Increased South Island reserve offer prices - May 2012

Market performance review

29 May 2012

Investigation stages

An in-depth investigation will typically be the final step of a sequence of escalating investigation stages. The investigations are targeted at gathering sufficient information to decide whether a Code amendment or market facilitation measure should be considered.

Market Performance Enquiry (Stage I): At the first stage, routine monitoring results in the identification of circumstances that require follow-up. This stage may entail the design of low-cost ad hoc analysis, using existing data and resources, to better characterise and understand what has been observed. The Authority would not usually announce it is carrying out this work.

This stage may result in no further action being taken if the enquiry is unlikely to have any implications for the competitive, reliable and efficient operation of the electricity industry. In this case, the Authority publishes its enquiry only if the matter is likely to be of interest to industry participants.

Market Performance Review (Stage II): A second stage of investigation occurs if there is insufficient information available to understand the issue and it could be significant for the competitive, reliable or efficient operation of the electricity industry. Relatively informal requests for information are made to relevant service providers and industry participants. There is typically a period of iterative information-gathering and analysis. The Authority would usually publish the results of these reviews but would not announce it is undertaking this work unless a high level of stakeholder or media interest was evident.

Market Performance Formal Investigation (Stage III): The Authority may exercise statutory information-gathering powers under section 46 of the Act to acquire the information it needs to fully investigate an issue. The Authority would generally announce early in the process that it is undertaking the investigation and indicate when it expects to complete the work. Draft reports will go to the Board of the Authority for publication approval.

The outcome of any of the three stages of investigation can be either a recommendation for a Code amendment, provision of information to a Code amendment process already underway, a brief report provided to industry as a market facilitation measure, or no further action.

From the point of view of participants, repeated information requests are generally concerned with Stage II; trying to understand the issue to such an extent that a decision can be made about materiality.

Contents

Executive summary 1

1 Introduction 3

2 Significant SI energy and IR price increases in May 2012 6

3 Offer rights arrangement increases ability to affect market prices 10

4 Market impact of increased IR offer prices in May 2012 17
Spot market 17
Futures market 20
FTR market 22

5 Increased SI IR prices had minimal impact on SI storage 22

6 Increased offer prices for the smelter's IL did not increase SI over-frequency risk 24

7 Potential provisions to address the observed issues 25

Appendix A Response letter from Meridian 27

Glossary of abbreviations and terms 29

Figures

Figure 1 Fast and sustained instantaneous reserves offered in the South Island 3
Figure 2 Daily average wholesale electricity spot price (January 2012 – May 2012) 4
Figure 3 Electricity futures price on ASX (January 2012 – May 2012) 5
Figure 4 Daily average wholesale spot energy and SI IR prices (May 2012) 6
Figure 5 Comparison of SI FIR requirement and SI FIR price (May 2012) 7
Figure 6 Offered FIR and SIR in the SI (May 2012) 8
Figure 7 SI FIR offers by company (9 to 24 May 2012) 9
Figure 8 SI SIR offers by company (9 to 24 May 2012) 10
Figure 9 Average monthly SI offered FIR and SIR by participant (2012) 11
Figure 10 Daily average HHI for offered IR in the NI and SI (Jan – May 2012) 12
Figure 11 Distribution of pivotal quantities under different scenarios (May 2012) 14
Figure 12 Distribution of estimated net pivotal quantities under different scenarios (May 2012) 15
Figure 13 Price impact of IR only pivotal analysis (May 2012) 16
Figure 14 Impact of reduced smelter IL offer prices on energy prices (9 to 24 March 2012) 18
Figure 15 Impact of reduced smelter IL offer prices on averaged SI IR prices (9 to 24 May 2012) 19
Figure 16 Electricity spot and futures price difference between Benmore and Otahuhu 20
Figure 17 Estimated impact on Benmore-Otahuhu futures price difference 21
Figure 18 Simulated impact of increased SI IR price on HVDC south imports 23
Figure 19 Proportion of different dispatch instructions for smelter's IL (May 2012) 24

Executive summary

The South Island (SI) experienced record low hydro inflows over the period from November 2011 to May 2012. The increased value of water in the SI resulted in higher spot and futures market prices in the SI during the first half of 2012. The higher prices resulted in increased North Island (NI) generation and south transfer across the HVDC, reducing SI generation and conserving SI storage.

Early in 2012, the lack of instantaneous reserves (IR) in the SI was impeding additional HVDC south transfer[1] which increased the reliance on SI hydro resources. The market response was an increase in instantaneous reserves offered into the SI, which included the entry of interruptible load at the aluminium smelter, located at Tiwai point, into the SI reserves market.

On 9 May 2012 the price for 70% of fast instantaneous reserves on offer in the SI was increased from less than $1/MW earlier in the day to over $150/MW. This increased the cost of covering the HVDC contingent event risk, leading to higher SI energy and IR prices and increased locational price differences between the SI and NI.

The observed increases in IR offer prices continued from 9 May 2012 to 24 May 2012 and came primarily from Meridian Energy Limited (Meridian) in regard to its SI generation and from the interruptible load offered at the Tiwai aluminium smelter. The offer prices for these sources of IR were highly correlated and the Electricity Authority (Authority) now understands that this correlation was due to Meridian's acquisition of the offer rights for the interruptible load at the Tiwai aluminium smelter as part of an agreement to bring that interruptible load to market.

Meridian has indicated to the Authority that the higher offer prices for IR were due to an adopted strategy, with no significant effect on the SI storage situation. The Authority has analysed the situation and has confirmed that the higher IR offer prices had minimal impact on overall SI hydro generation, with the greater impact being on spot and electricity futures prices.

The Authority has also analysed the impact of the IR offer rights arrangement between Meridian and the Tiwai aluminium smelter on market prices during the period from 9 May 2012 to 24 May 2012. Over the 16 day period from 9 May 2012 to 24 May 2012, it is estimated that there would have been a 13% reduction in SI energy prices and a 14% increase in NI energy prices had the interruptible load at Tiwai been offered at its low price. Correspondingly, the locational price difference between the SI and NI would have been 41% lower. These price impacts and the associated impact on scheduled resources would have reduced revenue for SI generators and increased revenue for NI generators with corresponding reduced costs on the spot market for SI loads and increased costs for NI loads. The net impact would have been a $1.3m reduction in the settlement surplus.

Using pivotal supplier analysis the Authority has determined that Meridian had the ability, with its own IR resources, to increase SI energy prices (and the locational price difference between the SI and the NI) during May 2012. The pivotal supplier analysis further shows that Meridian's ability to increase SI energy prices was enhanced by its acquisition of the offer rights for interruptible load at the Tiwai aluminium smelter. The acquisition of these offer rights potentially made Meridian net pivotal in the SI during May 2012 if its IR offers were used in conjunction with its energy offers. This enhanced ability to affect the market price poses an increased risk to other participants, and is therefore a potential impediment to further competition in the SI retail and hedge markets.

[1] Instantaneous reserves are needed to cater for the risk of the HVDC tripping. Greater amounts of instantaneous reserves are needed to support increased HVDC flow into the island.

The Authority has had discussions about potential regulatory boundary issues with the Commerce Commission.

This review recommends the Authority consider incorporating provisions into the Electricity Industry Participation Code (Code) to restrict the transfer of offer rights between market participants, since such transfers can reduce competition and efficiency in the electricity market. In developing these provisions the Authority would need to consider the potential efficiencies of arrangements where a participant acts as an offering agent for another party, in reducing transaction costs and barriers to entry, thus improving market access (particularly for non-participants).

In the course of this market performance review the Authority has also noticed the lack of visibility of reserve hedge contracts. Energy hedge contracts are currently disclosed on the Energy Hedge Disclosure system[2], however this does not include reserve contracts. This report proposes the inclusion of reserve contract information as part of the hedge disclosure regime to remove information asymmetries and facilitate greater competition in the hedge market.

The Authority considers that the potential for increased price separation across the HVDC would reduce with the introduction of pole 3 on the HVDC and the restoration of HVDC bipole operation during north and south transfers. This bipole configuration reduces the IR requirements to cover HVDC contingent event risks. The inter-island price separation across the HVDC, although less likely, could arise during HVDC pole outages or due to HVDC extended[3] contingent event risks.

The Authority has undertaken another market performance review that examined temporarily high prices at Tekapo A and Cobb [4]. The Authority recently announced its work programme for the year ending June 2013, which includes a high priority project examining options to achieve more efficient pricing during pivotal situations. The analysis in this review and the review of the Tekapo and Cobb situations will feed into that project.

2 See http://www.electricitycontract.co.nz/

3 This is the risk of both HVDC poles tripping. Dispatched IR and automatic under-frequency load shedding (AUFLS) can be used in combination to cater for such events.

4 See http://www.ea.govt.nz/industry/monitoring/enquiries-reviews-investigations/2012/

1 Introduction

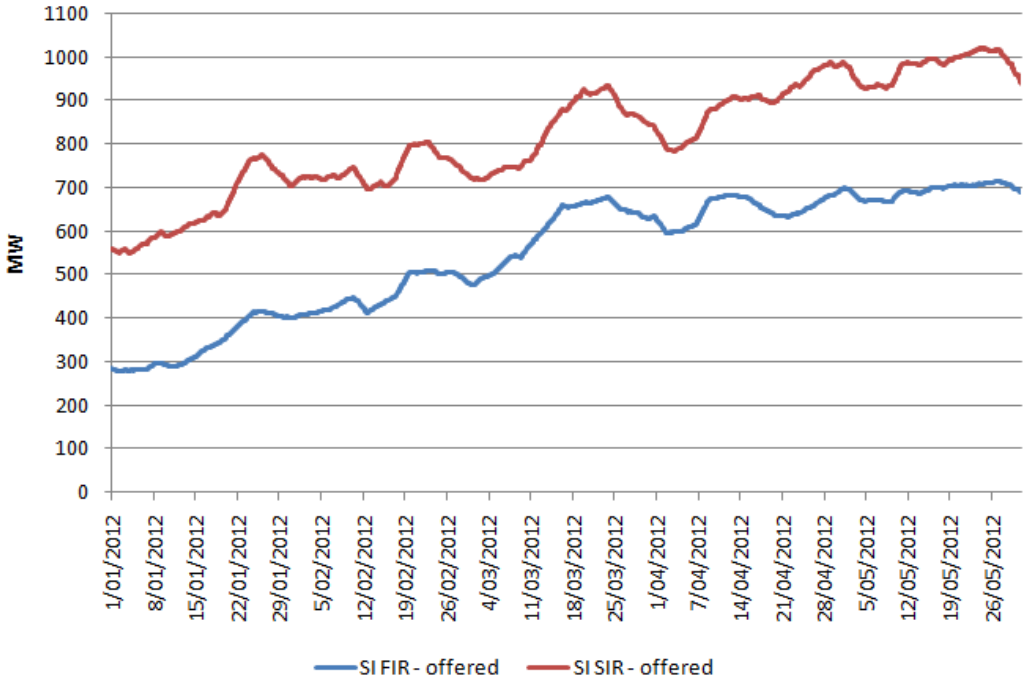
1.1 The low SI hydro inflows in 2012 have been widely signalled within the industry since early in the year, with regular teleconferences to discuss and alleviate any unnecessary restrictions to the conservation of SI hydro storage. One significant restriction noted early on was the unavailability of sufficient fast instantaneous reserves (FIR) in the SI to cater for the risk of an HVDC contingent event (CE).

1.2 The restriction on SI FIR was acting as an impediment to full utilisation of the HVDC link to transfer energy from the NI, resulting in increased use of SI generation.

1.3 During periods of high HVDC south flow, increased amounts of instantaneous reserves (IR) and in particular FIR is needed in the SI to cater for an HVDC CE[5]. In January and February 2012, the system operator constrained the flow on the HVDC link due to the lack of sufficient FIR in the SI.

1.4 Additional FIR and sustained instantaneous reserves (SIR) was offered in the SI to enable greater levels of HVDC south transfer, as illustrated in Figure 1. Along with increases in IR provided by SI generators, this increase includes additional IR offered for the interruptible load (IL) at the aluminium smelter located at Tiwai point.

