
Ancillary Service Report 2009
prepared under clause 3.11.11 of
the Market Rules by System
Management - 28 May 2009



Table of Contents

1	INTRODUCTION	1
1.1	System Management	1
1.2	Ancillary Service Report	1
2	QUANTITIES OF ANCILLARY SERVICES IN THE PRECEDING YEAR (2008/09)	2
2.1	Load Following and Spinning Reserve	2
2.2	Load Rejection	3
2.3	Dispatch Support	3
2.4	System Restart	3
3	COST OF ANCILLARY SERVICES IN THE PRECEEDING YEAR (2008/09)	4
4	ANCILLARY SERVICE REQUIREMENTS AND PLAN FOR COMING YEAR (2009/10)	5
4.1	Ancillary Service Requirements for Coming Year 2009/10	5
4.1.1	Overview	5
4.1.2	Load Following	5
4.1.3	Spinning Reserve	6
4.1.4	Load Rejection Reserve	7
4.1.5	Dispatch Support	7
4.1.6	System Restart	7
4.2	Ancillary Service Plan for Coming Year 2009/10	8
4.2.1	Development and Procurement	8
4.2.2	Load Following	8
4.2.3	Spinning Reserve	8
4.2.4	Load Rejection	8
4.2.5	Dispatch Support	9
4.2.6	System Restart	9
5	ANCILLARY SERVICE BUDGET FOR COMING YEAR (2009/10)	10

1 Introduction

1.1 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:

- operate the SWIS in a secure and reliable manner; and
- provide regular reports to the IMO and other market participants.

Included in the requirement to report is the Ancillary Service Report which is described in clause 3.11.11 of the Market Rules.

1.2 Ancillary Service Report

System Management has prepared this report pursuant to its obligations under clause 3.11.11 of the Market Rules, for the two year period 1 July 2008 to 30 June 2010. The Ancillary Service Report comprises of four parts:

- (a) the quantities of each of the Ancillary Services provided in the preceding year, including Ancillary Services provided under Ancillary Service Contracts, and the adequacy of these quantities;
- (b) the total cost of each of the categories of Ancillary Services provided, including Ancillary Services provided under Ancillary Service Contracts, in the preceding year;
- (c) the Ancillary Service Requirements for the coming year and the Ancillary Services plan to meet those requirements; and
- (d) the budget approved in accordance with clause 2.23 for providing Ancillary Services for the coming year.

The following sections will address each of these requirements.

2 Quantities of Ancillary Services in the Preceding Year (2008/09)

2.1 Load Following and Spinning Reserve

The average combination of Load Following and Spinning Reserve supplied for the period 1 May 2008 to 30 April 2009 inclusive was 285MW during Peak intervals and 259MW during Off-Peak intervals.

The amount of spinning reserve supplied generally exceeded the requirement that requires the sum of the load following and spinning reserve to be at greater than 70% of the maximum output of any generator. The more spinning reserve than the minimum requirement will often be provided especially at night when units are left running on minimum output. The average is weighted above minimum requirements because generators are committed/decommitted to the system in increments of capacity to ensure spinning reserve does not fall below the minimum requirement.

The adequacy of the load following service can be determined by analysing the distribution of the system frequency. The historic performance is given in Table 1 below.

Table 1 – Historic Frequency Performance

Month	Time Within 49.80-50.20Hz	Time Within 49.85-50.15Hz (NEM)	Average Hz	Standard Deviation Hz
May-08	99.977%	99.965%	50.000	0.019
Jun-08	99.986%	99.970%	50.000	0.018
Jul-08	99.951%	99.856%	50.000	0.024
Aug-08	99.919%	99.836%	50.000	0.024
Sep-08	99.949%	99.935%	50.000	0.020
Oct-08	99.933%	99.873%	50.000	0.024
Nov-08	99.961%	99.938%	50.000	0.022
Dec-08	99.991%	99.977%	50.000	0.020
Jan-09	99.949%	99.898%	50.000	0.028
Feb-09	99.960%	99.891%	50.000	0.027
Mar-09	99.998%	99.961%	50.000	0.021
Apr-09	99.928%	99.856%	50.000	0.023

The Market Rule require load following to cover 99.9% of the fluctuations. The Technical Rules require the frequency to be maintained between 49.80Hz and 50.20Hz for 99% of the time when there is no generation/load or islanding events. These requirements are interpreted as the frequency standard that is frequency should be maintained between 49.80Hz and 50.20Hz for 99.9% for each month. This is similar to the Power System Performance Monitoring in the National Electricity Market (NEM), see:

<http://www.nemmco.com.au/powersystemops/powersystemops.html#pspm>

Table 1 shows that for each month the frequency standard is maintained with the frequency distribution being 99.919% or better which meets the standard.

