

Review of system restart ancillary service arrangements – Final report

Volume 2

*(Response to comments on Draft report;
Appendices)*

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Table of contents (Volume 2)

Appendix 1 Summary of consultation comments on the Draft report and NEMMCO responses 4

A1.1 System restart service standard 4

A1.1.1 Who sets the standard / jurisdictionally specific standard 4

A1.1.2 Nature of restoration targets 5

A1.1.3 Assumptions underlying the standard 7

A1.2 Service procurement guidelines 7

A1.2.1 Categories of service 7

A1.2.2 Procurement criteria 9

A1.2.3 Independence of services 10

A1.3 Tendering / assessment / contracting 10

A1.3.1 Assessing technical capability and feasibility of offered services 11

A1.3.2 Assessing viability and best value combination of services 11

A1.3.3 Commissioning / testing of invited services and revision of restart plans and procedures 12

A1.3.4 ‘Standard’ tendering cycle and contract length / liquidated damages 14

A1.3.4.1 Contract length 14

A1.3.4.2 Liquidated damages 15

A1.4 Customer specific MW support 15

A1.5 Determination of electrical sub-networks 16

A1.5.1 Purpose of electrical sub-networks 16

A1.5.2 Consultation on sub-network boundaries 16

A1.6 Restart plans and procedures 17

A1.7 Administrative and operational issues 18

A1.7.1 Payments for restart services and contractual conditions 18

A1.7.2 Ensuring reasonable terms and conditions for all parties 19

A1.7.3 Recovery and discovery of system restart costs 21

A1.7.4 Prices under black system – incentive to make generation available 22

A1.8 NEMMCO’s responsiveness to consultation submissions 22

Appendix 2 Summary of changes to recommended arrangements 24

Appendix 3 Code clauses relevant to system restart arrangements 25

Chapter 3 25

3.1.4 Market design principles 25

3.11.3 Procedure for determining quantities of non-market ancillary services 26

3.11.4 Acquisition of non-market ancillary services 26

3.11.5 Tender process for non-market ancillary services 27

3.14.3 Conditions for suspension of the spot market 29

3.15.6A Ancillary service transactions 29

Chapter 4 30

4.2.6 General principles for maintaining power system security 30

4.3.1 Responsibility of NEMMCO for power system security 30

4.3.4 Network Service Providers 31

4.8.3 NEMMCO's advice on power system emergency conditions 31

4.8.12	Local black system procedures	31
4.8.13	Testing of black start-up facilities and local black system procedures	31
4.8.14	Black system start-up	32
Chapter 5	33
5.7.5	Testing by code participants of their own plant requiring changes to normal operation	33
Chapter 10 (Glossary)	34
	black start capability	34
	black start-up facilities	34
	black system	35
	local black system procedures	35
	power system security and reliability standards	35
	system restart	35
Appendix 4	Existing sub-network maximum demands.....	36
Appendix 5	Technical capabilities, assessment and testing of tendered restart services	37
A5.1	Technical capabilities for establishing a short list of tenders	37
A5.2	Assessment of service feasibility	38
A5.3	Assessment of service viability	38
A5.4	Physical testing of each category of restart service that is required prior to contract commencement	38
Appendix 6	Guidelines for restart plans and procedures	40
A6.1	System restart plan	40
A6.2	Local black system procedures	40
Appendix 7	Characteristics of restart service dependability	43
A7.1	Service capability	43
A7.2	Service availability	43
A7.3	Service reliability	43

Appendix 1 Summary of consultation comments on the Draft report and NEMMCO responses

Submissions received from:

- CS Energy
- Edison Mission Energy
- Electricity Supply Industry Planning Council of South Australia [ESIPC]
- Hydro Tasmania
- Macquarie Generation [MacGen]
- NEMOC Power System Security Working Group [PSSWG]
- NRG Flinders
- Powerlink Queensland
- Snowy Hydro
- Tomago Aluminium
- TransGrid
- Tasmanian Treasury
- Stanwell Corporation – this submission was received late
- Tarong Energy – this submission was received late

A1.1 System restart service standard

A1.1.1 *Who sets the standard / jurisdictionally specific standard*

Comments from respondents

- Powerlink and Snowy Hydro express their support for the standard to be established by an appropriate regulatory body.
- ESIPC, MacGen and Tasmanian Treasury make reference to the desirability of jurisdictional involvement in setting the standard. Tasmanian Treasury and ESIPC each allude to unique topographical factors resulting in a need for locationally specific restoration standards.

NEMMCO response

In the **Draft report** [at p.6 of Volume 2] NEMMCO indicated:

Unless jurisdictions themselves clearly indicate a desire for direct jurisdictional involvement in setting the standard, NEMMCO is not inclined to recommend such a path be taken. No jurisdiction has thus far indicated a wish to be so involved.

Jurisdictional involvement in setting standards – as distinct from interested parties within a region expressing a particular view – could be at two different levels:

- jurisdictions seeking to be directly involved in setting a NEM-wide restoration standard; or
- jurisdictions seeking to have regionally specific restoration standards imposed.

It remains the case that no jurisdiction has indicated a desire to be directly involved at either of these levels. Accordingly, NEMMCO remains of the view that a common, nationally based standard is appropriate.

Should the final form of the standard as determined by an appropriate regulatory body impose clearly differentiated requirements in various jurisdictions – as opposed to a commonly applied single national standard – NEMMCO believes that system-wide recovery of restart service costs would need to be replaced by a jurisdictional recovery mechanism¹.

NEMMCO considers that the points advanced by ESIPC and Tasmanian Treasury regarding specific *restart service* requirements according to network topography are best dealt with via either:

- the process that will determine the boundaries of *electrical sub-networks* through provision of evidence to support a particular interpretation of the *electrical sub-network* boundary criteria; or
- use of the recommended provisions for customer specific MW support that would enable additional restart services to be procured where a jurisdiction wished to have a restoration standard different to that which was applied NEM-wide.

A1.1.2 Nature of restoration targets

Comments from respondents

- Snowy Hydro and TransGrid each indicate a preference for the interim target component of the standard to be expressed in terms of restoration of customer load rather than restoration of generation auxiliaries. TransGrid argues that focussing on load restoration is more relevant to the ultimate objective of restart, than the restoration of power station auxiliaries. TransGrid suggests that CBDs should be assigned specific restoration targets.
- Stanwell suggests that NEMMCO's recommended standard is difficult, if not impossible to measure. Stanwell proposes an alternative form of interim target for the standard.

NEMMCO response

NEMMCO appreciates the need for the standard to ensure that customer supply be restored as quickly as is practicable in the circumstances that

¹ See Section 2.7.3 in Volume 1 of this **Final report**.

prevail. However, *restart services* must be procured well in advance of the event that creates their need. Accordingly, the specific circumstances of the event to which the services will be applied cannot be known at the time of service procurement.

NEMMCO agrees with TransGrid that restoring generation auxiliaries is only a means to an end, but NEMMCO is of the view that restoration of generation auxiliaries is a particularly important means to the end of substantial restoration of customer supply. The statement made by NEMMCO in the **Draft report** [p.6 of Volume 2] remains relevant – that is:

... benchmarking *restart service* performance against restored customer supply in the early phase of system recovery might give a misleading impression of the success (or otherwise) of efforts to deliver on the longer term goals of complete system restoration.

In proposing an initial objective in restoring the power system to be the restoration of supply to the auxiliaries of substantial generating capability, NEMMCO has been mindful of the need to ensure there is a strong foundation upon which to build complete system restoration. It is only when there is sustainable generation capability restored that sustainable supply capability can be returned to customers.

TransGrid put an alternative proposition that if the objective of restoring customer load within a defined period is met, then sufficient auxiliary supplies must have been made available to enough power stations in the early phases. This proposition is not without merit and may prove more compelling to those who ultimately set the standard.

The desirability of facilitating timely restoration of customer load has been acknowledged through changes to the service procurement guidelines. These guidelines will now indicate a preference for “contracting with *restart services* that contribute to faster restoration of customer supply capability” [see Section A1.2.2].

With regard to the priority restoration of CBDs, the **Draft report** indicated [p.6 of Volume 2]:

NEMMCO acknowledges the comments that restoration of CBD loads should be a high priority but jurisdictionally specified schedules of sensitive loads or other load shedding priorities must also be taken into account. It is intended that detailed restoration procedures be maintained to ensure load is restored as quickly as is practical for the circumstances that prevail.

Providing specific targets for restoration of CBDs begs the question as to how CBDs are to be consistently defined. The Sydney, Melbourne, Brisbane and Adelaide CBDs might be legitimate priorities, but what about Canberra, Geelong, Newcastle and Townsville? Where should significant industrial customers fit in to the priority order? NEMMCO is of the view that, in the absence of clear guidance from Jurisdictions, there is no correct answer as to where the dividing line should be drawn. Hence, NEMMCO’s preference is to adopt an approach that acknowledges loads such as major population centres and industrial operations exposed to major damage deserve a degree of priority in the restoration process. Wherever practicable, these priorities will be taken into account when NEMMCO is required to choose between options

to stabilise generation in the early phases of restoration through the connection of customer load.

