

System Management

System Management Ancillary Services Procurement Strategy



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Ancillary Services

The Market Rules define various processes for the provision of Ancillary Services, and make provision for competitive procurement if deemed warranted by System Management. In addition, the Power System Operating Procedure for Ancillary Services provides further guidance for System Management concerning procurement. In the 2008 Ancillary Service Report, System Management foreshadowed the need to seek competitive procurement of certain ancillary services. It was anticipated that the competitive procurement process would potentially commence in 2008/09.

The purpose of this document is to define the requirements of the Ancillary Services procurement process, identify issues requiring resolution, and indicate actions that will be required prior to the commencement of a competitive procurement process.

Section 1 describes obligations of System Management with regard to Ancillary Services, and then the current situation with regard to Ancillary Services is examined. The discussion then proceeds in section 3 to the requirements of future services, and details of a procurement process, while section 4 indicates issues that must be resolved. Finally, in section 5, a monitoring regime for the provision of services is described.

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1 System Management

Western Power is established under section 4(1) (b) of the *Electricity Corporations Act 2005* and has the functions conferred under section 41 of that act.

Part 9 of the *Electricity Industry Act 2004* makes provision for a wholesale electricity market and provides for the establishment of Market Rules.

One of the core functions undertaken by Western Power is the management of the electricity transmission and distribution networks. Regulation 13 of the *Electricity Industry (Wholesale Electricity Market) Regulations 2004* provides that the Market Rules may confer on an entity the function of operating the SWIS in a secure and reliable manner.

Clause 2.2 of the *Wholesale Electricity Market Amending Rules (September 2006)* (**Market Rules**) confers this responsibility upon the segregated ("ringfenced") business unit of Western Power known as System Management. Amongst these responsibilities, the functions of System Management are to:

- procure adequate Ancillary Services where the Electricity Generation Corporation cannot meet the Ancillary Service Requirements;
- carry out any other functions or responsibilities conferred, and perform any obligations imposed, on it under these Market Rules; this includes determining all Ancillary Service Requirements in accordance with the SWIS Operating Standards and the Ancillary Service Standards.

1.1 Ancillary Services Strategy

Clause 3.11.7 of the Market Rules and section 5 of the Power System Operating Procedure: Ancillary Services require that System Management annually prepare an Ancillary Services plan describing how it will ensure that the Ancillary Service Requirements are met. This plan must include:

(a) the Electricity Generation Corporation's Registered Facilities; and

(b) facilities under the control of Rule Participants, where System Management has an Ancillary Services Contract with each of those Rule Participants..

While the Ancillary Services plan was approved on 1 June 2008, System Management believes that further engagement with Participants is required to provide for the future of Ancillary Services. This Strategy attempts to meet that need.

2 Background

In order to understand the context of any procurement process, the type of services and current provision must be described. Current costs are contractually confidential, but aggregate costs for each type of Ancillary Service were published in the 2008 Ancillary Service Report for the period April 2007 to 30 March 2008, and are detailed in Table 1.

Table 1

Ancillary Service	Total Payment (excluding GST)
Load Following	\$1,489,716.23
Spinning Reserve	\$14,277,840.67
Load Rejection	\$0
Dispatch Support	\$0
System Restart	\$247,497.00
TOTAL	\$16,015,053.90

2.1 Types of Ancillary Services

There are several types of Ancillary Services. The main types of Ancillary Services (defined in Market Rule 3.9) are:

