

New Zealand Steel
**Participant Rolling Outage
Plan**

4 August 2015

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Definitions

AUFLS	Automatic Under Frequency Load Shedding
Authority	The Electricity Authority
Code	The Electricity Industry Participation Code 2010
developing event	An event that evolves over time, e.g. as the result of a period of unseasonably low inflows to hydro catchments
EMP	The system operator's Emergency Management Policy. Current version published 9 th January 2013
GXP	Transpower Grid Exit Point at which the NZS Glenbrook load is connected
GEN	Grid Emergency Notice
immediate event	An event that occurs with little or no warning, e.g. as a result of a transmission or major power station failure
NZS	New Zealand Steel
PROP	Participant Rolling Outage Plan (this plan)
Rolling Outages	Planned electricity disconnections spread over different parts of the electricity system at differing times to avoid prolonged outages at any one location.
SOROP	System operator rolling outage plan
Supply shortage declaration	Declaration made by the system operator under Part 9 sub part 2 of the Code.
system operator	Operator of the national electricity transmission grid (Transpower)
Transpower	Transpower New Zealand Limited
Transmission line	A high voltage supply line owned and operated by Transpower New Zealand Limited

Associated documents

1. Emergency Management Policy published by the system operator on 9th January 2013
2. system operator Rolling Outage Plan - Issued by the Electricity Commission on 30 September 2010
3. New Zealand Steel operational procedures

Purpose of this plan

4. Part 9 of the Electricity Industry Participation Code (the Code) relates to security of supply and includes provisions relating to the system operator rolling outage plan (SOROP) and participant rolling outage plans (PROPs).
5. This plan was written to satisfy the requirements of the Code that relate to PROPs. Clause 9.8 of the Code requires that each PROP must
 - a) be consistent with the system operator rolling outage plan; and
 - b) comply with the requirements specified in the notice sent under clause 9.6(2)(a); and
 - c) specify the actions that the specified participant will take to achieve, or contribute to achieving, reductions in the consumption of electricity (including any target level of reduction of consumption of electricity in accordance with criteria, methodologies, and principles specified in the system operator rolling outage plan) to comply with a direction from the system operator given under clause 9.15.
6. This PROP covers the following site:

Site name	Physical location	GXP
New Zealand Steel Limited	Glenbrook, South Auckland	GLN0331 and GLN0332

7. This PROP provides details of how New Zealand Steel (NZS) will respond to a supply shortage declaration issued by the system operator and how the system operator (Transpower) should communicate any requests for reductions in demand.
8. The outage plan provides details of the main energy saving measures that can be called on and how these are structured and implemented.

Supply shortage declaration

9. Part 9 Sub part 2 of the Code sets out how supply shortage situations will be managed.
10. Under the provisions of the Code the system operator has powers to direct outages following a supply shortage declaration. As a specified participant NZS must comply with any direction given by the system operator following a supply shortage declaration.
11. A supply shortage declaration may apply to:
 - a) All of New Zealand; or
 - b) Regions specified in the declaration
12. When a supply security declaration is made NZS must comply with a direction given by the system operator in accordance with this PROP.
13. The system operator may, at any time in the period during which a supply shortage declaration is in force, direct NZS to contribute to achieving reductions in the consumption of electricity by implementing outages or taking any other action specified in the direction.
14. A direction may be communicated through the information system operated by the system operator.
15. The system operator will notify NZS when a supply shortage declaration has been revoked
16. This PROP sets out the actions that NZS will take, who is responsible for implementing the actions and how communications will be managed between NZS and the system operator.

Background

The Electricity Authority

17. The Electricity Authority (Authority) is a Crown entity set up under the Electricity Act to oversee New Zealand's electricity industry and markets. The Authority's objective is to promote competition in, reliable supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers.

Transpower

18. Transpower is a State Owned Enterprise, tasked with owning and operating New Zealand's National Grid - the network of high voltage transmission lines and substations that transports bulk electricity from where it is generated to distribution line companies and directly (grid) connected major electricity consumers.

