



**ROAM
CONSULTING**
ENERGY MODELLING EXPERTISE

ROAM Consulting Pty Ltd
A.B.N. 54 091 533 621

Report (Nem00045a) to



NEMMCO

NATIONAL ELECTRICITY MARKET DEVELOPMENT

**Translation of Minimum Reserve Levels Following
Abolition of the Snowy Region**

17 October 2007



Report to:



NEM DEVELOPMENT
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VERSION HISTORY

Version History		
Version Number	Date	Description
1.0	08 October 2007	Initial draft release
1.1	16 October 2007	Second release after feedback
1.2	17 October 2007	Final release

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1) BACKGROUND

ROAM Consulting has been invited to conduct a review of the definition of NEM Minimum Reserve Levels (MRL) following the AEMC determination of the Snowy Hydro Proposal to abolish the Snowy region of the NEM.

The 2006 MRL Assessment remains valid as the simulations are based on the same underlying physical transmission network and generation and load conditions that exist prior to and following abolition of the Snowy Region of the NEM. This assessment will provide the alternative calculations required for translating the outcomes from the 2006 MRL simulation studies into Minimum Reserve Levels under the new regional boundary configuration. That is, translating Minimum Local Generation (MLG) applied in the simulation studies into the definition of Minimum Reserve Level and accompanying Assumed Interconnector Support.

2) SCOPE

The 2006 Minimum Reserve Level assessment provided NEM MRLs for the years 2006-07 and 2007-08. This assessment will consider only the 2007-08 financial year outlook. The outcomes of this assessment will apply from 1 July 2008 following implementation of the regional boundary change in the NEM systems.

The assessment will investigate the reallocation of demand and generation following abolition of the Snowy region of the NEM. Based on the data set applied to develop the Minimum Reserve Levels, it is understood that:

- Tumut power stations will be allocated to the NSW region;
- Guthega power station will be allocated to the NSW region;
- Tumut pumping load (demand) will be allocated to the NSW region;
- Murray power stations will be allocated to the VIC region;
- Jindabyne pump load (demand) at Guthega will be allocated to the VIC region.

Based on the above reallocation, ROAM will recalculate the translation of Minimum Local Generation into Minimum Reserve Levels as described in the report "Development of MTPASA Limits for 2006 Minimum Reserve Levels"¹.

3) METHODOLOGY

A desktop assessment of the translation of MLG to MRL will be completed to establish new MRLs for the NEM following abolition of the Snowy region. In completing this assessment the 'determination case' simulation study results have been reviewed and discussed with regard to the regional boundary change.

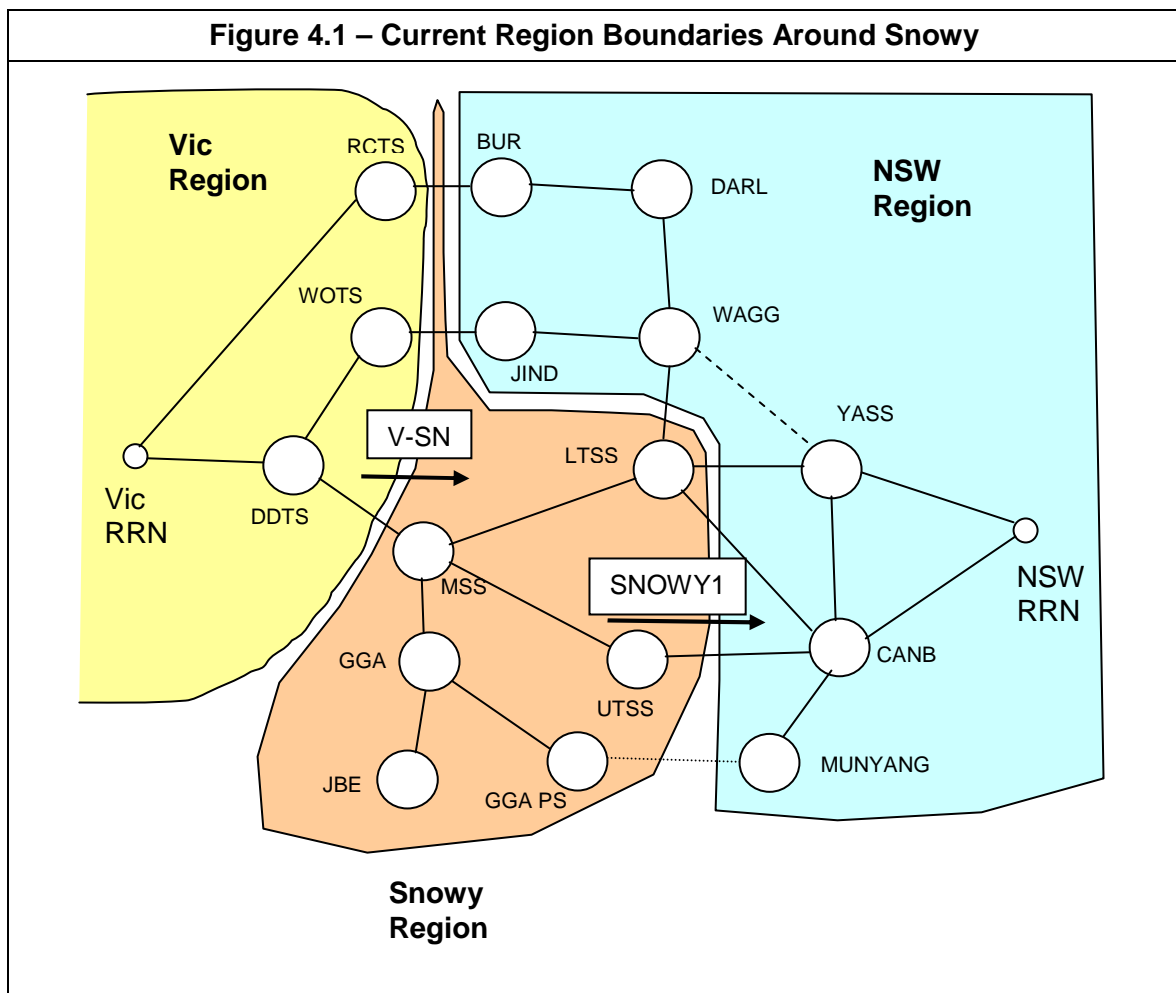
Additional simulation studies were not required for this revision of the translation of MLG to MRLs.