- Load Following Service (Minimum Frequency Keeping), which is the service of frequently adjusting the output of one or more Scheduled Generators within a Trading Interval so as to match total system generation to total system load in real time in order to correct any SWIS frequency variations. Note that this document uses the terms "Load Following Service" and "Frequency Keeping Service" (or "Minimum Frequency Keeping Service") interchangeably.
- Spinning Reserve Service, which includes Load Following, is the service of holding capacity associated with a synchronised Scheduled Generator, Dispatchable Load or Interruptible Load in reserve so that the relevant Facility is able to respond appropriately to retard frequency drops following the failure of one or more Registered Facilities and, where provided by Scheduled Generators and Dispatchable Loads, to supply electricity if the alternative is to trigger involuntary load curtailment. The portion of Spinning Reserve which is not Load Following is also known as Contingency Reserve.
- Load Rejection Reserve Service, is the service of holding capacity associated with a Scheduled Generator or Dispatchable Load in reserve so that a Scheduled Generator can reduce output rapidly, or a Dispatchable Load can increase consumption rapidly, in response to a sudden decrease in SWIS load.
- System Restart Service, which is the ability of a Registered Facility which is a generation system to start without requiring energy to be supplied from a Network to assist in the re-energisation of the SWIS in the event of system shut-down.
- Dispatch Support Service, which is any other ancillary service that is needed to maintain Power System Security and Power System Reliability that are not covered by the other Ancillary Service categories.

Spinning Reserve, which does not include Load Following (or Frequency Keeping), is further broken down into several time-periods: 6 seconds, 60 seconds and 6 minutes (MR 3.9.3).

2.2 Current Provision of Ancillary Services

Currently, the only budgeted Ancillary Services are:

- System Restart Service, provided by Verve Energy;
- contracts for Interruptible Loads which form part of Spinning Reserve; and
- Dispatch Support Services provided by Verve Energy (Mungarra, West Kalgoorlie and Geraldton).

All remaining Ancillary Services are provided by Verve Energy as per Market Rule 3.11.7A, and paid via the settlement clauses indicated in the Market Rules.

Load Rejection Reserve is currently provided by Verve Energy. As indicated in Table 1, the current cost to the Market for Verve Energy to provide this service is zero. Load Following Service and Spinning Reserve Service are not budgeted, but rather are paid via the Market at a proportion of the Marginal Cost Administrative Price (MCAP). System Management estimates the Load Following Service and Spinning Reserve Service to be provided each Trading Interval, and dispatches Verve Energy facilities to ensure that a sufficient level of these facilities is available at all times.

The provision of Dispatch Support Services or Load Rejection Services is adequate at this time. However System Management has foreshadowed that the need for Load Rejection Services will be examined in the near future, and in sufficient time for any identified shortfall to be catered for in the allowable revenue for the next Review Period (the next application must be made to the Economic Regulation Authority by 30 November 2009). System Management has identified a need for further System Restart Services and will embark on a competitive procurement for the provision of further System Restart Services in identified sub-networks serving the south metropolitan area and south country area.

The requirement for Spinning Reserve is 240 MW, which includes 60 MW of Load Following. Due to the expected greater penetration of intermittent generation in the next three years, this may well increase up to 120 MW or more.

Of the 180 MW Spinning Reserve that is not Load Following (ie Contingency Reserve), 52 MW is currently provided by Interruptible Loads. This represents an amount contracted for prior to the commencement of the Wholesale Electricity Market and a lengthy contract period remains. Therefore the maximum demand of Contingency Reserve is 128 MW. However, as indicated, System Management expects this requirement to decrease due to the need for additional Load Following Services. It would be imprudent to procure excessive quantities of Contingency Reserve when the need for more dynamic Frequency Keeping Services is expected to significantly increase due to wind farm penetration.

2.3 Competitive Procurement Process

Market Rule 3.11.8 indicates that System Management may enter into an Ancillary Service Contract (for Spinning Reserve and Load Following Services) with a Rule Participant other than the Electricity Generation Corporation where:

- it does not consider that it can meet the Ancillary Service Requirements with the Electricity Generation Corporation's Registered Facilities; or
- the Ancillary Service Contract provides a less expensive alternative to Ancillary Services provided by the Electricity Generation Corporation's Registered Facilities.

Further, Market Rule 3.11.8A provides a more general power for System Management to enter into an Ancillary Service Contract with a rule participant for the provision of Load Rejection Reserve, System Restart or Dispatch Support ancillary services.