System operator

19. As system operator, Transpower manages the real-time operation of New Zealand's electricity transmission system by matching supply (generation dispatch) with demand.
20. A function of the system operator under the Electricity Act is to use reasonable endeavours to ensure the security of electricity supply. The system operator's activities include forecasting supply and demand, developing and publishing guideline hydro levels for security of supply and improving the ability of consumers to manage price risks in the market

New Zealand Steel

21. NZS is the only integrated steelmaker and manufacturer of flat rolled steel products in New Zealand and is situated at Glenbrook in South Auckland. Locally mined ironsand and coal deposits are converted into a variety of flat steel products, both for the domestic and export markets.
22. The Company's annual gross usage is ~1060GWh (average of 121MW) with ~570GWh (average of 65MW) being generated on site via two waste heat power generation schemes. The Company's annual net usage is therefore ~490GWh (average of 56MW) and this includes the electricity used by BOC Gases.

Security of supply events covered by this plan

23. In its Emergency Management Policy the system operator provides the steps that the system operator will take and the circumstances that will need to exist for a supply security declaration to be made. Those steps provide for a series of last resort emergency measures, which would not be implemented unless there was a significant risk that it would not be possible to meet the demand for electricity on a sustained basis.
24. The types of event likely to require the implementation of the EMP include an extended period of extremely low inflows to hydro catchments, a major asset outage that was expected to be sustained for a long period, or some combination of these events.
25. The EMP describes two categories of events that could lead the system operator to make a supply shortage declaration these are:
 - **Developing Event** – Events that evolve over time – for example as the result of a period of unseasonably low inflows to hydro catchments; and
 - **Immediate Events** –. Events that occur with little or no warning – for example as a result of a transmission or major power station failure, the impact of which are expected to extend over a period of weeks rather than days.
26. Rolling outages under a supply shortage declaration are a last resort measure the system operator may initiate, after consultation with the Authority, only if there is a shortage of electricity supply (generation) or transmission capacity if the system operator considers:
 - a) that the normal operation of the wholesale market is, or will soon be, unlikely to facilitate the adjustment of supply and demand necessary to ensure that supply matches demand; and
 - b) that, if planned outages are not implemented, unplanned outages are more likely than not.

Full information and partial information PROPS

27. The system operator's Rolling Outage Plan sets out the following requirements for direct connect PROPs.

Full information plans: *These plans must contain sufficient information for the system operator to make a decision on the most appropriate savings target for the direct-connect user.*

A direct-connect user's full information plan must inform the system operator about:

- the nature of the load on site;

- whether any load is used to provide other services to the electricity sector such as interruptible load;
- the extent to which different levels of savings can be achieved;
- the nature of the measures that could be implemented; and
- the cost associated with different levels of savings.

Partial information plans: These plans may contain some of the information required for full information plans. If the system operator sets a savings target for a region where there is a direct-connect user with a partial information plan, their savings target will likely be set to achieve the same percentage saving as distribution companies in that region.

What this PROP contains

28. This PROP includes procedures for managing both developing and immediate category of event.

Section	Content
Communications	Contact details for communications during a supply shortage declaration
Description of Load	A description of the NZS load
Site response	How the site will respond to different types of event including a plan of possible savings
Coordination with the system operator	Sets out how NZS will coordinate with the system operator
Monitoring and reporting	How NZS will monitor and report savings made

29. This PROP contains all the information required for Partial Information Plan.

Communications

All urgent operational communications should, in the first instance, be made to:

Contact: Energy Balancing Team Member
Phone: 021 590 403

It should be noted that only operational communications directly related to a supply shortage event should be made to the Energy Balancing Team Member.

The Energy Balancing Team Member will communicate with the system operator for operational communications using the following details:

Transpower Control Centre
Energy Desk Duty - 0800 535 123
Security Desk Duty - 0800 488 500

Hamilton Co-ordination Centre
Fax (07) 843 7176

Wellington Co-ordination Centre
Fax (04) 496 9109

Communications from the system operator about a supply shortage declaration should be made to:

Contact: Energy Manager

If unable to be contacted, then try:

Contact: Energy Balancing Team Member

If unable to be contacted, then try:

Contact: Contract Electrical Engineer

Please refer to a separate letter from NZS to the system operator regarding NZS contact names and numbers.