¹ Development of MTPASA Limits for 2006 Minimum Reserve Levels: ROAM Consulting Report - 08 Nov 2006, (filename: 249-0003)

4) ABOLITION OF THE SNOWY REGION OF THE NEM

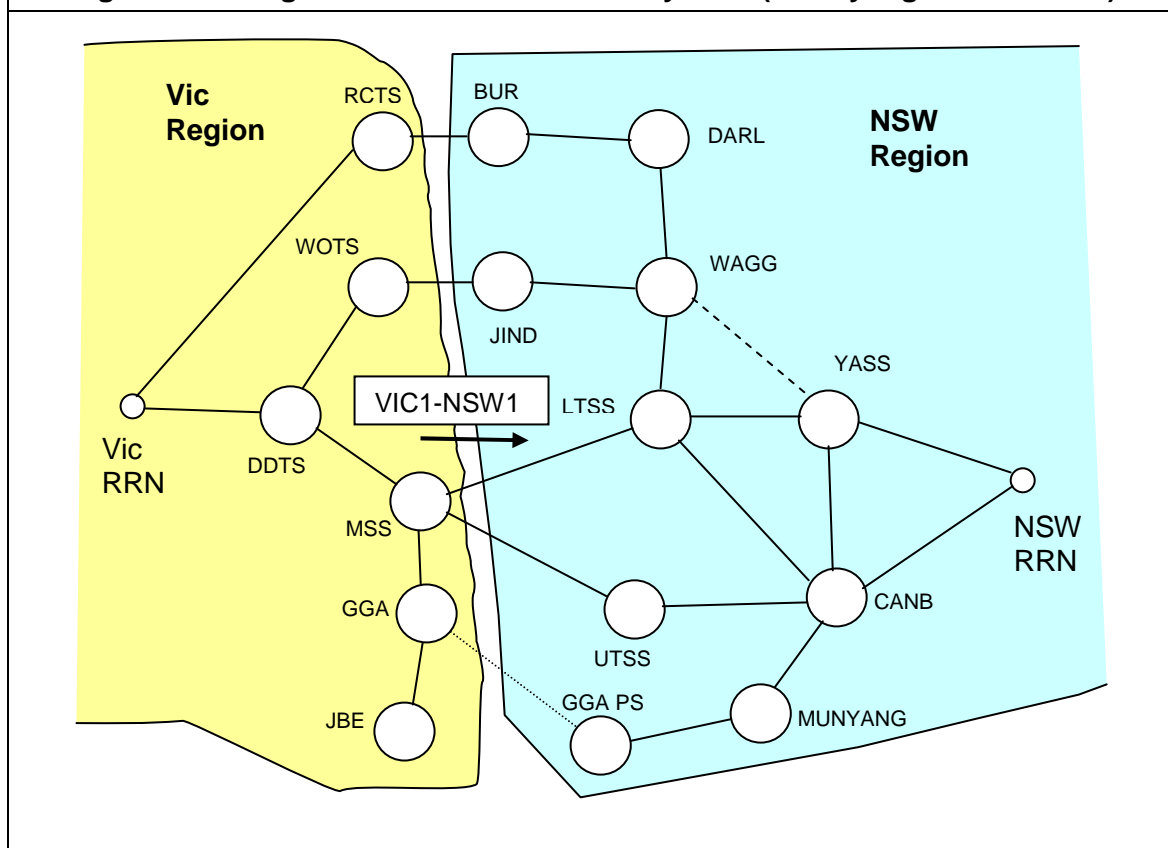
The AEMC Rule Determination² outlines the process undertaken for assessing the Snowy Hydro Proposal for abolition of the Snowy Region of the NEM and the final decision made by the Commission to proceed with the proposal. Section 6 in the Rule Determination specifically outlines the “*Implementation and description of Rule to be made*”.