Figure 1 Fast and sustained instantaneous reserves offered in the South Island



Source: Electricity Authority

[5] This is due to the lack of a bipole arrangement for south transfer on the HVDC link, and lower system inertia in the SI compared to the NI. Therefore, for a given level of HVDC flow into the island, the contingent event risk of an HVDC trip results in a faster decline in SI frequency, relative to a similar event in the NI. Additional FIR is needed in the SI to counter this rapid frequency decline. The HVDC bipole arrangement provides some self-cover where some of the flow on the bipole is transferred onto the remaining in-service branch for a contingency on the other branch. A bipole arrangement on the HVDC currently exists for northward flow, when Pole 1 is in service, but is unavailable for southward flow.

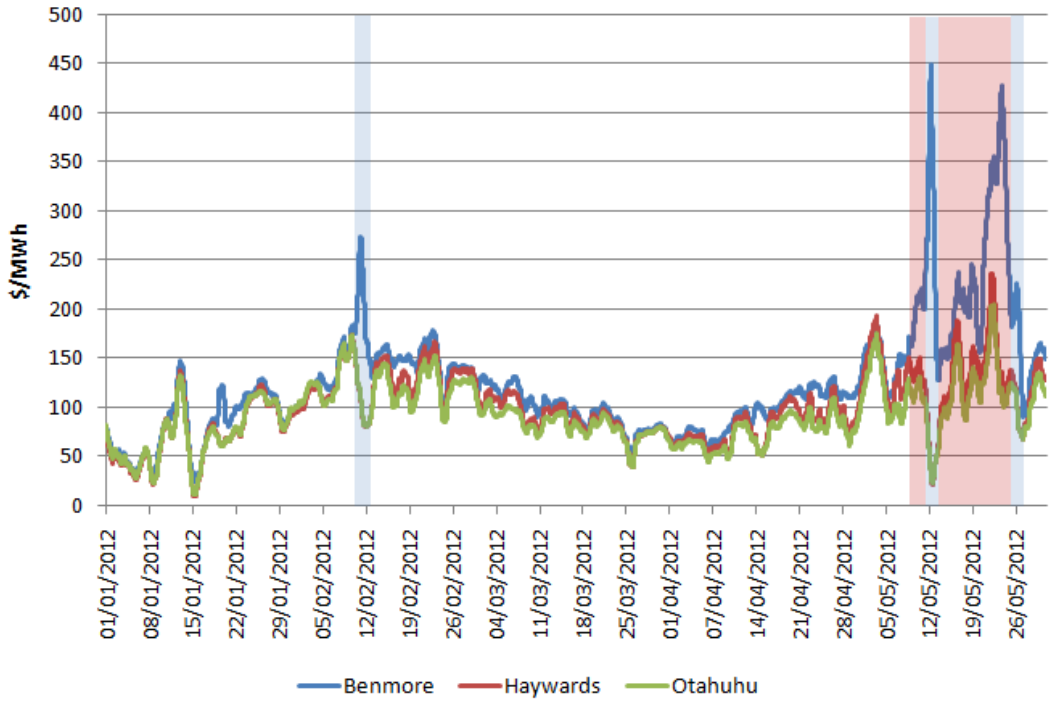
1.5 The aluminium smelter's IL was offered as IR under an agreement with Meridian (IL agreement). The Authority understands from Meridian that as part of this agreement, Meridian agreed to pay the smelter a weekly standing fee to acquire the right to offer in the IL at a price determined by Meridian.

1.6 The increased value of water in the SI during this year is reflected in the increased spot price at Benmore, relative to Haywards in the NI, as illustrated in Figure 2. The increase in the Benmore spot price results in greater thermal generation and consequently south flow on the HVDC. The result is a reduction in the use of SI hydro resources.

1.7 Planned outages of the HVDC link were the primary cause of the significant deviation between the SI and NI spot prices, as highlighted in blue in Figure 2. During this time, the NI and SI were operating as separate markets.

1.8 The increased separation between the Benmore and Haywards spot prices, highlighted in red in Figure 2, is the subject of the current review and discussed further in section 4.

Figure 2 Daily average wholesale electricity spot price (January 2012 – May 2012)

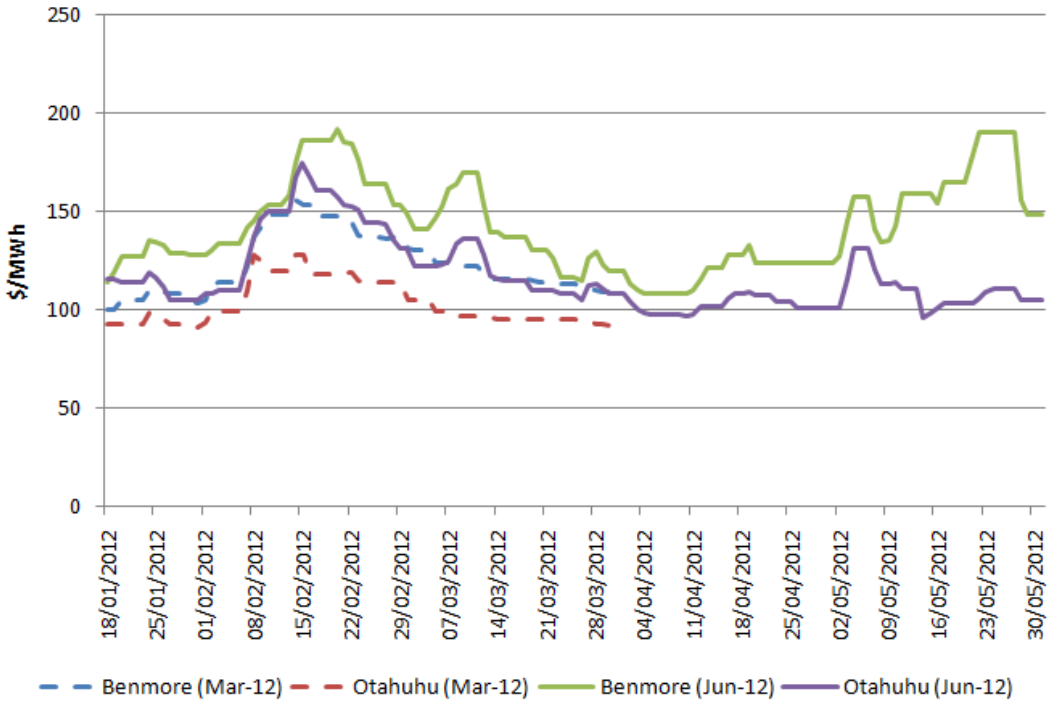


Source: Electricity Authority

1.9 The increase in price of electricity in the SI relative to the NI is also reflected in the electricity futures prices at Benmore and Otahuhu. Figure 3 illustrates the electricity futures price at Benmore and Otahuhu for the March 2012 and June 2012 quarters. The risk of increased SI hydro usage in late January and February 2012, due to the lack of sufficient SI reserves to support increased HVDC south transfer, is reflected in higher electricity futures prices at Benmore for the quarters ending March and June 2012.

1.10 On 9 March 2012 the risk of increased SI hydro usage was reduced with the introduction of additional SI IR, including the IL at the aluminium smelter. This reduced risk is reflected in the reduction of the difference between the Benmore and Otahuhu futures prices in March and April 2012. The increased price divergence between Benmore and Otahuhu observed in May 2012 mimics those observed in the spot market during the same period.

Figure 3 Electricity futures price on ASX (January 2012 – May 2012)



Source: Electricity Authority

Notes: 1. Electricity futures prices for quarters ending March 2012 and June 2012 are illustrated

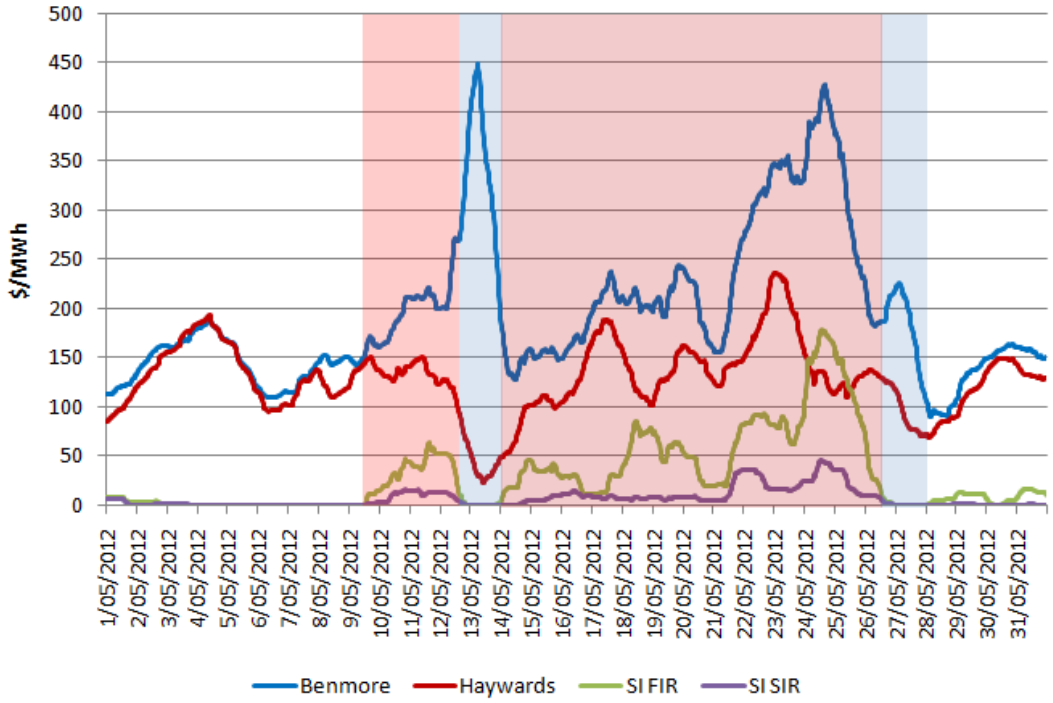
1.11 The Authority's market performance review analyses the issues surrounding the observed increases in the SI IR offer prices and its impact on the spot and futures market as well as potential impacts on SI generation and over-frequency risks. The review also considers Meridian's ability to affect market prices with its acquisition of the offer rights for the IL offered at the aluminium smelter. Finally, the report proposes Code provisions for consideration and facilitation of information disclosure to improve competition and efficiency in the electricity markets.

2 Significant SI energy and IR price increases in May 2012

2.1 Increased price separation between the SI and NI was observed from 9 May 2012, as illustrated in Figure 2 and more clearly in Figure 4; which also illustrates corresponding increases in the SI IR prices. This elevated price separation in May 2012 was driven by two outages on the HVDC link (shaded in blue), constraints on HVDC south flow, and increases in the IR prices which primarily stemmed from increases in the offer prices for IR in the SI (shaded in red).

2.2 The price divergence between the NI and SI during HVDC outages arises due to the separation of the NI and SI energy and IR markets. Market separation also occurs when the HVDC link is constrained. Cheaper NI generation cannot export more than the constraint on the HVDC link, thus requiring more expensive SI generation to service the remaining SI load. Therefore, the cheaper NI generation become the marginal suppliers and therefore price setters in the NI and the more expensive SI generators become the marginal suppliers and price setters in the SI, resulting in large price differences across the HVDC.

