Manual price publication

Period 31 on 26 February 2013

Market performance enquiry

5 April 2013

Market Performance

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.

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1 Overview and summary

1.1 Real time price schedules indicated infeasible prices at the Studholme (STU) and Oamaru (OAM) market nodes for all 5-minute intervals of trading periods 30 and 31 on 26 February 2013. The cause of these infeasible prices was a binding transmission security constraint in the Otago region.

1.2 The following day, 27 February 2013, the provisional pricing solution was issued containing a binding transmission security constraint in the lower South Island. As with the real times price schedules the day before, this caused an infeasibility whereby there was an insufficient supply of generation to meet the bus load at the Studholme and Oamaru market nodes in trading period 31. This particular type of event is referred to as a deficit bus generation situation. The system operator (SO) received an infeasibility situation notice from the pricing manager, and the deficit bus generation situations at these nodes were eventually resolved by the system operator at 10:12am the next day, on 28 February 2013.[1]

1.3 However, the next schedule of provisional prices published by the pricing manager at 10:39am on 28 February 2013 contained yet more binding transmission security constraints, once again resulting in deficit bus generation situations occurring – this time at the Black Point (BPT) and Black Point Tee (BPC) market nodes. Another infeasibility situation notice was sent to the SO by the pricing manager and these new deficit bus generation situations were subsequently resolved by the system operator at 12:00pm on 28 February 2013.[2]

1.4 When the pricing manager went to publish what would have been the third schedule of provisional prices, it was observed that yet again there was a deficit bus generation situation in trading period 31 of 26 February 2013, this time back at the OAM node. At this point the pricing manager decided to manually calculate prices.

1.5 At 14:20 on 28 February 2013, the pricing manager sent an email to the market operation manager at the Electricity Authority (Authority) expressing their intention to publish prices based on manual calculations due to a recurring infeasibility for trading period 31 on 26 February 2013, and in accordance with clause 13.164 of the New Zealand Electricity Participant Code (Code). The recurring infeasibility appeared to be the result of multiple security constraints in the general vicinity of Oamaru.

1.6 At 14:40 on 28 February 2013, the pricing manager published a manual price publication notice informing the market that interim energy and reserve prices for trading period 31 on 26 February 2013 had been manually calculated for all nodes in accordance with clause 13.164 of the Code.[3] Under the manual price calculation procedure, the Scheduling, Pricing and Dispatch (SPD) market clearing engine is not used to compute prices. Rather, energy and reserve prices are calculated using the formula specified in clause 13.164 of the Code. The interim prices subsequently became final prices.

1.7 The Authority has reviewed the infeasible price resolution process for these deficit bus generation situations and confirmed that the pricing manager correctly followed the Code. The SO also acted in accordance with the Code and adhered to its own guidelines published in June 2010 for resolving infeasibilities.[4] The Code requires that the SO notify the Authority when an unresolved

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1 See Appendix A for the first infeasibility situation notice and the SO's response.

2 See Appendix B for the second infeasibility situation notice and the SO's response.

3 See Appendix C for the manual price publication notice.

4 See http://www.systemoperator.co.nz/f2766,16927031/resolving-infeasibilites-and-constraints-jun-10.pdf.

provisional price situation exists. However, in this instance, the SO failed to do so and subsequently self-breached. The SO is preparing a report regarding this incident, which will eventually be published.

1.8 Manual price calculation ought to be a last resort measure as it represents a departure from the efficient pricing delivered by SPD. For this reason, the Authority is especially interested in ensuring that the Code and the various procedures and guidelines adopted by the parties responsible for computing and publishing prices remain focused on producing efficient prices. Prices ought to accurately reflect costs and mechanisms that might suppress prices, particularly during scarcity events, are to be avoided if at all possible. Besides ensuring a least cost operation in the short term, efficient pricing also provides appropriate investment signals for last-resort generating plant and demand-side response activities.

1.9 The Authority maintains that the infeasibilities that occurred in trading period 31 of 26 February 2013 could have easily been resolved had an alternative approach been applied. The infeasibilities at Studholme and Oamaru would have been resolved after the first infeasibility situation notice by increasing the right-hand side of the security constraints protecting OAM_STU_WTK2.2 and OAM_STU_WTK2.4 by 5 MW and 2 MW respectively.

1.10 The next section outlines the time and order in which events relating to the unresolved deficit bus generation situation of trading period 31 on 26 February 2013 unfolded. The Authority has used this event to review the process for resolving deficit bus generation situations.