System Management continually reviews the provision of Ancillary Services, and, at this time, has determined that the Electricity Generation Corporation (Verve Energy) is meeting the requirements.

Further, System Management is of the view that Verve Energy will always be obliged to provide sufficient Spinning Reserve, and after the total Verve capacity has been reduced for the provision of Ancillary Services, should there be insufficient generation remaining to meet demand, IPP's will be dispatched. Thus as long as Verve has sufficient on-line generation, Verve's facilities will be capable of providing Spinning Reserve. It is System Management's view, as a consequence of this, that competitive procurement of Spinning Reserve can only be sought on the basis that it is provided at a cost lower than that provided by Verve Energy.

Under Market Rule 3.11.9, where System Management intends to enter into an Ancillary Service Contract, it must:

- (a) seek to minimise the cost of scheduling and dispatching facilities to meet the Ancillary Service Requirements in each Trading Interval; and
- (b) give consideration to using a competitive tender process, unless System Management considers that this would not meet the requirements of paragraph (a).

System Management considers that to enter into an Ancillary Service Contract with a Participant other than Verve Energy, it must use a competitive tender process to ensure equity and fairness. Such a process will require considerable effort and the cost will not be insignificant, but it should be recognised that the Power System Operating Procedure: Ancillary Services requires that consideration be given to utilising such a process.

To date, System Management has not tested the market for the competitive provision of ancillary services due to the current lack of clear definition of ancillary service standards, which largely reflects the infancy of the market and the historical position that ancillary services were provided by the integrated Western Power Corporation. These ancillary service standards have been developed, and, as will be discussed, System Management intends to test the market.

It should also be noted that were System Management to enter into an Ancillary Service Contract with a Participant other than Verve Energy, there will be significant ongoing efforts and costs to meet the Ancillary Service Requirements in each Trading Interval. It may be that an automated Dispatch Process, which is to be developed by System Management in 2008/09, would be required, to facilitate dispatch around a resource plan.

The specific requirements of a competitive procurement process will be further discussed in the next section.

3 Procurement of ancillary services

3.1 Services Required

As discussed, System Management has identified a need for further System Restart Services and is arranging an Expression of Interest for the provision of further System Restart Services in identified sub-networks serving the south metropolitan area and south country area.

The current requirement for Load Following Services is 60 MW and un-contracted Contingency Reserve is 128 MW. System Management intends to embark on a competitive procurement process to identify whether these services can be provided as a less expensive alternative to Ancillary Services provided by the Electricity Generation Corporation's Registered Facilities. The process will be staged to ensure that system security is maintained, with each round procuring no more than one-third of the total requirement.

In accordance with the Power System Operating Procedure: Ancillary Services, the procurement process is intended to be two stage, an initial non-binding "expression of interest" process, followed by an invitation to tender. The second stage tender process will obviously be dependent upon the outcome of the first expression of interest process.

3.2 Who can tender

Any Participant, or person able to become a Rule Participant, will be permitted to provide an Expression of Interest.

In order to aid the transparency and acceptance of the procurement process System Management will follow, it is intended to develop and adhere to a "Probity Plan" to govern the procurement. This document will be made public and a probity advisor appointed.

System Management is of the view that the Market Rules do not themselves expressly mandate the exclusion of Verve Energy from the competitive procurement process, but are unclear in their application in this respect. However, System Management cannot readily demonstrate it has sought to minimise costs if it excludes one potential provider. Consequently, it is intended to include the following words within the expression of interest document:

In view of the Wholesale Electricity Market Rules and in particular clause 3.11, System Management is considering whether Verve Energy should or should not be included in any competitive process for procuring spinning reserve and load following ancillary services. System Management invites any rule participant (including Verve Energy) to make submissions on any relevant matter which should be considered by System Management, and the reasons for doing so, when lodging an expression of interest for these ancillary services.