Alteration of a region in the NEM does not change the underlying physical makeup of the transmission network and connected generators and loads. Figure 4.1 shows the existing Snowy region while Figure 4.2 shows the allocation of the Snowy generation and loads between New South Wales and Victoria. Tumut, Guthega and Jindabyne generation will be allocated to the New South Wales region, and Murray generation allocated to the Victoria region.



² “Rule Determination - National Electricity Amendment (Abolition of Snowy Region) Rule 2007”, 30 August 2007, Australian Energy Market Commission.

Figure 4.2 – Region Boundaries as of 1 July 2008 (Snowy region abolished)



Following abolition of the Snowy region the same pre-existing network limits in and around the present Snowy region (and across the whole NEM) will remain. The key notional transmission limitations that are discussed with respect to the MRL translation include (but are not limited to):

- The existing Snowy-NSW transmission constraint on the set of lines (predominantly) between Tumut and Canberra and Tumut and Yass;
- The existing transmission constraint (predominantly) between Murray and Tumut and Wodonga and Jindera;
- The existing Snowy-VIC transmission constraint (predominantly) between Murray and Dederang and Wodonga and Dederang.

The formulation of generic transmission constraint equations for implementation in the MRL Assessment simulation studies is in line with the operation of the NEM under system normal conditions³. Whilst constraint equations may be 'oriented' toward regional reference nodes to achieve desirable market pricing outcomes, the constraint outcomes will result in the same generator dispatch and/or maximum interconnector limitations

³ For the purpose of market simulation some generic constraints may be modified to retain only the interconnector term with the largest coefficient on the left hand side and move all other terms to the right hand side.

regardless of orientation. As that is the case, the simulated USE outcomes are valid for any regional boundary definition, providing the underlying network capability remains the same.

For the purpose of translating the key outcome from the 2006 MRL Assessment simulation studies (the MLG) into MRLs with associated assumed interconnector support, the Snowy Region Boundary provided a reference point for determining the allocation of the Snowy Hydro generation capacity to the Victoria and NSW regions through the application of assumed interconnector support. This is required as the Snowy Region carries very little load, compared with the other regions of the NEM.

5) TRANSLATION OF MINIMUM RESERVE LEVELS FOLLOWING ABOLITION OF THE SNOWY REGION

Table 5.1 below shows the calculations required to translate simulated MLG into the present 2007-08 MRLs and associated assumed interconnector support with the existing regional boundaries including Snowy.

	QLD	NSW	SNOWY	VIC	SA	TAS
Simulated MLG	10558	11524	3846	8790	3515	2210
M10 demand	-9998	-14900	0	-10635	-3565	-1456
Snowy-VIC i/c support			-1900	1900		
Snowy-NSW i/c support		1946	-1946			
TAS-VIC i/c support				610		-610
MRL	560	-1430	0	665	-50	144

Table 5.1 shows the simulated capacity of generation at Snowy Hydro set at 3846MW. This is made up of:

- 2216MW generation in Tumut power stations;
- 60MW generation in Guthega power station;
- 1570MW generation in Murray power stations.

The total amount of this capacity has effectively been allocated to the NSW and Victoria region through the application of assumed interconnector support. The assumed interconnector support was developed for the 2007-08 MRLs in order to provide maximum support towards the south. This distribution was selected because the actual installed generation in the Victorian region is approaching the required minimum level of installed generation and also because under extreme situations approaching USE there is a high level of certainty that the maximum limit of 1900MW to the south can be reached. As such, the maximum allocation of Snowy Hydro generation capacity was allocated to the Victorian region, limited by the transmission capability of 1900MW in the southerly direction.

