
**Ancillary Service Report 2010
prepared under clause 3.11.11 of
the Market Rules by System
Management - 21 May 2010**



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 (2009/10)	2
2.1	Load Following and Spinning Reserve	2
2.2	Load Rejection	3
2.3	Dispatch Support	3
2.4	System Restart	4
3	COST OF ANCILLARY SERVICES IN THE PRECEEDING YEAR (2009/10)	5
4	ANCILLARY SERVICE REQUIREMENTS AND PLAN FOR COMING YEAR (2010/11)	6
4.1	Ancillary Service Requirements for Coming Year 2010/11	6
4.1.1	Overview	6
4.1.2	Load Following	6
4.1.3	Spinning Reserve	7
4.1.4	Load Rejection Reserve	8
4.1.5	Dispatch Support	8
4.1.6	System Restart	8
4.2	Ancillary Service Plan for Coming Year 2010/11	9
4.2.1	Development and Procurement	9
4.2.2	Load Following	9
4.2.3	Spinning Reserve	9
4.2.4	Load Rejection	10
4.2.5	Dispatch Support	10
4.2.6	System Restart	10
5	ANCILLARY SERVICE BUDGET FOR COMING YEAR (2010/11)	11

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 2009 to 30 June 2011. 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 (2009/10)

2.1 Load Following and Spinning Reserve

The average combination of Load Following and Spinning Reserve supplied for the period 1 April 2009 to 31 March 2010 inclusive was 259MW during Peak intervals and 266MW 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. 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-09	99.92%	99.88%	50.00	0.025
Jun-09	99.93%	99.76%	50.00	0.028
Jul-09	99.91%	99.72%	50.00	0.028
Aug-09	99.93%	99.80%	50.00	0.025
Sep-09	99.95%	99.88%	50.00	0.024
Oct-09	99.91%	99.79%	50.00	0.025
Nov-09	99.95%	99.85%	50.00	0.027
Dec-09	99.89%	99.74%	50.00	0.028
Jan-10	99.96%	99.78%	50.00	0.025
Feb-10	99.96%	99.89%	50.00	0.027
Mar-10	99.99%	99.86%	50.00	0.026
Apr-10	99.98%	99.96%	50.00	0.028

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.aemo.com.au/electricityops/performance_monitoring.html

Table 1 shows that for each month the frequency standard is maintained with the frequency distribution being 99.910% or better which meets the standard except for December 2009. During December 2009 the time within the tolerance is 99.89% which is outside the standard of 99.9%. In this month a number of high frequency events pushed the frequency above the required levels during minimum load periods. The difference between the generation levels

on those generators performing the load following load and their minimum loading levels was too small to allow sufficient load following to meet unexpected intermittent load increases or load decreases. Late in December 2009 market conditions changed to increase this difference and so subsequent months are within the required levels as new major loads increased their consumption. System Management is monitoring prevailing conditions to manage the risk of this happening again in future.

By way of comparison with the previous year's result, the average monthly time within tolerance decreased from 99.96% to 99.94%. It should be noted that the frequency performance was within that prescribed by the Technical Rules being between 49.8hz and 50.2hz for more than 99% in each month.

For information performance against the NEM requirement (49.85Hz and 50.15Hz for 99% of the time) is also shown. Against the NEM frequency band the frequency standard would be met for each month.

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 2009 to 30 April 2010 inclusive as well as the quantities from the previous year.

Dispatch Support Facility	1/5/2009-30/4/2010	1/5/2008-30/4/2009
Mungarra Gas Turbines	53,895 MWh	62,302 MWh
Kalgoorlie Gas Turbines	1,534 MWh	0 MWh
Geraldton Gas Turbine	0 MWh	0 MWh

It should be noted Kalgoorlie Gas Turbines had to run significantly more than the previous year due to maintenance work on the Muja - Kalgoorlie 220kV transmission line.

