

Part C Common Quality

Section I General

1. Contents of part C

Part C relates to **common quality**. In particular, the **rules** in part C concern the **principal performance obligations** of the **system operator**, the performance obligations of **asset owners**, arrangements concerning **ancillary services** and **technical codes**.

Section II The principal performance obligations of the system operator (PPOs)

1. Contents of section II

Section II provides for:

- certain high level, output focussed performance obligations of the **system operator** in relation to the real time delivery of **common quality** and **dispatch**;
- a **policy statement** relating to the **principal performance obligations** of the **system operator**; and
- the review of that **policy statement**.

2. Principal performance obligations of the system operator

The **principal performance obligations** of the **system operator** are to:

2.1 Avoid cascade failure

Act as a **reasonable and prudent system operator** with the objective of **dispatching assets** made available in a manner which avoids the cascade failure of **assets** resulting in the loss of demand and arising from:

2.1.1 Frequency or voltage

Frequency or voltage excursions; or

2.1.2 Imbalances

Supply and demand imbalances.

2.2 Frequency

With regard to the frequency of **electricity**:

2.2.1 Maintain frequency in the normal band

Subject to rules 2.2.2 to 2.2.4 and 3, act as a **reasonable and prudent system operator** with the objective of maintaining frequency in the **normal band** in accordance with the requirements of schedule C6;

2.2.2 Manage frequency during momentary fluctuation

Subject to rule 3, act as a **reasonable and prudent system operator** with the objective of ensuring that during **momentary fluctuations** frequency stays between 47 Hertz and 52 Hertz (both inclusive);

2.2.3 Limit rate of occurrences of momentary fluctuations

Subject to rule 3, act as a **reasonable and prudent system operator** with the objective of ensuring that the aggregated rate of occurrence of **momentary fluctuations** experienced in the

North and South Islands of New Zealand does not exceed the statistical equivalent of the following levels:

Frequency Band (Hertz) (where "x" is the frequency during a momentary fluctuation)	Maximum number of occurrences by period (commencing on and from the operational date)
$52 > x \geq 51.25$	7 in any 12 month period
$51.25 > x \geq 50.5$	50 in any 12 month period
$49.5 \geq x > 48.75$	60 in any 12 month period
$48.75 \geq x > 48$	6 in any 12 month period
$48 \geq x > 47$	1 in any 60 month period

2.2.4 Recover quickly from a fluctuation

Act as a **reasonable and prudent system operator** with the objective of ensuring when a fluctuation in frequency occurs that frequency is restored to the **normal band** as soon as reasonably practicable having regard to all the circumstances surrounding the fluctuation;

2.2.5 Manage time error

Act as a **reasonable and prudent system operator** with the objective of ensuring **frequency time error** is not greater than five seconds of **New Zealand standard time**; and

2.2.6 Eliminate time error once a day

Act as a **reasonable and prudent system operator operator** with the objective of ensuring that at least once every **day** the **frequency time error** is eliminated.

2.3 Maintain other standards

2.3.1 Take reasonable action to maintain other standards

Where reasonably requested by any **participant**, identify the cause of the problem where the following standards are not being met at any **point of connection** to the **grid** and take any action available to it under the **rules**, as reasonably requested of it by any **participant** and practicable given the **assets** made available to it to resolve the problem:

2.3.1.1 Harmonic levels

The New Zealand Electrical Code of Practice (NZECP 36.1993) for harmonic levels, as amended from time to time;

2.3.1.2 Voltage flicker levels

The Australian Standard (AS2279.4 1991) for voltage flicker levels, as amended from time to time; and

2.3.1.3 Voltage imbalance of less than 1%

The requirement to use reasonable endeavours to maintain **negative sequence voltage** at less than 1% and to ensure that **negative sequence voltage** will be no more than 2% in any part of the grid.

2.3.2 Costs of maintaining other standards

In the event that the **system operator** is able to establish who is causing any departure from the standards referred to in rule 2.3.1, the **system operator** will endeavour to recover its reasonable identification and testing costs from that person. Where the causer is a **participant**, that **participant** must pay those costs to the **system operator**.

Where the **system operator** is unable to recover its reasonable identification and testing costs, or the causer is not able to be identified, then these costs will form part of the **system operator's identification costs**.

3. Exceptions for frequency standards

The **principal performance obligations** set out in rule 2 are qualified as follows:

3.1 Exceptions for South Island minimum frequency

The frequency the South Island will be permitted to fall below 47 Hertz provided that:

3.1.1 Momentary fluctuation rates not exceeded

The statistical equivalent of 1 **momentary fluctuation** below 47 Hertz in any 60 month period is not exceeded; and

3.1.2 Frequency does not fall below minimum limit

The frequency does not fall below 45 Hertz.

3.2 Exceptions for South Island maximum frequency

The frequency in the South Island will be permitted to exceed 52 Hertz, provided that:

3.2.1 Frequency does not rise above the maximum limit

The frequency does not exceed 55 Hertz; and

3.2.2 Momentary fluctuation rates not exceeded

The rate of **momentary fluctuations** experienced does not exceed the statistical equivalent of the following levels:

Frequency Band (Hertz) (where “x” is the frequency during a momentary fluctuation)	Maximum number of occurrences by period (commencing on and from the operational date)
55 > x ≥ 53.75	1 in any 60 month period
53.75 > x ≥ 52	2 in any 12 month period

3.3 Board may recommend rule changes in respect of South Island frequencies

The **Board** may, at the request of any **participant** or on its own initiative, recommend to the **Minister** any change to these **rules** to determine the **minimum South Island frequency** and **maximum South Island frequency** in accordance with the **Act**.

3.4 Factors the Board is to consider in recommending any rule change in respect of South Island frequencies

In making any recommendation to the **Minister** under rule 3.3, the **Board** must be satisfied that a **benefit to the public** will result from any such change. In making such an assessment, the **Board** will:

3.4.1 Capability of assets

Take into account the capability of **assets** to operate at frequencies below 47 Hertz, in respect of the **minimum South Island frequency**, or above 52 Hertz, in respect of the **maximum South Island frequency**; and

3.4.2 Likely costs

Take into account the likely costs of changing the **minimum South Island frequency** or the **maximum South Island frequency** including the cost of any additional **ancillary services** that will be required; and

3.4.3 Consult affected parties

Consult affected parties, including the **system operator**. Consultation with the **system operator** will address whether or not it will be necessary to revise the **policy statement** or the **procurement plan** as a result of the proposed change. If the **system operator** considers that a **policy statement** revision is required then the **system operator** will initiate a revision following the process set out in rule 12. If the **system operator** considers that a **procurement plan** revision is required then the

system operator will initiate a revision following the process set out in rule 7 of section IV.

4. **The system operator may rely on information provided**

For the purposes of the **rules** and the **regulations**, the **system operator** may rely on the **assets** and information about such **assets** made available to the **system operator** by **asset owners**, and may also assume that **asset owners** are complying with the **asset owner performance obligations** and the **technical codes** or complying with a valid **dispensation** or **equivalence arrangement**.

5. **Restoration**

In any event which disrupts the **system operator's** ability to comply with the **principal performance obligations**, the **system operator** will, given the capability of **generation** and **ancillary services** and the configuration and capacity of the grid and the information made available by **asset owners**, act as a **reasonable and prudent system operator** to re-establish normal operation of the power system as soon as possible having regard to the following priorities:

5.1 **Safety of persons**

First, to the safety of natural persons;

5.2 **Safety of assets**

Secondly, to the avoidance of damage to **assets**;

5.3 **Restoration of disconnected demand**

Thirdly, to the restoration of **offtake**;

5.4 **Restoration of PPO compliance**

Fourthly, to conformance with the **principal performance obligations**;
and

5.5 **Restoration of economic dispatch**

Fifthly, to full conformance with the **dispatch objective**.

6. **System operator may contract for higher levels of common quality**

Subject to part I, nothing in the **rules** will prevent the **system operator** from entering into contracts or arrangements whereby levels of quality more stringent than those specified in the **principal performance obligations** are agreed, provided that the **system operator** can identify the incremental costs of those more stringent levels and will ensure that those incremental costs are paid to the **system operator** by the persons wishing to enter into that contract or arrangement with the **system operator**.

7. System operator will not contract contrary to this arrangement

Subject to rule 6, and to part I, the **system operator** will not enter into contracts with other persons that are inconsistent with its obligations under the **rules** and the **technical codes**.

8. Purpose of the policy statement

The **policy statement** sets out policies and means that are considered appropriate during the term of that **policy statement** for the **system operator** to observe in complying with the **principal performance obligations**, subject always to the obligation of the **system operator** to act as a **reasonable and prudent system operator** and to therefore depart from the **policy statement** if so required. In particular, the **policy statement** is intended to allow the system operator to use its discretion in operational matters in accordance with rule 13.

9. Initial policy statement

The **policy statement** set out in schedule C4 is the **policy statement** to apply from the **operational date**.

10. Draft policy statement

10.1 Submit draft policy statement to Board

No later than 31 March in each successive twelve month period following the **operational date**, the **system operator** must submit to the **Board** a draft policy statement for the following 12 month period starting 1 September. The **Board** must use reasonable endeavours to bring the **draft policy statement** into effect no later than 1 September in the year in which it is submitted. In preparing the **draft policy statement**, the **system operator** is to invite comments from **registered participants** as to its content. The **Board** will review the **draft policy statement** in accordance with rule 11.

10.2 Contents of draft policy statement

The **draft policy statement** will contain the matters in, and will be prepared on the basis of, rule 8 for the period that it addresses, including:

10.2.1 Policies and means to comply with PPOs

The policies and means that the **system operator** considers appropriate for the **system operator** to observe in complying with its **principal performance obligations** for the following 12 months; and

10.2.2 Policies and means to achieve the dispatch objective

The policies and means by which scheduling and dispatch are adjusted to meet the **dispatch objective**, and will include the provision of a dispatch process statement. The dispatch process statement will contain the details of the processes which will enable the system operator to meet the **dispatch objective**,

including the methodologies to be used by the **system operator** for planning to meet the **dispatch objective** during the period leading up to real time and meeting the **dispatch objective** in real time.

10.2.3 Policies and means to address any conflict of interest

The policies and means by which the **system operator** intends to address any conflict of interest that arises in the performance of its obligations under the **rules**;

10.2.4 Reasons for adopting policies and means

A statement of the reasons for adopting the policies and means set out in the **policy statement** (which statement will be regarded as an explanatory note only and will not form part of the policies itself); and

10.2.5 Formulating policies and means in the future

A statement of how future policies and means might be formulated and implemented.

11. Process for policy statement review

11.1 Board must publish draft policy statement

Within 20 **business days** of receiving the **draft policy statement**, the **Board** must publish the **draft policy statement**.

11.2 Board invites submissions on draft policy statement

At the time the **Board publishes** the **draft policy statement** under rule 11.1, the **Board** will notify **registered participants** of the date by which submissions on the **draft policy statement** are to be received by the **Board**. This date will be no earlier than 10 **business days** from the date of **publication** of the **draft policy statement**.

11.3 Submissions process

11.3.1 Submissions to be in writing

Every submission on the **draft policy statement** must be made in writing to the **Board** and received on or before the **submission expiry date**. The **Board** will provide a copy of each submission received to the **system operator** at the close of business on the **submission expiry date** and will also **publish** these submissions.

11.3.2 System operator to be involved in submission process

The **system operator** shall have the right to make its own submission within 10 **business days** after the **submission expiry date** on the **draft policy statement** and the submissions received in relation to it. The **Board** must **publish** the **system operator's** submission when it is received.

11.4 Board to consider submissions and make recommendations to Minister

The **Board** must complete its consideration of all submissions it receives on the **draft policy statement** in accordance with rule 11.3 and must make recommendations to the **Minister**. Such recommendations must be made in accordance with the **Act**.

12. Rule changes and variations

12.1 Board will consult with system operator about impact of rule changes on policy statement

Where the **Board** is considering a proposal to change the **rules** or the **technical codes** (other than a change to the **policy statement** under rule 11), then, as part of the **Board's** consultation processes, the **Board** will consult with the **system operator** about the impact of the proposed changes on the **policy statement**.

12.2 Variations to a policy statement

12.2.1 Request for variation

At any time during the term of a current **policy statement** any **participant** (including the **system operator**) may submit a request for a variation to the current **policy statement**.

12.2.2 Process for considering variations

Upon receiving a request for a variation to a **policy statement**, the **Board** will decide whether or not to hold the request over until the next **draft policy statement** process under rule 10, or to decline the request or to pursue it. If the **Board** decides to pursue it, the **Board** must (except in the case of a request from the **system operator**) consult with the **system operator** as to the appropriateness of the requested variation. If the **system operator** considers, as a **reasonable and prudent system operator**, that the variation is appropriate, the **Board** may require the **system operator** to draft an amended **policy statement** and submit this to the **Board**. The **Board** will review the **draft policy statement** in accordance with rule 11.

13. Departure from a policy statement

13.1 Departure from a policy statement

The **system operator** shall depart from the policies set out in a **policy statement** in the event that a **system security situation** arises and such departure is required in terms of the **system operator** acting as a **reasonable and prudent system operator**.

13.2 Report required

When the **system operator** makes any departure under rule 13.1 because of a **system security situation**, the **system operator** will provide a report to the **Board** setting out the circumstances of the **system security situation** and the actions taken to deal with it. The **Board** will ensure this report is **published** within a reasonable time of its receipt.

14. Review of performance of the system operator

No later than 30 September in each year, the **system operator** must submit to the **Board** a review and assessment of its performance in the previous 12 month period ending 31 August. This self-review will contain such information as the **Board** may reasonably require from time to time to enable the **Board** to review the **system operator's** performance in carrying out its functions with respect to the **policy statement** during this period. The **Board** will review and assess the performance of the **system operator** in that period having regard to that self-review and such other matters as the **Board** considers relevant. The **Board's** review and assessment of the **system operator** will also be **published** within **ten business days** after the meeting of the **Board** at which it completed the review and assessment.

15. System operator to prepare and review system security forecast

15.1 System operator to prepare a system security forecast every two years

On a date to be agreed with the **Board**, but no later than 1 December 2004, and on the same day and month every two years thereafter, the **system operator** will prepare, **publish** and provide to the **Board** a **system security forecast**. The **system security forecast** will be a forecast of the **system operator's** ability to meet the **principal performance obligations** over the ensuing period of not less than three years. This forecast will take into account the capabilities of the **grid** and connected assets based on information known to, and able to be disclosed by, the **system operator**.

15.2 System operator to review system security forecast every six months

The **system operator** will review the most recent **system security forecast** prepared in accordance with rule 15.1 at six monthly intervals until a new forecast or update is prepared. If, in the reasonable opinion of **the system operator**, a change has been made to the power system that would materially affect the most recent forecast or update, the **system operator** will amend the **system security forecast**, **publish** it and provide it to the **Board**.

Section III Asset owner performance obligations (AOPOs) and technical standards

1. Contents of section III

Section III provides for:

- the establishment of performance obligations and technical standards for **asset owners** to assist the **system operator** in complying with the **principal performance obligations**;
- **asset owners** to obtain an assessment of their **assets** from the **system operator**; and
- a process for the **system operator** to approve applications for **equivalence arrangements** and **dispensations** (where necessary).

2. Asset owner performance obligations and technical standards concerning frequency

2.1 Contribution by injections to overall frequency management

Each **generator** (while **synchronised**) and the **HVDC owner** will at all times ensure that their **assets**, other than any **generating units** within an **excluded generating station**, make the maximum possible **injection** contribution to maintain frequency within the **normal band** (and to restore frequency to the **normal band**). Any such contribution will be assessed against the **technical codes**.

2.2 Contributions by purchasers to overall frequency management

Purchasers must limit the magnitude of any instantaneous changes in **offtake** of **electricity** and net rates of change in **offtake** to the levels the **system operator** reasonably requires. In setting these requirements, the **system operator** will have regard to the impact of the **offtake** on the **system operator's** ability to comply with the **principal performance obligations** concerning frequency (as set out in rule 2.2 of section II of part C) and the **dispatch objective**.

2.3 Contributions to frequency support in the case of under-frequency events

2.3.1 Generators

Subject to rule 2.3.2, each **generator** will at all times ensure that, while connected, its **assets**, other than any **excluded generating stations**, contribute to supporting frequency by remaining **synchronised**, ensuring each of its **generating units** can and does, at a minimum, sustain pre-event output:

2.3.1.1 At all times above 47.5 Hertz

At all times when the frequency is above 47.5 Hertz;

2.3.1.2 For at least 120 seconds when frequency is 47.5 Hertz

For at least 120 seconds when the frequency is 47.5 Hertz;

2.3.1.3 For at least 20 seconds when frequency is 47.3 Hertz

For at least 20 seconds when the frequency is 47.3 Hertz;

2.3.1.4 For at least 5 seconds when frequency is 47.1 Hertz

For at least 5 seconds when the frequency is 47.1 Hertz;

2.3.1.5 For at least 0.1 seconds when frequency is 47.0 Hertz

For at least 0.1 seconds when the frequency is 47.0 Hertz; and

2.3.1.6 For calculated times at other frequencies below 47.5 Hertz

At any frequencies between those specified in rules 2.3.1.2, 2.3.1.3, 2.3.1.4 and 2.3.1.5 for times derived by linear interpolation.

Where the inherent characteristics and design of its **generating unit** are such that it is reasonably able to operate beyond the above requirements, a **generator** will declare such capabilities in accordance with rule 2.5 of **technical code A** of schedule C3.

2.3.2 Exceptions for South Island generators

South Island **generators** will ensure that each of their assets, other than **excluded generating units**, remains **synchronised**, and can and does, at a minimum, sustain pre-event output:

2.3.2.1 At all times above 47 Hertz

At all times when the frequency is above 47 Hertz; and

2.3.2.2 For 30 seconds at minimum South Island frequency

For 30 seconds if the frequency falls below 47 Hertz but not below 45 Hertz.