The nature of the restoration standard recommended by NEMMCO is such that it is deliberately designed to enable ex ante (before the event) assessment of prospectively procured *restart services*. Assessment of performance against NEMMCO's recommended interim benchmark standard is based on modelling and does not require telemetry regarding auxiliary plant status. The suggestion from Stanwell that the recommended standard is difficult if not impossible to measure, appears to be taking an ex post (after the event) approach to application of a standard, rather than an ex ante approach as is required in the procurement process. Stanwell's alternative interim restoration benchmark relies on either: ex post assessment of system status; or the making of a series of assumptions that are no less complex than the assumptions outlined by NEMMCO. For this reason, NEMMCO still favours the form of interim restoration benchmark outlined in the **Draft report**.

Given that sub-network demand can vary substantially according to time of day/week/year, NEMMCO accepts the TransGrid suggestion made during discussions subsequent to receipt of written submissions that the final restoration benchmark should be expressed in terms of peak demand in order to provide a more stable and consistently defined target. Appropriate changes have been made to Section 2.1 in Volume 1 of this **Final report**.

A1.1.3 Assumptions underlying the standard

Comments from respondents

- Snowy Hydro notes that, as a matter of principle the standard should aim to err on the side of conservatism, and suggests the assumptions used to test the adequacy of prospectively procured restart services should be modified to reflect more worst case conditions.

NEMMCO response

The nature of the system failure scenarios / assumptions and system restoration capability NEMMCO already intends to model are that restoration targets can be met in any target sub-network when the entire system has gone black **and** critical infrastructure is not available. NEMMCO believes that such scenarios are already erring on the side of conservatism in regard to both: the extent of black system conditions; and damage to infrastructure.

A1.2 Service procurement guidelines

A1.2.1 Categories of service

Comments from respondents

- Hydro Tasmania and Powerlink express support for recommended differentiated levels of restart service. Stanwell agrees with the decision to remove the "reserve category of restart service."
- Snowy Hydro indicated they remained sceptical of the need to differentiate between service categories and expressed concern that explicit reliability targets have not been established. Snowy Hydro suggested the standard should dictate the outcomes required with

allowances for sensitivities in the non-availability / deliverability of contracted services.

- Tarong Energy expressed concern that the 98% availability requirement for primary services might be too onerous.

NEMMCO response

NEMMCO's initial **Proposal** for differentiating *restart services* received some criticism. In particular, the "reserve" category of restart services was not well supported. In response to comment received, NEMMCO eliminated the "reserve" service category but retained the categories of "primary" and "secondary" services, given there was no suggestion from respondents on the initial **Proposal** that a distinction between "primary" and "secondary" services was not appropriate.

The Snowy Hydro suggestion for an alternative approach to establishment of targets for availability and reliability relies on objective measurement of key parameters and, in NEMMCO's view, does not lend itself to practical implementation. The Snowy Hydro approach presumes two things:

1. reliability, and hence value, of a service can be objectively assessed; and
2. it is possible to identify an appropriate threshold such that, services rated as being above the threshold are worth contracting, but services rated as being below the threshold are not worth contracting.

NEMMCO expressed a view in the **Draft report** that presuming either of these two things is only ever likely to lead to a solution that is "precisely wrong" given:

- assessment of service reliability is likely to be subjective²; and
- creating a 'one size fits all' contract ignores the distinction between services with very different levels of dependability, and thus difficulties will emerge in developing a consistent approach to assessing the relative merits of alternative services³.

Submissions on the topic of service categories have not provided any evidence to counter these views. Therefore, NEMMCO remains of the view that a distinction between service categories as described in the **Draft report** is a useful one.

Once the primary service status threshold for dependability (availability and reliability) of a *restart service* has been reached, NEMMCO does not consider it to be economically prudent to pay more than a modest premium for further improvements in the dependability of a given *restart service*. However, if there are quite separate services available that have no points of failure in common with other offered restart services, such services would be considered in the

² See Section 1.3.2 in Volume 1 and Appendix 7 in Volume 2 of the **Draft report**.

³ See p.24, Section 2.2 in Volume 1 of the **Draft report**.

context of procuring additional services over and above the number necessary to achieve system restoration standards.

In recognition of legitimate maintenance requirements, NEMMCO is prepared to amend the availability expectations for primary services to 98% over the term of the contract, subject to services not falling below 95% availability in any rolling 12 month period.

A1.2.2 **Procurement criteria**

Comments from respondents

- Powerlink suggests inclusion of an additional procurement criterion giving priority to fast response services.
- Stanwell expressed a belief that NEMMCO should contract with two restart services within each sub-network. Stanwell indicated it could not see how a restart service could simultaneously provide restoration assistance to multiple sub-networks.

NEMMCO response

NEMMCO accepts the suggestion from Powerlink that a degree of priority be given to services able to respond faster, and the suggestion will be adopted by modifying the qualification contained in the second procurement criterion along the following lines:

Other things being equal, preference will be given to contracting with restart services that **contribute to faster restoration of customer supply capability**.⁴

NEMMCO does not believe it is necessarily the case that the most effective restart services – those technically able to contribute to timely restoration – would always be located within a sub-network. A *restart service* would not be contracted and assigned to an electrical sub-network unless there is a demonstrable capability for that service to contribute to system restoration in that sub-network, within the time frames specified in the standard. NEMMCO has a preference for minimising (within reasonable bounds) the constraints imposed on *restart service* procurement.

It is NEMMCO's belief that there is benefit in maintaining focus on what is arguably one of the most important requirements for contracting *restart services* – that is an ability to demonstrate⁵ a capability to deliver an effective service. If a service can demonstrate a capability to simultaneously provide restart capability for multiple sub-networks, without degrading the service to any other sub-network to which it was also assigned, NEMMCO sees no reason why it should not be so contracted to service both sub-networks. Whether that service is located within or outside a sub-network should be largely irrelevant. If the proposed service is the most effective and best value it should be contracted. If rigorous assessment is unable to demonstrate the

⁴ Existing qualification relates to “proximity to major generation centres within the target sub-network”.

⁵ Via modelling and/or physical testing.

capability of a generator to deliver effective restart services to a particular sub-network, it will not be assigned (contracted) to that sub-network.

A1.2.3 Independence of services

Comments from respondents

- MacGen disagrees with the proposal to only accept one restart service if the provider is subject to a potentially common point of failure.

NEMMCO response

In discussion subsequent to receipt of submissions, NEMMCO established that the MacGen position related to a different interpretation of the nature of “common point of failure” than NEMMCO intended.

NEMMCO is strongly of the view that, in contracting with the services required to meet the restoration standard, it would be imprudent to contract with two services having a common point of failure⁶. Damage to a “common point of failure” may be the event that leads to collapse of the system. If subsequent restoration largely relies on two services behind that point of failure, the restoration process is seriously impeded, with the risk of substantial economic costs accumulating as a result of an inability to use either contracted service and subsequently delayed restoration.

However, where NEMMCO is exercising its limited discretion to contract with services in addition to the number needed to meet the standard, the **Draft report** states [at p.23 of Volume 1]:

... the independence requirement would be relaxed to the extent that reliance on any one sub-station or one transmission corridor in common with another *restart service*, would not rule out an ability to contract with additional services. However, no power station would be able to carry more than one *restart service* contract (primary or secondary).

If a group of power stations could demonstrate there were multiple independent paths to the transmission network, it is possible that they would not be subject to a common point of failure as NEMMCO intended the term to be interpreted.

A1.3 Tendering / assessment / contracting

Comments from respondents

- ESIPC observes that restart resources can be connected to the distribution network and the Draft report unnecessarily focuses on transmission assets.

NEMMCO response

NEMMCO agrees with the observation from ESIPC that an effective *restart service* could be connected via the distribution rather than the transmission

⁶ Referred to by NEMMCO as the “independence requirement”.

network⁷. Accordingly, references will be changed, where appropriate, to ensure the scope of *restart services* is not unnecessarily restricted to encompass only services connected via transmission assets.

A1.3.1 Assessing technical capability and feasibility of offered services

Comments from respondents

- NRG suggest that final binding prices should only be required to be submitted when at the time of lodging formal tenders, rather than in accordance with NEMMCO's recommended time frame of two months after initial expressions of interest close (one month prior to tenders being finalised).

NEMMCO response

Given final technical specifications for all services will have to be submitted by two months after initial expressions of interest (EOI) close – the deadline for each EOI asked by NEMMCO to clarify/adjust elements of their offered service – all costing parameters should be identified by that point. Even though there is a one month period still to run before a tender short-list is finalised, parallel evaluation of technical and price considerations can commence prior to detailed assessment. NEMMCO is therefore not convinced there is a benefit in having further delay in the submission of final prices.

A1.3.2 Assessing viability and best value combination of services

Comments from respondents

- Snowy Hydro expressed concerns with respect to NEMMCO being able to apply judgement in the process of establishing viability and best value service combinations, also suggesting that modelling methodology, assumptions and findings be made available to market participants.

NEMMCO response

NEMMCO would not be in a position to publicly release details of its modelling of restart services. NEMMCO is required to make a decision regarding which services are to be procured on behalf of the market. Guidelines have been developed (outlined in some detail in this review) to minimise the degree of discretion that would be applied by NEMMCO. Publishing results of modelling would unavoidably reveal information of a commercially sensitive nature between NEMMCO and its service providers. Snowy Hydro has not provided any compelling argument as to why releasing such information to the market would be justified.