The NZS person responsible for reporting to the system operator on performance against savings targets is either:

Contact: Energy Manager

If unable to be contacted, then try:

Contact: Contract Electrical Engineer

Please refer to a letter from NZS to the system operator regarding NZS contact details.

Security of Supply Outage Plan

The person who the system operator should notify for revocation of the shortage declaration is:

Contact: Energy Manager

If unable to be contacted, then try:

Contact: Energy Balancing Team Member

If unable to be contacted, then try:

Contact: Contract Electrical Engineer

Please refer to a letter from NZS to the system operator regarding NZS contact details.

The above people will communicate with the system operator for administration and reporting against targets using the following details:

System Operator
Transpower
Level 7
Transpower House
96 The Terrace
PO Box 1021
Wellington

Telephone: 64 4 495 7000

Fax: 64 4 495 7100

The NZS person who is responsible for communicating with the media (if required) is:

Contact: External Affairs Officer

Please refer to a letter from NZS to the system operator regarding NZS contact details.

Description of site load

30. NZS is the 2nd largest industrial user of electricity in the country with an average gross load of ~121MW with daily average gross loads up to 138MW. The individual industrial processes at NZS are largely continuous with the balance being batch-type. As a whole, most of the processes are in series i.e. the output of one process is the input to the next process.
31. The major electricity loads on site are:
- Iron Plant – 20MW on average – comprises the Raw Materials Handling facility plus the four multi-hearth furnaces and the four kilns. The site has two fully embedded waste heat power generation schemes (owned and operated by Alinta ENZ Ltd) which average a total of 65MW (with peaks up to 82MW) and they are located in this area. In the Iron Plant, ironsand and coal are converted into reduced primary concentrate and char (RPCC) prior to being fed to the melters.
The Iron Plant is a continuous operation.
 - Melters 1&2 – total of 66MW on average with peaks occasionally up to 80MW. The melters convert the RPCC from the Iron Plant into liquid iron. NZS offers the melters' load (normally 60MW) into the Reserves Market both as FIR and SIR.
The melters are both continuous operations.
 - Slabmaking Plant – 3MW on average. In the Slabmaking Plant, the liquid iron from the melters is converted into liquid steel and then cast into slabs. Vanadium is extracted as a byproduct from the liquid iron.
The Slabmaking Plant is a series of batch operations.
 - Rolling Mills – 14MW on average. In the Rolling Mills, the Hot Strip Mill rolls the slabs into flat strip and the Cold Mills (4Hi and 6Hi) roll the strip to its final thickness and improves its surface quality. The Hot Strip Mill is the largest of these loads, averaging ~8MW.
The individual plants in the Rolling Mills are a series of batch operations.
 - Finishing Plants – 10MW on average. The Finishing Plants comprise the Metal Coating Line, the Colour Coating Line and the Pipe Mill which produce Zinalume, Colorsteel and pipes respectively. All these products are then sold to others. The Metal Coating Line is the largest of these plants, averaging 8MW.
All these plants operate continuously.

- BOC Gases – average of 8.5MW. BOC Gases' Air Separation Unit (ASU) is situated next door to NZS at Glenbrook and NZS purchases approximately 70% of the plant's gaseous oxygen and nitrogen output. NZS purchases electricity on behalf of BOC Gases for its ASU and for this exercise, it is considered to be part of NZS' load.

This plant operates continuously.

32. At the time of writing, NZS has an exemption from providing AUFLS at the GLN0331 and GLN0332 grid exit points – refer to Electricity Industry (Exemption No 157 (New Zealand Steel Ltd)) Amendment Notice 2014.
33. On-site generation is provided by three generation units which average a total of 65MW between them. Due to this generation, the expected normal net demand seen on the transmission grid is 56MW. However, the peak net demand seen on the grid can be approximately 100MW for a few trading periods when the largest generation unit fails unexpectedly (in practice, extremely rarely).