2.3.3 HVDC owner

The **HVDC owner** will at all times ensure that, while connected, its **assets** contribute to supporting frequency during an **under-frequency event** in either **island** by:

2.3.3.1 Remaining connected when frequency above 48 Hertz

Remaining connected to those **assets** making up the **grid** in the North and South Islands while the frequency in both **islands** remains above 48 Hertz; and

2.3.3.2 Remaining connected when frequency below 48 Hertz and above 47 Hertz

Remaining connected to those **assets** making up the **grid** in the North and South Islands while the frequency in both islands remains below 48 Hertz and above 47 Hertz for 90 seconds; and

2.3.3.3 Remaining connected when frequency above 45 Hertz

Remaining connected to those **assets** making up the **grid** in the North and South Islands while the frequency in both Islands remains above 45 Hertz for 35 seconds, unless the frequency in either Island is less than 46.5 Hertz and the frequency is falling at a rate of 7 Hertz per second or greater; and

2.3.3.4 Modifying level of transfer

Subject to the level of transfer and the **HVDC link** configuration at the beginning of the **under-frequency event**, if the **HVDC link** itself is not the cause of the **under-frequency event**, modifying the instantaneous transfer on the **HVDC link** by up to 250 **MW** with the objective of limiting the difference between the North and South Island frequencies to no greater than 0.2 Hertz.

2.3.4 North Island distributors and South Island grid owners

North Island **distributors** and South Island **grid owners** will ensure that they have established and maintained **automatic under-frequency load shedding** in block sizes and with relay settings in accordance with the requirements of the **technical codes**.

2.4 Contributions by grid owners to frequency support

Each **grid owner** will ensure that its **assets** are capable of being operated and will operate within the frequency targets set out in rule 2.2.2 of section II and, for South Island **assets**, rules 3.2 and 3.3 of section II.

2.5 Excluded generating stations

For the purposes of rule 2.1, 2.3 and the provisions in **technical code A** of schedule C3 relating to the obligations of **asset owners** in respect of frequency, an **excluded generating station** will mean any **generating station** which exports to a **local network** or the **grid** less than 30 **MW**, unless the **Board** has issued a directive pursuant to rule 10 that such **generating station** must comply with rule 2.1, 2.3 and the relevant provisions in **technical code A** of schedule C3.

2.6 Excluded generating station notification requirements

Whether likely to be an **excluded generation station** or not, a **generator** that is planning to connect to the **grid** or a **local network** a **generating unit** with rated net maximum capacity equal to or greater than one **MW** will provide the **system operator** with written advice of its intention to connect together with such other information relating to that **generating unit** in accordance with rule 4.4.

3. Asset owner performance obligations and technical standards concerning voltage

The **asset owner performance obligations** as they primarily affect voltage are as follows:

3.1 Voltage Range AOPOs

3.1.1 Grid Owner

Each **grid owner** will ensure that its **assets** at and in between:

3.1.1.1 High voltage terminals

The high voltage terminals of the **grid owner's** transformers at each **grid injection point** and **grid exit point**; or

3.1.1.2 Where no transformer exists

Where no transformer exists, the relevant **grid injection point** or **grid exit point**;

are capable of being operated within the following range of voltages:

Nominal grid voltage (kV)	Voltage Limits			
	Minimum (kV)		Maximum (kV)	
220	198	-10.0%	242	10.0%
110	99	-10.0%	121	10.0%
66	62.7	-5.0%	69.3	5.0%
50	47.5	-5.0%	52.5	5.0%

3.1.2 Generators

Each **generator** with a **point of connection** to the **grid** will at all times ensure that its **assets** are capable of being operated, and do operate, when the **grid** is operated within the range of voltages set out in rule 3.1.1.

3.1.3 Distributors

Each **distributor** will ensure that its **local network** is capable of being operated, and does operate, when the **grid** is operated over the range of voltages set out in rule 3.1.1.

3.2 Voltage Support AOPOs

Each **generator** with a **point of connection** to the **grid** will at all times ensure its **assets**:

3.2.1 Exporting net reactive power at full load

When the voltage at its **grid injection point** is within the applicable range of nominal voltage, are capable of exporting (over excited) when **synchronised** and made available for dispatch by the **system operator**, a minimum net **reactive power** which is 50% of the maximum continuous megawatt (**MW**) output power as measured at the **generating unit** terminals as set out below:

Nominal grid voltage (kV)	Voltage range for which reactive power is required			
	Minimum (kV)		Maximum (kV)	
220	198	-10.0%	242	10.0%
110	99	-10.0%	121	10.0%
66	62.7	-5.0%	69.3	5.0%
50	47.5	-5.0%	52.5	5.0%
33	31.35	-5.0%	34.65	5.0%
22	21.45	-2.5%	22.55	2.5%
11	10.725	-2.5%	11.275	2.5%

3.2.2 Importing net reactive power at full load

When the voltage at its **grid injection point** is within the applicable range of nominal voltage, are capable of importing (under excited) when synchronised and made available for dispatch by the **system operator**, a minimum net reactive power which is 33% of the maximum continuous megawatt (**MW**) output power as measured at the **generating unit** terminals as set out below:

Nominal grid voltage (kV)	Voltage range for which reactive power is required			
	Minimum (kV)		Maximum (kV)	
220	209	-5.0%	242	10.0%
110	104.5	-5.0%	121	10.0%
66	62.7	-5.0%	69.3	5.0%
50	47.5	-5.0%	52.5	5.0%
33	31.35	-5.0%	34.65	5.0%
22	21.45	-2.5%	22.55	2.5%
11	10.725	-2.5%	11.275	2.5%

3.2.3 Support voltage in order to prevent system collapse

when **synchronised**, continuously operate in a manner that supports voltage and voltage stability on the **grid** in compliance with the **technical codes**.

3.3 Load shedding obligations to support voltage

3.3.1 Grid owners to shed load

Where it is not possible for **distributors** to comply with rule 3.3.2, the **grid owner** will, if possible, establish load shedding in block sizes and at voltage levels (and, where automatic systems are established, with relay settings) set out in the **technical codes** or otherwise as the **system operator** reasonably requires;

3.3.2 Distributors to shed load

In order to prevent the collapse of the **network** voltage, **distributors** will ensure that, where possible, they have established load shedding in block sizes and at voltage levels (and, where automatic systems are established, with relay

settings) in accordance with the **technical codes** or otherwise as the **system operator** reasonably requires.

4. Other asset owner performance obligations and technical standards

Other **asset owner performance obligations** are as follows:

4.1 Grid owner configuration performance obligation

Each **grid owner** will ensure that the design and configuration of its **assets** (including its connections to other persons) and associated protection arrangements are consistent with the **technical codes** and, in the reasonable opinion of the **system operator**, with maintaining the **system operator's** ability to comply with the **principal performance obligations**. In reaching this opinion, the **system operator** will have regard to the potential impact of the design or configuration of those **assets** or associated protection arrangements on its compliance with the **principal performance obligations** and achievement of the **dispatch objective**.

4.2 Grid owner's and distributor's obligations relating to connected persons

Each **grid owner** and each **distributor** will use reasonable endeavours to ensure that any **generator** which:

4.2.1 Connected

Is directly connected to its **grid** or directly or indirectly connected to its **local network** (as the case may be); and

4.2.2 Has a generating unit

Has a **generating unit** with a rated net maximum capacity equal to or greater than one **MW**,

will provide the **system operator** with written advice of the existence of such **generating unit** and the **generator's** name and address.

4.3 Communication facilities to be provided

All **asset owners** and **purchasers** will provide communication facilities which comply with the **technical codes** or otherwise, as the **system operator** reasonably requires, which will assist the **system operator** in planning to comply, and complying, with its **principal performance obligations** and achieving the **dispatch objective**.

4.4 Information to be provided

All **asset owners** and **purchasers** will provide information which complies with the **technical codes** or otherwise as the **system operator** reasonably requests, to assist the **system operator** in planning to comply, and complying, with its **principal performance obligations** and achieving the **dispatch objective**.

4.5 Provision of information for embedded generation output

If the **system operator** reasonably considers it necessary to assist the **system operator** in planning to comply, and complying, with the **principal performance obligations** and achieving the **dispatch objective**, the **system operator** may require that an **embedded generator** provide information regarding the intended output of each **embedded generating station** greater than 10 **MW** in capacity. Such information must be either:

4.5.1 Offer

Submitted as an **offer** in accordance with section II of part G; or

4.5.2 Form and manner agreed between system operator and embedded generator

Provided in a form and manner agreed between the **system operator** and the **embedded generator**.

The **system operator** will notify the **embedded generator** of its requirement at least 20 **business days** in advance of the requirement coming into effect.

4.6 Further rule regarding provision of information for embedded generation output

If the **system operator** reasonably considers it necessary to assist the **system operator** in planning to comply, and complying, with the **principal performance obligations** and achieving the **dispatch objective**, the **system operator** apply to the **Board** to require an **embedded generator** to provide information regarding the intended output of a group of **embedded generating stations** which total greater than 10 **MW** in capacity and which are connected to the same **grid exit point**. If the **Board** approves the **system operator's** request, then such information must be provided to the **system operator** by the relevant **embedded generator** in a form and manner determined by the **Board**

4.7 Asset owners to co-operate

All **asset owners** and **purchasers** will co-operate with the **system operator** as may reasonably be required by the **system operator** in carrying out its functions.

5. System operator to monitor compliance

5.1 Ongoing compliance to be monitored

To the extent possible, given the information made available by **asset owners**, the **system operator** will monitor, in the manner set out in the **policy statement**, the ongoing compliance of **asset owners** with the **asset owner performance obligations** and the **technical codes**. For the avoidance of doubt the **system operator** will have no monitoring obligations under this section other than those set out in the **policy statement**.

5.2 Right not to dispatch

The **system operator** has the discretion, acting as a **reasonable and prudent operator**, to not dispatch any **asset** or configuration of **assets**, if it is not satisfied that the **assets** or configuration of **assets** comply with the relevant **asset owner performance obligations** and/or provisions of the **technical codes** or that the **asset owner** has, and complies with, a valid **equivalence arrangement** or **dispensation** from the relevant **asset owner performance obligations** and/or provisions of the **technical codes**.

5.3 Asset owners to be notified

Where the **system operator** has reasonable grounds for believing that non compliance with an **asset owner performance obligation**, **equivalence arrangement** or **dispensation** exists, and that the **asset owner** has no valid **equivalence arrangement** or **dispensation** from the relevant **asset owner performance obligations** or provisions of the **technical codes**, or does not comply with a valid **equivalence arrangement** or **dispensation** from the relevant **asset owner performance obligations** and/or provisions of the **technical codes**, then the **system operator** will immediately notify the **asset owner**.

6. Responsibility for compliance

6.1 Nature of compliance obligation

All **asset owners** will comply with the **asset owner performance obligations** and **technical codes** at all times and, in addition, will satisfy the **system operator**, whenever requested by the **system operator** acting reasonably, that each of their **assets** or configuration of **assets** comply with the **asset owner performance obligations** and **technical codes** that apply to that **asset** or configuration of **assets**.

6.2 Obligation to restore compliance

In the event that an **asset owner** receives notification pursuant to rule 5.3, it will co-operate with the **system operator** and use reasonable endeavours to restore compliance as soon as practical.

6.3 Special provisions applicable during commissioning or testing

During any period of commissioning or testing of **assets**, the **asset owner performance obligations** and **technical codes** will not apply to that **asset owner** in respect of those **assets**, provided that:

6.3.1 Obligations are specified in the plan

The obligations which do not apply to the **asset owner** are specified in the agreed commissioning plan or testing plan; and

6.3.2 Compliance with commissioning or testing plan

During the period of non-compliance the **asset owner** complies with a commissioning plan or testing plan (as appropriate) agreed with the **system operator**; and

6.3.3 Non-compliance does not exceed the commissioning or testing plan

The period of non-compliance is no longer than the agreed commissioning plan or testing plan; and

6.3.4 Asset owner liabilities

Subject to rule 6.4, where an **asset owner** during any period of non-compliance meets the requirements of rules 6.3.1 to 6.3.3 inclusive, neither the **asset owner** nor the **system operator** will have any liability under the **rules** or **regulations** in relation to the non-compliance, except that the **asset owner** will not be relieved of liability in the case of any negligent act or omission by the **asset owner**.

6.4 Costs of non-compliance

During any period of non-compliance, the non-compliant **asset owner** must pay any readily identifiable and quantifiable costs associated with its non-compliance, including the costs of the **system operator** purchasing any additional **ancillary services** required as a consequence of its non-compliance.

7. Equivalence arrangements and dispensations

7.1 Right to apply for approval of equivalence arrangement or grant of dispensation

If an **asset owner** cannot comply with an **AOPO** or a **technical code** obligation in respect of a particular **asset** or configuration of **assets**, being an existing, new or proposed **asset**, the **asset owner** may apply for an **equivalence arrangement** to be approved or **dispensation** to be granted in accordance with the process set out in schedule C1.

7.2 Approval of equivalence arrangements

The **system operator** will approve an **equivalence arrangement** where it has received satisfactory evidence that the **asset owner** will put in place on the agreed date technical and/or commercial arrangements which will, in the reasonable opinion of the **system operator**, achieve compliance with the **AOPO** or **technical code** for which the **equivalence arrangement** is sought, even though the **assets** or configuration of **assets** are not themselves strictly compliant.

7.3 Grant of dispensations

The **system operator** will grant a **dispensation** to an **asset owner** who has or will have **assets** or a configuration of **assets** which are not compliant with either an **AOPO** or **technical code** where the **system operator** has a reasonable expectation that it can continue to operate the existing system and meet its **principal performance obligations** and where the **system operator** can readily quantify the costs on other persons of that **dispensation**, notwithstanding the particular non-compliance of those **assets**, provided that:

7.3.1 Costs to be paid

Where the approval of a **dispensation** could impose readily identifiable and quantifiable costs on other persons, then a condition of the **dispensation** shall be that the **asset owner** is liable to pay the **system operator** for those costs, including the costs of the **system operator** purchasing any other **ancillary services** required as a consequence of its **dispensation**; and

7.3.2 Acknowledgement regarding dispatch

The **asset owner** acknowledges that the granting of a **dispensation** does not guarantee that the **system operator** will **dispatch** that **asset** for which the **dispensation** was granted, as **dispatch** will only occur in accordance with the **dispatch objective**; and

7.3.3 Generator under-frequency AOPD dispensation costs

For the purpose of a **generating unit dispensation** from rule 2.3.1 or rule 2.3.2, a **generator** will be allocated the following costs in a relevant **trading period** with respect to rule 7.3.1 for each of **fast instantaneous reserves** or **sustained instantaneous reserves**:

$$\text{DispCost}_{\text{GENxt}} = 0.5 * Q_{\text{GENxt}} * P_{\text{IRt}}$$

Where:

$\text{DispCOst}_{\text{GENxt}}$ is the cost payable by a **generator** for **generating unit x** in any **trading period t** in which a class of **instantaneous reserves** is procured as a direct result of that **generating unit's dispensation** to ensure that the frequency does not fall below 47 Hertz or, in the South Island, below the **minimum South Island frequency** established in accordance with rule 3 of section II;

Q_{GENxt} is the **MW** amount by which **generating unit x** is unable to sustain pre-event output in **trading period t** with reference to rule 2.3.1 or 2.3.2 (as the case may be) as determined from the capabilities specified in that **generating unit's dispensation** (different amounts may be specified with respect to each class of **instantaneous reserves**); and

P_{IRt} is the **final reserve price** for **fast instantaneous reserves** or **sustained instantaneous reserves** (as the case may be) in **trading period t** in the relevant **island**.

7.4 Other conditions can be imposed

The **system operator** may also impose other reasonable conditions on the grant of a **dispensation** pursuant to rule 7.3, including conditions as to duration of the **dispensation**.

8. Liability of asset owner pending decision

Pending determination of the **asset owner's** application for a **dispensation** or **equivalence arrangement**, if the **asset** is not complying with the **AOPOs** or the **technical codes**, the **asset owner** is liable for its non-compliance and is responsible for any additional costs to the **system operator** or **asset owners** incurred as a result of the non-compliance, including the costs of the **system operator** purchasing any other **ancillary services** as a consequence of the **equivalence arrangement** or **dispensation**.

8.1 Modification of an equivalence arrangement or a dispensation

An **asset owner** may apply to the **system operator** for a modification to a **equivalence arrangement** or **dispensation** and the process set out in this rule 8 and schedule C1 will apply.

8.2 Cancellation of an equivalence arrangement or a dispensation

An **asset owner** may at any time give written notice to the **system operator** for the **equivalence arrangement** or **dispensation** to be cancelled on the grounds that the **asset** or configuration of **assets** subject to the **equivalence arrangement** or **dispensation** now complies with **AOPOs** or **technical codes**. The cancellation will take effect on the date specified in the notice as being the date the **system operator** accepted the cancellation. The **system operator** shall record such cancellation in the **system operator register** within five days of such notice.

8.3 Revocation of equivalence arrangement and revocation or variation of dispensation

8.3.1 Right to revoke

The **system operator** may revoke approval of an **equivalence arrangement** or revoke or vary the grant of the **dispensation** as the **system operator** reasonably considers appropriate if, at any time after the **system operator** has approved an **equivalence arrangement** or granted a **dispensation**, the **system operator** is satisfied that one or more of the following factors apply:

8.3.1.1 False or misleading information

The **dispensation** or **equivalence arrangement** was approved on information that was false or materially misleading;

8.3.1.2 Change in circumstance

A prerequisite of the **dispensation** or **equivalence arrangement** has changed;

8.3.1.3 Condition not complied with

A condition upon which the **dispensation** or **equivalence arrangement** was approved has not been complied with;

8.3.1.4 Term of dispensation

Such withdrawal is provided for under the terms of any **dispensation** granted;

8.3.1.5 Rule change

A rule change has occurred which affects the **dispensations** or **equivalence arrangements**;

8.3.1.6 Ruling Panel direction

After reconsideration of any decision carried out at the direction of the **Rulings Panel** under rule 8.4.1.4.

8.3.2 Restriction on right to revoke

The **system operator** shall not revoke or amend a **dispensation** and/or grant a further **dispensation** or revoke its approval of an **equivalence arrangement** pursuant to rule 8.3.1 above, unless:

8.3.2.1 Notice of intentions

The **asset owner** to whom the **dispensation** was granted, or for whom an **equivalence arrangement** was approved, and any other person who in the opinion of the **system operator** is likely to have an interest in the matter, is given reasonable notice of the **system operator's** intentions and a reasonable opportunity to make submissions to the **system operator** on the issue; and

8.3.2.2 The system operator has regard to submissions

The **system operator** has regard to those submissions.