⁷ Although, in re-establishing customer supply capability NEMMCO will be focussing on re-energisation of the transmission network and large generators that are typically connected via the transmission network.

A1.3.3 **Commissioning / testing of invited services and revision of restart plans and procedures**

Comments from respondents

- CS Energy, Hydro Tasmania, Powerlink, PSSWG, Snowy Hydro, Tasmanian Treasury and Stanwell each indicated concerns and practical difficulties associated with the nature of the testing regime that NEMMCO had recommended. The PSSWG expressed a view that where physical testing of restart services would place system security at some risk, NEMMCO should pursue other forms of technical due diligence to assess the capability of offered services.
- TransGrid suggests it would be appropriate to require a capability for prospective service providers to be able to operate with no external load for a period of time.

NEMMCO response

NEMMCO firmly believes that robust physical testing of restart services is the only way in which high levels of confidence in the capability of *restart service* can be achieved. Past experience has shown that even though detailed modelling might not indicate any likely problems with the delivery of a service, it is only when physical testing is conducted that issues emerge, such as: frequency and voltage regulation; harmonic resonance; and the compatibility of protection settings with the high starting current of power station auxiliary motors – each of which are sufficient to cause the *restart service* to trip. Such physical testing sometimes reveals that if the service had been required in an actual system black scenario, it would have failed to perform as necessary. This raises the question: Why was the service provider paid for availability of a service it was incapable of delivering?

It is for these reasons that NEMMCO had proposed a testing process that attempts to create conditions as close as practical to conditions likely to occur in a real black start situation. NEMMCO acknowledges that testing of the nature contemplated might prove challenging to arrange, but believes there were sufficient financial incentives (for both prospective service providers and TNSPs) to seek innovative means to facilitate the required testing without placing network security at risk. NEMMCO would not countenance testing that was likely to place the system in an insecure state⁸.

It should be noted that all recent non-market ancillary service ITT processes include a requirement for “*Annual performance tests ... to verify ... the capability to accept blocks of load*”⁹ that is, presumably, priced into tenders. However, these tests are inevitably waived because the contracted party is unable to arrange them. NEMMCO is yet to experience a case where a

⁸ This has been made clear in the context of NEMMCO approving proposed testing programs that are required to be submitted with Expressions of interest (see Section 2.3.1 of Volume 1 in this **Final report**).

⁹ Clause 5.3.6(d) of the March 2003 ITT for non-market ancillary services. Tests are required to be conducted within 6 months of entering into a contract.

contracted party has offered to accept a lower payment because priced tests are not conducted.

Feedback on the proposed testing regime indicates a reluctance on the part of both TNSPs and service providers to commit to such testing on the basis that TNSPs do/would perceive network security as being placed at risk if testing of the nature suggested was forced to be undertaken. NEMMCO perceives that part of the difficulty has been caused by a misunderstanding of the words “load block” in the ancillary services agreement. NEMMCO does not expect that the “load block” would be customer load, but rather the type of load that a *restart service* would initially supply during system restoration – that is, the auxiliary load of another generating unit. Where these tests have been successfully conducted the load has been the auxiliary load of another generating unit at the same power station or an equivalent load such as a hydro storage pump at a nearby power station.

NEMMCO accepts that there are practical constraints on the extent to which *restart services* can be tested and that these testing requirements need to be balanced with the ongoing management of power system security. Accordingly NEMMCO will now recommend an amended form of testing program, combined with a requirement for prospective service providers to submit some modelling detail with formal tenders.

The testing regime is to be re-specified as indicated below (see also Appendix 5 of this **Final report**).

- **Part A tests:** Physical testing is required of:
 - *black start capability* – that is, to either:
 - : start without external supply while disconnected from the main network; or
 - : maintain stable generation capability following disconnection of external supply; and
 - operation at zero export while disconnected from the main network for at least 15 minutes for at least 15 minutes while supplying own auxiliaries.
- **Part B tests:** Physical testing is required to verify the tendered service can:
 - make ready to connect to the transmission system; and
 - energise at least to its previously de-energised connection point at a voltage NEMMCO determines would be necessary to not exceed network voltage ratings while energising network to establish supply to another generating unit.

NEMMCO may require Part B tests to extend beyond the generating unit’s connection point should there be any reasonable doubt as to the generating unit’s ability to energise circuits at an appropriate voltage towards target generating units and load.

- **Part C tests:** Physical testing is required to:
 - energise and supply a load that is representative of the load that would need to be energised and supplied in the process of starting another generating unit¹⁰; and
 - operate in a stable manner for 30 minutes, to demonstrate ability to adequately control frequency and voltage in a small island.

Primary restart services would be required to undertake Part A, Part B and Part C tests.

Secondary restart services would only be required to undertake Part A and Part B tests.

Meeting Part A and Part B testing requirements of the nature described above would minimise the intrusiveness of testing to network operation, while still ensuring that adequate testing is carried out to verify the capability of a potential *restart service*. Coordination of testing should therefore be significantly less challenging than the originally recommended arrangements.

Failure of any test would not necessarily disqualify a tenderer – tests of the same unit that failed the initial test can be retaken within one month of initial test failure, with a limit of one retest for each Part. Remuneration would only be provided for successful tests.

A1.3.4 'Standard' tendering cycle and contract length / liquidated damages

A1.3.4.1 Contract length

Comments from respondents

- CS Energy expressed concern that the (potentially 6 year) term of primary service contracts created risks should services become uneconomic or are decommissioned.

NEMMCO response

Some of the feedback received by NEMMCO in the early phases of the review was that contract terms were not long enough. For this reason, NEMMCO recommended that longer contract terms would be allowed subject to services reaching threshold levels of dependability and testing. If a prospective service provider was unsure of either availability or reliability of its service in the longer term, the choice to seek only secondary service status (with shorter contract terms) is an option service providers may wish to consider. NEMMCO believes the weight of feedback is in favour of the recommended contract structures and terms.

However, should a service provider be willing to submit to and pass the all the requirements (availability, reliability and testing) for being contracted as a

¹⁰ It would be highly desirable for the load to be at the (remote) end of a transmission line, although NEMMCO would give consideration to accepting a Part C test that energises and supplies a load either near to or inside a generator's connection point.

primary restart service, but was only prepared to be contracted for a limited period, minor changes to the **Draft report** recommendations could facilitate such arrangements. To continue to provide an incentive for prospective service provider to strive for primary status, the *primary service premium* would be incorporated into contract payments, with each contract year attracting a premium of $\frac{1}{4}$ of the full *primary service premium* should that service be contracted. If circumstances require NEMMCO to seek additional flexibility in contracting, NEMMCO may accept an offer from a prospective service provider for shorter term contracting on the same basis. Changes have been made to the Section 2.3.4 of Volume 1 of this **Final report** to reflect the opportunity for shorter term contracting.

A1.3.4.2 Liquidated damages

Comments from respondents

- Stanwell suggested that risks associated with failed testing might expose tenderers to an unknown quantum of liquidated damages.
- NRG expressed concern that the liquidated damage clauses NEMMCO sought to include in contracts would increase pressure on costs structures and, hence, offered prices.

NEMMCO response

It is not the case that a party would be exposed to an unknown quantum of liquidated damages. The **Draft report** stated [at p.34 of Volume 1]:

... the quantum of liquidated damages would be a genuine **pre-estimate** of the damage that may be suffered ... [emphasis added]

That is, liquidated damages would be agreed between the parties before any contract was executed. The fact that failure of any test would not necessarily disqualify a tenderer should further alleviate concerns about the exposure a tenderer may have to liquidated damages.

NEMMCO understands NRG concerns about liquidated damages to be directed towards the uncertainties associated with the need to make arrangements with third parties (TNSPs) to facilitate testing and to install equipment. Given NEMMCO is now recommending a less intrusive form of testing, which is likely to lessen the risks faced by TNSPs if and when facilitating testing, NRG's concern about exposure to liquidated damages should be reduced. Nevertheless, to the extent a party perceives additional risk associated with entering into a contract, it would be legitimate to price-in such risk.

A1.4 Customer specific MW support

Comments from respondents

- Hydro Tasmania, Tasmanian Treasury and Stanwell each expressed support for the concept of customer specific MW support arrangements.

NEMMCO response

[For comment regarding the interface between customer specific MW support arrangements and the NEM restart plan see Section A1.6.]

A1.5 Determination of electrical sub-networks

A1.5.1 Purpose of electrical sub-networks

Comments from respondents

- TransGrid expressed some concern regarding the equity of the recommended arrangements, whereby large well meshed networks could have fewer contracted services than smaller non-meshed networks, and possible inconsistencies between assumed damage levels and sub-network boundary criteria.

NEMMCO response

NEMMCO has clarified the intended interpretation of the sub-network boundary criteria with TransGrid, including that “electrical distance” relates to the physical (km) length of transmission lines. The fact that an area of the transmission network is “highly meshed”, would not necessarily rule out multiple electrical sub-networks being declared within that area. It is understood from further discussion with TransGrid that, provided all criteria are applied jointly, with no one criterion alone determining the outcome, remaining concerns regarding the purpose of electrical sub-networks are substantially eliminated.

