

Replacement of the system operator procurement plan

Decision

29 March 2022



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1 Purpose

- 1.1 The purpose of this paper is to publicise a decision made by the Electricity Authority (Authority) regarding the replacement of the Ancillary Services Procurement Plan (procurement plan) in its entirety.
- 1.2 The procurement plan amendments have two objectives:
- (a) to give effect to a range of improvements resulting from a periodic review of the procurement plan by the system operator, undertaken in accordance with clause 8.42A of the Code
 - (b) to align aspects of the procurement plan with a Code amendment that was developed to make aspects of the Code more technology neutral, remedying the unintended exclusion of modern energy storage system (ESS) technologies from offering instantaneous reserve to the system operator while discharging.

2 Decision

- 2.1 The Authority has decided to amend the procurement plan, a document incorporated by reference into the Electricity Industry Participation Code (Code), in accordance with clause 8.42 of the Code.
- 2.2 The amendment replaces the existing procurement plan in its entirety and includes changes to:
- (a) the glossary of terms
 - (b) the ancillary services procurement methodologies and processes that are set out in the main body and Appendix A of the procurement plan
 - (c) the technical requirements, set out in Appendix B of the procurement plan, in respect of each of the ancillary services:
 - (i) frequency keeping
 - (ii) instantaneous reserve
 - (iii) over frequency reserve
 - (iv) black start
 - (v) voltage support.
- 2.3 Some of the proposed amendments may trigger consequential changes to ancillary services procurement contracts. Such changes will be implemented as and when the relevant procurement contracts become due for renewal.
- 2.4 The amendment results in a procurement plan that improves the reliability of ancillary service arrangements and is clearer and easier to understand, thereby reducing uncertainty and risk for both ancillary service providers and the system operator.

- 2.5 In addition, the amended procurement plan includes a number of changes made to align with a Code amendment developed by the Authority in the first half of 2021 that will enable ESSs to provide instantaneous reserve while discharging.¹ Before the amendment, the Code did not allow this operating mode, representing an unintended regulatory gap.
- 2.6 Developments in new technologies, particularly in battery ESS, and corresponding investment announcements in battery technology, are occurring with increasing frequency. Such investments signal exciting opportunities to support the transition to greater electrification of the New Zealand economy.
- 2.7 While the Code amendment is technology neutral regarding ESS technology in general, it requires a complementary amendment to the procurement plan to include procurement arrangements for specific ESS technologies. This will initially focus on battery ESSs that can meet the system operator’s technical requirements for use as instantaneous reserve. Future procurement plan amendments may be required to enable aggregations of smaller, distributed battery ESSs – and other ESS technologies of all scales – to fully participate in ancillary services markets.

The replacement procurement plan and the Code amendment will become effective simultaneously

- 2.8 The Authority intends to give simultaneous effect to both the procurement plan amendment (in accordance with clause 8.42(2) of the Code) and the ESS Code amendment (in accordance with section 38 of the Act) by notices in the *Gazette*.
- 2.9 Marked up and clean versions of the replacement procurement plan are included in Appendix A.
- 2.10 The finalised ESS Code amendment is available in Appendix A of the Final Decision paper *Enabling energy storage systems to offer instantaneous reserve*.
- 2.11 Subject to the Authority completing the relevant statutory processes governing the amendments, the replacement procurement plan amendment and the ESS Code amendment will become effective on 3 May 2022.

3 The Authority developed a Code amendment to fix a regulatory gap

- 3.1 In early 2021, the Authority developed a Code amendment to remedy a regulatory gap that unintentionally precluded owners of ESSs from offering injectable instantaneous reserve² to the system operator as an ancillary service.

¹ See Final Decision paper at <https://www.ea.govt.nz/development/work-programme/evolving-tech-business/batteries-as-instantaneous-reserve/development/>.

² Injectable instantaneous reserve refers to reserve technologies that can inject power into a network, as opposed to technologies that interrupt load. The Code amendment defines the new term “generation reserve” for this type of reserve.

- 3.2 The Authority consulted on a proposal and received 19 submissions on its 8 April 2021 consultation paper.³ After considering submissions, the Authority published a *Draft Decision Paper*⁴ that accepted the proposed Code amendments with minor changes only, and signalled the commencement of the next phase of the project.
- 3.3 The decision was a draft decision because, to be effective, the draft Code amendment required complementary changes to the procurement plan and, at that time, it was possible that development of and consultation on the procurement plan amendment may require further minor or technical changes to the Code amendment drafting.

4 The system operator proposed improvements to the procurement plan

- 4.1 The procurement plan sets out the processes the system operator must use reasonable endeavours to follow when it procures ancillary services. Clause 8.42A requires the system operator to review the procurement plan at least once every two years and decide whether or not to propose a change to the procurement plan.
- 4.2 The system operator:
- (a) carried out the required review and decided to propose a change to the procurement plan to the Authority
 - (b) completed the steps set out in clause 8.42A(2), including consulting with participants
 - (c) on 24 September 2021, provided a draft procurement plan to the Authority, along with the supporting information set out in clause 8.42A(2).
- 4.3 On 9 November 2021, following the process set out in clause 8.44, we published a consultation paper titled *Procurement Plan 2021 – Consulting on changes to enable battery energy storage systems and other improvements to procurement of ancillary services*.⁵ We consulted on the proposal to replace the current procurement plan in its entirety, so as to incorporate the system operator’s proposed amendments.
- 4.4 The system operator’s proposed amendments address its specific concerns about each of the procured ancillary services, and with the glossary of terms. These concerns, and the improvements adopted in the draft procurement plan, are summarised in the following sections.

Frequency keeping

- 4.5 The proposed changes to frequency keeping would:
- (a) introduce a requirement for back-up single provider frequency keeping providers to conduct a pre-contract technical review
 - (b) introduce a maximum response time for back-up single provider frequency keeping

³ The consultation paper is available at: <https://www.ea.govt.nz/development/work-programme/evolving-tech-business/batteries-as-instantaneous-reserve/consultations/>.

⁴ The draft Decision paper is available at: <https://www.ea.govt.nz/development/work-programme/evolving-tech-business/batteries-as-instantaneous-reserve/development/>

⁵ The consultation documents are available at: <https://www.ea.govt.nz/development/work-programme/operational-efficiencies/so-policy-statement-procurement-plans/consultations/#c18549>. Note that the procurement plan consultation process is specifically provided for in the Code, rather than the Act.

- (c) increase monitoring requirements for back-up single provider frequency keeping;
- (d) introduce a requirement for measurement accuracy for single provider frequency keeping when monitoring frequency time error
- (e) increase and align the data retention requirements for both multiple and back-up single provider frequency keeping
- (f) align single provider frequency keeping requirements for block and station dispatch groups with multiple provider frequency keeping
- (g) align offer timeframe requirements with the current gate closure period requirements
- (h) introduce additional dispatch requirements
- (i) introduce responsibilities to share data with the system operator associated with special testing.

Instantaneous reserve

4.6 The proposed changes to instantaneous reserve intend to:

- (a) improve certain provisions related to performance requirements, monitoring, periodic testing and data sharing
- (b) make complementary changes that give effect to the Authority's draft decision to amend the Code to enable battery ESS to offer instantaneous reserve while discharging.

4.7 The changes proposed to instantaneous reserve would:

- (a) introduce performance requirements for the different forms of instantaneous reserve
- (b) increase instantaneous reserve monitoring
- (c) reduce the frequency of periodic testing of equipment used to provide interruptible load other than that provided by battery ESS
- (d) introduce a requirement for instantaneous reserve equipment to be tested upon completion of changes to equipment that could impact its instantaneous reserve performance
- (e) make distinctions between requirements for generation reserve and between interruptible load provided by battery ESS and interruptible load other than that provided by battery ESS
- (f) introduce responsibilities to share data with the system operator associated with special testing and responses to under-frequency events.

Over-frequency reserve

4.8 The changes proposed to over frequency reserve would:

- (a) reduce the frequency of periodic testing of over frequency reserve equipment
- (b) introduce data sharing responsibilities associated with special testing

Black start

- 4.9 The changes proposed to black start would:
- (a) introduce requirements for ancillary service agents to notify the system operator upon rectification of an issue causing failure to perform black start
 - (b) reduce the baseline testing requirements for black start equipment.

Voltage support

- 4.10 The changes proposed to voltage support would:
- (a) introduce responsibilities to share data with the system operator associated with special testing.

5 The process to approve an amendment to the procurement plan is different to a Code amendment

- 5.1 In approving any amendment to the procurement plan, the Authority must follow the process set out in clause 8.44 of the Code.
- 5.2 The clause 8.44 process is different to a Code amendment process because a proposal to amend the procurement plan is initially developed by the system operator, not the Authority. In this case, the Authority's role is to consult with participants about the system operator's draft procurement plan amendment, incorporating the supporting information developed by the system operator.
- 5.3 We have followed the process set out in clause 8.44. Specifically, we:
- (a) published the draft amended procurement plan submitted under clause 8.42A and the information required under clause 8.42A(2) (the 9 November 2021 consultation paper) (clause 8.44(1)(a))
 - (b) advised participants of the date by which submissions on the changes proposed in the draft procurement plan must be received by the Authority, which date (7 December 2021) was not less than 10 business days following publication of the 9 November 2021 consultation paper (clause 8.44(2))
 - (c) received and published submissions and provided a copy of the submissions to the system operator (clause 8.44(4)).
- 5.4 The system operator subsequently advised the Authority that it did not wish to submit a cross submission in accordance with the rights granted to it in clause 8.44(5).
- 5.5 Following completion of the consultation process outlined above, and having considered the submissions received, the Authority has decided to approve the draft procurement plan, without further changes, in accordance with clause 8.44(7).

6 The Authority considered the following matters in making the decision on the procurement plan

- 6.1 We received submissions on our 9 November 2021 consultation paper from the two parties listed in Table 1.
- 6.2 Copies of the submissions are available on our website at:
<https://www.ea.govt.nz/development/work-programme/operational-efficiencies/system-operator-documents-incorporated-into-the-code-by-reference/consultations/>

- 6.3 At a headline level, both submissions support the system operator’s proposal to amend the procurement plan.

Table 1: List of submitters

Submitter	Category
Enel X	Ancillary services provider
SolarZero	Ancillary services provider

- 6.4 As we stated in the 9 November 2021 consultation paper, our overall assessment supported adoption of the system operator’s proposal to replace the procurement plan in its entirety with the detailed amendments set out in Appendix D of that paper.⁶
- 6.5 The objective of the procurement plan review was to ensure ancillary services continue to be procured in a competitive, reliable and efficient manner. Additionally, the proposed procurement plan amendment sought to complement the more technology neutral drafting in the Code amendment to enable fuller participation in the instantaneous reserve market by ESS owners.
- 6.6 The system operator assessed that the benefits of the amendments would outweigh the costs and provided supporting reasons for its views in Appendix B of the 9 November 2021 consultation paper.
- 6.7 The submitted points are best categorised by considering the three questions asked in the consultation paper, starting with Questions 1 and 3 together.

Question 1 – Do you agree with the Authority’s overall assessment of the proposal? If not, what alternative assessment would you make and why?

Question 3 - What comments do you have on the proposed drafting of the amendments, as set out in Appendix D? If you disagree with the drafting or can suggest improved drafting, please provide this.

- 6.8 Question 1 provided an opportunity for submitters to comment on any of the amendments proposed in the draft procurement plan, including the detailed drafting of the proposed amendments.
- 6.9 Enel X did not specifically answer Question 1 but pointed out that its comments were limited to matters relating to instantaneous reserve. Enel X commented on individual clause as follows:
- (a) **Clause B37.2** – *We are comfortable with the proposed changes as they relate to FIR and SIR provided by interruptible loads, as this is largely a formalisation of current practice.*
 - (b) **Clauses B.40.1 and B.40.2** – *We support the proposed amendments to clauses to enable FIR and SIR delivery to be calculated from either the grid frequency falling to or below 49.2 Hz, or the trip time.*

⁶ The consultation paper included both marked up and clean versions of the draft procurement plan.

- (c) **Clause B.43.1 and B43.2** – *We are broadly comfortable with the proposed amendments to the measurement and recording requirements set out in these clauses, specifically the requirement that the IR response be measured and recorded at no greater than 0.1 second intervals and commencing not less than 15 seconds prior to the UFE time or trip time. We opposed Transpower’s original proposal for 0.02 second granularity commencing 60s before the UFE / trip time for the reasons set out in our submission to that consultation process.*
 - (d) **Clause B43.4** – *We support the proposed amendment to allow recorded data to be aligned with the time-tagged frequency measurement from the same device if GPS time-tagging capability is not available.*
 - (e) **Clause B50.2** – *We support the decision to decrease how often end-to-end testing must be conducted by interruptible load providers from 12 months to 24 months. We agree with Transpower’s conclusion that this change will reduce participants’ compliance requirements without unduly affecting performance of the service.*
- 6.10 In its submission, solarZero expressed agreement with the Authority’s assessment of the proposal. SolarZero stated:
- (a) *We consider that enabling batteries to participate in the reserves market will result in a more stable and efficient power system. These proposals are timely given the growth in amount of battery storage and that batteries can do a much better job in power system stability management than electro-mechanical generation.*
 - (b) *In time we would like to see distributed batteries playing a role in a range of ancillary services, including new services that have not yet been designed in New Zealand, but we are seeing emerging in some other jurisdictions. These services reflect the technical characteristics of batteries – particularly their fast and accurate responses enabled by software.*
- 6.11 SolarZero responded to Question 3 as follows:
- We are comfortable with the drafting on the basis that we understand that the draft will enable distributed battery systems to provide reserves.*

Our decision

- 6.12 Submissions raised no objections to replacing the current procurement plan with the system operator’s draft procurement plan in its entirety or to the detailed drafting of the proposed amendments.
- 6.13 Accordingly, we consider the amendments included in the draft procurement plan are fit for purpose and are suitable for adoption as a replacement procurement plan.

Question 2 – Are there alternative means to any of the individual amendments proposed by the system operator that you consider better meet the proposal objectives? If so, please describe the alternative and why you prefer it.

- 6.14 The system operator set out its views on possible alternatives to the amendments it proposed in the draft procurement plan.⁷ In all cases, the system operator considered there was either no alternative or that the alternative was to retain the status quo.

⁷ 9 November 2021 Consultation paper, Appendix B.

6.15 The Authority acknowledged the system operator's views but considered that other alternatives may exist that had not been identified, and therefore invited stakeholder feedback on this point in Question 2.

6.16 Enel X did not specifically answer Question 2.

6.17 In its submission, solarZero stated:

We are comfortable with the proposed amendments on the basis that we understand that the proposed amendments will enable distributed battery systems to provide reserves.

Our decision

6.18 We note that submitters provided no viable alternatives to the specific drafting changes included in the draft procurement plan. Accordingly, we have decided to approve the system operator's draft procurement plan.

Additional views expressed in submissions

6.19 We note that Enel X submitted a further point:

On a more general note, we support the Authority's proposal to further consider how the procurement plan requirements should apply to behind the meter assets, e.g. storage. However, it's important not to over-complicate the issue, particularly where commercial and industrial customers are involved. An industrial business that uses a battery to supply the site's load when responding to an underfrequency event is no different to a similar site that uses an onsite generator to do the same. With some clarifications we believe that this arrangement can already be accommodated under the existing procurement plan. Our proposed approach is set out in more detail in our submission to Transpower's consultation process.

6.20 We have referred this view back to the system operator. The Authority supports enabling efficient participation by providers of smaller blocks of resources based on new technologies.

Appendix A Approved amended procurement plan
(CLEAN)

Ancillary services procurement plan

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Introduction

1. This **procurement plan** sets out the processes the **system operator** must use reasonable endeavours to follow when it procures **ancillary services** during the term of this **procurement plan**.
2. Terms used in this **procurement plan** which are defined terms under the **Code** have the same meaning as contained in Part 1 of the **Code**. Some other terms are defined in Appendix D of this **procurement plan**.
3. Unless the context requires otherwise, references in this **procurement plan** to:
 - 3.1 paragraphs are to paragraphs of this **procurement plan**;
 - 3.2 Appendices are to Appendices of this **procurement plan**; and
 - 3.3 “the term of this **procurement plan**” are to the period of time from the commencement of this **procurement plan** until the **Authority** adopts a new **procurement plan** under clause 8.44B of the **Code**.

A paragraph number in this **procurement plan** preceded by a letter indicates that the paragraph is in the Appendix corresponding to that letter.
4. The content and structure of this **procurement plan** is consistent with the content and structure set out in clause 8.43 of the **Code**.

Ancillary services to purchase

5. The **system operator** may purchase the following **ancillary services** from **ancillary service agents**:
 - 5.1 **frequency keeping**;
 - 5.2 **instantaneous reserve**;
 - 5.3 **over frequency reserve**;
 - 5.4 **voltage support**; and
 - 5.5 **black start**.
6. The purpose of **frequency keeping** is to balance any generation and **demand** inequalities with the objective of maintaining the **grid** frequency at or near 50 Hertz under normal operating conditions and managing **frequency time error**. Factors that contribute to inequalities under normal operating conditions include unanticipated load changes, differences in **generator** ramping, and the inherent inaccuracies between the modelled and actual system conditions.
7. The purpose of **instantaneous reserve** is to manage frequency recovery after an **under-frequency event**, with the objective of arresting the frequency fall, and recovering the frequency after an **under-frequency event**.
8. The purpose of **over frequency reserve** is to manage frequency recovery after an event that might otherwise cause the **grid** frequency to exceed 52 Hertz in the North Island or 55 Hertz in the South Island. For such an event, the **system operator**'s objective is to arrest the rise in frequency and recover it to the **normal band**.
9. The purpose of **voltage support** is to provide additional **reactive power** resources of the static or dynamic type, depending on the location and **network** loading conditions, to contribute to **network** voltage control when dispatched.
10. The purpose of **black start** is to maintain equipment that can initialise the **supply** for the progressive relivening of the **grid** following a partial or total blackout.
11. Implementation of this **procurement plan** is subject to the **ancillary services** being made available to the **system operator** on—
 - 11.1 the terms contained in this **procurement plan**; or
 - 11.2 terms that, in the **system operator**'s reasonable opinion, do not differ materially from those contained in this **procurement plan**.

Principles applied in making net purchase quantity assessments (clause 8.43(a) of the Code)

The requirements for complying with the PPOs (clause 8.43(a)(i) of the Code)

12. The **system operator** must procure **ancillary services** to assist it to achieve the following objectives:

Ancillary service	Objectives
Frequency keeping	Compliance with clause 7.2A(2), 7.2B, 7.2C of the Code Compliance with the policy statement
Instantaneous reserve	Compliance with clause 7.2A, 7.2B, 7.2C of the Code Prevent the frequency from going outside defined limits for specified contingencies Compliance with the policy statement
Over frequency reserve	Compliance with clause 7.2A(1), 7.2A(2), 7.2B, 7.2C of the Code Compliance with the policy statement
Voltage support	Compliance with clause 7.2A(1) of the Code Compliance with the policy statement
Black start	Compliance with clause 8.5 of the Code Compliance with the policy statement

The requirements for achieving the dispatch objective (clause 8.43(a)(ii) of the Code)

13. The **system operator** must use reasonable endeavours to dispatch assets in a manner consistent with the **dispatch objective**. This includes the dispatch of **ancillary services**.
14. It is recognised in the **Code** that the meeting of the **dispatch objective** is subject to the availability and capability of generation and **ancillary services**. Accordingly, the **system operator** must dispatch **ancillary services** according to the **dispatch objective** provided there is sufficient availability of **ancillary services**.
15. The **policy statement** sets out the policies used by the **system operator** in scheduling and dispatching **ancillary services** to assist it in planning to comply and complying with its **dispatch objective**.

Asset owner contribution (clause 8.43(a)(iii) of the Code)

16. The **system operator** must assess the net purchase quantity of **ancillary services** required to achieve compliance with the **PPOs**, taking into account its assessment of the contribution

that **asset owners** provide in achieving the **PPOs** through compliance with the **asset owner performance obligations** and **technical codes**.

17. The **system operator's** assessment of the contribution provided by **asset owners** must rely on the following:
 - 17.1 that **asset owners** will at all times comply with the **asset owner performance obligations** including any **dispensation** or **equivalence arrangement** in respect of these obligations that has been granted by the **system operator** pursuant to the **Code**;
 - 17.2 that information contained in the **asset capability statements** provided by **asset owners** is correct;
 - 17.3 the contribution provided by **asset owners** in meeting the relevant **asset owner performance obligations** will be provided at no additional procurement cost when dispatched for energy;
 - 17.4 the existence of any contracts of the type and nature set out in clause 8.6 of the **Code**.

Impact of dispensations and alternative ancillary service arrangements held by asset owners (clause 8.43(a)(iv) of the Code)

Dispensations

18. The **system operator** must take into account all known **dispensations** from compliance with an **asset owner performance obligation** or **technical code** when determining the net quantity of procurement required for each **ancillary service**.
19. **Allocable cost** excludes the readily identifiable and quantifiable costs resulting from granting **dispensations**. A **dispensation** may affect the net quantity of procurement for an **ancillary service**, and the additional procurement cost must be borne by the **asset owner** with the **dispensation**.

Alternative ancillary service arrangements

20. At the time of the preparation of this **procurement plan**, no **alternative ancillary service arrangements** were in place.
21. The **system operator** has no information indicating that any **alternative ancillary service arrangements** will be in operation over the period of this **procurement plan** which may decrease the quantity of **ancillary services** needing to be purchased by the **system operator**.

Impact of local quality agreements and existing long term contracts held by asset owners

Local quality agreements

22. In assessing the net quantities of procurement, the **system operator** must take account of any existing contracts for higher levels of **common quality** that the **system operator** has entered into under clause 8.6 of the **Code**. These are referred to as local quality agreements.

Existing long term contracts

23. In assessing the net quantities of procurement, the **system operator** must take account of any **existing long term contracts**.
24. The **system operator** may continue to procure **ancillary services** under **existing long term contracts** during the term of this **procurement plan**.