For information performance against the NEM requirement (49.85Hz and 50.15Hz) is also shown. Against the NEM frequency band the frequency standard would not be met. To meet

the narrower requirements in the SWIS additional load following services would need to be dispatched.

2.2 Load Rejection

Load rejection reserve service is calculated for dispatch purposes, with quantities of this service being dynamic and not currently recorded for historic analysis. The requirement for this year was 120MW and no overfrequency events above 51Hz were recorded.

2.3 Dispatch Support

Dispatch Support Services were procured from Verve Energy for Power System Security

The following gives the quantities of Dispatch Support for the period 1 May 2008 to 30 April 2009 inclusive.

Mungarra Gas Turbines	62,302 MWh
Kalgoorlie Gas Turbines	0 MWh
Geraldton Gas Turbine	0 MWh

Mungarra Gas Turbines consist of Mungarra GT1, Mungarra GT2 and Mungarra GT3. These have a total sent out capacity of 112.6MW

Kalgoorlie Gas Turbines consist of West Kalgoorlie GT2 and West Kalgoorlie GT3 which have a total capacity of 62.8MW

Geraldton Gas Turbine has a capacity of 20.8MW

2.4 System Restart

No System Restart Services were used in 2008/09. Three Verve Energy Black Start facilities are allocated for this purpose. These facilities are Kwinana GT1, Tiwest Cog1 and Pinjar GT3 & Pinjar GT5. Note Pinjar gas turbines 3&5 are considered one black start facility as they are at the same site.

3 Cost of Ancillary Services in the Preceding Year (2008/09)

Table 2 provides the cost of each ancillary service for the period 1 April 2008 to 31 March 2009. These costs are defined in Market Rule 3.13.1 and are collected by the IMO on behalf of System Management. It should be noted that the cost of load following and spinning reserve is dependent on the Marginal Cost Administered Price (MCAP) during the trading intervals. The MCAP is determined two business days after the relevant trading day.

Table 2 – Cost of Ancillary Services

Ancillary Service	Total Payment (excluding GST)
Load Following	\$ 6,441,297.60 (Capacity)
	\$ 3,381,720.92 (Availability)
	\$ 9,823,018.52 (Total)
Spinning Reserve	\$ 24,710,977.43
Load Rejection	\$ 0.00
Dispatch Support	\$ 3,306,849.71
System Restart	\$ 249,996.00
TOTAL	\$ 38,090,841.66

4 Ancillary Service Requirements and Plan for Coming Year (2009/10)

4.1 Ancillary Service Requirements for Coming Year 2009/10

4.1.1 Overview

The ancillary service requirements are determined by the Ancillary Service Standards defined in Market Rule 3.10. The requirements for each of the ancillary services have been developed to meet the standards for the upcoming year, having regard to the requirements of the Power System Operation Procedure: Ancillary Services.

Except as otherwise noted in this section, the ancillary service requirements are not:

- location specific;
- variable for different SWIS load levels or other scenarios;
- variable by the type of day and time of day; or
- variable across the year.

4.1.2 Load Following

The standard is specified in Market Rule 3.10.1(a):-

“a level which is sufficient to:

provide Minimum Frequency Keeping Capacity, where the Minimum Frequency Keeping Capacity is the greater of:

i. 30 MW; and

ii. the capacity sufficient to cover 99.9% of the short term fluctuations in load and output of Non-Scheduled Generators and uninstructed output fluctuations from Scheduled Generators, measured as the variance of 1 minute average readings around a thirty minute rolling average.”

