

Claimed undesirable trading situation, 26 March 2011

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Sapere Research Group is one of the largest expert consulting firms in Australasia and a leader in provision of independent economic, forensic accounting and public policy services. Sapere provides independent expert testimony, strategic advisory services, data analytics and other advice to Australasia's private sector corporate clients, major law firms, government agencies, and regulatory bodies.

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Introduction

Experience and qualifications

1. My full name is Kieran O'Neill Murray. I am Chairman of Sapere Research Group (formerly LECG Ltd), an expert services firm with offices in New Zealand and Australia.
2. I am a professional economist; I provide advice and expert analysis in the areas of regulation, public policy, institutional structure and market analysis, with a particular focus on the energy sector. I have served as an economic consultant on these matters in New Zealand, Australia, Canada, the Philippines, Singapore, Tonga, the United States of America, and Vietnam.
3. I have given expert evidence or advice on matters associated with energy markets and public policy before Select Committees of New Zealand's House of Representatives, the High Court of New Zealand, the New Zealand Commerce Commission, the Australian Energy Market Commission, the (former) National Electricity Code Administrator in Australia, the Australian Competition and Consumer Commission, the Energy Regulatory Authority in Singapore, the Energy Regulatory Commission of the Philippines, and I have presented to the Federal Energy Regulatory Commission of the United States of America.
4. Before joining Sapere, I led the design of the trading arrangements for New Zealand's wholesale electricity market, as Manager Research and Development, for the Electricity Market Company (subsequently M-co). During this period I worked with the Rules Structure Working Group and the Rules Committee to design, draft, and explain the rationale for the market governance rules, including the Undesirable Trading Situation rules.
5. I subsequently held leading roles in industry reforms, including the Electricity Governance Establishment Project and the Grid Security Project. I have served on the Appeal Board for the New Zealand Electricity Market.
6. My public-policy experience includes Economic Adviser to the Leader of the Opposition; member of the Prime Ministerial Task Force on Targeting Social Assistance; Economic Adviser to the Minister of Finance; and adviser to the New Zealand Treasury and the State Services Commission. I currently serve as an International Arbitrator for the Papua New Guinea Independent Consumer and Competition Commission.
7. In preparing this report, I complied with the New Zealand High Court Code of Conduct for Expert Witnesses.

Scope of report

8. Mighty River Power Ltd, and others, claim that the events in the New Zealand wholesale electricity market on 26 March 2011 result in an Undesirable Trading Situation. Clause 1.1 of Part 1 of the Electricity Industry Participation Code 2010 defines an undesirable trading situation as:
 - a. Undesirable trading situation means any contingency or event –
 - i. that threatens, or may threaten, trading on the wholesale market for electricity and that would, or would likely to, preclude the maintenance of orderly trading or proper settlement of trades; and
 - ii. that, in the reasonable opinion of the Authority, cannot satisfactorily be resolved by any other mechanism available under this Code; and
 - b. includes, without limitation –
 - i. manipulative or attempted manipulative trading activity;
 - ii. conduct in relation to trading that is misleading or deceptive, or is likely to mislead or deceive;
 - iii. unwarranted speculation or an undesirable practice;
 - iv. material breach or any law; and
 - v. any exceptional or unforeseen circumstances that is at variance with, or that threatens or may threaten, generally accepted principles of trading or the public interest.
9. In this report, I:
 - a. Describe the role of organised markets in facilitating exchange and how the gains from trade depend on an intricate system of rules, including rules on orderly trading; from this review I specify a test for interpreting and applying standards contained within rules.
 - b. Review the origin of the Undesirable Trading rule and the evolution of equivalent rules in other markets.
 - c. Summarise the precedents and tests which have been used in applying Undesirable Trading rules in electricity markets and commodity markets generally.
 - d. Apply the tests and precedents described in (a) and (b) to the events of 26 March 2011.
 - e. Conclude that, on the basis of information available to me, the events of 26 March 2011 constitute manipulative trading activity and

an exceptional or unforeseen circumstance that is at variance with generally accepted principles of the public interest.

10. My assessment is necessarily from an economic perspective.

Markets operate within rules

Organised markets exist to reduce costs of exchange

11. 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. These gains from trade are reduced by the costs involved in making the transaction.
12. Costs of market exchange encompass more than simply the fees and charges incurred by an organisation to complete a transaction. The relevant costs include all of those costs that have come to be known in the economics literature as “transaction costs”. Noble laureate, Ronald Coase, described these costs in his seminal article, *The Problem of Social Cost*, in the following terms:¹

In order to carry out a market transaction, it is necessary to discover who it is that one wishes to deal with, to inform people that one wishes to deal and on what terms, to conduct negotiations leading up to a bargain, to draw up the contract, to undertake the inspection needed to make sure that the terms of the contract are being observed, and so on.

13. Dahlman crystallised the concept of transaction costs by describing them as “search and information costs, bargaining and decision costs, policing and enforcement costs”.² The New Zealand wholesale electricity market is a form of organised market for carrying out market exchanges of wholesale electricity. As with other forms of organised market, it exists to reduce the cost of carrying out exchange transactions.³

¹ Ronald H Coase, “The Problem of Social Cost”, *Journal of Law & Economics*, 3 (October): 1-40, 1960

² J Dahlman, “The Problem of Externality”, *Journal of Law & Economics*, 22(1) (April 1979): 148

³ Ronald H Coase, *The Firm, The Market and The Law*, Chicago University Press, 1988, p. 7.

14. Organised markets reduce the costs of exchange, and hence increase the gains from trade, by addressing many real world hurdles to mutually acceptable transactions. These hurdles stem from “the identities of the parties to the transaction, their reliability, credit worthiness, promptness, honesty, and flexibility; the qualities of the good; and the circumstances of the trade.”⁴ Organized markets address these transaction costs, including issues of moral hazard, through requiring members of the organised market to meet certain requirements. As Coase observes:⁵

All exchanges regulate in great detail the activities of those who trade in these markets (the times at which transactions can be made, what can be traded, the responsibilities of the parties, the terms of settlement, etc.), and they all provide machinery for the settlement of disputes and impose sanctions against those who infringe the rules of the exchange. It is not without significance that these exchanges, often used by economists as examples of a perfect market and perfect competition, are markets in which transactions are highly regulated (and this is quite apart from any government regulation that there may be). It suggests, I think correctly, that for anything approaching perfect competition to exist, an intricate system of rules and regulations would normally be needed.

An economic analysis of market rules

15. The rules of an organised market intend to give those who trade on the exchange confidence in the reliability of the transactions executed on the exchange.⁶ In the absence of an organised market, transacting parties would need to address issues of integrity and moral hazard through costly bilateral negotiations and long-term contracts. In common with contract law, a fundamental function of market rules is to deter opportunistic behaviour and obviate costly self-protective measures. The rules of an organised market protect the integrity of the settlement process and protect the integrity of the price discovery process.

⁴ Lester G Telser and Harlow N, Higinbotham, “Organized Futures Markets: Costs and Benefits”, *Journal of Political Economy* 85, no. 5 (1977): p. 969.

⁵ Ronald H Coase, *The Firm, The Market and The Law*, Chicago University Press, 1988, p. 9.

⁶ Lester G Telser and Harlow N, Higinbotham, “Organized Futures Markets: Costs and Benefits”, *Journal of Political Economy* 85, no. 5 (1977): p. 973.

16. Many of the rules of an organised market express precisely what a participant can and cannot do; other rules, such as the Undesirable Trading Situation rule, are expressed in general or imprecise terms. Economists refer to imprecise rules as “standards”.⁷ Precise rules are used where it is possible to stipulate efficient behaviour in advance. Standards are used where it is not feasible to specify behaviour in advance, or where the application of the rule may depend on the circumstances, and the interpreting body must determine after the event whether the behaviour met the intent of the rule.⁸
17. Economic analysis provides a simple test for interpreting standards or imputing undefined terms in market rules. 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.*”⁹ In his influential book, *Economic Analysis of Law*, Judge Richard Posner summarised this economic approach as follows:¹⁰

And both tort and contract problems can be framed as problems in the definition of property rights ... The definition of property rights can itself be viewed as a process of figuring out what measures the parties would agree to, if transaction costs weren't prohibitive.

18. Hence, a broad standard, such as the Undesirable Trading Situation rule, can be interpreted by figuring out what measures the parties would have agreed to unilaterally had circumstances allowed for those negotiations.¹¹ As an overarching purpose of an organised market is to facilitate exchange by reducing the cost of carrying out transactions, a standard can generally be interpreted in terms of economic efficiency. This view provides the rationale for stipulating in the definition of Undesirable Trading Situation that it applies to “any exceptional or unforeseen circumstances [hence, a standard not a precise rule] that is at variance with, or that threatens or may threaten, generally accepted principles of ... the public interest.” Economic efficiency is in the public interest

⁷ See Louis Kaplow, *Rules Versus Standards: An Economic Analysis*, 42 Duke L. J. 557 (1992).

