators are spilling
    - spot prices falling when supply is abundant
    - price separation occurring across transmission constraints when available generation supply exceeds transmission capacity.

50. The Authority estimates that the difference between the outcomes it would anticipate from an efficient market, and the outcomes it observed in December 2020, was large; using a measure of additional spill, it calculates this difference between its expectation and outcome at 55 MW throughout December, or 41 GWh (Electricity Authority, 30 June 2020, p. 14).

51. There are several difficulties with this approach:

    - The events described by the Authority are neither rare nor unpredictable; the prospect of inflows to hydro storage lakes exceeding storage capacity is a well understood and planned for phenomenon.
    - Normal market operations continued without interruption during the period investigated, and the outcomes observed by the Authority (generator offer prices exceeding its estimate of generator short-run costs) are regularly observed in the New Zealand wholesale market.
    - An estimate that short-term wholesale prices may not be as allocatively efficient as the Authority would like could be useful as an input into a work programme considering how the market design might be improved, but does not establish a UTS.

52. I discuss each of these points below.

Hydro spills are expected and planned for phenomena

53. As discussed above (paragraph 16), the Authority explained (correctly in my view) the rationale for the UTS provisions in the following terms:

> UTS provisions are adopted by market providers because they cannot foresee all future eventualities and hence cater for these in the market's rules. Also, some practices are particularly difficult to specify in the rules, and so are better covered by generic UTS-type rules.

54. The prospect that inflows to hydro storage lakes might exceed storage capacity is not an unforeseen event, nor a rare event. Large capital works—spillways and diversions—have been built in anticipation of such events, detailed resource consents govern the actions of dam operators to preserve community safety and environmental values during periods of high inflows, and Meridian and Contact (as well as hydro generators operating in different catchments) will have invested considerable resources in planning for such events and in developing tools—including monitoring and modelling capability—to assist them in responding to the inflows.

55. The weather of events of late 2019 might have been exceptional in terms of the quantum of inflows, but the prospect that inflows would exceed storage, and spill would be necessary, was neither unforeseen nor rare. Indeed, for eight years between 2008 and 2016, hydro generators voluntarily reported spill volumes. These volumes were previously reported by the Authority on its website, and the data is still available on its archive.[3] On those occasions, as with December 2019, the price discovery process of the wholesale market was not impeded, as discussed further below.

56. As with previous occasions, the hydro generators in the South Island appear to have proved capable of managing the high inflows, without disruption to normal market operations. The Authority's preliminary decision does not argue that South Island generators failed to meet either their obligations under their resource consents or obligations under the wholesale market rules. The high inflows did not disrupt, impair or cause unusual conduct by the generators, or disrupt, impair or cause unusual conduct by any other party in the wholesale electricity market.

57. Indeed, on Meridian's estimate, "avoidable spill" amounted to less than 0.5 per cent of the water it had to deal with in December 2019, an amount it characterises as falling within the margin of error for spill reporting. Meridian's calculation would indicate that the wholesale market made good use of the bounty from the weather event, and there was little unavoidable waste.

Normal market operations

58. The Authority does not assess whether normal market operations continued during the period of high inflows. Rather, the Authority models the offers that Meridian and Contact could have made, if they were forced—by competitors or rules that do not exist—to price their output at the Authority's estimate of the opportunity cost of water (which the Authority assessed at close to nil), rather than at the price at which they were willing to sell.

59. The Authority's approach attempts to arrive at a theoretical estimate of the short-run allocative efficiency gains that might be achievable if a market could be designed to deliver the Authority's perspective of efficient short-run prices without giving rise to countervailing, unintended consequences of equal or greater magnitude. There is nothing unusual in the

[3] https://www.ea.govt.nz/about-us/what-we-do/our-history/archive/operations-archive/security-of-supply/short-term-monitoring/hydro-spill-archive/

Authority's finding that market outcomes differ from such an expectation, if those expectations are formed from an assumption that offer prices would reflect short-term operating costs.