8.4 Appeal against decisions

8.4.1 Right of appeal

8.4.1.1 Participant

Any **participant** can appeal any decision of the **system operator** or an **asset owner** in relation to an application for **dispensation** or **equivalence arrangements** on the grounds set out in rule 8.4.1.3;

8.4.1.2 Notice of appeal

Every such appeal shall be made to the **Rulings Panel** by giving written notice to the **Board** specifying

the grounds of appeal. Every such notice must be given within 10 **business days** of publication of the relevant decision in the **system operator register** under rule 8 of schedule C1;

8.4.1.3 Grounds of appeal

For the purpose of rule 8.4.1.2, an appeal may be made on the grounds that:

- (a) the **system operator** made an error of fact or failed to take properly into account all relevant information or took into account irrelevant information and such error, failure or irrelevancy was material to the decision; or
- (b) the conditions imposed on the **dispensation** or **equivalence arrangement** are unjustifiably onerous, unnecessary or impose extra costs where appropriate alternatives exist.

8.4.1.4 Decision of the Ruling Panel

The **Rulings Panel**, in determining any appeal, shall either approve the decision of the **system operator** or direct the **system operator** to reconsider the decision in full or by reference to specified matters.

8.4.2 Status of decisions pending any appeal

Pending the outcome of any appeal pursuant to rule 8.4.1.4, the decision of the **system operator** in relation to the grant of a **dispensation** or approval of an **equivalence arrangement** will be valid and may be acted upon by the relevant **asset owner**.

9. Other provisions relating to equivalence arrangements and dispensations

9.1 Compliance of asset owners

An **asset owner** who obtains approval for an **equivalence arrangement** will comply with its obligations under that arrangement.

9.2 No precedent

Equivalence arrangements and **dispensations** are specific to **asset owners**, and no approval of an **equivalence arrangement** or granting of a dispensation shall be construed as creating a precedent for the approval of other **equivalence arrangements** or **dispensations**.

9.3 Asset owner to notify system operator of potential non-compliance

The owner or operator of an **asset** or configuration of **assets** will notify the **system operator** if that owner or operator believes that it is in breach of any condition of its **dispensation** or **equivalence arrangement** or that such **asset** or configuration of **assets**, including any **equivalence arrangement**, does not, or is likely not to, comply with the **asset owner performance obligations** and **technical codes**.

9.4 Failure of an equivalence arrangement or dispensation

If an **asset owner** fails to put in place, maintain and meet all requirements of an approved **equivalence arrangement** or **dispensation**, the **asset owner** will be in breach of the **rules**.

10. Board may require excluded generating stations to comply with certain rules

10.1 System operator may apply to Board to extend compliance

Notwithstanding anything in rules 2.1 and 2.3, the **system operator** may, at any time, apply to the **Board** for it to issue a directive that certain **excluded generating station assets** must comply with rules 2.1 and 2.3 and the provisions of the **technical codes** (or parts thereof).

10.2 Criteria for Board decision

The **Board** will issue the directive referred to in rule 10.1 if it is satisfied that there is a **benefit to the public** in obtaining that compliance.

10.3 Implementation of directive

In the event that a directive is issued pursuant to rule 10.2, the owner of the relevant **excluded generating station assets** will ensure that it complies with the directive with effect from the date specified in that directive.

Section IV Arrangements concerning ancillary services

1. Contents of section IV

Section IV provides for:

- a **procurement plan** which the **system operator** must use reasonable endeavours to implement and comply with;
- the review of the **procurement plan**;
- certain **alternative ancillary service arrangements**;
- how each **ancillary service** is to be priced and measured; and
- identifying the **allocable costs** for **ancillary services** and sets out the regime by which those costs are allocated to affected parties.

2. System operator to use reasonable endeavours to implement and comply with procurement plan

The **system operator** must use reasonable endeavours to both implement and comply with the **procurement plan**.

3. Initial procurement plan

The initial **procurement plan** will be for the year starting 1 November 2004. The procurement of **ancillary services** prior to the introduction of the initial **procurement plan** will be governed by part I.

4. Process for procuring ancillary services

4.1 Draft procurement plan

No later than 1 June in each 12 month period following the **operational date**, the **system operator** must submit a draft procurement plan to the **Board** for the following 12 month period starting 1 December. The **Board** must use reasonable endeavours to bring the draft procurement plan into effect no later than 1 December in the year in which it is submitted. In preparing the **draft procurement plan**, the **system operator** must invite comment from **registered participants** as to its content. The **Board** will review the **draft procurement plan** in accordance with rule 5.

4.2 Contents of draft procurement plan

The **draft procurement plan** will, for each **ancillary service**:

4.2.1 Principles to be applied in making net purchaser quantity assessment

Specify the principles that the **system operator** will apply in making a **net purchase quantity assessment**;

4.2.2 Process for making a net purchase quantity assessment

Outline the process which the **system operator** will apply in making a **net purchase quantity assessment**, which will include:

4.2.2.1 Requirements for complying with PPOs

Determining the requirements for complying with the **principal performance obligations**;

4.2.2.2 Requirements for achieving the dispatch objective

Determining the requirements for achieving the **dispatch objective**;

4.2.2.3 Contribution of asset owner compliance

Assessing the contribution that compliance by **asset owners** with the **asset owner performance obligations** will make towards the **system operator's** compliance with the **principal performance obligations**; and

4.2.2.4 Impact of dispensations and equivalence

Assessing the impact that **dispensations** and **alternative ancillary services arrangements** held by **asset owners** will have on the quantity of **ancillary services** required to enable the **system operator** to comply with the **principal performance obligations**;

4.2.3 A net purchase quantity assessment

Contain a net purchase quantity assessment for the 12 months following the expiry of the term of the then current **procurement plan** (if any);

4.2.4 The system operator's proposed procurement processes

Outline the process which the **system operator** will use to procure that **ancillary service**, taking into account that:

4.2.4.1 Market mechanisms preferred

The **system operator** will use market mechanisms to procure **ancillary services** wherever technology and transaction costs make this practicable and efficient; and

4.2.4.2 Transparent processes where no market mechanisms

Until such time as markets are developed, the **system operator** will use transparent processes which encourage all potential providers to compete to supply **ancillary services** required to meet **common quality** standards at the best economic cost.

4.2.5 Financial information concerning ancillary services

Specify the **administrative costs** for that **ancillary service** as proposed in the **draft procurement plan**;

4.2.6 Technical and contracting principles

Outline the **system operator's** technical requirements and key contract terms to support the **draft procurement plan**;

4.2.7 Matters relating to unanticipated procurement

Outline the rights and obligations of the **system operator** in relation to procurement of that **ancillary service** in circumstances not anticipated by the **draft procurement plan** and in circumstances where the assumptions made by the **system operator** in the **procurement plan** cannot be met;

4.2.8 Commentary on competitive cost pressures and degree of innovation involved

Include an assessment by the **system operator** of competitive cost pressures and the degree of innovation it believes are involved in the procurement process it is proposing for that **ancillary service**; and

4.2.9 The system operator's reporting obligations

Outline how the **system operator** will report on progress in implementing the **procurement plan**.

5. Process for procurement plan review

5.1 Board must publish draft procurement plan

Within 20 **business days** of receiving a **draft procurement plan**, the **Board** must publish the **draft procurement plan**.

5.2 Board invites submissions on draft procurement plan

At the time the **Board publishes** the **draft procurement plan** in accordance with rule 5.1, the **Board** will notify the **registered participants** of the date by which submissions on the **draft procurement plan** are to be received by the **Board**. This date will be no earlier than 10 **business days** from the date of **publication** of the **draft procurement plan**.

5.3 Submission process

5.3.1 Submissions to be made in writing

Every submission on the **draft procurement plan** must be made in writing to the **Board** and received on or before the **submission expiry date**. The **Board** will provide a copy of each submission received to the **system operator** at the close of business on the **submission expiry date** and will also **publish** these submissions.

5.3.2 System operator to be involved in submission process.

The **system operator** shall have the right to make its own submission within 10 **business days** after the **submission expiry date** on the **draft procurement plan** and the submissions

received in relation to it. The **Board** must **publish** the **system operator's** submission when it is received.

5.4 Board to consider submissions and make recommendations

The **Board** must complete its consideration of all submissions it receives on the **draft procurement plan** in accordance with rule 5.3 and must make recommendations to the **Minister**. Such recommendations must be made in accordance with the **Act**.

6. Contracts with ancillary service agents

The **system operator** will use reasonable endeavours to implement the **procurement plan** for each **ancillary service** by entering into contracts with the **ancillary service agents** in the manner specified in the **procurement plan**. The **system operator** will act as a principal to any contracts it enters into with **ancillary service agents**. Where the **system operator** has entered into contracts, the **system operator** will use reasonable endeavours to ensure that the **ancillary service agents** comply with their contractual obligations but the **system operator** will not otherwise be liable in respect of any failure by the **ancillary service agents** to comply with such obligations.

7. Rule changes and variations

7.1 Board will consult with system operator about impact of changes to rules and technical codes on procurement plan

Where the **Board** is considering changing the **rules** or the **technical codes** (other than a change to the **procurement plan** under rule 4), then, as part of the **Board's** consultation processes, the **Board** will consult with the **system operator** about the impact of the proposed changes on the **procurement plan**.

7.2 Variations to a procurement plan

7.2.1 Right to submit a request for variation

At any time during the term of a current **procurement plan** any **participant** (including the **system operator**) may submit a request for a variation to the current **procurement plan**.

7.2.2 Process for considering variations

Upon receiving a request for a variation to a **procurement plan**, the **Board** will decide whether or not to hold the request over until the next **draft procurement plan** process under rule 4, or to decline the request or to pursue it. If the **Board** decides to pursue it, the **Board** must (except in the case of a request from the **system operator**) consult with the **system operator** as to the appropriateness of the requested variation. If the **system operator** considers, as a **reasonable and prudent system operator**, that the variation is appropriate, the **Board** may require the **system operator** to draft an amendment **procurement plan** and submit this to the **Board**. The **Board** will review the amended **procurement plan** in accordance with rule 5.

8. Departure from procurement plan

8.1 Departure from the procurement plan

The **system operator** may depart from the processes and arrangements set out in the **procurement plan** if the **system operator** reasonably considers it necessary to do so to comply with the **principal performance obligations**.

8.2 Report required

When the **system operator** makes any departure under rule 8.1, the **system operator** will provide a report to the **Board** setting out the circumstances of the departure and the actions taken to deal with it. The **Board** will ensure this report is **published** within a reasonable time of its receipt.

9. Alternative ancillary service arrangements

9.1 Right to apply to system operator for authorisation of an alternative ancillary service arrangement

Where an **asset owner** wishes to have an **alternative ancillary service arrangement** authorised by the **system operator**, that **asset owner** (or, in the event that more than one **asset owner** wishes to have an authorisation, those **asset owners** jointly) may apply to the **system operator** to have that arrangement authorised as an **alternative ancillary service arrangement** using the process set out in schedule C2.

9.2 Authorisation of an alternative ancillary service arrangement

The **system operator** will authorise the arrangement as an **alternative ancillary service arrangement** if:

9.2.1 Technical compliance with procurement plan

The proposed arrangement complies with the technical requirements for that **ancillary service** as set out in the current **procurement plan**; and

9.2.2 Ancillary service made available for dispatch by the system operator

The implementation of the proposed arrangement will make the **ancillary service** available for dispatch by the **system operator** in substantially the same manner as if that **ancillary service** had been procured pursuant to the **procurement plan**.

9.3 System operator may impose conditions

As a condition of authorising an **alternative ancillary service arrangement** under rule 9.2, the **system operator** may:

9.3.1 Arrangements with the system operator

Require the applicant to enter into certain arrangements with the **system operator** to ensure that it can continue to meet the **principal performance obligations**;

9.3.2 Specify a operational date

Specify the date on which the **alternative ancillary service arrangement** will commence; and

9.3.3 Impose conditions

Impose any other condition it reasonably believes is necessary, including conditions necessary for the **system operator** to meet its **principal performance obligations** and conditions necessary for the orderly reconciliation and settlement of **ancillary services**.

9.4 Suspension of alternative ancillary service arrangement

9.4.1 Asset owner may suspend

An **asset owner** may at any time give written reasonable notice to the **system operator** of suspension of the **alternative ancillary service arrangement** for a period specified in the notice.

9.4.2 System operator may suspend an alternative ancillary service arrangement

The **system operator** may suspend an **alternative ancillary service arrangement** in a **system security situation**.

9.5 Modification of an alternative ancillary service arrangement

An **asset owner** may apply to the **system operator** for a modification to an **alternative ancillary service arrangement** and the process set out in this rule 9 and schedule C2 will apply.

9.6 Cancellation of an alternative ancillary service arrangement

An **asset owner** may at any time give reasonable notice in writing to the **system operator** of cancellation of the **alternative ancillary service arrangement** which shall come into effect on the date specified in the notice.

9.7 Revocation of alternative ancillary service arrangements

9.7.1 Right to revoke

If at any time after the **system operator** has authorised an **alternative ancillary services arrangement**, the **system operator** is satisfied that one or more of the following factors apply:

9.7.1.1 False or materially misleading information

The **alternative ancillary service arrangement** was authorised on information that was false or materially misleading;

9.7.1.2 Prerequisite changed

A prerequisite of the **alternative ancillary service arrangement** has changed;

9.7.1.3 Condition not complied with

A condition upon which the authorisation was granted has not been complied with;

9.7.1.4 Revocation is provided for

Such revocation is provided for under the terms of any authorisation,

the **system operator** may revoke authorisation of the **alternative ancillary service arrangement** as the **system operator** reasonably considers appropriate.

9.7.2 Restriction on right to revoke

Subject to rule 9.4.2, the **system operator** shall not revoke or amend an **alternative ancillary service arrangement** unless the person to whom the authorisation was granted and any other person who, in the opinion of the **system operator**, is likely to have an interest in the matter is given reasonable notice of the **system operator's** intentions and a reasonable opportunity to make submissions to the **system operator**, and the **system operator** has had regard to those submissions.

9.8 Appeal of system operator decisions

9.8.1 Applicant

Any applicant can appeal any decision of the **system operator** in relation to any **alternative ancillary service arrangement**.

9.8.2 Participant

Any **participant** can appeal any decision of the **system operator** in relation to an **alternative ancillary service arrangement** on the grounds set out in rule 9.8.4;

9.8.3 Notice of appeal

Every such appeal shall be made to the **Rulings Panel** by giving written notice to the **Board**, specifying the grounds of appeal. Every such notice must be given within 10 **business days** of **publication** of the decision in the **system operator register** under rule 1.6 of schedule C2.

9.8.4 Grounds of appeal

For the purpose of rule 9.8.2, an appeal may be made on the grounds that:

9.8.4.1 System operator error

The **system operator** made an error of fact, or failed to take properly into account all relevant information or took into account irrelevant information and such error, failure or irrelevancy was material to the decision; or

9.8.4.2 Conditions imposed

The conditions imposed on the **alternative ancillary service arrangement** are onerous, unnecessary or impose extra costs where appropriate alternatives exist.

9.8.5 Decision of the Rulings Panel

The **Rulings Panel**, in determining any appeal, shall either approve the decision of the **system operator** or direct the **system operator** to reconsider the decision in full or by reference to specified matters.

9.8.6 Status of decision pending any appeal

Pending the outcome of any appeal pursuant to this rule 9.8, the decision of the **system operator** in relation to the authorisation of an **alternative ancillary service arrangement** will be valid and can be acted upon by the relevant **asset owner**.

10. Other provisions relating to alternative ancillary service arrangements

10.1 System operator to monitor ongoing compliance of alternative ancillary service arrangements

The **system operator** will monitor the performance of **alternative ancillary service arrangements** in accordance with both the **procurement plan** and the monitoring regimes specified in the respective **alternative ancillary service arrangements**. Where the **system operator** has reasonable grounds for thinking that an **alternative ancillary service arrangement** is not being, or likely not to be, complied with then the **system operator** will immediately notify the **asset owner**.

10.2 Compliance by asset owner

An **asset owner** who obtains an authorisation of an **alternative ancillary service arrangement** will comply with its obligations under the arrangement. In the event that an **asset owner** receives notification pursuant to rule 10.1, it will co-operate with the **system operator** and will immediately use reasonable endeavours to restore compliance as soon as possible.

10.3 Holder of an alternative ancillary service arrangement not subject to cost allocations

It is intended that any **asset owner** who holds an **alternative ancillary service arrangement** will be relieved of an obligation to pay costs for **ancillary service** in the manner provided for in rule 11 to the extent set out in the **alternative ancillary service arrangement**.

10.4 Failure of an authorised alternative ancillary services arrangement

The holder of an **alternative ancillary service arrangement** will be in breach of the **rules** where **ancillary services** are not made available to the **system operator** in accordance with the **alternative ancillary service arrangement** or where an **alternative ancillary service arrangement** fails. From the date any such breach of an **alternative ancillary service arrangement** becomes known the holder of the **alternative ancillary service arrangement** shall be required to meet its share of the ancillary costs as if the **alternative ancillary service arrangement** had not been authorised.

11. Allocating ancillary services costs

11.1 Identifying costs associated with each ancillary service

The **allocable costs** for each **ancillary service** will be:

11.1.1 Actual costs pursuant to procurement contracts

The actual amounts that the **ancillary service agents** are entitled to receive for that **ancillary service** pursuant to contracts entered into by the **system operator** in implementing the **procurement plan**; plus

11.1.2 Administrative costs associated with that ancillary service

The actual **administrative costs** of the **system operator** (as approved by the **Board**) incurred in administering the **procurement plan** in respect of that **ancillary service**; less

11.1.3 Contribution from dispensation

Any readily identifiable and quantifiable costs to be paid by **asset owners** in respect of that **ancillary service** as a condition of any **dispensations** stipulated in accordance with rule 7.3.1 of section III; less

11.1.4 Identifiable costs

Any identifiable costs to be paid by any person in respect of that **ancillary service**, as a condition of any agreement reached by the **system operator**, in accordance with rule 6 of section II.