Philosophers often use the term “principles” to refer to imprecise rules.

⁸ Robert Cooter, Thoms Ulen, “*Law and Economics*” University of Illinois, 5th ed, 2007, p359.

⁹ Cooter, *ibid*, p 221.

¹⁰ Richard Posner, *Economic Analysis of Law*, (Boston: Little Brown), 4th ed. 1992: p 252-53.

¹¹ This concept of evaluating outcomes against outcomes that might result from a willing and informed buyer transacting with a willing and informed seller underpins other standards, for example, the IAS 39 in accounting for hedges.

because it is always better to achieve a given policy at lower cost than higher cost.

The Undesirable Trading Situation rule

A founding rule of the New Zealand electricity market

19. The initial New Zealand Electricity Market (NZEM) Rules, implemented in 1995, included rules for an undesirable trading situation. I have attached as appendix 1 the original 1995 rule. I advised the industry working group established to set up the market governance rules, the Rules Structure Working Group, while serving as Manager, Research and Development at the Electricity Market Company.¹² At the time of drafting the NZEM rules, the process of price formation in electricity markets was not well understood. The United Kingdom had introduced a form of electricity pool a few years earlier, but New Zealand would be the first market to schedule generators on the basis of simple price and quantity offers and to establish nodal electricity prices.
20. Consistent with the conceptual foundations for NZEM, the Rules Structure Working Group turned for guidance to long established commodities and futures markets; the premise was that rules of these markets had evolved as a result of their long experience and would provide lessons for an emerging market place. The drafting of the initial Undesirable Trading Situation rule drew heavily on (then) similar provisions in the New Zealand Futures & Options Exchange Rules, Rules of Sydney Futures Exchange and the Chicago Board of Trade. As with the rules of these long standing markets, the Undesirable Trading Situation rule was phrased in terms of standards, rather than specifying precisely what a trader can and cannot do. Standards, rather than precise rules, are necessary because “The methods and techniques of manipulation are limited only by the ingenuity of man.”¹³
21. On my reading, there is no difference in substance between the 1995 rule and the Undesirable Trading Situation specified in part 1 and part 5 of the Electricity

¹² Electricity Authority Chairman, Dr Brent Layton, was then Chairman of the Rules Structure Working Group and the Chairman of the Rules Committee.

¹³ *Cargill v Hardin* 452 F.2d 1154 (8th Cir. 1971)

Industry Participation Code 2010. I note, however, that both the Chicago Board of Trade and Sydney Futures Exchange rules have continued to evolve.¹⁴

22. From an economic perspective, this continuity of the substance of the rule is important. The rule formed part of the terms and conditions under which industry participants voluntarily elected to join the NZEM at its formation. Market Participants expected net gains from being bound to the market rules, including the Undesirable Trading Situation rule. All investments by generators and major users in the subsequent 15 years, which in aggregate amount to hundreds of millions of dollars, were made in an environment in which the sale and purchase of wholesale electricity would be subject to a, substantially unchanged, Undesirable Trading Situation rule.

New Zealand electricity market precedent

23. Though the Undesirable Trading Situation rule has remained substantially the same since 1995, I could not locate any decision by the Electricity Commission or the former Market Surveillance Committee of NZEM which dealt with events substantively the same as the events of 26 March.
24. The Electricity Commission did find, in its decision concerning a claimed Undesirable Trading Situation of 19 May 2009, that:

As the Commission has previously stated, very high or very low prices do not of themselves indicate a threat to orderly trading.

25. This decision that high prices, in of themselves, are not a threat to orderly trading must be correct, at least from the perspective of economics. Returning to the test I outlined in paragraphs 17 and 18 above, it would seem implausible that market participants would preclude arrangements for prices to clear the market and such a rule would not be in the public interest.¹⁵ Prices discovered

¹⁴ A casual review of the rulebooks suggests continuous evolution to adapt the rules to keep pace with market developments. By comparison, a 2008 review of the New Zealand electricity market suggested that development of the electricity market rules had slowed considerably during the term of the Electricity Commission relative to industry processes prior to 2003, see Kieran Murray, Graham Scott, Toby Stevenson, *Determining outcomes or facilitating effective market processes: a review of regulation and governance of the electricity sector*, 2 February 2008.

¹⁵ When the NZEM Participants determined the initial Undesirable Trading Situation rule they also determined not to place a cap on market prices.

through trading collate and convey information.¹⁶ Spot prices communicate information about relative scarcity; to provide efficient price signals, prices should fluctuate down to zero if necessary in periods of excess supply (because no business should be turned away that covers the short-run marginal cost of supplying it) and, in periods of shortage, prices should rise to whatever level is necessary to ration limited supplies among customers.

26. In an electricity market, in which electricity cannot be stored economically, prices might need to rise to very high levels in situations where capacity is constrained. Where capacity is constrained, prices at the margin should rise to the short-run marginal *opportunity* cost of supply – with constrained capacity, the opportunity cost of electricity is the price point at which sufficient consumers would voluntarily take their next best alternative rather than consume an extra unit so that limited supplies are efficiently rationed among customers. This concept of opportunity cost is the rationale for value of loss of load calculations.
27. Appendix 2 sets out an analysis of generator offer data of 26 March.¹⁷ It is clear from this analysis that the events of 26 March was *not* a circumstance in which there was insufficient electricity available to meet demand and where prices needed to rise to levels sufficient for consumers to voluntarily reduce demand. To illustrate this point, the following table compares the offered quantity (by price band) offered by Genesis on 26 March from the combination of its old 4 x 250 MW Huntly units, and its 400 MW modern CCGT (E3P) and 40 MW GT (P40) with the offered quantity on 2 April when a similar transmission outage was in effect.

¹⁶ Friedrich Hayek, 'Economics and Knowledge', 1937; Presidential address delivered before the London Economic Club; November 10 1936, reprinted in *Economica* IV (new ser., 1937), 33-54.

¹⁷ This analysis was compiled for me by Patrick Harnett, Principal at Sapere Research Group. Patrick is a senior and very experienced electricity sector analyst.

Table 1. Genesis offers for Huntly 26 March and 2 April

	2/04/2011	26/03/2011
Offer Price (\$/MWh)	Offered Quantity	Offered Quantity
0	490	305 - 360
3 - 5	130	
55 - 65	145	
300 - 950	130	
3000	30	
>19,000	30	355 - 300
Total	955	660

- 28.** On 2 April, Genesis offers almost twice the capacity at prices less than \$5 per MWh and total offered capacity was 955 MW compared to 660MW on the previous weekend. On 2 April, only 30 MW was offered at \$19,000 / MWh or higher, compared to between 300 to 355 MW at these prices on 26 March.
- 29.** As detailed in appendix 2, the price setting unit for periods in which prices reached above \$19,000 per MWh appears to be Huntly unit 5, the new gas fired plant referred to as E3p.
- 30.** This conclusion that energy was not scarce on 26 March is consistent with the reported comments of Transpower chief executive, Dr Patrick Strange, who said that plenty of generation was available on both sides of the constraint during the work and that Transpower would not have continued with the work if there was not enough generation.¹⁸

¹⁸ <http://www.nbr.co.nz/article/mighty-river-seeks-price-correction-after-massive-spike-nn-89363>

31. If the extremely high prices of 26 March, of approximately \$20,000 per MWh, were not due to scarcity, but the outcome of deliberate offer strategies, did these activities amount to market manipulation an undesirable practice, or an exceptional or unforeseen circumstance that threatens the public interest?

Manipulative trading

32. Manipulation of market trading and hence prices is an offense under most, if not all, organised market rules.¹⁹ Rule 432 of the Chicago Board of Trade Rulebook – the oldest of the world’s existing organised markets having started in 1848 and by the far the largest - states, for example, that it is an offense:

To engage in, or attempt to engage in, the manipulation of prices of Exchange futures or options contracts; to corner or squeeze, or attempt to corner or squeeze, the underlying cash market; or to purchase or sell, or offer to purchase or sell Exchange futures or options contracts, or any underlying commodities or securities, for the purpose of upsetting the equilibrium of the market or creating a condition in which prices do not or will not reflect fair market values.

33. Market manipulation is an offense under the rules of organised markets because it distorts prices and there is doubt that markets self correct, or at least self correct without significant welfare losses.²⁰ Price distortions that result from market manipulation are socially costly because incorrect information is conveyed for decisions on real resource allocation. For example, agricultural chemical firm Nufarm reportedly stated that it would close its plant on Saturday 2 April (when a second transmission outage was planned), though it had significant volumes of export orders to satisfy, rather than “risk potentially ruinous prices”.²¹ The Auckland Museum was also reported as looking to manage its power use.²² To the extent that the demand from these

¹⁹ In the United States, the origin of many of the rules governing organised markets, the Grain Futures Act of 1922, the Commodity Exchange Act of 1936 and the Commodity Futures Trading Commission Act of 1974 all proscribe manipulative conduct.