1.11 As a result of this review, the Authority maintains that the outage timing mismatch problem is not always the root cause of a bus deficit generation situation and, therefore, the current resolution procedure should be used with caution (see section 4). The Authority also recommends that the SO consider using a model-based approach to resolving branch or branch group constraint-related deficit bus generation situations.[5] Such an approach will remove the incidence of recurring deficit bus generation, as occurred on 26 February 2013. It will also improve the repeatability and robustness of the deficit bus generation resolution process (see section 5).

2 Infeasibility resolution timeline

2.1 The timeline sketched out in this section focuses only on the details relating to the resolution of the infeasibility in trading period 31 on 26 February 2013.

[5] The model-based approach was previously proposed in the *Review of events of 13 and 14 December 2011*, Market Performance report, 13 January 2012.

Table 1 Infeasibility resolution timeline, trading period 31 on 26 February 2013

Date and time	Events
27 February 2013 07:36	Final pricing schedule of 26 February 2013 were solved for the first time
27 February 2013 08:22	Pricing manager sent an infeasibility situation notice in which it is stated that: • Deficit generation occurred at nodes STU0111 and OAM1101
27 February 2013 10:14	Provisional prices for 26 February 2013 were published.
28 February 2013 10:12	The SO responded to the above infeasibilities as follows: • Outage times on ASB_TIM_TWZ_1, STU_DIS_76, and TIM_T5 adjusted from being out of service to being in service to remove the infeasibility at node STU0111 • The OAM_STU_WTK2.2_OAM_BPT_WTK1.2_OAM_WTK1_WTK_LN and OAM_STU_WTK2.4_OAM_BPT_WTK1.2_:S_OAM_WTK1_GNY-_LN constraints were relaxed to remove the infeasibility at node OAM1101
28 February 2013 10:36	Final pricing schedule of 26 February 2013 were solved for the second time
28 February 2013 11:18	Pricing manager sent an infeasibility situation notice in which it is stated that deficit generation occurred at nodes BPT1101 and BPC1101
28 February 2013 12:00	The SO responded to the above infeasibilities as follows: • The OAM_STU_WTK2.2_OAM_BPT_WTK1.2_OAM_WTK1_WTK_LN and OAM_STU_WTK2.4_OAM_BPT_WTK1.2_:S_OAM_WTK1_GNY-_LN constraints were relaxed to remove the infeasibility at nodes BPT1101 and BPC1101
28 February 2013 12:41	Final pricing schedule of 26 February 2013 were solved for the third time
28 February 2013 14:20	Pricing manager informed the Authority of its intention to publish manual prices in accordance with clause 13.164 of the Code for trading period 31 (15:00-15:30) of trading date 26 February 2013[6]
1 March 2013 14:40	Pricing manager issued a manual price publication notice stating that interim energy prices and interim reserve prices for trading period 31 (15:00-15:30) on trading date 26 February 2013 had been manually calculated according to clause 13.164 of the Code
1 March 2013 18:00	Interim prices for 26 February 2013 were published by 18:00
2 March 2013 14:00	Interim prices for 26 February 2013 became final prices by 14:00

[6] See Appendix C for email from pricing manager to Authority.

3 Review of the process used to resolve infeasibilities

3.1 The Authority has determined that the SO and the pricing manager correctly followed the procedure for resolving provisional price situations, as set out in sections 13.149 to 13.164 of the Code. The Code does not stipulate the method by which infeasibilities must be resolved so the SO has published the procedures it follows to resolve infeasibilities. The Authority has found that the SO correctly applied its infeasibility resolution process. However, the SO was unaware of, and failed to act in accordance with, clause 13.165 of the Code, which requires the SO to notify the Authority if it receives notice of an unresolved provisional price situation as defined in section 13.164 of the Code.

3.2 Unresolved infeasible prices due to deficit bus generation situations have occurred rarely in the past. Nevertheless, the continuous development and increasing complexity of the New Zealand electricity market system means that such situations may be more common in the future. With this in mind, the Authority has taken the opportunity presented by this event to review the deficit bus generation resolution process along with the incidental issues this event has brought to light. The incidental issues are:

(a) Outage timing mismatch

(b) Multiple constraints arising from the simultaneous feasibility test (SFT).

4 Outage timing mismatch

4.1 In the final pricing schedule, a transmission component is modelled based on the status of the component at the start of trading period. This means that if a transmission outage ends after the start but prior to the end of a trading period, it will be modelled as out of service for the entire trading period for the purpose of determining final prices. This type of situation is referred to as an outage timing mismatch.