11.2 Black start costs allocated to grid owner

The **allocable cost** of **black start** will be paid by the **registered participants** who are **grid owners** to the **system operator** in accordance with the process described in rule 11.7. Where there are multiple **grid owners**, these costs will be allocated between them in proportion to their respective ODV valuations.

11.3 Over frequency reserve costs allocated to HVDC owner

The **allocable cost** of **over frequency reserves** will be paid by the **HVDC owner** to the **system operator** in accordance with the process described in rule 11.7.

11.4 Frequency keeping costs are allocated to purchasers

The **allocable cost** of **frequency keeping** will be paid by **purchasers** to the **system operator** in accordance with the process in rule 11.7. These costs will be calculated in accordance with the following formula:

$$\text{Share}_{\text{PUR}_x} = \frac{F_c * \max(0, \sum_t (\text{Offtake}_{\text{PUR}_{xt}} - E^{\text{FK}}_{\text{PUR}_{xt}}))}{\sum_x \max(0, \sum_t (\text{Offtake}_{\text{PUR}_{xt}} - E^{\text{FK}}_{\text{PUR}_{xt}}))}$$

where:

$\text{Share}_{\text{PUR}_x}$ is **purchaser x's share of allocable cost** in relation to **frequency keeping**;

F_c is the **allocable cost** of **frequency keeping** services in the **billing period**;

$\text{Offtake}_{\text{PUR}_{xt}}$ is the total **reconciled quantity** in **kWh** for **purchaser x** across all **grid exit points** in **trading period t** in the **billing period**;

$E^{\text{FK}}_{\text{PUR}_{xt}}$ is the quantity of any **frequency keeping** provided pursuant to any alternative **ancillary services arrangement** for **frequency keeping** authorised by the **system operator** for **purchaser x** in **trading period t**.

11.5 Instantaneous reserve costs are allocated in two parts – availability and event charges

11.5.1 Availability costs allocated to generators and HVDC owner

The **availability costs** in a **billing period** will be allocated separately to persons in the North Island and South Island in accordance with the following formula:

$$\text{Share}_t = \frac{A_{ct} * m_t}{M_t}$$

where:

Share_t	is the availability cost allocated to a generator which owns “ generating unit x ” or to the HVDC link for trading period t for the North Island or South Island as appropriate;
A_{ct}	is the availability cost for the North Island or South Island as appropriate incurred in respect of trading period t ;
m_t	<div style="display: flex; align-items: center;"> <div style="font-size: 3em; margin-right: 10px;">{</div> <div> <p>is $\max(0, \text{INJ}_{\text{GENxt}} - (h * \text{INJ}_D) - E^{\text{IR}}_{\text{GENxt}}) = m_{xt}$ for any generating unit; and</p> <p>is $\max(0, \text{HVDC}_{\text{Riskt}} - (h * \text{INJ}_D) - E^{\text{IR}}_{\text{HVDCt}}) = m_{ht}$ for the HVDC link;</p> </div> </div>
M_t	is $\sum_x m_{xt} + m_{ht}$;
h	is 0.5 MWh/MW ;
$\text{INJ}_{\text{GENxt}}$	is the electricity injected (expressed in MWh) by generating unit x in trading period t into the North Island or South Island as appropriate;
$E^{\text{IR}}_{\text{GENxt}}$	is the quantity of any instantaneous reserve provided pursuant to any alternative ancillary service arrangements for instantaneous reserve authorised by the system operator for generating unit x in trading period t ;
$\text{HVDC}_{\text{Riskt}}$	is the at risk HVDC transfer (expressed in MWh) in trading period t into the North Island or South Island as appropriate;
$E^{\text{IR}}_{\text{HVDCt}}$	is the quantity of any instantaneous reserve provided pursuant to any alternative ancillary services arrangement for instantaneous reserve authorised by the system operator for at risk HVDC transfer in trading period t ; and
INJ_D	is 60 MW .

11.5.2 Event costs allocated to event causers

The **event charge** payable by the **causer** of an **under-frequency event** (referred to as “Event e” below) will be calculated in accordance with the following formula:

$$EC = ECR * (\sum_y (INT_{ye} \text{ for all } y) - INJ_D)$$

where:

- EC is the **event charge** payable by the **causer**;
- ECR is \$1,250 per **MW**;
- INJ_D is 60 **MW**;
- INT_{ye} is the electric power (expressed in **MW**) lost at point y by reason of Event e (being the net reduction in the injection of **electricity** (expressed in **MW**) experienced at point y by reason of Event e) excluding any loss at point y by reason of secondary Event e; and
- y is a **point of connection** or the **HVDC injection point** where the injection of **electricity** was interrupted or reduced by reason of Event e.

11.5.3 Rebates paid for under-frequency events

Any **event charge** that has been paid for an **under-frequency event** (referred to as “Event e”) pursuant to rule 11.5.2 will be rebated in accordance with the following formula to persons who are allocated **availability costs** in accordance with rule 11.5.1:

$$\text{Rebate}_{xe} = EC_e * Z_{xe}/Z_{tote}$$

where:

- Rebate_{xe} is the rebate of the **event charge** paid for Event e to person “x”, who has been allocated **availability costs** in accordance with rule 11.5.1;
- EC_e is the **event charge** paid for Event e;
- Z_{xe} is the sum of all **availability costs** paid by x during the **billing period** in which Event e occurred and the two preceding **billing periods**; and
- Z_{tote} is the sum of all **availability costs** paid for all **trading periods** during the **billing period** in which Event e occurred and the two preceding **billing periods**.

11.5.4 Payments and rebates

All costs calculated in accordance with rules 11.5.1 and 11.5.2 will be payable by the relevant **participants** to the **system operator**, and all **event charge** rebates calculated in accordance with rule 11.5.3 will be payable by the **system operator** to the relevant **participants**, in accordance with the process set out in rule 11.8.

11.6 Voltage support costs are allocated in three parts – nominated peak, monthly peak and residual charges

Each **generator** holding a **dispensation** issued in accordance with rule 1 of section II of part I and each **distributor** will pay the **allocable cost** of **voltage support** in each **zone** to the **system operator** in accordance with the process described in rule 11.7. These costs will be calculated in accordance with the following process:

11.6.1 Calculating the nominated peak kvar charge

Each **generator** who holds a **dispensation** for which costs are payable under rule 1.1.4 of section II of part I and each **distributor** will pay a nominated peak kvar charge calculated in accordance with the following formula:

$$\text{NomCharge}_{xz} = \text{PeakRate}_z * \sum_j Q_{xjz}$$

where:

NomCharge_{xz} is the total nominated peak charges for **distributor x** or the total charge for **generator x** (as the case may be) in zone z;

Peak Rate_z is the fixed \$/kvar set annually in advance by **system operator** for zone z;

Q_{xjz} = { is **Nom Peak_{LINES_{xjz}}**, which is the peak demand in kvar (in zone z) nominated to the System Operator in advance of, and having effect from, 1 March each year by **distributor x** at its **distributor kvar reference node j**; and
 is **Non Comp_{GEN_{xjz}}**, which is the difference between the kvar capability required by the **rules** and the kvar capability of the dispensated **generator**, as recorded in the **dispensation** for **generator x** at each of its dispensated **generating stations j** in zone z;

∑ j = { is the sum across all **distributor kvar reference nodes j** of **distributor x** in zone z; and
 is the sum across all dispensated **generating stations j** of **generator x** in zone z.

11.6.2 Calculating the monthly peak penalty charge

Each **distributor** will pay a monthly peak penalty charge calculated in accordance with the following formula:

$$\text{PeakPenaltyCharge}_{\text{LINE}xz} = \text{PenaltyRate}_z * \sum_j \text{PenaltyQuantity}_{\text{LINE}xjz}$$

where:

$\text{PeakPenaltyCharge}_{\text{LINE}xz}$ is the total peak penalty charges for **distributor** x across all **distributor kvar reference nodes** j for **distributor** x in zone z;

PenaltyRate_z is the fixed \$/kvar penalty charge for “kvar above nominated kvar” set annually in advance by **system operator** in zone z;

$\text{PenaltyQuantity}_{\text{LINE}xjz}$ is the “kvar above nominated kvar” quantity for **distributor** x at its **distributor kvar reference node** j in zone z;

For the purpose of calculating “kvar above nominated kvar”, the kvar taken by the **distributor**:

(a) includes only kvar demands on weekdays (Monday to Friday but excluding **national holidays**) between the hours of 0700 to 2100 inclusive;

(b) includes no more than two kvar peaks in any one day; and

(c) is the average of the six largest kvar peaks for the **distributor** in each month measured at the **distributor kvar reference node** j within the zone z.

and “kvar above nominated kvar” shall be the difference between the kvar taken by the **distributors** as determined in (a), (b) and (c) and nominated kvar specified by the **distributor**.

\sum_j is the sum across all **distributor kvar reference nodes** j of **distributor** x in zone z.

11.6.3 Calculation of residual charge

Each **generator** who holds a **dispensation** issued in accordance with rule 1 of section II of part I for which costs are payable under rule 1 of section II of Part I and each **distributor** (as the case may be) will pay a residual charge or receive a residual payment calculated in accordance with the following formulae:

$$\begin{aligned} \text{Residual}_{\text{ALL}z} &= \text{Vcost}_z - \text{Nom Charge}_{\text{ALL}z} - \text{PeakPenaltyCharge}_{\text{ALL}z} \\ \text{Residual}_{\text{LINE}allz} &= \text{Residual}_{\text{ALL}z} * (\sum_{xj} \text{NomPeak}_{\text{LINE}xjz} / \sum_{xj} Q_{xjz}) \\ \text{Residual}_{\text{GEN}allz} &= \text{Residual}_{\text{ALL}z} * (\sum_{xj} \text{NonComp}_{\text{GEN}xjz} / \sum_{xj} Q_{xjz}) \\ \text{Residual}_{\text{LINE}xz} &= \text{Residual}_{\text{LINE}allz} * (\text{BillingPeriodOfftake}_{\text{LINE}xz} / \end{aligned}$$

$$\text{Residual}_{\text{GEN}xz} = \frac{\text{BillingPeriodOfftake}_{\text{ALL}z} \cdot \text{Residual}_{\text{GEN}allz}}{\sum_j \text{NonComp}_{\text{GEN}xjz}}$$

Where:

- $Vcost_z$ is the total **allocable costs** for voltage support in zone z in the **billing period**;
- $\text{Nom Charge}_{\text{ALL}z}$ is the sum of all Nom Charge_{xz} for zone z;
- $\text{PeakPenaltyCharge}_{\text{ALL}z}$ is the sum of all **distributors'** $\text{PeakPenaltyCharge}_{\text{LINE}xz}$ for zone z;
- $\text{Residual}_{\text{ALL}z}$ is the total Residual to be recovered from or paid to **distributors** and **generators** in zone z;
- $\text{Residual}_{\text{LINE}allz}$ is the portion of $\text{Residual}_{\text{ALL}z}$ to be recovered from or paid to **distributors** in zone z;
- $\text{Residual}_{\text{GEN}allz}$ is the portion of $\text{Residual}_{\text{ALL}z}$ to be recovered from or paid to **generators** in zone z;
- $\text{Residual}_{\text{LINE}xz}$ is the portion of $\text{Residual}_{\text{LINE}allz}$ to be recovered from or paid to **distributor** x in zone z;
- $\text{Residual}_{\text{GEN}xz}$ is the portion of $\text{Residual}_{\text{GEN}allz}$ to be recovered from or paid to **generator** x in zone z;
- $\text{BillingPeriodOfftake}_{\text{LINE}xz}$ is the sum of **metering information** for **distributor** x across all **distributor kvar reference nodes** in zone z for the **billing period** for all **trading periods**;
- $\text{BillingPeriodOfftake}_{\text{ALL}z}$ is the sum of **metering information** for all **distributors** across all **distributor kvar reference nodes** in zone z for the **billing period** for all **trading periods**;

$\sum_{xj} =$ { is the sum across all **distributor kvar reference nodes** j for all **distributors** x in zone z; and
is the sum across all dispensated **generating stations** j of all **generators** x in zone z;

$\sum_j =$ { is the sum across all **distributor kvar reference nodes** j of **distributor** x in zone z; and
is the sum across all dispensated **generating stations** j of **generator** x in zone z.

$Q_{xjz} =$ { is $\text{Nom Peak}_{\text{LINE}Sxjz}$, which is the peak demand in kvar (in zone z) nominated to the System Operator in advance of, and having effect from, 1 March each year by **distributor** x at its **distributor kvar reference node** j; and
is $\text{Non Comp}_{\text{GEN}xjz}$, which is the difference between the kvar capability required by the **rules** and the kvar

capability of the dispensated **generator**, as recorded in the **dispensation** for **generator** x at each of its dispensated **generating stations** j in zone z;

11.6.4 Definition of distributor excludes generators

For the purposes of this rule 11.6, the definition of **distributor** does not include **generators** who are supplied **electricity** for consumption at a **point of connection** with the grid.

11.7 Clearing manager to determine amounts payable and receivable

11.7.1 Amounts payable to system operator

The **clearing manager** will determine the amount payable to the **system operator** by each **grid owner**, **purchaser**, **generator** and **distributor** for **ancillary services** pursuant to rules 11.1 to 11.6. On behalf of the **system operator**, the **clearing manager** will collect these amounts, and any amounts advised by the **system operator** as payable to it under rule 7.3.1 of section III and under rule 6 of section II, by including the relevant amounts in the invoices issued by the **clearing manager** pursuant to part H. All amounts payable under this rule will be subject to the priority order of payments set out in rule 8.4 of part H.

11.7.2 System operator will provide information

To enable the **clearing manager** to determine these amounts, the **system operator** will provide to the **clearing manager** the total allocable cost for each **ancillary service** and any additional information required to carry out the calculations under rules 11.1 to 11.6 inclusive which is not otherwise provided by the **reconciliation manager** or the **pricing manager** pursuant to the rules in part G.

11.8 Clearing manager to determine wash up amounts payable and receivable

11.8.1 Washup amounts payable

The **clearing manager** will determine the amount payable to the **system operator** by each **grid owner**, **purchaser**, **generator** and **distributor**, and the amount payable to each **grid owner**, **purchaser**, **generator** and **distributor** by the **system operator** for **ancillary services** pursuant to rules 11.1 to 11.6 of this section as a result of any **washups** that might occur under rule 11.1 of Part H. On behalf of the **system operator** the **clearing manager** will collect or pay these amounts, and any amounts advised by the **system operator** as payable to it under rule 7.3.1 of section III and under rule 6 of section II, by including the relevant amounts in the invoices issued by the **clearing manager** pursuant to part H. All amounts payable under this rule will be subject to the priority order of payments set out in rule 8.4 of part H.

11.8.2 System operator will provide information

To enable the **clearing manager** to determine these amounts the **system operator** will provide to the **clearing manager** the allocable cost for each **ancillary service** and any additional information required to carry out the recalculations under rules 11.1 to 11.6 inclusive which is not otherwise provided by the **reconciliation manager** or the **pricing manager** pursuant to the rules in part G.

11.9 System operator pays ancillary service agents

The **system operator** will be responsible for paying all **ancillary service agents** the amounts they are entitled to receive for that **ancillary service** pursuant to contracts entered into by the **system operator** in implementing the **procurement plan**. The **system operator** must use the **clearing manager** as its agent to make payments to **participants**.

Schedule C1 – Approval of equivalence arrangement or grant of dispensation

1. Contents of schedule C1

This schedule sets out the process for all **asset owners** who wish to apply for approval of an **equivalence arrangement** or grant of a **dispensation**.

2. Application and supporting information

Each application for an **equivalence arrangement** or a **dispensation** shall be in writing and shall:

2.1 Specify the AOPO or technical code

Specify the **AOPO** or **technical code** from which approval for an **equivalence arrangement** or the grant of **dispensation** is sought;

2.2 Provide supporting information

Provide supporting information for the application, including sufficient information about the actual capability of the **asset** or configuration of **assets**;

2.3 Describe any remedial action planned

Describe any remedial action planned to return the **asset** or configuration of **assets** to a compliant state;

2.4 Specify required term

Specify the required term of the **equivalence arrangement** or **dispensation**; and

2.5 Identify confidential information

Indicate any information for which confidentiality is sought on the grounds that it would, if disclosed, unreasonably prejudice the commercial position of the person who supplied the information (or of the person who is the subject of that information) or would disclose a trade secret or on the ground that it is necessary to protect information which is itself subject to an obligation of confidence and the duration of the requirement for confidentiality.

3. System operator obligations on receipt of application

Within 5 **business days** of receipt of the application made in accordance with rule 2, the **system operator** shall:

3.1 Record the name of the asset owner

Record the name of the **asset owner** making the application, the date and the subject matter of the application in the **system operator register**;

3.2 Notify the Board

Notify the **Board** of the application; and

3.3 Provide an estimate of time and costs

Provide the **asset owner** with an estimate of the likely time it will take to consider the application and the likely costs associated with processing the application.

4. Rights and obligations during the processing of applications

4.1 Reasonable endeavours

The **system operator** will use reasonable endeavours to process the application for approval of an **equivalence arrangement** or grant of a **dispensation** within the timeframe and costs estimated in accordance with 3.3 of this schedule.

4.2 Amended estimates

In the event that the **system operator** cannot process the application within the timeframe and/or costs originally estimated, it will give notice of this fact and its amended estimates of timeframe and/or costs to the **asset owner** and the provisions of rule 5 of this schedule will apply in respect to those costs.

4.3 Additional information

The **system operator** may require the provision of additional information at any stage during the application process and, provided the **system operator's** requirements are reasonable, that information must be provided by the **asset owner** if the application is to be processed.

4.4 Withdrawal of application

The **asset owner** may withdraw an application at any time, subject to the meeting of all costs incurred by the **system operator** as at the date of withdrawal of the application. Where costs have been paid in advance, those monies outstanding to the credit of the **asset owner** will be immediately returned to the **asset owner**.

4.5 Amendment of application

An applicant may amend an application being considered by the **system operator** at any time. All amendments must be in writing and submitted to the **system operator** and will take effect from the date of receipt.