Figure 4 Daily average wholesale spot energy and SI IR prices (May 2012)



Source: Electricity Authority

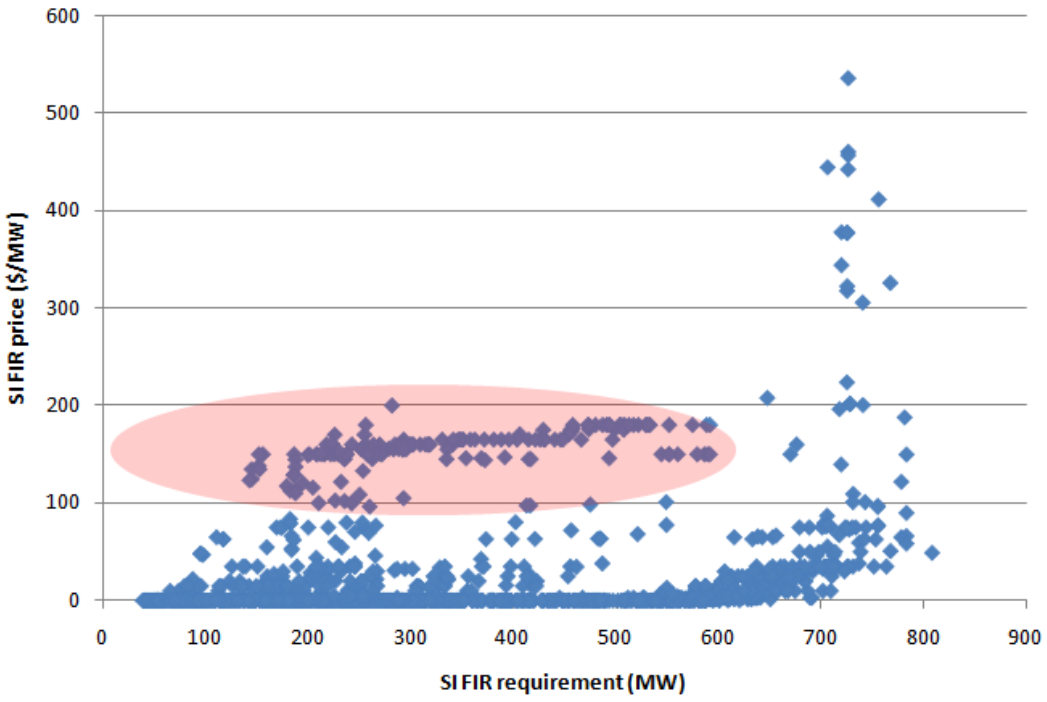
2.3 The IR price can also result in price separation between the NI and SI as it acts as an additional cost on importing energy into the SI. When there are high volumes of unconstrained south flow on the HVDC, as is the case when SI storage is being conserved, the HVDC injection into the SI is usually the largest risk in the island. At this time, the price of energy in the SI[6] is the price of energy in the NI plus the transportation costs across the HVDC (which includes transmission losses and price of IR in the SI to cover the HVDC risk).

2.4 Therefore, when the HVDC is the risk setter, the increased IR price in the SI to cover this risk is reflected in the energy price due to the increased transportation costs on the HVDC.

[6] This is ignoring intra-island losses and transmission constraints.

2.5 During May 2012, the observed increases in the SI IR price were due to increased requirements for IR in the SI to cover higher HVDC south flows, but also due to the "pricing up" of IR in the SI. Figure 5 illustrates the observed relationship between the FIR price and FIR requirement in the SI during May 2012. The expectation is that as the requirement and therefore the supply of FIR increases, so would the FIR price (ceteris paribus). However, a number of instances are noted (shaded in red) where lower amounts of FIR are supplied, relative to other instances during May 2012, but higher SI FIR prices still prevailed. These indicate potential instances when IR was being "priced up" in the SI.

Figure 5 Comparison of SI FIR requirement and SI FIR price (May 2012)

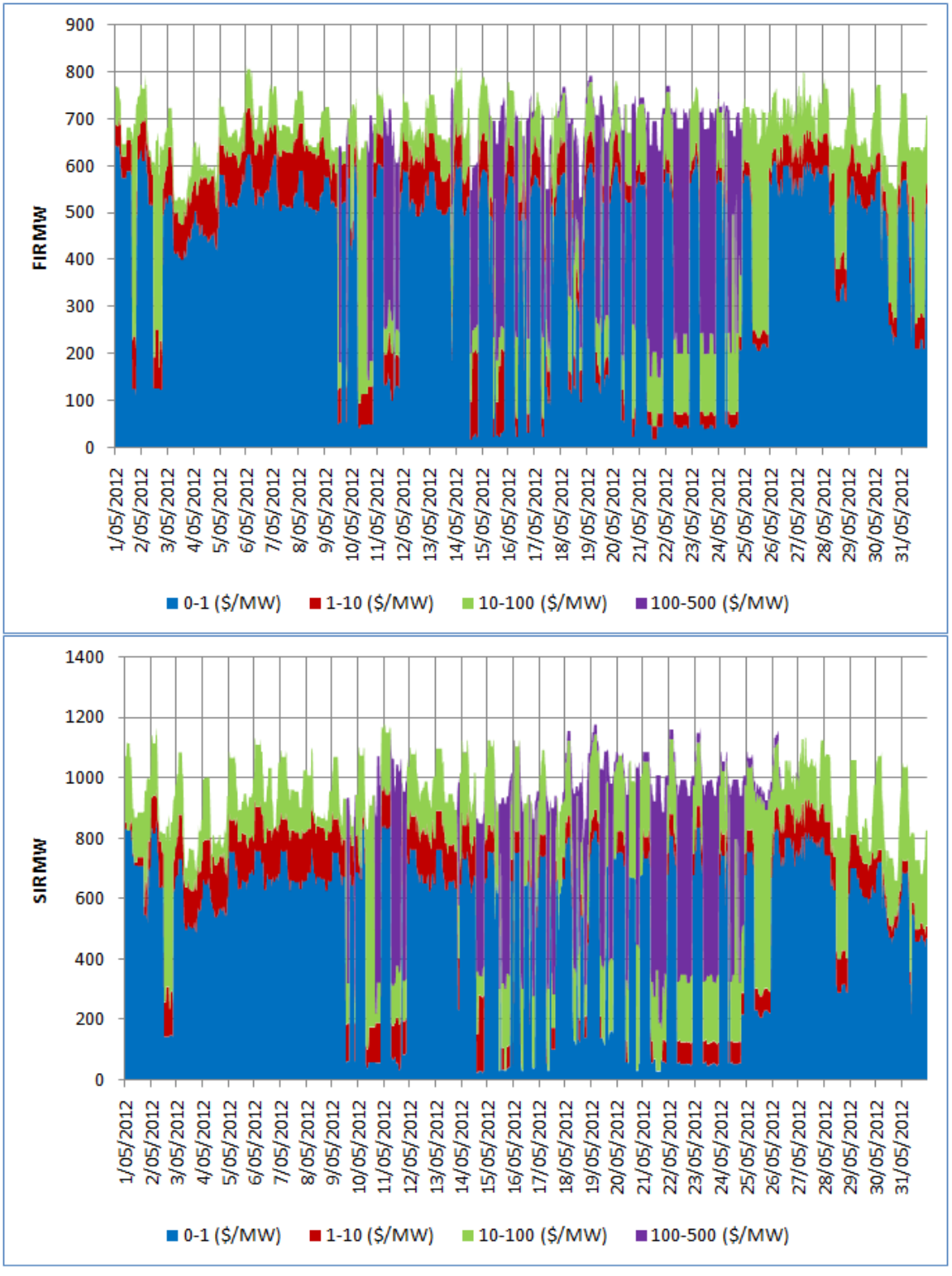


Source: Electricity Authority

2.6 Figure 6 illustrates the offered FIR and SIR in the SI differentiated into price bands and indicates the extent of the SI IR offer price increases. The intermittent "pricing up" of the offered FIR and SIR in the SI is indicated by the prevalence of the purple price band ($100/MW - $500/MW).

2.7 This "pricing up" of IR started on the 9 May 2012 where the price of at least 70% of FIR offered in the SI (459MW) was increased from below $1/MW to over $150/MW for several trading periods in the day. Increases were also observed in the SI SIR offer prices. The intermittent increases in the SI IR offers prices continued up to 24 May 2012.

Figure 6 Offered FIR and SIR in the SI (May 2012)

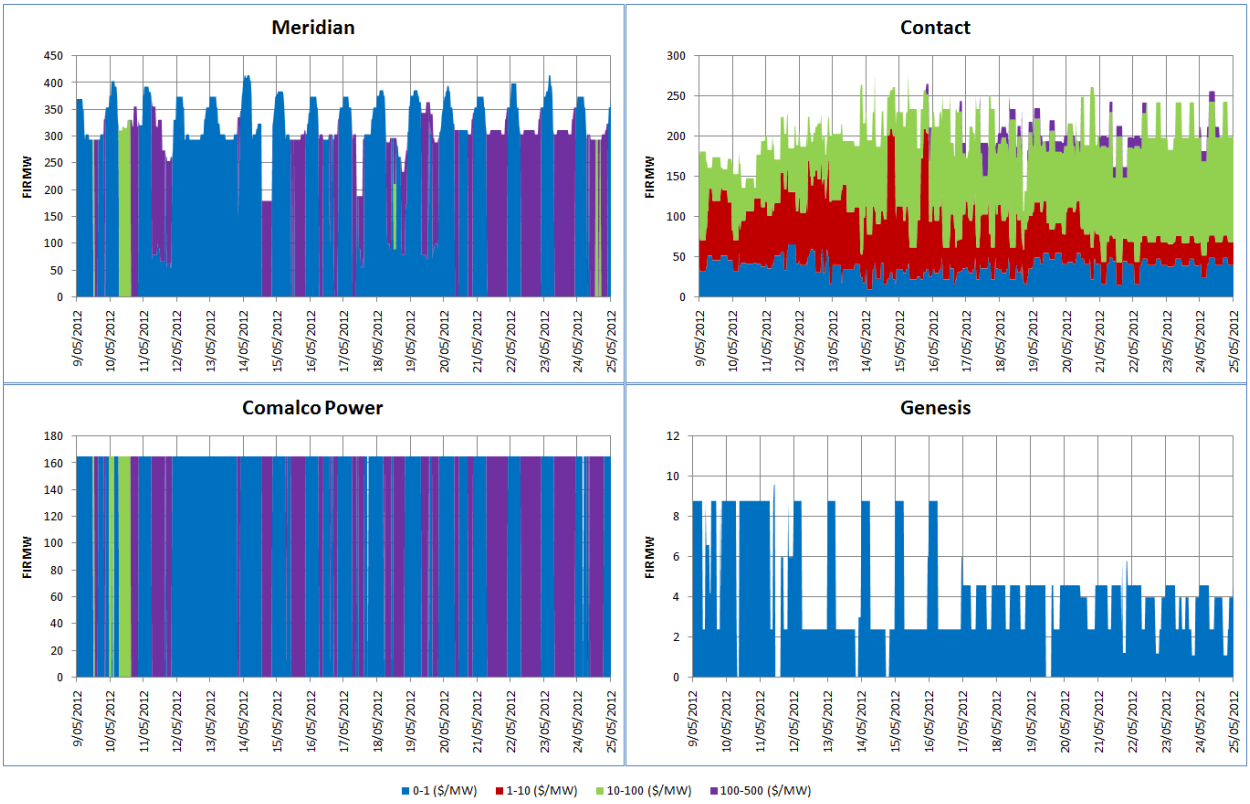


Source: Electricity Authority

2.8 Figure 7 and Figure 8 provide a breakdown of the offered SI FIR and SIR respectively, by participant, from 9 to 24 May 2012. The purple price bands indicate instances when the offered IR was between $100/MW and $500/MW.

2.9 The increased IR offer prices were primarily due to increases in IR offer prices from Meridian SI generation and IL offered at the aluminium smelter (Comalco Power[7]) where the entire IR offered was moved from low-priced bands to higher priced ones for several trading periods during a day. Some increases in offered IR from Contact Energy Limited (Contact) are also noticeable from 15 May 2012.