The above inclusion will allow System Management to transparently consider arguments for and against the inclusion of Verve Energy, with the intention of adopting a position consistent with the requirements of the Regulations, the Market Rules and the subordinate Market Procedures.

3.3 Requirements for the provision of services

System Management's requirement for Load Following totals 60 MW, but is made up of various quantities provided at various ramp rates. As a facility with a higher ramp rate is

preferred to a facility with a lower ramp rate, and to ensure that neither Verve Energy nor other Participants are disadvantaged, System Management will set a minimum ramp-rate requirement of +/- 5 MW per minute. This minimum ramp rate is supported by technical analysis undertaken by System Management.

A participant who expresses an interest in providing Contingency Reserve must ensure that the relevant Facility is capable of providing a 6 second response.

All participants expressing interest in providing Load Following must be capable of being connected to AGC (the Automated Generation Control system employed by System Management's SCADA), and will be required to be connected and tested prior to commencement of the service. In the case of Contingency Reserve, AGC connection will not be required, but additional SCADA points are necessary to allow the determination of current actual Spinning Reserve provision in real-time. Also, System Management will require that each expression be a portfolio of at least 10 MW for Contingency Reserve and +/- 10 MW for Load Following, with a telemetered response in at least 4 seconds.

3.4 Pricing of services

The Market Rules provide that for location specific services, such as System Restart, which are not or cannot be provided by Verve Energy, the most competitive offer that meets technical requirements must be successful.

For Spinning Reserve, incorporating Contingency Reserve and Load Following the situation is different. The current provision of Spinning Reserve is provided by Verve Energy based on an availability component and with energy paid at a proportion of MCAP, where the proportion is determined by the ERA. All expressions of interest must be compared against the current (or projected) cost of Verve Energy to provide the services. In other words, if the lowest tender exceeded the projected costs of Verve Energy, then the tender could not be accepted.

3.5 When will services be required

Following the completion of the various competitive procurement processes, both the respondent's plant and System Management's systems will require configuration and testing. The successful respondent may need to install equipment, be tested to ensure that the service can be provided, and may need to be connected to AGC and tested. Given the innovative nature of providing ancillary services under the auspices of the Market Rules, this is likely to take a number of months to complete.

In order not to preclude respondents, the timeframe must allow all of these elements to be completed. Thus, System Management expects the start date for the provision of the first tranche of System Restart to be 1 July 2010. For future competitive procurements processes, System Management will allow a period of 18 months from the completion of the procurement process to the date the contract commences to ensure configuration is completed adequately. Where a contract can commence earlier, this will occur.

3.6 Contract duration

In the first stage Expression of Interest System Management intends to ask respondents to nominate prices for varying stipulated contract periods.

3.7 Spinning Reserve Categories

Market Rule 3.9.3 defines three categories of Spinning Reserve (in this case Contingency Reserve). Following a contingency event, a provider must be able to respond appropriately:

- (a) within 6 seconds and sustain or exceed the required response for at least 60 seconds; or
- (b) within 60 seconds and sustain or exceed the required response for at least 6 minutes; or
- (c) within 6 minutes and sustain or exceed the required response for at least 15 minutes.

There may be technical issues as to how the above requirements meet the needs of the SWIS, and therefore System Management may only be able to procure a response within a certain time-frame. Further, System Management may need to specify further categories.

The above Market Rule does, however, provide guidance as to the requirement within any time-frame. Provision of Contingency Reserve within a time-frame is the sustained output in each time period. For example, if a generator can initially increase output by 20 MW following an event (the actual droop), but this drops to 10 MW over the next minute, then the service provided in the 60 second time-frame is 10 MW.

3.8 Spinning Reserve Availability Payments

Verve Energy is remunerated for Spinning Reserve in two ways: an availability payment and a payment for energy. The energy is paid for at MCAP, while the availability payment is based on a proportion of MCAP based on the margin set in MR 3.13.3, which is currently 15% for peak periods and 12% for non-peak periods.