Cost effectiveness

25. The **system operator** must consider the following in achieving the appropriate balance between cost and quality for each **ancillary service** purchased:
 - 25.1 the technical specification of the plant being offered, including any measuring equipment required;
 - 25.2 the minimum acceptable service standard;
 - 25.3 the number of suppliers offering the service and reasons for any limitations;
 - 25.4 the actual cost of providing the service over the **ancillary service** procurement contract term;
 - 25.5 the liability for providing the service and the potential cost of failure; and
 - 25.6 the desirability of maintaining capability and competition in the provision of **ancillary services**.

Methodologies for net purchase quantity assessments (clause 8.43(b) of the Code)

Assessment methodology for frequency keeping

26. Subject to paragraphs 27 and 28, all parties that can offer **frequency keeping** compliant with the **system operator's** technical requirements and the **Code** and who are prepared to enter into an **ancillary service** procurement contract with the **system operator** to provide **frequency keeping** on a **half-hour clearing market procurement** basis must be contracted by the **system operator** for provision of **frequency keeping**. Each such **ancillary service** procurement contract is a contract to provide **frequency keeping** for the purposes of clause 13.82(5)(a) of the **Code**.
27. The **system operator** may procure **back-up SFK** from one or more parties, but is not required to enter into an **ancillary service** procurement contract for **back-up SFK** with every potential provider of **back-up SFK**.
28. Parties who wish to provide **frequency keeping** are subject to a pre-contract technical review. The **system operator** must be satisfied with the outcome of the technical review before entering into an **ancillary service** procurement contract with that party for **frequency keeping**. Without limitation, the scope of the technical review may include a review of:
 - 28.1 the control accuracy of the party's proposed **FK sites**;
 - 28.2 the **response rates** of the party's proposed **FK sites**;
 - 28.3 the capabilities of the monitoring equipment for the party's proposed **FK sites**; and
 - 28.4 for **multiple provider frequency keeping**; the ability of the party's proposed **FK sites** to receive and respond to regulating instructions;
29. The **system operator** must assess the net purchase quantity of **frequency keeping** in accordance with the processes set out in paragraphs 12 to 25.
30. The **system operator** must use reasonable endeavours to have an **ancillary service** procurement contract with at least one provider of **frequency keeping** in each island;

Assessment methodology for instantaneous reserve

31. All parties that can offer **instantaneous reserve** compliant with the **system operator's** technical requirements and the **Code** and who are prepared to enter into an **ancillary service** procurement contract with the **system operator** to provide **instantaneous reserve** on a **half-hour clearing market procurement** basis must be contracted by the **system operator** for provision of **instantaneous reserve** on that basis. Each such **ancillary service** procurement contract is a contract to provide **reserve offers** for the purposes of clause 13.37 of the **Code** and a contract to provide **instantaneous reserve** for the purposes of clause 13.82(5)(a) of the **Code**.
32. The **system operator** must assess the net purchase quantity of **instantaneous reserve** in accordance with the processes set out in paragraphs 12 to 25 and Schedule 13.3 of the **Code**.

Assessment methodology for over frequency reserve

33. The **system operator** may procure **over frequency reserves** from parties that can offer **over frequency reserves** compliant with the **system operator's** technical requirements and the **Code** and who are prepared to enter into an **ancillary service** procurement

contract with the **system operator** to provide **over frequency reserves** on a **firm quantity procurement** basis. Each such **ancillary service** procurement contract is a contract to provide **over frequency reserves** for the purposes of clause 13.82(5)(a) of the **Code**.

34. The **system operator** must assess the net purchase quantity of **over frequency reserves** in accordance with the processes set out in paragraphs 12 to 25.

Assessment methodology for voltage support

35. The **system operator** may procure **voltage support** from parties that can offer **voltage support** compliant with the **system operator's** technical requirements and the **Code** and who are prepared to enter into an **ancillary service** procurement contract with the **system operator** to provide **voltage support** on a **firm quantity procurement** basis. Each such **ancillary service** procurement contract is a contract to provide **voltage support** for the purposes of clause 13.82(5)(a) of the **Code**.
36. The **system operator** must assess the net purchase quantity of **voltage support** in each **zone** in accordance with the processes set out in paragraphs 12 to 25.

Assessment methodology for black start

37. The **system operator** may procure **black start** from parties that can offer **black start** compliant with the **system operator's** technical requirements and the **Code** and who are prepared to enter into an **ancillary service** procurement contract with the **system operator** to provide **black start** on a **firm quantity procurement** basis.
38. The **system operator** must assess the net purchase quantity of **black start** in accordance with the processes set out in paragraphs 12 to 25.
39. The **system operator** must use reasonable endeavours to have **ancillary service** procurement contracts for **black start** at two sites in each **island**.

Procurement processes (clause 8.43(c) of the Code)

Ancillary service procurement contracts

40. Subject to paragraph 41, the **system operator** may enter into an **ancillary service** procurement contract with an **ancillary service agent** at any time during the period of this **procurement plan** using any means of entering into the contract it considers appropriate.

Tendering

41. Subject to paragraphs 42 and 43, the **system operator** must seek tenders from potential providers of each **ancillary service** at least once every 24 months, taking into account the period since the **system operator** last sought tenders from potential providers of the **ancillary service** under any previous **procurement plan**.
42. The **system operator** need not comply with paragraph 41 for an **ancillary service** that is or would be procured on a **firm quantity procurement** basis if the **system operator** considers none or no more of the **ancillary service** is required in the relevant **region**.
43. The **system operator** need not comply with paragraph 41 for an **ancillary service** if the **system operator** considers there is only one potential provider of the **ancillary service** in the relevant **region**.
44. The terms and conditions of each tender process referred to in paragraph 41 must require the **system operator** to treat information received from tenderers during the tender process as confidential, subject only to the provisions that permit the disclosure of confidential information under the **system operator's** standard form **ancillary service** procurement contract.

Contracting

45. The **system operator** must negotiate in good faith **ancillary service** procurement contracts using the **system operator's** standard form **ancillary service** procurement contracts as starting points.
46. The term of an **ancillary service** procurement contract may differ from that of this **procurement plan**. Without limitation, the **system operator** may enter into a **new long term contract** for any **ancillary service**.

Bases of procurement

47. Subject to paragraph 48, **ancillary services** must be procured through a half-hour clearing market process whereby, for each **ancillary service** and **trading period**, **ancillary service agents** submit offers to the **system operator** to provide **the ancillary service**. The market for the **ancillary service** is priced and settled for each **trading period** based on the offers dispatched by the **system operator**. This type of procurement is referred to as “**half-hour clearing market procurement**”.
48. **Ancillary services** must be procured on a fixed quantity and fixed price basis where the **system operator** assesses there is a requirement for a fixed quantity or a high availability, irrespective of dispatch, of the **ancillary service**. This type of procurement is referred to as “**firm quantity procurement**”.
49. **Ancillary services** procured on a **firm quantity procurement** basis must be paid for by way of an **availability fee**, an **event fee** or both. **Ancillary services** procured on a **half-**

hour clearing market procurement basis must be paid for by way of an **offer price** and may also be paid for by way of an **availability fee**.

50. The basis of procurement for each **ancillary service** is set out in Appendix A.

Islanded situations

51. Despite anything to the contrary in this **procurement plan**, when part of the **grid** is **islanded** the **system operator** may procure **ancillary services** for that part of the **grid** using procurement processes other than those set out in paragraphs 41 to 50 and Appendix A. For the avoidance of doubt, an **ancillary service** procured under this paragraph is not an **alternative ancillary service arrangement**.

Administrative costs (clause 8.43(d) of the Code)

52. Identifiable **administrative costs** are those significant costs incurred by the **system operator** as a direct consequence of implementing this **procurement plan** and that are specifically attributable to an **ancillary service** and that have been agreed to by the **Authority** and the **system operator**. The **system operator** is entitled to recover these costs as an **allocable cost** in accordance with the **ancillary service** cost recovery methodology set out in clauses 8.55 to 8.70 of the **Code**.
53. Any **administrative costs** must be charged at the following standard rates:

Grade	Position	Rate \$/hr (excl GST)
1	Analyst/Engineer	138
2	Senior Analyst/Engineer/Consultant	170
3	Senior Advisor	222

Technical requirements and key contracting terms (clause 8.43(e) of the Code)

54. The key technical requirements for each **ancillary service** are set out in Appendix B.
55. The key contracting terms for the procurement of **ancillary services** are set out in Appendix C.
56. When entering into **ancillary service** procurement contracts with **ancillary service agents** for the provision of **ancillary services**, the **system operator** must use reasonable endeavours to ensure that the **ancillary service** procurement contracts include the key technical requirements and the key contracting terms.
57. The **ancillary service** procurement contracts negotiated between the **system operator** and the **ancillary service agents** must not be materially inconsistent with the key contracting terms.
58. Despite anything to the contrary in this **procurement plan**, when part of the **grid** is **islanded** the **system operator** may procure **ancillary services** for that part of the **grid** under **ancillary service** procurement contracts that do not include the key technical requirements or key contracting terms set out in Appendices B or C. For the avoidance of doubt, an **ancillary service** procured under this paragraph is not an **alternative ancillary service arrangement**.

Arrangements for unanticipated procurement of ancillary services (clause 8.43(f) of the Code)

59. During a **grid emergency**, the **system operator** relies on **ancillary service agents** complying with their obligations set out in **technical code B** of schedule 8.3 of the **Code**
60. Any departures from this **procurement plan** must be in accordance with clause 8.47 of the **Code**.
61. Where the **system operator** identifies a need to change any aspect of this **procurement plan**, the **system operator** may propose a change pursuant to clause 8.43A(1) or 8.44A(1) of the **Code**.

System operator reporting to the Authority (clause 8.43(g) of the Code)

62. The **system operator** must report to the **Authority** in relation to the procurement of **ancillary services** as follows:
- 62.1 settlement volumes, prices, costs, and **administrative costs** where appropriate, on a monthly basis;
 - 62.2 any issues arising with respect to cost allocation, liability and disputes, on a monthly basis; and
 - 62.3 other general procurement issues to be contained within the **system operator** monthly report provided in accordance with clause 3.14 of the **Code**.

Appendix A – Bases for procuring ancillary services (paragraph 50)

Frequency keeping

- A1. The **system operator** must:
- A1.1 procure **frequency keeping** on a **half-hour clearing market procurement** basis; and
 - A1.2 procure **frequency keeping** as **single provider frequency keeping** or **multiple provider frequency keeping**.
- A2. The **system operator** may:
- A2.1 procure **back-up SFK** at the same time it procures **multiple provider frequency keeping**; and
 - A2.2 pay an **availability fee** for **back-up SFK** but must not otherwise pay an **availability fee** for **frequency keeping**.
- A3. For each **island** independently, the **system operator** may set an **MFK transition trading period** or **SFK transition trading period**.
- A4. The **system operator** must communicate the setting of an **MFK transition trading period** or **SFK transition trading period** by:
- A4.1 notifying all **ancillary service agents** with an **ancillary service** procurement contract for **frequency keeping** in the relevant **island**; and
 - A4.2 publishing the notification on the **system operator's** website.
- A5. The **system operator** need not communicate an **SFK transition trading period** in accordance with paragraph A4 in advance of the **SFK transition trading period** if the transition to **single provider frequency keeping** is urgent.
- A6. Subject to paragraph A7, the **system operator** must dispatch offer(s) to provide **frequency keeping** for each **island** for each **trading period** to provide an aggregate **MW band** sufficient to meet the **system operator's net purchase quantity assessment** for that **trading period** at least cost based on the **offer prices** and estimated **constraint costs**. For the avoidance of doubt, the aggregate **MW band** may be zero.
- A7. The **system operator** may depart from paragraph A6 by excluding a **frequency keeping** offer from its determination of the least cost **frequency keeping** solution if the **system operator** reasonably considers it necessary to do so to comply with the **PPOs**. The **system operator** must notify the affected **ancillary service agent** as soon as reasonably practicable if it does this.
- A8. **Frequency keeping** for an **island** may be provided by one or more providers of **frequency keeping** in the other **island**, via the **HVDC link**.

Instantaneous reserve

- A9. The **system operator** must:
- A9.1 procure **instantaneous reserve** on a **half-hour clearing market procurement** basis.
 - A9.2 procure **instantaneous reserve** as **fast instantaneous reserve** and **sustained instantaneous reserve**.

- A10. The **system operator** must dispatch **reserve offers** in accordance with Subpart 2 of Part 13 of the **Code**.
- A11. **Reserve offers** dispatched by the **system operator** must be priced and settled in accordance with Subpart 4 of Part 13 of the **Code**.
- A12. **Instantaneous reserve** for an **island** may be provided by one or more providers of **instantaneous reserve** situated in the other **island**, via the **HVDC link**.

Over frequency reserve, voltage support and black start

- A13. The **system operator** has determined that it is uneconomic to procure **over frequency reserve, voltage support** and **black start** on a **half-hour clearing market procurement** basis.
- A14. The **system operator** must procure **over frequency reserve, voltage support** and **black start** on a **firm quantity procurement** basis.
- A15. For the purpose of determining when an **event fee** is payable for **over frequency reserve, voltage support** and **black start**:
 - A15.1 an **over frequency reserve** event occurs for dispatched **relay equipment** and the **generating unit** to which it is fitted when the **relay equipment** causes the **generating unit** to disconnect;
 - A15.2 A **voltage support** event occurs for voltage support **equipment** when the **voltage support equipment** is dispatched; and
 - A15.3 A **black start** event begins when the **system operator** requests **black start** and ends when **core grid** restoration is complete. There may be multiple attempts at restoration before the event ends.

Appendix B – Key technical requirements for ancillary services (paragraph 54)

- B1. For the avoidance of doubt, a key technical requirement that is expressed as an **ancillary service agent** right or obligation does not confer or impose that right or obligation on an **ancillary service agent** unless and until that right or obligation is included in an **ancillary service** procurement contract between the **system operator** and the **ancillary service agent**.

Frequency keeping

Performance requirements and technical specifications for frequency keeping

- B2. The **ancillary service agent** must provide one or more **frequency keeping units** and trained operators or **control equipment** at an **FK site** that, collectively, are capable of meeting the performance requirements in:
- B2.1 paragraphs B3 and B4, for **single provider frequency keeping**;
 - B2.2 paragraph B5, for **multiple provider frequency keeping**; and
 - B2.3 paragraphs B7 to B6, for both **single provider frequency keeping** and **multiple provider frequency keeping**.

Single provider frequency keeping performance requirements

- B3. Subject to paragraph B6, when providing **single provider frequency keeping** the **ancillary service agent** must:
- B3.1 when there is a **grid frequency error**, ensure the relevant **FK site** responds to eliminate the **grid frequency error** and commences the response as fast as practicable but in all cases within 10 seconds of the **grid frequency error** occurring;
 - B3.2 ensure the relevant **FK site** provides an average **response rate** of at least 10 **MW** per minute when the **grid** frequency is outside the **normal band** over each of the **ancillary service agent's single provider frequency keeping periods**;
 - B3.3 at all times act to maintain the frequency of the **grid** within the **normal band**, and use reasonable endeavours to continuously maintain the frequency of the **grid** as close as possible to 50 Hertz;
 - B3.4 at all times act to maintain **frequency time error** within the limits specified in clause 7.2C(1) of the **Code**, and use reasonable endeavours to continuously maintain **frequency time error** as close as possible to zero; and
 - B3.5 return **frequency time error** to zero at least once every **day**.
- B4. Subject to paragraph B6, the **ancillary service agent** must ensure the deviation of the **grid frequency** over any of the **ancillary service agent's single provider frequency keeping periods** does not exceed the maximum allowable deviation specified in the **ancillary service agent's ancillary service** procurement contract. Such deviation must be determined by reference to the **system operator measured frequency** but excluding any frequency measurements that are outside the **normal band**.

Multiple provider frequency keeping performance requirements

- B5. Subject to paragraph B6, when providing **multiple provider frequency keeping** the **ancillary service agent** must:
- B5.1 comply with regulating instructions issued to it; and
 - B5.2 ensure that the relevant **FK site** provides a **response rate** of at least 0.4 **MW** per minute per **MW** in the dispatched **MW band**.

General frequency keeping performance requirements

- B6. In meeting the performance requirements in paragraphs B3, B4 and B5, the **ancillary service agent's FK site** is not required to operate outside the limits of the **MW band** contained in the relevant **dispatch instruction** issued in accordance with Part 13 of the **Code** or above the relevant **control max** or below the relevant **control min**.
- B7. The **ancillary service agent** must ensure that each **frequency keeping unit** and item of **control equipment** at an **FK site** is maintained in accordance with good industry practice.

Monitoring requirements for frequency keeping

- B8. The **ancillary service agent** must comply, and provide monitoring equipment that complies, with:
- B8.1 paragraphs B9 to B10, for **single provider frequency keeping**;
 - B8.2 paragraphs B11 to B12, for **multiple provider frequency keeping**; and
 - B8.3 paragraphs B14 to B15, for both **single provider frequency keeping** and **multiple provider frequency keeping**.

Single provider frequency keeping monitoring requirements

- B9. The **ancillary service agent** must provide monitoring equipment that accurately measures and records in a time-tagged manner the following:
- B9.1 **FK output** at each of its **FK sites** that provides **single provider frequency keeping**;
 - B9.2 frequency of the **grid** in Hertz; and
 - B9.3 **frequency time error**.
- B10. When an **FK Site** is providing **single provider frequency keeping** the relevant monitoring equipment must measure and record:
- B10.1 **FK output** at an agreed location in the **grid** at least once every 1 second, each measurement accurate to within plus or minus 2% of the measured value;
 - B10.2 frequency at least once every 1 second (or such longer period as the **system operator** may determine), each measurement accurate to within 0.01 Hertz; and
 - B10.3 **frequency time error** using a GPS clock or agreed equivalent at least twice every 1 minute, each measurement accurate to within 0.05 seconds.

Multiple provider frequency keeping monitoring requirements

- B11. The **ancillary service agent** must provide monitoring equipment that accurately measures and records in a time-tagged manner the following:
- B11.1 **FK output** at each of its **FK sites** that provides **multiple provider frequency**

keeping; and

- B11.2 the regulating instructions received for each of its **FK sites** that provides **multiple provider frequency keeping**.
- B12. When an **FK Site** is providing **multiple provider frequency keeping** the relevant monitoring equipment must measure and record:
- B12.1 **FK output** at an agreed location in the **grid** at least once every 1 second, each measurement accurate to within plus or minus 2% of the total expected **FK output** range of the **FK site**; and
- B12.2 the regulating instructions received for the **FK site**.

General frequency keeping monitoring requirements

- B13. The **ancillary service agent** must ensure that the **frequency keeping** data recorded by the monitoring equipment at each **FK site** for each calendar month is held by the **ancillary service agent** for at least 15 **business days** following the end of that calendar month and is provided to the **system operator** within 5 **business days** of a written request from the **system operator**.
- B14. If an **FK site** is a **block dispatch group**, **station dispatch group** or group of load sources then, for the purposes of paragraphs B8 to B13, the **FK site** is to be treated as the specific **frequency keeping unit(s)** within the **FK site** that are allocated to **frequency keeping** for the relevant period.
- B15. The **ancillary service agent** must maintain the monitoring equipment in accordance with good industry practice.

Offer requirements for frequency keeping

- B16. The **ancillary service agent** may submit an offer to provide **frequency keeping** no later than 2 **trading periods** immediately preceding the **trading period** to which the offer relates. Each offer submitted is valid until revised or cancelled in accordance with paragraph B20 or B21.
- B17. Each offer to provide **frequency keeping** must be submitted to the **system operator** using the same **information system** approved by the **Authority** for the time being for submitting **reserve offers** under clause 13.38 of the **Code**.
- B18. There will be separate **ancillary service** procurement contract schedules for **back-up SFK** and **multiple provider frequency keeping**. The **ancillary service agent** must have:
- B18.1 an **ancillary service** procurement contract for **back-up SFK** from an **FK Site** in order to offer **single provider frequency keeping** from that **FK Site**; and
- B18.2 an **ancillary service** procurement contract for **multiple provider frequency keeping** from an **FK Site** in order to offer **multiple provider frequency keeping** from that **FK Site**.
- B19. Each offer to provide **frequency keeping** must include the following information:
- B19.1 a unique code for the **FK site** for which the offer is made;
- B19.2 a unique code for the **ancillary service agent** submitting the offer;
- B19.3 the **trading day** for which the offer is made;
- B19.4 the **trading periods** for which the offer is made;
- B19.5 the **control min** and **control max** for the **FK site** for which the offer is made; and
- B19.6 up to five separate **MW bands** and prices.

- B20. The **ancillary service agent** may revise an offer to provide **frequency keeping** by submitting a revised offer before the **gate closure** for the offer. Each such revision must be submitted or notified to the **system operator** using the same **information system** approved by the **Authority** for the time being for revising **reserve offers** under clause 13.46 of the **Code**.
- B21. The **ancillary service agent** may submit a new or revised offer to provide **frequency keeping** after the **gate closure** for the offer only in circumstances where a **bona fide physical reason** necessitates the cancellation or submission or where the **system operator** has issued a **formal notice**.
- B22. If the **ancillary service agent** submits a new or revised offer to provide **frequency keeping** later than one hour prior to the beginning of the **trading period** in respect of which the offer is made, the **ancillary service agent** must report the submission to the **system operator** in writing together with an explanation of the reasons for the submission. The **ancillary service agent** must provide the **system operator** with a written monthly report of all such cancellations and submissions by the 20th of the month following the month being reported.
- B23. The **system operator** must, as soon as reasonably practicable, confirm to the **ancillary service agent** the receipt of any new or revised offer to provide **frequency keeping** using the same **information system** approved by the **Authority** for the time being for confirming receipt of **reserve offers** under clause 13.51(2) of the **Code**.
- B24. If at any time the **system operator** is not satisfied (acting reasonably) that the **ancillary service agent** can meet the relevant performance requirements then, if so notified by the **system operator** (which notice must outline the areas of concern that the **system operator** has), the **ancillary service agent** must not submit any offers to provide **frequency keeping** until and unless it has provided evidence that demonstrates to the **system operator's** reasonable satisfaction that it can meet the performance requirements.
- B25. **Multiple provider frequency keeping** offers for an **FK site** must be subject to a minimum and may be subject to a maximum **MW band**. The minimum and maximum **MW bands** must be based on the results of the **MFK technical review** of the **ancillary service agent**, including the measurement accuracy of the **ancillary service agent's** monitoring equipment for the **FK site**. The **system operator** must publish the minimum **MW band** on its website.