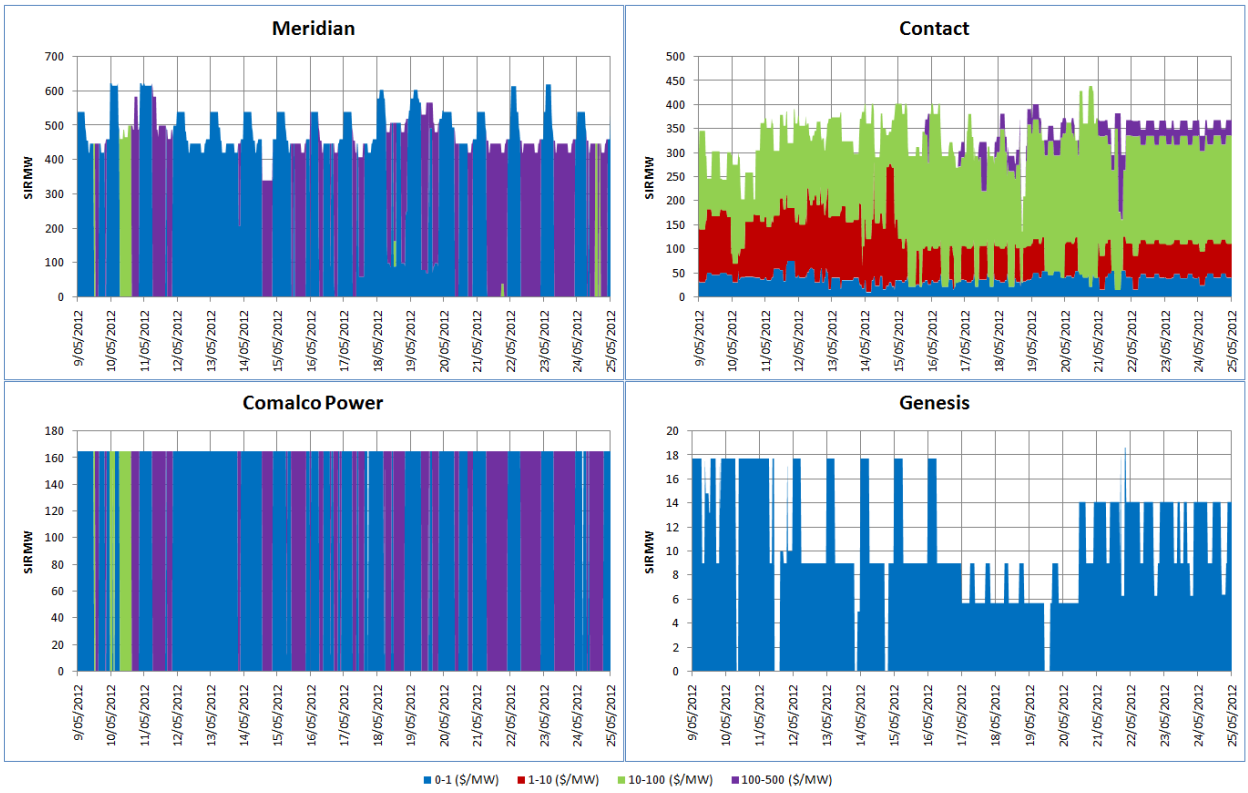
Figure 7 SI FIR offers by company (9 to 24 May 2012)



Source: Electricity Authority

[7] Comalco Power NZ Limited (Comalco Power) is the trader associated with the IL offered at the Tiwai aluminium smelter in the final pricing data.

Figure 8 SI SIR offers by company (9 to 24 May 2012)



Source: Electricity Authority

2.10 The Authority asked Meridian to give its reasons on a voluntary basis for the observed increases in offer prices for their SI IR on 10 and 11 May 2012, and the potential impact on restricting HVDC south flow. Meridian's response was that the increases in its IR offers were part of an adopted trading strategy and that there had been no material physical impact from such strategy on HVDC south flow. A copy of Meridian's response, excluding commercial and confidentially sensitive information, is included in Appendix A.

2.11 There is a high degree of correlation in the IR price increases provided by Meridian and Comalco Power as can be seen in Figure 7 and Figure 8. This high correlation (90% for FIR and SIR over the 16 day period) is due to Meridian procuring the offer rights for the IL at the Tiwai aluminium smelter.

2.12 The following sections analyse the potential impact of the IR offer right arrangement between Meridian and the Tiwai aluminium smelter.

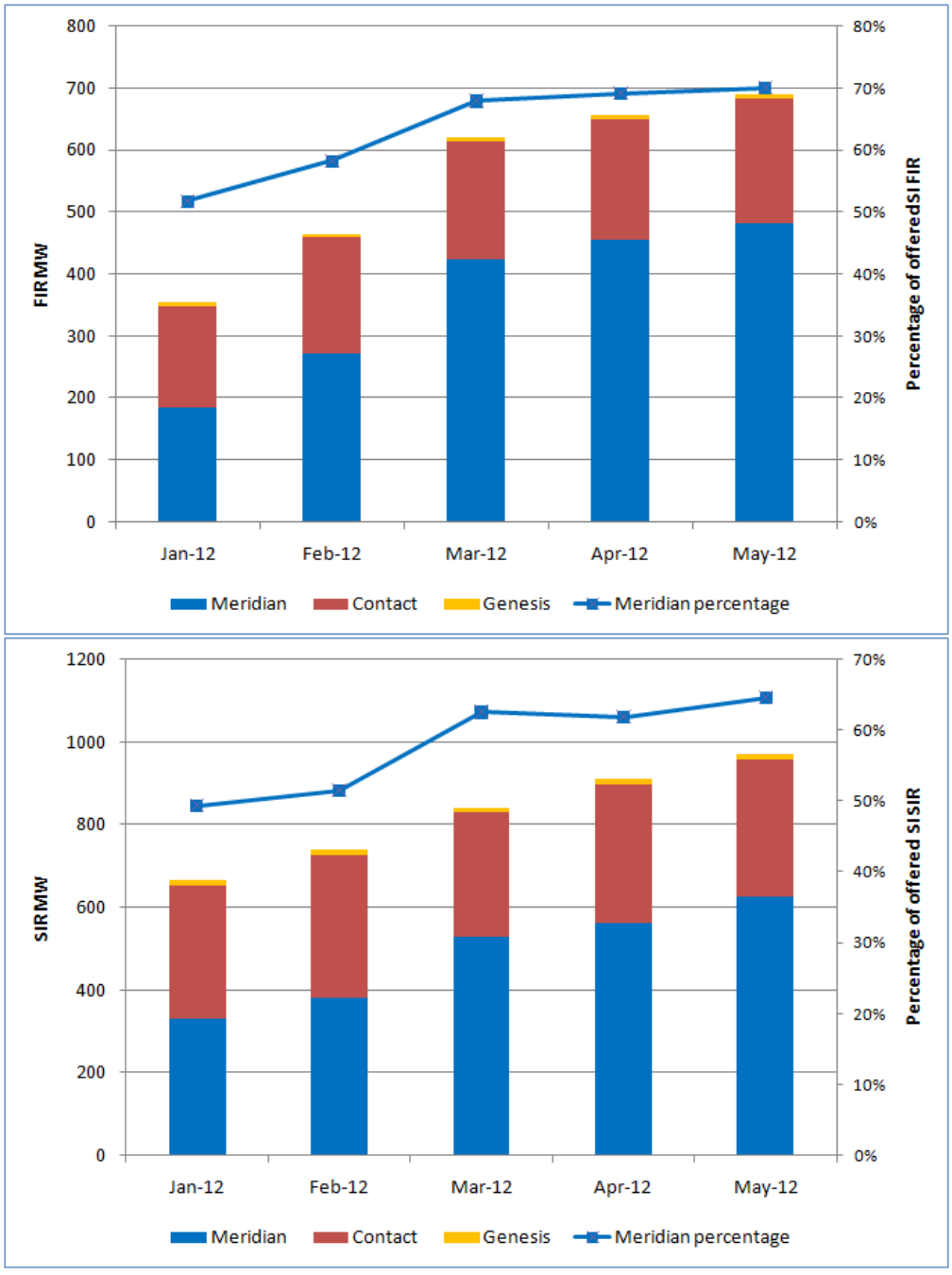
3 Offer rights arrangement increases ability to affect market prices

3.1 The Authority's analysis indicates that the offering of the smelter's 165MW IL by Meridian increased Meridian's proportion of the SI IR resources under their control, and consequently afforded them greater ability to affect the SI IR and energy spot price.

3.2 The increased ability of a generator to affect prices within a region increases the risks to other participants wanting to retail or offer hedge contracts within that region. This increased risk can reduce the potential for competitive pricing in the retail and hedge markets within that region.

3.3 Figure 9 illustrates the proportion of each participant's FIR and SIR resources offered in the SI in 2012. Meridian's proportion of offered FIR in the SI increased from 187MW (52%) in January 2012 to 484MW (70%) in May 2012. Similarly, Meridian's proportion of offered SIR increased from 49% in January 2012 to 65% in May 2012. A large portion of Meridian's increase of both FIR and SIR resources occurred in March 2012. At this time, the 165MW IL at the Tiwai aluminium smelter entered the IR spot market with an arrangement with Meridian to offer the IL into the market.

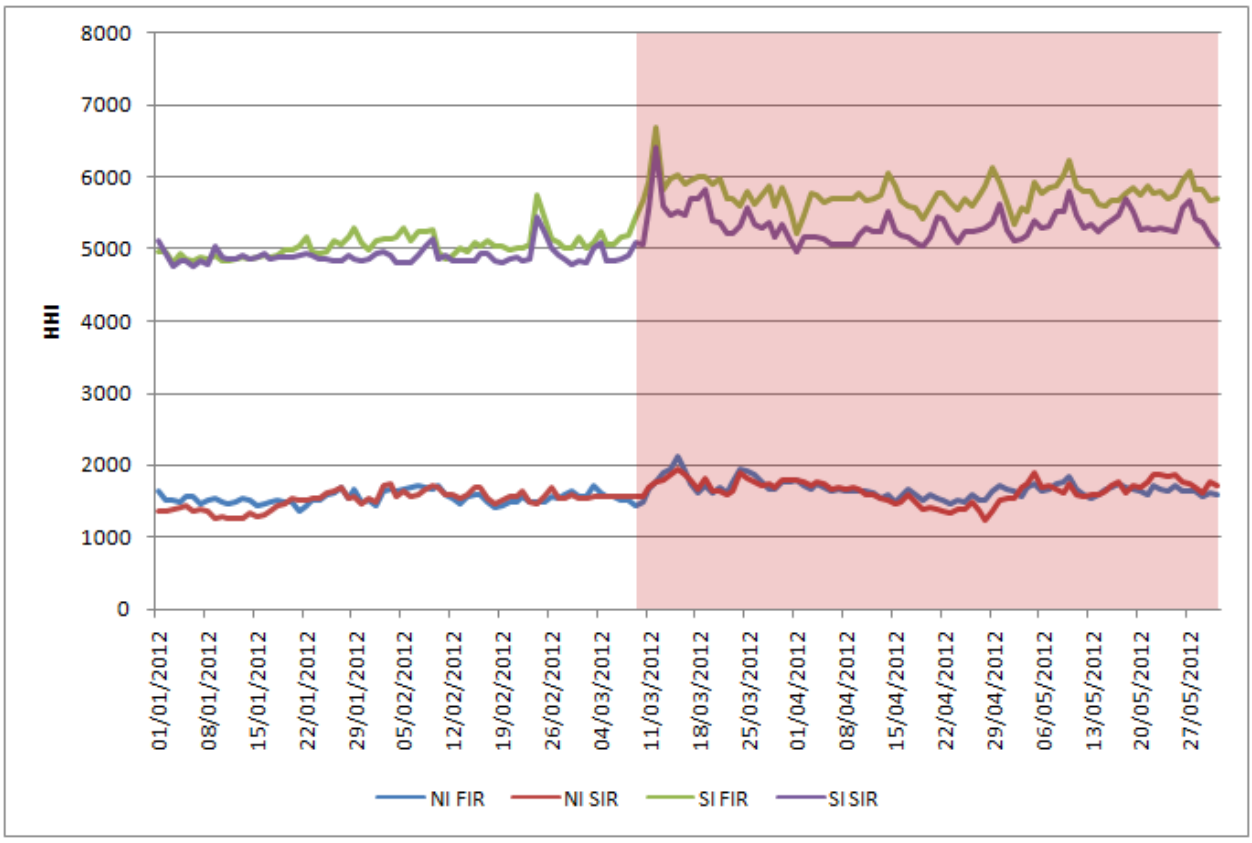
Figure 9 Average monthly SI offered FIR and SIR by participant (2012)



Source: Electricity Authority

3.4 The Herfindahl-Hirschman Index (HHI) is a measure of market concentration which is calculated as the sum of squares of each participant's market share. A monopoly seller has a 100% market share, so the HHI for this market is 10000 (100% x 100%). The lower the HHI, the less concentrated the market structure and consequently the greater the potential for competition. An HHI of around 3500 is considered a reasonably competitive market structure. The HHI for IR offered into the NI and SI markets is illustrated in Figure 10.

Figure 10 Daily average HHI for offered IR in the NI and SI (Jan – May 2012)



Source: Electricity Authority

Notes: 1. Period following the IL agreement is shaded in red.

3.5 From January 2012 to May 2012, the HHI for the NI IR market was generally less than 2000 indicating a reasonably competitive market structure. The HHI for the SI IR market was around 5000 from January 2012 to March 2012 and increased closer to 6000 (for FIR) following the IL agreement from March 2012 to May 2012. The higher HHI in the SI relative to the NI is reflective of the increased concentration of IR resources in the SI relative to the NI and the increase in the SI HHI following the IL agreement is reflective of the further increased concentration of the SI IR resources afforded by this agreement.