5. Obligation of asset owner to pay costs

The **system operator** and the **asset owner** must agree on the costs involved in processing any applications for approval of an **equivalence arrangement** or grant of a **dispensation** and the method for payment to the **system operator** by the **asset owner** of those costs:

5.1 Before the system operator proceeds

Before the **system operator** proceeds with the application;

5.2 At any time during the process

At any time during the processing of the application when either:

5.2.1 Estimate of likely time will exceed the previous estimate

The **system operator** notifies the **asset owner** that it considers the estimate of the likely timeframe involved in processing the application will exceed the estimate given under rule 3.3 of this schedule or any revised estimate given under rule 4 of this schedule; or

5.2.2 Asset owner varies its application

An **asset owner** varies its application and the **system operator**, acting reasonably, considers this variation will change the costs in processing the application.

The **system operator** is entitled not to proceed until agreement on costs is reached at any of these stages.

6. Special provisions relating to the grant of dispensations

6.1 Issue a draft decision

Before granting a **dispensation**, the **system operator** will issue a draft decision on the application. This draft decision will be published on the **system operator register** and will include:

6.1.1 Assessment of technical issues

An assessment by the **system operator** of the technical issues; and

6.1.2 Advice on ancillary services changes

Advice from the **system operator** about any changes required to **ancillary services** procurement as a result of the proposed **dispensation**.

6.2 Changes to procurement plan required

Where changes are required to the **procurement plan**, the draft decision will be conditional on the **procurement plan** being amended appropriately in accordance with rule 5 of section IV.

6.3 Right to make submissions

Any **participant** may make a submission to the **system operator** on the application that resulted in the publication of the draft decision within 10 **business days** of the draft decision being recorded on the **system operator register**.

6.4 Right to be notified of outcome

All submissions will be considered by the **system operator**, and the **system operator** will notify any **participant** who made a submission as to the **system operator's** decision on the application.

7. Decision of the system operator

The **system operator** will advise all applicants for approval of an **equivalence arrangement** or grant of a **dispensation** of its decision as soon as it is made in writing and will advise such applicants of the reason for that decision.

8. Decisions to be recorded

Any approval of an **equivalence arrangement** or a grant of **dispensation** by the **system operator** will be recorded in the **system operator register**. The approval will state the name of the **asset owner**, the date, duration and nature of the **equivalence arrangement** or **dispensation**, including any conditions. On request, and at the cost of the person making the request, the **system operator** will supply all background information in relation to its decision to that person other than that which was designated as commercially sensitive by the relevant **asset owner**.

Schedule C2 - Approval of alternative ancillary service arrangement

1. Process for approval of alternative ancillary service arrangement

1.1 Applications and supporting information

Each application for an **alternative ancillary service arrangement** shall be in writing and shall:

1.1.1 Specify the ancillary service

Specify the **ancillary service** for which approval for an **alternative ancillary service arrangement** is sought; and

1.1.2 Provide supporting information

Provide supporting information for the application including sufficient information about the actual capability of the **asset** or configuration of **assets**; and

1.1.3 Describe remedial action planned

Describe any remedial action planned to return the **asset** or configuration of **assets** to a compliant state; and

1.1.4 Specify required term

Specify the required term of the **alternative ancillary service arrangement**; and

1.1.5 Identify confidential information

Indicate any information for which confidentiality is sought on the grounds that it would, if disclosed, unreasonably prejudice the commercial position of the person who supplied the information (or the person who is the subject of that information), or would disclose a trade secret, or on the ground that it is necessary to protect information which is itself subject to an obligation of confidence.

1.2 System operator obligations on receipt of the application

Within five **business days** of the receipt of the application under rule 1.1, the **system operator** shall:

1.2.1 Record details of the application

Record the name of the **asset owner** making the application, the date and the subject matter of the application in the **system operator register**; and

1.2.2 Notify the Board

Notify the **Board** of the application; and

1.2.3 Provide an estimated time and costs

Provide the **asset owner** with an estimate of the likely time it will take to consider the application and the likely costs associated with processing the application.

1.3 Obligation of asset owner to pay costs

The **system operator** and the **asset owner** must agree on the costs involved in processing any applications for authorisation of an **alternative ancillary service arrangement** and the method for payment to the **system operator** by the **asset owner** of those costs:

1.3.1 Before the system operator proceeds

Before the **system operator** proceeds with the application;

1.3.2 At any time during the processing

At any time during the processing of the application when either;

1.3.2.1 Time and cost estimate will exceed original estimate

The **system operator** notifies the **asset owner** that it considers the estimate of the likely timeframe and costs involved in processing the application will exceed the estimate given under rule 1.2.3; or

1.3.2.2 Asset owner varies the application

An **asset owner** varies its application and the **system operator**, acting reasonably, considers this variation will change the costs in processing the application,

the **system operator** is entitled not to proceed until agreement is reached.

1.4 Obligations in processing applications

1.4.1 System operator to use reasonable endeavours

The **system operator** will use reasonable endeavours to process the application for authorisation of an **alternative ancillary service arrangement** within the timeframe and costs estimated in accordance with rule 1.2.3.

1.4.2 System operator to give notice if original timeframe and costs not achievable

In the event that the **system operator** cannot process the application within the timeframe and costs originally estimated, it will give notice of this fact and its amended estimates of timeframe and costs to the **asset owner** and the provisions of rule 1.3 will apply in respect of those costs.

1.4.3 System operator may require extra information

The **system operator** may require the provision of additional information at any stage during the application process and, provided the **system operator's** requirements are reasonable, that information must be provided by the **asset owner** if the application is to be processed.

1.4.4 Asset owner may withdraw an application at any time

The **asset owner** may withdraw an application at any time subject to the meeting of all costs incurred by the **system operator** as at the date of withdrawal of the application. Where costs have been paid in advance, those monies outstanding to the credit of the **asset owner** will be immediately returned to the **asset owner**.

1.4.5 Applicant may amend an application at any time

An applicant may amend an application being considered by the **system operator** at any time. All amendments must be in writing and submitted to the **system operator** and will take effect from the date of receipt.

1.5 Decision of system operator

The **system operator** will advise all applicants for authorisation of an **alternative ancillary service arrangement** of its decision as soon as it is made in writing and will advise such applicants of the reason for that decision.

1.6 Decision to be recorded

Any authorisation of an **alternative ancillary service arrangement** by the **system operator** will be recorded in the **system operator register**. Except for information which the **system operator** agreed was commercially sensitive, the authorisation will state the name of the **asset owner**, the date, duration and nature of the **alternative ancillary service arrangement**, including any conditions. On request and at the cost of the person making the request, the **system operator** will supply all background information in relation to its decision to that person other than that which was designated as commercially sensitive by the relevant **asset owner**.

Schedule C3 - Technical Codes

Technical Code A – Assets

1. Purpose

The purpose of this **technical code A** is to define obligations for **asset owners** and technical standards for **assets** that are supportive of, or more detailed than, those set out in section III in order to enable the **system operator** to plan to comply, and to comply, with the **principal performance obligations**.

2. General requirements

2.1 Operational performance of assets

Each **asset owner** will ensure that:

2.1.1 System number

Its **assets** at **grid exit points** and at **grid injection points**, and, in the case of **distributors**, the **assets** of any **embedded generator** connected to it, are identified and referred to by a **system number**; and

2.1.2 Assets capable of operating within stated limits

Its **assets**, both in the manner in which they are designed and operated, are capable of being operated, and operate, within the limits stated in the **asset capability statement** provided by the **asset owner** for that **asset**; and

2.1.3 Meets any other reasonable requirements

It meets any other reasonable requirements of the **system operator**, identified during planning studies, which are required for the **system operator** to plan to comply, or to comply, with its **principal performance obligations**.

2.2 Requirements on asset owners for assets to be connected to the grid

All **asset owners** will provide the **system operator** with an **asset capability statement**, and any other information reasonably required by the **system operator**, to allow the **system operator** to assess compliance of its **asset** or any configuration of **assets** with the requirements of the **asset owner performance obligations** and **technical codes** at each of the following times:

2.2.1 During the planning stage

Prior to the completion of planning for the construction of that asset or configuration of **assets**; and

2.2.2 Prior to the commissioning

At, or prior to, the completion of construction but prior to the commissioning of that **asset** or configuration of **assets** except that the **asset owner** will put in place a commissioning plan in accordance with rule 2.6 to minimise the impact of commissioning tests on the **system operator's** ability to comply with its **principal performance obligations** and will adhere to this plan during commissioning, unless otherwise agreed to by the **system operator**.

2.3 On completion of commissioning

On, or prior to, completion of commissioning of any **asset** or configuration of **assets** the **asset owner** will obtain a final assessment in writing from the **system operator** that the **asset** or configuration of assets meets the requirements of the **asset owner performance obligations** and **technical codes**. This final assessment will be based on the information supplied by the **asset owner** and, where necessary, the result of **system tests** at commissioning.

2.4 System operator responsibilities

The **system operator** will give the assessment referred to in 2.2.2 within a reasonable time frame of the request and will supply the **asset owner** with all information which supports its assessment. Any permission granted by the **system operator** to any **asset owner** to conduct commissioning of any **asset** or configuration of assets shall permit connection of the **asset** (or configuration of assets) solely for the purposes of commissioning.

2.5 Requirements for asset capability statement

Each **asset owner** will provide the **system operator** with an **asset capability statement** in the form from time to time **published** by the **system operator** for each **asset** that is proposed to be connected, or is connected to, or form part of the **grid**. The **asset capability statement** will:

2.5.1 Include all information requested by the system operator

Include all information reasonably requested by the **system operator** so as to allow the **system operator** to determine the limitations in the operation of the asset that the **system operator** needs to know for the safe and efficient operation of the **grid**;

2.5.2 Include any modelling data

Include any modelling data for the planning studies, as reasonably requested by the **system operator**;

2.5.3 Be updated and reissued to the system operator

Be updated and reissued to the **system operator** as information and design development progresses through the study, design, manufacture, testing and commissioning phases;

2.5.4 Be complete and up to date before commissioning

Be complete and up to date before the commissioning of the **asset**; and

2.5.5 Be complete and up to date at all times

Be complete and up to date at all times while the **asset** is connected to, or forms part of, the **grid**.

2.6 Requirements for commissioning or testing of assets

2.6.1 Asset owners must provide a commissioning or test plan

Asset owners must provide a commissioning or test plan in accordance with rule 2.6.2 or rule 2.6.3 (as the case may be) in any of the following situations:

2.6.1.1 Changes are made to assets

When changes are made to **assets** that alter any of the following at the **grid interface**:

5.1.1.1 The single-line diagram;

5.1.1.1 A protection system, other than a change to a protection system setting;

5.1.1.1 A **control system**, including a change to a **control system** setting;

5.1.1.1 Any rating of **assets**;

2.6.1.2 Assets are to be connected to the grid

When **assets** are to be connected to, or are to form part of, the **grid**;

2.6.1.3 Assets to remain connected whilst being tested

Where it is necessary for an **asset owner** to perform a **system test** or other test to ascertain or confirm **asset** capabilities and where the commissioning or testing or connection of these **assets** may affect the **system operator's** ability to plan to comply, or to comply with, its **principal performance obligations**. Where an **asset owner** is unsure whether the commissioning or connection of an **asset** may impact on the **system operator's** ability to plan to comply, and to comply, with the **principal performance obligations** they should contact the **system operator** for advice.

2.6.2 Requirements of a commissioning plan

The commissioning plan prepared by **asset owners** and agreed by the **system operator** will:

2.6.2.1 Include a timetable

Include a timetable containing the sequence of events necessary to connect the **assets** to the **grid** and conduct any proposed **system test**; and

2.6.2.2 Contain protection and control settings

Contain the protection and control settings to be applied before livening of the **assets**; and

2.6.2.3 Contain procedures

Contain the procedures for commissioning the plant with minimum risk to personnel and plant and to the ability of the **system operator** to plan to comply and to comply with its **principal performance obligations**.

2.6.3 Requirement of a test plan

Where a test plan is required under rule 2.6.1, it will be prepared by the **asset owner** in consultation with the **system operator**. The test plan must contain sufficient information to enable the **system operator** to plan to comply, and to comply, with the **principal performance obligations**.

2.7 Asset owner to follow commissioning or testing plan

Once assessed by the **system operator** acting reasonably, the **asset owner** will follow the commissioning or test plan at all times, unless otherwise agreed with the **system operator** (which agreement will not be unreasonably withheld where compliance with the commissioning or testing plan is not practicable and non compliance would not impact on the **system operators** ability to comply with its **principal performance obligations** or on other **asset owners**).

3. Requirements for assets information

In accordance with rule 4.4 of section III, the following information is required by the **system operator** to assist it to plan to comply, and to comply, with its **principal performance obligations**:

3.1 Exchange of information

Sufficient information must be exchanged between the **system operator** and the **asset owner** to ensure that both fully understand the implications of any changes to the asset capability statement or of any proposed connection of the relevant **assets** to the **grid** or to the **local network**. This information must be exchanged in accordance with a timetable agreed to by both the **system operator** and the **asset owner**.

3.2 For planning studies by the system operator

Where reasonably requested by the **system operator**, the **asset owner** will provide sufficient information to the **system operator** to demonstrate the compliance of its **assets** with the **asset owner performance obligations** and the **technical codes**.

3.3 Information about other asset owners

Information about any **asset**, **supply** or **demand** of other **asset owners** will only be disclosed by the **system operator**:

3.3.1 As provided for elsewhere in the rules

As expressly provided for elsewhere in the **rules**; or

3.3.2 Required in a grid emergency

As reasonably required in a **grid emergency** or to ensure the security of the **grid**; or

3.3.3 Required by law

As required by law; or

3.3.4 Otherwise agreed with relevant asset owners

Otherwise as may be agreed with the relevant **asset owners**.

3.4 For approval of the grid interface

Each **asset owner** will provide the **system operator** with:

3.4.1 Information requested

All information reasonably requested by the **system operator** so as to ensure compliance with rule 4.4 of section III and to enable the **system operator** to assess the **grid interface**; and

3.4.2 Details of systems

Details of protection systems, including settings, to ensure the requirements of rule 4.4 of section III are met.

3.5 Supporting information

Each **asset owner** must ensure that all supporting information for the operational control of **assets** is kept up to date.

4. Requirements for the grid and a grid interface

4.1 Co-operation required between all parties about protection systems

All **asset owners** and **grid owners** must co-operate with the **system operator** to ensure that protection systems on both sides of a **grid interface**, which will include main and back up protection systems, are co-ordinated so that a faulted **asset** is disconnected by the main protection system first and the other **assets** are not prematurely disconnected.

4.2 Agreement required before implementation

Any proposed **grid interface**, including the settings of any associated protection system, must be agreed between the relevant **asset owner** and the **system operator** before being implemented.

4.3 Grid interface switchgear to be provided

Each **asset owner** must ensure that sufficient **circuit breakers** are provided for its **assets** so that each of its **assets** is able to be disconnected totally from the **grid** whenever a fault occurs within the **asset**.

4.4 Protection of assets and the grid

Each **asset owner** must ensure that it provides protection systems for its **assets** that are connected to, or form part of, the **grid**. Each **asset owner** must also ensure that as a minimum requirement:

4.4.1 Achieve the PPOs

Such protection systems will support the **system operator** in planning to comply, and complying, with the **principal performance obligations** and must be designed, commissioned and maintained, and settings must be applied, to achieve the following performance in a reliable manner:

4.4.1.1 Disconnect any faulted asset

Disconnect any faulted **asset** in minimum practical time (taking into account selectivity margins and industry best design practice) and minimum disruption to the operation of the **grid** or other **assets**; and

4.4.1.2 Be selective when operating

Be selective when operating, so that the minimum amount of **assets** will be disconnected; and

4.4.1.3 Preserve power system stability

As far as reasonably practicable, preserve power system stability;

4.4.2 Duplicated main protection systems for assets other than busbars

It provides duplicated **main protection systems** for each of its **assets** at voltages of 220 kV a.c. or above, other than busbars;

4.4.3 Protection for busbars at 220 kV a.c.;

It provides, for each of its 220 kV a.c. busbars:

4.4.3.1 a single **main protection system** and a **back up protection system**; or

4.4.3.2 if the performance of its **back up protection system** does not meet the requirements of rule 4.4.1, a duplicated **main protection system**;

4.4.4 Protection for busbars above 220 kV a.c.

It provides duplicated **main protection systems** for each of its busbars at voltages above 220 kV a.c.;

4.4.5 Main protection system requirements

It designs, tests and maintains its **main protection systems** at voltages of 220 kV a.c. or above in accordance with the requirements set out in appendix A;

4.4.6 Circuit breaker failure protection system is provided

A **circuit breaker failure protection system** that need not be duplicated is provided for each **circuit breaker** at voltages of 220 kV a.c. or above. **Circuit breaker** duplication is not required; and

4.4.7 Similar to existing design practice

Protection system design for a connection of **assets** to the **grid** at lower voltages must be similar to existing design practice in adjacent connections of **assets** to ensure co-ordination of protection systems.

4.5 Synchronising facilities

At a point of connection:

4.5.1 Asset owners

Asset owners, other than **grid owners**, must provide a means of checking **synchronisation** before the switching of **assets** where it is possible that such switching may result in connection of parts of the New Zealand electric power system which are not **synchronised**; and

4.5.2 Grid owners

Grid owners must provide a means of checking **synchronisation** before the switching of **assets** in locations agreed with the **system operator** so that it is not possible for such switching to result in connections of parts of the New Zealand electric power system which are not **synchronised**.

4.6 Auto-reclose facility

Any auto-reclose facility at the **grid interface**, where power flow into the **grid** can occur, must include an appropriate **synchronising** check facility.

5. Specific requirements for generators

5.1 Requirements for frequency response and control

Each **generator** will ensure that:

5.1.1 Generating units and associated control systems

Each of its **generating units**, and its associated **control systems**:

5.1.1.1 Supports the system operator

Supports the **system operator** to plan to comply, and to comply, with the **principal performance obligations**; and

5.1.1.2 Is able to synchronise

Is able to **synchronise** at a stable frequency within the frequency range stated in the **asset capability statement** for that **asset**.

