AUSTRALIAN ENERGY REGULATOR

Derating of the Heywood interconnector

Investigation Report

December 2008

Contents

Glossary

AER	Australian Energy Regulator
ANTS	"Annual National Transmission Statement" publication by NEMMCO under NER clause 5.6.5
APR	Annual Planning Report
ESIPC	Electricity Supply Industry Planning Council
IRPC	Inter-regional Planning Committee
kV	kilovolt
MW	Megawatt
MWh	Megawatt hour
NEM	National Electricity Market
NEMMCO	National Electricity Market Management Company
NER	National Electricity Rules
NSP	Network Service Provider
Regulations	The *National Electricity (South Australia) Regulations* made under the *National Electricity (South Australia) Act 1996* (South Australia)
SOO	"Statement of Opportunities" publication by NEMMCO, incorporating ANTS
TNSP	Transmission Network Service Provider

Executive Summary

The Heywood interconnector (**Heywood**) is an electricity transmission line that connects the transmission networks of South Australia and Victoria. Heywood was commissioned in 1989 with a nominal import capability into South Australia of 500 Megawatts (**MW**). ElectraNet is the Transmission Network Service Provider (**TNSP**) that owns and operates the South Australian transmission network.

Heywood's capability has been reduced several times. In 2003, the limit for flows into South Australia was reduced to 460 MW due to a change in the rating of certain transmission equipment in Victoria. A further derating of 100 MW occurred in late 2007, which reduced the limit to 360MW. The 100 MW derating was due to the following inter-related factors:

- the change in the maximum capacity of the largest single generating unit in South Australia, Northern Power Station that comprises two units, located at Port Augusta;
- the completion of ElectraNet's 275 kilovolts (**kV**) substation at Tungkillo (**Tungkillo substation**), 60km East of Adelaide; and
- the completion of the Lake Bonney Stage 2 wind farm, in South East South Australia.

The AER was concerned that registered participants in the National Electricity Market (**NEM**) received limited notice of the derating, which contributed to higher prices in South Australia (particularly during early 2008). Therefore, the AER commenced an investigation into ElectraNet's compliance with relevant network planning and reporting obligations in the National Electricity Rules (**NER**).

As part of this investigation, the AER has sought the views of the National Electricity Market Management Company (**NEMMCO**) and the Electricity Supply Industry Planning Council of South Australia (**ESIPC**).

While this investigation did not reveal any breaches of the NER by ElectraNet, it did identify opportunities for ElectraNet to improve its process of determining and reporting on transmission capacity. To address these, the AER has decided to:

- obtain a written commitment from ElectraNet to improve its processes; and
- consult with relevant registered participants and contribute to an improved national transmission planning process.

This investigation also identified shortcomings in the registration process for maximum generator capacity. NEMMCO are proposing to submit a rule change proposal aimed at clarifying this issue.

1 Introduction

Section 15 of the National Electricity Law (**NEL**) sets out the functions and powers of the AER. These include:

- monitoring compliance by registered participants and other persons with this Law, the Regulations and the NER; and
- investigating breaches or possible breaches of provisions of this Law, the Regulations or the NER that are not offence provisions.

To fulfil its role, the AER monitors the operation and performance of the NEM and conducts special investigations in response to market outcomes and/or specific events.

This report sets out the results from the AER's investigation into the Heywood derating. The focus of this investigation has been to determine whether ElectraNet, the TNSP that owns and operates the transmission network in South Australia, has complied with relevant obligations under the NER. In particular, the investigation focuses on ElectraNet's compliance with the network planning and reporting obligations in the NER.

In this report:

- Part 2 provides a description of the matter under investigation;
- Part 3 details the NER provisions and ElectraNet's compliance;
- Part 4 analyses issues arising from the NER reporting obligations; and
- Part 5 details the outcomes of the investigation.

2 Description of the matter

2.1 Background regarding Heywood

At the time of its commissioning in 1989, the import capability of Heywood into South Australia was nominally 500 MW. In April 2003, the import capability of Heywood reduced to 460 MW, reflecting a change in the rating for certain transmission equipment at Heywood in Victoria.

Between November and December 2007, revisions to the interconnector's import constraint equations resulted in a further reduction of the import capability to around 360 MW. Based on information it received from ElectraNet, NEMMCO attribute these further reductions to new and altered generation and network augmentations.

Appendices 1 and **2** of this report illustrate the reductions of Heywood's limits and flows from Victoria to South Australia over time.

2.2 High prices in South Australia

During the March 2008 quarter, South Australia experienced a series of high price events in the electricity spot market. The AER published two reports[1] covering the 51 trading intervals[2] when the spot price[3] exceeded $5 000/MWh. The contribution of the Heywood derating to the above high prices is outlined in the AER's $5 000/MWh report for the period 5 to 17 March 2008.

As part of the investigation into these events, the AER requested information from ElectraNet about the derating. ElectraNet's preliminary response in early 2008 was that the factors contributing to the derating of Heywood were:

- the development of the Tungkillo substation, 60km east of Adelaide, which affected Heywood's limits under certain network conditions;
- the introduction of a new 132kV transmission line between South East substation and Snuggery in South Australia (**Snuggery transmission line**), particularly in circumstances when generation was dispatched in the vicinity of the Snuggery Substation; and
- the increase in the maximum rated output of Northern Power Station, which is the largest generator in South Australia.