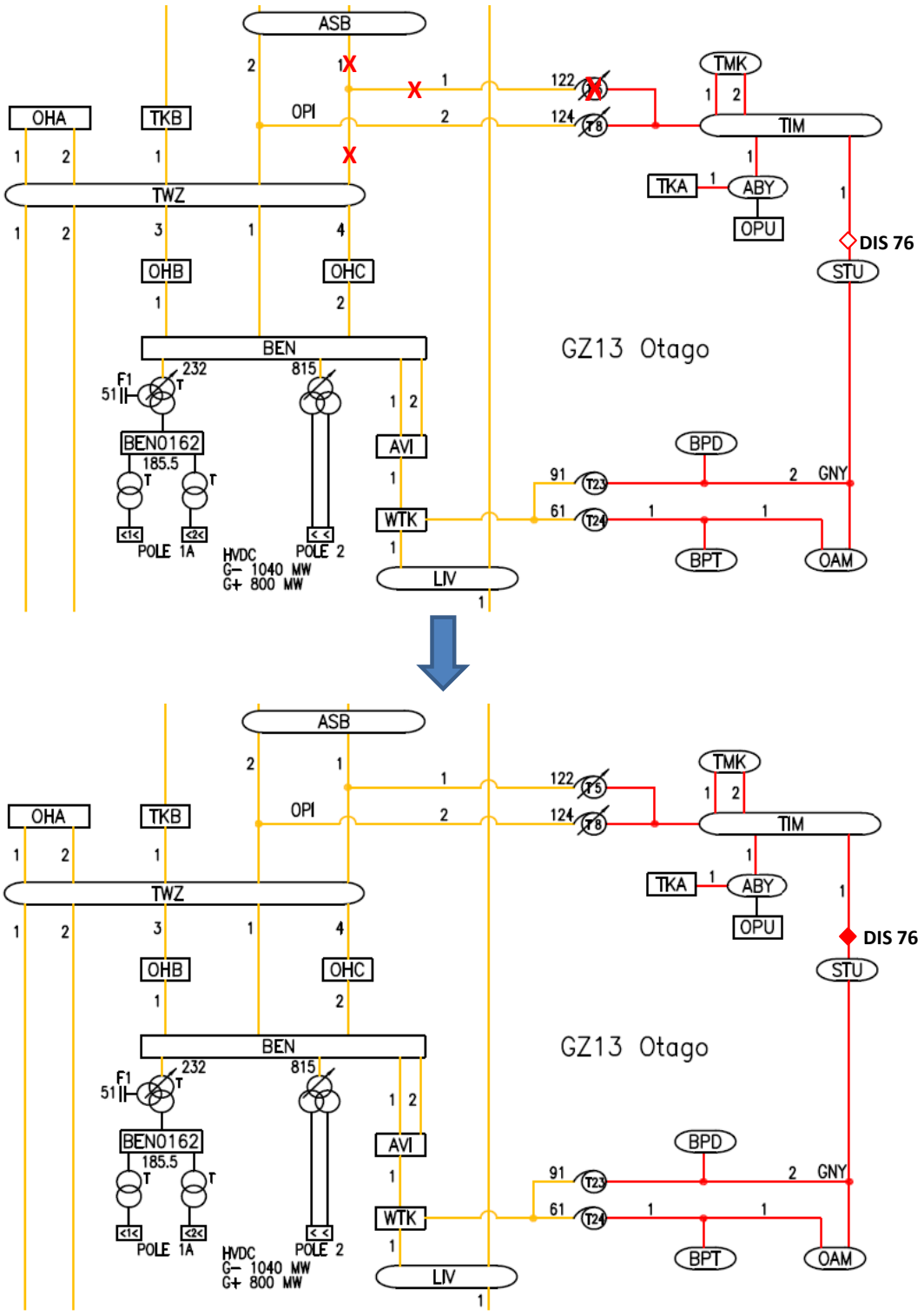
4.2 But an outage timing mismatch is not always the cause of deficit bus generation.

4.3 In the process of resolving an infeasibility situation, the SO will first check if there are any outage timing mismatches when confronted with deficit bus generation, assuming there are no metering situations or the load has not been estimated. An outage that occurs before or precisely at the start of a trading period and finishes before the end of that trading period is modelled as out of service for the entirety of that trading period in final pricing schedule. The SO will re-model as 'in service' any outage that may be the cause of deficit bus generation in the final pricing schedule.