²⁰ There is debate about the effectiveness of self regulation. See, for example, Daniel R Fishel & David J Ross, *Should the Law Prohibit Manipulation in Financial Markets?* 105 Harv. L. Rev. 503 (1991) and Stephen Craig Pirrong, *The Self-Regulation of Commodity Exchanges: the Case of Market Manipulation*, Journal of Law and Economics, 38 No.1 (1995), 141.

²¹ Brendon Redmond, Production Manager, Nufarm, reported in Dominion Post, Saturday 2 April 2011, p B 8.

²² Melanie Cooper, spokeswoman, Auckland Museum, reported in Dominion Post, Saturday 2 April 2011, p B 8.

consumers, and others, could have been met profitably at a cost lowered than the \$20,000 per MWh they feared, then the reduction in demand lowered economic welfare.

34. An organised market in which prices are manipulated fails its basic purpose of increasing the gains from trade through lowering transaction costs. Faced with the prospect of manipulated prices, market participants must take costly actions to mitigate the costs of the distortions and these actions may not be successful. One reason why mitigation actions are costly is that they tend not be effective against unanticipated or unexpected market manipulation. People tend to anchor their decisions on what has gone before.²³ Market manipulation undermines the ability for market participants to anchor their expectations; without a history of high prices, or some signal in advance, market participants would unlikely to have planned effectively for the events of 26 March. The following table shows that the prices on 26 March were unprecedented.

²³ Kahneman, Daniel, Paul Slovic, and Amos Tversky. 1982. *Judgment under uncertainty: Heuristics and biases*. Cambridge: Cambridge University Press.

Table 2. 16 periods in which spot prices exceeded \$5,000 per MWh

Date	trading period	Price Indication	Nodes	Periods	Comment
26-Oct-00	17	\$5,618	1	1	Western Road (Hamilton)
27-Apr-04	17	\$5,803	5	1	Southland
21-Aug-04	22	\$11,822	32	1	Lower North Island
25-Mar-06	47	\$6,297	14	2	Upper South Island/West coast
19-Jun-06	36	\$9,685	239	1	New Zealand wide
13-Feb-09	24	\$7,540	1	1	Lichfield
27-Apr-09	38	\$8,140	1	1	Fernhill
19-May-09	16	\$5,925	36	1	Lower North Island
21-May-09	16	\$5,278	2	1	Kaikohe and Kaitaia
4-May-10	36	\$5,260	2	3	Wairoa and Gisborne
4-Jul-10	36	\$5,272	49	1	Upper North Island (approx. Glenbrook north)
6-Sep-10	36	\$5,359	145	1	\$5000/MWh at Whirinaki
3-Nov-10	17	\$5,359	143	1	\$5000/MWh at Whirinaki

- 35.** Development of related markets may also be affected, as establishing a futures market, or developing demand side management, would be very difficult if settlement prices are subject to manipulation. Prospective traders of New Zealand electricity futures and hedge contracts might reasonably expect the New Zealand electricity market to adopt similar standards as apply in other markets.

Establishing whether trading was manipulative / not in the public interest

- 36.** Though there may be wide agreement that market manipulation is costly, there is much less agreement on what constitutes manipulation of trading. The imprecise use of the term is illustrated in Texas cotton trader William Clayton's

response, to an accusation by the president of the New York Cotton Exchange at a Senate hearing that Clayton was a manipulator:²⁴

The word “manipulation” ... in its use is so broad as to include any operation of the cotton market that does not suit the gentleman who is speaking at the moment.

37. Professor Craig Pirrong argues that there are at least two, very distinct, types of manipulative acts.²⁵ One type of manipulation involves some sort of fraud. For instance, a trader can spread a false rumour that causes prices to move in a way that benefits his or her position or misreport some aspect of their trading. There is no suggestion of any fraudulent activities by any party on 26 March and therefore I do not consider fraud-based manipulation.
38. The second major type of manipulation involves use of market power. However, the concern is not simply that a party may attempt to maximise their profits by selling above marginal cost; traders attempting to sell at the highest price they can or ‘holding out’ for a more advantageous price represents normal activity in all markets.²⁶ If bilateral negotiations were to replace the market rules (in this case, the Code), market participants would still charge above marginal cost if market conditions allowed. Hence, the test I outlined in paragraph 18 above would suggest that simplistic measures of price against cost are therefore unlikely to isolate destructive market manipulations.
39. Internationally, and particularly in the United States where market manipulation is illegal under various statutes as well as an offense under market rules, there are numerous examples of proceedings against alleged attempts to manipulate the market in soybeans, copper, propane, crude oil and government securities, amongst others. Markham²⁷ and Pirrong²⁸ provide extensive analysis of these cases and conclude that the legal tests in the United States are confused and

²⁴ Cotton Prices: Hearings Before a Sub Committee of the Senate Committee on Agriculture and Forestry, Pursuant to S. Res. 142, 70th Congress, 1st Session, 154 (1928), cited in Craig Pirrong, Energy Market Manipulation: Definition, Diagnosis, and Deterrence, Energy Law Journal, Vol 31, No 1, 2010, p 3.

²⁵ Craig Pirrong, Energy Market Manipulation: Definition, Diagnosis, and Deterrence, Energy Law Journal, Vol 31, No 1, 2010, p 3.

²⁶ Richard Friedman, Stalking the squeeze: understanding commodities market manipulation, Michigan Law Review, Vol 89: 30, October 1990, p 40.

²⁷ Jerry W Markham, Manipulation of Commodity Futures Prices: The Unprosecutable Crime, 8 Yale J. On Reg. 281 (1991).

²⁸ Stephen Craig Pirrong, Commodity Market Manipulation Law: A Very Critical Analysis and a Proposed Alternative, 51 Wash & Lee. L. Rev. 945 (1994).

muddled. Pirrong summarises the United States legal precedents to establish manipulation as being necessary to show that:

- a. The price of the contract was ‘artificial’ (or a “price which does not reflect the basic forces of supply and demand”²⁹).
 - b. The accused had the ability to cause the artificial price.
 - c. The accused did indeed cause the artificial price, and
 - d. The accused acted with the intent to cause the price to be artificial.
40. Pirrong argues that a comparison of relative prices provides a clear guide to whether the market has been manipulated.³⁰ Material changes in relative prices, when combined with an analysis of the accused manipulator’s actions, can provide powerful evidence to support inferences of intent.³¹ Prices are likely to be substantially lower prior to the claimed activity and to fall rapidly once the activity ceases. Manipulated prices are also likely to rise relative to other market prices.³² On this view, the data analysis in appendix 2 infers that market prices were manipulated on 26 March. Price outcomes were so unusual that the ex ante price forecasts issued during 26 March did not hint at the ex post price outcomes. Figure 1 shows the ex ante price forecasts with the interim prices over the relevant period for the Otatahu node.

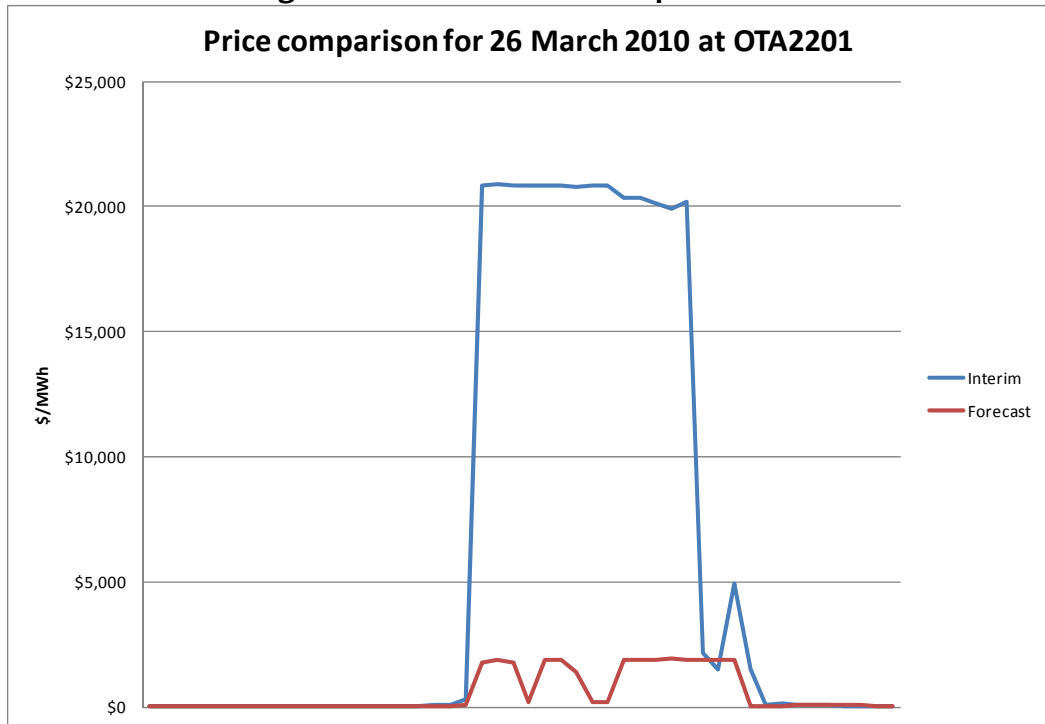
²⁹ *Cargill v Hardin* 452 F.2d 1154 (8th Cir. 1971), 1163.