The current Market Rules provide for the settlement of Ancillary Services based on the availability payment, whereas energy is settled separately. System Management does not propose to alter this arrangement. Therefore, the Ancillary Services Contract will only cover the availability payment.

To determine whether a respondent can provide Spinning Reserve at a lower cost than Verve Energy, both the availability payment and energy payment must be on the same footing ie all energy must be settled at MCAP.

It is almost impossible for System Management to assess whether an ancillary services contract presents a less expensive alternative to supply by Verve Energy under the Market Rules arrangements unless participants bid a discount against the existing availability pricing formulation.

Consequently, System Management will include a pricing mechanism in the Expression of Interest documentation which will require participants to propose a contract price which represents a discount against the "Margin Peak" and "Margin Off Peak" (as prevailing from time to time) inputs into the payments to Verve Energy. In the view of System Management, this mechanism provides the most certain means to establish that an Ancillary Services Contract provides a less expensive alternative to services provided by Verve Energy, as required by clause 3.11.8(b) of the Market Rules.

3.9 Spinning Reserve Energy payments

As discussed in the preceding section, energy payments pursuant to an ancillary service contract must be on the same footing as Verve Energy – settled at MCAP.

At present, energy payments for Ancillary Services dispatch instructions would be at the Participant's pay-as-bid price. Further, as the Spinning Reserve time period finishes as detailed in MR 3.9.3, any additional energy requested after that time should be paid as a normal dispatch instruction (ie at the pay-as-bid price), assuming that the dispatch merit order necessitates calling upon that particular facility. This will necessitate a Rule Change which would create a new payment mechanism for a dispatch instruction issued pursuant to an ancillary service contract based on MCAP.

Finally, the technical requirements for Load Following may require yet another type of dispatch instruction, and this may also require a Rule Change.

3.10 Market Rules relating to Verve Energy's obligation to provide Ancillary Services

Market Rule 3.11.7A provides that Verve Energy must make capacity available to provide Ancillary Services to a standard sufficient to enable System Management to meet its obligations with respect to Ancillary Service requirements.

This allows System Management to utilise Verve Energy to cover any shortfall in the provision of Ancillary Services by other providers.

3.11 Technical Issues

As discussed, a provider of Load Following must be connected to the Automatic Generation Control (AGC) system. Many of Verve Energy's facilities are currently connected to this facility, however, for other Participants the technical situation will vary, due to the requirements of Resource Plans.

In brief, the provision of Load Following or Contingency Reserve must be via a band surrounding the Resource Plan. Due to this the AGC system or SCADA arrangements must be altered to take account of the Resource Plan.

This will require modification to Western Power's XA-21 system, SMMITS, and possibly WEMS. Modifications may be substantial.

4 Monitoring of Ancillary Services

System Management continually reviews the provision of Ancillary Services, and, at this time, has determined that the Electricity Generation Corporation (Verve Energy) is meeting the requirements.

System Management intends that all facilities providing Ancillary Services will be tested at least twice a year as part of an Ancillary Services Contract, or as part of a standard for Verve Energy facilities. Where facilities in the immediately preceding period have demonstrated that they have responded as contracted to operational events then further testing will not be necessary.

4.1 Future monitoring of Spinning Reserve

System Management has developed a model of ideal provision of Spinning Reserve, incorporating droop, sustained rate limits, AGC commands, and maximum operating limits.

The model calculates the integral of the response compared to the integral of the model over the relevant time-frames, and currently assumes:

- for AGC-controlled facilities loading to full output at the sustained rate limit will commence in the 60 seconds following the start of the event. All new entrants will be required to connect to AGC; and
- for non-AGC controlled machines output following the event will be at pre-load (ie the facility will stabilise but not increase in load). This is to incorporate the provision of Spinning Reserve by Verve Energy's thermal units which will not be connected to AGC in the foreseeable future, and other providers which are also not connected.