60. A number of studies over the years have observed the same outcomes as the Authority—that generator offer prices are regularly higher than the authors' estimates of short-run operating costs. For example, in 2009, Professor Frank Wolak prepared a report for the Commerce Commission and estimated that generators obtained a market rent—by setting offer prices above short-run operating costs—of $4.3 billion (Wolak, 2009). In 2018, Dr Stephen Poletti estimated that over the seven years from 2010 to 2016, electricity generators had benefited from an extra $5.4 billion in profits relative to the amount they would have earned if forced to always sell power at cost (Poletti, 2018). While issues have been raised with the methodologies used, no one would contest that short-run prices are often above marginal costs. That is, the normal operation of our market gives rise to large differences between actual and expected outcomes, if expected outcomes are formed from short-term operating costs.

61. The reason for these differences between short-run operating costs and market prices is that the New Zealand market is designed to allow price discovery—to establish the price at which generators are willing to make sufficient generation available to meet demand. Generators make offers at the prices they are willing to generate; there is no requirement that offers reflect short-run operating costs. This design is a deliberate and considered choice (Read, 2018). The design recognises that, over time, generators must recover their full costs by offering above short-run operating costs if electricity demand is to be met, in a market design that does not provide for 'capacity payments' as are charged to consumers in some market designs.

62. Successive government reviews, the most recent being the 'Electricity Price Review' completed in May 2019, have concluded that this price discovery aspect of the market should be retained. The Electricity Price Review summed up the wholesale market as providing "strong investment incentives that result in a reliable supply of electricity and low and falling emissions" and "found no evidence of generator-retailers making excessive profits" (while acknowledging the data limitations in that assessment) (Electricity Price Review, 2018, p. 41). I discuss the benefits of price discovery in the New Zealand electricity market more fully in a paper attached to a recent submission by Meridian to the Market Development Advisory Group.[4]

Identifying a potential for design improvement is not a UTS

An imperfect market design?

63. The New Zealand wholesale electricity market design has rightly been recognised, both in successive internal reviews and internationally, as getting many elements right in terms of a trading mechanism that promotes the long-term benefit of consumers. However, the wholesale electricity market is far from perfect. Like all real-world markets in which prices trend to workably competitive levels, waste can still occur. An investigation into any market would

[4] Available here: https://www.meridianenergy.co.nz/assets/Investors/Reports-and-presentations/Submissions/MDAG-HSOTC-submission.pdf

identify short-term waste of resources that might have been put to good use—fruit that does not meet export standards is sometimes dumped or fed to animals, perishable food not sold can go uneaten while families are hungry, there are people looking for work while employers seek to fill positions, hotel rooms are empty while people live in crowded conditions or on the street, and so on. These are all symptoms of imperfect design and inevitable transaction costs.

64. The Authority's findings suggest that there is potential for it to design improvements to the wholesale electricity market. However, a conclusion that the market design is imperfect does not lend support for a claim of a UTS. A topical example is that the Authority was convinced soon after its formation in 2010 that the Code allows Transpower to charge some market participants more than the efficient cost of the services they receive and that those pricing practices act like a tax on generation in the South Island and, by implication, create a barrier to entry to new generation and impede competition. The Authority has since estimated that these pricing practices result in a loss of benefit to consumers amounting to $1.3 billion in present value terms (Electricity Authority, 10 June 2020). The Authority estimated this potential benefit in support of its proposed changes, and not to claim that Transpower's pricing gives rise to a UTS. Yet, the logic of the preliminary decision implies that the present regime for transmission pricing is a continuing and significant UTS.

The Authority's statutory objective applies to it, not participant offers

65. Studies showing that the wholesale electricity market is imperfect raise important questions about the respective roles and responsibilities of the Authority and market participants. In its rule making role, the Authority is charged with identifying ways that the market can be improved over time and developing rule changes that would further its statutory objective. Improving the design of electricity markets is difficult and there is no guarantee that a change will result in a better outcome, which is why Code changes are subject to consultation and a regulatory impact assessment.

66. Market participants are not responsible for imperfections in the market design. The statutory objective set for the Authority need not be shared by market participants in formulating their offers and purchase decisions. A central theme of organised markets, and markets in general, is that market participants individually pursuing an objective of maximising their own profits or benefits will, over time, produce outcomes consistent with welfare maximisation. There is no requirement in the Code for market participants to forego profitable transactions to achieve better market outcomes. This market principle is embodied in the shorthand description of a market 'clearing price'.