A1.5.2 Consultation on sub-network boundaries

Comments from respondents

- Powerlink, Tasmanian Treasury and Stanwell each indicated the process recommended by NEMMCO to establish sub-network boundaries – boundaries determined by NEMMCO in consultation with *Jurisdictional Co-ordinators* and TNSPs – was appropriate.
- Tasmanian Treasury and ESIPC each indicated that specific locational factors must be taken into account when determining sub-network boundaries.
- Tarong Energy, Stanwell and Snowy Hydro each expressed a belief that prospective service providers should be consulted on proposed sub-network boundaries.

NEMMCO response

As far as NEMMCO is able to establish, the nature of the criteria recommended to be used in the establishment sub-network boundaries are supported. The 1000 MW peak load threshold was intended to be indicative only, and whether or not that proves to be a defining factor would be determined through the recommended consultative process between NEMMCO, *Jurisdictional Co-ordinators* and TNSPs. Similarly, other specific locational factors make it impossible to be definitive regarding sub-network boundaries without first having conducted the recommended consultation.

As indicated in the **Draft report** [p.17 of Volume 2]:

NEMMCO considers it important that there can be no perception that commercial self interest has influenced the determination of such boundaries.

If market participants were involved in the evaluation process there would always be a risk of the process being (perceived to have been) influenced by commercial self interest. Determination of sub-networks should be a matter entirely for NEMMCO as the party responsible for procuring *restart services*, in consultation with TNSPs and Jurisdictional Coordinators. NEMMCO would nevertheless seek to ensure interested parties were appraised of changes in electrical sub-network boundaries as early as possible to ensure maximum opportunity for prospective services providers to develop proposals.

A1.6 Restart plans and procedures

Comments from respondents

- Both Powerlink and Stanwell indicated a desire that the priority of the NEMMCO restart plan be clarified vis a vis customer specific MW support arrangements.
- Tomago Aluminium expressed a desire to be involved in the process to establish the NEM restart plan.

NEMMCO response

In referring to the relative priorities of the NEM system restart plan and customer specific MW support arrangements, discussion has been changed such that the **Final report** now indicates [see Section 2.6 on Volume 1]:

If any conflict arises between deployment of the NEM *system restart plan* and deployment of 'off-market' *customer specific MW support* due to the specific circumstances of a *black system* condition, deployment of the NEM *system restart plan* **will** take priority. [Emphasis added.]

NEMMCO is of the view that effective system restoration plans and procedures can be developed, and all stakeholders kept appropriately informed, via the following process:

- NEMMCO to liaise directly with all TNSPs and generators;
- TNSPs to liaise directly with DNSPs and customers connected to their transmission network¹¹. TNSPs to also liaise with generators regarding connection point characteristics and the nature of switching that may need to be conducted during the process of system restoration; and
- DNSPs to liaise directly with parties connected to their distribution network.

Each party should have the responsibility to ensure they establish and maintain effective lines of communication that facilitate exchange of all information relevant to their participation in any system restoration process. Communication processes of this nature are consistent with the way the

¹¹ The objective of TNSP liaison with DNSPs and customers is to ensure all parties understand the nature of connection point characteristics and capabilities, as well as the size and nature of critical loads. As NSPs will be undertaking physical switching in response to NEMMCO instructions it is vital that likely responses to, and impact of, possible switching combinations is well understood.

operation of an actual system restoration would be coordinated. NEMMCO intends to Codify obligations along these lines.

Local black system procedures (LBSPs) will be the formal mechanism by which NEMMCO will be apprised of stakeholders' ability to support a NEM restart plan. The Code will require NEMMCO to develop a NEM restart plan¹². As network topology and contracted restart service providers change, restart plans and procedures may also change. Consequently, development of restart plans and procedures may be a continuously evolving process as relevant information is exchanged. Through this process, it may be legitimate for NEMMCO to provide a level of detail regarding how quickly a given generator or customer would be expected to have supply restored should a black system event occur and provided all infrastructure remains undamaged and available for service.

As indicated in the **Draft report**, all LBSPs will be subject to approval by NEMMCO as conforming with the guidelines for preparation of LBSPs. Preparation of 'NEMMCO approved' LBSPs by TNSPs, DNSPs, MNSPs and generators will be a Code requirement¹³. The nature of the guidelines for preparation of LBSPs would not be codified, although the guidelines would be subject to industry consultation.

A1.7 Administrative and operational issues

A1.7.1 Payments for restart services and contractual conditions

Comments from respondents

- Stanwell indicated disappointment that causer pays penalties that might apply during restart service testing were not reviewed. Stanwell disagrees with NEMMCO's payment "claw back" proposal on the basis that failure of a required test mid-way through a contract period is not necessarily indicative of a unit's expected performance.
- Snowy Hydro disagrees with the proposal to remunerate primary service providers with a primary service premium paid at a fixed amount suggesting that the premium should be paid as a percentage of the tendered price.
- MacGen expressed disappointment that its proposal to provide a separate fund to reward any participant that contributed successfully to system restoration appeared to have been ignored by NEMMCO.

NEMMCO response

To the extent that prospective service providers face additional risks or costs in carrying out the requirements for being contracted as a restart service, it would be legitimate to price such risks into tendered prices. Exposure to

¹² NEMMCO already prepares a restart plan, although the requirement to do so is not currently codified.

¹³ Existing arrangements do not require TNSPs and DNSPs to prepare *local black system procedures*.

FCAS causer pays penalties during testing is one such expense that NEMMCO would expect to be priced-in.

In discussion subsequent to receipt of written submissions, NEMMCO established Stanwell's concern regarding the "claw back" proposals to relate to risks arising from failure of required tests and the prospect of immediate disqualification from further consideration as a tenderer. Given there will be an opportunity to repeat a test, should the initial test fail, concern regarding "claw back" should be diminished.

As indicated in the **Draft report** [on p.49 of Volume 1]:

NEMMCO is of the view that the premium should be determined as an absolute amount rather than as a percentage of tendered price. Such an approach is less likely to encourage padding of initially tendered prices.

Given the premium would be remuneration in addition to tendered (agreed) prices¹⁴, and represents a payment providing an incentive to strive for higher levels of service, NEMMCO remains of the view that it is appropriate for the premium should be determined as an absolute amount rather than as a percentage of tendered price.

NEMMCO also notes the criticism from MacGen for failing to explicitly respond to their proposal to provide a separate fund to reward any participant that contributed successfully to system restoration. As subsequently discussed with MacGen, this matter was nevertheless considered in some detail prior to releasing the **Draft report**. NEMMCO is of the view that generators are unlikely to maintain (additional) *black start capability* on the off-chance that they could share in the proceeds of such a fund. Such an arrangement would also necessitate the direct involvement of jurisdictions in the process – as previously discussed, interest in such involvement has not been communicated by jurisdictions to NEMMCO. The arrangement would also tie up substantial amounts of Market Participants' capital in perpetuity.

Existing powers of direction and attendant remuneration guidelines are considered sufficient to ensure both contracted and non-contracted *restart services* would be appropriately remunerated should they ever be called upon to assist with system restoration. This point was accepted by MacGen as reasonable during discussions subsequent to receipt of written submissions.

A1.7.2 Ensuring reasonable terms and conditions for all parties

Comments from respondents

- CS Energy suggested that during good faith negotiations participants must have the right to maintain their original offer or withdraw it.
- MacGen and Snowy Hydro each expressed opposition to the recommendations regarding "good faith negotiations", each suggesting they are unable to comment on the proposal given the absence of adequate opportunity to examine the detail behind the guidelines.

¹⁴ Noting that tendered prices should also represent reasonable terms and conditions from the perspective of both the service provider and the market (on whose behalf NEMMCO is procuring the services).

- MacGen expressed a view that an independent third party should be responsible for undertaking negotiations if there is reason to believe the tendered price is substantially above efficient costs or that the terms are unreasonable.
- ESIPC suggested that economic efficiency objective outlined as one of the principles NEMMCO must follow in ensuring reasonable terms and conditions, should be subservient to relevant jurisdictional acts and laws where they exist.

NEMMCO response

NEMMCO is not aware of anything in these recommendations that would prevent offers from being withdrawn at any stage up to the point of a determination through the independently facilitated process – this has been made clear in Section 2.7.2 of Volume 1 of this Final report.

However, NEMMCO has an obligation to the market to ensure contracts entered into (on behalf of the market) do not reflect unreasonable terms and conditions. Likewise, NEMMCO would not expect a service provider to accept terms and conditions that were demonstrably unreasonable for the service provider. The fact that good faith negotiations may have been triggered does not rule out agreeing on terms and conditions very similar to those initially tendered. Provided the tenderer is able to satisfy NEMMCO that the tenderer's circumstances (cost and risk structures) are such that the terms and conditions offered are actually reasonable, the tendered price might end up being accepted.

The process of “good faith negotiations” at NEMMCO’s discretion already exists in the Code as part of Clause 3.11.5(d) and (d1). NEMMCO is merely proposing:

- an alternative to the trigger in Clause 3.11.5(d1) for the negotiations; and
- guiding principles regarding expected outcomes from such negotiations an effort to give some definition to the existing terms:
 - “minimise the overall cost of supply”;
 - “appropriately remunerate”; and
 - “reasonable terms and conditions”.