4.4 This practice works well when the transmission component is a supply transformer or a spur line. If deemed to be in service (when in fact it is out of service), the component will not form a loop on the modelled network. For example, consider a supply transformer connected solely to a local bus that is out of service at the start of a trading period and is back in service five minutes before the trading period end. The load at the bus is supplied for the last five minutes and is represented in the final pricing schedule as a positive load value at this node. But the supply transformer is modelled as out of service. This creates deficit bus generation at this bus. In this case, remodelling the supply transformer as being in service for this trading period will successfully address the root cause of deficit bus generation.

However, in the situation on 26 February 2013, the component STU_DIS_76 was open in trading period 31. When the SO modelled STU_DIS_76 as being closed in order to resolve the deficit bus generation at STU0111, STU_DIS_76 causes a loop in the network. More specifically, closing STU_DIS_76 reconnects STU1101 to TIM1101 through STU_TIM.1, see Figure 1.

Figure 1 Single line diagram demonstrating the SO's response to deficit bus generation at STU



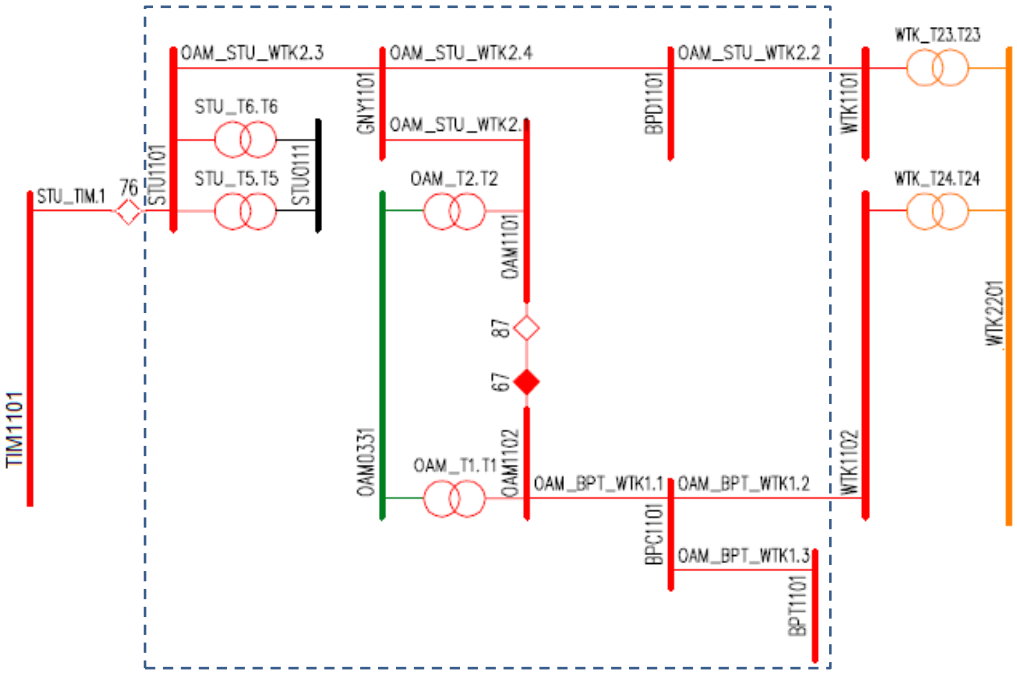
Source: Electricity Authority

Note: Outages times on ASB_TIM_TWZ_1, STU_DIS_76 and TIM_T5 adjusted from being out of service to being in service to remove infeasibility at node STU0111.

4.6 It is reasonable to assume that the outage timing mismatch of STU_DIS_76 caused the deficit bus generation at STU0111 if the power flows from TIM1101 to STU1101 when STU_DIS_76 is closed. But this is not what happens in this situation.

4.7 In this particular event, the deficit bus generation at STU0111 is caused by the N-1 security constraints which protect OAM_STU_WTK2.2 and OAM_STU_WTK2.4, see Figure 2. These constraints are generated by the SFT tool under the assumption that STU_DIS_76 is open.

Figure 2 SPD network diagram of the Oamaru region with deficit bus generation



Source: Electricity Authority

Note: Security constraints protect OAM_STU_WTK2.2 and OAM_STU_WTK2.4 against the contingency of OAM_BPT_WTK1.2 failing.