3.6 The Authority conducted pivotal analysis to understand the ability, afforded to Meridian through its increased share of the SI IR resources, in increasing the SI prices. This analysis attempted to understand the extent Meridian, during May 2012, was able to *unilaterally* set the price in the SI and whether the extent of such ability increased with its offer rights arrangement with the smelter for it's IL. This unilateral ability to set the price is an extreme measure and therefore provides a lower bound on the expected ability to influence the price.

3.7 The pivotal analysis involved using the Authority's vSPD model with increased offer prices (well above the existing market offers) for Meridian's SI energy and IR and the smelter's IL resources, under different scenarios. The scheduling of these offers at elevated prices provided an indication of the ability to unilaterally set the market price and therefore be pivotal. The pivotal quantity is the amount scheduled from the pivotal resource. The pivotal quantities were adjusted with Meridian's SI purchases from the clearing manager, to estimate when the pivotal ability translated into a potential incentive to increase the price (ie. net pivotal). The incentive to increase the price is enhanced when the generator-retailer (gentailer) is a net seller of electricity to the spot market after accounting for contracted generation.

3.8 The Authority understands that such a strategy, as conducted in the pivotal analysis, might not be followed by a participant however, the Authority considers that such analysis provides an indicator of potential abilities and incentives of participants in affecting the market price, at the margin.

3.9 A $20,000/MWh pivotal price was used for different resources under the following scenarios:

(a) Scenario A: Meridian SI IR offer prices were increased to the pivotal price but the smelter's IL was maintained at its low offer price (no offer rights arrangement);

(b) Scenario B: Meridian SI IR and the smelter's IL offer prices were increased to the pivotal price;

(c) Scenario C: Meridian SI energy offer prices were increased to the pivotal price;

(d) Scenario D: Meridian SI energy and IR offer prices were increased to the pivotal price but the smelter's IL was maintained at its low offer price (no offer rights arrangement);

(e) Scenario E: Meridian SI energy, IR and the smelter's IL offer prices were increased to the pivotal price.

3.10 Scenarios A and B analyse the impact on Meridian's pivotal status using only IR market offers. The remaining scenarios analyse the same impact on Meridian's pivotal ability but using energy offers in addition to the IR offers.

3.11 Figure 11 illustrates the sorted distribution of pivotal quantities under the different pivotal offer scenarios. There was no impact on the pivotal quantities under the two IR-only scenarios. This indicates that using IR resources alone, including the smelter's IL, is unlikely to increase Meridian's pivotal status in the SI. This does not imply that Meridian's ability to increase the price is not affected by the acquisition of the offer rights for the smelter's IL, but rather that it is unlikely to affect Meridian's ability to *unilaterally* increase the price. Such ability to increase the price using IR only is discussed further in 3.15 and Section 4.

3.12 Meridian's offering of the smelter's IL increases its ability to unilaterally increase the SI price when it's IR offers are used in conjunction with it's energy offers.

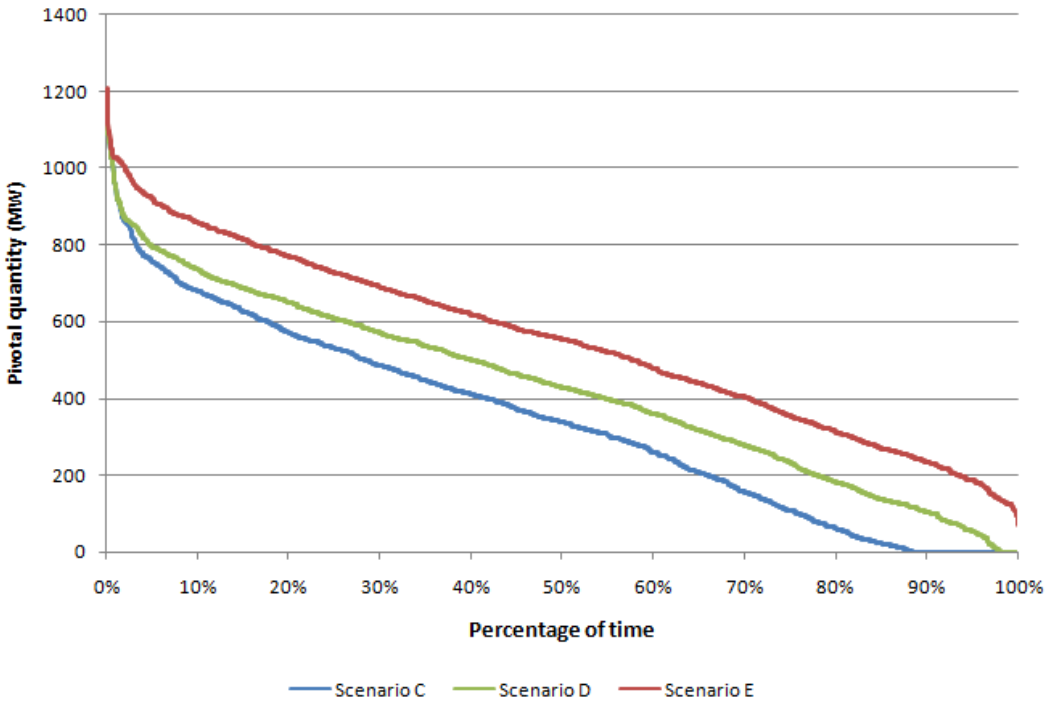
3.13 For half of the trading periods in May 2012:

(a) at least 339MW is required from Meridian SI generation, even with energy offer prices at $20,000/MWh (Scenario C);

(b) at least 429MW (an increase of 27%) is required from Meridian SI generation if Meridian were to also increase the IR offers from its SI generators (Scenario D) and;

(c) At least 555MW is required from Meridian SI generation if Meridian also increased the IR offers from its SI generators with the transfer of the smelter's IL offer rights to Meridian (Scenario E). This represents a 29% increase over Scenario D and a 64% increase over Scenario C.

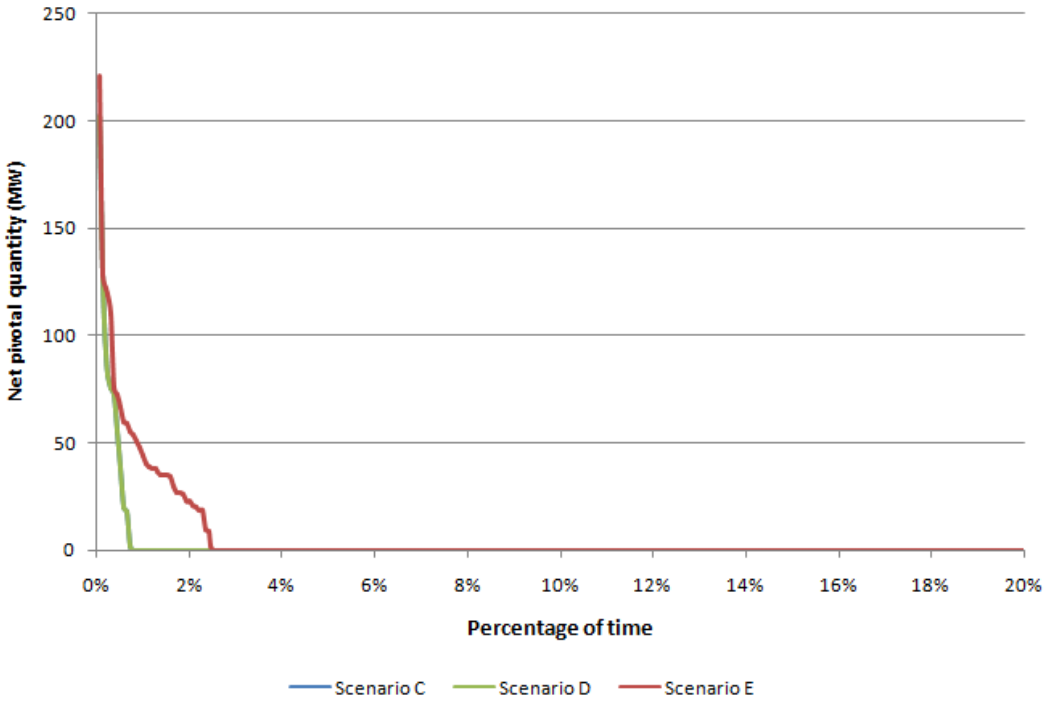
Figure 11 Distribution of pivotal quantities under different scenarios (May 2012)



Source: Electricity Authority

3.14 Figure 12 illustrates the estimated net pivotal quantities calculated using the pivotal quantities from Figure 11 less Meridian's SI purchases from the clearing manager during May 2012. As expected, the extent of Meridian's net pivotal ability is less than its pivotal ability. Relative to the other scenarios, there is an increase in Meridian's estimated net pivotal status with the inclusion of the smelter's IL. Under the two scenarios excluding the use of the smelter's IL by Meridian (Scenarios C and D) the expected net pivotal status is limited to a number of instances where the HVDC was on outage during May 2012 or where Meridian was pivotal nationally. The inclusion of the smelter's IL (Scenario E) extends Meridian's net pivotal ability within the SI both in terms of net pivotal quantity and duration (2.5%) within May 2012.

Figure 12 Distribution of estimated net pivotal quantities under different scenarios (May 2012)

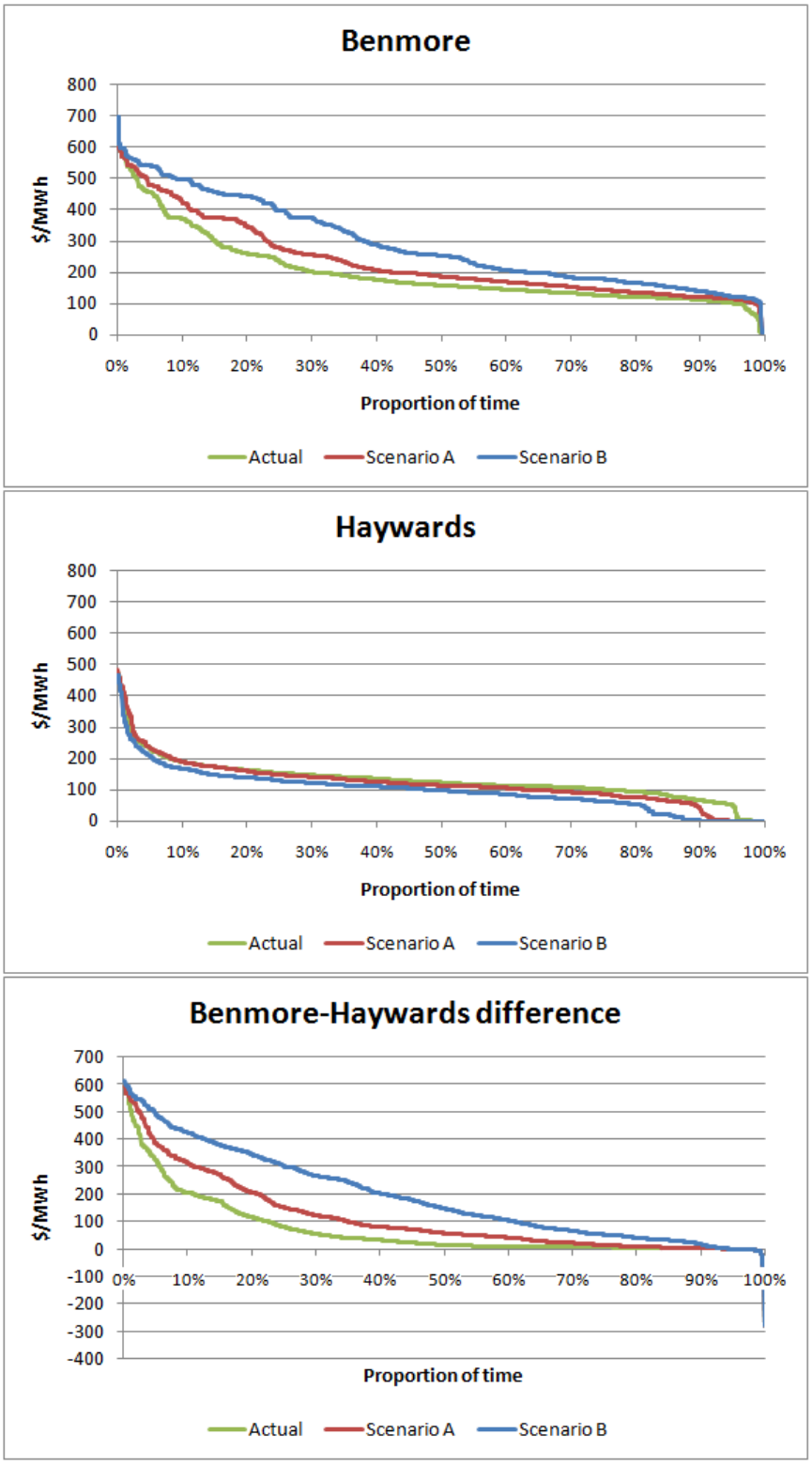


Source: Electricity Authority

Notes: 1. The scale has been reduced to more clearly illustrate the impact.