Dispatch requirements for frequency keeping

- B26. The **system operator** must use all reasonable endeavours to issue **dispatch instructions** for **frequency keeping** at least five minutes in advance of the start or end of the relevant **trading period**, as the case may be.
- B27. If an **ancillary service agent** finds it cannot maintain the frequency or time error within the required targets the **ancillary service agent** must advise the **system operator** as soon as is practicable. If so notified the **system operator** must review its **dispatch instructions** for **frequency keeping** and make any further **dispatch instructions** it considers reasonably necessary or desirable to maintain the frequency or time error within the required targets.
- B28. The **ancillary service agent** must ensure that prior to entering a **trading period** for which it has received a **dispatch instruction** to provide **frequency keeping**, the relevant **frequency keeping units** are connected and able to perform **frequency keeping** from the start of that **trading period**.

Special testing requirements for frequency keeping

- B29. Prior to offering **frequency keeping** for an **FK site** for **dispatch** for the first time, **ancillary service agents** must have conducted and passed a **baseline test** or otherwise demonstrated the capability of the relevant **FK site** to provide **frequency keeping** to the reasonable satisfaction of the **system operator**.

- B30. Each **ancillary service agent** that provides **multiple provider frequency keeping** must conduct and pass a **baseline test**, or otherwise demonstrate the capability of the relevant **FK site** to provide **multiple provider frequency keeping** to the reasonable satisfaction of the **system operator**, at least once every four years.
- B31. Each **ancillary service agent** that provides **single provider frequency keeping** must conduct and pass a **baseline test** of equipment and/or trained operators at least once every six months, provided that the **ancillary service agent** is not required to conduct such a **baseline test** if the equipment and/or trained operators have provided and monitored **single provider frequency keeping** to the reasonable satisfaction of the **system operator** within the previous six months.
- B32. Other than those **baseline tests** described in paragraphs B29, B30 and B31, there are no other **baseline tests** for equipment and/or trained operators that are used, or may be used, to provide and monitor **frequency keeping**.
- B33. A **baseline test** or **on-demand test** of equipment and/or trained operators used for providing **frequency keeping** (other than monitoring equipment) must verify whether or not the relevant **FK Site** meets the performance requirements in paragraph B3 (for **single provider frequency keeping**) or B5 (for **multiple provider frequency keeping**) or such lesser performance requirements as the **system operator** may determine in consultation with the **ancillary service agent**.
- B34. A **baseline test** or **on-demand test** of monitoring equipment must verify whether or not the monitoring equipment meets the performance requirements in paragraphs B9 and B10 (for **single provider frequency keeping**) or B11 and B12 (for **multiple provider frequency keeping**).
- B35. Upon completion of a **baseline test** or **on-demand test** the **ancillary service agent** must provide the **system operator** with the corresponding test data and verification of meeting the performance requirements within 15 **business days**.

Instantaneous reserve

Performance requirements and technical specifications for instantaneous reserve

- B36. To be able to provide **instantaneous reserve** the **ancillary service agent** must have equipment that can provide **fast instantaneous reserve** and/or **sustained instantaneous reserve**.
- B37. An **ancillary service agent** providing **instantaneous reserve** must ensure that at all times the equipment that is the subject of the **reserve offer**:
- B37.1 is maintained in accordance with good industry practice so that the equipment is able to provide **instantaneous reserve** that meets the standards set out in this **procurement plan**;
- B37.2 is able to respond, when dispatched, within the timeframe applicable to either **fast instantaneous reserve** or **sustained instantaneous reserve**, as the case may be:
- B37.2.1 for **fast instantaneous reserve** in the case of **interruptible load** other than that provided by **battery energy storage systems**, the drop in load (in **MW**) must occur within 1 second of the **grid** system frequency falling to or below 49.2 Hertz, or the **trip frequency** specified in the **ancillary service agent's ancillary service** procurement contract, and must be sustained for a period of at least 60 seconds;
- B37.2.2 for **sustained instantaneous reserve** in the case of **interruptible load**

other than that provided by **battery energy storage systems**, the average drop in load (in **MW**) must occur over the first 60 seconds after the **grid** system frequency falls to or below 49.2 Hertz, or the **trip frequency** specified in the **ancillary service agent's ancillary service** procurement contract, and must be sustained for a period of at least 30 minutes or until instructed by the **system operator**, whichever is lesser. The **ancillary service agent** must use reasonable endeavours to maintain the **sustained instantaneous reserve** response after the 30 minute period for as long as the **grid** system frequency remains below the normal band;

- B37.3 meets, where relevant, the requirements for frequency response and control set out in clause 5(1) of **technical code A** of schedule 8.3 of the **Code** and has been approved by the **system operator**;
- B37.4 in the case of all equipment providing **generation reserve**, and **battery energy storage systems** providing **interruptible load**:
- B37.4.1 provides stable performance with adequate damping;
- B37.4.2 responds with a droop set within the range 1.5 - 7 per cent or with a controlled response as agreed with the **system operator**;
- B37.4.3 does not adversely affect the operation of the **grid** because of any of its non-linear characteristics or rate of change in output;
- B37.5 in the case of all equipment providing **generation reserve**, and **battery energy storage systems** providing **interruptible load**: in the North Island, remain connected:
- B37.5.1 at all times when the frequency is above 47.5 Hertz;
- B37.5.2 for at least 120 seconds when the frequency is at 47.5 Hertz;
- B37.5.3 for at least 20 seconds when the frequency is at 47.3 Hertz;
- B37.5.4 for at least 5 seconds when the frequency is at 47.1 Hertz;
- B37.5.5 for at least 0.1 seconds when the frequency is at 47.0 Hertz;
- B37.5.6 at any frequencies between those specified above, for times derived by linear interpolation.
- B37.6 in the case of all equipment providing **generation reserve**, and **battery energy storage systems** providing **interruptible load**: in the South Island, remain connected
- B37.6.1 at all times while frequency is at or above 47 Hertz; and
- B37.6.2 for 30 seconds if the frequency falls below 47 Hertz but not below 45 Hertz.
- B37.7 is available and has the capacity to provide the quantity of **instantaneous reserve** specified in the **reserve offer**;
- B38. An **ancillary service agent** dispatched to provide **instantaneous reserve** in accordance with Part 13 of the **Code** must:
- B38.1 provide additional **supply** into the **grid** equal to or exceeding the dispatched quantity of **instantaneous reserve** automatically when there is an **under-frequency event**; and/or
- B38.2 reduce **demand** from the **grid** equal to or exceeding the dispatched quantity of **instantaneous reserve** automatically when the frequency of the **grid** falls to or below the **trip frequency**.
- B39. In determining the response capability specified in the definition of **fast instantaneous reserve** and **sustained instantaneous reserve** set out in Part 1 of the **Code**, the **system operator** must use reasonable endeavours to exclude inertial response.

Assessment of performance requirements for interruptible load other than that provided by battery energy storage systems

- B40. In assessing the delivery of **interruptible load** other than that provided from **battery energy storage systems**, the **system operator** must apply the following methodology:
- B40.1 **Fast instantaneous reserve** must be calculated as the total reduction in load that occurs within one second of either the **grid** system frequency falling to or below 49.2 Hertz or the **trip time**, and which is sustained for a period of at least 60 seconds. The total reduction in load is to be calculated from the **pre-event load**.
 - B40.2 **Sustained instantaneous reserve** must be calculated as the average reduction in load that occurs over the first 60 seconds after either the **grid** system frequency falls to or below 49.2 Hertz or the **trip time**. The average reduction in load is to be calculated from the **pre-event load**. **Sustained instantaneous reserve** load is not to be restored until advised by the **system operator**.
 - B40.3 The **fast instantaneous reserve** and **sustained instantaneous reserve** delivered quantities must be determined from the aggregate load response:
 - B40.3.1 recorded at the **ancillary service agent's** equipment; or
 - B40.3.2 recorded at the **ancillary service agent's contracted GXPs** (if any), if no data is recorded at the **ancillary service agent's** equipment or the **system operator** reasonably considers it is not appropriate to assess delivered quantities from this data.
 - B40.4 If the analysis required for the purpose of paragraph B40.3 indicates an under-delivery of **interruptible load**, the analysis must be performed on each item of the **ancillary service agent's** equipment or each of the **ancillary service agent's contracted GXPs**, as the case may be. The data may be time adjusted to account for possible timing errors.
- B41. In determining the **pre-event load** the **system operator** must apply the following methodology when calculating delivered quantities:
- B41.1 To account for possible timing errors in data and a possible reduction in **pre-event load** due to the influence of falling frequency, the **pre-event load** must be taken at a previous steady state frequency, prior to the frequency falling. That is, at a time when frequency is within a +/-0.1 Hertz band for at least 60 seconds.

Assessment of performance requirements for generation reserve, and interruptible load provided by battery energy storage systems

- B42. In assessing the delivery of **fast instantaneous reserve** quantities from **generation reserve**, and **interruptible load** provided by **battery energy storage systems**, the **system operator** must apply the following methodology:
- B42.1 Equipment that is the subject of a **reserve offer** for **fast instantaneous reserve** is deemed to comply with the performance requirement in paragraph B38 if and only if the equipment's actual response meets or exceeds its **asset capability statement** modelled response.
 - B42.2 The equipment's **asset capability statement** modelled response is the response that could reasonably be expected if all the information in the equipment's current **asset capability statement** is correct, taking into account:
 - B42.2.1 the frequency profile of the **under-frequency event**;

- B42.2.2 the equipment's real power output immediately before the start of the **under-frequency event** ("**pre-event real power output**");
- B42.2.3 the number of **generating units** on **partly loaded spinning reserve** mode;
- B42.2.4 the number of hydro **generating units** on **tail water depressed reserve** mode; and
- B42.2.5 the amount of **fast instantaneous reserve** dispatched for **generating units**.
- B42.3 Subject to paragraph B39, the equipment's actual response must be calculated as the additional real power output of the equipment compared to the **pre-event real power output** of the equipment.
- B42.4 In determining the **pre-event real power output** of the equipment, the **system operator** must apply the following methodology when calculating the delivered quantities:
 - B42.4.1 to account for possible timing errors contained in the data provided by the **ancillary service agent**, the **pre-event real power output** at several different times must be used to calculate the delivered quantities;
 - B42.4.2 the maximum delivered quantity obtained from applying the **pre-event real power outputs** must be used to determine the reserve response during an **under-frequency event**; and
 - B42.4.3 **generating unit** data must be used if measured and provided by the **ancillary service agent**.
- B42.5 On request, the **system operator** must provide each **ancillary service agent** with details of the **system operator's** assessment under paragraph B42.4 of the **ancillary service agent's** delivery of **fast instantaneous reserve** quantities.

Monitoring requirements for instantaneous reserve

- B43. The **ancillary service agent** must provide monitoring equipment that accurately measures and records the **instantaneous reserve** response (in **MW**) from the **ancillary service agent's** equipment:
 - B43.1 for **fast instantaneous reserve**, at no greater than 0.1 second intervals commencing not less than 15 seconds prior to, and continuing until 60 seconds after, the **UFE time** or **trip time** as applicable;
 - B43.2 for **sustained instantaneous reserve**, at no greater than 0.1 second intervals commencing not less than 15 seconds prior to, and continuing until 60 seconds after, the **UFE time** or **trip time** as applicable, and then at no greater than 1 second intervals until the **instantaneous reserve** response ends;
 - B43.3 including measurement of the locally measured frequency and relay activation signal; and
 - B43.4 in a time-tagged manner such that all recorded data is either:
 - B43.4.1 GPS time-tagged; or
 - B43.4.2 if GPS time-tagging capability is not available, then aligned with the time-tagged frequency measurement from the same device.
- B44. The **ancillary service agent** must ensure that the data recorded by the monitoring equipment under paragraph B43 is held by the **ancillary service agent** for at least 15 **business days** and is provided to the **system operator** within 5 **business days** of a written request from the **system operator**.

- B45. The **ancillary service agent** may provide an independently verified error range for data it provides to the **system operator** under paragraph B44, which the **system operator** must have regard to in any assessment of the **ancillary service agent's** compliance with performance requirements using the data.
- B46. For hydro **generating stations**, the data referred to in paragraph B43 may be measured, recorded and provided by **generating station** unless the **generating station** is providing both **tail water depressed reserve** and **partly loaded spinning reserve**, in which case the data must be measured, recorded and provided by **generating unit**. For other **generating stations** providing **partly loaded spinning reserve**, the data referred to in paragraph B43 must be measured, recorded and provided by **generating unit**.
- B47. The **ancillary service agent** must maintain the monitoring equipment in accordance with good industry practice.

Offer requirements for instantaneous reserve

- B48. If the **system operator** reasonably believes that the maximum quantities of **fast instantaneous reserve** and **sustained instantaneous reserve** that can be provided by the **ancillary service agent** are higher or lower than the maximum quantities specified in the **ancillary service** procurement contract, the **system operator** may, by written notice to the **ancillary service agent**, increase or decrease the maximum quantities of **fast instantaneous reserve** and **sustained instantaneous reserve** specified in the **ancillary service** procurement contract. The **system operator** must use reasonable endeavours to contact the **ancillary service agent** and discuss the matter prior to providing such notice, but any failure to do so does not invalidate the notice.
- B49. If at any time the **system operator** is not satisfied (acting reasonably) that the **ancillary service agent** can meet the relevant performance requirements, then:
- B49.1 if so notified by the **system operator** (which notice must outline the areas of concern that the **system operator** has), the **ancillary service agent** must not submit any **reserve offers** until and unless it has provided evidence that demonstrates to the **system operator's** reasonable satisfaction that it can meet the performance requirements;
- B49.2 **reserve offers** submitted by the **ancillary service agent** (or any **reserve offers** relating to specific equipment) are deemed not to be submitted pursuant to a valid and enforceable contract with the **system operator** and must not be accepted by the **system operator**; and
- B49.3 if such reserve offers are in the price-responsive schedule or the non-response schedule (as the case may be), the system operator may require the removal of such reserve offers from the relevant price-responsive schedule or non-response schedule (as the case may be).

Special testing requirements for instantaneous reserve

- B50. For **interruptible load** other than that provided by **battery energy storage systems**, the **ancillary service agent** must either:
- B50.1 conduct an **end-to-end test** of all items of equipment it uses for providing **interruptible load**; or
- B50.2 have demonstrated fully compliant operational performance of that equipment by responding to an **under-frequency event**,
- at least once every 24 months.
- B51. The scope of the **end-to-end test** referred to in clause B50 must be agreed between the **ancillary service agent** and the **system operator** and may not require the full contracted

- amount of **interruptible load** to be shed, provided the functionality of the equipment is demonstrated to the **system operator's** reasonable satisfaction.
- B52. For **generation reserve**, and **interruptible load** provided by **battery energy storage systems**, the **ancillary service agent** must conduct a **baseline test** of the relevant equipment used to provide **instantaneous reserve**:
- B52.1 at least once every four years for analogue equipment and non-self-monitoring digital equipment; and
- B52.2 at least once every ten years for self-monitoring digital equipment;
- B53. Notwithstanding clauses B50 and B52.1 the **ancillary service agent** must conduct a **baseline test** of the equipment it uses to provide **instantaneous reserve** following any change to such equipment that may impact its **instantaneous reserve** performance.
- B54. For the avoidance of doubt, a **baseline test** for **generation reserve**, and **interruptible load** provided by **battery energy storage systems**,
- B54.1 must be used to validate the **asset capability statement** modelled response of the assets subject of a reserve offer for **fast instantaneous reserve**; and
- B54.2 may be combined with testing required under Schedule 8.3, Technical Code A, Appendix B, Clause 2 of the **Code**.
- B55. An **end-to-end test**, **baseline test**, or **on-demand test** of equipment used for providing **instantaneous reserve** (other than monitoring equipment) must verify whether or not the equipment meets the performance requirements in paragraphs B36, or such lesser performance requirements as the **system operator** may determine in consultation with the **ancillary service agent**.
- B56. An **end-to-end test**, **baseline test**, or **on-demand test** of monitoring equipment must verify whether or not the monitoring equipment meets the performance requirements in paragraph.
- B57. Upon completion of a **baseline test**, **end-to-end test**, **on-demand test**, or response to an **under-frequency event** the **ancillary service agent** must provide the **system operator** with the corresponding test data and verification of meeting the performance requirements within 15 **business days**.
- B58. The **ancillary service agent** must not submit **reserve offers**:
- B58.1 for **interruptible load** other than that provided by **battery energy storage systems** unless it has conducted and passed an **end-to-end test** of the relevant equipment or demonstrated fully compliant operational performance of that equipment in accordance with paragraph B50;
- B58.2 for **generation reserve**, and **interruptible load** provided by **battery energy storage systems**, unless it has conducted and passed a **baseline test** of the relevant equipment in accordance with paragraph B54.
- B59. For the avoidance of doubt—
- B59.1 there are no other **baseline tests** for equipment used to provide or monitor **instantaneous reserve**; and
- B59.2 paragraphs B49.2 and B49.3 apply to any **reserve offers** submitted in breach of paragraph B58.

Over frequency reserve

Performance requirements and technical specifications for over frequency reserve

- B60. To be able to provide **over frequency reserve**, the **ancillary service agent** must provide **relay equipment** that:
- B60.1 when armed, automatically disconnects the **generating unit** to which it is fitted within half a second of the frequency of the **grid** rising to or above the **required frequency** for that **generating unit**;
 - B60.2 if the **system operator** has remote arming and/or disarming control of the **relay equipment**, immediately arms or disarms (as appropriate) when it receives a remote arming or disarming signal from the **system operator's** co-ordination centre;
 - B60.3 is available at all times to provide **over frequency reserve** except:
 - B60.3.1 where the **relay equipment** is taken out of service under the conditions specified in the **ancillary service** procurement contract; and
 - B60.3.2 during the period in which any tests are conducted; and
 - B60.3.3 during any **trading period** when the **generating unit** is not generating **electricity**; and
 - B60.4 is maintained in accordance with good industry practice so that the **relay equipment** is able to provide **over frequency reserve** in accordance with the **ancillary service** procurement contract.
- B61. The conditions under which outages may occur on the **relay equipment** are specified in the **ancillary service** procurement contract with the **ancillary service agent**.

Monitoring requirements for over frequency reserve

- B62. The **ancillary service agent** must provide monitoring equipment that:
- B62.1 is available at all times (except during an **allowed outage** or during a test);
 - B62.2 continuously measures and transmits to the designated interface point information as to whether or not the **relay equipment** is armed (except during an **allowed outage** or during a test); and
 - B62.3 is maintained in accordance with good industry practice.

Special testing requirements for over frequency reserve

- B63. The **ancillary service agent** must conduct a **baseline test** of each item of **relay equipment** at least once every 24 months unless:
- B63.1 otherwise agreed with the **system operator**; or
 - B63.2 each **ancillary service agent** providing **over frequency reserve** has demonstrated fully compliant operational performance of its **generating units** by providing **over frequency reserve** in the previous 24 months.
- B64. A **baseline test** or **on-demand test** of **relay equipment** must verify whether or not the **relay equipment** meets the performance requirements in paragraphs B60.1 and B60.2, or such lesser performance requirements as the **system operator** may determine in consultation with the **ancillary service agent**.

- B65. An **on-demand test** of monitoring equipment must verify whether or not the monitoring equipment meets the performance requirements in paragraph B62.2.
- B66. Upon completion of a **baseline test** or **on-demand test** the **ancillary service agent** must provide the **system operator** with the corresponding test data and verification of meeting the performance requirements within 15 **business days**.

Voltage support

Performance requirements and technical specifications for voltage support

- B67. In order to provide **voltage support**, the **ancillary service agent** must provide either:
- B67.1 continuously variable **reactive power** resources that have:
 - B67.1.1 the capability of providing the contracted **reactive power** quantities whilst the **grid** is operated to the voltage range, as specified in the **technical codes**; and
 - B67.1.2 both automatic and 24-hour manual voltage control facilities; or
 - B67.2 static **reactive power** resources that have:
 - B67.2.1 provision for manual control available on a 24-hour basis; and
 - B67.2.2 automatic operation to parameters and for conditions specified by the **system operator**.
- B68. All **voltage support equipment** provided by an **ancillary service agent** must have data and analogue indications of the **reactive power** and status of the **voltage support equipment**, provided in accordance with the requirements of the **technical codes**.
- B69. To be able to provide **voltage support**, the **ancillary service agent** must provide **voltage support equipment** that:
- B69.1 is available at all times to provide **voltage support** at the maximum **reactive power** and network busbar(s) specified in the **ancillary service** procurement contract, except:
 - B69.1.1 where the **voltage support equipment** is taken out of service under the conditions specified in the **ancillary service** procurement contract; or
 - B69.1.2 during the period in which any tests are conducted;
 - B69.2 is able to respond, when dispatched, in accordance with the response times specified in the **ancillary service** procurement contract; and
 - B69.3 is maintained in accordance with good industry practice so that the **voltage support equipment** is able to provide **voltage support** in accordance with the **ancillary service** procurement contract.

Monitoring requirements for voltage support

- B70. The **ancillary service agent** must provide monitoring equipment that:
- B70.1 is available at all times (except during an **allowed outage** or during a test);
 - B70.2 continuously measures and transmits to the designated interface point the **reactive power** provided by the **voltage support equipment** (except during an **allowed outage** or during a test); and
 - B70.3 is maintained in accordance with good industry practice.