The principles outlined by NEMMCO were supported by a detailed paper (published in conjunction with the **Draft report**) prepared on NEMMCO’s behalf by an independent economic consultant¹⁵. Note that this was directly in line with MacGen’s comments on the initial **Proposal**, where MacGen suggested “NEMMCO should clarify the meaning of reasonable terms and conditions as part of the changes to support the new arrangements”.

¹⁵ The Allen Consulting Group, **Guidelines for dealing with non-competitive tenders for System Restart Ancillary Services in the NEM**, March 2004. This paper is available from <http://www.nemmco.com.au>.

Should negotiations fail to reach agreement on reasonable terms and conditions, the recommended arrangements would provide for the matter to be referred by either party to an independently facilitated process where, again, the provider has the option to withdraw at any time up to the point prior to a determination being made.

NEMMCO is recommending that the guiding principles as outlined by in the **Draft report** be Codified. Consistent with existing arrangements, any Code changes necessary to support the recommendations from this review would be subject to separate consultation.

NEMMCO is aware of its responsibility to act in accordance with relevant state and Commonwealth laws as well as the National Electricity Code. Efficient outcomes would not be pursued at the expense of contravening relevant law.

A1.7.3 Recovery and discovery of system restart costs

Comments from respondents

- Edison Mission proposes an alternative model focussing on the principle of “beneficiary pays” to that recommended by NEMMCO as the basis for allocating restart service costs between generators and market customers.
- MacGen expressed disappointment that NEMMCO has not recommended changes in the balance of the SRAS costs allocations between generators and customers.

NEMMCO response

NEMMCO is of the view that the alternative model proposed by Edison Mission is not consistent with the Code requirements regarding the cost allocation mechanism for ancillary services. The Edison Mission proposition is based on a presumption that “beneficiary pays” is a principle relevant to determining the appropriate allocation of ancillary service costs¹⁶. As indicated in the **Draft report** [p.52 of Volume 1, emphasis added] and again in this **Final report**:

there is no compelling reason to apply the beneficiary pays principle (as compared to other pricing principles) to the allocation of SRAS costs. In fact, it should be noted that Clause 3.1.4(a)(8) of the Code states:

where arrangements require participants to pay a proportion of NEMMCO costs for *ancillary services*, **charges should where possible be allocated to provide incentives to lower overall costs of the national electricity market**. Costs unable to be reasonably allocated this way should be apportioned as broadly as possible whilst minimising distortions to production, consumption and investment decisions

¹⁶ Edison Mission also asserts that NEMMCO relied on the “beneficiary pays” principle in the recent participant fee determination. The guiding principle in determining participant fees was actually “reflective of involvement”, not “beneficiary pays”.

That is, the relevant governing clause of the Code makes no reference to ‘beneficiary pays’ as a principle to be considered in determining the allocation of SRAS costs.

In NEMMCO’s view, a 50:50 allocation of SRAS costs between generators and market customers is consistent with the Code’s suggestion that “*charges should where possible be allocated to provide incentives to lower overall costs of the national electricity market*”.

A1.7.4 Prices under black system – incentive to make generation available

Comments from respondents

- CS Energy believes that if a sub-network collapses to a black system condition then the market should be suspended.

NEMMCO response

The thresholds for declaring black system conditions and market suspension was the subject of a separate consultation process¹⁷ that established a threshold for declaration of *black system* conditions and market suspension. In discussion with CS Energy subsequent to receipt of written submissions it was noted by NEMMCO that there is probably no “correct” threshold that could be determined such that all parties would agree. However, it might be agreed, for example, that 1% loss of supply (to a region or sub-network) is not sufficient reason to declare a *black system* condition and suspend the market. It might also be agreed that to wait for 99% loss of supply to declare a *black system* condition and suspend the market is to leave it too late. But what is the “correct” answer between these extremes? It is probable that wherever the threshold is set there would be windfall losses and windfall gains experienced.

In the absence of an alternative that can be demonstrated to be “less wrong” than the existing threshold, NEMMCO is not inclined to recommend this issue be revisited.

A1.8 NEMMCO’s responsiveness to consultation submissions

Comments from respondents

- MacGen indicated that NEMMCO:
 - is diligent at ensuring that participants have the opportunity to comment publicly on each market development proposal;
 - provides some, albeit limited, explanation of its reasons for not incorporating proposals or suggestions from market participants;
 - seems treat consultation as all about process and not about effective involvement of the market.

¹⁷ See NEMMCO, **Power system emergencies, black system conditions and market suspension – Final report**, August 2003. This paper is available from <http://www.nemmco.com.au>.

NEMMCO response

NEMMCO believes that it has been very responsive to suggestions received in written submissions and subsequent meetings with participants, including MacGen, that would lead to improvement in the set of recommendations made by NEMMCO for future system restart arrangements.

At each stage of the consultation NEMMCO has been careful to ensure it properly understands the issues raised by interested parties and that an appropriate response to that issue is made. Appendix 2 of the **Draft report** listed several changes that were made as a direct result of stakeholder comment on the initial **Proposal**. Appendix 2 of this **Final report** lists further changes made as a result of stakeholder comment on the **Draft report**. The reasons for making the changes have been carefully documented in Appendix 1 in each of the **Draft report** and **Final report** respectively. Where NEMMCO takes a contrary view to that expressed by an interested party, effort is made to communicate why such a view is taken and to acknowledge that agreement on some matters has not been reached.

Appendix 2 Summary of changes to recommended arrangements

The following represents a high level summary of the key amendments to the **Draft report** as published by NEMMCO in April 2004 that have been made following consideration of respondent comment on that **Draft report**.

Parties should not rely on the following list as an exhaustive representation of all changes made. Key amendments are:

- Refinement of the 98% availability requirement for *primary restart services* [Section 2.2].
- Criteria for procurement now reflect a preference for contracting with *restart services* that contribute to faster restoration of customer supply capability [Section 2.2].
- Clarification that *restart services* are not necessarily restricted to transmission network connected generators – restart sources could be connected to the distribution network.
- A requirement for tenderers to provide data, models and parameters of relevant plant, sufficient to facilitate thorough assessment of the network impacts and power station impacts of the use of the tendered service [Section 2.3.2].
- Physical testing requirements of prospective *restart services* has been respecified such that it can now largely be conducted inside a generator's connection point. Modified Part B testing now required to be undertaken by secondary service providers [Section 2.3.3].
- Clarification that failure of any test would not necessarily disqualify a tenderer – tests could be retaken within one month of initial test failure, with a limit of one retest for each test Part [Section 2.3.3].
- *Primary restart service* providers can be contracted for less than a 4 year term, with each contract year attracting a premium of $\frac{1}{4}$ of the full *primary service premium* [Section 2.3.4].
- Clarification of the criteria for determination of *electrical sub-network* boundaries [Section 2.5].
- Clarification of communication responsibilities of NEMMCO, TNSPs and DNSPs in (preparation for) *black system* conditions [Section 2.6].
- Reflecting service availability in remuneration of secondary services and refinement of "claw back" provisions [Section 2.7.1].
- Clarification that, a tenderer would be able to withdraw its offer to provide *restart services* at any time prior to execution of a contract [Section 2.7.2].

Appendix 3 Code clauses relevant to system restart arrangements

The following material is a collation of existing provisions of the National electricity Code that relate to system restart.

Chapter 3

3.1.4 Market design principles

...

(a1) *NEMMCO* must review, prepare and *publish* a report on:

- (1) a long term strategy for the provision of *system restart* services, taking into account:
 - (i) the need to ensure sufficient *system restart* services to restore normal *power system* operation within a reasonable time period;
 - (ii) the desirability of acquiring supplementary *system restart capability* on a competitive basis to reduce the time required to resupply *loads* where benefits outweigh the costs; and
 - (iii) options, including *embedded generation*, that could be developed over a 3 year period to provide *system restart capability*; and ...

...

(a2) In conducting the reviews under clause 3.1.4(a1), *NEMMCO* must:

- (1) seek and take account of the opinion of the *Reliability Panel* on matters to be considered in, and the draft conclusions of, the review set out in clause 3.1.4(a1)(1);
- ...
- (5) use the *Code consultation procedures* in conducting each review;
 - (6) *publish* a review outline and indicative timelines at the commencement of each review;
 - (7) complete each review and deliver to *NECA* a report of the findings and recommendations of the review within 12 months of the commencement of the review; and
 - (8) deliver to *NECA* within 3 months of the conclusion of each review any proposed *Code* changes required to implement the recommendations of the review.

3.11.3 Procedure for determining quantities of non-market ancillary services

- (a) *NEMMCO* must develop and *publish* a detailed description of each *non-market ancillary service*.
- (b) *NEMMCO* must develop and *publish* a procedure for determining the quantity of each kind of *non-market ancillary service* required for *NEMMCO*:
 - (1) to achieve the *power system security and reliability standards*; and
 - (2) where practicable to enhance *network* transfer capability whilst still maintaining a *secure operating state* when, in *NEMMCO's* reasonable opinion, the resultant expected increase in *non-market ancillary service* costs will not exceed the resultant expected increase in benefits of trade from the *spot market*.
- (c) *NEMMCO* may amend the description developed under this clause 3.11.3, from time to time.
- (d) *NEMMCO* must comply with the *Code consultation procedures* when making or amending descriptions or procedures under this clause 3.11.3.