5.1.2 Rate of change in output

The rate of change in the output of any of its **generating units** does not adversely affect the **system operator's** ability to plan to comply, and to comply, with the **principal performance obligations**. The rate of change must be adjustable to allow for changes in **grid** conditions;

5.1.3 Generating unit has a speed governor

Each of its **generating units** has a speed governor which:

5.1.3.1 Provides stable performance

Provides stable performance with adequate damping; and

5.1.3.2 Has adjustable droop

Has an adjustable droop over the range of zero percent to 7 percent; and

5.1.3.3 Is able to synchronise

Does not adversely affect the operation of the **grid** because of any of its non-linear characteristics;

5.1.4 Appropriate speed governor settings

Appropriate speed governor settings to be applied before commencing **system tests** for a **generating unit** are agreed between the **system operator** and the **generator**. The performance of the **generating unit** is then assessed by measurements from **system tests** and final settings are then applied to the **generating unit** before making it ready for service after those final settings are agreed between the **system operator** and the **generator**. **Asset owners** will not change speed governor settings without **system operator** approval.

5.2 Voltage response and control

Each **grid-connected generator** shall:

5.2.1 Excitation and voltage control system

Have an excitation and voltage control system with a voltage set point that is adjustable over the range of voltage set out in rule 3.2 of section III and will operate continuously in the voltage control mode when **synchronised**; and

5.2.2 Generating unit requirements

In order to meet the **asset owner performance obligations**, ensure that each of its **generating units** is equipped with either:

5.2.2.1 Taps

A connection transformer with an appropriate range of taps on each transformer together with an on-load tap-changer; or

5.2.2.2 Assets

Assets to give a dynamic performance equivalent to rule 5.2.2.1.

5.3 Multi-generating unit control

Where the output of more than one **generating unit** is controlled by a common **control system**, the **generator** must ensure that:

5.3.1 Achieve the PPOs

The common **control system** does not adversely affect the ability of the **system operator** to plan to comply, and to comply, with the **principal performance obligations**; and

5.3.2 Combined output

The combined output from the **generating units** performs as though it were from one **generating unit**; and

5.3.3 Individual performances not degraded

Such **control system** does not degrade the individual performance of any one **generating unit**.

5.4 Imbalance conditions

Each **generator** and **grid owner** must ensure that each of its **assets** is capable of operating under the voltage imbalance conditions stated in rule 2.3.1.3 of section II and, when operated within the limits stated in its **asset capability statement**, does not:

5.4.1 Contribute unbalanced phase currents

Contribute unbalanced phase currents into the **grid**; or

5.4.2 Aggravate any current unbalances

Aggravate any current imbalance that may occur on the **grid**.

5.5 Back up protection for grid faults

At some **points of connection**, a **generator** must ensure that its **generating units** have both main and back-up protection systems for nearby faults on the **grid**, where the necessity for, and the method of providing, such protection systems is agreed between the **system operator** and the **generator**.

6. Specific requirements for local networks

6.1 Connection of local networks in parallel with the grid

Each **distributor** must agree with the **system operator** any temporary or permanent connection of its **assets** when those **assets** become simultaneously connected to the **grid** at more than one **point of connection**.

7. Modifications and changes to assets

7.1 Requirements for new connections to apply

Assets that have been modified, or are proposed to be modified, will be deemed to be new **assets** for the purposes of the **rules** and this **technical code A** and will be subject to the requirements for connection to the **grid** and the requirements for commissioning **assets**. For the purposes of this section, the following are considered to be modifications to **assets**:

7.1.1 New connection to the grid

A new connection of **assets** to the **grid** or a **local network**; or

7.1.2 New connection to form part of the grid

A new connection of **assets** to form part of the **grid**; or

7.1.3 A new connection to local network

A new connection of an **embedded generator** to a **local network** other than an **excluded generator** as defined in rule 2.5 of section III; or

7.1.4 Alteration to assets already connected to the grid

An alteration to **assets** already connected to the **grid** or, in the case of **embedded generator**, already connected to a **local network**;

and, the new connection or alteration may affect the capacity of the **assets** or may affect **asset owner performance obligations** or **technical code** requirements.

7.2 Notification of decommissioned assets

The **asset owner** agrees to notify the **system operator** in a timely manner of any **assets** which have been decommissioned where those **assets** affect or can affect the **system operator's** ability to comply with its **principal performance obligations**.

8. Records, tests and inspections

8.1 Asset records to be kept

Each **asset owner** must arrange for, and retain, records for each of its assets to demonstrate that the **assets** comply with **asset owner performance obligations** and this **technical code A**.

8.2 Asset owners to conduct testing

In addition to the requirements for commissioning or testing set out in rule 2.6, **asset owners** must carry out periodic testing of their **assets** and **automatic under-frequency load shedding** systems in accordance with the requirements set out in appendix B.

8.3 Tests requested by the system operator

Where the **system operator** advises an **asset owner** that it reasonably believes that an **asset** may not comply with an **asset owner performance obligation** or this **technical code A**, the **asset owner** will:

8.3.1 Advise the system operator of its remedial or test plan

As soon as practicable, but in a period no longer than 30 days after receiving a written request, advise the **system operator** of its remedial or test plan for the **assets**; and

8.3.2 Undertake any remedial action or testing

As soon as reasonably practicable undertake any remedial action or testing of its **assets** in accordance with its plan advised to the **system operator** in rule 8.3.1. The **system operator** may require such testing or remedial action to be undertaken in the presence of a **system operator** representative.

8.4 Access to records or assets

Each **asset owner** must, at the request of the **system operator**, provide access to records of the performance or testing of any **asset** and access to inspect any **asset**.

9. Status of system operator approval

Any review and approval by the **system operator** under the **rules** is not to be construed as confirming or endorsing the design nor of warranting the safety, durability or reliability of any **asset**. Such review or approval does not relieve the **asset owner** from its obligations to continue to meet the requirements of the **rules**. The **system operator** will not, by reason of any such review or lack of review, be held responsible for strength, adequacy of design or capacity of any **asset**. In undertaking any review, the **system operator** will not be held responsible for any consequence of a failure of any **asset** due to inadequate design.

Appendix A: Main protection system requirements

1. General requirements

The **asset owner** must design, test and maintain all **main protection systems** at voltages of 220 kV a.c. or above to conform to electricity industry standards and practices as they are reasonably and ordinarily applied by a skilled and experienced **asset owner** to current installations at voltages of 220 kV a.c. or above in the New Zealand context.

2. Specific requirements for main protection systems

Main protection systems at voltages of 220 kV a.c. or above must meet the requirements set out below:

2.1 Test blocks

Either test blocks or both test switches and test terminals must be provided;

2.2 Supervision of fused circuits

The electrical continuity of fused protection circuits, including d.c. and voltage transformer circuits must be supervised; and

2.3 Supervision of trip circuits

The electrical continuity of **circuit breaker** trip circuits must be supervised.

3. Specific requirements for duplicated main protection systems

Duplicated **main protection systems** (the two components of which are referred to in this appendix as main 1 protection and main 2 protection) at voltages of 220 kV a.c. or above must meet the requirements set out below:

3.1 Coverage and probability of detection

Duplicated **main protection systems** must be designed with sufficient coverage and probability of detection that if any or all parts of one **main protection system** fail, the other **main protection system** will disconnect a faulted **asset** before a **back up protection system** initiates the disconnection of other non-faulted **assets**;

3.2 Independent station batteries

The d.c. supply to duplicated **main protection systems** must consist of two independent station batteries, each with its own charger, supervision, and with a capacity and carry over duty to cover charger failure until repair and restoration. Station batteries may only feed a common primary d.c. busbar provided that the busbar is insulated and isolated from earth;

3.3 d.c. supply fused independently

The d.c. supply to each duplicated **main protection system** must be independently fused at the primary d.c. busbar;

3.4 Different main 1 protection and main 2 protection

The manufacturer of main 1 protection must not be the same as the manufacturer of main 2 protection, unless one protection uses different measurement principles from the other;

3.5 Different current transformer cores

The current transformer core (or an equivalent instrument) and the cabling associated with that current transformer core or equivalent instrument (as the case may be) used for main 1 protection must be independent from that used for main 2 protection;

3.6 Voltage transformer supplies

Where a voltage transformer supply is required for main 1 or main 2 protection:

3.6.1 Fused at the voltage transformer

The supply must be fused at the voltage transformer; and

3.6.2 Different fuse and cable for main 1 and main 2 protection

The supply for main 1 protection must use an independent fuse and cable from those used for main 2 protection;

3.7 Circuit breaker trip coils

Main 1 protection must use, in each of the **circuit breakers** tripped by that main 1 protection, an independent trip coil from that used for main 2 protection;

3.8 Protection signalling

Where protection signalling is used, main 1 protection must use a signal channel over an independent bearer on a different route from that used for main 2 protection; and

3.9 Segregation of cabling

Main 1 protection cabling must be segregated from main 2 protection cabling in a manner that minimises the risk of common mode failure of main 1 and 2 protection and minimises the number of connections in any protection circuit.

4 Existing equipment

Despite rules 1 and 3 of this appendix:

4.1 Current transformers

A current transformer commissioned prior to the date upon which this rule came into force¹ is not required to comply with the requirements of rule 3.5 until the current transformer is replaced;

4.2 Circuit breaker trip coils

A **circuit breaker** commissioned prior to the date upon which this rule came into force¹, if not designed to incorporate a second trip coil, is not required to comply with the requirements of rule 3.7 until the **circuit breaker** is replaced; and

4.3 Cabling

Cabling commissioned prior to the date upon which this rule came into force¹, if not designed to be segregated, is not required to comply with the segregation requirements of rule 3.9 until the cabling is replaced.

¹ Rules 4.1, 4.2 and 4.3 came into force on 31 May 2007

Appendix B: Routine testing of assets and automatic under-frequency load shedding systems

1. Periodic tests to be carried out

- 1.1 This appendix sets out periodic tests required for the purposes of rule 8.2 of **technical code A**. **Asset owners** and owners of **automatic under-frequency load shedding** systems may have legal requirements, other than under the **rules**, to carry out additional tests to ensure their **assets** and **automatic under-frequency load shedding** systems are safe and reliable.
- 1.2 For the purposes of this appendix, **generating unit** does not include a **generating unit** for which wind is the primary power source.

2. Generating unit frequency response

Each **generator**, other than owners of **excluded generating stations** not subject to a relevant directive issued by the **Board** under rule 10 of section III of part C, must:

- 2.1 test the trip frequencies and trip time delays of each of its **generating units'** analogue over-frequency relays and analogue under-frequency relays at least once every 4 years;
- 2.2 test the trip frequencies and trip time delays of each of its **generating units'** non-self monitoring digital over-frequency relays and non-self monitoring digital under-frequency relays at least once every 4 years;
- 2.3 test the trip frequencies and trip time delays of each of its **generating units'** self monitoring digital over-frequency relays and self monitoring digital under-frequency relays at least once every 10 years;
- 2.4 based on the tests carried out in accordance with rule 2.1, 2.2 or 2.3, provide a verified set of under-frequency trip settings and time delays to the **system operator** in an updated **asset capability statement** within 3 months of the completion date of each such test; and
- 2.5 based on the tests carried out in accordance with rule 2.1, 2.2 or 2.3, provide a verified set of over-frequency trip settings and time delays to the **system operator** in an updated **asset capability statement** within 3 months of the completion date of each such test.

3. Generating unit governor and speed control

Each **generator**, other than owners of **excluded generating stations** not subject to a relevant directive issued by the **Board** under rule 10 of section III of part C, must:

- 3.1 test the governor system response of each of its **generating units'** mechanical or analogue speed governors at least once every 5 years;
- 3.2 test the governor system response of each of its **generating units'** digital or electro-hydraulic speed governors at least once every 10 years; and
- 3.3 based on the tests carried out in accordance with rule 3.1 or rule 3.2, provide a verified set of modelling parameters and governor system response data to the **system operator** in an updated **asset capability statement** within 3 months of the completion date of each such test, including:
 - 3.3.1 a block diagram showing the mathematical representation of the governor;
 - 3.3.2 a block diagram showing the mathematical representation of the turbine dynamics including non-linearity and the applicable fuel source; and
 - 3.3.3 a parameter list showing gains, time constants and other settings applicable to the block diagrams.

4. Generating unit transformer voltage control

Each **generator** with a **point of connection** to the **grid** must:

- 4.1 test the operation of each of its **generating unit** transformers' on-load tap changer analogue **control systems** at least once every 4 years;
- 4.2 test the operation of each of its **generating unit** transformers' on-load tap changer digital **control systems** at least once every 10 years; and
- 4.3 based on the tests carried out in accordance with rule 4.1 or rule 4.2, provide a verified set of control parameters including voltage set points, operating dead bands and response times to the **system operator** in an updated **asset capability statement** within 3 months of the completion date of each such test.

5. Generating unit voltage response and control

Each **generator** with a **point of connection** to the **grid** must:

- 5.1 test the modelling parameters and voltage response of each of its **generating units'** analogue excitation systems at least once every 5 years;
- 5.2 test the modelling parameters and voltage response of each of its **generating units'** digital excitation systems at least once every 10 years; and
- 5.3 based on the tests carried out in accordance with rule 5.1 or rule 5.2, provide a verified set of modelling parameters and voltage response data to the **system operator** in an updated **asset capability statement** within 3 months of the completion date of each such test, including:
 - 5.3.1 a block diagram showing the mathematical representation of the automatic voltage regulator;
 - 5.3.2 a block diagram showing the mathematical representation of the exciter; and
 - 5.3.3 a parameter list showing gains, time constants and other settings applicable to the block diagrams.

6. North Island distributor automatic under-frequency load shedding systems profiles and trip settings

Each North Island **distributor** must:

- 6.1 provide profile information as described in rule 6.5 of **technical code B** of schedule C3 to the **system operator** in an updated **asset capability statement** at least once every year;
- 6.2 test the operation of its **automatic under-frequency load shedding** systems at least once every 4 years; and
- 6.3 based on the test carried out in accordance with rule 6.2, provide a verified set of trip settings and time delays to the **system operator** in an updated **asset capability statement** within 3 months of the completion date of each such test.

7. South Island grid owner automatic under-frequency load shedding systems profiles and trip settings

Each South Island **grid owner** must:

- 7.1 provide profile information as described in rule 6.5 of **technical code B** of schedule C3 to the **system operator** in an updated **asset capability statement** at least once every year;
- 7.2 test the operation of its **automatic under-frequency load shedding** systems at least once every 4 years; and
- 7.3 based on the test carried out in accordance with rule 7.2, provide a verified set of trip settings and time delays to the **system operator** in an updated **asset capability statement** within 3 months of the completion date of each such test.

8. Grid owner transformer voltage range

Each **grid owner** must:

- 8.1 test the operation of each of its transformers' on-load tap changer analogue **control systems** at least once every 4 years;
- 8.2 test the operation of each of its transformers' on-load tap changer digital **control systems** at least once every 10 years; and
- 8.3 based on tests carried out in accordance with rule 8.1 or rule 8.2, provide a verified set of control parameters to the **system operator** in an updated **asset capability statement** within 3 months of the completion date of each such test, including voltage set points, operating dead bands and response times.

9. Grid owner static var compensator transient response and control

Each **grid owner** must:

- 9.1 test the transient response, steady state response and a.c. disturbance response of each of its static var compensators at least once every 10 years;
- 9.2 test the operation of each of its static var compensators' analogue **control systems** at least once every 4 years;
- 9.3 test the operation of each of its static var compensators' digital **control systems** at least once every 10 years;
- 9.4 based on the test carried out in accordance with rule 9.1, provide a verified set of modelling parameters, transient response parameters, steady state response parameters, and a.c. disturbance response data to the **system operator** in an updated

asset capability statement within 3 months of the completion date of each such test including:

- 9.4.1 a block diagram showing the mathematical representation of the static var compensator;
 - 9.4.2 a parameter list showing gains, time constants, limiters and other settings applicable to the block diagrams;
 - 9.4.3 a detailed functional description of all of the components of the static var compensator and how they interact in each mode of control;
 - 9.4.4 step response test results; and
 - 9.4.5 a.c. fault recovery disturbance test results; and
- 9.5 based on tests carried out in accordance with rule 9.2 or rule 9.3, provide a set of **control system** test results to the **system operator** in an updated **asset capability statement** within 3 months of the completion date of each such test.

10. Grid owner capacitors and reactive power control systems

Each **grid owner** must:

- 10.1 test the capacitance of each of its capacitors at least once every 8 years;
- 10.2 test the operation of each of its reactive power control assets' analogue **control systems** at least once every 4 years;
- 10.3 test the operation of each of its reactive power control assets' digital **control systems** at least once every 10 years;
- 10.4 based on the test carried out in accordance with rule 10.1, provide a set of test results to the **system operator** in an updated **asset capability statement** within 3 months of the completion date of each such test; and
- 10.5 based on tests carried out in accordance with rule 10.2 or rule 10.3, provide a verified set of **control system** test results including voltage set points, operating dead bands and time delays to the **system operator** in an updated **asset capability statement** within 3 months of the completion date of each such test.

11. Grid owner synchronous compensators

Each **grid owner** must:

- 11.1 test each of its synchronous compensators' analogue and electromechanical excitation systems at least once every 5 years;
- 11.2 test each of its synchronous compensators' digital excitation systems at least once every 10 years; and
- 11.3 based on the tests carried out in accordance with rule 11.1 or rule 11.2, provide a verified set of modelling parameters and voltage response data to the **system operator** in an updated **asset capability statement** within 3 months of the completion date of each such test including:
 - 11.3.1 a block diagram showing the mathematical representation of the automatic voltage regulator;
 - 11.3.2 a block diagram showing the mathematical representation of the exciter;
 - 11.3.3 a detailed functional description of the excitation system in all modes of control; and
 - 11.3.4 a parameter list showing gains, time constants, limiters and other settings applicable to the block diagrams.