The Authority's analysis does not support a UTS conclusion

67. In short, the analysis presented by the Authority does not support a UTS conclusion. The Authority assessed the claimed UTS by estimating the difference between the outcomes it would anticipate from an efficient market, and the outcomes it observed in December 2020. However, the events described by the Authority are neither unpredictable nor rare; the prospect

of inflows to hydro storage lakes exceeding storage capacity is a well understood and planned for phenomenon. Normal market operations continued without interruption during the period investigated—there is no suggestion that the high inflows disrupted or impaired or caused unusual conduct by the generators, or disrupted or impaired or caused unusual conduct by any other party in the wholesale electricity market.

68. The outcomes observed by the Authority—generator offer prices exceeding the Authority's estimate of generator short-run costs—are regularly observed in the New Zealand wholesale market. These differences between short-run operating costs and market prices occur because the New Zealand market is designed to allow price discovery—to establish the price at which generators are willing to make sufficient generation available to meet demand. There is no requirement that offers reflect short-run operating costs. This design is a deliberate and considered choice, adopted because the suite of incentives created were expected to result in better outcomes for consumers over time than alternative market designs.

69. The Authority is charged with identifying flawed design elements and developing rule changes that would further its statutory objective. Market participants are not responsible for adjusting their actions to ameliorate imperfections in the market design. There is no requirement in the Code for market participants to forego profitable transactions to achieve better market outcomes.

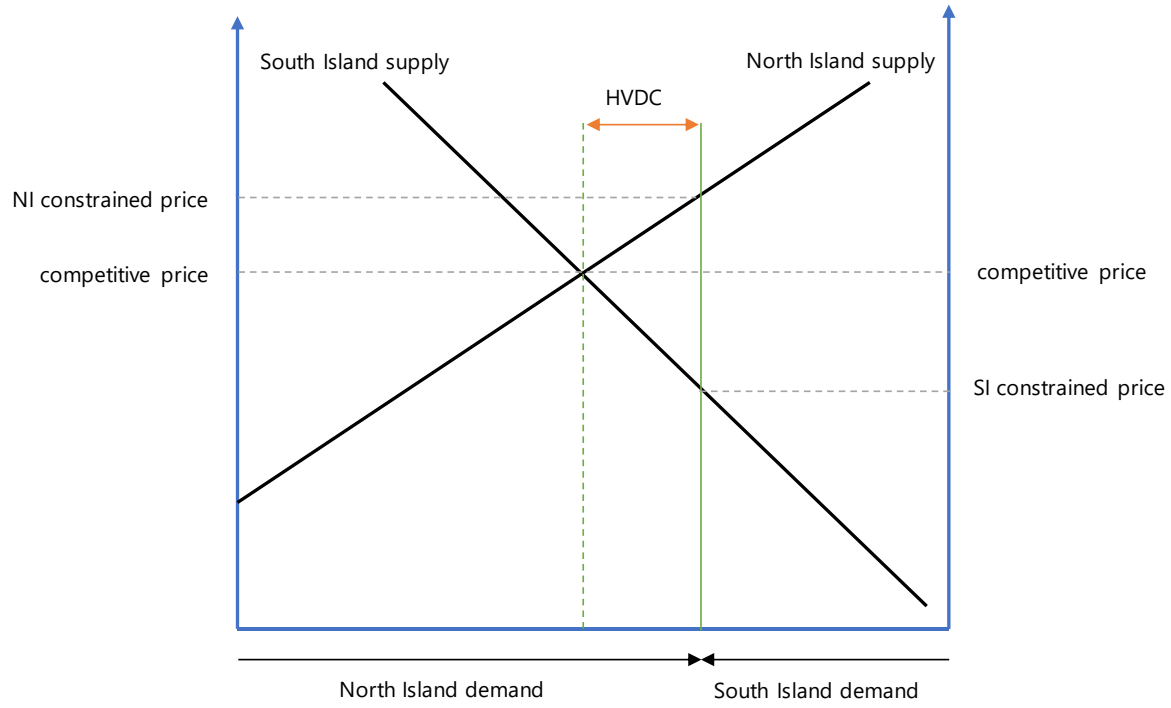
Offer prices to prevent transmission constraints binding

The Authority's concern

70. The Authority's preliminary view is that, during the period of its investigation, outcomes differed from its expectation at least in part because "Meridian was offering to prevent transmission constraints—including the HVDC—from binding" (Electricity Authority, 30 June 2020, p. 12). The Authority notes that it does not agree with using offers to manage transmission constraints and that it wrote to Meridian about this in 2017 (Electricity Authority, 30 June 2020, p. 14).