How the site will respond to different types of event

Immediate & Developing Event

34. The system operator is responsible for making a supply shortage declaration and for directing NZS to implement rolling outage savings.
35. If a load reduction is required for any reason, Kilns Cogen is always fired with extra natural gas first with a resultant Company net load reduction of nominally 8MW (or ~16% of the site net load), the actual amount is uncertain and is dependent on Iron Plant production conditions at the time. However, over the period of a week, the average net load reduction should be approximately 8MW or 1,344MWh. Requesting this can be carried out in minutes and once gas firing starts, the maximum increase in generation usually takes 10-15 minutes to achieve. There may be some delay while revised offers are made and accepted in the electricity market.
36. In the past, NZS has trimmed the melters' load to effect a load reduction but usually for not longer than 4 hours at a time. The trimming is usually of the order of 10MW to take the melters' total load down to 60MW. This figure has been chosen because then the Company does not have to reoffer its melter load into the Reserves Market. It also means that the Iron Plant (the upstream plant) can keep running at full capacity while the surplus RPCC is diverted into a storage hopper ready for subsequent processing. The storage hopper has about 4 hours' capacity and when it is full, RPCC either has to be dumped (with its consequent environmental effects) or one of the kiln/multi-hearth streams has to be turned off with a resulting slightly larger loss in on-site generation than power reduction in the melters.
37. It should be mentioned here that NZS uses less net electricity when the Iron Plant and melters are running at rated capacity because, under these conditions, maximum waste heat is produced which means that on-site generation is at a maximum. If the melters have to power down for more than about 6 hours, this affects the level of operation of the kilns and multi-hearth furnaces and the decrease in load is more than offset by a slightly larger decrease in generation (ie the Company's net load increases). NZS does not plan to offer any more load reduction initiatives in the Iron Plant and melter areas other than those mentioned above.
38. Also in the past, NZS has turned off its Hot Strip Mill (HSM) to effect a load reduction of nominally 8MW but normally for no longer than 6 hours at a time. The HSM is not normally a bottleneck plant and when this is the case, it has been turned off very infrequently for load reduction purposes.
39. Also in the Rolling Mills complex, NZS has two Cold Mills each rated at ~1.5MW. Each mill has provision for material storage upstream. Relatively speaking, these loads are quite small and have never been used for load reduction purposes in the past.
40. The new BOC ASU plant is fully integrated, that is the Oxygen, Nitrogen and Argon processes are all driven by the single main air compressor, thereby limiting the ability to discretely shed load. However, BOC is able to shed part loads from the facility to achieve partial load reduction as follows: H₂ Plant 1MW and NZS Nitrogen Pipeline Compressors (2 x

0.39MW). These loads may only be shed provided there is sufficient Nitrogen stock levels in storage and if the Hydrogen buffer storage vessels are at maximum pressure to maintain critical supplies to NZS.

41. A plant in the Finishing Plants complex is the Colour Coating Line. Relatively speaking, its load is very small, averaging ~1MW. Although its value adding capability is quite high, it is usually not a bottleneck plant and is generally available for load reduction purposes (depending on the order book situation at the time), although it has never been used as such in the past.
42. Another plant in the Finishing Plants complex is the Pipe Mill. Relatively speaking, its load is also very small, averaging ~1MW. It is usually not a bottleneck plant and is generally available for load reduction purposes (depending on the order book situation at the time), although it has never been used as such in the past.

Comments on Other Plants at NZS

43. The Slabmaking Plant is a bottleneck plant and has a load of ~3MW on average. In relative terms, its load is small. There is basically no capability to store liquid iron produced by the melters upstream of the Slabmaking Plant. If the Plant stops working, liquid iron has to be plated (tipped over a bank and allowed to cool and can be sold as plate later on) or the melters have to stop (along with the kilns and multi-hearth furnaces) with the ensuing modest net load rise (as described earlier). NZS does not plan to offer the Slabmaking Plant into its load reduction plan.
44. In the Finishing Plants, the largest load in this area is our Metals Coating Line. Its average load is ~8MW and it is a continuous plant. This plant has always been a bottleneck plant. NZS does not plan to offer the Metal Coating Line into its load reduction plan.
45. As mentioned earlier, BOC Gases Ltd operates an Air Separation Unit (ASU) at Glenbrook. The plant averages 8.5MW and operates continuously. Comments on partial load shedding have been made previously in para 40. If the ASU is shut down completely, NZS and other BOC customers will be completely reliant on finite stored gases in liquid gas storage facilities. A complete interruption to NZS supply (particularly Nitrogen) immediately causes emergency shutdowns of all NZS production plants. BOC is also the major supplier of pharmacopeia grade and aviation grade gases to the New Zealand market. NZS does not plan to offer a complete shutdown of the existing ASU into its load reduction plan.