System Management cannot accurately forecast the fluctuations due to load and wind variations in the short or long term. System Management carried out a detailed analysis of historic short term fluctuations of the system performance from 1 May 2008 to 30 April 2009 inclusive. This analysis demonstrated that the capacity to cover 99.9% of these fluctuations of scheduled generators, measured as a variance of 1 minute average readings around a 30 minute rolling average is +60/-58MW. The fluctuations caused by the loads alone was -35/+36MW and for the intermittent generators alone was -48/+53MW. These values are up from the previous ancillary plan which had fluctuations from load alone being -28/+24 and down for the intermittent generators alone being -58/59MW.

For the 2009/10 year System Management has analysed the fluctuations at on peak and off peak times to ensure that the correct amount of load following is dispatched at all times. The fluctuations were +67/-65MW during peak times and +44/-45MW during off peak times.

The load following requirement for the 2009/10 year has been based on this historical analysis and is set at +60/-60MW based on the variations during all times. The minimum Frequency Keeping Capacity is set to the positive value of the requirement derived from historical analysis, being 60MW, representing no change to the 2008/09 value. These fluctuations are expected to vary from year to year due to their random nature.

The load following service rate specification is based on the ramp rates that are needed to be sustained over 5 minute periods. An analysis of the data covering 99% of these ramps showed that the requirement is +8.8/-6.4 MW/minute. This is an average of 7.5 MW/minute (rounded to the nearest 0.5). The services required should provide an average ramp rate of this or better.

Examination of the lower range of the ramp rates that is able to be provided by scheduled generators is 5MW/minute. Hence for the procurement process it is proposed that the load following service can be made up of 30MW at 5MW/minute and 30MW at 10MW/minute, though preference may be given to those facilities that can provide a higher ramp rate.

It should be noted that this increases the proportion of load following component in the spinning reserve which is discussed below and this service can not be supplied from facilities such as interruptible loads that do not respond to continuous control signals.

4.1.3 Spinning Reserve

The standard is specified in Market Rule 3.10.2 -

“is a level which satisfies the following

principles:

(a) the level must be sufficient to cover the greater of:

- i. 70% of the total output, including parasitic load, of the generation unit synchronised to the SWIS with the highest total output at that time; and*
- ii. the maximum load ramp expected over a period of 15 minutes;*

(b) the level must include capacity utilised to meet the Load Following Service standard under clause 3.10.1, so that the capacity provided to meet the Load Following requirement is counted as providing part of the Spinning Reserve requirement;”

The requirement is determined by the largest output of any unit on the system. This will vary with the dispatch plans of the various participants. System Management cannot accurately forecast the dispatch of each unit on the system in the short or long term.

For 2009/10 Collie Power Station is the largest unit on the SWIS with a maximum generated output of 340MW. Hence, the maximum spinning reserve level that may be required is 0.7 multiplied by 340MW which is 240MW.

It is noted that the spinning reserve ancillary service requirement is the spinning reserve level less any load following requirement. Hence the minimum spinning reserve service required is $240 - 60 = 180\text{MW}$. This can be provided by such facilities as synchronised generation and interruptible loads.

4.1.4 Load Rejection Reserve

The standard is

“The standard for Load Rejection Reserve Service is a level which satisfies the following principles:

(a) the level sufficient to keep over-frequency below 51 Hz for all credible load rejection events;”

The requirement is determined by the amount of load that is lost during the majority of network faults. This requirement is set at 120MW, this is unchanged from last year. It should be noted that at times when the risk of load rejection is low due to the prevailing weather conditions this may be reduced. This results from the risk of a network fault causing a load rejection is significantly reduced at times of low lightning activity.

It is expected that later in the 2009/10 year the reduction during fair weather conditions will be limited to 110MW which will cover disconnection of load at Boddington after a network fault.

4.1.5 Dispatch Support

Dispatch support services are forecast to be required for 2009/10. This will continue to be supplied for network support from Verve Energy facilities at Mungarra, West Kalgoorlie and Geraldton.

System Management does not at this time anticipate entering into further arrangements for dispatch support during 2009/10.

4.1.6 System Restart

System Management has determined that there should be at least three generating stations that can start upon black system conditions and can energise the rest of the system. It should be noted that certain generators with self-start facilities, such as those at Kalgoorlie, cannot restart the rest of the system due to network constraints.