Special testing requirements for voltage support

- B71. There are no **baseline tests** for equipment used to provide or monitor **voltage support**.
- B72. An **on-demand test** of **voltage support equipment** must verify whether or not the **voltage support equipment** meets the performance requirements in paragraphs B69.1 and B69.2, or such lesser performance requirements as the **system operator** may determine in consultation with the **ancillary service agent**.
- B73. An **on-demand test** of monitoring equipment must verify whether or not the monitoring equipment meets the performance requirements in paragraph B70.2.
- B74. Upon completion of an **on-demand test** the **ancillary service agent** must provide the **system operator** with the corresponding test data and verification of meeting the performance requirements within 15 **business days**.

Black start

Performance requirements and technical specifications for black start

- B75. The **ancillary service agent** must ensure that, when requested to provide **black start**, it provides such services by:
 - B75.1 starting a **generating unit** and raising it to synchronous speed, without any power being obtained from the **grid** or any **local network**;
 - B75.2 operating the **generating unit** at zero load at synchronous speed for 15 minutes (or such shorter period as instructed by the **system operator**);
 - B75.3 having the **generating unit** switched on to de-energised **network** busbar(s);
 - B75.4 providing generation output that supports the initial charging of transmission circuits and **assets**, and the progressive energising of the **grid** at **network** busbar(s);
 - B75.5 providing the **reactive capability** specified in clause 8.23 of the **Code** for the **generating unit**;
 - B75.6 subject to paragraph B75.5, controlling the **network** voltage as instructed by the **system operator**; and
 - B75.7 providing an emergency frequency regulating reserve service by maintaining the frequency to between 49.25 Hertz and 50.75 Hertz, to the extent practicable.
- B76. The **ancillary service agent** must ensure that:
 - B76.1 sufficient **black start equipment** is available at all times to provide **black start** in accordance with the **ancillary service** procurement contract;
 - B76.2 the **black start equipment** is able to start without power being obtained from the **grid** or any **local network**;
 - B76.3 sufficient **generating units** are available continuously to provide **black start**, except where there is an **allowed outage** preventing the provision of **black start**;
 - B76.4 such **generating units** are able to achieve the response times to synchronous speed specified in the **ancillary service** procurement contract;
 - B76.5 such **generating units** otherwise have the capabilities specified in the **ancillary service** procurement contract; and
 - B76.6 such **generating units** and the **black start equipment** are maintained in

accordance with good industry practice to enable the provision of **black start** in accordance with the **ancillary service** procurement contract.

Black start outages

- B77. An outage of **black start equipment** will not be taken into account in assessing the **ancillary service agent's** compliance with paragraph B75.1 if the **ancillary service agent** removes the **black start equipment** from service for:
- B77.1 maintenance of the **black start equipment**;
 - B77.2 to eliminate or mitigate a risk of injury to any person or damage to the **black start equipment**;
 - B77.3 a test of the **black start equipment**;
- and the **ancillary service agent** otherwise complies with paragraph B79 in respect of the outage.
- B78. The **ancillary service agent** must use reasonable endeavours to minimise the duration and frequency of any outage that affects the **ancillary service agent's** ability to provide **black start**.
- B79. Where an outage that may compromise the **ancillary service agent's** ability to provide **black start** is planned or anticipated by the **ancillary service agent** the **ancillary service agent** must:
- B79.1 consult with the **system operator** on the timing of the outage with the intention that the timing of the outage must ensure that the **system operator** can, at all times, comply with its Principal Performance Obligations;
 - B79.2 provide notice to the **system operator** of the outage, its expected start date, its duration and the programme of works no later than:
 - B79.2.1 twelve weeks before the start of the outage for outages planned to be 12 hours or greater in duration; or
 - B79.2.2 two weeks before the start of the outage for outages planned to be less than 12 hours in duration;unless the **system operator** agrees otherwise in writing;
 - B79.3 if the expected start date, duration or programme of works for a planned outage changes, provide the **system operator** with as much advance warning as reasonably practicable of the revised expected start date, duration or programme of works;
- B80. For each planned outage for which the **ancillary service agent** fails to meet the notice requirements in clause B79.2 or B79.3 the **ancillary service agent** is liable to the **system operator** for an amount equal to the **availability fee** charged by the **ancillary service agent** for one month.
- B81. In the event of any unexpected outage that compromises the **ancillary service agent's** ability to provide black start, the **ancillary service agent** must:
- B81.1 immediately report the unexpected outage to the **system operator**, including reporting to the **system operator** the expected time to rectify the unexpected outage;
 - B81.2 determine and rectify the cause of the unexpected outage as soon as practicable; and
 - B81.3 use reasonable endeavours to continue to provide **black start**.

Monitoring requirements for black start

- B82. Any failure of the equipment that compromises the ability of the **ancillary service agent** to perform **black start** must be reported to the **system operator** immediately. The cause of the failure must be determined and rectified as soon as practicable, and the **system operator** must be advised of the expected date of completion, and upon completion.

Special testing requirements for black start

- B83. The **ancillary service agent** must conduct a **baseline test** of each item of **black start equipment** at least once every six weeks, provided that the **ancillary service agent** is not required to conduct such a **baseline test** if the **black start equipment** has been generating at any time since the last such **baseline test**.
- B84. A **baseline test** or **on-demand test** of **black start equipment** must verify whether or not the **black start equipment** meets the performance requirements in paragraph B76.2.
- B85. Without limiting any other rights the **system operator** may have to request tests of **black start**, the **system operator** may require the **ancillary service agent** to conduct a **baseline test** of **black start** no more than once every 12 months.
- B86. A **baseline test** or **on-demand test** of **black start** must verify whether or not the **black start** meets the performance requirements in paragraphs B75 and B76, or such lesser performance requirements as the **system operator** may determine in consultation with the **ancillary service agent**. A **baseline test** or **on-demand test** of **black start** will include a full station shutdown unless the **system operator** determines otherwise in consultation with the **ancillary service agent**.

Appendix C – Key contracting terms for ancillary service procurement contracts (paragraph 55)

- C1. For the avoidance of doubt, a key contracting term that is expressed as an **ancillary service agent** right or obligation does not confer or impose that right or obligation on an **ancillary service agent** unless and until that right or obligation is included in an **ancillary service** procurement contract between the **system operator** and the **ancillary service agent**.

Disputes

- C2. In the event of a dispute between the parties in relation to the **ancillary service** procurement contract (not being a dispute under the **regulations** or **Code**) that the parties cannot resolve by negotiation, the parties can agree to refer the dispute for resolution by:
- C2.1 mediation; or
 - C2.2 independent expert determination; or
 - C2.3 Rulings Panel determination under Part 3 of the **enforcement regulations**; or
 - C2.4 arbitration in accordance with the provisions of the Arbitration Act 1996.
- C3. In the event that the parties do not agree to refer an unresolved dispute to one of the above forms of dispute resolution, or having been referred to such dispute resolution the dispute is not resolved within 100 **business days** (or such longer period as the parties may agree), either party may refer the dispute to an arbitrator for resolution. The arbitrator must be agreed between the parties or, failing agreement, must be an arbitrator appointed by the President for the time being of the New Zealand Law Society. Such arbitration shall be conducted under and in accordance with the provisions of the Arbitration Act 1996.

Obligations under the regulations and Code

- C4. Nothing in the **ancillary service** procurement contract limits any obligation of the **ancillary service agent** or the **system operator** to comply with the **regulations** or **Code** or limit any liabilities arising due to the breach of the **regulations** or **Code** by an **ancillary service agent** or the **system operator**.
- C5. Any performance requirement in the **ancillary service** procurement contract that refers to a specific clause of the **Code** is subject to any **dispensation** granted to the **ancillary service agent**, provided the **ancillary service agent** has notified the **system operator** of the **dispensation**.

Rights to terminate

- C6. A party has the right to terminate the **ancillary service** procurement contract (or an **ancillary service** schedule to the **ancillary service** procurement contract) immediately on notice to the other party where a change to the **regulations** or **Code** that occurs during the term of the **ancillary service** procurement contract:
- C6.1 results in the **ancillary service** procurement contract being materially inconsistent with the **regulations** or **Code**; or
 - C6.2 imposes material additional obligations or material costs on the terminating party in respect of matters covered by the **ancillary service** procurement contract.

Whether any such change is material is to be decided by independent dispute resolution where the parties cannot agree.

- C7. A party has the right to terminate the **ancillary service** procurement contract immediately on notice to the other party if:
- C7.1 the other party goes into liquidation, compromises with its creditors, enters statutory management or receivership, becomes insolvent, or is subject to any analogous event; or
 - C7.2 the other party sells its business without the consent of the terminating party, such consent not to be unreasonably withheld; or
 - C7.3 it becomes illegal for the terminating party to perform the **ancillary service** procurement contract.
- C8. The **system operator** has the right to terminate an **ancillary service** schedule to the **ancillary service** procurement contract immediately on notice to the **ancillary service agent** if:
- C8.1 the **ancillary service agent** commits a material breach of the **ancillary service** procurement contract in relation to that **ancillary service**; and
 - C8.2 such breach, if remediable, is not remedied to the **system operator's** reasonable satisfaction within 10 **business days** of the **system operator's** notice, or such longer period as the **system operator** may determine.
- C9. A failure by the **ancillary service agent** to meet a performance requirement for the **ancillary service** is not a material breach unless—
- C9.1 the **ancillary service agent** has previously failed to meet the same performance requirement under its existing **ancillary service** procurement contract; or
 - C9.2 the **ancillary service agent** has failed to meet the performance requirement in paragraph B4; or
 - C9.3 the effect of the failure is that the **ancillary service** was not provided at all when it should have been.

Payment and invoicing

- C10. The payment and invoicing terms of the **ancillary service** procurement contract must recognise and be consistent with the obligations of the parties under the **Code** in respect of payment and invoicing.
- C11. The **system operator** may delegate its invoicing obligations under the **ancillary service** procurement contract to the **clearing manager**. Invoices for **ancillary services** are paid by the **clearing manager** on the **system operator's** behalf.

Limitation of liability

- C12. Where a party breaches an obligation under the **ancillary service** procurement contract that is also an obligation contained within the **regulations** or **Code**, the liability (if any) of that party is determined under and in accordance with the **regulations** and **Code** (including the limitations of liability contained in the **regulations** and **Code**) and that party has no liability under the **ancillary service** procurement contract.
- C13. The **system operator's** liability to the **ancillary service agent** under the **ancillary service** procurement contract is limited to situations where the **system operator** has breached the provisions of the **ancillary service** procurement contract. For the avoidance of doubt, the **ancillary service agent** has no claim against the **system operator** for failing to follow the **procurement plan** in any respect.

- C14. The **system operator** is only liable to the **ancillary service agent** for direct loss suffered by the **ancillary service agent** and caused by the **system operator's** breach of the **ancillary service** procurement contract. The **system operator** is not liable for loss of use, revenue or profit, any third party damages, and third party settlement or any costs associated with such items, even where such losses may be direct losses.
- C15. The **ancillary service agent's** liability to the **system operator** under the **ancillary service** procurement contract is limited to situations where the **ancillary service agent** has breached the provisions of the **ancillary service** procurement contract.
- C16. The **ancillary service agent** is only be liable to the **system operator** for direct loss suffered by the **system operator** and caused by the **ancillary service agent's** breach of the **ancillary service** procurement contract. The **ancillary service agent** is not be liable for loss of use, revenue or profit, any third party damages, and third party settlement or any costs associated with such items, even where such losses may be direct losses.
- C17. The maximum liability of each party to the other party under the **ancillary service** procurement contract is as follows:
- C17.1 \$100,000 in any 12 month period in respect of all defaults of obligations contained in the general contracting terms of the **ancillary service** procurement contract (and not contained in an **ancillary service** schedule to the **ancillary service** procurement contract) irrespective of the number of defaults; and
- C17.2 In respect of defaults of obligations contained in an **ancillary service** schedule to the **ancillary service** procurement contract:
- C17.2.1 the combined maximum liability for any single event or related series of events is the lesser of 5% of the total amount of the expected annual fees payable for that particular **ancillary service** (such total to be set by the **system operator** prior to the execution of the **ancillary service** procurement contract) or \$100,000; and
- C17.2.2 the combined maximum liability in any 12 month period is the lesser of 20% of the total amount of the expected annual fees payable for that particular **ancillary service** (to be set by the **system operator** prior to the execution of the contract) or \$300,000, irrespective of the number of events.
- C18. The **system operator** has no liability to the **ancillary service agent** in respect of:
- C18.1 the **system operator's** selection or dispatch of any other **ancillary service agent** to provide **multiple provider frequency keeping**; or
- C18.2 any other **ancillary service agent's** failure to comply with a **dispatch instruction** for **multiple provider frequency keeping**, regulating instructions or any performance or monitoring requirement for **multiple provider frequency keeping**.
- C19. Nothing in paragraphs C12 to C18 limits the **system operator's** ability to withhold payment for an **ancillary service** under paragraph C23.1.

Force majeure

- C20. The parties must be able to rely on force majeure in certain circumstances to limit any liability under the **ancillary service** procurement contract for a breach of the provisions contained in the **ancillary service** procurement contract. The following situations must be included in the definition of force majeure within the **ancillary service** procurement contract:
- C20.1 any event or circumstance occasioned by, or in consequence of, any act of God (being an event or circumstance (i) due to natural causes, directly or indirectly and exclusively without human intervention, and (ii) which could not by any amount of ability have been foreseen or, if foreseen, could not by any amount of human care

and skill have been resisted), strikes, lockouts, other industrial disturbances, acts of public enemy, wars, blockades, insurrections, riots, epidemics, aircraft, or civil disturbances; or

- C20.2 the binding order of any Court, government or a local authority (except where the **ancillary service agent** seeks to invoke this paragraph and the local authority which made the binding order is the owner of, or is otherwise associated with or related to, the **ancillary service agent**); or
 - C20.3 any other event or circumstance beyond the control of the party invoking this paragraph and being such that, by the exercise of reasonable care acting in accordance with good industry practice, such party could not have prevented such failure.
- C21. Any force majeure provision contained in the **ancillary service** procurement contract must not apply to any liability of the **ancillary service agent** that arises due to a breach of the **regulations** or **Code** whether or not such obligation arises in the provision of **ancillary services**.

Claims for failure to perform

- C22. The **system operator** may notify the **ancillary service agent** of a claim that the **ancillary service agent** has failed, or is unable, to meet a performance requirement in the **ancillary service** procurement contract or comply with a **dispatch instruction** for the **ancillary service**.
- C23. If the claim is accepted (voluntarily by the **ancillary service agent** or after dispute resolution):
- C23.1 the **system operator** is not liable to pay the **ancillary service agent** for providing the **ancillary service** for the relevant period; and
 - C23.2 the **ancillary service agent** must take remedial steps to ensure that it is able to meet the performance requirement and/or comply with **dispatch instructions**.

Tests

- C24. The **ancillary service agent** must pay its costs of any **baseline test**.
- C25. For each **ancillary service** the **system operator** may request:
- C25.1 an “**on-demand test**”; and/or
 - C25.2 a statement of the capability and operational limitations of the equipment used to provide or monitor the **ancillary service**,
- which, if requested, the **ancillary service agent** must carry out or provide within a timeframe agreed between the **system operator** and the **ancillary service agent**. Unless the **system operator** and the **ancillary service agent** agree otherwise, if an **on-demand test** has been requested but not carried out and passed within 30 **business days** of the **system operator’s** request, the **ancillary service agent** is deemed to be incapable of providing or monitoring the **ancillary service** from the end of that period until the **on-demand test** is carried out and passed.
- C26. The **ancillary service agent** must provide the **system operator** with written information in such detail as the **system operator** reasonably requires about the timing of tests and the results of tests.
- C27. The **system operator** must pay the **ancillary service agent’s** reasonable costs of an **on-demand test** unless:
- C27.1 the equipment fails the **on-demand test**; or

- C27.2 the **system operator** requested the **on-demand test** within 20 **business days** of the **ancillary service agent** notifying the **system operator** that the **ancillary service agent** had completed remedial action on the equipment in response to a claim by the **system operator** under paragraph C22, and the sole purpose of the **on-demand test** is to determine the sufficiency of that remedial action.
- C28. If equipment used to provide or monitor an **ancillary service** fails a **baseline test** or **on-demand test** the **ancillary service agent**:
- C28.1 is deemed to be incapable of providing or monitoring the **ancillary service** until the test is passed; and
- C28.2 must re-test the equipment until the test is passed, and the **ancillary service agent** must pay the costs of any such re-test unless:
- C28.2.1 the equipment is used to provide or monitor **frequency keeping** and/or **instantaneous reserve** and no other **ancillary service**; or
- C28.2.2 otherwise agreed with the **system operator**.

Inspections

- C29. The **system operator** may inspect any equipment used by the **ancillary service agent** to provide or monitor an **ancillary service**. The **system operator** must not interfere unreasonably with the **ancillary service agent's** business in carrying out such an inspection.
- C30. The **system operator** must give the **ancillary service agent** at least five **business days'** notice of any such inspection, unless the **system operator** reasonably believes that the equipment is being used in a manner inconsistent with providing the **ancillary service** in accordance with the **ancillary service** procurement contract, in which case the **system operator** may give less or no notice.

Sub-contracting and assignment

- C31. The **ancillary service agent** may not sub-contract any of its obligations under the **ancillary service** procurement contract to any person without the **system operator's** prior consent. If the **ancillary service agent** does sub-contract any of its obligations under the **ancillary service** procurement contract, it remains primarily responsible for the performance of those obligations, including for any breach of the **regulations** or **Code** arising from the performance or non-performance of those obligations.
- C32. The **system operator** may assign its interest in the **ancillary service** procurement contract to any person who takes over the role of **system operator**. Otherwise, neither party may assign its interest in the **ancillary service** procurement contract to any person without the consent of the other party.

New long term contracts

- C33. The following provisions must be included in any **new long term contract** for **over frequency reserve, voltage support** or **black start**:
- C33.1 If, in the **system operator's** reasonable opinion, the number or duration of maintenance outages of equipment used to provide or monitor the **ancillary service** is such that the **ancillary service agent's** ability to provide or monitor the **ancillary service** in accordance with the **new long term contract** has been substantially detrimentally affected, the **system operator** may, by giving one month's prior written notice to the **ancillary service agent**, terminate the **new long term contract**.

- C33.2 Any **availability fee** or **event fee** payable under the **new long term contract** is to be subject to adjustment no more frequently than once every 12 months in accordance with an objective formula to be agreed between the **system operator** and **ancillary service agent**.

Appendix D – Glossary of terms

In this **procurement plan**, unless the context otherwise requires:

“**allowed outage**” means an outage of that equipment that is permitted under an **ancillary service** procurement contract;

“**availability fee**” means a fixed fee for the availability of an **ancillary service**, irrespective of dispatch or provision, expressed as dollars per period of availability;

“**back-up SFK**” means **single provider frequency keeping** that is procured against the risk of technical failure of **multiple provider frequency keeping**;

“**baseline test**” means a set of tests to demonstrate to the reasonable satisfaction of the **system operator** that the equipment and associated systems are able to, and will continue to be able to, meet the performance requirements of the **ancillary service** for which the equipment and associated systems is offered or is intended to be offered;

“**battery energy storage system**” means an **energy storage system** with an electro-chemical storage component;

“**black start equipment**” means diesel generators or auxiliary hydro plant capable of livening a unit isolated from the **grid**;

“**Code**” means the Electricity Industry Participation Code 2010;

“**constraint costs**” means **constrained off amounts** and **constrained on amounts** attributable to **frequency keeping**;

“**contracted GXPs**” means the **GXPs** at which an **ancillary service agent** may provide **interruptible load**, as set out in an **ancillary service** procurement contract for **instantaneous reserve**;

“**control equipment**” means equipment in respect of a **frequency keeping unit** that automatically responds to changes in frequency for the purposes of providing **frequency keeping**;

“**control min**” means the minimum quantity of power (in megawatts) an **FK site** must operate at to provide **frequency keeping** to the relevant performance requirements;

“**control max**” means the maximum quantity of power (in megawatts) an **FK site** can operate at and still provide **frequency keeping** to the relevant performance requirements. The **control max** offered for an **FK site** must be greater than or equal to **control min** plus twice the range of the offered **MW band** for the **FK site**;

“**end-to-end test**” means a specific type of **baseline test** to verify that the integrated components of an **interruptible load** system, other than the monitoring components, function correctly as a complete system;

“**event fee**” means a fixed price for the dispatch or provision of an **ancillary service**, expressed as dollars per event;

“**existing long term contract**” means an **ancillary service** procurement contract entered into between the **system operator** and an **ancillary service agent** before the commencement of this **procurement plan**, the term of which **ancillary service** procurement contract overlaps with the term of this **procurement plan**;

“**enforcement regulations**” means the Electricity Industry (Enforcement) Regulations 2010;

“**firm quantity procurement**” is defined in paragraph 48;

“**FK output**” means the generation from or load at an **FK site**, as the case may be;

“**FK site**” means a **frequency keeping unit** or group of **frequency keeping units**. An **FK site** may be a **generating unit**, **generating station**, **block dispatch group**, **station dispatch group**, load source or group of load sources;

“**frequency time error**” means a deviation from **New Zealand standard time** caused by variations in system frequency;

“**gate closure**” means, for a **frequency keeping** offer, the time referred to in clause 13.46 of the **Code** after which the offer could not be revised if the offer were a **reserve offer**;

“**grid frequency error**” means the **grid** frequency deviation in Hertz from 50.00 Hertz;

“**half-hour clearing market procurement**” is defined in paragraph 47;

“**islanded**”, in relation to part of the **grid**, means that that part of the **grid** is disconnected from the rest of the **grid** owing to planned or unplanned outages;

“**MFK transition trading period**” is a **trading period** on which **frequency keeping** for an **island** will transition from **single provider frequency keeping** to **multiple provider frequency keeping**;

“**multiple provider frequency keeping**” means, for a **trading period** and **island**, **frequency keeping** that is dispatched on the basis that during the **trading period** there may be more than one provider of **frequency keeping** in the **island**;

“**MW band**” means a range in (**MW**) over which an **FK site** may vary its **FK output**;

“**new long term contract**” means an **ancillary service** procurement contract entered into between the **system operator** and an **ancillary service agent** during the term of this **procurement plan**, the term of which **ancillary service** procurement contract exceeds 12 months;

“**offer price**” means a price offered by an **ancillary service agent** for the dispatch of an **ancillary service** for a **trading period**, expressed as dollars per unit of quantity of the **ancillary service**;

“**on-demand test**” is a **baseline test** conducted at the specific request of the **system operator**;

“**pre-event real power output**” is defined in paragraph B42.2.2;

“**pre-event load**” means the average load over a period of 60 seconds with a reasonable adjustment for any load change detected on the relevant **network**;

“**region**” means New Zealand, an **island** or a smaller geographical region within an **island**, and includes a **zone**;

“**relay equipment**” means equipment fitted to a **generating unit** that automatically disconnects the **generating unit** when the frequency of the **grid** reaches the **required frequency** for that **generating unit**;

“**required frequency**” means, in relation to a **generating unit**, the frequency at which that **generating unit** is contracted to disconnect;

“**regulating instruction**” means an instruction by the **system operator** to an **ancillary service agent** providing **multiple provider frequency keeping** from an **FK site** to increase or decrease **FK output** from the **FK site** within the dispatched **MW band** for the **FK site**. For the avoidance of doubt, a **regulating instruction** is not a **dispatch instruction**;

“**regulations**” means the **enforcement regulations** and any other regulations made under the **Act**;

“**response rate**” means the rate of change in **FK output** from an **FK site** in **MW** per minute;

“**SFK transition trading period**” is a **trading period** on which **frequency keeping** for an **island** will transition from **multiple provider frequency keeping** to **single provider frequency keeping**;

“**single provider frequency keeping**” means, for a **trading period** and **island**, **frequency keeping** that is dispatched on the basis that during the **trading period** there must be only one provider of **frequency keeping** in the **island**;

“**single provider frequency keeping period**” means, in relation to an **ancillary service agent** and **island**, all the **trading periods** within any continuous period of 30 days for which the **ancillary service agent** was dispatched to provide **single provider frequency keeping** in the **island**;

“**system operator measured frequency**” means the frequency of the **grid** as determined by **system operator** frequency logging;

“**trip frequency**” means the trip frequency for **interruptible load** other than that provided by **battery energy storage systems** and specified in the relevant **ancillary service** procurement contract;

“**trip time**” only relates to **interruptible load** other than that provided **by battery energy storage systems** and means the time at which the **ancillary service agent’s** locally measured frequency of the **grid** falls to or below the **trip frequency** (if not available the frequency of the **grid** as otherwise determined by the **system operator**);

“**UFE time**” means the time at which an **under-frequency event** occurs, as determined by reference to the **system operator measured frequency**; and

“**voltage support equipment**” means **assets** capable of providing **reactive power**.