The model identifies the ideal expected response for each individual generator facility. System Management will determine a minimum expected response for each facility. Following every system event, the actual response will be compared to the modeled response, where any response less than the minimum indicated in the standard for the facility over the relevant time period (eg 60 seconds) will result in the level of service provided being reduced, and a penalty applying.

In addition, the monitoring regime will include two types of tests, each performed twice a year:

- Governor response: this will be tested by, for example, inputting a frequency signal into the facility's control system simulating a frequency drop from 50 Hz to of 49 Hz (the worst case scenario) in 2.5 seconds, and monitoring the response.
 - Each respondent will be required to provide a method of testing the governor response as part of an EOI.
 - Any response less than the minimum indicated in the standard for the facility over the relevant time period (eg 60 seconds) will result in the level of service provided being reduced, and a penalty applying.
- AGC response: this will be tested by programming the AGC to ramp the facility between full and minimum outputs, and monitoring the response.
 - Any response less than the minimum indicated in the standard for the facility during the test will result in the level of service provided being reduced, and a penalty applying.

Appendix 1- Competitive Procurement Program

1. Staging of Ancillary Service Procurement

Due to the extensive and involved nature of procuring Ancillary Services, and limited resources, System Management will stage the procurement of ancillary services. System Management has prioritised the procurement by Ancillary Services Type as shown in the table below.

Market Rule Reference	Ancillary Services Description	Priority	Target Completion Date
3.9.1	Load Following/ Frequency Keeping- first round	3	July 2009
3.9.9	Dispatch Support	1	Completed as at April 2008
3.9.2	Spinning Reserve- first round	4	December 2009
3.9.8	System Restart	2	March 2009
3.9.6	Load Rejection Reserve	5	Not required at this time.

The process of procurement of ancillary services will involve a number of steps including specification of standards, expression of interest, short listing, tender, evaluation of offers, negotiation of contract, agreement and contract award.

2. Tasks

System Management has defined the following tasks in moving to competitive procurement of Ancillary Services, with an indicative timeline:

a. System Restart

Task Description	Task Status	Target Completion Date
Define standards of performance and specify requirements. Incorporate standards into PSOP	Completed	December 2007
Assess Verve's capability & identify opportunities.	Completed	February 2008
Call for Expressions of Interest (EOI)	Completed	July 2008
Evaluation of EOI submissions and shortlisting	Completed	August 2008
If EOIs acceptable then request for Tender		October 2008
Evaluation of offers		December 2008
Agreement and contract award		March 2009
Notify IMO of details of agreements		March 2009
Configuration of systems and installation of equipment		April 2010
Testing of performance		May 2010
Commencement of Services		July 2010

b. Load Following/ Frequency Keeping- First Round

Task Description	Task Status	Target Completion Date
Define standards of performance and specify requirements.	Completed	June 2008
Assess Verve's capability & identify opportunities.	Started	December 2008
Call for Expressions of Interest (EOI)		February 2009
Evaluation of EOI submissions and shortlisting		April 2009
If EOIs acceptable then request for Tender		May 2009
Evaluation of offers		June 2009
Agreement and contract award		July 2009
Notify IMO of details of agreements		July 2009
Configuration of systems and installation of equipment		September 2010
Testing of performance		November 2010
Commencement of Services		January 2011

c. Spinning Reserve- First Round

Task Description	Task Status	Target Completion Date
Define standards of performance and specify requirements.	Completed	December 2007
Assess Verve's capability & identify opportunities.	Completed	February 2008
Trial and configure real time Spinning Reserve monitoring	Completed	June 2008
Identify and resolve issues for procurement process	Started	December 2008
Call for Expressions of Interest (EOI)		July 2009
Evaluation of EOI submissions and shortlisting		August 2009
If EOIs acceptable then request for Tender		September 2009
Evaluation of offers		December 2009
Agreement and contract award		January 2010
Notify IMO of details of agreements		January 2010
Configuration of systems and installation of equipment		May 2011
Testing of performance		June 2011
Commencement of Services		July 2011