3.15 While the increase of Meridian's SI IR offer prices does not increase Meridian's pivotal status in the SI, it still does lead to an increase in SI energy prices and SI-NI price differential, as discussed in section 4. Figure 13 illustrates the impact of the IR-only scenarios on the Benmore and Haywards prices, and separation in the Benmore-Haywards energy price, in May 2012. These prices are sorted to illustrate the percentage of time in the analysis the prices were at or above a certain level. This figure illustrates a consistent increase in the Benmore price, reduction in the Haywards price and increase in the Benmore-Haywards price separation when the increase in the offer price of the smelter's IL is made in conjunction with Meridian's SI IR resources (Scenario B) as opposed to when the same increases in the IR offer prices were applied only to the Meridian SI IR resources (Scenario A).

Figure 13 Price impact of IR only pivotal analysis (May 2012)



Source: Electricity Authority

3.16 The above analysis indicates that, with the offer rights for the IL at the smelter, Meridian increased its share of the SI IR resources. While Meridian has the ability to increase the price in the SI using its IR offers alone, the increased share of the SI IR resources further enhances Meridian's impact on the energy and IR prices. Using the IR offers in unison with its SI energy offers increases Meridian's pivotal and net pivotal status in the SI and the acquisition of the offer rights for the smelter's IL further increased Meridian's ability, during May 2012, to *unilaterally* set the SI price with an increased incentive.

3.17 The pivotal and net pivotal indicator is an extreme measure of such an ability to set the price as it relies on a unilateral ability and therefore could be considered a lower bound on the likelihood of influencing the price. There could be instances where a party might not be net pivotal but with other participants also benefiting from high prices, and therefore taking similar actions, increase the likelihood of affecting the prices.

3.18 Meridian's increased ability to affect the SI energy price and SI-NI energy price differential increases the risk to other market participants wanting to retail or offer hedge contracts in the SI. This impediment poses a risk to competition in these markets in the long term.

4 Market impact of increased IR offer prices in May 2012

Spot market

4.1 This section estimates the impact of the increased SI IR prices observed from 9 to 24 May 2012 on the spot and futures electricity market with an estimate of the net impact on market participants. Some potential impacts on the upcoming Financial Transmission Rights (FTR) market are also outlined.

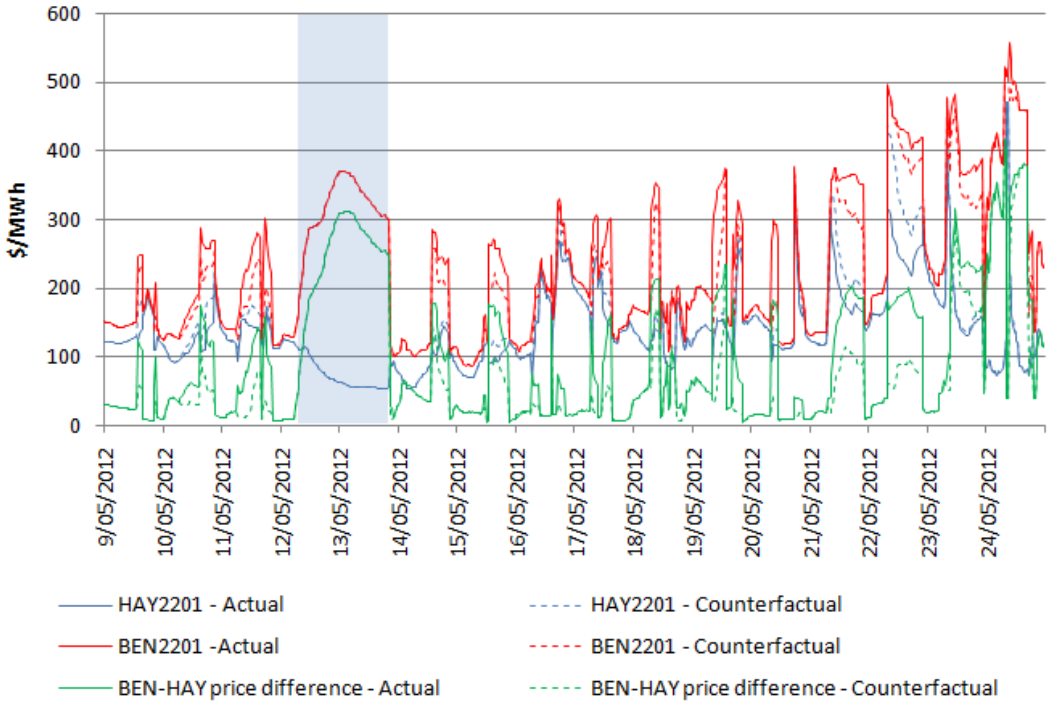
4.2 The Authority analysed the impact of the increased IR offer prices by simulating counterfactual final pricing solutions[8] assuming the smelter's IL was offered, and that the offer price was not increased during the period from 9 to 24 May 2012. This scenario was considered a credible counterfactual as the smelter has an incentive to reduce the spot energy price due to the exposure of its load to the spot energy price, both directly through its load paying spot prices and indirectly through its future contracted load price[9]. Maintaining a low price for its IL is consistent with this incentive for lower energy prices.

[8] This involved using the Authority's vSPD model. Adjustments were made to the vSPD model to account for changes in SI net free reserves (NFRs) for changes in HVDC south imports.

[9] Since 14 April 2012, there has been 50MW of load reduction at the Tiwai aluminium smelter in response to high SI spot prices. A new pricing agreement between the smelter and Meridian takes effect from 1 January 2013. The new agreement has an escalation factor to a base price where one of the determinants of the escalation factor is a multi-year average of the NZ electricity market price. See http://www.meridianenergy.co.nz/assets/PDF/Company/Investors/Reports-and-presentations/Annual-reports/2010/MeridianEnergyAnnualReportforyearending30June2010.pdf.

4.3 Figure 14 illustrates the actual NI and SI energy and SI-NI energy price differential as well as the simulated counterfactual prices. These prices are averaged over those periods defined by the increased SI IR offer prices and illustrate the impact on the prices due to the intermittent increases in the SI IR offer price from 9 to 24 May 2012.

Figure 14 Impact of reduced smelter IL offer prices on energy prices (9 to 24 March 2012)



Source: Electricity Authority

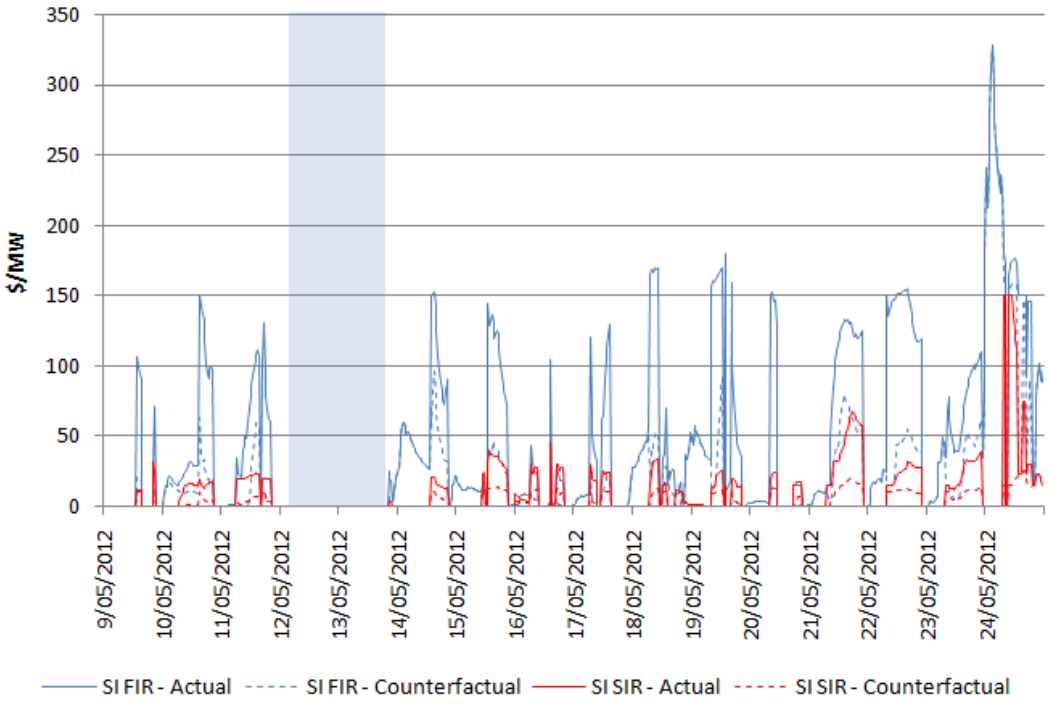
Notes: 1. HAY2201 and BEN2201 represent Haywards and Benmore 220kV nodes respectively.

4.4 Figure 14 illustrates an increase in the NI energy price and a corresponding decrease in the SI energy price in the counterfactual scenario. This is due to the increased HVDC exports from the NI which is now economic with the reduced SI IR costs. The additional HVDC export implies additional NI generation (supply) which in turn results in an increase in the marginal cost of supply in the NI and therefore an increase in the NI price. The reduction in the SI energy price is due a reduction in the use of more expensive SI generation and the reduced cost imposed on south transfer across the HVDC link as a result of the reduced SI IR cost. The combined effect is a significant reduction in the price differential between the SI and NI under the counterfactual scenario (41% reduction in those periods where the SI IR offer price was increased).

4.5 The reduction in the ability of a single participant to affect inter-island price separation reduces the locational price risk of NI generators attempting to serve retail and hedge commitments in the SI.

4.6 Figure 15 illustrates the comparative actual and counterfactual SI IR prices averaged over the periods defined by the intermittent increases in SI IR offer prices. These illustrate the reduction in the smelter's IL offer prices also has a significant impact on SI IR prices. This reduction is directly related to the increased availability of lower cost FIR and SIR resources in the SI.

Figure 15 Impact of reduced smelter IL offer prices on averaged SI IR prices (9 to 24 May 2012)



Source: Electricity Authority

4.7 The counterfactual analysis indicates that, over those periods where the SI IR offers from Meridian and the smelter's IL, were increased from 9 to 24 May 2012, there would be a reduction in SI energy and IR price, an increase in the NI energy price and a reduction in the SI-NI energy price differential. The impact on average prices over these periods are:

(a) 58% reduction in FIR prices and a 68% reduction in SIR prices in the SI due to the increased provision of low cost IR in the SI;

(b) 13% reduction in SI and 14% increase in NI energy prices; and

(c) 41% reduction in the SI-NI energy price differentials.

4.8 The increase in SI IR prices, relative to the counterfactual, resulted in an increase in the IR revenue earned by SI IR providers, estimated at $3m. The additional $3m revenue earned by SI IR providers is allocated as a cost to injections into the SI greater than 60MW. These injections include those by generators owned by Meridian, Contact and Genesis Power Limited (Genesis) as well as the owners of the HVDC (Transpower). Transpower however would ultimately recover their portion of the IR cost via the HVDC charge allocated to SI generators.

4.9 Relative to the counterfactual scenario, the increase in SI energy prices and reduction in NI energy prices, due to the increase in the SI IR offer prices, resulted in:

(a) an increase in spot revenue of $10m (7.5%) to SI generators;

(b) a reduction in spot revenue of $9.5m (5.9%) to NI generators;

(c) an increase in spot payments of $10.5m (6.7%) to SI off-take customers; and

(d) a reduction in spot payments of $8.7m (5.9%) to NI off-take customers.