Appendix B Approved amended procurement plan
(TRACKED)

Ancillary services procurement plan

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Introduction

1. This **procurement plan** sets out the processes the **system operator** must use reasonable endeavours to follow when it procures **ancillary services** during the term of this **procurement plan**.
2. Terms used in this **procurement plan** which are defined terms under the **Code** have the same meaning as contained in Part 1 of the **Code**. Some other terms are defined in Appendix D of this **procurement plan**.
3. Unless the context requires otherwise, references in this **procurement plan** to:
 - 3.1 paragraphs are to paragraphs of this **procurement plan**;
 - 3.2 Appendices are to Appendices of this **procurement plan**; and
 - 3.3 “the term of this **procurement plan**” are to the period of time from the commencement of this **procurement plan** until the **Authority** adopts a new **procurement plan** under clause 8.44B of the **Code**.

A paragraph number in this **procurement plan** preceded by a letter indicates that the paragraph is in the Appendix corresponding to that letter.
4. The content and structure of this **procurement plan** is consistent with the content and structure set out in clause 8.43 ~~(+)~~ of the **Code**.

Ancillary services to purchase

5. The **system operator** may purchase the following **ancillary services** from **ancillary service agents**:
 - 5.1 **frequency keeping**;
 - 5.2 **instantaneous reserve**;
 - 5.3 **over frequency reserve**;
 - 5.4 **voltage support**; and
 - 5.5 **black start**.
6. The purpose of **frequency keeping** is to balance any generation and **demand** inequalities with the objective of maintaining the **grid** frequency at or near 50 Hertz under normal operating conditions and managing **frequency time error**. Factors that contribute to inequalities under normal operating conditions include unanticipated load changes, differences in **generator** ramping, and the inherent inaccuracies between the modelled and actual system conditions.
7. The purpose of **instantaneous reserve** is to manage frequency recovery after an **under-frequency event**, with the objective of arresting the frequency fall, and recovering the frequency after an **under-frequency event**.
8. The purpose of **over frequency reserve** is to manage frequency recovery after an event that might otherwise cause the **grid** frequency to exceed 52 Hertz in the North Island or 55 Hertz in the South Island. For such an event, the **system operator**'s objective is to arrest the rise in frequency and recover it to the **normal band**.
9. The purpose of **voltage support** is to provide additional **reactive power** resources of the static or dynamic type, depending on the location and **network** loading conditions, to contribute to **network** voltage control when dispatched.
10. The purpose of **black start** is to maintain equipment that can initialise the **supply** for the progressive reliving of the **grid** following a partial or total blackout.
11. Implementation of this **procurement plan** is subject to the **ancillary services** being made available to the **system operator** on—
 - 11.1 the terms contained in this **procurement plan**; or
 - 11.2 terms that, in the **system operator**'s reasonable opinion, do not differ materially from those contained in this **procurement plan**.

Principles applied in making net purchase quantity assessments (clause 8.43(a) of the Code)

The requirements for complying with the PPOs (clause 8.43(a)(i) of the Code)

12. The **system operator** must procure **ancillary services** to assist it to achieve the following objectives:

Ancillary service	Objectives
Frequency keeping	Compliance with clause 7.2A(2), 7.2B, 7.2C of the Code Compliance with the policy statement
Instantaneous reserve	Compliance with clause 7.2A, 7.2B, 7.2C of the Code Prevent the frequency from going outside defined limits for specified contingencies Compliance with the policy statement
Over frequency reserve	Compliance with clause 7.2A(1), 7.2A(2), 7.2B, 7.2C of the Code Compliance with the policy statement
Voltage support	Compliance with clause 7.2A(1) of the Code Compliance with the policy statement
Black start	Compliance with clause 8.5 of the Code Compliance with the policy statement

The requirements for achieving the dispatch objective (clause 8.43(a)(ii) of the Code)

13. The **system operator** must use reasonable endeavours to dispatch assets in a manner consistent with the **dispatch objective**. This includes the dispatch of **ancillary services**.
14. It is recognised in the **Code** that the meeting of the **dispatch objective** is subject to the availability and capability of generation and **ancillary services**. Accordingly, the **system operator** must dispatch **ancillary services** according to the **dispatch objective** provided there is sufficient availability of **ancillary services**.
15. The **policy statement** sets out the policies used by the **system operator** in scheduling and dispatching **ancillary services** to assist it in planning to comply and complying with its **dispatch objective**.

Asset owner contribution (clause 8.43(a)(iii) of the Code)

16. The **system operator** must assess the net purchase quantity of **ancillary services** required to achieve compliance with the **PPOs**, taking into account its assessment of the contribution

that **asset owners** provide in achieving the **PPOs** through compliance with the **asset owner performance obligations** and **technical codes**.

17. The **system operator's** assessment of the contribution provided by **asset owners** must rely on the following:
 - 17.1 that **asset owners** will at all times comply with the **asset owner performance obligations** including any **dispensation** or **equivalence arrangement** in respect of these obligations that has been granted by the **system operator** pursuant to the **Code**;
 - 17.2 that information contained in the **asset capability statements** provided by **asset owners** is correct;
 - 17.3 the contribution provided by **asset owners** in meeting the relevant **asset owner performance obligations** will be provided at no additional procurement cost when dispatched for energy;
 - 17.4 the existence of any contracts of the type and nature set out in clause 8.6 of the **Code**.

Impact of dispensations and alternative ancillary service arrangements held by asset owners (clause 8.43(a)(iv) of the Code)

Dispensations

18. The **system operator** must take into account all known **dispensations** from compliance with an **asset owner performance obligation** or **technical code** when determining the net quantity of procurement required for each **ancillary service**.
19. **Allocable cost** excludes the readily identifiable and quantifiable costs resulting from granting **dispensations**. A **dispensation** may affect the net quantity of procurement for an **ancillary service**, and the additional procurement cost must be borne by the **asset owner** with the **dispensation**.

Alternative ancillary service arrangements

20. At the time of the preparation of this **procurement plan**, no **alternative ancillary service arrangements** were in place.
21. The **system operator** has no information indicating that any **alternative ancillary service arrangements** will be in operation over the period of this **procurement plan** which may decrease the quantity of **ancillary services** needing to be purchased by the **system operator**.

Impact of local quality agreements and existing long term contracts held by asset owners

Local quality agreements

22. In assessing the net quantities of procurement, the **system operator** must take account of any existing contracts for higher levels of **common quality** that the **system operator** has entered into under clause 8.6 of the **Code**. These are referred to as local quality agreements.

Existing long term contracts

23. In assessing the net quantities of procurement, the **system operator** must take account of any **existing long term contracts**.
24. The **system operator** may continue to procure **ancillary services** under **existing long term contracts** during the term of this **procurement plan**.

Cost effectiveness

25. The **system operator** must consider the following in achieving the appropriate balance between cost and quality for each **ancillary service** purchased:
 - 25.1 the technical specification of the plant being offered, including any measuring equipment required;
 - 25.2 the minimum acceptable service standard;
 - 25.3 the number of suppliers offering the service and reasons for any limitations;
 - 25.4 the actual cost of providing the service over the **ancillary service** procurement contract term;
 - 25.5 the liability for providing the service and the potential cost of failure; and
 - 25.6 the desirability of maintaining capability and competition in the provision of **ancillary services**.

Methodologies for net purchase quantity assessments (clause 8.43(b) of the Code)

Assessment methodology for frequency keeping

26. Subject to paragraphs 27 and 28, all parties that can offer **frequency keeping** compliant with the **system operator's** technical requirements and the **Code** and who are prepared to enter into an **ancillary service** procurement contract with the **system operator** to provide **frequency keeping** on a **half-hour clearing market procurement** basis must be contracted by the **system operator** for provision of **frequency keeping**. Each such **ancillary service** procurement contract is a contract to provide **frequency keeping** for the purposes of clause 13.82(5)(a) of the **Code**.
27. The **system operator** may procure **back-up SFK** from one or more parties, but is not required to enter into an **ancillary service** procurement contract for **back-up SFK** with every potential provider of **back-up SFK**.
28. Parties who wish to provide **multiple provider frequency keeping** are subject to a pre-contract ~~review by the system operator of their technical capabilities relating to the provision of multiple provider frequency keeping (an "MFK technical review")~~. The **system operator** must be satisfied with the outcome of the **MFK** technical review before entering into an **ancillary service** procurement contract with that party for **multiple provider frequency keeping**. Without limitation, the scope of the **MFK** technical review may include a review of:
- ~~28.1 the ability of the party's proposed FK sites to receive and respond to regulating instructions;~~
- ~~28.228.1~~ the control accuracy of the party's proposed **FK sites**;
- ~~28.328.2~~ the **response rates** of the party's proposed **FK sites**; and
- ~~28.3~~ the capabilities of the monitoring equipment for the party's proposed **FK sites**; and
- ~~28.4~~ for **multiple provider frequency keeping**; the ability of the party's proposed **FK sites to receive and respond to regulating instructions**;
29. The **system operator** must assess the net purchase quantity of **frequency keeping** in accordance with the processes set out in paragraphs 12 to 25.
30. The **system operator** must use reasonable endeavours to have an **ancillary service** procurement contract with at least one provider of **frequency keeping** in each island;

Assessment methodology for instantaneous reserve

31. All parties that can offer **instantaneous reserve** compliant with the **system operator's** technical requirements and the **Code** and who are prepared to enter into an **ancillary service** procurement contract with the **system operator** to provide **instantaneous reserve** on a **half-hour clearing market procurement** basis must be contracted by the **system operator** for provision of **instantaneous reserve** on that basis. Each such **ancillary service** procurement contract is a contract to provide **reserve offers** for the purposes of clause 13.37 of the **Code** and a contract to provide **instantaneous reserve** for the purposes of clause 13.82(5)(a) of the **Code**.
32. The **system operator** must assess the net purchase quantity of **instantaneous reserve** in accordance with the processes set out in paragraphs 12 to 25 and Schedule 13.3 of the **Code**.

Assessment methodology for over frequency reserve

33. The **system operator** may procure **over frequency reserves** from parties that can offer **over frequency reserves** compliant with the **system operator's** technical requirements and the **Code** and who are prepared to enter into an **ancillary service** procurement contract with the **system operator** to provide **over frequency reserves** on a **firm quantity procurement** basis. Each such **ancillary service** procurement contract is a contract to provide **over frequency reserves** for the purposes of clause 13.82(5)(a) of the **Code**.
34. The **system operator** must assess the net purchase quantity of **over frequency reserves** in accordance with the processes set out in paragraphs 12 to 25.

Assessment methodology for voltage support

35. The **system operator** may procure **voltage support** from parties that can offer **voltage support** compliant with the **system operator's** technical requirements and the **Code** and who are prepared to enter into an **ancillary service** procurement contract with the **system operator** to provide **voltage support** on a **firm quantity procurement** basis. Each such **ancillary service** procurement contract is a contract to provide **voltage support** for the purposes of clause 13.82(5)(a) of the **Code**.
36. The **system operator** must assess the net purchase quantity of **voltage support** in each **zone** in accordance with the processes set out in paragraphs 12 to 25.

Assessment methodology for black start

37. The **system operator** may procure **black start** from parties that can offer **black start** compliant with the **system operator's** technical requirements and the **Code** and who are prepared to enter into an **ancillary service** procurement contract with the **system operator** to provide **black start** on a **firm quantity procurement** basis.
38. The **system operator** must assess the net purchase quantity of **black start** in accordance with the processes set out in paragraphs 12 to 25.
39. The **system operator** must use reasonable endeavours to have **ancillary service** procurement contracts for **black start** at two sites in each **island**.

Procurement processes (clause 8.43(c) of the Code)

Ancillary service procurement contracts

40. Subject to paragraph 41, the **system operator** may enter into an **ancillary service** procurement contract with an **ancillary service agent** at any time during the period of this **procurement plan** using any means of entering into the contract it considers appropriate.

Tendering

41. Subject to paragraphs 42 and 43, the **system operator** must seek tenders from potential providers of each **ancillary service** at least once every 24 months, taking into account the period since the **system operator** last sought tenders from potential providers of the **ancillary service** under any previous **procurement plan**.
42. The **system operator** need not comply with paragraph 41 for an **ancillary service** that is or would be procured on a **firm quantity procurement** basis if the **system operator** considers none or no more of the **ancillary service** is required in the relevant **region**.
43. The **system operator** need not comply with paragraph 41 for an **ancillary service** if the **system operator** considers there is only one potential provider of the **ancillary service** in the relevant **region**.
44. The terms and conditions of each tender process referred to in paragraph 41 must require the **system operator** to treat information received from tenderers during the tender process as confidential, subject only to the provisions that permit the disclosure of confidential information under the **system operator's** standard form **ancillary service** procurement contract.

Contracting

45. The **system operator** must negotiate in good faith **ancillary service** procurement contracts using the **system operator's** standard form **ancillary service** procurement contracts as starting points.
46. The term of an **ancillary service** procurement contract may differ from that of this **procurement plan**. Without limitation, the **system operator** may enter into a **new long term contract** for any **ancillary service**.

Bases of procurement

47. Subject to paragraph 48, **ancillary services** must be procured through a half-hour clearing market process whereby, for each **ancillary service** and **trading period**, **ancillary service agents** submit offers to the **system operator** to provide the **ancillary service**.~~—~~The market for the **ancillary service** is priced and settled for each **trading period** based on the offers dispatched by the **system operator**.~~—~~This type of procurement is referred to as “**half-hour clearing market procurement**”.
48. **Ancillary services** must be procured on a fixed quantity and fixed price basis where the **system operator** assesses there is a requirement for a fixed quantity or a high availability, irrespective of dispatch, of the **ancillary service**.~~—~~This type of procurement is referred to as “**firm quantity procurement**”.
49. **Ancillary services** procured on a **firm quantity procurement** basis must be paid for by way of an **availability price fee**, an **event price fee** or both.~~—~~**Ancillary services** procured

on a **half-hour clearing market procurement** basis must be paid for by way of an **offer price** and may also be paid for by way of an **availability pricefee**.

50. The basis of procurement for each **ancillary service** is set out in Appendix A.

Islanded situations

51. Despite anything to the contrary in this **procurement plan**, when part of the **grid** is **islanded** the **system operator** may procure **ancillary services** for that part of the **grid** using procurement processes other than those set out in paragraphs 41 to 50 and Appendix A. For the avoidance of doubt, an **ancillary service** procured under this paragraph is not an **alternative ancillary service arrangement**.

Administrative costs (clause 8.43(d) of the Code)

52. Identifiable **administrative costs** are those significant costs incurred by the **system operator** as a direct consequence of implementing this **procurement plan** and that are specifically attributable to an **ancillary service** and that have been agreed to by the **Authority** and the **system operator**. The **system operator** is entitled to recover these costs as an **allocable cost** in accordance with the **ancillary service** cost recovery methodology set out in clauses 8.55 to 8.70 of the **Code**.
53. Any **administrative costs** must be charged at the following standard rates:

Grade	Position	Rate \$/hr (excl GST)
1	Analyst/Engineer	138
2	Senior Analyst/Engineer/Consultant	170
3	Senior Advisor	222

Technical requirements and key contracting terms (clause 8.43(e) of the Code)

54. The key technical requirements for each **ancillary service** are set out in Appendix B.
55. The key contracting terms for the procurement of **ancillary services** are set out in Appendix C.
56. When entering into **ancillary service** procurement contracts with **ancillary service agents** for the provision of **ancillary services**, the **system operator** must use reasonable endeavours to ensure that the **ancillary service** procurement contracts include the key technical requirements and the key contracting terms.
57. The **ancillary service** procurement contracts negotiated between the **system operator** and the **ancillary service agents** must not be materially inconsistent with the key contracting terms.
58. Despite anything to the contrary in this **procurement plan**, when part of the **grid** is **islanded** the **system operator** may procure **ancillary services** for that part of the **grid** under **ancillary service** procurement contracts that do not include the key technical requirements or key contracting terms set out in Appendices B or C. For the avoidance of doubt, an **ancillary service** procured under this paragraph is not an **alternative ancillary service arrangement**.

Arrangements for unanticipated procurement of ancillary services (clause 8.43(f) of the Code)

59. During a **grid emergency**, the **system operator** relies on **ancillary service agents** complying with their obligations set out in **technical code B** of schedule 8.3 of the **Code**
60. Any departures from this **procurement plan** must be in accordance with clause 8.47 of the **Code**.
61. Where the **system operator** identifies a need to change any aspect of this **procurement plan**, the **system operator** may propose a change pursuant to clause 8.43A(1) or 8.44A(1) of the **Code**.

System operator reporting to the Authority (clause 8.43(g) of the Code)

62. The **system operator** must report to the **Authority** in relation to the procurement of **ancillary services** as follows:
- 62.1 settlement volumes, prices, costs, and **administrative costs** where appropriate, on a monthly basis;
 - 62.2 any issues arising with respect to cost allocation, liability and disputes, on a monthly basis; and
 - 62.3 other general procurement issues to be contained within the **system operator** monthly report provided in accordance with clause 3.14 of the **Code**.

Appendix A – Bases for procuring ancillary services (paragraph 50)

Frequency keeping

- A1. The **system operator** must:
- A1.1 procure **frequency keeping** on a **half-hour clearing market procurement** basis; and
 - A1.2 procure **frequency keeping** as **single provider frequency keeping** or **multiple provider frequency keeping**.
- A2. The **system operator** may:
- A2.1 procure **back-up SFK** at the same time it procures **multiple provider frequency keeping**; and
 - A2.2 pay an **availability price-fee** for **back-up SFK** but must not otherwise pay an **availability price-fee** for **frequency keeping**.
- A3. For each **island independently**, the **system operator** may: **set an MFK transition trading period or SFK transition trading period**.
- A3.1 ~~set or reset a trading period on which frequency keeping for that island will transition from single provider frequency keeping to multiple provider frequency keeping (an “MFK transition trading period”); and~~
 - A3.2 ~~set or reset a trading period on which frequency keeping for the island will revert to single provider frequency keeping (an “SFK return trading period”).~~
- A4. The **system operator** must communicate the setting ~~or resetting~~ of an **MFK transition trading period** or **SFK ~~transitionreturn~~ trading period** by:
- A4.1 notifying all **ancillary service agents** with an **ancillary service** procurement contract for **frequency keeping** in the relevant **island**; and
 - A4.2 publishing the notification on the **system operator’s** website.
- A5. The **system operator** need not communicate an **SFK ~~transitionreturn~~ trading period** in accordance with paragraph A4 in advance of the **SFK ~~transitionreturn~~ trading period** if the ~~reversion-transition~~ to **single provider frequency keeping** is urgent.
- A6. Subject to paragraph A7, the **system operator** must dispatch offer(s) to provide **frequency keeping** for each **island** for each **trading period** to provide an aggregate **MW band** sufficient to meet the **system operator’s net purchase quantity assessment** for that **trading period** at least cost based on the **offer prices** and estimated **constraint costs**. For the avoidance of doubt, the aggregate **MW band** may be zero.
- A7. The **system operator** may depart from paragraph A6 by excluding a **frequency keeping** offer from its determination of the least cost **frequency keeping** solution if the **system operator** reasonably considers it necessary to do so to comply with the **PPOs**. ~~The~~ **system operator** must notify the affected **ancillary service agent** as soon as reasonably practicable if it does this.
- A8. **Frequency keeping** for an **island** may be provided by one or more providers of **frequency keeping** in the other **island**, via the **HVDC link**.