12. HVDC link frequency control and protection

The **HVDC Owner** must:

- 12.1 test the operation of each of its **HVDC link's** analogue **control systems** at least once every 4 years;
- 12.2 test the operation of each of its **HVDC link's** digital **control systems** at least once every 10 years;
- 12.3 test the operation of each of its **HVDC link's** analogue protection systems at least once every 4 years;
- 12.4 test the operation of each of its **HVDC link's** digital protection systems at least once every 10 years;
- 12.5 test the modulation functions on its **HVDC link** at least once every 10 years;
- 12.6 based on tests carried out in accordance with rule 12.1 or rule 12.2, provide a set of **control system** test results and verified modelling parameters to the **system operator** in an updated

asset capability statement within 3 months of the completion date of each such test;

- 12.7 based on tests carried out in accordance with rule 12.3 or rule 12.4, provide a set of protection system test results to the **system operator** in an updated **asset capability statement** within 3 months of the completion date of each such test; and
- 12.8 based on tests carried out in accordance with rule 12.5, provide a set of modulation function test results to the **system operator** in an updated **asset capability statement** within 3 months of the completion date of each such test including:
 - 12.8.1 a block diagram showing the mathematical representation of the **HVDC link**;
 - 12.8.2 a parameter list showing gains, time constants, limiters and other settings applicable to the block diagram; and
 - 12.8.3 a detailed functional description of all of the components of the **HVDC link** and how they interact in each mode of control.

13. Asset owner a.c. protection systems

Each **asset owner** must:

- 13.1 test the operation of the analogue protection systems on its a.c. **assets** at least once every 4 years;
- 13.2 test the operation of the non-self monitoring digital protection systems on its a.c. **assets** at least once every 4 years;
- 13.3 test the operation of the self monitoring digital protection systems on its a.c. **assets** at least once every 10 years;
- 13.4 test the operation of the protection system measuring circuits on its a.c. **assets** by secondary injection at least once every 4 years;
- 13.5 test the operation of the protection system trip circuits, including circuit breaker trips, on its a.c. **assets** at least once every 4 years;
- 13.6 confirm at least once every 4 years that its protection settings are identified, co-ordinated, applied correctly and meet the requirements of the **AOPOs** and the **technical codes**;
- 13.7 based on tests carried out in accordance with rules 13.1, 13.2, 13.3, 13.4 or 13.5, provide a verification to the **system operator** in an updated **asset capability statement** that the protection systems meet the requirements of the **AOPOs** and **technical**

codes within 3 months of the completion date of each such test;
and

- 13.8** based on the confirmation carried out in accordance with rule 13.6, provide an updated **asset capability statement** to the **system operator** within 3 months of the completion date of each such confirmation.

14. Representative Testing

- 14.1** Subject to rule 8.3 of **technical code A**, each **asset owner** may provide the information required under rules 3.3, 5.3, or 11.3 to the **system operator**, based on representative modelling parameters and response data instead of based on the tests required under rules 3.1, 3.2, 5.1, 5.2, 11.1 and 11.2 of this appendix, for any group of identical **assets**, if each of those **assets**:

14.1.1 was manufactured to the same specification;

14.1.2 is installed at the same location;

14.1.3 is controlled in the same way; and

14.1.4 has a similar maintenance history.

- 14.2** Each **asset owner** providing representative modelling parameters and response data to the **system operator** in accordance with rule 14.1 for a group of identical **assets** must:

14.2.1 complete a full set of tests in accordance with rules 3.1, 3.2, 5.1, 5.2, 11.1 or 11.2 of this appendix, as applicable, on an **asset** that is representative of that group to derive a verified set of modelling parameters and response data;

14.2.2 complete sufficient testing on the remaining **assets** in that group of identical **assets** in accordance with rules 3.1, 3.2, 5.1, 5.2, 11.1 or 11.2 of this appendix, as applicable, to verify that the performance of the remaining **assets** in that group is fully consistent with the modelling parameters and response data derived from the tests carried out on the representative **asset**; and

14.2.3 certify to the **system operator**, that to the best of the **asset owner's** information, knowledge and belief, the performance of that group of **assets** is fully consistent with the representative modelling parameters and response data provided to the **system operator** for that group of **assets**.

15. Transitional provisions

- 15.1** Unless a shorter test interval is specified in this appendix, each **asset owner** must complete the first of each test required in this appendix no later than 5 years after the date upon which this appendix came into force¹.
- 15.2** A test of a type that is required to be carried out in accordance with this appendix, but that an **asset owner** carried out prior to the date upon which this appendix came into force, is deemed to be the first test of that type required in this appendix provided that:
- 15.2.1** the **asset owner** has submitted the relevant written test results to the **system operator**;
 - 15.2.2** the **system operator** has advised the **asset owner** that the specification of the test is acceptable;
 - 15.2.3** the interval between the actual date of the test and the date upon which this appendix came into force is less than the maximum test interval specified for the corresponding test in this appendix.
- 15.3** If a test has been deemed to be the first test in accordance with rule 15.2, the date by which the next such test must be carried out must be calculated using the actual date upon which the first test was carried out, not the date upon which it was deemed to have been carried out.

¹ Appendix B came into force on 5 June 2008.

Technical Code B – Emergencies

1. Purpose and application

1.1 Purpose

The purpose of this **technical code B** is to set out the basis on which the **system operator** and **participants** will anticipate and respond to emergency events on the **grid** that affect the **system operator's** ability to plan to comply, and to comply with, its **principal performance obligations**.

1.2 Application

This **technical code B** applies to all **asset owners** except for **excluded generating stations**. If the **system operator** reasonably considers it necessary to assist the **system operator** in planning to comply and complying with the **principal performance obligations** the **system operator** may require that an **excluded generating station** comply with some or all of the requirements of this **technical code B**.

2. Obligations of all parties

The **system operator** and all **participants** are to plan individually and, where appropriate, collectively for a **grid emergency** and act quickly and safely during a **grid emergency** in accordance with this **technical code B** so that the actual and potential impacts of any **grid emergency** are minimised.

3. Obligations of the system operator

3.1 Planning in anticipation of a grid emergency

The **system operator** will use reasonable endeavours to ensure that:

3.1.1 Each participant advised of any independent action

Where necessary, each **participant** is advised of any independent action required of it if there is a **grid emergency**; and

3.1.2 Facilities are specified

Facilities to be put in place by **grid owners** and/or other **asset owners** to manually disconnect **demand** at each **point of connection** are specified.

4. Formal notices and responses

4.1 Requirements for formal notices

The **system operator** will issue a notice either orally or in writing to relevant **participants** whenever, or as soon as practicable after, any of the following events has occurred:

4.1.1 Achievement of PPOs is at risk

The ability of the **system operator** to plan to comply, and to comply, with the **principal performance obligations** is at risk or is compromised (as set out in the **policy statement**);

4.1.2 Public safety is at risk

Public safety is at risk;

4.1.3 Assets are at risk

There is a risk of significant damage to **assets**;

4.1.4 Independent action has been taken

Independent action has been taken in accordance with this **technical code B** to restore the **system operator's principal performance obligations**.

4.2 Content of formal notice

The **system operator** will ensure that any **formal notice** issued in accordance with rule 4.1 will include the following:

4.2.1 Electrical or geographical region

The electrical or geographical region affected by the notice; and

4.2.2 Potential consequences

The potential consequences of the situation; and

4.2.3 Responses requested

The responses requested of **participants**; and

4.2.4 Trading periods

The **trading periods** to which the notice applies.

4.3 Recording formal notices

The **system operator** will record the issue of a **formal notice** and **participants** will record the receipt of a **formal notice**.

4.4 Participants to modify proposals

Where the **system operator** issues a request in accordance with this **technical code B** to a **participant**, that **participant** will use reasonable endeavours to respond to the request.

5. Actions to be taken by the system operator in a grid emergency

5.1 Insufficient generation and frequency regulating reserve gives rise to a grid emergency

In the event that insufficient generation and **frequency regulating reserve** gives rise to a **grid emergency**, the **system operator** may, having regard to the priority below, where practicable:

5.1.1 Generators to vary their offer

Request any relevant **generator** to vary its **offer** and **dispatch generators** in accordance with that **offer**, to ensure there is sufficient **generation** and **frequency regulating reserves**;

5.1.2 Reduce demand

Request any relevant **purchaser** or any relevant **distributor** to reduce **demand**;

5.1.3 Reconfigure the grid

Require a **grid owner** to reconfigure the **grid**;

5.1.4 Disconnection of demand

Require the disconnection of **demand** in accordance with rule 6.9,

5.1.5 Any other reasonable action

Take any other reasonable action to alleviate the **grid emergency**;

regardless of whether a **formal notice** has been issued.

5.2 Insufficient transmission capacity that gives rise to a grid emergency

In the event that insufficient transmission capacity gives rise to a **grid emergency**, the **system operator** may, having regard to the priority below, where practicable:

5.2.1 Generators to vary their offer

Request **generators** to vary their **offer** and **dispatch** the **generator** in accordance with that **offer** to ensure that the available transmission capacity within the **grid** is sufficient to transmit the remaining level of **demand**;

5.2.2 Asset owners to restore their assets

Request any **asset owner** to restore its **assets** that are not in service;

5.2.3 Reduce demand

Request any **purchaser** or **distributor** to reduce **demand**;

5.2.4 Disconnection of demand

Require the disconnection of **demand** in accordance with rule 6.9; and

5.2.5 Any other reasonable action

Take any other reasonable action to alleviate the **grid emergency**,

regardless of whether a **formal notice** has been issued.

5.3 Frequency outside normal band

When frequency is outside the **normal band** and all available **injection** has been dispatched, the **system operator** may require the disconnection of **demand** in accordance with rule 6.10 in appropriate block sizes until frequency is restored to the **normal band**.

5.4 Minimum voltage limit

When any **grid** voltage reaches the minimum voltage limit set out in the table contained in rule 3.1.1 of section III of part C, and is sustained at or below that limit, the **system operator** may require the disconnection of **demand** in accordance with rule 6.9 in appropriate block sizes until the voltage is restored to above the minimum voltage limit.

5.5 Unexpected event gives rise to a grid emergency

The **system operator** may, where an unexpected event occurs giving rise to a **grid emergency**, take any reasonable action to alleviate the **grid emergency** situation.

6. Load shedding systems

6.1 Distributors and grid owners to establish and maintain automatic under-frequency load shedding systems

Every North Island **distributor** will ensure, at all times, that an **automatic under-frequency load shedding** system is installed in accordance with rule 6.3 for each **grid exit point** to which its **local network** is connected. Every South Island **grid owner** will ensure, at all times, that an **automatic under-frequency load shedding** system is installed in accordance with rule 6.3 for each **grid exit point** in the South Island. Subject to rules 6.4 and 6.6, every **distributor** and **grid owner** will use reasonable endeavours to ensure that at all times its **automatic under-frequency load shedding** systems are maintained in accordance with the requirements of rule 6.3. If, at any time, a **distributor** or **grid owner** believes that an **automatic under-frequency load shedding** system may not be capable of meeting the requirements of rule 6.3, it will notify the **system operator** as soon as practicable and provide any information the **system operator** reasonably requests.

6.2 Distributors to cooperate with grid owners

Each South Island **distributor** will co-operate fully with any **grid owner** in relation to an **automatic under-frequency load shedding** system installed at any **GXP's** at which the **distributor's local network** is connected to the **grid**. Each South Island **distributor** must also provide the **grid owner** with any information relating to **automatic under-frequency load shedding** which the **grid owner** reasonably requests.

6.3 Requirements of an automatic under-frequency load shedding system

Any **automatic under-frequency load shedding** system required to be provided in accordance with rule 6.1, must enable at all times automatic disconnection of two blocks of **demand** (each block being a minimum of 16% of the total pre-event **demand** at that **grid exit point** subject to rule 6.4) with block one disconnecting **demand**:

6.3.1 North Island

In the North Island within 0.4 seconds after the frequency reduces to, and remains at or below, 47.8 Hertz; and

6.3.2 South Island

In the South Island within 0.4 seconds after the frequency reduces to, and remains at or below 47.5 Hertz,

and block two disconnecting **demand**:

6.3.3 North Island

In the North Island:

- 15 seconds after the frequency reduces to, and remains at or below, 47.8 Hertz; or
- within 0.4 seconds after the frequency reduces to, and remains at or below, 47.5 Hertz; and

6.3.4 South Island

In the South Island:

- 15 seconds after the frequency reduces to, and remains at or below, 47.5 Hertz; or
- within 0.4 seconds after the frequency reduces to, and remains at or below, 45.5 Hertz.

For the avoidance of doubt, **automatic under-frequency load shedding** blocks must not include any **interruptible load** procured by the **system operator**.

6.4 Automatic under-frequency load shedding may be aggregated

Subject to **system operator** agreement, which will not be unreasonably withheld, a **distributor** or **grid owner** may redistribute **automatic under-frequency load shedding** quantities between **grid exit points** provided that the overall **automatic under-frequency load shedding** quantity obligations required in rule 6.3 are met.

6.5 Disclosure of automatic under-frequency load shedding profiles

Distributors and **grid owners** will provide **automatic under-frequency load shedding** block **demand** profile information to the **system operator** where reasonably requested by the **system operator**. This information will be in a form which enables the **system operator** to make a reasonable assessment of the total amount of **demand** available to be disconnected should **automatic under-**

frequency load shedding blocks operate in accordance with rules 6.3 and 6.4.

6.5A Requirements during security of supply outages

6.5A.1 This rule 6.5A applies if a direction under regulation 10 of the Electricity Governance (Security of Supply) Regulations 2008 is in force.

6.5A.2 At any time when this rule applies, the **system operator** may give notice to one or more of the **participants** specified in rule 6.5A.5, specifying modifications to the extent to which rules 6.1 and 6.3 apply to the **participant** during any one or more periods, or in any one or more circumstances, specified in the notice.

6.5A.3 The **system operator** must keep a record of each notice given under rule 6.5A.2.

6.5A.4 When a notice under rule 6.5A.2 is in force in relation to a **participant**, the requirements of rules 6.1 and 6.3 are modified for that **participant** to the extent, and during the periods or in the circumstances (as the case may be), specified in the notice.

6.5A.5 The **participants** to whom the **system operator** may issue a notice in accordance with rule 6.5A.2 are:

6.5A.5.1 **distributors** in the North Island:

6.5A.5.2 **grid owners** in the South Island.

6.5A.6 The **system operator** may amend or revoke a notice, or revoke and substitute a new notice.

6.5A.7 A notice under rule 6.5A.2 expires on the earlier of—

6.5A.7.1 the date (if any) specified in the notice for its expiry; or

6.5A.7.2 the revocation or expiry of the direction referred to in rule 6.5A.1.

6.6 Exemptions from automatic under-frequency load shedding requirements

Where a **distributor** or **grid owner** can satisfy the **Board** that the direct financial impact of providing **automatic under-frequency load shedding** would exceed the **expected interruption costs** for each kW interrupted, the **Board** will grant an exemption from full compliance with the requirements of rule 6.3. The **Board** will advise the **system operator** of any exemptions from full compliance with the requirements of rule 6.3.

6.7 System operator and distributors to co-operate

The **system operator**, each **distributor**, each **grid owner** and relevant **retailers** will co-operate where reasonably practicable to ensure that

any **interruptible load** contracted by the **system operator** which could affect the size of **automatic under-frequency load shedding** block is identified to assist that **distributor** or **grid owner** to meet its obligations in rules 6.2, 6.3, 6.4 and 6.5.

6.8 Action to be taken following automatic under-frequency load shedding

Upon operation of an **automatic under-frequency load shedding** system, the **distributor** or **grid owner**:

6.8.1 Distributor to advise system operator

Must, as soon as practicable, advise the **system operator** of the operation of the **automatic under-frequency load shedding** system and, where reasonably required by the **system operator** to plan to comply, or to comply, with its **principal performance obligations**, a reasonable estimate of the amount of **demand** that has been disconnected;

6.8.2 May restore demand

May restore **demand** only when permitted to do so by the **system operator**;

6.8.3 Ensure demand restored

Must ensure **demand** restored in accordance with rule 6.8.2 remains subject to the requirements of rule 6.3;

6.8.4 Report to the system operator if demand is moved

Must report to the **system operator** if **demand** is moved between **points of connection**;

6.8.5 Request permission to restore demand

May request permission to restore **demand** from the **system operator** where no instruction to restore **demand** has been received from the **system operator** within 15 minutes of the frequency returning to the **normal band**; and

6.8.6 Loss of communication

May cautiously and gradually restore the **demand** disconnected through the **automatic under-frequency load shedding** system if there is a loss of communication, after 15 minutes of the loss of communication occurring. This restoration must be done only while the frequency is within the **normal band** and the voltage is within the required range. Each **distributor** must immediately cease the restoration of **demand** and, to the extent necessary, disconnect **demand** if the frequency drops below the **normal band** or the voltage moves outside the required range. As soon as practicable after communications are restored, each **distributor** or **grid owner** must report to the **system operator** on the status of load restoration and the status of re-arming the automatic under-frequency relays.

6.9 Process for manual load shedding

Each **distributor** must maintain an up to date process for the disconnection of **demand** for **points of connection**, including the specification of the **participant** who will effect the disconnection of **demand**. The **distributor** must obtain agreement for the process from the **system operator** and **grid owners** (such agreement not to be unreasonably withheld). Each **distributor** must advise the **system operator** of the agreed process in addition to any changes to a process previously advised.

6.10 Requirements for manual load shedding

Where the **system operator** requires the disconnection of **demand** in accordance with this **technical code B**, the **system operator** will instruct **distributors** and **grid owners** (as the case may be) in accordance with the agreed process in rule 6.9 to disconnect **demand** for the relevant **point of connection**. Where the **system operator** and a **distributor** and/or **grid owner** (as the case may be) have not agreed on a process for disconnection of **demand** at a **point of connection**, the **system operator** will instruct **grid owners** to disconnect **demand** directly at the relevant **point of connection**. To the extent practicable, the **system operator** will use reasonable endeavours when instructing for the disconnection of **demand** to ensure equity between **distributors**.

6.11 Distributor and grid owner to act as instructed by system operator

Each **distributor** or **grid owner** will act as instructed by the **system operator** operating in accordance with rules 5 and 6.

7. Obligations of grid owners

7.1 Planning for switching of grid feeders during a grid emergency

A **grid owner** must use reasonable endeavours to ensure that appropriate **assets** are installed for the manual disconnection of **demand** at **points of connection**.

7.2 Independent action to be taken at minimum voltage limit

A **grid owner** will take independent action as may be required by the **system operator** in accordance with rule 5.4 to disconnect **demand** at **points of connection** when any grid voltage reaches the minimum voltage limit set out in the table contained in rule 3.1.1 of section III of part C and is sustained at or below that level. A **grid owner** will continue to disconnect **demand** at **points of connection** while the voltage remains below that minimum voltage limit, being guided by any arrangements with **distributors** as advised by the **system operator**.