3.11.4 Acquisition of non-market ancillary services

- (a) *NEMMCO* must use reasonable endeavours to acquire the following *non-market ancillary services* in accordance with the remaining provisions of this clause 3.11:
 - (1) *NCAS*; and
 - (2) *system restart*.
- (b) The requirements for services to give *NEMMCO* the capability to do the things referred to it in clause 3.11.4(a) are to be met in the following ways:
 - (1) by *NEMMCO* setting minimum standards which are to be dealt with in *Code Participants' connection agreements* for technical performance service; or
 - (2) by *NEMMCO* acquiring *ancillary services* in accordance with this clause 3.11 or giving a direction in accordance with clause 4.8.9A.
- (c) *NEMMCO* must make and publish a set of minimum technical ancillary service standards that must be met by all Code Participants who have entered into a connection agreement.
- (d) *NEMMCO* may amend the *minimum technical ancillary service standards* from time to time.
- (e) *NEMMCO* must comply with the *Code consultation procedures* when making or amending the *minimum technical ancillary service standards*.

- (f) In setting or amending *minimum technical ancillary service standards*, NEMMCO must:
 - (1) take into account the provisions of *connection agreements* existing at the time of setting or amending such standards;
 - (2) ensure that proposed *minimum technical ancillary service standards* do not impose more onerous material obligations on parties to existing *connection agreements*, as a whole, than are imposed by such existing *connection agreements*;
 - (3) take into account and minimise the additional costs overall that may arise from proposed *minimum technical ancillary service standards* for parties to existing *connection agreements*, as a whole; and
 - (4) take into account the obligations imposed on parties to *connection agreements* by Chapter 5 of the *Code* and any *derogation* thereto.
- (g) The *minimum technical ancillary service standards* are not intended to, nor are to be read or construed as having the effect of:
 - (1) altering any term of a *connection agreement*;
 - (2) altering the contractual rights or obligations of any of the parties under the *connection agreement* as between those parties; or
 - (3) relieving the parties under any such *connection agreements* of their contractual obligations under such agreement or obligations under Chapter 5 of this *Code*.
- (h) An amendment to the *minimum technical ancillary service standards* must not take effect until at least 30 days after the publication of the report required under the *Code consultation procedures* in 3.11.4(e).
- (i) NEMMCO is not responsible for payment to a *Code Participant* for services which must be provided by that *Code Participant* under a *connection agreement* or under clause 4.9.2(b).
- (j) A *Network Service Provider* must advise NEMMCO of all *ancillary services* or similar services to be provided by a *Code Participant* under a *connection agreement* to which it is a party.
- (k) NEMMCO may instruct a *Code Participant* to provide a service agreed to be provided under a *connection agreement* of a kind described in paragraph (b) and any *Code Participant* so instructed must use reasonable endeavours to comply with any such instruction.

3.11.5 Tender process for non-market ancillary services

- (a) Except as provided in clause 4.8.9A, if NEMMCO wishes to acquire a *non-market ancillary service*, then NEMMCO must call for offers from persons who are in a position to provide the *non-market ancillary service*

so as to have the required effect at a connection to a *transmission network* in an invitation to tender.

- (b) A *Code Participant* is not under any obligation to submit an offer in response to a call for offers under this clause 3.11.5.
- (c) *NEMMCO* is not under any obligation to accept an offer in response to a call for offers under this clause 3.11.5.
- (d) Where a *Code Participant* submits an offer in response to a call for offers under this clause 3.11.5 and *NEMMCO* wishes to negotiate an aspect of that offer, then *NEMMCO* and the *Code Participant* must negotiate in good faith concerning that aspect.
- (d1) In assessing any offers submitted in response to a call for offers under this clause 3.11.5, *NEMMCO* must seek to acquire the quantity of the relevant kind of *non-market ancillary service* determined in accordance with clause 3.11.3 by competitive tender in accordance with this paragraph (d1). A tender will be deemed to be a competitive tender for a particular *non-market ancillary service* if the required quantity of that *non-market ancillary service* determined in accordance with clause 3.11.3 can be supplied from the conforming offers received by *NEMMCO* with any one conforming offer discarded or all conforming offers from any one party discarded. If a tender process is not deemed to be a competitive tender for a particular *non-market ancillary service*, then *NEMMCO* and those *Code Participants* that submitted conforming and non-conforming tenders selected by *NEMMCO*, must negotiate in good faith to agree reasonable terms and conditions for the supply of the relevant kind of *non-market ancillary service*, taking into account the need to:
 - (1) subject to paragraph (2), so far as practicable minimise the overall cost of supply of those *non-market ancillary service*; and
 - (2) appropriately remunerate the providers of the relevant *non-market ancillary service* for that service.
- (d2) If *NEMMCO* and the *Code Participants* selected by *NEMMCO* cannot agree on the terms and conditions for the supply of *non-market ancillary service* after 21 business days from delivery to the *Code Participant* of a written notice to negotiate, then either *NEMMCO* or the *Code Participant* may refer the matter to an *Adviser* for the determination of a dispute as to those terms and conditions in accordance with clause 8.2.
- (e) Subject to clause 3.11.5(f), *NEMMCO* must not acquire *non-market ancillary services* from any person who is not a *Code Participant*.
- (f) *NEMMCO* may enter into an agreement to acquire *non-market ancillary services* with a person who is not a *Code Participant* if that agreement includes a condition for the benefit of *NEMMCO* that no *ancillary*

services will be provided under the agreement until that person becomes a *Code Participant*.

- (g) If *NEMMCO* calls for offers under clause 3.11.5(a) in respect of a kind of *non-market ancillary service*, then *NEMMCO* must notify *Code Participants* when it believes that it has available, under *ancillary services agreements*, a sufficient quantity of that kind of *non-market ancillary service* (as determined by applying the procedure developed under clause 3.11.3).
- (h) Within 5 business days of *NEMMCO* giving a notice under clause 3.11.5(g), *NEMMCO* must publish the total quantity of each kind of *non-market ancillary service* acquired by *NEMMCO* pursuant to *ancillary service agreements* under this clause 3.11.5.

3.14.3 Conditions for suspension of the spot market

- (a) Subject to clause 3.14.3(b), *NEMMCO* may declare the *spot market* to be suspended in a *region* when in respect of that *region*:
 - (1) the *power system* has collapsed to a *black system*;

3.15.6A Ancillary service transactions

...

- (d) In each *trading interval*, in relation to each *Market Generator*, an ancillary services transaction occurs, which results in a *trading amount* determined in accordance with the following formula:

$$TA = \frac{TSRP}{2} \times \frac{TGE}{ATGE} \times I$$

where:

- TA (in \$) = the *trading amount* to be determined (which is a negative number);
- TSRP (in \$) = the total of all amounts payable by *NEMMCO* in respect of the *trading interval* under *ancillary services agreements* in respect of the provision of *system restart*;
- TGE (in MWh) = the *generator energy* for the *Market Generator* for the *trading interval*;
and

ATGE (in MWh) = the aggregate of the *generator energy* figures for all *Market Generators* for the *trading interval*.

- (e) In each *trading interval*, in relation to each *Market Customer*, an ancillary services transaction occurs, which results in a *trading amount* determined in accordance with the following formula:

$$TA = \frac{TSRP}{2} \times \frac{TCE}{ATCE} \times x - 1$$

where:

TA (in \$) = the *trading amount* to be determined (which is a negative number);

TSRP (in \$) = has the meaning given in paragraph (d);

TCE (in MWh) = the *customer energy* for the *Market Customer* for the *trading interval*; and

ATCE (in MWh) = the aggregate of the *customer energy* figures for all *Market Customer* for the *trading interval*.

Chapter 4

4.2.6 General principles for maintaining power system security

The power system security principles are as follows:

...

- (e) Sufficient *black start-up facilities* should be available so as to allow the restoration of *power system security* and any necessary restarting of *generating units* following a *black system* condition.

4.3.1 Responsibility of NEMMCO for power system security

The *NEMMCO power system security responsibilities* are:

...

- (p) to procure adequate *system restart ancillary services* in accordance with clause 3.11 to enable *NEMMCO* to co-ordinate the response to a partial or total *black system* condition;

4.3.4 Network Service Providers

- (a) Each *Network Service Provider* must use reasonable endeavours to exercise its rights and obligations in relation to its *networks* so as to co-operate with and assist *NEMMCO* in the proper discharge of the *NEMMCO power system security responsibilities*.

4.8.3 NEMMCO's advice on power system emergency conditions

- (a) *NEMMCO* must *publish* all relevant details promptly after *NEMMCO* becomes aware of any circumstance with respect to the *power system* which, in the reasonable opinion of *NEMMCO*, could be expected to materially adversely affect *supply* to or from *Code Participants*.
- (b) Without limitation, such circumstances may include:
 - ...
 - (3) a *black system* condition.

4.8.12 Local black system procedures

- (a) Each *Generator* and *Market Network Service Provider* must develop draft *local black system procedures* for each of its *power stations* and each of its *network elements* which contribute to the provision of *market network services* and must submit those procedures for approval by *NEMMCO*.
- (b) *NEMMCO* may request amendments to draft *local black system procedures* or any proposed changes as *NEMMCO* reasonably considers necessary by notice in writing to a *Generator* or *Market Network Service Provider*.