Instantaneous reserve

- A9. The **system operator** must:
- A9.1 procure **instantaneous reserve** on a **half-hour clearing market procurement** basis.
 - A9.2 procure **instantaneous reserve** as **fast instantaneous reserve** and **sustained instantaneous reserve**.
- A10. The **system operator** must dispatch **reserve offers** in accordance with Subpart 2 of Part 13 of the **Code**.
- A11. **Reserve offers** dispatched by the **system operator** must be priced and settled in accordance with Subpart 4 of Part 13 of the **Code**.
- A12. **Instantaneous reserve** for an **island** may be provided by one or more providers of **instantaneous reserve** situated in the other **island**, via the **HVDC link**.

Over frequency reserve, voltage support and black start

- A13. The **system operator** has determined that it is uneconomic to procure **over frequency reserve, voltage support** and **black start** on a **half-hour clearing market procurement** basis.
- A14. The **system operator** must procure **over frequency reserve, voltage support** and **black start** on a **firm quantity procurement** basis.
- A15. For the purpose of determining when an **event price-fee** is payable for **over frequency reserve, voltage support** and **black start**:
- A15.1 an **over frequency reserve** event occurs for dispatched **relay equipment** and the **generating unit** to which it is fitted when the **relay equipment** causes the **generating unit** to disconnect;
 - A15.2 A **voltage support** event occurs for voltage support **equipment** when the **voltage support equipment** is dispatched; and
 - A15.3 A **black start** event begins when the **system operator** requests **black start** and ends when **core grid** restoration is complete. There may be multiple attempts at restoration before the event ends.

Appendix B – Key technical requirements for ancillary services (paragraph 54)

- B1. For the avoidance of doubt, a key technical requirement that is expressed as an **ancillary service agent** right or obligation does not confer or impose that right or obligation on an **ancillary service agent** unless and until that right or obligation is included in an **ancillary service** procurement contract between the **system operator** and the **ancillary service agent**.

Frequency keeping

Performance requirements and technical specifications for frequency keeping

- B2. The **ancillary service agent** must provide one or more **frequency keeping units** and trained operators or **control equipment** at an **FK site** that, collectively, are capable of meeting the performance requirements in:
- B2.1 paragraphs B3 and B4, for **single provider frequency keeping**;
 - B2.2 paragraph B5, for **multiple provider frequency keeping**; and
 - B2.3 paragraphs B7 to B6, for both **single provider frequency keeping** and **multiple provider frequency keeping**.

Single provider frequency keeping performance requirements

- B3. Subject to paragraph B6, when providing **single provider frequency keeping** the **ancillary service agent** must:
- B3.1** when there is a **grid frequency error**, ensure the relevant **FK site** responds to eliminate the **grid frequency error** and commences the response as fast as practicable but in all cases within 10 seconds of the **grid frequency error** occurring;
 - B3.2** ensure the relevant **FK site** provides an average **response rate** of at least 10 MW per minute when the **grid frequency error** is greater than 0.2 Hertz (that is, when the **grid** frequency is outside the **normal band**) over each all of the **ancillary service agent's single provider frequency keeping periods**;
 - B3.3** at all times **act to** maintain the frequency of the **grid** within the **normal band**, and use reasonable endeavours to continuously maintain the frequency of the **grid** as close as possible to 50 Hertz;
 - B3.4** at all times **act to** maintain **frequency time error** within the limits specified in clause 7.2C(1) of the **Code**, and use reasonable endeavours to continuously maintain **frequency time error** as close as possible to zero; and
 - B3.5** return **frequency time error** to zero at least once every **day**.
- B4. Subject to paragraph B6, the **ancillary service agent** must ensure the deviation of the **grid frequency** over any of the **ancillary service agent's single provider frequency keeping periods** does not exceed the maximum allowable deviation specified in the **ancillary service agent's ancillary service** procurement contract. Such deviation must be determined by reference to the **system operator measured frequency** but excluding any frequency measurements that are outside the **normal band**.

Multiple provider frequency keeping performance requirements

- B5. Subject to paragraph B6, when providing **multiple provider frequency keeping** the **ancillary service agent** must:
- B5.1 comply with regulating instructions issued to it; and
 - B5.2 ensure that the relevant **FK site** provides a **response rate** of at least 0.4 **MW** per minute per **MW** in the dispatched **MW band**.

General frequency keeping performance requirements

~~The ancillary service agent must ensure that each frequency keeping unit and item of control equipment at an FK site is maintained in accordance with good industry practice.~~

- B6. In meeting the performance requirements in paragraphs B3, B4 and B5, the **ancillary service agent's FK site** is not required to operate outside the limits of the **MW band** contained in the relevant **dispatch instruction** issued in accordance with Part 13 of the **Code** or above the relevant **control max** or below the relevant **control min**.
- B7. The ancillary service agent must ensure that each frequency keeping unit and item of control equipment at an FK site is maintained in accordance with good industry practice.

Monitoring requirements for frequency keeping

- B8. The **ancillary service agent** must comply, and provide monitoring equipment that complies, with:
- B8.1 paragraphs B9 to B10~~B14~~, for **single provider frequency keeping**;
 - B8.2 paragraphs B11 to B12~~B15~~, for **multiple provider frequency keeping**; and
 - B8.3 paragraphs ~~B14 to B15~~, for both **single provider frequency keeping** and **multiple provider frequency keeping**.

Single provider frequency keeping monitoring requirements

- B9. The **ancillary service agent** must provide monitoring equipment that accurately measures and records in a time-tagged manner the following:
- B9.1 **FK output** at each of its **FK sites** that provides **single provider frequency keeping**;
 - B9.2 frequency of the **grid** in Hertz; and
 - B9.3 **frequency time error**.
- B10. When an **FK Site** is providing **single provider frequency keeping** the relevant monitoring equipment must measure and record:
- B10.1 **FK output** at an agreed location in the **grid** at least once every ~~18~~ seconds, each measurement accurate to within plus or minus 2% of the measured value;
 - B10.2 frequency at least once every ~~2-1~~ seconds (or such longer period as the **system operator** may determine), each measurement accurate to within 0.01 Hertz; and
 - B10.3 **frequency time error** using a GPS clock or agreed equivalent at least twice every 1 minute, each measurement accurate to within 0.05 seconds.

~~B11. The ancillary service agent must ensure that the data recorded by the monitoring equipment is held by the ancillary service agent for at least 14 business days and is provided to the system operator within 5 business days of a written request from the system operator.~~

Multiple provider frequency keeping monitoring requirements

~~B12-B11.~~ The **ancillary service agent** must provide monitoring equipment that accurately measures and records in a time-tagged manner the following:

~~B12-1B11.1~~ **FK output** at each of its **FK sites** that provides **multiple provider frequency keeping**; and

~~B12-2B11.2~~ the regulating instructions received for each of its **FK sites** that provides **multiple provider frequency keeping**.

~~B13-B12.~~ When an **FK Site** is providing **multiple provider frequency keeping** the relevant monitoring equipment must measure and record:

~~B13-1B12.1~~ **FK output** at an agreed location in the **grid** at least once every 1 second, each measurement accurate to within plus or minus 2% of the total expected **FK output** range of the **FK site**; and

~~B13-2B12.2~~ the regulating instructions received for the **FK site**.

~~B14.~~ If requested by the **system operator** in writing before the end of a calendar month during which an **FK site** was dispatched to provide **multiple provider frequency keeping**, the **ancillary service agent** must provide the **system operator** with the data recorded by the monitoring equipment for that **FK site** and month within **5 business days** following the request.

~~B15.~~ If an **FK site** is a **block dispatch group**, **station dispatch group** or group of load sources then, for the purposes of paragraphs B12 to B14, the **FK site** is to be treated as the **allocated frequency keeping units** within the **FK site** for the relevant period.

General frequency keeping monitoring requirements

~~B13.~~ The **ancillary service agent** must ensure that the **frequency keeping data** recorded by the monitoring equipment at each **FK site** for each calendar month is held by the **ancillary service agent** for at least **15 business days** following the end of that calendar month and is provided to the **system operator** within **5 business days** of a written request from the **system operator**.

~~B14.~~ If an **FK site** is a **block dispatch group**, **station dispatch group** or group of load sources then, for the purposes of paragraphs B8 to B13, the **FK site** is to be treated as the **specific frequency keeping unit(s)** within the **FK site** that are allocated to **frequency keeping** for the relevant period.

~~B16-B15.~~ The **ancillary service agent** must maintain the monitoring equipment in accordance with good industry practice.

Offer requirements for frequency keeping

~~B17-B16.~~ The **ancillary service agent** may ~~no later than 2 hours prior to a trading period~~, submit an offer to provide **frequency keeping** ~~for that trading period, no later than 2 trading periods immediately preceding the trading period to which the offer relates~~. Each offer submitted is valid until revised or cancelled in accordance with paragraph B20 or B21.

~~B18-B17.~~ Each offer to provide **frequency keeping** must be submitted to the **system operator** using the same **information system** approved by the **Authority** for the time being for submitting **reserve offers** under clause 13.38 of the **Code**.

~~B19-B18.~~ There will be separate **ancillary service** procurement contract schedules for **back-up SFK** ~~single provider frequency keeping~~ and **multiple provider frequency keeping**. The **ancillary service agent** must have:

~~B19-1B18.1~~ an **ancillary service** procurement contract for **back-up SFK** ~~single~~

provider frequency keeping from an **FK Site** in order to offer **single provider frequency keeping** from that **FK Site**; and

B19.2B18.2 an **ancillary service** procurement contract for **multiple provider frequency keeping** from an **FK Site** in order to offer **multiple provider frequency keeping** from that **FK Site**.

B20-B19. Each offer to provide **frequency keeping** must include the following information:

B20.1B19.1 a unique code for the **FK site** for which the offer is made;

B20.2B19.2 a unique code for the **ancillary service agent** submitting the offer;

B20.3B19.3 the **trading day** for which the offer is made;

B20.4B19.4 the **trading periods** for which the offer is made;

B20.5B19.5 the **control min** and **control max** for the **FK site** for which the offer is made; and

B20.6B19.6 up to five separate **MW bands** and prices.

B24-B20. The **ancillary service agent** may revise an offer to provide **frequency keeping** by submitting a revised offer before the **gate closure** for the offer. Each such revision must be submitted or notified to the **system operator** using the same **information system** approved by the **Authority** for the time being for revising **reserve offers** under clause 13.46 of the **Code**.

B22-B21. The **ancillary service agent** may submit a new or revised offer to provide **frequency keeping** after the **gate closure** for the offer only in circumstances where a **bona fide physical reason** necessitates the cancellation or submission or where the **system operator** has issued a **formal notice**.

B23-B22. If the **ancillary service agent** submits a new or revised offer to provide **frequency keeping** later than one hour prior to the beginning of the **trading period** in respect of which the offer is made, the **ancillary service agent** must report the submission to the **system operator** in writing together with an explanation of the reasons for the submission. The **ancillary service agent** must provide the **system operator** with a written monthly report of all such cancellations and submissions by the 20th of the month following the month being reported.

B24-B23. The **system operator** must, as soon as reasonably practicable, confirm to the **ancillary service agent** the receipt of any new or revised offer to provide **frequency keeping** using the same **information system** approved by the **Authority** for the time being for confirming receipt of **reserve offers** under clause 13.51(2) of the **Code**.

B25-B24. If at any time the **system operator** is not satisfied (acting reasonably) that the **ancillary service agent** can meet the relevant performance requirements then, if so notified by the **system operator** (which notice must outline the areas of concern that the **system operator** has), the **ancillary service agent** must not submit any offers to provide **frequency keeping** until and unless it has provided evidence that demonstrates to the **system operator's** reasonable satisfaction that it can meet the performance requirements.

B26-B25. **Multiple provider frequency keeping** offers for an **FK site** must be subject to a minimum and may be subject to a maximum **MW band**— The minimum and maximum **MW bands** must be based on the results of the **MFK technical review** of the **ancillary service agent**, including the measurement accuracy of the **ancillary service agent's** monitoring equipment for the **FK site**. The **system operator** must publish the minimum **MW band** on its website.

Dispatch requirements for frequency keeping

B27-B26. The **system operator** must use all reasonable endeavours to issue **dispatch instructions** for **frequency keeping** at least five minutes in advance of the start or end of the relevant **trading period**, as the case may be.

B27. If an **ancillary service agent** finds it cannot maintain the frequency or time error within the required targets the **ancillary service agent** must advise the **system operator** as soon as is practicable. If so notified the **system operator** must review its **dispatch instructions** for **frequency keeping** and make any further **dispatch instructions** it considers reasonably necessary or desirable to maintain the frequency or time error within the required targets.

B28. The **ancillary service agent** must ensure that prior to entering a trading period for which it has received a **dispatch instruction to provide frequency keeping**, the relevant **frequency keeping units** are connected and able to perform **frequency keeping** from the start of that trading period.

Special testing requirements for frequency keeping

B28.

B29. B28A. Prior to offering **frequency keeping** for an **FK site** for **dispatch** for the first time, **ancillary service agents** must have conducted and passed a **baseline test** or otherwise demonstrated the capability of the relevant **FK site** to provide **frequency keeping** to the **reasonable** satisfaction of the **system operator**.

B29.

B30. B28B. EachThe **ancillary service agent that provides multiple provider frequency keeping** must conduct and pass a **baseline test**, or otherwise demonstrate the capability of the relevant **FK site** to provide **multiple provider frequency keeping** to the **reasonable** satisfaction of the **system operator**, at least once every four years.

B31. Notwithstanding clause B28B, Eachthe **ancillary service agent that provides single provider frequency keeping** must conduct and pass a **baseline test** of equipment and/or trained operators that may be used for providing or monitoring back-up SFK at least once every six months, provided that the **ancillary service agent** is not required to conduct such a **baseline test** if the equipment and/or trained operators have provided and/or monitored **single provider frequency keeping to the reasonable satisfaction of the system operator within** the previous six months.

B31.

B32. B29A. Other than those **baseline tests** described in paragraphs B29B28A, B30B28B and B31B29, there are no other **baseline tests** for equipment and/or trained operators that are used, or may be used, to provide and/or monitor **frequency keeping**.

B33. A **baseline test** or **on-demand test** of equipment and/or trained operators used for providing **frequency keeping** (other than monitoring equipment) must verify whether or not the relevant **FK Site** meets the performance requirements in paragraph B3 (for **single provider frequency keeping**) or B5 (for **multiple provider frequency keeping**) or such lesser performance requirements as the **system operator** may determine in consultation with the **ancillary service agent**.

B34. A **baseline test** or **on-demand test** of monitoring equipment must verify whether or not the monitoring equipment meets the performance requirements in paragraphs B9 and B10 (for **single provider frequency keeping**) or B11 and B12 (for **multiple provider frequency keeping**).

B34-B35. Upon completion of a **baseline test** or **on-demand test** the **ancillary service agent** must provide the **system operator** with the corresponding test data and verification of meeting the performance requirements within 15 business days.

Instantaneous reserve

Performance requirements and technical specifications for instantaneous reserve

~~B35.~~ To be able to provide **instantaneous reserve** the **ancillary service agent** must have equipment that can provide **fast instantaneous reserve** and/or **sustained instantaneous reserve**. ~~Only ancillary service agents that can meet the technical requirements of these definitions can provide instantaneous reserve.~~

~~B36.~~

~~B36-B37.~~ An **ancillary service agent** providing **instantaneous reserve** must ensure that at all times the equipment that is the subject of the **reserve offer**:

~~B36-1B37.1~~ is maintained in accordance with good industry practice so that the equipment is able to provide **instantaneous reserve** that meets the standards set out in this **procurement plan**;

~~B36-2B37.2~~ is able to respond, when dispatched, within the timeframe applicable to either **fast instantaneous reserve** or **sustained instantaneous reserve**, as the case may be;

~~B37.2.1~~ for **fast instantaneous reserve** in the case of **interruptible load** other than that provided by **battery energy storage systems**, the drop in load (in MW) must occur within 1 second of the **grid system frequency** falling to or below 49.2 Hertz, or the **trip frequency** specified in the **ancillary service agent's ancillary service** procurement contract, and must be sustained for a period of at least 60 seconds;

~~B37.2.2~~ for **sustained instantaneous reserve** in the case of **interruptible load** other than that provided by **battery energy storage systems**, the average drop in load (in MW) must occur over the first 60 seconds after the **grid system frequency** falls to or below 49.2 Hertz, or the **trip frequency** specified in the **ancillary service agent's ancillary service** procurement contract, and must be sustained for a period of at least 30 minutes or until instructed by the **system operator**, whichever is lesser. The **ancillary service agent** must use reasonable endeavours to maintain the **sustained instantaneous reserve** response after the 30 minute period for as long as the **grid system frequency** remains below the normal band;

~~B37.3~~ meets, where relevant, the requirements for frequency response and control set out in clause 5(1) of **technical code A** of schedule 8.3 of the **Code** and has been approved by the **system operator**;

~~B37.4~~ in the case of all equipment providing **generation reserve**, and **battery energy storage systems** providing **interruptible load**:

~~B37.4.1~~ provides stable performance with adequate damping;

~~B37.4.2~~ responds with a droop set within the range 1.5 - 7 per cent or with a controlled response as agreed with the **system operator**;

~~B37.4.3~~ does not adversely affect the operation of the **grid** because of any of its non-linear characteristics or rate of change in output;

~~B37.5~~ in the case of all equipment providing **generation reserve**, and **battery energy storage systems** providing **interruptible load**: in the North Island, remain connected:

~~B37.5.1~~ at all times when the frequency is above 47.5 Hertz;

B37.5.2 for at least 120 seconds when the frequency is at 47.5 Hertz;
B37.5.3 for at least 20 seconds when the frequency is at 47.3 Hertz;
B37.5.4 for at least 5 seconds when the frequency is at 47.1 Hertz;
B37.5.5 for at least 0.1 seconds when the frequency is at 47.0 Hertz;
B37.5.6 at any frequencies between those specified above, for times derived by linear interpolation.

B37.6 in the case of all equipment providing generation reserve, and battery energy storage systems providing interruptible load: in the South Island, remain connected

B37.6.1 at all times while frequency is at or above 47 Hertz; and

B37.6.2 for 30 seconds if the frequency falls below 47 Hertz but not below 45 Hertz.

B37.7 is available and has the capacity to provide the quantity of instantaneous reserve specified in the reserve offer;

B37-B38. An ancillary service agent dispatched to provide instantaneous reserve in accordance with Part 13 of the Code must:

B37-1B38.1 provide additional supply into the grid equal to or exceeding the dispatched quantity of instantaneous reserve automatically when there is an under-frequency event; and/or

B37-2B38.2 reduce demand from the grid equal to or exceeding the dispatched quantity of instantaneous reserve automatically when the frequency of the grid falls to or below the trip frequency.

B38-B39. In determining the response capability specified in the definition of fast instantaneous reserve and sustained instantaneous reserve set out in Part 1 of the Code, the system operator must use reasonable endeavours to exclude inertial response.

Assessment of performance requirements for interruptible load other than that provided by battery energy storage systems

B39-B40. In assessing the delivery of interruptible load other than that provided from battery energy storage systems, the system operator must apply the following methodology:

B39-1B40.1 Fast instantaneous reserve must be calculated as the total reduction in load that occurs within one second of either the grid system frequency falling to or below 49.2 Hertz or the trip time, and which is sustained for a period of at least 60 seconds. The total reduction in load is to be calculated from the pre-event load.

B39-2B40.2 Sustained instantaneous reserve must be calculated as the average reduction in load that occurs over the first 60 seconds after either the grid system frequency falls to or below 49.2 Hertz or the trip time. The average reduction in load is to be calculated from the pre-event load. Sustained instantaneous reserve load is not to be restored until advised by the system operator.

B39-3B40.3 The fast instantaneous reserve and sustained instantaneous reserve delivered quantities must be determined from the aggregate load response:

B39-3-1B40.3.1 recorded at the ancillary service agent's equipment; or

B39-3-2B40.3.2 recorded at the ancillary service agent's contracted GXPs (if any), if no data is recorded at the ancillary service agent's equipment or the system operator reasonably considers it is not appropriate to assess delivered quantities from this data.

B39-4B40.4 If the analysis required for the purpose of paragraph B40.3 indicates an

under-delivery of **interruptible load**, the analysis must be performed on each item of the **ancillary service agent's** equipment or each of the **ancillary service agent's contracted GXPs**, as the case may be. The data may be time adjusted to account for possible timing errors.

B40-B41. In determining the **pre-event load** the **system operator** must apply the following methodology when calculating delivered quantities:

B40.1B41.1 To account for possible timing errors in data and a possible reduction in **pre-event load** due to the influence of falling frequency, the **pre-event load** must be taken at a previous steady state frequency, prior to the frequency falling. That is, at a time when frequency is within a +/-0.1 Hertz band for at least 60 seconds.

Assessment of performance requirements for- generation reserve, and interruptible load provided by battery energy storage systems~~fast instantaneous reserve other than interruptible load~~

B41-B42. In assessing the delivery of **fast instantaneous reserve** quantities from generation reserve, and interruptible load provided by battery energy storage systems, ~~other than interruptible load~~ the **system operator** must apply the following methodology:

B41.1B42.1 Equipment that is the subject of a **reserve offer** for **fast instantaneous reserve** is deemed to comply with the performance requirement in paragraph B38B37 if and only if the equipment's actual response meets or exceeds its **asset capability statement** modelled response.