OAM_STU_WTK2.2_OAM_BPT_WTK1.2_OAM_WTK1_WTK_LN:

-1.085 * OAM_STU_WTK2.2 + -0.884 * OAM_BPT_WTK1.2 ≤ 58.25 (MW)

OAM_STU_WTK2.4_OAM_BPT_WTK1.2_:S_OAM_WTK1_GYN_LN:

1 * OAM_STU_WTK2.2 + -0.788 * OAM_BPT_WTK1.2 ≤ 48.33 (MW)

4.8 Simulation undertaken by the Authority using the vectorised SPD (vSPD) model shows that more than 12MW of power flows from STU1101 to TIM1101 through STU_TIM.1 when STU_DIS_76 is closed. The amount of deficit bus generation in the constrained region also increases from 4MW (STU0111 and OAM1101) to 19MW (BPT1101 and OAM1102). All of these power flows result from the spring washer effect occurring on the closed loop connecting Waitaki, Oamaru, Studholme, Timaru, Twizel and Benmore (see Figure 1).

4.9 An alternative to fixing the apparent outage timing mismatch to resolve the deficit bus generation situation at STU0111 is to adjust the right-hand side of the security constraints protecting OAM_STU_WTK2.2 and OAM_STU_WTK2.4 by 5 MW and 2 MW respectively. In other words, rather than close STU_DIS_76 to treat it as in service when in fact it is out of service, simply relax the security constraints by a small amount.

OAM_STU_WTK2.2_OAM_BPT_WTK1.2_OAM_WTK1_WTK_LN:

-1.085 * OAM_STU_WTK2.2 + -0.884 * OAM_BPT_WTK1.2 ≤ 63.25 (MW)

OAM_STU_WTK2.4_OAM_BPT_WTK1.2_:S_OAM_WTK1_GYN_LN:

1 * OAM_STU_WTK2.2 + -0.788 * OAM_BPT_WTK1.2 ≤ 50.33 (MW)

4.10 Table 2 compares nodal prices before and after the deficit bus generation at STU0111 is resolved by adjusting the right-hand side of security constraints protecting OAM_STU_WTK2.2 and OAM_STU_WTK2.4 as suggested above. Table 2 reports only the nodes at which prices change.

Table 2 Nodal prices before and after resolving infeasibility at STU0111, $/MWh

Infeasibility resolved by adjusting right-hand side of security constraint

Node	Before	After
BPC1101	419,401.58	119.23
BPD1101	490,191.06	120.58
BPT1101	419,623.35	119.29
GNY1101	492,848.19	122.01
OAM0331	479,731.17	126.05
OAM1101	500,000.00	125.89
OAM1102	455,911.96	125.26
STU0111	500,000.00	124.03
STU1101	496,742.87	122.97
WTK1101	-2,768.12	115.20
WTK1102	2,798.16	115.21
BEN2201	117.51	117.51
HAY2201	120.23	120.23

Source: Electricity Authority

Note: Prices at all other nodes are identical in both cases.

4.11 Table 3 compares the slight difference in total load cost and generation revenue between using this method to resolve the infeasibility at STU0111 and using the manual price calculation.

Table 3 Estimated load cost and generation revenue

	Manual price determination	Model-based price determination
Load cost	$329,759	$323,250
Generation revenue	$326,199	$314,500

Source: Electricity Authority

Notes:
1. Generation revenue is calculated based on SCADA data.
2. Load cost is calculated with negative load being adjusted, if possible, based on SCADA generation data.

4.12 The simulation shows that relaxing the binding security constraints could be a superior approach to resolving bus deficit generation involving binding security constraints. The current arrangement used by the SO to resolve a deficit bus generation situation places checking for, and correcting, an outage timing mismatch at the top of the list of actions to employ. Even though there is no formal statement about the priority of resolution methods, it is evidently assumed that outage timing mismatches, if they exist, will be the first action to undertake when resolving infeasible prices due to deficit bus generation.

4.13 The Authority contends that while correcting an outage timing mismatch will resolve most deficit bus generation situations, it should be used with caution, especially if the bus deficit generation situation involves binding security constraint(s). After adjusting the outage timing to put a transmission component and re-computing the final pricing schedule, the SO ought to check that the power flow on the adjusted transmission component is in the expected direction. The expected direction of flow can be characterised as flow from lower price bus to higher price bus when the transmission component is reconnected. A further indication on the applicability of adjusting the outage timing to resolve the infeasibility is that the infeasibility situation should not be made worse (more MWs of infeasibility) after the adjustment of the outage timing of a component.

4.14 If the outage timing mismatch correction is used, any security constraints which are affected by the changes need to be updated prior to beginning the infeasibility resolution process. Unfortunately, the current system does not allow this to happen, as SFT, which is the tool that constructs and determines the parameters for security constraints, is not re-solved for the purpose of producing the schedule of final prices.