71. Figure 1 provides a stylised illustration of the outcomes that concern the Authority. In this example, power flows north and, with the HVDC link unconstrained, the "competitive price" balances total supply to total demand. The Authority's expectation is that if the link is constrained, prices in the South Island would fall to the "SI constrained price" and prices in the North Island would rise to the "NI constrained price".

Figure 1 Offer strategies and pricing across the HVDC constraint



A long history of debate

72. I first drew the above diagram nearly 25 years ago in a paper I drafted as the secretariat to the Dispatch Rules Working Group, for its February 1996 report to the Rules Committee on the then proposed design for the New Zealand wholesale electricity market (Dispatch Rules Working Group, draft 21 February 1996, p. 34). In describing a debate that had occurred within the

Working Group, as to the price outcomes that could be expected across the constraint, I explained that (Dispatch Rules Working Group, draft 21 February 1996, p. 48):

> Some people take the view that South Island generators will be able to work out the likely North Island price and adjust their offers accordingly.

73. These comments reflected my advice to the Working Group. I had arrived at this view from studying how prices were formed in successful commodity markets of long standing, such as the Chicago Board of Trade. At the time, wholesale electricity market design was in its infancy. The United Kingdom had established a 'pool' (since abandoned) that required generators to submit offers based on operating costs, with an added capacity payment to compensate for capital costs. It was already clear that such a design provided no form of price discovery, and hence would not provide signals for efficient investment. The Norwegians were developing promising forward markets for trading contracts for 'unders and overs', but had not attempted competitive dispatch of generation based on price offers.

74. The experience of price formation in successful commodity markets, and the economic literature that emerged from that experience, is referred to as the Law of One Price.[5] The concept of the Law of One Price relates to the impact of market arbitrage and trade on the prices of identical commodities exchanged in two or more different geographical locations. An efficient market should result in only one price of identical commodities regardless of where they are traded, once adjustments are made for transport and transaction costs.[6] In the jargon of traders, an efficient trading market would reduce if not eliminate the basis risk between identical products at different locations. If the price of a product varies between locations, then an arbitrageur could purchase the commodity in the cheaper location and sell it where prices are higher to earn a profit. Prices of a commodity in separate geographical locations (though in the same market) may not necessarily be identical, but any price differential should reflect transport and transaction costs.[7]

75. At the time, the Dispatch Rules Working Group advised the Rules Committee that (Dispatch Rules Working Group, draft 21 February 1996, p. 48):

> Others argue that competition between South Island generators will ensure that step function supply curves are offered by each party (once South Island load is met, South

[5] The intellectual history of the concept can be traced back to economists active in France in the 1760-70's, which applied the "law" to markets involved in international trade, hence the phrase "Law of One Price".

[6] The Commerce Commission used this test for market separation in its 2009 Investigations Report. It suggested that if nodal prices at two locations are highly correlated then both locations would be part of the same market. "In contrast, if the prices at two locations were to exhibit a lower correlation, they would likely fall in separate markets" (Commerce Commission, 22 May 2009, para. 175).

[7] Consider the example of wheat from Chicago being sold in Liverpool, as has been the case since the 1850's. If the price differential between these locations exceeds transport and transaction costs, then self-interested and well-informed traders could profit by shipping wheat from Chicago to Liverpool. Such arbitrage closes the price gap because it increases supply and hence decreases price in Liverpool, while it increases demand, and hence price in Chicago. This operation of the law of one price is not only based on trade flows but also on inventory adjustments in either Chicago or Liverpool, to prevent prices diverging.

Island demand places little or no constraint on offering behaviour by South Island generators).