B41.2B42.2 The equipment's **asset capability statement** modelled response is the response that could reasonably be expected if all the information in the equipment's current **asset capability statement** is correct, taking into account:

B41.2.1B42.2.1 the frequency profile of the **under-frequency event**;

B41.2.2B42.2.2 the equipment's real power output immediately before the start of the **under-frequency event** ("**pre-event real power output**");

B41.2.3B42.2.3 the number of **generating units** on **partly loaded spinning reserve** mode;

B41.2.4B42.2.4 the number of hydro **generating units** on **tail water depressed reserve** mode; and

B41.2.5B42.2.5 the amount of **fast instantaneous reserve** dispatched for **generating units**.

B41.3B42.3 Subject to paragraph B39, the equipment's actual response must be calculated as the additional real power output of the equipment compared to the **pre-event real power output** of the equipment.

B41.4B42.4 In determining the **pre-event real power output** of the equipment, the **system operator** must apply the following methodology when calculating the delivered quantities:

B41.4.1B42.4.1 to account for possible timing errors contained in the data provided by the **ancillary service agent**, the **pre-event real power output** at several different times must be used to calculate the delivered quantities;

B41.4.2B42.4.2 the maximum delivered quantity obtained from applying the **pre-event real power outputs** must be used to determine the reserve response during an **under-frequency event**; and

~~B41.4.3~~**B42.4.3** **generating unit** data must be used if measured and provided by the **ancillary service agent**.

B42.5 On request, the **system operator** must provide each **ancillary service agent** with details of the **system operator's** assessment under paragraph B42.4 of the **ancillary service agent's** delivery of **fast instantaneous reserve** quantities.

Assessment of performance requirements for instantaneous reserve generally

~~B42.~~ For the purposes of assessing the delivery of ~~instantaneous reserve~~ quantities:

~~B42.1~~ the ~~UFE time~~ (in the case of ~~instantaneous reserve~~ other than ~~interruptible load~~) must be determined by reference to the ~~system operator measured frequency~~; and

~~B42.2~~ the ~~trip time~~ (in the case of ~~interruptible load~~) must be determined by reference to the ~~ancillary service agent's~~ locally measured frequency of the ~~grid~~, if available and provided to the ~~system operator~~.

Monitoring requirements for instantaneous reserve

~~B43.~~ The ~~ancillary service agent~~ must provide monitoring equipment that accurately measures and records the ~~instantaneous reserve~~ response (in ~~MW~~) from the ~~ancillary service agent's~~ equipment:

~~B43.1~~ for ~~fast instantaneous reserve~~, at no greater than 0.1 second intervals commencing not less than 15 seconds prior to, and continuing until 60 seconds after, the ~~UFE time~~ or ~~trip time~~ as applicable;

~~B43.2~~ for ~~sustained instantaneous reserve~~, at no greater than 0.1 second intervals commencing not less than 15 seconds prior to, and continuing until 60 seconds after, the ~~UFE time~~ or ~~trip time~~ as applicable, and then at no greater than 1 second intervals until the ~~instantaneous reserve~~ response ends;

~~B43.3~~ including measurement of the locally measured frequency and relay activation signal; and

~~B43.4~~ in a time-tagged manner such that all recorded data is either:

~~B43.4.1~~ GPS time-tagged; or

~~B43.4.2~~ if GPS time-tagging capability is not available, then aligned with the time-tagged frequency measurement from the same device.

~~B43.~~ The ~~ancillary service agent~~ must provide monitoring equipment that accurately:

~~B43.1~~ Measures in a time-tagged manner the ~~instantaneous reserve~~ response (in ~~MW~~) from the ~~ancillary service agent's~~ equipment at no greater than 6 second intervals for ~~fast instantaneous reserve~~ and no greater than 10 second intervals for ~~sustained instantaneous reserve~~; and

~~B43.2~~ uses such measured response data to record in a time-tagged manner:

~~B43.2.1~~ for ~~fast instantaneous reserve~~, the actual ~~instantaneous reserve~~ response (in ~~MW~~) from the ~~ancillary service agent's~~ equipment over intervals no greater than six seconds; and

~~B43.2.2~~ for ~~sustained instantaneous reserve~~, either the average ~~instantaneous reserve~~ response (in ~~MW~~) at no greater than 60 seconds, or the actual ~~instantaneous reserve~~ response (in ~~MW~~) at no greater than 10 seconds, from the ~~ancillary service agent's~~ equipment.

- ~~B44.~~ The monitoring referred to in paragraph ~~B43~~ is required during all periods for which the **ancillary service agent's** equipment is dispatched to provide **instantaneous reserve**:
- ~~B44.1~~ in the case of **instantaneous reserve** other than **interruptible load**, commencing not less than six seconds prior to the **UFE time** (determined in accordance with paragraph 36); and
- ~~B44.2~~ in the case of **interruptible load**, commencing not less than six seconds prior to when the equipment providing the **interruptible load** activates; and
- ~~B44.3~~ in all cases, ending not less than 15 minutes later for **sustained instantaneous reserve** and 60 seconds later for **fast instantaneous reserve**.
- ~~B45-B44.~~ The **ancillary service agent** must ensure that the data recorded by the monitoring equipment under paragraph ~~B43~~B1 is held by the **ancillary service agent** for at least 15 **business days** and is provided to the **system operator** within 5 **business days** of a written request from the **system operator**.
- ~~B46-B45.~~ The **ancillary service agent** may provide an independently verified error range for data it provides to the **system operator** under paragraph B44, which the **system operator** must have regard to in any assessment of the **ancillary service agent's** compliance with performance requirements using the data.
- ~~B47-B46.~~ For hydro **generating stations**, the data referred to in paragraph ~~B43~~ may be measured, recorded and provided by **generating station** unless the **generating station** is providing both **tail water depressed reserve** and **partly loaded spinning reserve**, in which case the data must be measured, recorded and provided by **generating unit**. For other **generating stations** providing **partly loaded spinning reserve**, the data referred to in paragraph ~~B43~~B38 must be measured, recorded and provided by **generating unit**.
- ~~B48-B47.~~ The **ancillary service agent** must maintain the monitoring equipment in accordance with good industry practice.

Offer requirements for instantaneous reserve

- ~~B49-B48.~~ If the **system operator** reasonably believes that the maximum quantities of **fast instantaneous reserve** and **sustained instantaneous reserve** that can be provided by the **ancillary service agent** are higher or lower than the maximum quantities specified in the **ancillary service** procurement contract, the **system operator** may, by written notice to the **ancillary service agent**, increase or decrease the maximum quantities of **fast instantaneous reserve** and **sustained instantaneous reserve** specified in the **ancillary service** procurement contract. The **system operator** must use reasonable endeavours to contact the **ancillary service agent** and discuss the matter prior to providing such notice, but any failure to do so does not invalidate the notice.
- ~~B50-B49.~~ If at any time the **system operator** is not satisfied (acting reasonably) that the **ancillary service agent** can meet the relevant performance requirements, then:
- ~~B50.1~~~~B49.1~~ if so notified by the **system operator** (which notice must outline the areas of concern that the **system operator** has), the **ancillary service agent** must not submit any **reserve offers** until and unless it has provided evidence that demonstrates to the **system operator's** reasonable satisfaction that it can meet the performance requirements;
- ~~B50.2~~~~B49.2~~ **reserve offers** submitted by the **ancillary service agent** (or any **reserve offers** relating to specific equipment) are deemed not to be submitted pursuant to a valid and enforceable contract with the **system operator** and must not be accepted by the **system operator**; and
- ~~B50.3~~~~B49.3~~ if such reserve offers are in the price-responsive schedule or the non-response schedule (as the case may be), the system operator may require the removal of such reserve offers from the relevant price-responsive schedule or non-

response schedule (as the case may be).

Special testing requirements for instantaneous reserve

- B50.** For ~~interruptible load other than that provided by battery energy storage systems~~, the **ancillary service agent** must either:
- ~~B50.4~~
- ~~B50.5~~ ~~B45.1~~ conduct an **end-to-end test** of all items of equipment it uses for providing **interruptible load**; or
- ~~B50.1~~
- ~~B50.6~~~~B50.2~~ ~~B45.2~~ have demonstrated fully compliant operational performance of that equipment by responding to an **under-frequency event**, at least once every ~~12-24~~ months.
- ~~B51.~~ The scope of the **end-to-end test** ~~referred to in clause B50~~ must be agreed between the **ancillary service agent** and the **system operator** and may not require the full contracted amount of **interruptible load** to be shed, provided the functionality of the equipment is demonstrated to the **system operator's** reasonable satisfaction.
- ~~B51.~~
- ~~B51.1~~ ~~B46A.~~ For ~~generation instantaneous reserve, and interruptible load provided by battery energy storage systems, other than interruptible load~~, the **ancillary service agent** must conduct a **baseline test** of the relevant equipment used to provide **instantaneous reserve**:
- ~~B52.~~
- ~~B51.2~~ ~~B46A.1~~ at least once every four years for analogue equipment and non-self-monitoring digital equipment; ~~and~~
- ~~B52.1~~
- ~~B52.2~~ ~~B46A.2~~ at least once every ten years for ~~self-monitoring~~ digital equipment;-
- ~~B46B.~~ For the avoidance of doubt, a **baseline test** for ~~instantaneous reserve, other than interruptible load, may be combined with testing required under Schedule 8.3, Technical Code A, Appendix B, Clause 2 of the Code.~~
- ~~B53.~~ Notwithstanding clauses ~~B50 and B52.1~~ the **ancillary service agent** must conduct a **baseline test** of the equipment it uses to provide **instantaneous reserve** following any change to such equipment that may impact its **instantaneous reserve** performance.
- ~~B54.~~ For the avoidance of doubt, a **baseline test** for ~~generation reserve, and interruptible load provided by battery energy storage systems.~~
- ~~B54.1~~ must be used to validate the **asset capability statement** modelled response of the assets subject of a reserve offer for **fast instantaneous reserve**; and
- ~~B54.2~~ may be combined with testing required under ~~Schedule 8.3, Technical Code A, Appendix B, Clause 2 of the Code.~~
- ~~B52-B55.~~ An **end-to-end test, baseline test, or on-demand test** of equipment used for providing **instantaneous reserve** (other than monitoring equipment) must verify whether or not the equipment meets the performance requirements in paragraphs B1, or such lesser performance requirements as the **system operator** may determine in consultation with the **ancillary service agent**.
- ~~B56.~~ An **end-to-end test, baseline test, or on-demand test** of monitoring equipment must verify

whether or not the monitoring equipment meets the performance requirements in paragraph ~~B57.~~ ~~B37.~~ Upon completion of a **baseline test, end-to-end test, on-demand test, or response to an under-frequency event the ancillary service agent must provide the system operator with the corresponding test data and verification of meeting the performance requirements within 15 business days.**

~~B53-B58.~~ The ancillary service agent must not submit **reserve offers**:

~~B53.1~~~~B58.1~~ for **interruptible load** ~~other than that provided by battery energy storage systems~~ unless it has conducted and passed ~~an~~ **end-to-end test** of the relevant equipment or demonstrated fully compliant operational performance of that equipment in accordance with paragraph B50~~B46~~;

~~B53.2~~~~B58.2~~ for **instantaneous generation reserve**, ~~other than~~ **and interruptible load** ~~provided by battery energy storage systems~~, unless it has conducted and passed ~~a~~ **baseline test** of the relevant equipment in accordance with paragraph B54~~B46A~~.

~~B54-B59.~~ For the avoidance of doubt—

~~B54.1~~~~B59.1~~ there are no other **baseline tests** for equipment used to provide or monitor **instantaneous reserve**; and

~~B54.2~~~~B59.2~~ paragraphs B49.2 and B49.3 apply to any **reserve offers** submitted in breach of paragraph B58.

Over frequency reserve

Performance requirements and technical specifications for over frequency reserve

~~B55-B60.~~ To be able to provide **over frequency reserve**, the **ancillary service agent** must provide **relay equipment** that:

~~B55.1~~~~B60.1~~ when armed, automatically disconnects the **generating unit** to which it is fitted within half a second of the frequency of the **grid** rising to or above the **required frequency** for that **generating unit**;

~~B55.2~~~~B60.2~~ if the **system operator** has remote arming and/or disarming control of the **relay equipment**, immediately arms or disarms (as appropriate) when it receives a remote arming or disarming signal from the **system operator's** co-ordination centre;

~~B55.3~~~~B60.3~~ is available at all times to provide **over frequency reserve** except:

~~B55.3.1~~~~B60.3.1~~ where the **relay equipment** is taken out of service under the conditions specified in the **ancillary service** procurement contract; and

~~B55.3.2~~~~B60.3.2~~ during the period in which any tests are conducted; and

~~B55.3.3~~~~B60.3.3~~ during any **trading period** when the **generating unit** is not generating **electricity**; and

~~B55.4~~~~B60.4~~ is maintained in accordance with good industry practice so that the **relay equipment** is able to provide **over frequency reserve** in accordance with the **ancillary service** procurement contract.

~~B56-B61.~~ The conditions under which outages may occur on the **relay equipment** are specified in the **ancillary service** procurement contract with the **ancillary service agent**.

Monitoring requirements for over frequency reserve

B57-B62. The **ancillary service agent** must provide monitoring equipment that:

B57.1B62.1 is available at all times (except during an **allowed outage** or during a test);

B57.2B62.2 continuously measures and transmits to the designated interface point information as to whether or not the **relay equipment** is armed (except during an **allowed outage** or during a test); and

B57.3B62.3 is maintained in accordance with good industry practice.

Special testing requirements for over frequency reserve

B58-B63. The **ancillary service agent** must conduct a **baseline test** of each item of **relay equipment** at least once every **12-24** months unless:

B58.1B63.1 otherwise agreed with the **system operator**; or

B58.2B63.2 each **ancillary service agent** providing **over frequency reserve** has demonstrated fully compliant operational performance of its **generating units** by providing **over frequency reserve** in the previous **12-24** months.

B59-B64. A **baseline test** or **on-demand test** of **relay equipment** must verify whether or not the **relay equipment** meets the performance requirements in paragraphs B60.1 and B60.2, or such lesser performance requirements as the **system operator** may determine in consultation with the **ancillary service agent**.

B65. An **on-demand test** of monitoring equipment must verify whether or not the monitoring equipment meets the performance requirements in paragraph B62.2.

B66. Upon completion of a **baseline test** or **on-demand test** the **ancillary service agent** must provide the **system operator** with the corresponding test data and verification of meeting the performance requirements within **15 business days**.

Voltage support

Performance requirements and technical specifications for voltage support

B60-B67. In order to provide **voltage support**, the **ancillary service agent** must provide either:

B60.1B67.1 continuously variable **reactive power** resources that have:

B60.1.1B67.1.1 the capability of providing the contracted **reactive power** quantities whilst the **grid** is operated to the voltage range, as specified in the **technical codes**; and

B60.1.2B67.1.2 both automatic and 24-hour manual voltage control facilities; or

B60.2B67.2 static **reactive power** resources that have:

B60.2.1B67.2.1 provision for manual control available on a 24-hour basis; and

B60.2.2B67.2.2 automatic operation to parameters and for conditions specified by the **system operator**.

B64-B68. All **voltage support equipment** provided by an **ancillary service agent** must have data and analogue indications of the **reactive power** and status of the **voltage support equipment**, provided in accordance with the requirements of the **technical codes**.

B62-B69. To be able to provide **voltage support**, the **ancillary service agent** must provide **voltage support equipment** that:

B62-1B69.1 is available at all times to provide **voltage support** at the maximum **reactive power** and network busbar(s) specified in the **ancillary service** procurement contract, except:

B62.1.1B69.1.1 where the **voltage support equipment** is taken out of service under the conditions specified in the **ancillary service** procurement contract; or

B62.1.2B69.1.2 during the period in which any tests are conducted;

B62-2B69.2 is able to respond, when dispatched, in accordance with the response times specified in the **ancillary service** procurement contract; and

B62-3B69.3 is maintained in accordance with good industry practice so that the **voltage support equipment** is able to provide **voltage support** in accordance with the **ancillary service** procurement contract.

Monitoring requirements for voltage support

B63-B70. The **ancillary service agent** must provide monitoring equipment that:

B63-1B70.1 is available at all times (except during an **allowed outage** or during a test);

B63-2B70.2 continuously measures and transmits to the designated interface point the **reactive power** provided by the **voltage support equipment** (except during an **allowed outage** or during a test); and

B63-3B70.3 is maintained in accordance with good industry practice.

Special testing requirements for voltage support

B64-B71. There are no **baseline tests** for equipment used to provide or monitor **voltage support**.

B65-B72. An **on-demand test** of **voltage support equipment** must verify whether or not the **voltage support equipment** meets the performance requirements in paragraphs B69.1 and B69.2, or such lesser performance requirements as the **system operator** may determine in consultation with the **ancillary service agent**.

B73. An **on-demand test** of monitoring equipment must verify whether or not the monitoring equipment meets the performance requirements in paragraph B70.2.

B74. Upon completion of an **on-demand test** the **ancillary service agent** must provide the **system operator** with the corresponding test data and verification of meeting the performance requirements within 15 **business days**.

Black start

Performance requirements and technical specifications for black start

B66-B75. The **ancillary service agent** must ensure that, when requested to provide **black start**, it provides such services by:

B66-1B75.1 starting a **generating unit** and raising it to synchronous speed, without any power being obtained from the **grid** or any **local network**;

B66-2B75.2 operating the **generating unit** at zero load at synchronous speed for 15

minutes (or such shorter period as instructed by the **system operator**);

~~B66-3~~B75.3 having the **generating unit** switched on to de-energised **network** busbar(s);

~~B66-4~~B75.4 providing generation output that supports the initial charging of transmission circuits and **assets**, and the progressive energising of the **grid** at **network** busbar(s);

~~B66-5~~B75.5 providing the **reactive capability** specified in clause 8.23 of the **Code** for the **generating unit**;

~~B66-6~~B75.6 subject to paragraph B75.5, controlling the **network** voltage as instructed by the **system operator**; and

~~B66-7~~B75.7 providing an emergency frequency regulating reserve service by maintaining the frequency to between 49.25 Hertz and 50.75 Hertz, to the extent practicable.

~~B67-B76~~ The **ancillary service agent** must ensure that:

~~B67-1~~B76.1 sufficient **black start equipment** is available at all times to provide **black start** in accordance with the **ancillary service** procurement contract;

~~B67-2~~B76.2 the **black start equipment** is able to start without power being obtained from the **grid** or any **local network**;

~~B67-3~~B76.3 sufficient **generating units** are available continuously to provide **black start**, except where there is an **allowed outage** preventing the provision of **black start**;

~~B67-4~~B76.4 such **generating units** are able to achieve the response times to synchronous speed specified in the **ancillary service** procurement contract;

~~B67-5~~B76.5 such **generating units** otherwise have the capabilities specified in the **ancillary service** procurement contract; and

~~B67-6~~B76.6 such **generating units** and the **black start equipment** are maintained in accordance with good industry practice to enable the provision of **black start** in accordance with the **ancillary service** procurement contract.

Black start outages

~~B68-B77~~ An outage of **black start equipment** will not be taken into account in assessing the **ancillary service agent's** compliance with paragraph B75.1, ~~B65-1~~ if the **ancillary service agent** removes the **black start equipment** from service for:

~~B68-1~~B77.1 ~~B65A-1~~ — maintenance of the **black start equipment**;

~~B68-2~~B77.2 ~~B65A-2~~ — to eliminate or mitigate a risk of injury to any person or damage to the **black start equipment**;

~~B68-3~~B77.3 ~~B65A-3~~ — a test of the **black start equipment**;

and the **ancillary service agent** otherwise complies with paragraph B79~~B65C~~ in respect of the outage.

~~B69-B78~~ ~~B65B~~ — The **ancillary service agent** must use reasonable endeavours to minimise the duration and frequency of any outage that affects the **ancillary service agent's** ability to provide **black start**.

~~B70-B79~~ ~~B65C~~ — Where an outage that may compromise the **ancillary service agent's** ability to provide **black start** is planned or anticipated by the **ancillary service agent** the **ancillary service agent** must:

~~B70-1~~B79.1 ~~B65C-1~~ — consult with the **system operator** on the timing of the outage

with the intention that the timing of the outage must ensure that the **system operator** can, at all times, comply with its Principal Performance Obligations;

~~B70.2~~~~B79.2~~ ~~B65C.2~~ — provide notice to the **system operator** of the outage, its expected start date, its duration and the programme of works no later than:

~~B70.2.1~~~~B79.2.1~~ ~~B65C.2.1~~ — twelve weeks before the start of the outage for outages planned to be 12 hours or greater in duration; or

~~B70.2.2~~~~B79.2.2~~ ~~B65C.2.2~~ — two weeks before the start of the outage for outages planned to be less than 12 hours in duration;

unless the **system operator** agrees otherwise in writing;

~~B70.3~~~~B79.3~~ ~~B65C.3~~ — if the expected start date, duration or programme of works for a planned outage changes, provide the **system operator** with as much advance warning as reasonably practicable of the revised expected start date, duration or programme of works;

~~B71~~~~B80~~ ~~B65D~~ — For each planned outage for which the **ancillary service agent** fails to meet the notice requirements in clause ~~B79.2~~~~B65C.2~~ or ~~B79.3~~~~B65C.3~~ the **ancillary service agent** is liable to the **system operator** for an amount equal to the **availability fee** charged by the **ancillary service agent** for one month.

~~B72~~~~B81~~ ~~B65E~~ — In the event of any unexpected outage that compromises the **ancillary service agent's** ability to provide black start, the **ancillary service agent** must:

~~B72.1~~~~B81.1~~ ~~B65E.1~~ — immediately report the unexpected outage to the **system operator**, including reporting to the **system operator** the expected time to rectify the unexpected outage;

~~B72.2~~~~B81.2~~ ~~B65E.2~~ — determine and rectify the cause of the unexpected outage as soon as practicable; and

~~B72.3~~~~B81.3~~ ~~B65E.3~~ — use reasonable endeavours to continue to provide **black start**.