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 2009/10. 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 (2009/10)

Table 2 provides the cost of each ancillary service for the period 1 April 2009 to 31 March 2010 as well as the cost for the previous year. 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	1/4/2009 – 31/3/2010 Total Payment (excluding GST)	1/4/2008 – 31/3/2009 Total Payment (excluding GST)
Load Following	\$ 6,188,803.20 (Capacity)	\$ 6,441,297.60 (Capacity)
	\$ 1,453,073.57 (Availability)	\$ 3,381,720.92 (Availability)
	\$ 7,641,876.77 (Total)	\$ 9,823,018.52 (Total)
Spinning Reserve	\$ 10,424,519.71	\$ 24,710,977.43
Load Rejection	\$ 0.00	\$ 0.00
Dispatch Support	\$ 5,274,074.25	\$ 3,306,849.71
System Restart	\$ 249,996.00	\$ 249,996.00
TOTAL	\$ 23,590,466.73	\$ 38,090,841.66

The costs of Load Following and Spinning Reserve have reduced significantly. The requirements have not changed or the relativity to MCAP. However it is observed that the average MCAP in 2009/10 was \$38/MWh compared to 2008/09 when it was \$105/MWh, resulting in the major variation in the annual costs.

4 Ancillary Service Requirements and Plan for Coming Year (2010/11)

4.1 Ancillary Service Requirements for Coming Year 2010/11

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 2009 to 30 April 2010 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/-63MW. These values are comparable with the previous ancillary service plan of +60/-58MW.

The fluctuations caused by the loads alone was -32/+26MW and for the intermittent generators alone was -57/+59MW. Compared with the previous ancillary plan these values

for loads alone are down being -35/+36MW and up for the intermittent generators alone being -48/+53MW.

For the May 2009 to 30 April 2010 System Management has analysed the fluctuations at on peak and off peak times to ensure that the correct amount of load following is dispatch at all times. The fluctuations were +61/-67MW during peak times and +59/-55MW during off peak times.

The load following requirement for the 2010/11 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 2009/10 value. These fluctuations are to 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 need to be sustained of 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 any 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 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 2010/11 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 should be noted that the facility with the highest registered capacity is Newgen Neerabup with 342 MW, but this is made up of 2 generating units of 171MW each.

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 to 110MW which will cover disconnection of load at Boddington after a network fault. This results from the risk of a network fault causing a load rejection is significantly reduced at times of low lightning activity.

4.1.5 Dispatch Support

Dispatch support services are forecast to be required for 2010/11. 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 2010/11.

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 2010/11

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 completed a Tender to provide System Restart starting in 2011/12. It has awarded a contract for South Metropolitan region and is finalising a contract for North Metropolitan region.

System Management is still assessing the feasibility of options in the South Country region. There are no existing or proposed black start facilities in this subregion so sites are being studied as where a new facilities could be installed.

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 completed an Expression of Interest for competitive procurement of this service in February 2010. No expressions were received from this process so Verve Energy will continue to be the sole provider of this service, at this time.

System Management will continue to explore ways which could make provision of this service more attractive to providers other than Verve Energy.

4.2.3 Spinning Reserve

For 2010/11, 52MW of spinning reserve will be provided by interruptible load supplied by two non-Verve Energy market participants. This will reduce to reduce to 42MW in October 2010 as the contract to supply 10MW from one supplier will expire.

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 after it has explored ways which could make provision of this service more attractive to providers other than Verve Energy.

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.

4.2.5 Dispatch Support

Dispatch support services are forecast to be required for 2010/11. 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 easily predictable as the cost is dependent on the future value of the Marginal Cost Administered Price. Load increases in the Geraldton Area however is expected to require this service to be activated more often.

4.2.6 System Restart

The service will be provided by three Verve Energy gas turbines located at Kwinana, Pinjar and Tiwest for 2010/11.

The cost of this service is expected to remain at 2009/10 levels (\$250,000).

5 Ancillary Service Budget for Coming Year (2010/11)

The Ancillary Service Budget for 2010/11 is determined by the Economic Regulation Authority (**ERA**). The ERA determined that the Ancillary Services Allowable revenue is nil for 2010/11. 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 2010/11.