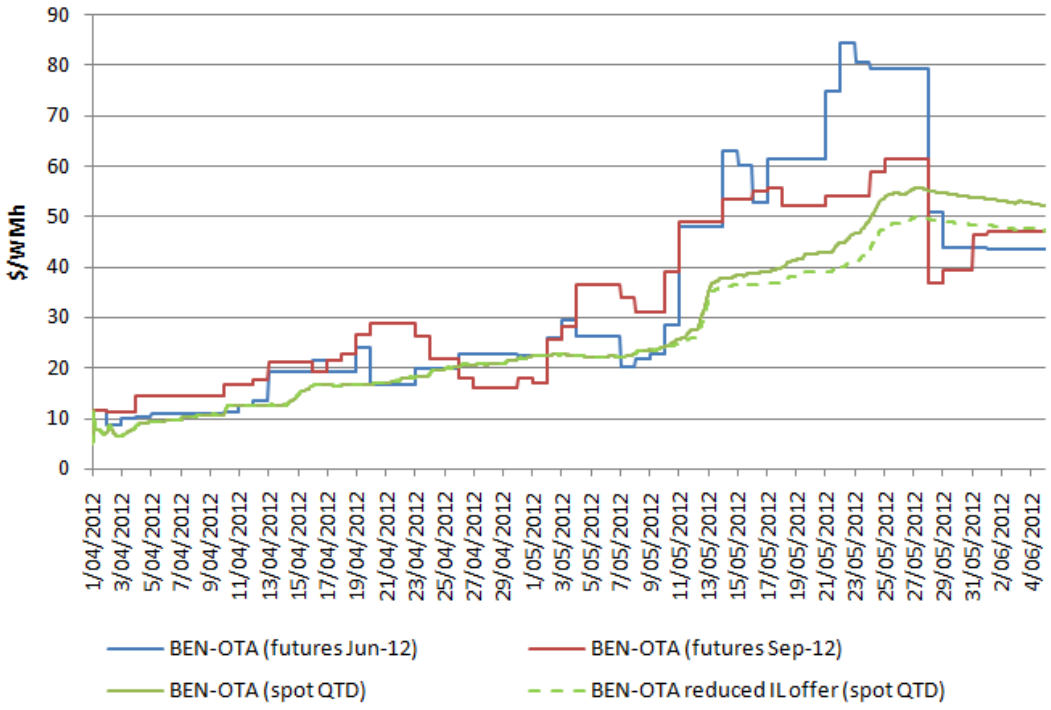
4.10 The counterfactual scenario resulting in lower SI prices and increased NI prices results in a wealth transfer from SI generators and NI loads to NI generators and SI loads. The net effect of this, relative to the counterfactual, is a $1.3m (9%) increase in the settlement surplus (also called the loss and constraint excess (LCE)), over the 16 day period from 9 to 24 May 2012. This net increase in the settlement surplus is passed on to Transpower's connection and interconnection customers, as well as SI generators. The LCE attributed to connection and interconnection transmission assets are allocated to connection and interconnection customers whereas the LCE attributed to the HVDC is allocated to SI generators in proportion to their HVDC transmission charge.

Futures market

4.11 The increased spot price separation between Benmore and Otahuhu, as a consequence of the increased SI IR offer prices during May 2012, also affected the futures market.

4.12 Figure 16 illustrates the average of the spot price difference between Benmore and Otahuhu from 1 April 2012 to 4 June 2012 as well as the difference in the electricity futures prices at these nodes for the June 2012 and September 2012 quarters. These differences indicate the price of energy in the SI relative to the NI in both the spot and futures markets. Figure 16 also illustrates the impact on the average Benmore and Otahuhu spot price difference for the June 2012 quarter, had the smelter's IL been offered at its low price.

Figure 16 Electricity spot and futures price difference between Benmore and Otahuhu



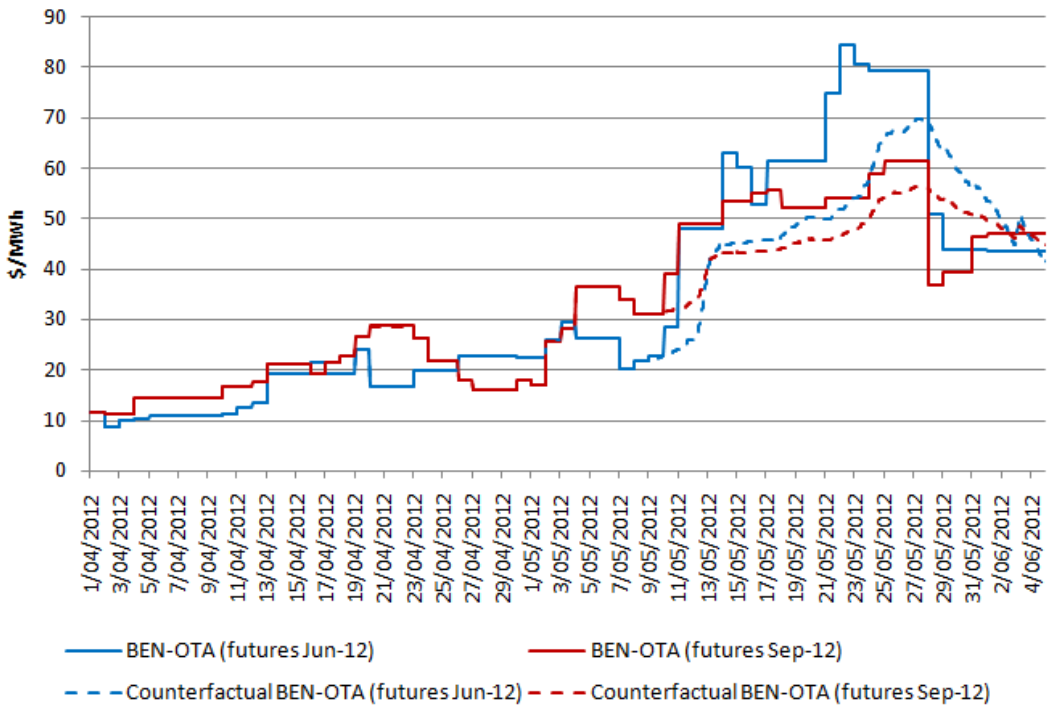
Source: Electricity Authority

4.13 There is a high degree of correlation between the locational price differences on the spot and futures markets for the June 2012 and September 2012 quarters (87% for June 12 and September 12 quarter). At the beginning of May 2012, both the spot market and futures market for the June 12 quarter converged on a price difference between Benmore and Otahuhu of $23/MWh. The increased spot price separation observed after 9 May 2012, in part due to the increased SI IR offer prices, translated into an increase in the price of electricity futures at Benmore relative to Otahuhu. As at 4 June 2012, the difference in electricity futures prices between Benmore and Otahuhu had increased to $44/MWh.

4.14 The increase in the inter-island spot price differences in May 2012 had a flow on effect into the electricity futures prices, increasing the futures prices at Benmore relative to Otahuhu.

4.15 A comparison of the actual and estimated impact on the futures prices due to the reduction in the counterfactual spot prices is illustrated in Figure 17. The ratio of the change in the average spot price to the change in the futures price provides an indication of the sensitivity of futures prices to changes in the spot price. This relationship was used to estimate changes in the futures price based on changes in the spot price, under the counterfactual case. Separate sensitivities were calculated for upward and downward movement of the spot and futures prices.

Figure 17 Estimated impact on Benmore-Otahuhu futures price difference



Source: Electricity Authority

4.16 From 9 May 2012 to 27 May 2012, the Benmore-Otahuhu spot price difference increased from $24/MWh to $55/MWh. Over the same period the Benmore-Otahuhu futures price difference for the June 2012 quarter increased from $22/MWh to $80/MWh. This indicates an average sensitivity of 1.8 between changes in the Benmore-Otahuhu futures price difference to changes in

the Benmore-Otahuhu spot price difference. Using this sensitivity, it is estimated that the peak futures price difference for the June 2012 quarter would have reduced from the observed $80/MWh to $69/MWh (13% reduction). A similar calculation for the September 2012 quarter indicates a 9% reduction in the peak Benmore-Otahuhu futures price difference due to the reduction in the counterfactual Benmore-Otahuhu spot price difference.

FTR market

4.17 The Financial Transmission Rights (FTR) market provides a mechanism for participants to manage locational price risk between Benmore and Otahuhu. This market is scheduled to be operational in May 2013. Each FTR contract is for a one month period. It must specify the source and sink (ie. direction) - either Benmore to Otahuhu or Otahuhu to Benmore, and may be one of two types - obligation FTRs or option FTRs.

4.18 The holders of FTR contracts get paid out the sink price minus the source price (if this price difference is positive) for each trading period in the month for each MW of FTRs held. For any trading period where this price difference is negative, participants holding obligation FTRs must pay this amount into the FTR market. Participants holding option FTRs pay nothing for any trading periods where the price difference is negative.

4.19 Had the FTR market been operational during May 2012, holders of FTR options or obligations in the Otahuhu to Benmore direction would have been hedged against the observed inter-island locational price risk for the volume of FTRs they held. The extent of this hedge cover depends however on the revenue adequacy of the FTR market. During the periods of increased SI IR prices in May 2012, and consequently increased price separation between the NI and SI, the HVDC south flow was less than the thermal capacity of the HVDC link on south transfer. Therefore, the ability of the FTR manager to pay out is dependent on the available FTR auction revenue and the extent that the FTR manager can estimate the expected transfer considering the potential risks that can restrict HVDC transfer, such as expensive IR in the importing island.

4.20 Meridian's increased ability to affect the inter-island price separation, by the acquisition of the offer rights for the smelter's IL, could have affected the FTR market had it been operating at the time. Meridian would have had additional knowledge on the potential FTR payoff and could have used this knowledge to either purchase south transfer FTRs or bid up and therefore increase the price of these FTRs for other participants.

4.21 The addition of pole 3 to the existing pole 2 is expected to be in operation before the FTR market. The return of HVDC bipole operation on south transfer would reduce the potential of increased IR offers in increasing the island price separation. This is due to the reduced size of a CE risk with the remaining link able to maintain some transfer.

5 Increased SI IR prices had minimal impact on SI storage

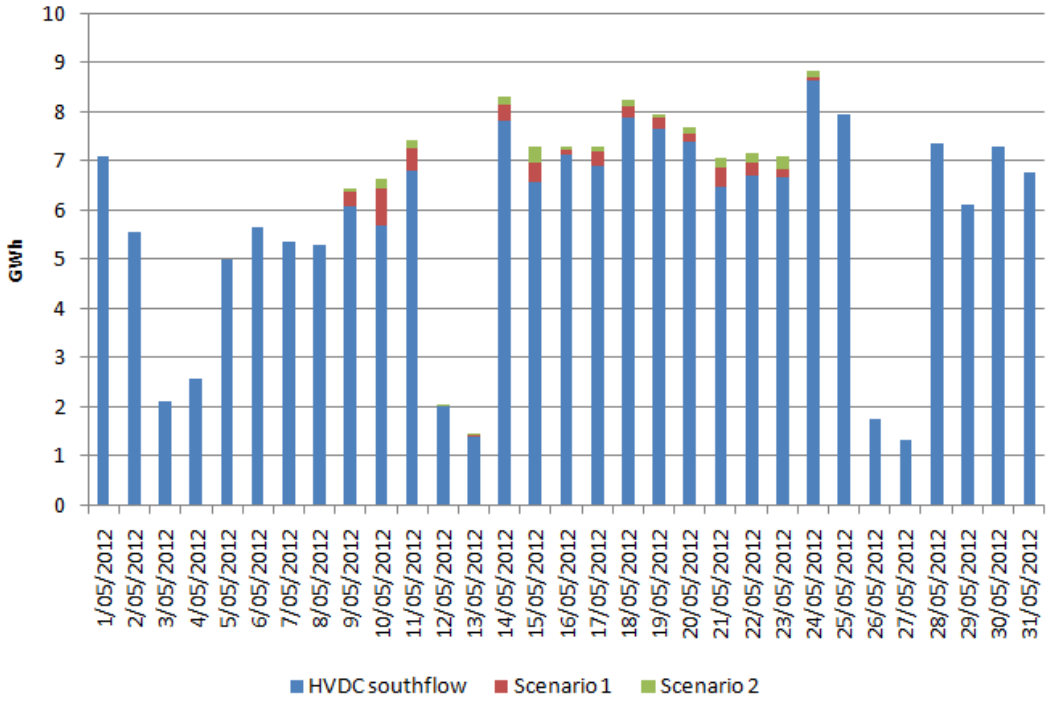
5.1 The initial concern of the Authority about the increased SI IR offer prices was the potential impact on restricting HVDC south transfer, and therefore exacerbating the low SI storage situation. While the increased SI IR prices did have some impact of reducing HVDC south transfer during specific trading periods, the overall impact of this reduction in HVDC transfer on SI energy was minimal.