5 Multiple constraints from the simultaneous feasibility test

5.1 Reviewing this event has highlighted a second problem with the current infeasibility resolution process. As it stands now, the SFT tool enables two constraints to be created to protect two adjacent segments of a transmission line against the contingency of some other transmission line failing. In certain instances, these constraints are very similar but not quite identical. This means that if one constraint binds and causes deficit bus generation, the other constraint will be very close to binding but in a strict mathematical sense will not bind. When the binding constraint is then relaxed, the other (previously non-binding) constraint will immediately bind. This can then give rise to a situation where the deficit bus generation situation will disappear at one bus only to appear at another. Subsequent relaxations of the various binding constraints can result in the

deficit bus generation calculated by SPD simply moving around to one or more buses in the region. Given sufficient repetitions the infeasibility resolution process, this would continue until all the relevant constraints are sufficiently relaxed to completely remove the deficit bus generation.

5.2 But sufficient repetitions are never undertaken. The SO's current infeasibility resolution process requires that the right-hand side of one or more constraints be increased in 1MW increments until the deficit bus generation at the bus in question is resolved (or disappears). The process doesn't consider the resolution to have failed if the deficit bus generation simply moves to another bus. Under clauses 13.149 to 13.159 of the Code, infeasibility situations can be resolved just twice. If the infeasibility situation(s) remains after the second resolution, manual price publication will be invoked.

5.3 The deficit bus generation situation resolution at node OAM1101 for trading period 31 of trading date 26 February 2013 is a real example for the circumstance described above. Table 4 shows the steps to resolve the deficit bus generation situation at node OAM1101. According to the Code, the resolution process stops before the third attempt and manual prices are then calculated and published. However, if the resolution process is continued, the deficit bus generation situation will keep alternating between OAM1102 and BPT1101 (and BPC1101).

5.4 Table 4 highlights two issues which need to be overcome in order to completely resolve the infeasibility situation caused by multiple constraints as described above. The first issue is the limited number of re-solves allowed to deal with the infeasibility situation. This can be solved by changing the system operator's definition of when an infeasibility situation is resolved. The second issue is the possibly large number of steps used to completely resolve a deficit bus generation situation. The number of steps used to resolve a deficit bus generation situation is generally small. However, when the number of steps required to resolve an infeasibility situation is large, over-relaxation of a binding constraint is prone to occur.

5.5 As mentioned above, a deficit bus generation situation at a node is considered to be resolved when the infeasible price at the node disappears. With multiple constraints able to be created by SFT, it is possible that the deficit bus generation situation is not resolved but simply shifts to another node(s). The SO's infeasibility resolution process does not address this issue. The Authority recommends that the SO address this by updating its infeasibility resolution process, which was last revised in June 2010. One possibility is that a deficit bus generation situation is considered resolved if and only if no other deficit bus generation situation consequently arises. If one or more infeasibility situation consequently arises, the resolution process is continued until all deficit bus generation situations arising from this process are resolved.

5.6 Regarding the potential for a time-consuming large number of steps being required to completely resolve a deficit bus generation situation, the Authority recommends the use of a model-based approach. This approach is applied for deficit bus generation situations caused by branch and/or branch group constraints after outage timing mismatch adjustments to the inputs has been reasonably applied as mentioned above. In summary, this approach only allows branch/branch group constraints' limits to be violated. The amount of violation (in MW) for each constraint will be applied to resolve the deficit bus generation situation. This approach also improves the repeatability and robustness of the infeasibility resolution process. This approach has been recommended by Authority to solve the infeasibilities for the event on 13 and 14 December 2011.[7]

[7] See the *Review of events of 13 and 14 December 2011*, Market Performance report, 13 January 2012.