8. Obligations of generators and ancillary service agents to take independent action

The following independent action is required of **generators** and **ancillary service agents** during the occurrence of extreme variations of frequency or voltage at the **points of connection** to which their **assets** are connected (such extreme levels of frequency or voltage are deemed to constitute a **grid emergency** and require a fast and independent response from **generators** and **ancillary service agents**):

8.1 To correct extreme under-frequency

When the **under-frequency limit** is reached and the frequency continues to fall, **generators** must use reasonable endeavours to take the following immediate independent action to assist in restoring frequency:

8.1.1 Increase the energy injection

Increase the energy **injection** from **generating units** where those **generating units** are physically capable of increasing such **injection**;

8.1.2 Attempt to restore network frequency

Attempt to restore **grid** frequency to the **normal band** by **synchronising**, connecting to the **grid** and loading those **generating units** which are not connected but are able to be connected and operated in this manner;

8.1.3 Re-synchronise

Re-synchronise, re-connect to the **grid** and load any **generating units** that have tripped and are able to be connected and operated in this manner; and

8.1.4 Report to the system operator

Report to the **system operator** as soon as practicable after taking action in accordance with rules 8.1.1, 8.1.2 and 8.1.3.

8.2 To correct extreme over frequency

When the **over frequency limit** is reached and the frequency continues to rise, **generators** must use reasonable endeavours to take the following immediate independent action to assist in restoring frequency:

8.2.1 Decrease the energy injection

Decrease the energy injection from connected **generating units** where **generators** are physically capable of decreasing such **injection**; and

8.2.2 Report to the system operator

Report to the **system operator** as soon as practicable after taking action in accordance with rule 8.2.1.

8.3 To correct extreme voltage

When either the minimum voltage limit or the maximum voltage limit set out in the table contained in rule 3.1.1 of section III of part C is exceeded at any point of connection, **generators** and **ancillary service agents** must use reasonable endeavours to take immediate independent action to return the voltage to, as close as practicable, within such limits. **Generators** must use reasonable endeavours to **synchronise**, connect to the **grid** and, as necessary, load and adjust all available **generating units** which can assist in restoring the voltage. **Ancillary service agents** must also use reasonable endeavours to

connect to the **grid** and, as necessary, load all available **reactive capability** resources, which can assist in restoring the voltage. As soon as practicable after taking such actions, **generators** and **ancillary service agents** must report to the **system operator** on the action taken to correct voltage.

8.4 During a loss of communication with generators

For a loss of communication with the **system operator** lasting at least five minutes, **generators** must use reasonable endeavours to:

8.4.1 Take independent action

For **synchronised generating units**, take independent action to adjust supply to maintain frequency as close as possible to the **normal band**, and maintain voltage as close as possible either to that previously advised by the **system operator** or as can be best established by the **generator**;

8.4.2 Synchronise and connect available generating units

Synchronise and connect available **generating units** to the **grid** if the **generating units** currently connected do not have the capacity to control the frequency and voltage as required by rule 8.5.1;

8.4.3 Continue to attempt to maintain frequency and voltage

Continue to attempt to maintain the frequency and voltage to the requirements of rule 8.5.1; and

8.4.4 Report to the system operator

As soon as practicable after communications are restored, report to the **system operator** on the action taken.

8.5 During a loss of communication with ancillary service agents

For a loss of communication with the **system operator** lasting at least five minutes, **ancillary service agents** must use reasonable endeavours to:

8.5.1 Take independent action

If on load, take independent action to adjust any real or reactive power resources to maintain frequency and voltage as close as possible either to that previously advised by the **system operator** or as can be best established by the **ancillary service agent**;

8.5.2 Connect available reactive capability resources

Connect available **reactive capability** resources to the **grid** if the currently connected reactive power resources do not have the capacity to control the voltage above the minimum limit set out in the table contained in rule 3.1.1 of section III of part C;

8.5.3 Continue to attempt to maintain the voltage

Continue to attempt to maintain the voltage above the minimum limit set out in the table contained in rule 3.1.1 of section III of part C; and

8.5.4 Report to the system operator

As soon as practicable after communications are restored, report to the **system operator** on the action taken.

8.6 Major disruption to system operator communications and operational control centre facilities

In the event of a failure at the **system operator's** operational centre that disables the main dispatch or communication systems, the **system operator** may temporarily transfer its operational activities to an alternative operational centre, and the **system operator** will arrange for communication facilities to transfer to the new location and will notify **participants** of these arrangements.

Technical Code C – Operational communications

1. Purpose and application

1.1 Purpose

The purpose of this **technical code C** is to state the minimum requirements for the communications required under the **rules** between **asset owners**, except owners of **excluded generating stations**, and the **system operator** in order to assist the **system operator** to plan to comply, and to comply, with the **principal performance obligations**. Additional requirements may be set out in other **rules**. This **technical code C** does not deal with the content of communications, which is dealt with in each **technical code** and in part G where relevant.

1.2 Application

This **technical code C** applies to the **system operator** and to all **asset owners** except owners of **excluded generating stations**. If the **system operator** reasonably considers it necessary to assist the **system operator** in planning to comply, and complying, with the **principal performance obligations** the **system operator** may require that an **excluded generating station** comply with some or all of the requirements of this **technical code C**.

2. General requirements for operational communications

2.1 Voice and electronic communications

Every voice or electronic communication between the **system operator** and the **asset owner** must be logged by both the **system operator** and the **asset owner**. Unless otherwise agreed between the **system operator** and the **asset owner** every voice instruction must be repeated back by the person receiving the instruction and confirmed by the person giving the instruction before the instruction is actioned.

2.2 Points of contact between the system operator and asset owners

The **system operator** and each **asset owner** must nominate and advise each other of the preferred points of contact and the alternative points of contact to be used by the **system operator** and the **asset owner**. Each **asset owner** must also nominate and advise the **system operator** of the person to receive instructions and formal notices as set out in **technical code B – Emergencies**. The preferred points of contact will include those to be used when the **system operator** instructs the **asset owner**, when the **system operator** sends **formal notices** to the **asset owner** and when the **asset owner** contacts the **system operator**. The alternative points of contact will only be used if preferred points of contact are not available.

2.3 Points of contact between the grid owner and other asset owners

The **grid owner** and each other **asset owner** must nominate and advise each other of the preferred points of contact and the alternative points of contact to be used by the **grid owner** and the

other **asset owner** for the purpose of communications regarding the availability of the **grid owner's** data transmission communications. The alternative points of contact will only be used if preferred points of contact are not available.

3. Specific requirements for voice communication

3.1 Primary means of voice communication

Each **asset owner** must have in place a primary means of communicating by voice between the **control room** of the **asset owner** and the **system operator**. The primary means of voice communication must use either:

- 3.1.1 the **grid owner's** speech network; or
- 3.1.2 a widely available Public Switched Telephone Network that operates in real time and in full duplex mode.

3.2 Backup means of voice communication

Each **asset owner** must have in place a backup means of communicating by voice between the **control room** of the **asset owner** and the **system operator**. The backup means of voice communication:

- 3.2.1 must be approved by the **system operator** (such approval not to be unreasonably withheld); and
- 3.2.2 may include, but is not limited to, satellite phone or cellular phone; and
- 3.2.3 may only be used if the primary means of voice communication described in rule 3.1 is unavailable or otherwise with the agreement of the **system operator**.

3.3 Backup means of voice communication over 299 MW

- 3.3.1 An **asset owner** that has a **control room** with, at any time, operational control of more than 299 MW of **injection, offtake,** or power flow must have two or more back up means of voice communication between the **control room** of the **asset owner** and the **system operator**, each of which must meet the requirements of rule 3.2.

4. Specific requirements for document transmission communication

4.1 Primary means of document transmission communication

- 4.1.1 Subject to rule 4.1.2 and the **information system**, each **asset owner** must use facsimile transmission as the primary means of transmitting a document between the **control room** of the **asset owner** and the **system operator**.

4.1.2 An **asset owner** may request the **system operator** to approve an alternative primary means of transmitting a document (such approval not to be unreasonably withheld).

4.2 Backup means of document transmission communication

Each **asset owner** must have in place a backup means of transmitting a document. The backup means of document transmission communication:

4.2.1 must be approved by the **system operator** (such approval not to be unreasonably withheld);

4.2.2 may include, but is not limited to, voice communication or email; and

4.2.3 may only be used if the primary means of document transmission described in rule 4.1 is unavailable or otherwise with the agreement of the **system operator**.

5. Specific requirements for data transmission communication

5.1 Primary means of data transmission communication

5.1.1 Each **asset owner** (other than the **grid owner**) must have in place:

5.1.1.1 a primary means of transmitting data between the **assets** of the **asset owner** and a **SCADA** remote terminal unit of the **grid owner**; or

5.1.1.2 if approved by the **system operator** (such approval not to be unreasonably withheld), a primary means of transmitting data between the **assets** of the **asset owner** and the **system operator**.

5.1.2 The **grid owner** must have in place a primary means of transmitting data between the **assets** of the **grid owner** and the **system operator**.

5.2 Backup means of data transmission communication

Each **asset owner** must have in place a backup means of transmitting data for each type of indication and measurement specified in appendix A of **technical code C**. The backup means of data transmission communication:

5.2.1 must be approved by the **system operator** (such approval not to be unreasonably withheld);

5.2.2 may include, but is not limited to, use of voice communication or document transmission communication;

5.2.3 may only be used if the primary means of data transmission communication described in rule 5.1 is unavailable or otherwise with the agreement of the **system operator**.

6. Availability of primary means of communication

- 6.1 Each **asset owner** must use reasonable endeavours to ensure that the primary means of communication described in rules 3.1, 4.1, and 5.1 is available continuously.
- 6.2 If the primary means of communication described in rules 3.1, 4.1, and 5.1 is unavailable, an **asset owner** must use reasonable endeavours to restore availability of the primary means of communication as soon as practicable.

7. Notification of planned outages of primary means of communication

Each **asset owner** must notify the **system operator** of any planned outage of a primary means of communication described in rule 3.1, 4.1, or 5.1.

8. Performance requirements for indications and measurements

8.1 Minimum required indications and measurements

Each **asset owner** must provide the relevant indications and measurements shown in appendix A to the **system operator**, in accordance with rule 5. The **system operator** may require the **asset owner** to provide additional information where, in the reasonable opinion of the **system operator**, such information is required for the **system operator** to plan to comply, and to comply, with its **principal performance obligations**.

8.2 Required accuracy of measurements

The **asset owner** must use reasonable endeavours to ensure that the accuracy of the measurements it provides to the **system operator** in accordance with rule 8.1 complies with appendix A.

8.3 Maximum interval between indications and measurements

Each indication and measurement provided in accordance with rule 8.1 must be updated at the **grid owner's SCADA** remote terminal or the **system operator's** interface unit at least once every 8 seconds when provided by the primary means of data transmission communications.

APPENDIX A: INDICATIONS AND MEASUREMENTS (RULES 8.1 – 8.3)**Table A1: Requirements of generators:**

Generators must provide the indications and measurements in table A1. Where net (or gross) measurements are required in table A1, the use of scaling factors together with the provision of the relevant gross (or net) values is acceptable with the **system operator's** approval. Generators must provide scaling factors to the **grid owner** so that the **grid owner** can apply the adjustment at the **SCADA** server.

Indication or measurement	Values required	Accuracy ³
Station net MW	Import and export	±2%
Generating unit gross MW¹	Import and export, for each generating unit	±2%
Station net Mvar	Import and export	±2%
Generating unit gross Mvar¹	Import and export, for each generating unit	±2%
Generating unit circuit breaker status¹	Open /closed /in transition/ indication error ²	N/A
Grid interface circuit breaker status	Open /closed /in transition/ indication error ²	N/A
Grid interface disconnecter status	Open /closed /in transition/ indication error	N/A
Special protection scheme status	Enabled/disabled/summer/winter	N/A
Maximum output capacity of generating station (for intermittent generators only)	Number of connected generating units × MW capability of each generating unit	N/A

Table A2: Requirements of grid owners:

Grid owners must provide the indications and measurements shown in table A2 in respect of **assets** connected to, or forming part of, the **grid**.

Indication or measurement	Values required	Accuracy ³
Grid interface circuit breaker status	Open /closed /in transition/ indication error ²	N/A
Grid interface disconnecter status	Open/ closed/ in transition/ closed to earth/ indication error	N/A
Grid interface auto reclose status	Enabled/disabled/operated/locked out	N/A
Grid interface MW	Import and export	±2%
Grid interface Mvar	Import and export	±2%
Circuit Amps	Current at each termination point of a circuit	N/A
Circuit MW	MW at each termination point of a circuit	N/A
Circuit Mvar	Mvar at each termination point of a circuit	N/A
Special protection scheme status	Enabled/disabled/summer/winter	N/A
Tap positions for interconnecting transformers and supply transformers with on-load tap changers	Tap position for all windings including tapped tertiaries	N/A

Indication or measurement	Values required	Accuracy ³
Tap positions for interconnecting transformers and supply transformers with off-load tap changers ⁴	Tap position for all windings including tapped tertiaries	N/A
Reactive plant (eg RPC equipment, capacitor, reactor, condenser) Mvar	Import and export	±2%
Bus voltage	kV	±2%
Special protection scheme status	Enabled/disabled/summer/winter	N/A
HVDC modulation status	Frequency stabiliser/ spinning reserve sharing/ Haywards frequency control/ AC transient voltage support	N/A

Table A3: Requirements of distributors:

Distributors must provide the indications and measurements shown in table A3 in respect of **assets** connected to, or forming part of, the **grid**.

Indication or measurement	Values required	Accuracy ³
Grid interface circuit breaker status	Open/ closed/ in transition/ indication error ²	N/A
Grid interface disconnecter status	Open/ closed/ in transition/ indication error	N/A
Grid interface auto reclose status	Enabled/disabled/operated/locked out	N/A
Special protection scheme status	Enabled/disabled/summer/winter	N/A
Reactive plant ⁵ (eg RPC equipment, capacitor, reactor, condenser) Mvar	Import and export	±2%

¹ Required only if a **generating unit** has a maximum continuous rating of greater than 5 **MW**.

² No intentional time delays should be included for **circuit breaker** indications as these are time tagged by the **system operator** to less than 10 ms.

³ Where accuracy is measured at the input terminal of the RTU of the **grid owner**, under normal operating conditions at full scale.

⁴ Indication required within 5 minutes of status change.

⁵ Required only if reactive plant has a maximum continuous rating of greater than 5 Mvar.

For the purposes of appendix A of **technical code C**:

"**generating unit gross**" means the output of a **generating unit** measured or calculated at its output terminals, inclusive of any **generating unit** load supplied

"**generating unit load**" means the active and **reactive power** supplied or injected via connections between the **generating unit's** output terminals and its **generating unit circuit breaker**

"**generating unit net**" means the output of a **generating unit** measured or calculated at its **point of connection**. **Generating unit net** excludes **generating unit** load and any other active or **reactive power** supplied (including losses) between the **generating unit** and the **point of connection**

"scaling factor" means a factor applied to a measurement at one point to calculate a corresponding measurement at another point

"special protection scheme" means a protection scheme that takes predetermined action, including reconfiguration of the **grid**, reduction of demand or reduction of generation, to counteract a particular condition once that condition is detected. Special protection schemes allow a power system to be operated to a higher pre-event capacity limit while still in a **secure state**. **Automatic under frequency load shedding** systems and **instantaneous reserves** are excluded from the requirements for special protection schemes

"station net" means the sum of all **generating unit** net outputs for **generating units** at a single **generating station**, measured or calculated at its **point of connection**. Station net excludes **generating unit load** and any other active or **reactive power** (including losses) supplied between the **generating station** and the **point of connection**.

Technical Code D – Co-ordination of outages affecting common quality

1. Purpose

The purpose of this **technical code D** is to set out the obligations of **asset owners** to notify planned outages of **assets** which affect **common quality** and to set out the obligations of the **system operator** in relation to **outage co-ordination** and the provision of timely advice to **asset owners** on the security implications of **notified planned outages**.

2. Notification of planned outages

An **asset owner** will, in relation to each of its **assets**, notify the **system operator** as soon as practicable of all planned outages of such **assets** where such outages may impact on the **system operator's** ability to plan to comply, and to comply, with the **principal performance obligations**. Where the **asset owner** is unsure whether an outage of an **asset** may impact on the **system operator's** ability to plan to comply, and to comply, with the **principal performance obligations**, they should contact the **system operator** for advice. **Asset owners** should notify the **system operator** up to 12 months ahead of planned outages and update the **system operator** of changes to the planned outages as and when the **asset owner** becomes aware of them.

3. Assessment of notified planned outages

The **system operator** will assess all **notified planned outages** and the extent to which they impact on the **system operator's** ability to plan to comply, and to comply with the **principal performance obligations**.

4. Assets may be requested to remain in service

The **system operator** may request that an **asset owner** of **assets** which are the subject of a **notified planned outage** keep those **assets** in service until a more suitable time if such outage would, in the reasonable opinion of the **system operator**, adversely affect the **system operator's** ability to plan to comply, and to comply, with the **principal performance obligations**. The **system operator** may propose a suitable alternative time for the **notified planned outage**.

5. Asset owners to assist security

An **asset owner** should endeavour to programme its **notified planned outage** at a time when there will be no disruption to the **system operator's** ability to plan to comply, and to comply, with the **principal performance obligations**. The **system operator** may advise an **asset owner** when an appropriate time would be. Where the **asset owner** is able to modify the **notified planned outage** period for an **asset** in the manner suggested by the **system operator** without material cost or disruption, the **asset owner** should endeavour to do so.

6. Asset outage programme

The **system operator** will regularly publish an **asset** outage programme containing all **notified planned outage** information provided by the **asset owners**.

7. Assets may be requested to return to service

The **system operator** may request an **asset owner** to terminate a **notified planned outage** in progress within a pre-arranged period so that **assets** which are the subject of the **notified planned outage** can be returned to service to support the **system operator** in planning to comply, and in complying, with the **principal performance obligations**