76. The implication of this view was that prices would separate across a transmission constraint; the view currently held by the Authority. In Australia, this perspective—that electricity markets would behave differently from the lessons of other commodity markets—gained considerable support in the late 1990s: three unregulated transmission interconnectors between regions were constructed on the basis that they would derive revenue from the difference between the (separated) prices in the two regions; that is, by buying in the low-priced region the energy transported across the link and selling that energy in the high-priced region.[8] This method of financing transmission investment failed because the prices did not separate as the backers of the projects predicted. Two of these interconnectors have since successfully applied to become regulated interconnectors with revenue set using processes similar to the Commerce Commission's input methodologies. The third (Basslink) is operated by the monopoly generator in Tasmania in conjunction with its generation portfolio rather than on a standalone basis.

Least cost optimisation or price discovery

77. At the heart of the debate in the Dispatch Rules Working Group 25 years ago, and in its echoes in the arguments presented by the Authority in its preliminary decision, is whether offer strategies of generators in wholesale electricity markets should reflect the predictions of 'least cost' models or the dynamics of price discovery of commodity markets. I say "should" because how generators offer in energy-only markets is now a matter of historical record, at least in New Zealand and Australia.[9] In these markets, economic costs—scarcity rents, opportunity costs, premiums for risk, etc—are revealed in the process of price discovery and at any point in time may differ from costs predicted by least cost engineering models.

78. Offer strategies that prevent constraints from binding smooth prices across regions compared to what would occur if the constraints bind. This price-smoothing effect increases consumer surplus because consumers benefit more from lower peak prices than they are harmed by higher prices in regions where prices would otherwise fall.[10] Nodal prices continue to reflect marginal transport costs (losses) in marginal prices, and the new transmission pricing guidelines are intended to price fixed transmission costs on a 'beneficiary pays' method.

79. The Authority, in its preliminary decision, reaches a different conclusion as to the economic efficiency effects of generators offering in such a way as to ensure transmission constraints do not bind. If the Authority is convinced of the merits of its analysis, then the appropriate course is for it to introduce a rule change. Meanwhile, the basic principle that market participants can and should seek to profit from trading within the market rules should apply. As Professor

[8] In New Zealand, some predicted considerable "constraint rentals" from the HVDC link for the same reasons.
[9] For a discussion of generator offers in Australia see (Yarrow & Decker, 2014)
[10] The Authority is familiar with the method for calculating these benefits, as it applies a very similar calculation in estimating the benefits of the new transmission pricing guidelines (Electricity Authority, 10 June 2020).

William Hogan said, it cannot be a principled way to define or enforce rules, to sanction market participants for responding to the incentives created by the market rules (Hogan W. , 2014).

Transmission constraints a red herring?

80. Finally, I note that the Authority does not show that offering so as to avoid transmission constraints from binding was a material factor in relation to the offer strategies of any generator during December 2019. It may be that this issue is immaterial to the December 2019 event.

Conclusion

81. UTS provisions exist in market rulebooks to cover unforeseen or exceptional situations. The events described by the Authority in its preliminary decision are neither unpredictable nor rare; the prospect of inflows to hydro storage lakes exceeding storage capacity is a well understood and planned for phenomenon. Normal market operations continued without interruption during the period investigated. No UTS arose.

82. The outcomes observed by the Authority—generator offer prices exceeding the Authority's estimate of generator short-run costs—are regularly observed in the New Zealand wholesale market. The New Zealand market is designed to allow price discovery—to establish the price at which generators are willing to make sufficient generation available to meet demand. There is no requirement that offers reflect short-run operating costs.

83. The Authority's consternation at generators offering in such a way as to ensure transmission constraints do not bind echoes a long-standing market design debate. That generators routinely offer in this manner in energy-only markets is now a matter of historical record, at least in New Zealand and Australia. There are good reasons for viewing these offer strategies as in the long-run interest of consumers.

84. The Authority is charged with identifying flawed design elements and developing rule changes that would further its statutory objective. Market participants are not responsible for adjusting their actions to ameliorate imperfections in the market design. If the Authority is convinced of the merits of its analysis, then the appropriate course is for it to introduce a rule change.

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