Table 4 Steps taken to resolve deficit bus generation situation at OAM1101

Resolution	Constraints	Value	Limit	Affected node
Unresolved	OAM_STU_WTK2.2_OAM_BPT_WTK1.2_OAM_WTK1_WTK_LN OAM_STU_WTK2.4_OAM_BPT_WTK1.2_:S_OAM_WTK1_GNY_LN OAM_STU_WTK2.4_OAM_BPT_WTK1.2_OAM_WTK1_GNY_LN	58.250 45.710 47.206	58.250 48.330 54.700	OAM1101
First attempt	OAM_STU_WTK2.2_OAM_BPT_WTK1.2_OAM_WTK1_WTK_LN OAM_STU_WTK2.4_OAM_BPT_WTK1.2_:S_OAM_WTK1_GNY_LN OAM_STU_WTK2.4_OAM_BPT_WTK1.2_OAM_WTK1_GNY_LN	64.250 50.330 52.508	64.250 50.330 51.700	BPT1101 BPC1101
Second attempt	OAM_STU_WTK2.2_OAM_BPT_WTK1.2_OAM_WTK1_WTK_LN OAM_STU_WTK2.4_OAM_BPT_WTK1.2_:S_OAM_WTK1_GNY_LN OAM_STU_WTK2.4_OAM_BPT_WTK1.2_OAM_WTK1_GNY_LN	66.250 52.556 54.700	66.250 53.330 54.700	OAM1102
Third attempt	OAM_STU_WTK2.2_OAM_BPT_WTK1.2_OAM_WTK1_WTK_LN OAM_STU_WTK2.4_OAM_BPT_WTK1.2_:S_OAM_WTK1_GNY_LN OAM_STU_WTK2.4_OAM_BPT_WTK1.2_OAM_WTK1_GNY_LN	66.250 53.330 54.910	66.250 53.330 55.700	BPT1101 BPC1101
Fourth attempt	OAM_STU_WTK2.2_OAM_BPT_WTK1.2_OAM_WTK1_WTK_LN OAM_STU_WTK2.4_OAM_BPT_WTK1.2_:S_OAM_WTK1_GNY_LN OAM_STU_WTK2.4_OAM_BPT_WTK1.2_OAM_WTK1_GNY_LN	67.250 53.550 54.910	67.250 54.330 55.700	OAM1102
And so on…				
N^{th} attempt	OAM_STU_WTK2.2_OAM_BPT_WTK1.2_OAM_WTK1_WTK_LN OAM_STU_WTK2.4_OAM_BPT_WTK1.2_:S_OAM_WTK1_GNY_LN OAM_STU_WTK2.4_OAM_BPT_WTK1.2_OAM_WTK1_GNY_LN	75.250 60.330 62.590	75.250 60.330 62.700	Infeasibility resolved

Notes:
1. The affected node(s) is the node(s) with deficit generation and/or with the price equal to the constraint violation penalty of $500,000/MWh.
2. The first and second attempts are based on data provided by the SO.
3. The third to n^{th} attempts are calculated using the vectorised SPD (vSPD) model.

Appendix A First infeasibility situation notice and system operator's response

From: Sarah Smith [mailto:Sarah.Smith@transpower.co.nz]
Sent: Thursday, 28 February 2013 10:12 a.m.
To: 'managerp@nzx.com'; Market Services; EMS GXP Metering (EMS); market_COMIT@nzx.com
Subject: RE: Infeasibility Situation Notice

SO response below:

From: Sarah Smith [mailto:Sarah.Smith@transpower.co.nz]
Sent: Thursday, 28 February 2013 10:12 a.m.
To: 'managerp@nzx.com'; Market Services; EMS GXP Metering (EMS); market_COMIT@nzx.com
Subject: RE: Infeasibility Situation Notice
SO response below:

From: Pricing [mailto:managerp@nzx.com]
Sent: Wednesday, 27 February 2013 08:22
To: Market Services; EMS GXP Metering (EMS); market_COMIT@nzx.com
Subject: Infeasibility Situation Notice

Infeasibility Situation Notice
Pursuant to the Electricity Industry Participation Code, clause 13.144, prices were calculated yielding an infeasibility situation:
Trading date: 26 February 2013

Infeasibility 1:
Periods Affected: 7:30 - 8:30, 17:00
Unit/node affected: KMO0331
Cause: Deficit generation

System Operator Response 1:
Action: Outage times on KMO_T1 adjusted to remove infeasibility
Issue: 3

Infeasibility 2:
Periods Affected: 14:30-15:00
Unit/node affected: STU0111
Cause: Deficit generation

System Operator Response 2:
Action: Outage times on ASB_TIM_TWZ_1, STU_DIS_76 & TIM_T5 adjusted to remove 15:00 infeasibility
Constraint OAM_STU_WTK2.2__OAM_BPT_WTK1.2__OAM_WTK1__WTK__LN relieved to remove 14:30 infeasibility.
Issue: 3

Infeasibility 3:
Periods Affected: 15:00
Unit/node affected: OAM1101
Cause: Deficit generation

System Operator Response 3:
Action: Constraints OAM_STU_WTK2.2__OAM_BPT_WTK1.2__OAM_WTK1__WTK__LN
OAM_STU_WTK2.4__OAM_BPT_WTK1.2__:S__OAM_WTK1__GNY__LN relieved to remove infeasibility.
Issue: 3

Infeasibility 4:
Periods Affected: 17:00
Unit/node affected: KAW1101 KAG0
Cause: Down ramp rate violation