Monitoring requirements for black start

~~B73~~~~B82~~ Any failure of the **starting** equipment that compromises the ability of the **ancillary service agent** to perform **black start** must be reported to the **system operator** immediately. The cause of the failure must be determined and rectified as soon as practicable, and the **system operator** must be advised of the expected date of completion, and upon completion.

Special testing requirements for black start

~~B83~~ — The **ancillary service agent** must conduct a **baseline test** of each item of **black start equipment** at least once every six weeks, provided that the **ancillary service agent** is not required to conduct such a **baseline test** if the **black start equipment** has been generating for 66% or more of the time at any time since the last such **baseline test**.

~~B84~~ — A **baseline test** or **on-demand test** of **black start equipment** must verify whether or not the **black start equipment** meets the performance requirements in paragraph ~~B76.2~~~~B65.2~~.

~~B74~~~~B85~~ Without limiting any other rights the **system operator** may have to request tests of **black start**, the **system operator** may require the **ancillary service agent** to conduct a **baseline test** of **black start** no more than once every 12 months. There are no other **baseline tests** for equipment used to provide or monitor **black start**.

~~B75~~~~B1~~ — A **baseline test** or **on-demand test** of **black start equipment** must verify whether or not the **black start equipment** meets the performance requirements in paragraph ~~B65.2~~.

Field Code Changed

Gazette Effective Date – 3 May 2022

~~B76-B86.~~ A **baseline test** or **on-demand test** of **black start** must verify whether or not the **black start** meets the performance requirements in paragraphs B75 and B76, or such lesser performance requirements as the **system operator** may determine in consultation with the **ancillary service agent**. ~~—~~ A **baseline test** or **on-demand test** of **black start** will include a full station shutdown unless the **system operator** determines otherwise in consultation with the **ancillary service agent**.

Appendix C – Key contracting terms for ancillary service procurement contracts (paragraph 55)

- C1. For the avoidance of doubt, a key contracting term that is expressed as an **ancillary service agent** right or obligation does not confer or impose that right or obligation on an **ancillary service agent** unless and until that right or obligation is included in an **ancillary service** procurement contract between the **system operator** and the **ancillary service agent**.

Disputes

- C2. In the event of a dispute between the parties in relation to the **ancillary service** procurement contract (not being a dispute under the **regulations** or **Code**) that the parties cannot resolve by negotiation, the parties can agree to refer the dispute for resolution by:
- C2.1 mediation; or
 - C2.2 independent expert determination; or
 - C2.3 Rulings Panel determination under Part 3 of the **enforcement regulations**; or
 - C2.4 arbitration in accordance with the provisions of the Arbitration Act 1996.
- C3. In the event that the parties do not agree to refer an unresolved dispute to one of the above forms of dispute resolution, or having been referred to such dispute resolution the dispute is not resolved within 100 **business days** (or such longer period as the parties may agree), either party may refer the dispute to an arbitrator for resolution. The arbitrator must be agreed between the parties or, failing agreement, must be an arbitrator appointed by the President for the time being of the New Zealand Law Society. Such arbitration shall be conducted under and in accordance with the provisions of the Arbitration Act 1996.

Obligations under the regulations and Code

- C4. Nothing in the **ancillary service** procurement contract limits any obligation of the **ancillary service agent** or the **system operator** to comply with the **regulations** or **Code** or limit any liabilities arising due to the breach of the **regulations** or **Code** by an **ancillary service agent** or the **system operator**.
- C5. Any performance requirement in the **ancillary service** procurement contract that refers to a specific clause of the **Code** is subject to any **dispensation** granted to the **ancillary service agent**, provided the **ancillary service agent** has notified the **system operator** of the **dispensation**.

Rights to terminate

- C6. A party has the right to terminate the **ancillary service** procurement contract (or an **ancillary service** schedule to the **ancillary service** procurement contract) immediately on notice to the other party where a change to the **regulations** or **Code** that occurs during the term of the **ancillary service** procurement contract:
- C6.1 results in the **ancillary service** procurement contract being materially inconsistent with the **regulations** or **Code**; or
 - C6.2 imposes material additional obligations or material costs on the terminating party in respect of matters covered by the **ancillary service** procurement contract.

Whether any such change is material is to be decided by independent dispute resolution where the parties cannot agree.

- C7. A party has the right to terminate the **ancillary service** procurement contract immediately on notice to the other party if:
- C7.1 the other party goes into liquidation, compromises with its creditors, enters statutory management or receivership, becomes insolvent, or is subject to any analogous event; or
 - C7.2 the other party sells its business without the consent of the terminating party, such consent not to be unreasonably withheld; or
 - C7.3 it becomes illegal for the terminating party to perform the **ancillary service** procurement contract.
- C8. The **system operator** has the right to terminate an **ancillary service** schedule to the **ancillary service** procurement contract immediately on notice to the **ancillary service agent** if:
- C8.1 the **ancillary service agent** commits a material breach of the **ancillary service** procurement contract in relation to that **ancillary service**; and
 - C8.2 such breach, if remediable, is not remedied to the **system operator's** reasonable satisfaction within 10 **business days** of the **system operator's** notice, or such longer period as the **system operator** may determine.
- C9. A failure by the **ancillary service agent** to meet a performance requirement for the **ancillary service** is not a material breach unless—
- C9.1 the **ancillary service agent** has previously failed to meet the same performance requirement under its existing **ancillary service** procurement contract; or
 - C9.2 the **ancillary service agent** has failed to meet the performance requirement in paragraph B4; or
 - C9.3 the effect of the failure is that the **ancillary service** was not provided at all when it should have been.

Payment and invoicing

- C10. The payment and invoicing terms of the **ancillary service** procurement contract must recognise and be consistent with the obligations of the parties under the **Code** in respect of payment and invoicing.
- C11. The **system operator** may delegate its invoicing obligations under the **ancillary service** procurement contract to the **clearing manager**. Invoices for **ancillary services** are paid by the **clearing manager** on the **system operator's** behalf.

Limitation of liability

- C12. Where a party breaches an obligation under the **ancillary service** procurement contract that is also an obligation contained within the **regulations** or **Code**, the liability (if any) of that party is determined under and in accordance with the **regulations** and **Code** (including the limitations of liability contained in the **regulations** and **Code**) and that party has no liability under the **ancillary service** procurement contract.
- C13. The **system operator's** liability to the **ancillary service agent** under the **ancillary service** procurement contract is limited to situations where the **system operator** has breached the provisions of the **ancillary service** procurement contract. For the avoidance of doubt, the **ancillary service agent** has no claim against the **system operator** for failing to follow the **procurement plan** in any respect.

- C14. The **system operator** is only liable to the **ancillary service agent** for direct loss suffered by the **ancillary service agent** and caused by the **system operator's** breach of the **ancillary service** procurement contract.— The **system operator** is not liable for loss of use, revenue or profit, any third party damages, and third party settlement or any costs associated with such items, even where such losses may be direct losses.
- C15. The **ancillary service agent's** liability to the **system operator** under the **ancillary service** procurement contract is limited to situations where the **ancillary service agent** has breached the provisions of the **ancillary service** procurement contract.
- C16. The **ancillary service agent** is only be liable to the **system operator** for direct loss suffered by the **system operator** and caused by the **ancillary service agent's** breach of the **ancillary service** procurement contract.— The **ancillary service agent** is not be liable for loss of use, revenue or profit, any third party damages, and third party settlement or any costs associated with such items, even where such losses may be direct losses.
- C17. The maximum liability of each party to the other party under the **ancillary service** procurement contract is as follows:
- C17.1 \$100,000 in any 12 month period in respect of all defaults of obligations contained in the general contracting terms of the **ancillary service** procurement contract (and not contained in an **ancillary service** schedule to the **ancillary service** procurement contract) irrespective of the number of defaults; and
- C17.2 In respect of defaults of obligations contained in an **ancillary service** schedule to the **ancillary service** procurement contract:
- C17.2.1 the combined maximum liability for any single event or related series of events is the lesser of 5% of the total amount of the expected annual fees payable for that particular **ancillary service** (such total to be set by the **system operator** prior to the execution of the **ancillary service** procurement contract) or \$100,000; and
- C17.2.2 the combined maximum liability in any 12 month period is the lesser of 20% of the total amount of the expected annual fees payable for that particular **ancillary service** (to be set by the **system operator** prior to the execution of the contract) or \$300,000, irrespective of the number of events.
- C18. The **system operator** has no liability to the **ancillary service agent** in respect of:
- C18.1 the **system operator's** selection or dispatch of any other **ancillary service agent** to provide **multiple provider frequency keeping**; or
- C18.2 any other **ancillary service agent's** failure to comply with a **dispatch instruction** for **multiple provider frequency keeping**, regulating instructions or any performance or monitoring requirement for **multiple provider frequency keeping**.
- C19. Nothing in paragraphs C12 to C18 limits the **system operator's** ability to withhold payment for an **ancillary service** under paragraph C23.1.

Force majeure

- C20. The parties must be able to rely on force majeure in certain circumstances to limit any liability under the **ancillary service** procurement contract for a breach of the provisions contained in the **ancillary service** procurement contract.— The following situations must be included in the definition of force majeure within the **ancillary service** procurement contract:
- C20.1 any event or circumstance occasioned by, or in consequence of, any act of God (being an event or circumstance (i) due to natural causes, directly or indirectly and exclusively without human intervention, and (ii) which could not by any amount of ability have been foreseen or, if foreseen, could not by any amount of human care

and skill have been resisted), strikes, lockouts, other industrial disturbances, acts of public enemy, wars, blockades, insurrections, riots, epidemics, aircraft, or civil disturbances; or

- C20.2 the binding order of any Court, government or a local authority (except where the **ancillary service agent** seeks to invoke this paragraph and the local authority which made the binding order is the owner of, or is otherwise associated with or related to, the **ancillary service agent**); or
 - C20.3 any other event or circumstance beyond the control of the party invoking this paragraph and being such that, by the exercise of reasonable care acting in accordance with good industry practice, such party could not have prevented such failure.
- C21. Any force majeure provision contained in the **ancillary service** procurement contract must not apply to any liability of the **ancillary service agent** that arises due to a breach of the **regulations** or **Code** whether or not such obligation arises in the provision of **ancillary services**.

Claims for failure to perform

- C22. The **system operator** may notify the **ancillary service agent** of a claim that the **ancillary service agent** has failed, or is unable, to meet a performance requirement in the **ancillary service** procurement contract or comply with a **dispatch instruction** for the **ancillary service**.
- C23. If the claim is accepted (voluntarily by the **ancillary service agent** or after dispute resolution):
- C23.1 the **system operator** is not liable to pay the **ancillary service agent** for providing the **ancillary service** for the relevant period; and
 - C23.2 the **ancillary service agent** must take remedial steps to ensure that it is able to meet the performance requirement and/or comply with **dispatch instructions**.

Tests

- C24. ~~For some **ancillary services** a minimum number of tests of the equipment used to provide or monitor them are required (each a "**baseline test**").~~ The **ancillary service agent** must pay its costs of any **baseline test**.
- C25. For each **ancillary service** the **system operator** may request:
- C25.1 ~~a test of the equipment used to provide or monitor the **ancillary service** (which may be in addition to a **baseline test**)~~ (an "**on-demand test**"); and/or
 - C25.2 a statement of the capability and operational limitations of the equipment used to provide or monitor the **ancillary service**,
- which, if requested, the **ancillary service agent** must carry out or provide within a timeframe agreed between the **system operator** and the **ancillary service agent**. ~~Unless the **system operator** and the **ancillary service agent** agree otherwise, if an **on-demand test** has been requested but not carried out and passed within 30 **business days** of the **system operator's** request, the **ancillary service agent** is deemed to be incapable of providing or monitoring the **ancillary service** from the end of that period until the **on-demand test** is carried out and passed.~~
- C26. The **ancillary service agent** must provide the **system operator** with written information in such detail as the **system operator** reasonably requires about the timing of tests and the results of tests.
- C27. The **system operator** must pay the **ancillary service agent's** reasonable costs of an **on-**

demand test unless:

- C27.1 the equipment fails the **on-demand test**; or
 - C27.2 the **system operator** requested the **on-demand test** within 20 **business days** of the **ancillary service agent** notifying the **system operator** that the **ancillary service agent** had completed remedial action on the equipment in response to a claim by the **system operator** under paragraph C22, and the sole purpose of the **on-demand test** is to determine the sufficiency of that remedial action.
- C28. If equipment used to provide or monitor an **ancillary service** fails a **baseline test** or **on-demand test** the **ancillary service agent**:
- C28.1 is deemed to be incapable of providing or monitoring the **ancillary service** until the test is passed; and
 - C28.2 must re-test the equipment until the test is passed, and the **ancillary service agent** must pay the costs of any such re-test unless:
 - C28.2.1 the equipment is used to provide or monitor **frequency keeping** and/or **instantaneous reserve** and no other **ancillary service**; or
 - C28.2.2 otherwise agreed with the **system operator**.

Inspections

- C29. The **system operator** may inspect any equipment used by the **ancillary service agent** to provide or monitor an **ancillary service**. The **system operator** must not interfere unreasonably with the **ancillary service agent's** business in carrying out such an inspection.
- C30. The **system operator** must give the **ancillary service agent** at least five **business days'** notice of any such inspection, unless the **system operator** reasonably believes that the equipment is being used in a manner inconsistent with providing the **ancillary service** in accordance with the **ancillary service** procurement contract, in which case the **system operator** may give less or no notice.

Sub-contracting and assignment

- C31. The **ancillary service agent** may not sub-contract any of its obligations under the **ancillary service** procurement contract to any person without the **system operator's** prior consent. If the **ancillary service agent** does sub-contract any of its obligations under the **ancillary service** procurement contract, it remains primarily responsible for the performance of those obligations, including for any breach of the **regulations** or **Code** arising from the performance or non-performance of those obligations.
- C32. The **system operator** may assign its interest in the **ancillary service** procurement contract to any person who takes over the role of **system operator**. Otherwise, neither party may assign its interest in the **ancillary service** procurement contract to any person without the consent of the other party.

New long term contracts

- C33. The following provisions must be included in any **new long term contract** for **over frequency reserve**, **voltage support** or **black start**:
 - C33.1 If, in the **system operator's** reasonable opinion, the number or duration of maintenance outages of equipment used to provide or monitor the **ancillary service** is such that the **ancillary service agent's** ability to provide or monitor the **ancillary service** in accordance with the **new long term contract** has been

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substantially detrimentally affected, the **system operator** may, by giving one month's prior written notice to the **ancillary service agent**, terminate the **new long term contract**.

C33.2 Any **availability price-fee** or **event price-fee** payable under the **new long term contract** is to be subject to adjustment no more frequently than once every 12 months in accordance with an objective formula to be agreed between the **system operator** and **ancillary service agent**.

Appendix D – Glossary of terms

In this **procurement plan**, unless the context otherwise requires:

~~“allocated frequency keeping unit” means, for an FK site that is a block dispatch group, station dispatch group or group of load sources, the specific frequency keeping unit(s) within the FK site that are allocated to frequency keeping;~~

“allowed outage” means an outage of that equipment that is permitted under an **ancillary service** procurement contract;

“availability ~~fee~~price” means a fixed ~~price-fee~~ for the availability of an **ancillary service**, irrespective of dispatch or provision, expressed as dollars per period of availability;

“back-up SFK” means **single provider frequency keeping** that is procured against the risk of technical failure of **multiple provider frequency keeping**;

“baseline test” ~~means a set of tests to demonstrate to the reasonable satisfaction of the system operator that the equipment and associated systems are able to, and will continue to be able to, meet the performance requirements of the ancillary service for which the equipment and associated systems is offered or is intended to be offered; is defined in paragraph C24;~~

“battery energy storage system” means an **energy storage system** with an electro-chemical storage component;

“black start equipment” means diesel generators or auxiliary hydro plant capable of livening a unit isolated from the grid;

“Code” means the Electricity Industry Participation Code 2010;

“constraint costs” means **constrained off amounts** and **constrained on amounts** attributable to frequency keeping;

“contracted GXPs” means the **GXPs** at which an **ancillary service agent** may provide **interruptible load**, as set out in an **ancillary service** procurement contract for **instantaneous reserve**;

“control equipment” means equipment in respect of a **frequency keeping unit** that automatically responds to changes in frequency for the purposes of providing **frequency keeping**;

“control min” means the minimum quantity of power (in megawatts) an **FK site** must operate at to provide **frequency keeping** to the relevant performance requirements;

“control max” means the maximum quantity of power (in megawatts) an **FK site** can operate at and still provide **frequency keeping** to the relevant performance requirements. ~~—~~ The **control max** offered for an **FK site** must be greater than or equal to **control min** plus twice the range of the offered **MW band** for the **FK site**;

~~“end-to-end test” means a specific type of baseline test to verify that the integrated components of an interruptible load system, other than the monitoring components, function correctly as a complete system; means a baseline test to verify that the integrated components of an interruptible load system, other than the monitoring components, function correctly as part of the overall system from start to finish;~~

“event ~~price~~fee” means a fixed price for the dispatch or provision of an **ancillary service**, expressed as dollars per event;

“existing long term contract” means an **ancillary service** procurement contract entered into between the **system operator** and an **ancillary service agent** before the commencement of this **procurement plan**, the term of which **ancillary service** procurement contract overlaps with the term of this **procurement plan**;

“enforcement regulations” means the Electricity Industry (Enforcement) Regulations 2010;

“firm quantity procurement” is defined in paragraph 48;

“FK output” means the generation from or load at an **FK site**, as the case may be;

“FK site” means a **frequency keeping unit** or group of **frequency keeping units**. An **FK site** may be a **generating unit**, **generating station**, **block dispatch group**, **station dispatch group**, load source or group of load sources;

“frequency time error” means a deviation from **New Zealand standard time** caused by variations in system frequency;

“gate closure” means, for a **frequency keeping offer**, the time referred to in clause 13.46 of the **Code** after which the offer could not be revised if the offer were a **reserve offer**;

~~“generating unit” has the meaning given to it in the Code and for the purposes of this Procurement Plan includes battery energy storage systems;~~

“grid frequency error” means the **grid** frequency deviation in Hertz from 50.00 Hertz;

“half-hour clearing market procurement” is defined in paragraph 47;

“islanded”, in relation to part of the **grid**, means that that part of the **grid** is disconnected from the rest of the **grid** owing to planned or unplanned outages;

“**MFK period**” means a period:

(a) beginning at the start of an **MFK transition trading period**; and

(b) ending at the start of the first **SFK return trading period** following an **MFK transition trading period** (if any);

~~“MFK technical review” is defined in paragraph 28;~~

“**MFK transition trading period**” is a trading period on which frequency keeping for an island will transition from single provider frequency keeping to multiple provider frequency keeping defined in paragraph A3.4;

“multiple provider frequency keeping” means, for a **trading period** and **island**, **frequency keeping** that is dispatched on the basis that during the **trading period** there may be more than one provider of **frequency keeping** in the **island**;

“**MW band**” means a range in (**MW**) over which an **FK site** may vary its **FK output**;

“**new long term contract**” means an **ancillary service** procurement contract entered into between the **system operator** and an **ancillary service agent** during the term of this **procurement plan**, the term of which **ancillary service** procurement contract exceeds 12 months;

“**offer price**” means a price offered by an **ancillary service agent** for the dispatch of an **ancillary service** for a **trading period**, expressed as dollars per unit of quantity of the **ancillary service**;

~~“on-demand test” is a baseline test conducted at the specific request of the system operator defined in paragraph C25.4;~~

“pre-event real power output” is defined in paragraph B42.2.2;

“pre-event load” means the average load over a period of 60 seconds with a reasonable adjustment for any load change detected on the relevant **network**;

“**region**” means New Zealand, an **island** or a smaller geographical region within an **island**, and includes a **zone**;

“**relay equipment**” means equipment fitted to a **generating unit** that automatically disconnects the **generating unit** when the frequency of the **grid** reaches the **required frequency** for that **generating unit**;

“**required frequency**” means, in relation to a **generating unit**, the frequency at which that **generating unit** is contracted to disconnect;

“**regulating instruction**” means an instruction by the **system operator** to an **ancillary service agent** providing **multiple provider frequency keeping** from an **FK site** to increase or decrease **FK output** from the **FK site** within the dispatched **MW band** for the **FK site**. For the avoidance of doubt, a **regulating instruction** is not a **dispatch instruction**;

“**regulations**” means the **enforcement regulations** and any other regulations made under the **Act**;

“**response rate**” means the rate of change in **FK output** from an **FK site** in **MW** per minute;

“**SFK period**” means any period that is outside an **MFK period**;

“**SFK transition trading period**” is a **trading period** on which **frequency keeping** for an **island** will transition from **multiple provider frequency keeping** to **single provider frequency keeping** defined in paragraph A3.2;

“**single provider frequency keeping**” means, for a **trading period** and **island**, **frequency keeping** that is dispatched on the basis that during the **trading period** there must be only one provider of **frequency keeping** in the **island**;

“**single provider frequency keeping period**” means, in relation to an **ancillary service agent** and **island**, all the **trading periods** within any continuous period of 30 days for which the **ancillary service agent** was dispatched to provide **single provider frequency keeping** in the **island**, provided the number of such **trading periods** is at least 24;

“**system operator measured frequency**” means the frequency of the **grid** as determined by **system operator** frequency logging;

“**trip frequency**” means the trip frequency for **interruptible load** other than that provided by **battery energy storage systems** and specified in the relevant **ancillary service** procurement contract;

“**trip time**” only relates to **interruptible load** other than that provided by **battery energy storage systems** and means the time at which the **ancillary service agent’s** locally measured frequency of the **grid** falls to or below the **trip frequency** (if not available the frequency of the **grid** as otherwise determined by the **system operator**);

“**UFE time**” means the time at which an **under-frequency event** occurs, as determined by reference to the **system operator measured frequency**; and

“**voltage support equipment**” means **assets** capable of providing **reactive power**.