4.8.13 Testing of black start-up facilities and local black system procedures

- (a) Each *Generator* providing *black start-up facilities* must arrange for the testing of:
 - (1) its *black start-up facilities* which are the subject of an *ancillary services agreement*; and
 - (2) the approved *local black system procedures*, to be carried out in accordance with *NEMMCO's* reasonable requirements at intervals nominated by *NEMMCO*, not exceeding 12 months to demonstrate that:

- (3) each of the *black start-up facilities* is capable of start-up from a condition where it is *disconnected* from external power supplies; and
 - (4) the arranged *black start-up facilities* can actually start up the nominated *generating units* without assistance from the *power system*.
- (b) Each *Generator* providing *black start-up facilities* must ensure that the *auxiliary plant* associated with those *black start-up facilities* is fully tested at intervals not exceeding three months.

4.8.14 **Black system start-up**¹⁸

- (a) *NEMMCO* must advise a *Code Participant* if, in *NEMMCO's* reasonable opinion, there is a *black system* condition which is affecting, or which may affect, that *Code Participant*.
- (b) If a *Generator* or *Market Network Service Provider* is bound to provide *system restart* to *NEMMCO* under an *ancillary services agreement*, then the *local black system procedures* for that *Generator* or *Market Network Service Provider* must be consistent with that *ancillary services agreement*.
- (c) *NEMMCO* may by notice in writing to the relevant *Generator* or *Market Network Service Provider* require such amendments to the *local black system procedures* for a *Generator* or *Market Network Service Provider* which, in its reasonable opinion, are needed for consistency with:
 - (1) actual *power system* requirements; or
 - (2) if the *Generator* or *Market Network Service Provider* is providing *system restart* under an *ancillary services agreement*, the relevant *ancillary services agreement*.¹⁹
- (d) If *NEMMCO* advises a *Generator* or *Market Network Service Provider* of a *black system* condition, and/or if the terms of the relevant *local black system procedures* require the *Generator* or *Market Network Service Provider* to take action, then the *Generator* or *Market Network Service Provider* must comply with the requirements of the *local black system procedures*.

¹⁸ Sub-clauses (b) and (c) may be better placed under 4.8.12 as these sub-clauses relate fundamentally to *local black system procedures*.

¹⁹ This sub-clause may be redundant, as it is covered under (b) above and/or 4.8.12(b).

- (e) If there is a *black system* condition, then a *Market Customer* must comply with *NEMMCO's* instructions with respect to the timing and magnitude of *load* restoration.

Chapter 5

5.7.5 **Testing by code participants of their own plant requiring changes to normal operation**

- (a) A *Code Participant* proposing to conduct a test on equipment related to a *connection point*, which requires a change to the normal operation of that equipment, must give notice in writing to the relevant *Network Service Provider* of at least 15 *business days* except in an emergency.
- (b) The notice to be provided under clause 5.7.5(a) is to include:
 - (1) the nature of the proposed test;
 - (2) the estimated start and finish time for the proposed test;
 - (3) the identity of the equipment to be tested;
 - (4) the *power system* conditions required for the conduct of the proposed test;
 - (5) details of any potential adverse consequences of the proposed test on the equipment to be tested;
 - (6) details of any potential adverse consequences of the proposed test on the *power system*; and
 - (7) the name of the person responsible for the co-ordination of the proposed test on behalf of the *Code Participant*.
- (c) The *Network Service Provider* must review the proposed test described in a notice provided under clause 5.7.5(a) to determine whether the test:
 - (1) could adversely affect the normal operation of the *power system*;
 - (2) could cause a threat to *power system security*;
 - (3) requires the *power system* to be operated in a particular way which differs from the way in which the *power system* is normally operated; or
 - (4) could affect the normal *metering* of *energy* at a *connection point*.
- (d) If the *Network Service Provider* determines that the proposed test does fulfil one of the conditions specified in clause 5.7.5(c), then the *Code Participant* and *Network Service Provider* must seek *NEMMCO's* approval prior to undertaking the test, which approval must not be unreasonably withheld or delayed.

- (e) If, in *NEMMCO's* reasonable opinion, a test could threaten public safety, damage or threaten to damage equipment or adversely affect the operation of the *power system*, *NEMMCO* may direct that the proposed test procedure be modified or that the test not be conducted at the time proposed.
- (f) *NEMMCO* must advise *Network Service Providers* of any test which may have a possible effect on normal *metering of energy* at a *connection point*.
- (g) *NEMMCO* must advise any other *Code Participants* who might be adversely affected by a proposed test and consider any reasonable requirements of those *Code Participants* when approving the proposed test.
- (h) The *Code Participant* who conducts a test under this clause 5.7.5 must ensure that the person responsible for the co-ordination of a test promptly advises *NEMMCO* when the test is complete.
- (i) If *NEMMCO* approves a proposed test, *NEMMCO* must use its reasonable endeavours to ensure that *power system* conditions reasonably required for that test are provided as close as is reasonably practicable to the proposed start time of the test and continue for the proposed duration of the test.
- (j) Within a reasonable period after any such test has been conducted, the *Code Participant* who has conducted a test under this clause 5.7.5 must provide the *Network Service Provider* with a report in relation to that test including test results where appropriate.

Chapter 10 (Glossary)

black start capability

1. In relation to a *generating unit*, the ability to start and *synchronise* without using supply from the *power system*.
2. In relation to a *market network service*, the ability to assist in utilising the *black start capability* of one or more *generating units* to restore normal *power system* operation from a *black system* condition.

black start-up facilities

The *facilities* described as such in clause 4.8.11.

[NOTE: clause 4.8.11 has been deleted from the Code, leaving this definition apparently stranded.]

black system

The absence of *voltage* on all or a significant part of the *transmission system* or within a *region* following a major *supply* disruption, affecting one or more *power stations* and a significant number of customers.

local black system procedures

The procedures, described under clause 4.8.12 applicable to a *local area* as approved by *NEMMCO* from time to time.

power system security and reliability standards

The standards governing *power system security* and *reliability* of the *power system* to be approved by the *Reliability Panel* on the advice of *NEMMCO*, which may include but are not limited to standards for the *frequency* of the *power system* in operation, *contingency capacity reserves* (including guidelines for assessing requirements and utilisation), *short term capacity reserves*, *medium term capacity reserves* and *system restart*.

system restart

In respect of a *generating unit*, means the service of generating in order to assist other *generating units* to start during a *black system* condition.

Appendix 4 Existing sub-network maximum demands

The 2003 non-market ancillary services ITT process focussed on procurement of SRAS for the following *electrical sub-networks*:

- North Queensland;
- Central Queensland;
- South Queensland;
- New South Wales;
- Snowy;
- Victoria; and
- South Australia.

With the exception of the Queensland sub-networks, all other sub-networks are currently defined by region boundaries.

Table 1: Maximum demand by network area for 2002-03 ^a

Network Area	MW
Queensland (summer peak)	6 402
North (summer peak)	1 101 ^b
Central (summer peak)	1 474 ^c
South (summer peak)	3 948 ^d
New South Wales (summer peak)	12 456
Victoria (summer peak)	8 202
South Australia (summer peak)	2 788
Tasmania (2002 winter peak)	1 601

- a. Sourced from NEMMCO, *2003 Statement of Opportunities* (Chapter 2) except where otherwise indicated. Maximum demand for the Snowy region is not reported in the SOO – considered negligible for planning purposes.
- b. Approximation based on aggregation of peaks for included zones. 'North Queensland' defined as Powerlink Queensland zones: Far North; Ross; and North. Data source: Powerlink Queensland *Annual Planning Report 2003*.
- c. Approximation based on aggregation of peaks for included zones. 'Central Queensland' defined as Powerlink Queensland zones: Central West; and Gladstone. Data source: Powerlink Queensland *Annual Planning Report 2003*.
- d. Approximation based on aggregation of peaks for included zones. 'South Queensland' defined as Powerlink Queensland zones: Wide Bay; South West; Moreton North; Moreton South; and Gold Coast / Tweed. Data source: Powerlink Queensland *Annual Planning Report 2003*.

Appendix 5 Technical capabilities, assessment and testing of tendered restart services

A5.1 Technical capabilities for establishing a short list of tenders

Tenderers seeking to provide a *restart service* must satisfy minimum technical and other requirements to achieve the restoration objectives.

The following criteria are established from the technical capabilities required for *restart services* and these criteria will be considered by NEMMCO in the preliminary assessment of tenders:

- tendered plant;
- capability of the tendered plant to start under *black system* conditions;
- time frames to provide each part of the service;
- period for which readiness to provide *restart services* can be maintained following loss of external supplies;
- capability to operate at zero export load;
- capability to close on to a dead bus;
- capability to re-establish and energise sections of the power system;
- network controls and protection review – ensure network controls and protections do not interfere with system restoration;
- proposed target generator;
- proposed circuit path for restoration of target generator;
- capability to operate stably while network switching is performed;
- capability to control network voltage;
- capability to supply load blocks;
- potential to restart other generating units (ideally this would be the target generating units);
- capability to control network frequency;
- location (geographical and electrical) of the tendered plant;
- availability of the tendered plant;
- performance history, where applicable, of operation during *black system* conditions;
- restrictions and limitations of the tendered plant;
- the extent of work required to provide the required capabilities;

- the testing program;
- the scope for testing the capabilities to provide *restart services*; and
- other relevant criteria.