Following abolition of the Snowy region the Tumut and Guthega⁴ power stations have been allocated to the NSW region and the Murray power stations into the Victorian region. Recall that these power stations have not physically moved, they maintain the same connection points in the same underlying transmission network. Their capacity has simply been allocated to a new notional region.

Table 5.2 below provides the translation components necessary to re-allocate the Snowy Hydro generation capacity to the alternate NSW and Victoria regions. Following that, translation of MLG into MRL and associated assumed interconnector support is completed in the same way as previously.

	QLD	NSW	SNOWY	VIC	SA	TAS
Simulated MLG	10558	11524	3846	8790	3515	2210
Tumut into NSW		2216	-2216			
Murray into VIC			-1570	1570		
Guthega into NSW		60	-60			
New Regional MLG	10558	13800	0	10360	3515	2210
M10 demand	-9998	-14900	0	-10635	-3565	-1456
Zero Transfer MRL	560	-1100	0	-275	-50	754
2007-08 MRL	560	-1430	0	665	-50	144
Net Transfer Req.	0	-330	0	940	0	-610
TAS-VIC i/c support				610		-610
NSW-VIC i/c support		-330		330		
2008-09 MRL	560	-1430	0	665	-50	144

Table 5.2 shows:

- In the green section, reallocation of the Snowy Hydro generation capacity into the NSW and Victoria regions to establish a new MLG set;
- In the orange section, translation of MLG into MRL on the basis of zero net interconnector support;
- In the blue section, the net regional interconnector support necessary to retain the simulated MLG from the 2006 Minimum Reserve Level assessment;
- In the light yellow section, the 2008-09 regional MRLs and associated assumed interconnector support following abolition of the Snowy region.

⁴ This is a physical switching re-arrangement outlined in the AEMC Rule Determination in Section 6.1.2.

6) 2008-09 MRLs FOLLOWING ABOLITION OF THE SNOWY REGION OF THE NEM

Based on the translation calculations presented in Table 5.2 above, the definition of regional Minimum Reserve Levels and their associated Assumed Interconnector Support for the NEM following abolition of the Snowy Region is as follows:

Table 6.1 – 2008-09 MRL Definition (MW)					
Region	QLD	NSW	VIC	SA	TAS
MRL	560	-1430	665	-50	144
Interconnector	QNI+DLINK	VIC-NSW		HEY+MLINK	BLINK
I/C Support	0	-330 (south support)		0	610

Given the underlying network limitations have not been altered it may be seen that the maximum interconnector support into the Victoria region is still maintained.⁵

7) 2008-09 MTPASA LIMITS FOLLOWING ABOLITION OF THE SNOWY REGION OF THE NEM

As outlined in the 2006 MTPASA limits report the definition of MRL and associated assumed interconnector support contains the required information to implement net import limits in the MTPASA calculation. The same methodology may be applied here, following abolition of the Snowy region.

The net import limits for the QLD and SA regions remain unchanged following the boundary change. The net import limits for the NSW and Victoria regions however must change in accordance with the revisions to the assumed interconnector support. The following net import limits should be applied in the MTPASA calculation in conjunction with the '2008-09 MRLs' following abolition of the Snowy Region.

⁵ That is, the Murray power stations contribute 1570MW and the interconnector support contributes an additional 330MW into the Victoria region. This is constrained by the (existing and future) network limit of 1900MW south of Murray into Dederang. Therefore the same maximum support into Victoria is maintained in the MRL definition both pre and post abolishing the Snowy region.

QLD

The QLD MRL should be assessed with 0MW transfer into the region.

Net import limit for QLD

$$(Flow\ into\ QLD\ on\ QNI) + (Flow\ into\ QLD\ on\ Terranora) \leq 0MW$$

NSW

The NSW MRL should be assessed with a net import limit into NSW of -330MW. That is, the NSW region must be exporting at least 330MW in the MTPASA solution in order to maintain sufficient headroom on the interconnectors into the region.

Net import limit for NSW

$$(Flow\ into\ NSW\ on\ QNI) + (Flow\ into\ NSW\ on\ Terranora) + (Flow\ into\ NSW\ on\ NSW-VIC) \leq -330MW$$

VIC

The VIC MRL should be assessed with a net import limit into VIC of 940MW.

Net import limit for VIC

$$(Flow\ into\ VIC\ on\ NSW-VIC) + (Flow\ into\ VIC\ on\ Basslink) + (Flow\ into\ VIC\ on\ Heywood) + (Flow\ into\ VIC\ on\ Murraylink) \leq 940MW$$

SA

The SA MRL should be assessed with 0MW transfer into the region.

Net import limit for SA

$$(Flow\ into\ SA\ on\ Heywood) + (Flow\ into\ SA\ on\ Murraylink) \leq 0MW$$