³⁰ Craig Pirrong, Energy Market Manipulation: Definition, Diagnosis, and Deterrence, Energy Law Journal, Vol 31, No 1, 2010, p 3.

³¹ Pirrong, *ibid*, p 16.

³² Pirrong also considers circumstances in which prices are manipulated down.

Figure 1. Ex ante and interim prices



An electricity market equivalent of the “squeeze”

41. Perhaps the best known, and widely accepted, example of market manipulation is the activities of the Hunt brothers in the silver market in 1979-80. The Hunt brothers were actively trying to ‘corner’ the market. To do this they took a long futures position while simultaneously exercising control over the supply of silver. As the maturity of their futures contracts came near, rather than closing out their position they demanded delivery. The holders of short positions realised that they would find it difficult to deliver and became desperate to close out their position. The result was a large rise in both future and spot prices. Between the middle of 1979 and the beginning of 1980, the activities of the Hunt brothers led to silver prices leaping from \$9 per ounce to \$50 per ounce. In the jargon of the commodity markets, the Hunt brothers had engaged in a corner and squeeze of the market.

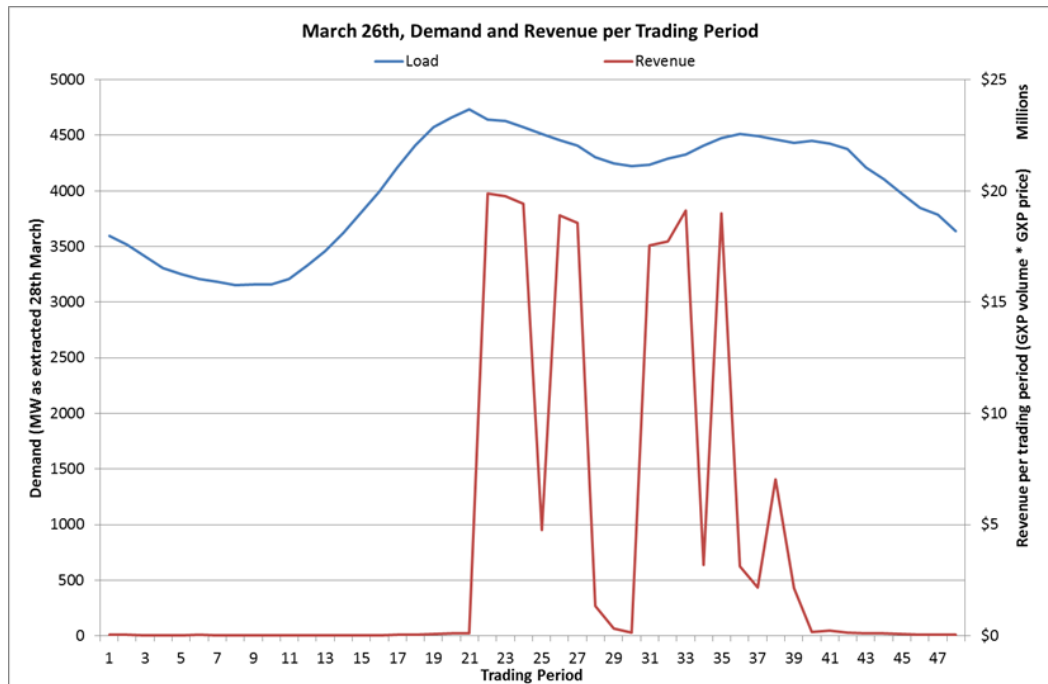
- 42. Professor Richard Friedman distinguishes a squeeze from ordinary use of market power because in a squeeze the buyer must pay the inflated price or suffer severe sanctions.³³ Ordinarily, the sales by a monopolist would be at a price no higher than the value of the article to the buyer, because at a higher price the buyer would simply do without. The squeezer, by contrast, takes advantage of the short seller who must pay a high price (by either purchasing physical commodity or an offsetting contract) or face severe penalties for default under the market rules. A corner generally refers to a situation where a trader has gained control over enough of the available supply of a commodity to manipulate its price.
- 43. No organised commodity market permits a squeeze or a corner. As US Eight Circuit Court observed in the precedent setting *Cargill* case: "We cannot conceive that any useful purpose would be served by encouraging such conduct in the future."³⁴
- 44. The activities on 26 March bear strong similarities with a classic commodity market squeeze:
 - a. Genesis had gained a temporary dominant position in the supply of electricity north of the constraint; Genesis had gained a corner on the physical market.
 - b. Genesis appears to have altered its trading position to ensure price separation above and below the constraint; this gave Genesis the ability to set prices at an unprecedented "high" level North of the constraint.
 - c. These price changes were not well signalled to consumers in advance and took effect over a time period when it was almost impossible for consumers to respond; many consumers did not learn of the prices until after the event.
 - d. Mighty River Power, and others, were obliged to pay the extremely high prices for electricity taken by consumers (who were unaware of the price change), or face severe penalties for default.

³³ Richard Friedman, *Stalking the squeeze: understanding commodities market manipulation*, Michigan Law Review, Vol 89: 30, October 1990, p 40.

³⁴ *Cargill v Hardin* 452 F.2d 1154 (8th Cir. 1971), paragraph 109.

- e. The primary alternative to paying the high prices set by Genesis would be for market participants to buy a hedge from Genesis at a price set by Genesis; Genesis appears to have secured high (relative to prices prevailing prior to the squeeze) prices for hedges for the weekend of 2 April when Genesis would similarly corner the physical market.
45. Returning to the economic test developed at paragraphs 17 and 18, it would be ridiculous to suggest that participants would have negotiated the outcomes arising from the events of 26 March if circumstances had allowed for those negotiations. The “squeeze” exerted by Genesis will raise market transaction costs, if it were a permitted trade, and therefore is contrary to a primary objective of an organised market in lowering transaction costs.
46. As an illustration of the additional costs to the market, figure 2 shows the revenue impact (based on provision prices) over relevant trading period. The demand for the day appears to be 96.7 GWh and total revenue \$196 million, with \$170 million of that produced from just 4.5 hours. This revenue impact will have flow on consequences for prudential security and end user retail rates. These costs flowing from the exceptional and unforeseen outcomes of 26 March are not in accord with the generally accepted principles of the public interest.

Figure 2. Revenue per trading period



47. However, the Code specifically refers to market manipulation as an Undesirable Trading Situation, and a squeeze and corners are the most well-known forms of market manipulation. Three authors of the original NZEM rule on Undesirable Trading Situations – Dr Brent Layton, Mr Len Ward, and Mr Lincoln Gould – had extensive knowledge of futures and commodity markets. They would have been aware of rules against manipulative trading practices and, in adopting the prohibitions from futures and commodity markets in drafting the Undesirable Trading Situation rule, would have been intent on making such practices an offense under the rules.

NEM prohibits a ‘squeeze’

48. It appears that the National Energy Market (NEM) in Australia similarly prohibits a ‘squeeze’, though through a different rule mechanism. The Australian Energy Regulatory (AER) and its predecessor have undertaken a series of investigations of specific market events or unusual market behaviour, particularly in relation to generator rebidding under severe transmission network congestion.
49. The key requirement in the NEM designed to limit market manipulation is that generators must make a “dispatch offer, dispatch bid or rebid in relation to

available capacity and daily energy constraints in good faith.³⁵ A dispatch offer, bid or rebid is “taken to be made in good faith, if at the time of making such offer, bid or rebid, the [generator] has a genuine intention to honour that offer, bid or rebid if the material conditions upon which the offer, bid or rebid were based remains unchanged until the relevant dispatch interval.”³⁶

50. In introducing these measures, the National Electricity Code Authority (NECA) stated that the change “represents no more nor [sic] less than fair and honest dealing.”³⁷

Conclusion

51. As with other forms of organised market, the New Zealand wholesale electricity market exists to reduce the cost of carrying out exchange transactions. The rules governing Undesirable Trading Situations are substantially unchanged since the wholesale market rules were implemented in 1995. The drafting of the initial Undesirable Trading Situation rule drew heavily on (then) similar provisions in the Rules of Sydney Futures Exchange and the Chicago Board of Trade.
52. As a broad standard, the Undesirable Trading Situation rule can be interpreted by figuring out what measures the parties would have agreed to unilaterally had circumstances allowed for those negotiations. There is no basis for suggesting that the participants would have negotiated the outcomes arising from the events of 26 March if circumstances had allowed for those negotiations. Hence, the trading activities would breach an economic interpretation of the standards forming the Undesirable Trading Situation rule.
53. As an over arching purpose of an organised market is to facilitate exchange by reducing the cost of carrying out transactions, the Undesirable Trading Situation standards can be interpreted in terms of economic efficiency. The exceptional and unforeseen pricing outcomes of 26 March do not reflect

³⁵ Refer to Clause 3.8.22A(a) of version 42 of the NER available at:

<http://www.aemc.gov.au/Electricity/National-Electricity-Rules/Current-Rules.html>

³⁶ Refer to Clause 3.8.22A(b) of the NER.