A5.2 Assessment of service feasibility

NEMMCO would assess whether the plant capability warranted by tenderers matches the technical capabilities set out above.

Where provided, consideration would be given to previously demonstrated tests. Although evidence of service feasibility may be provided, it is not essential at this stage of the assessment.

NEMMCO would assess whether the testing program submitted by each tenderer is adequate to demonstrate the capabilities required of Part A, Part B and Part C tests as described below.

A5.3 Assessment of service viability

NEMMCO intends to conduct studies, including modelling to determine the viability of the tenders. That is, confirmation, in theory, that warranted capabilities are sufficient to deliver effective *restart services* and contribute to the achievement of the *system restart service standard* given their physical location in the network.

A5.4 Physical testing of each category of restart service that is required prior to contract commencement

The objective of testing is to demonstrate the warranted and modelled capabilities. The proposed period for testing is from the end of March to the end of June.

Prior to the commencement of contracts, each *restart service* will be subjected to appropriate testing. The following provides an indication only of the nature of testing that would be considered appropriate.

Primary restart services

Part A tests: Physical testing is required of:

- *black start capability* – that is, to either:
 - start without external supply (meet or exceed test parameters) while disconnected from the main network; or
 - maintain stable generation capability (meet or exceed test parameters) following disconnection of external supply; and
- operation at zero export while disconnected from the main network for at least 15 minutes while supplying own auxiliaries (meet or exceed test parameters).

Part B tests: Physical testing is required to verify the tendered service can:

- make ready to connect to the transmission system; and

- energise at least to its previously de-energised connection point at a voltage NEMMCO determines would be necessary to not exceed network voltage ratings while energising network to establish supply to another generating unit.

NEMMCO may require Part B tests to extend beyond the generating unit's connection point should there be any reasonable doubt as to the generating unit's ability to energise circuits at an appropriate voltage towards target generating units and load.

Part C tests: Physical testing is required to:

- energise and supply a load that is representative of the load that would need to be energised and supplied in the process of starting another generating unit²⁰; and
- operate in a stable manner for 30 minutes, to demonstrate ability to adequately control frequency and voltage in a small island.

Secondary restart services

Physical testing of *secondary restart services* requires the completion of Part A and Part B testing as indicated above for *primary restart services*, but does not require the completion of Part C tests.

²⁰ It would be highly desirable for the load to be at the (remote) end of a transmission line, although NEMMCO would give consideration to accepting a Part C test that energises and supplies a load either near to or inside a generator's connection point.

Appendix 6 Guidelines for restart plans and procedures

In order to support comprehensive and well coordinated restart processes, all parties likely to be involved require a common understanding of their respective obligations and responsibilities. The following provides an indication of the level of detail considered necessary to develop robust plans and procedures.

A6.1 System restart plan

NEMMCO's own *system restart plan* would incorporate the following:

- **staff competency** – ensure staff involved restarting the power system have been sufficiently trained and arrangements have been made to ensure the on-going maintenance of the staff competency;
- **system restart procedures** – develop and maintain a set of robust restart procedures covering the principles and guidelines to restart the power system that can be used independently of the cause of the system shut down;
- **local black start procedures** – ensure *local black system procedures* are consistent with the system restart procedures. In the event of inconsistencies, take prompt action to investigate and align the *local black start procedure* with the system restart procedure;
- **availability of sufficient SRAS** – ensure a sufficient number SRAS acquired for all *electrical sub-networks*, test the SRAS to ensure the reliability of contracted SRAS and make alternate arrangements if a given contracted SRAS will not be available for a considerable time period; and
- **access to additional resource in a black system condition** – ensure arrangements in place to call in additional staff resources to make restart more efficient in the event of *black system* condition.

A6.2 Local black system procedures

Generator and MNSP *local black system procedures* will generally cover (but are not limited to) the following:

- details of any 'off-market' arrangements for provision of customer specific MW support the generator or MNSP might be a party to;
- capability of safely shutting down without external supply and the relevant details (in accordance with Clause S5.2.5.6);
- capability of restarting following restoration of external electricity supply, after being without external supply for two hours (in accordance with Clause S5.2.5.7) and the relevant details;
- capability of the generator to return to service without external supply;
- indicative time to make the generator ready for service after external supply is made available following *black system*;

- sequence of generating unit restoration and the indicative time frames for starting the subsequent generating units after starting the first generator;
- maximum time the generating unit can remain out of service without external supply;
- generator ability to *trip to house load* (TTHL) and the duration the generator able to run on TTHL;
- any relevant technical limitations that may affect the system restart capability of the generator/MNSP;
- minimum load for stable operation;
- maximum load block the generator can accept during the restart process; and
- details of any unique switching requirements to supply station auxiliaries; ability of the generator to connect to a dead bus; requirements (voltage, frequency and angle) for synchronising; voltage control issues such as under excitation etc.

TNSP *local black system procedures* will generally cover (but are not limited to) the following:

- details of any 'off-market' arrangements for provision of customer specific MW support the TNSP might be a party to;
- guidelines to prepare the transmission network to restart the power system;
- guidelines to prepare individual substations to accept supply;
- details of any technical limitations/requirements NEMMCO should be aware of in restarting the transmission system;
- availability of UPS supplies, standby generators and the indicative time periods these supplies can be used;
- locations where staff is required to reset relays etc. as a part of preparing to accept supply;
- details of the synchronising points across the transmission network and the preferred method of synchronising;
- documentation of the key physical characteristics of significant customer loads and the requirements such loads may have in *black system* scenarios;
- methods of emergency communication used by TNSP staff;
- locations of fault recorders/locators; and
- TNSP operating arrangements with DNSPs to liaise the progressive restoration of the power system.

DNSP *local black system procedures* will generally cover (but are not limited to) the following:

- details of any 'off-market' arrangements for provision of customer specific MW support the DNSP might be a party to;
- guidelines to prepare the distribution network for restart;
- arrangements to manage embedded generation;
- locations where staff are required to prepare the network to accept supply;
- details of any technical limitations/requirements NEMMCO/TNSP should be aware of in restarting the distribution network; and
- documentation of the key physical characteristics of significant customer loads and the requirements such loads may have in *black system* scenarios.

Appendix 7 Characteristics of restart service dependability

This Draft report specifically notes a requirement for *primary restart services* to be 'dependable' – that is, technically capable of doing the job, highly available, highly reliable and comprehensively tested. These characteristics are important because stakeholders need to be confident that the *restart service* will work if and when called upon. The distinctions between each of the characteristics of 'capability', 'availability' and 'reliability' and how they might be individually assessed is discussed below.

A7.1 Service capability

The **capability** of individual restart sources to contribute to timely system restoration – on the assumption that the unit is both available and performs as required when called upon – can be objectively assessed through analysis of technical parameters and the time frames required to achieve various start-up benchmarks. Such capability would be demonstrated via modelling and subsequent physical testing as required.

A7.2 Service availability

It is conceded that the concept of **availability** is not necessarily easy to establish *ex ante*, although availability can be unambiguously assessed *ex poste* – there seems little choice, as now, but to accept undertakings as to availability as indicated in tenders and to enforce agreed availability through contracting provisions.

A7.3 Service reliability

Defining **reliability** of *black start capability* is particularly problematic, but potential *restart service* providers could demonstrate claims to having highly reliable *black start capability* by referring to appropriate independently assessed technical data. The only alternative would be to rely on commonly accepted industry benchmarks of reliability for plant of similar technology and condition.

In making a judgement on the reliability of a service, it might be relevant to draw a distinction between likelihood of success:

- under 'test' conditions (where the plant has been carefully prepared in advance of a known trip); and
- under actual *black system* conditions (where it has not been possible to specifically prepare for the event).

Although certain technologies may be more reliable than others as in terms of the probability of successfully delivering a *restart service*, individual non-reliability of a technology may be overcome by grouping the units and offering the collective capability of the units as a *restart service* as the following example is designed to demonstrate.

Individual vs group reliability of a restart service: an example

The notional reliability requirement for a *primary restart service* is, say, 90%²¹ – that is, if subjected to repeated random tests of its restart capability, any given *restart service* would be expected to fail to deliver on less than 10% of the occasions it was called on.

There are two restart technologies, A and B.

- ‘Technology A’ is considered highly reliable, and if subjected to repeated random tests of its restart capability, any given unit would be expected to fail to deliver on less than 10% of the occasions it was called on.
- ‘Technology B’ is considered only moderately reliable and if subjected to repeated random tests of its restart capability, any given unit would be expected to fail to deliver on, say, 50% of the occasions it was called on.

If assessment of the reliability of a *restart services* was on the basis of the likely capability of any individual unit, only ‘technology A’ would be considered worthy of contracting as a *primary restart service*. However, if a group of four ‘technology B’ units could be established and offered collectively as a *restart service*, the probability of all four units failing at the same time is only 6.25% (50% x 50% x 50% x 50%). Hence, a group of four ‘technology B’ units would meet the notional reliability requirement for a *primary restart service* of 90%.

A similar approach to the assessment of reliability of a group of black start capable units could also be adopted in the assessment of the availability of a group of black start capable units.

²¹ This reliability threshold is considered “notional” in the sense that, in the absence of repeated testing under *black system* conditions, the reliability cannot specifically be measured. However, for the purpose of the example it is assumed that measurement of reliability is possible.