5.2 Figure 18 illustrates the estimated increase in HVDC south transfer under two scenarios[10]:

(a) Scenario 1: Smelter's IL offered at its low price;

(b) Scenario 2: Smelter's IL and Meridian IR offered at low price[11].

Figure 18 Simulated impact of increased SI IR price on HVDC south imports



Source: EM6

Notes: 1. HVDC data based on SCADA.

5.3 There was 180GWh of energy imported in the SI via the HVDC during May 2012. It is estimated that with the reduction in IR offer prices from the smelter's IL, the HVDC south imports would have increased by 4GWh (2%). Additional reduction in IR offers from Meridian SI generation would have resulted in an additional 2GWh of HVDC imports (1%). The total increase of 6GWh represents approximately 0.6% of SI discretionary hydro generation during May 2012.

5.4 This would have had minimal impact on the SI storage situation.

5.5 It is also worth noting that the 6GWh impact is an upper bound estimate, as it is probable that Meridian conserved its South Island storage during periods of the day when it offered SI IR at low price.

[10] These scenarios were simulated using vSPD with the different offer inputs.

[11] Both the smelter's IL and Meridian IR offered in the SI was assumed to be at $0.01/MW

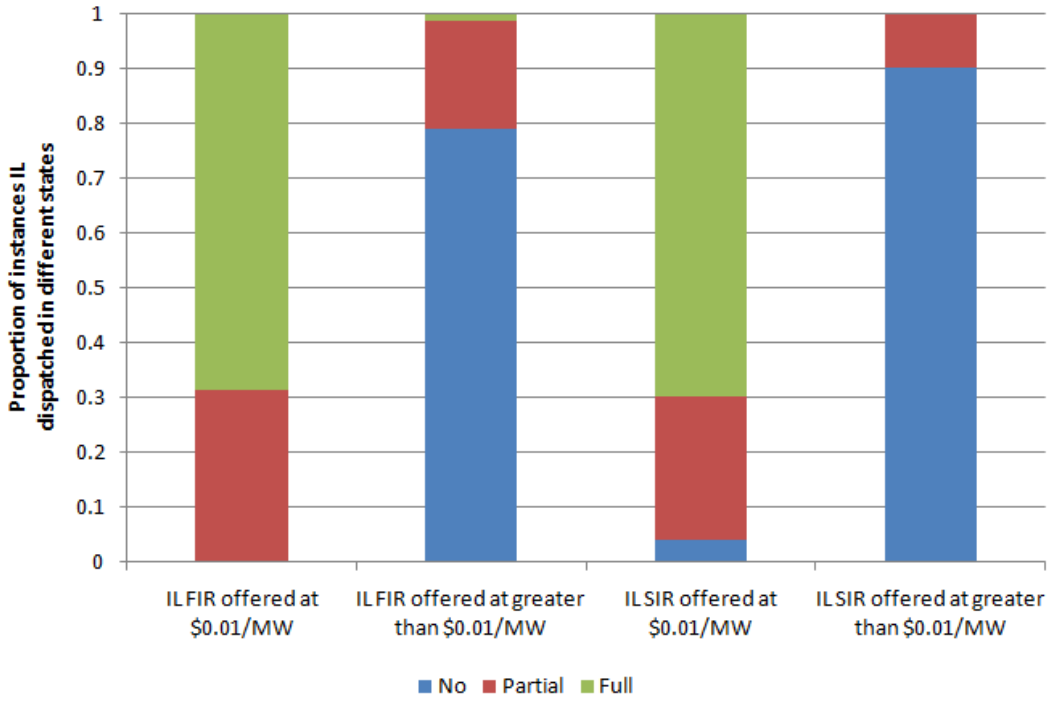
6 Increased offer prices for the smelter's IL did not increase SI over-frequency risk

6.1 A market participant raised a concern with the Authority around the increased likelihood of initiating partial dispatch from the IL offered at the Tiwai aluminium smelter when the IL was offered at higher price.

6.2 The system operator has indicated that the IL offered at the Tiwai aluminium smelter would not be able to provide a partial response with its relays armed. This could result in a full potline tripping (165MW) based on a partial dispatch instruction, resulting in an increase in SI frequency. The system operator has also indicated that it is expected that the IL would trip before any generator was able to respond with their dispatched reserves, and generator governor action would thus mitigate any significant over frequency event.

6.3 The Authority has also analysed the proportion of instances the smelter's IL was partially dispatched when its offer price was increased. Figure 19 illustrates the proportion of instances during May 2012 when the smelter's IL was not dispatched, partially dispatched and fully dispatched when offered at $0.01/MW as compared to when the offer price of the smelter's IL was increased.

Figure 19 Proportion of different dispatch instructions for smelter's IL (May 2012)



Source: System Operator

Notes: 1. Partially dispatched is considered those instances where the IL is dispatched above zero but less than 95% of its offered quantity.

6.4 The results of the analysis indicates that when the smelter's IL offer price was increased, the proportion of partial dispatch instructions actually reduced due to a higher likelihood of the IL not being dispatched, as compared to when it was offered at its low price.

6.5 Therefore, the Authority does not believe there was an increased risk of an over-frequency when the smelter's IL offer price was increased in May 2012.

7 Potential provisions to address the observed issues

7.1 The Authority is concerned at the potential impact of the transfer of offer rights amongst market participants and its effect on competition and efficiency in the electricity market. The Authority's analysis indicates that Meridian's acquisitions of the IR offer rights for the IL at the Tiwai aluminium smelter increased its ability to affect SI energy and IR prices, as well as increase the SI-NI price differential. This had flow-on effects into the electricity futures prices.

7.2 This increase in the ability to affect prices through the transfer of offer rights elicits a market response, through these prices, that would otherwise be considered inefficient. To address this, the Authority will give further consideration to incorporating provisions in the Code relating to the ability to transfer offer rights. These considerations would need to be sensitive to situations where such transfers reduce transaction costs and reduce barriers to entry for new resources into the market, in particular non-market participants. An example of such a situation is the transfer of offer rights from a non-market participant load to demand-side aggregators.

7.3 A further issue observed in this review is the lack of visibility of IR contracts on the energy hedge disclosure website. Currently IR contracts are not required to be disclosed, however such disclosure would reduce the potential for market information asymmetries. The Authority will further consider such requirements for the Electricity Hedge Disclosure system.

7.4 The ability of participants to increase locational price risk across the HVDC would reduce with the introduction of pole 3 on the HVDC. This pole 1 replacement would restore a bipole arrangement for north and south transfers thus reducing the IR requirements to cover HVDC contingent event risks. Such risks could however arise during pole outages.

7.5 The introduction of a national IR market, following the introduction of HVDC pole 3, would improve the competitiveness of the IR market by allowing reserve sharing between the islands. This ability to share reserves however is limited by the ramp up capability of the HVDC link. As an example, the Authority does not consider that a national reserves market would have had an impact if conditions similar to May 2012 were to transpire under a national reserves market regime (i.e. high SI energy prices, high HVDC south flows and with a single HVDC pole in operation). The reason being that under monopole operation, there is no ramp up capability and therefore any reserves required to cater for the HVDC contingent event would need to be procured from providers in the receiving island of the HVDC injection (in this instance from the SI IR providers), even under the national reserves market structure. Similarly, there would be no ability to dispatch NI reserves for the SI for southward[12] HVDC transfer under a bipole configuration when the HVDC is loaded above its ramp up capability. In this instance the reserve providers to cover for the HVDC contingent and extended contingent event risks are limited to those in the receiving island of the HVDC injection.

7.6 The introduction of the FTR market in May 2013 would also improve the ability of participants to manage inter-island locational price risk. Monitoring of the FTR market would be needed to ensure it provides a platform to increase competition and efficiency in the electricity market.

[12] The opposite is true for northward HVDC transfer.

Appendix A Response letter from Meridian

meridian

21 May 2012

Ramu Naidoo
Senior Analyst
Electricity Authority
By email: ramu.naidoo@ea.govt.nz

Enquiries into increased South Island reserve offers

This letter responds to your emails of 11 and 14 May 2012 requesting Meridian to provide, on a voluntary basis, our reasons for the observed increases in Meridian's reserve offer prices in the South Island between 07:00 and 20:30 on 10 May and 06:30 and 15:30, and 17:00 and 20:30, on 11 May 2012. Please note that the information provided below is confidential and commercially sensitive. If published or distributed further, the information may prejudice Meridian's commercial position. We request that the Authority respects the confidential nature of the information and that the information is not published or distributed further without our permission.

As an initial matter, we understand that the reason for the Authority's interest in our trading strategy is an understanding that during these periods HVDC south flow was constrained due to the offer prices for reserves. As we explain below, this is not our understanding of the situation.

Meridian's reserve trading strategy [redacted] Reserve offers during the specified periods were consistent with this trading strategy. [redacted]

We do not consider that the reserve market outcomes during 10 and 11 May altered HVDC south flow volumes. While FIR prices were higher on these days than they had been in the days before, we note that the quantity of reserves cleared and the volume of HVDC south flow were generally unaffected. This is illustrated in Figure 1 below.

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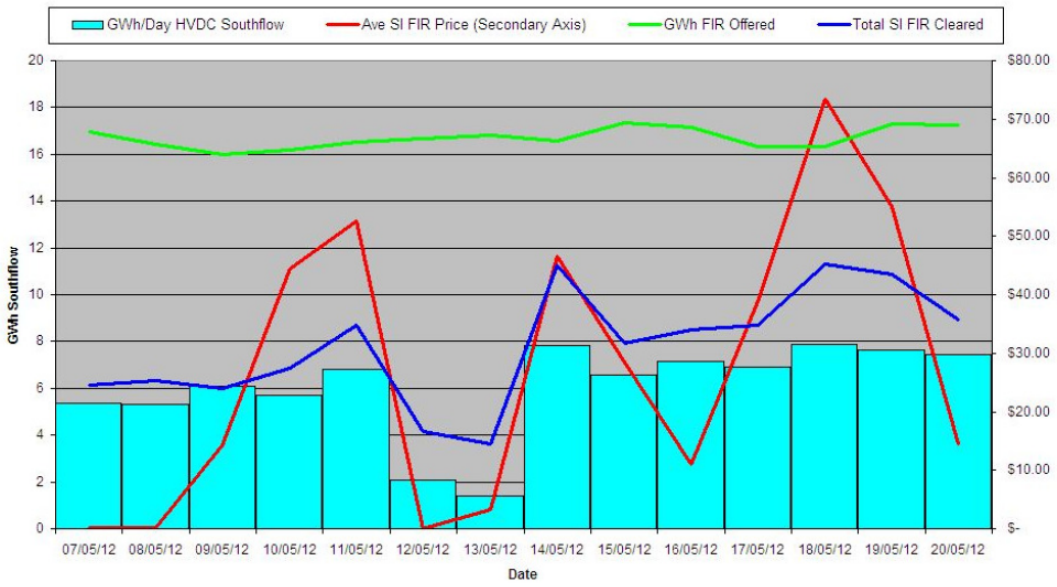
Figure 1: Daily HVDC South Flow, South Island FIR Price and FIR Quantity (Offered and Cleared)



We therefore consider that there has been no material physical impact from our adopted trading strategy. We will nevertheless continue to monitor for such impacts and would be happy to discuss this issue further.

Please contact me if you have any queries regarding this response.

Yours sincerely,

Matthew Hall
Regulatory Analyst

DDI [redacted]
Mobile [redacted]
Email [redacted]

Glossary of abbreviations and terms

Act	Electricity Industry Act 2010
Authority	Electricity Authority
Code	Electricity Industry Participation Code 2010
Contact	Contact Energy Limited
Genesis	Genesis Power Limited (trading as Genesis Energy)
GWh	Gigawatt hour
GXP	Grid exit point
IL	Interruptible load
IMM	Industry and Market Monitoring
Meridian	Meridian Energy Limited
MEUG	Major Electricity Users' Group
MRP	Mighty River Power Limited
MW	Megawatt
MWh	Megawatt hour
SCADA	Supervisory Control and Data Acquisition
SO	System Operator
SPD	Scheduling, Pricing and Dispatch
TP	Trading period
TrustPower	TrustPower Limited
vSPD	Vectorised Scheduling, Pricing and Dispatch