³⁷ Refer to page one of a NECA notice on changes to bidding and rebidding rules dated January 2003, available at: <http://www.aer.gov.au/content/index.phtml/itemId/656303>

scarcity and are at variance with generally accepted principles of the public interest.

54. A comparison of relative prices prior to the events on 26 March 2011, the prices during those events, and the prices immediately following those events, combined with an analysis of generator offer changes, provide a strong inference that the prices result from manipulative trading activity. There was no shortage of electricity relative to demand that would explain the extremely high prices.
55. The activities on 26 March bear strong similarities with a classic commodity market squeeze:
 - a. Genesis had gained a temporary dominant position in the supply of electricity north of the constraint; Genesis had gained a corner on the physical market.
 - b. Genesis appears to have altered its trading position to ensure price separation above and below the constraint, this gave Genesis the ability to set prices at an unprecedented high level North of the constraint.
 - c. These price changes were not well signalled to consumers in advance and took effect over a time period when it was almost impossible for consumers to respond; many consumers did not learn of the prices until after the event.
 - d. Mighty River Power, and others, will be obliged to pay the extremely high prices for electricity taken by consumers (who were unaware of the price change), or face severe penalties for default. Mighty River Power and others will also face adverse hedge contract settlements.
 - e. The primary alternative to paying the high prices set by Genesis would be for market participants to buy a hedge from Genesis at a price set by Genesis. Genesis appears to have secured high (relative to prices prevailing prior to the squeeze) prices for hedges for the weekend of 2 April when Genesis would similarly corner the physical market.
56. Squeezes and corners are among the most well known manipulative and undesirable trading practices. The authors of the original NZEM rule on Undesirable Trading Situations had extensive knowledge of futures and commodity markets. They would have been aware of manipulative trading practices and, in adopting the prohibitions from futures and commodity

markets in drafting the Undesirable Trading Situation rule, would have been intent on making such practices an offense under the rules.

Appendix 1: 1995 New Zealand electricity market rules, undesirable trading situation

Rules of



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2.25.2.2 an entity controlled by an officer or employee of the Market Participant; or

2.25.2.3 an entity controlled by any person with whom the Market Participant is deemed to be associated or connected by virtue of rule 2.2 of Annexure A;

2.25.3 a Market Participant shall not be deemed to be associated or connected with any person who is a Shareholding Minister as that term is defined in section 2 of the State-Owned Enterprises Act 1986 or any other New Zealand legislation provided that person is acting in his or her capacity as a Shareholding Minister.

2.26 The occurrence of an undesirable situation or practice

If EMCO or the Market Surveillance Committee suspects or anticipates the development, or possible development, of an Undesirable Situation (as defined in rule 2.27), the Market Surveillance Committee shall investigate the matter.

2.27 Meaning of "Undesirable Situation"

For the purposes of these rules, an "Undesirable Situation" means any situation which threatens or may threaten fair, orderly or proper trading on NZEM, and without affecting the generality of the foregoing, includes the occurrence, threat or possible threat of:

2.27.1 any contingency or event which affects or has affected, or is capable of affecting trading on NZEM or any market, where the consequences of strict enforcement of the rules or Contract Specifications would, or would be likely to, preclude the maintenance of a fair or orderly market or fair or proper settlement of trades;

2.27.2 manipulative or attempted manipulative activity;

2.27.3 an excessive position;

2.27.4 unwarranted speculation or an undesirable practice;

2.27.5 a breach of any law; or

2.27.6 action or proposed action by a government, government instrumentality, futures exchange or stock exchange or any other body in New Zealand or elsewhere, or any exceptional or unforeseen circumstance, which is at variance with, or which threatens or may threaten, just and equitable principles of trading or the public interest.

2.28 MSC may take appropriate steps to correct an Undesirable Situation

If the Market Surveillance Committee finds that an Undesirable Situation is developing or has developed the Committee may take whatever steps it considers appropriate to correct the situation and may give directions to EMCO or any Market Participant accordingly.

2.29 MSC may act if directed by a Regulatory Authority

In the event that a direction has been given to the Market Surveillance Committee by any Regulatory Authority in respect of any Undesirable Situation the Committee may take whatever steps it considers necessary to enable compliance with the direction.

2.30 Actions the MSC may take to correct an Undesirable Situation

Without affecting the generality of rules 2.28 and 2.29, the steps which the Market Surveillance Committee may, but is not obliged to, take under those rules include any one or more of the following:

2.30.1 Suspend or curtail trading

Suspending or curtailing trading generally, or trading in any market which is part of NZEM, for any one or more months, or for a specified period;

2.30.2 Limit trading

Limiting trading generally, or trading in any market which is part of NZEM;

2.30.3 Defer completion of trades

Deferring completion of trades for a specified period;

2.30.4 Direct trades to be settled or closed out

Directing that any trades be closed out or settled at a specified price;

2.30.5 *Direct EMCO or Market Participants to act*

Giving directions to EMCO or any Market Participant to act in such manner as will in its opinion correct or assist in overcoming the situation or practice, including, without limitation, a direction to transfer any position to one or more of the other Market Participants;

2.30.6 *Notify a Regulatory Authority*

Notifying any Regulatory Authority.

2.31 MSC orders on Undesirable Situations are binding

Any decision of the Market Surveillance Committee under rules 2.26 to 2.30 as to whether or not the Committee will act, and as to what action, if any, the Committee will take or require to be taken, shall be binding upon all Market Participants, EMCO and upon all persons claiming through or under any Market Participant.

2.32 These rules may be amended in the event of an Undesirable Situation

The Market Surveillance Committee may determine that an Undesirable Situation necessitates that a rule change should be made. In these circumstances, the Market Surveillance Committee may call a meeting of the Rules Committee and propose that the Rules Committee vote to approve a rule change. The Rules Committee will vote on whether to approve the rule change proposed by the Market Surveillance Committee. Any such rule change will be effective immediately upon the affirmative vote of a majority of the members of the Rules Committee, but is subject to the provisions of rule 2.33.

2.33 Changes must be approved by affected Market Participants

Any rule change made as a result of a vote of the Rules Committee pursuant to rule 2.32 must be approved by a vote of each affected class of Market Participants in accordance with rule 5.16 within ten business days of the Rules Committee's vote. If approval is not obtained within this time, the rule change made by the Rules Committee shall lapse and, from the date of that lapse, the rules that were in force prior to the rule change shall apply.

2.34 MSC to consult with the Grid Operator on Undesirable Situations

Where the Market Surveillance Committee is considering taking any action pursuant to rules 2.26 to 2.30 to correct an Undesirable Situation, then, in circumstances where it is possible that such action may have an effect on system security, the Committee shall consult with the Grid Operator. The Grid Operator shall maintain such procedures as are necessary to be able to immediately respond to the Committee should the Committee seek its advice pursuant to this rule.

Appendix 2: Analysis of 26 March offer data

In this analysis of the 26th March generation offer data, we examine and illustrate a hindsight review of the events of the day and in particular the re-offer behaviour that can be observed from the time-stamp associated with the final offer for each station.

Data Used

The core data sets, obtained from <https://www.electricitywits.co.nz/comit/> are:

- Offer data file for March 26th
- Provisional published prices for March 26th

When combined, this data also matches offered prices to the provisional price identifying the likely marginal (price setting) station for each period.

From a detailed review of the offer data we have concentrated our analysis on the activity of Genesis Energy and the interaction with the Mighty River Power (MRP) offers. The data from other generation companies is less relevant, although we note Meridian Energy did make a number of changes during the day.