There is a requirement that the black start generators should not be at the same location to mitigate the risk of common failure at the same power station and capable of energising discrete sub-networks.

The requirement for system restart is based on having restart capability in each of three electrical sub-networks being North Metropolitan, South Metropolitan and South Country. The details of these requirements are given on the System Management Webpage at:

http://www.westernpower.com.au/mainContent/workingWithPower/systemManagement/System_Restart_Services.html.

4.2 Ancillary Service Plan for Coming Year 2009/10

4.2.1 Development and Procurement

System Management may procure ancillary service from participants other than Verve Energy in circumstances where it believes Verve Energy cannot provide sufficient services or another party can provide a less expensive alternative.

System Management has requested and received Tender Offers to provide System Restart starting in 2011/12. It anticipates awarding contracts during 2009/10. System Management also anticipates testing the market for the provision of Load Following ancillary services during 2009/10.

4.2.2 Load Following

The load following requirements will be met with the additional commitment of Verve Energy generation in the absence of procurement from a Non-Verve provider.

There is sufficient Verve Energy plant to meet this requirement even with the largest load following provider unit (a frame 9 gas turbine) out of service.

The requirement given in section 4.1.1 above (i.e. +/-60MW) can be met by operating fast acting generators, such as open cycle gas turbines, whose total operating range (in MW) is equal to that required. The requirement can also be met by operating slower acting generators, such as steam turbines, however their total operating range (in MW) may need to be greater than required. For example a +/-30MW load following service may be provided by slow acting generators whose total operating range is +/-60MW.

System Management may seek competitive procurement of this service, a process which will potentially commence in 2009/10.

4.2.3 Spinning Reserve

For 2009/10, 52MW of spinning reserve will be provided by interruptible load supplied by two non-Verve Energy market participants. The previous ancillary service report indicated that this would reduce to 42MW, however the contract to supply 10MW of this service was extended during 2008/09

The remaining spinning reserve will be supplied by synchronising additional Verve Energy generators. There is expected to be sufficient Verve Energy plant to meet this requirement even with the largest spinning reserve provider unit (a large open cycle gas turbine) out of service.

System Management may seek competitive procurement of this service, a process which will potentially commence in 2010/11.

4.2.4 Load Rejection

The Load Rejection requirement will be provided by the ability to turn down or off a Verve Energy generating unit(s). There is expected to be enough turn down even at times of minimum Verve Energy generation. This however will get harder to manage as overnight load supplied by Verve Energy is reduced.

With greater penetration of non Verve Energy generation with overnight running commitments, System Management considers that it may be necessary to undertake detailed analysis of the need for load rejection prior to the commencement of the next allowable revenue review period on 1 July 2010.

4.2.5 Dispatch Support

Dispatch support services are forecast to be required for 2009/10. At this stage System Management anticipates continuing to obtain these services from Verve Energy facilities at Mungarra, West Kalgoorlie and Geraldton.

The cost of this service is expected to increase slightly from 2008/09 (\$3.3M) as load increases in the Geraldton Area require this service to be activated more often. This is not easily predictable as the cost is dependent on the future value of the Marginal Cost Administered Price.

4.2.6 System Restart

The service will be provided by three Verve Energy gas turbines located at Kwinana, Pinjar and Tiwest for 2009/10. System Management is engaging in a tender process to replace the currently contracted service from 2011/12.

The cost of this service is expected to remain at 2008/09 levels (\$250,000).

5 Ancillary Service Budget for Coming Year (2009/10)

The Ancillary Service Budget for 2009/10 is determined by the Economic Regulation Authority (**ERA**). The ERA determined that the Ancillary Services Allowable revenue is nil for 2009/10. Ancillary Services are funded by Market Participants through the IMO.

However, the ERA approved an allocation of \$250,000 for the purposes of the provision of System Restart Ancillary Services.

In addition, Dispatch Support is provided pursuant to contractual provisions and depend on the frequency of dispatch of particular facilities and the value of the Marginal Cost Administered Price. Consequently it is not possible to accurately forecast the likely cost to the market of these services in 2009/10.