System Operator Response 4: 27/02/2013
Action: No action necessary
Issue: 3
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Appendix B Second infeasibility situation notice and system operator's response

From: Sarah Smith [mailto:Sarah.Smith@transpower.co.nz]
Sent: Thursday, 28 February 2013 12:00 p.m.
To: 'managerp@nzx.com'; Market Services; EMS GXP Metering (EMS); market_COMIT@nzx.com
Subject: RE: Infeasibility Situation Notice

So response below:

From: managerp@nzx.com [mailto:managerp@nzx.com]
Sent: Thursday, 28 February 2013 11:18
To: Market Services; EMS GXP Metering (EMS); market_COMIT@nzx.com
Subject: Infeasibility Situation Notice

Infeasibility Situation Notice

Pursuant to the Electricity Industry Participation Code, clause 13.144, prices were calculated yielding an infeasibility situation:

Trading date: 26 February 2013

Infeasibility 1:

Periods Affected: 15:00

Unit/node affected: BPT1101, BPC1101

Cause: Deficit Generation

System Operator Response 1: 28/02/2013

Action: Constraints OAM_STU_WTK2.2__OAM_BPT_WTK1.2__OAM_WTK1__WTK__LN
OAM_STU_WTK2.4__OAM_BPT_WTK1.2__:S__OAM_WTK1__GNY__LN relieved to remove infeasibility.

Issue: 3
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Pricing Analyst
NZX Energy
NZX Limited
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Appendix C Manual price publication email from NZX to Authority

From: Steve Torrens [mailto:steve.torrens@nzx.com]
Sent: Thursday, 28 February 2013 2:20 p.m.
To: Ron Beatty
Cc: Erich Livengood; Pricing Manager
Subject: Manual publication of prices for the 26 Feb, trading period 13:00

Hi Ron,

As discussed, please note that we intend to publish prices in accordance with Clause 13.164 for trading date 26 Feb 2013, trading period 13:00.

Our deadline for publishing prices under Clauses 13.163 and 13.164 is 1800 hours on the 28 Feb.

Prices will be published manually due to a re-occurring infeasibility: Prices were published provisional for the 26 Feb 2013 on the 17 Feb at 1014 hours. Two infeasibility notices have been published for this trading date. Revised data in response to the second notice sent out in accordance with Clause 13.156 was received at 12:00 hours today. This has resulted in a further infeasibility, which according to Clause 13.159 requires the pricing manager to publish interim prices under Clause 13.163 and 13.164 of the Code.

The re-occurring infeasibility appears to be the result of multiple security constraints in the general vicinity of Oamaru.

Kind regards,

--
Steve Torrens
NZX Limited
Level 2, NZX Centre
11 Cable St
Wellington

DDI 04 471 4394
Mob 021 853614

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Appendix D Manual price publication notice

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From: Pricing [mailto:managerp@nzx.com]
Sent: Friday, 1 March 2013 2:40 p.m.
To: Market Services; EMS GXP Metering (EMS); market_COMIT@nzx.com
Subject: Manual Price Publication Notice for the Trading Day 26/02/2013

Manual Price Publication Notice

Under clause 13.164 of the New Zealand Electricity Participation Code (the Code), interim energy prices and interim reserve prices for trading period 31 (15:00) for the trading day 26/02/2013 have been manually calculated for all nodes. The reason for this manual calculation was recurring infeasibilities due to multiple security constraints in the Otago area, which meant that the market system could not be used to calculate interim energy and interim reserve prices within the requisite number of solves prescribed under the code.

Prices for trading periods other than trading period 31 have been calculated by the market system as normal.

The basis of the manual calculation is the data provided under clause 13.154 of the Code as stipulated in clause 13.163(2).

In accordance with clauses 13.163 and 13.164 of the Code, the Pricing Manager has published interim prices for this trading date on the Wholesale Information Trading System (WITS).

The Pricing Manager
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Glossary of abbreviations and terms

Act	Electricity Industry Act 2010
Authority	Electricity Authority
BPC	Black Point Tee
BPT	Black Point
Code	Electricity Industry Participation Code 2010
GWh	Gigawatt hour
GXP	Grid exit point
MW	Megawatt
MWh	Megawatt hour
OAM	Oamaru
SCADA	Supervisory Control and Data Acquisition
SFT	Simultaneous feasibility test
SO	System operator
SPD	Scheduling, Pricing and Dispatch
STU	Studholme
TP	Trading period
vSPD	Vectorised Scheduling, Pricing and Dispatch