Commercially Rational Offering

One of the suggestions is that the high offer prices are commercially rational pricing of the older gas/coal units at a high price to justify their continued use. This does not appear to be the case because the market offers for all the Huntly units that were available were all around the \$20,000/MWh level. While units 1, 3 and 4 were not offered (as indicated by their maximum MW being set to zero and zero offered volume), unit 2, 5 (E3P) and 6 (peaker) exhibited similarly offers. For illustration, trading period 25, band 4 indicated:

- Unit 2, 38 MW @ \$19,820.02/MWh
- Unit 5, 30 MW @ \$19,850.05/MWh
- Unit 6, 40 MW @ \$19,950.06/MWh

Note the older unit 2 is priced below the newer and more efficient unit 5. Taking a simple view of the offers, however, masks the cost for incremental energy. Thus, a more accurate depiction would be (also for trading period 25):

- Unit 2, 110 MW @ 0.01/MWh to help ensure minimum output running, with incremental energy priced at a minimum of \$19,720.02/MWh.
- Unit 5, 250 MW @ 0.01/MWh to help ensure minimum output running, with incremental energy priced at a minimum of \$19,750.02/MWh.
- Unit 5, 40 MW @ \$19,950.06/MWh to help ensure that if required, a very high price is set.

When matched to the peak offer prices Genesis has submitted for other days, the inference is that the prices for March 26th were unusual. For illustration, during January the offer price for Huntly unit 6 peaked at \$4990/MWh, similar to the

highest offered volumes for the east coast hydro, with other Huntly units offered at a lower level. February followed a similar pattern with regard to the bulk of peak prices limited to \$5,000/MWh or less except for a small number of trading periods with offers around \$10,000/MWh, mainly related to Huntly unit 6 (35 of 49 prices) related to three specific days (4 February, 22nd February and 23rd February).

For context, Genesis has 14,784 offers for February based on eleven stations, 28 days and 48 trading periods. Counting only the highest priced volumes (regardless of being dispatched or not) 3,398 were in the \$4900-\$4999/MWh range, and 4,753 above \$2,000/MWh. 6,187 offers including 3,830 relating to Huntly had prices of \$0.01/MWh as the highest price for energy.

Offering and Re-Offering

A limitation of the data that we have available is that it only records the last offer made for each period. Thus, the intermediate steps and history of behaviour is usually hidden. For the events of March this is also the case for much of the day, but some information can be inferred from the data timestamps, and it is this chronology that we seek to investigate.

In order to balance the volume of data with the aspects that we wish to examine, we have identified a subset of representative data for Genesis and MRP and organised it into a standard format as shown in the table for trading period 1 on March 26th.

Note Huntly unit 6 is offered in tranche four and five so the first three prices do not impact on the price if the station were to be dispatched. The other two Huntly units are offered at zero to help ensure running at minimum. Peak prices of \$4,990/MWh are typical of the top price limit they have used in the past.

Trading Period 1	Tranche 1	Tranche 2	Tranche 3	Tranche 4	Tranche 5	Last Change
Huntly unit 2	70MW @ \$0	10MW @ \$0.01	60MW @ \$4970.02	68MW @ \$4980.02	32MW @ \$4990.02	25/03 12:02
Huntly unit 5	250MW @ \$0	40MW @ \$120.05	30MW @ \$950.05	30MW @ \$2600.05	26MW @ \$4950.05	25/03 21:39
Huntly unit 6	0MW @ \$0.01	0MW @ \$1.06	0MW @ \$200.06	40MW @ \$4950.06	5MW @ \$4990.06	25/03 12:02
Tokaanu	40MW @ \$54.06	40MW @ \$65.06	30MW @ \$110.06	70MW @ \$4980.06	60MW @ \$4990.06	25/03 12:02
Tuai	18.2MW @ \$0	0MW @ \$4.07	0MW @ \$5.07	0MW @ \$4950.07	11.8MW @ \$4990.07	25/03 12:02
Atiamuri	5MW @ \$0.49	15MW @ \$20	2MW @ \$29	7MW @ \$78	45MW @ \$195	25/03 21:52
Maraetai	55MW @ \$0	0MW @ \$20	7MW @ \$29	15MW @ \$78	134MW @ \$195	25/03 21:52
Whakamaru	5MW @ \$0.49	9MW @ \$20	5MW @ \$29	4MW @ \$78	31MW @ \$195	25/03 21:52

Huntly units 1, 3 and 4 were not offered so are not included. Rangipo was offered at either 40 or 60 MW at \$0.01/MW during the day. Tuai represents the three stations at Waikaremoana that are offered on the same price basis with variations on MW availability. For MRP, we have selected three of their Waikato stations to illustrate the offers of the eight hydro stations as their other capacity (thermal and geothermal) was offered throughout the day at zero or \$0.01/MWh.

Early March 26th

The trading period 1 data shown in the above table is typical of the offers submitted for the early hours of Saturday morning. The first major revision comes at trading period 11 (starting 5:00 a.m.).

Trading Period 11	Tranche 1	Tranche 2	Tranche 3	Tranche 4	Tranche 5	Last Change
Huntly unit 2	80MW @ \$0.01	30MW @ \$19720.02	31MW @ \$19770.02	67MW @ \$19820.02	32MW @ \$19870.02	26/03 0:57
Huntly unit 5	225MW @ \$0	65MW @ \$19750.05	30MW @ \$19800.05	30MW @ \$19850.05	27MW @ \$19900.05	26/03 0:57
Huntly unit 6	0MW @ \$0.01	0MW @ \$1.06	0MW @ \$200.06	40MW @ \$19950.06	5MW @ \$19990.06	26/03 0:57
Tokaanu	40MW @ \$65.06	70MW @ \$130.06	40MW @ \$180.06	30MW @ \$240.06	60MW @ \$280.06	26/03 0:57
Tuai	8MW @ \$0	0MW @ \$4.07	0MW @ \$5.07	10.2MW @ \$4950.07	11.8MW @ \$4990.07	26/03 0:57
Atiamuri	5MW @ \$0	12MW @ \$20	5MW @ \$24	6MW @ \$64	46MW @ \$195	26/03 2:38
Maraetai	55MW @ \$0	0MW @ \$20	3MW @ \$24	17MW @ \$64	136MW @ \$195	26/03 2:38
Whakamaru	25MW @ \$0	0MW @ \$20	9MW @ \$24	10MW @ \$64	31MW @ \$195	26/03 2:38

The offers for the Huntly units are revised upwards to near \$20,000/MWh, and 90MW of Tokaanu capacity is revised down to under \$300/MWh. This revision occurred shortly before 1 a.m., well before the cut-off for revision. The timing, in the “middle of the night” matches a potentially quiet time for revisions to be made. A revision to Tokaanu from trading period 14 also occurs, but is minor.

Trading period 16 – commencing 7:30 a.m.

Trading Period 16	Tranche 1	Tranche 2	Tranche 3	Tranche 4	Tranche 5	Last Change
Huntly unit 2	110MW @ \$0.01	30MW @ \$19720.02	30MW @ \$19770.02	38MW @ \$19820.02	32MW @ \$19870.02	26/03 5:20
Huntly unit 5	250MW @ \$0	40MW @ \$54.05	30MW @ \$19800.05	30MW @ \$19850.05	26MW @ \$19900.05	26/03 5:20
Huntly unit 6	0MW @ \$0.01	0MW @ \$1.06	0MW @ \$200.06	40MW @ \$19950.06	5MW @ \$19990.06	26/03 5:20
Tokaanu	40MW @ \$50.06	70MW @ \$54.06	40MW @ \$65.06	30MW @ \$130.06	60MW @ \$180.06	26/03 5:24
Tuai	18.2MW @ \$0	0MW @ \$4.07	0MW @ \$5.07	0MW @ \$4950.07	11.8MW @ \$4990.07	26/03 5:20
Atiamuri	27MW @ \$0.49	7MW @ \$16.5	9MW @ \$25	21MW @ \$78	10MW @ \$300	26/03 4:46
Maraetai	65MW @ \$0.49	10MW @ \$16.5	10MW @ \$25	10MW @ \$78	116MW @ \$300	26/03 4:46
Whakamaru	20MW @ \$0.49	5MW @ \$16.5	5MW @ \$25	5MW @ \$78	40MW @ \$300	26/03 4:46

A large reduction in the E3P price for an additional 40 MW is added at 5:20 a.m. This is 10 minutes within the cut-off for changes to the 2-hour limit for changes. This would allow a small amount of additional generation to be made available at this time at a reasonable price level. The market clearing price appears at Atiamuri at \$16.50/MWh.

Trading period 17 sees an additional 60 MW of capacity at unit 5 (E3P) available at low prices \$54.05/MWh). Period 18 sees the price at Huntly unit 5 fall further to \$15.05/MWh and full capacity available at \$54.05/MWh. This latest change occurred at 6:22 a.m.

Trading period 21 – commencing 10:00 a.m.

Tokaanu appears to set the system price at \$65.06/MWh. This price/volume combination was modified commencing at trading period 19, changed last at 6:22 a.m.

Trading period 22 – commencing 10:30 a.m.