Savings Plan

46. Following the receipt of a properly-given supply shortage direction for the system operator, NZS will issue a directive to all staff to reduce all discretionary electricity use. Discretionary means electricity use that does not impact on production and the health and safety of staff and the security of the site.
47. For any shortage, the first action the Company would take is to instruct Alinta to fire extra natural gas into Kilns Cogen and nominally an extra 8MW can be generated, thereby reducing the Company's net load on the grid by the same amount. The amount actually generated depends on the Iron Plant's production conditions at the time. Firing extra natural gas has been used extensively in the past to reduce NZS's net load on the grid, both short and long term. It has always been the Company's first action as it has no effect on production and, relatively speaking, the cost is not large, especially if the spot price is high at the time.
48. The next load that NZS would consider turning off is the Hot Strip Mill (as explained in section 38) which will reduce the Company's load by nominally 8MW.
49. Other loads which the Company would consider reducing should it be necessary to do so are (not necessarily in order) are the Cold Mills, the Color Coating Line, the Pipe Mill, the Metals Coating Line, BOC Gases and the Melters (see earlier sections 34-45 for the loads involved).
50. As generally explained earlier in sections 36 and 37, reducing the load of the Iron Plant (Multiple Hearth Furnaces and Kilns) and/or the Melters will have an effect on the amount of cogeneration, resulting in a small increase in the Company's net load. Short term load decreases (especially by the melters) are able to be done at peak NI load times but longer load decreases will see the Company's net load increase.
51. Any MW savings figures depend on the production conditions of the various plants at the time the request to reduce load is given. The cost figures for the various plants depend on the demand for and the selling price of various finished products that the Company makes.
52. Should NZS be contacted by the system operator to reduce load, NZS can provide up-to-date \$/MWh cost and production status information on a confidential basis.
53. If NZS has already reduced load due to high spot prices when contacted by the system operator, then this reduction shall form part of the response to the total reduction requested.

Coordination with the system operator

54. Communications from the system operator for coordination of NZS operations will be made in the first instance to the Energy Balancing Team Member. This communication will be made by telephone (see the Communications section of this plan – top of page 10). The Energy Balancing Team Member's cellphone is able to be called and will be answered 24/7.
55. A documented procedure that provides instruction and guidance to the Energy Balancing Team Member for supply shortage events has been developed. This procedure includes how coordination with the system operator is achieved during implementation of savings and restoration of loads.
56. As already mentioned in para 32, NZS currently has an exemption from providing AUFLS. If this situation changes, this plan assumes that any load connected to an armed AUFLS relay will remain eligible for inclusion in planned load reductions provided for in this PROP.
57. In the event that a Grid Emergency is coincident with a request for savings under this PROP it is assumed that the Grid Emergency requirements made by the system operator will take precedence over the PROP savings plan. The level of savings available under this plan will, therefore, be reduced by the level of any load reductions made in response to a Grid Emergency. It is expected that this will be taken into account in the levels of savings required by the system operator. NZS must take steps to ensure it meets the level of savings directed by the system operator.
58. It should be noted that, in the event of a Grid Emergency (especially the Developing Event variety), NZS may already have taken some net load reduction actions before being contacted by the system operator to do so under this Plan.

Monitoring and reporting

59. For major loads, NZS internal SCADA data will be used to produce daily or weekly reports of savings achieved.
60. Increased generation output from the Kilns Co-generation plant will be recorded on existing data logging metering and daily or weekly reports will be produced.
61. For unmetered loads, savings will be calculated by comparison with an average energy consumption profile and the observed actual loading reductions for during a supply shortage event.
62. Monitoring and reporting is the responsibility of the Energy Manager.
63. If required, reporting to the Electricity Authority will be undertaken as requested.