Trading Period 22	Tranche 1	Tranche 2	Tranche 3	Tranche 4	Tranche 5	Last Change
Huntly unit 2	110MW @ \$0.01	30MW @ \$19720.02	30MW @ \$19770.02	38MW @ \$19820.02	32MW @ \$19870.02	26/03 6:22
Huntly unit 5	250MW @ \$0.01	40MW @ \$19750.05	30MW @ \$19800.05	30MW @ \$19850.05	25MW @ \$19900.05	26/03 6:22
Huntly unit 6	0MW @ \$0.01	0MW @ \$1.06	0MW @ \$200.06	40MW @ \$19950.06	5MW @ \$19990.06	26/03 6:22
Tokaanu	90MW @ \$45.06	60MW @ \$54.06	30MW @ \$65.06	10MW @ \$130.06	50MW @ \$180.06	26/03 6:22
Tuai	18.2MW @ \$0.01	11.8MW @ \$4.07	0MW @ \$5.07	0MW @ \$4950.07	0MW @ \$4990.07	26/03 6:22
Atiamuri	37MW @ \$0.49	8MW @ \$24	22MW @ \$59	6MW @ \$128	1MW @ \$300	26/03 5:52
Maraetai	65MW @ \$0.49	10MW @ \$24	10MW @ \$59	10MW @ \$128	116MW @ \$300	26/03 5:52
Whakamaru	20MW @ \$0.49	5MW @ \$24	5MW @ \$59	5MW @ \$128	40MW @ \$300	26/03 5:52

Tokaanu price is dropped further (to \$45.06/MWh) and Huntly unit 5 prices are restored to \$19,000/MWh or higher. These prices, entered at 6:22 a.m., might have become evident in the pre-dispatch schedules and prices before trading period 22 depending on the forecast demand, and how the transmission constraints bind.

On the 220kV system Huntly appear to have set the price of \$19,720.05/MWh while on the 110kV system MRP appear to have set the \$300/MWh price.

Between period 22 and 26 there were some minor variations in price/volume offers. Notable is the re-offer of Tokaanu for period 25 and 26 increasing the tranche five volume (60 MW) to \$500/MWh that appears to set the price in period 25.

For trading period 27 the Tokaanu price increases to \$2000.06/MWh, again change shortly before the close-off for revisions.

Trading period 28 – commencing 1:30 p.m.

Trading Period 28	Tranche 1	Tranche 2	Tranche 3	Tranche 4	Tranche 5	Last Change
Huntly unit 2	110MW @ \$0.01	30MW @ \$19720.02	30MW @ \$19770.02	38MW @ \$19820.02	32MW @ \$19870.02	26/03 6:22
Huntly unit 5	230MW @ \$0.01	60MW @ \$19750.05	30MW @ \$19800.05	30MW @ \$19850.05	23MW @ \$19900.05	26/03 11:04
Huntly unit 6	0MW @ \$0.01	0MW @ \$1.06	0MW @ \$200.06	40MW @ \$19950.06	5MW @ \$19990.06	26/03 6:22
Tokaanu	40MW @ \$0.01	50MW @ \$54.06	40MW @ \$65.06	50MW @ \$180.06	60MW @ \$2000.06	26/03 11:24
Tuai	18.2MW @ \$0.01	11.8MW @ \$4.07	0MW @ \$5.07	0MW @ \$4950.07	0MW @ \$4990.07	26/03 6:22
Atiamuri	6MW @ \$0.49	18MW @ \$900	4MW @ \$1400	6MW @ \$1500	40MW @ \$2000	26/03 10:54
Maraetai	65MW @ \$0.49	10MW @ \$900	10MW @ \$1400	10MW @ \$1500	116MW @ \$2000	26/03 10:54
Whakamaru	16MW @ \$0.49	5MW @ \$900	5MW @ \$1400	5MW @ \$1500	44MW @ \$2000	26/03 10:54

MRP increases its offers for the Waikato. This occurs at 10:54 a.m. (trading period 22) the first period where the high Huntly prices occur in real time. For period 28 the price fell and appears transmission constraints were not binding.

Trading period 29 – commencing 2:00 p.m.

Trading Period 29	Tranche 1	Tranche 2	Tranche 3	Tranche 4	Tranche 5	Last Change
Huntly unit 2	110MW @ \$0.01	30MW @ \$19720.02	30MW @ \$19770.02	38MW @ \$19820.02	32MW @ \$19870.02	26/03 11:36
Huntly unit 5	230MW @ \$0.01	60MW @ \$19750.05	30MW @ \$19800.05	30MW @ \$19850.05	21MW @ \$19900.05	26/03 11:04
Huntly unit 6	0MW @ \$0.01	0MW @ \$1.06	0MW @ \$200.06	40MW @ \$19950.06	5MW @ \$19990.06	26/03 6:22
Tokaanu	40MW @ \$0.01	40MW @ \$54.06	30MW @ \$65.06	40MW @ \$180.06	90MW @ \$2000.06	26/03 11:24
Tuai	18.2MW @ \$0.01	11.8MW @ \$4.07	0MW @ \$5.07	0MW @ \$4950.07	0MW @ \$4990.07	26/03 6:22
Atiamuri	5MW @ \$0.49	18MW @ \$19700	5MW @ \$19800	6MW @ \$19990	40MW @ \$21000	26/03 11:50
Maraetai	65MW @ \$0.49	10MW @ \$19700	10MW @ \$19800	10MW @ \$19990	116MW @ \$21000	26/03 11:50
Whakamaru	16MW @ \$0.49	5MW @ \$19700	5MW @ \$19800	5MW @ \$19990	44MW @ \$21000	26/03 11:50

MRP again increases offer prices, this time to very high levels. This is probably in reaction to the prices observed in the electricity market. Further adjustments are made in periods 30 and 31.

Genesis also makes a revision their price/volume offers with volume adjustments at Huntly unit 5 and Tokaanu.

As the transmission network is exhibiting price separation between the island and between the different voltage networks in the North Island, this might have an impact on both the electricity flows and the price received by MRP for electricity generated.

Unusually, it appears Mangahao set the North Island price in period 29 at \$200/MWh based on an offer entered the previous day (March 25th).

Trading period 31 – commencing 3:00 p.m.

Trading Period 31	Tranche 1	Tranche 2	Tranche 3	Tranche 4	Tranche 5	Last Change
Huntly unit 2	80MW @ \$0.01	60MW @ \$19200.02	30MW @ \$19500.02	38MW @ \$19600.02	32MW @ \$19870.02	26/03 12:54
Huntly unit 5	225MW @ \$0.01	65MW @ \$19300.05	30MW @ \$19500.05	30MW @ \$19550.05	21MW @ \$19900.05	26/03 12:54
Huntly unit 6	0MW @ \$0.01	0MW @ \$1.06	0MW @ \$200.06	40MW @ \$19950.06	5MW @ \$19990.06	26/03 12:54
Tokaanu	40MW @ \$0.01	40MW @ \$54.06	60MW @ \$65.06	10MW @ \$180.06	90MW @ \$2000.06	26/03 12:54
Tuai	18.2MW @ \$0.01	11.8MW @ \$4.07	0MW @ \$5.07	0MW @ \$4950.07	0MW @ \$4990.07	26/03 12:54
Atiamuri	9MW @ \$0.49	0MW @ \$20800	4MW @ \$20850	10MW @ \$20950	51MW @ \$21000	26/03 12:52
Maraetai	65MW @ \$0.49	10MW @ \$20800	10MW @ \$20850	10MW @ \$20950	116MW @ \$21000	26/03 12:52
Whakamaru	16MW @ \$0.49	5MW @ \$20800	5MW @ \$20850	5MW @ \$20950	44MW @ \$21000	26/03 12:52

Genesis makes a slight downward revision to Huntly prices. As MRP inject some of their output into the 110 kV Waikato system, this could help displace that generation and help constrain the interconnecting transformers (this information has not been reviewed).

The timing of the revision from Genesis provides them approximately one hour to react to the offers placed by MRP at 11:50 a.m.

Huntly again appears to set the system price at \$19,200.02/MWh showing the finely balanced supply with \$0.03/MWh to the next available tranche of generation.

Trading period 32 is similar to #31.

Trading period 33 sees Tokaanu and Tuai prices increase \$2000/MWh.

Trading Period 33	Tranche 1	Tranche 2	Tranche 3	Tranche 4	Tranche 5	Last Change
Huntly unit 2	80MW @ \$0.01	60MW @ \$19200.02	30MW @ \$19500.02	38MW @ \$19600.02	32MW @ \$19870.02	26/03 13:46
Huntly unit 5	225MW @ \$0.01	65MW @ \$19300.05	30MW @ \$19500.05	30MW @ \$19550.05	21MW @ \$19900.05	26/03 13:46
Huntly unit 6	0MW @ \$0.01	0MW @ \$1.06	0MW @ \$200.06	40MW @ \$19950.06	5MW @ \$19990.06	26/03 13:46
Tokaanu	40MW @ \$0.01	100MW @ \$54.06	60MW @ \$65.06	10MW @ \$2000.06	30MW @ \$4000.06	26/03 13:46
Tuai	18.2MW @ \$0.01	11.8MW @ \$2000.07	0MW @ \$2001.07	0MW @ \$4950.07	0MW @ \$4990.07	26/03 13:46
Atiamuri	5MW @ \$0.49	15MW @ \$20250	6MW @ \$20850	6MW @ \$20900	42MW @ \$21000	26/03 13:57
Maraetai	65MW @ \$0.49	10MW @ \$20250	10MW @ \$20850	10MW @ \$20900	116MW @ \$21000	26/03 13:57
Whakamaru	16MW @ \$0.49	5MW @ \$20250	5MW @ \$20850	5MW @ \$20900	44MW @ \$21000	26/03 13:57

Trading period 34/35 – commencing 4:30 p.m.

Trading Period 34	Tranche 1	Tranche 2	Tranche 3	Tranche 4	Tranche 5	Last Change
Huntly unit 2	80MW @ \$0.01	60MW @ \$18900.02	30MW @ \$19100.02	38MW @ \$19300.02	32MW @ \$19870.02	26/03 14:31
Huntly unit 5	225MW @ \$0.01	65MW @ \$1900.05	30MW @ \$19100.05	30MW @ \$19200.05	21MW @ \$19250.05	26/03 14:28
Huntly unit 6	0MW @ \$0.01	0MW @ \$1.06	0MW @ \$200.06	40MW @ \$19950.06	5MW @ \$19990.06	26/03 13:46
Tokaanu	80MW @ \$0.01	80MW @ \$54.06	60MW @ \$65.06	10MW @ \$2000.06	10MW @ \$4000.06	26/03 14:25
Tuai	18.2MW @ \$0.01	11.8MW @ \$2000.07	0MW @ \$2001.07	0MW @ \$4950.07	0MW @ \$4990.07	26/03 13:46
Atiamuri	14MW @ \$0.49	11MW @ \$19000	6MW @ \$20850	4MW @ \$20900	39MW @ \$21000	26/03 14:17
Maraetai	45MW @ \$0.49	26MW @ \$19000	10MW @ \$20850	15MW @ \$20900	115MW @ \$21000	26/03 14:17
Whakamaru	16MW @ \$0.49	5MW @ \$19000	5MW @ \$20850	5MW @ \$20900	44MW @ \$21000	26/03 14:17

Genesis introduce a drop in Huntly unit 2 and unit 5 prices, particularly at unit 5 offering 65MW at \$1900.05/MWh rather than \$19,300.05/MWh. MRP enter \$19,000/MWh prices.

Trading Period 35	Tranche 1	Tranche 2	Tranche 3	Tranche 4	Tranche 5	Last Change
Huntly unit 2	80MW @ \$0.01	60MW @ \$18900.02	30MW @ \$19100.02	38MW @ \$19300.02	32MW @ \$19870.02	26/03 14:51
Huntly unit 5	225MW @ \$0.01	65MW @ \$19000.05	30MW @ \$19100.05	30MW @ \$19200.05	21MW @ \$19250.05	26/03 14:51
Huntly unit 6	0MW @ \$0.01	0MW @ \$1.06	0MW @ \$200.06	40MW @ \$19950.06	5MW @ \$19990.06	26/03 14:31
Tokaanu	80MW @ \$0.01	80MW @ \$54.06	70MW @ \$65.06	10MW @ \$2000.06	0MW @ \$4000.06	26/03 14:31
Tuai	18.2MW @ \$0.01	11.8MW @ \$2000.07	0MW @ \$2001.07	0MW @ \$4950.07	0MW @ \$4990.07	26/03 14:31
Atiamuri	12MW @ \$0.49	15MW @ \$900	4MW @ \$1400	5MW @ \$1500	38MW @ \$2000	26/03 14:48
Maraetai	35MW @ \$0.49	37MW @ \$900	11MW @ \$1400	15MW @ \$1500	113MW @ \$2000	26/03 14:48
Whakamaru	16MW @ \$0.49	5MW @ \$900	5MW @ \$1400	5MW @ \$1500	44MW @ \$2000	26/03 14:48

MRP drop their prices to \$2,000/MWh and below.

Both Genesis and MRP appear to be monitoring prices and offers very closely as there is a consistent placement of offers shortly before the 2-hour close-off across the previous trading periods.

Trading period 38-40 – commencing 6:30 p.m.

Trading Period 39	Tranche 1	Tranche 2	Tranche 3	Tranche 4	Tranche 5	Last Change
Huntly unit 2	110MW @ \$0.01	30MW @ \$10.02	30MW @ \$19500.02	38MW @ \$19600.02	32MW @ \$19870.02	26/03 16:59
Huntly unit 5	250MW @ \$0.01	40MW @ \$5.05	30MW @ \$10	30MW @ \$54.05	24MW @ \$65.05	26/03 16:59
Huntly unit 6	0MW @ \$0.01	0MW @ \$1.06	0MW @ \$200.06	40MW @ \$19950.06	5MW @ \$19990.06	26/03 16:59
Tokaanu	40MW @ \$0.01	70MW @ \$4000.06	50MW @ \$8000.06	40MW @ \$8500.06	40MW @ \$9000.06	26/03 16:59
Tuai	18.2MW @ \$0.01	11.8MW @ \$4.07	0MW @ \$5.07	0MW @ \$4950.07	0MW @ \$4990.07	26/03 16:59
Atiamuri	26MW @ \$0.49	9MW @ \$1500	17MW @ \$13000	6MW @ \$16000	16MW @ \$18000	26/03 16:46
Maraetai	65MW @ \$0.49	27MW @ \$1500	24MW @ \$13000	36MW @ \$16000	59MW @ \$18000	26/03 16:46
Whakamaru	15MW @ \$0.49	5MW @ \$1500	5MW @ \$13000	5MW @ \$16000	45MW @ \$18000	26/03 16:46

MRP make several changes to their offers for this period. Genesis drop Huntly unit 5 prices to levels typical for the earlier portion of the day, \$65/MWh or less.

Trading period 42 – commencing 10:30 p.m.

Trading Period 42	Tranche 1	Tranche 2	Tranche 3	Tranche 4	Tranche 5	Last Change
Huntly unit 2	110MW @ \$0.01	30MW @ \$10.02	30MW @ \$54.02	38MW @ \$4980.02	32MW @ \$4990.02	26/03 18:29
Huntly unit 5	250MW @ \$0.01	40MW @ \$5.05	30MW @ \$10.05	30MW @ \$15.05	25MW @ \$65.05	26/03 18:29
Huntly unit 6	0MW @ \$0.01	0MW @ \$1.06	0MW @ \$200.06	40MW @ \$4950.06	5MW @ \$4990.06	26/03 18:14
Tokaanu	40MW @ \$80.06	40MW @ \$85.06	30MW @ \$110.06	70MW @ \$4980.06	60MW @ \$4990.06	26/03 18:14
Tuai	18.2MW @ \$0.01	11.8MW @ \$4.07	0MW @ \$5.07	0MW @ \$4950.07	0MW @ \$4990.07	26/03 18:14
Atiamuri	22MW @ \$0.49	8MW @ \$42	4MW @ \$150	9MW @ \$1500	31MW @ \$2000	26/03 18:27
Maraetai	61MW @ \$0.49	18MW @ \$42	15MW @ \$150	5MW @ \$1500	112MW @ \$2000	26/03 18:27
Whakamaru	35MW @ \$0.49	13MW @ \$42	7MW @ \$150	6MW @ \$1500	14MW @ \$2000	26/03 18:27

Prices return to “normal” with smaller adjustments across the remainder of the day.

March 26th – Overall

Without the additional information relating to transmission constraints present on Saturday March 26th, the offers place by Genesis would otherwise be inexplicable. There would be no apparent motivation to diverge from the offer strategy they had employed during the previous months, nor would there have been such a large reaction from other market participants, notably MRP. This is inferred from the continuous and large revision of offers close to real time.

Knowing that a transmission constraint did exist on this day, a continuation of Genesis’s offering strategy might have seen prices approaching \$5,000/MWh for some regions of the North Island. The changes to Tuai hydro, nominally south of the constraint, is likely to have contributed to the high prices for the southern part of the North Island. Similarly, the “weak” points in the transmission system between the 220kV and 110kV systems appears to have placed other participants at a disadvantage (particularly MRP), especially as Genesis had flexibility of output on both sides of the potential constraint.

The likely interpretation, based on the available data, is that there was an active change to offer behaviour to take advantage of a short-term opportunity.

That a similar offer strategy was not adopted by Genesis for April 2nd, with another planned transmission outage, is also indicative that the prices on 26 March were manipulated. That is, while some of Genesis’s prices appear similar, a substantial block of capacity was available at very low prices and the substance of their strategy is materially different.