In June 2008, the Annual Planning Report (**APR**) published by the ESIPC[4] referred to information from ElectraNet which identified a further factor contributing to the derating, which was the completion of the Lake Bonney - Stage 2 wind farm in South East South Australia.

3 The NER reporting obligations

The NER require TNSPs to analyse and report on the expected future operation of their networks in the short and long term. This is to ensure that other stakeholders, such as generators, are aware of network developments that may affect them and can react accordingly.

The potential compliance issues examined by the AER fall into three key categories:

- ElectraNet's compliance with network planning and development processes - NER clause 5.6.6;
- ElectraNet's compliance with obligations associated with network analysis and the

[1] Under NER clause 3.13.7(d). Copies of these reports are available from: http://www.aer.gov.au/content/index.phtml/itemId/714860.
[2] A trading interval is a 30-minute period ending on the hour (Australian Eastern Standard Time) or on the half hour and, where identified by a time, means the 30-minute period ending at that time.
[3] The spot price for electricity in a trading interval is the average of the six 5-minute dispatch prices determined in accordance with clause 3.9.2 of the NER.
[4] Available from http://www.esipc.sa.gov.au/site/page.cfm?u=269.

annual reporting process[5] – NER clauses 5.6.2, 5.6.2A, 9.28.3; and

- ElectraNet's compliance with the general reporting requirement to update NEMMCO on changes that impact on the network - NER clause 5.2.3(d)(12).

A secondary issue, which does not concern ElectraNet's compliance but is of relevance more generally, is the manner in which maximum generator capacities are changed and registered. This secondary issue is of relevance given that changes in maximum output from the Northern Power Station contributed to Heywood's derating.

This part of the report examines each of the areas identified above in detail and assesses compliance with the relevant NER provisions.

3.1.1 Network development processes

TNSPs constructing a new large transmission asset must comply with the access arrangements and procedures set out in clause 5.6.6 of the NER.

A large transmission network asset is an augmentation where the TNSP estimates a total expenditure in excess of $10 million. Both the development of the Snuggery transmission line and Tungkillo substation were large transmission assets.

Under clause 5.6.6(c), the TNSP must make an application notice available to all registered participants and NEMMCO. This notice must set out specific information about the new asset, and in certain circumstances must include an augmentation technical report prepared by the Inter-regional Planning Committee (**IRPC**)[6]. Under clause 5.6.6(c)(5), the technical report is only required if:

- the asset is reasonably likely to have a material inter-network impact based on IRPC assessment criteria[7]; and

- the applicant has not received consent to proceed with the construction of the new asset from all TNSPs whose networks are materially affected by the asset.

The IRPC assessment criteria:

- require TNSPs to take into account "the equipment on the NEM that will exist at the time the augmentation is brought into service and those projects committed at the time of the assessment being made"; and

[5] APRs are incorporated into NEMMCO's Annual National Transmission Statement (**ANTS**), which is a publication with a 10-year outlook incorporated in the Statement of Opportunities (**SOO**). NEMMCO publishes the SOO every October, in accordance with clause 5.6.5 of the NER.

[6] The IRPC is a committee established by NEMMCO under NER clause 5.6.6(a) to perform various functions including: (i) assisting NEMMCO with the preparation of the SOO and ANTS (discussed in Part 5.2.4 of this report); and publishing an objective set of criteria for assessing whether a proposed transmission network augmentation is reasonably likely to have a material inter-network impact, in accordance with NER clause 5.6.3(i) or (l). The former provision applies to new large transmission network assets and the latter to new small transmission network assets.

[7] TNSPs must have regard to these criteria in accordance with clause 5.6.6(d) of the NER. The IRPC publishes the criteria in accordance with NER clause 5.6.3(i), which is specific to large transmission network assets; for further details, refer to the IRPC's "Final Determination: criteria for assessing material inter-network impact of transmission augmentations" (version no. 1.3) available at http://www.nemmco.com.au/psplanning/170-0024.html).

- establish that a material inter-network impact for a transmission augmentation covers situations where there is "a reduction of power transfer capability between transmission networks or within another TNSP's network of more than the minimum of 3% of maximum transfer capability and 50 MW".

ElectraNet published the relevant applications notices for the Snuggery transmission line and the Tungkillo substation in August 2003 and March 2005[8]. ElectraNet claims its analysis at the time took into account the relevant material inter-regional impact criteria as part of this process. ElectraNet also stated that its technical analysis and studies for the above augmentations did not reveal any material inter-network impact.

Compliance assessment

The AER has concluded that there was no breach of clause 5.6.6 of the NER, in particular subclauses (c) and (d). ElectraNet published the required application notices and has demonstrated that it had regard to the applicable material inter-network impact criteria, for both the Snuggery transmission line and Tungkillo substation augmentations. No augmentation technical report under clause 5.6.6(c)(5) was required because:

- ElectraNet's technical analysis and studies did not reveal any material inter-network impact caused by either augmentation at the time of their individual proposal and development; and

- no opposition to the construction of either the Snuggery transmission line or the Tungkillo substation arose from the other TNSPs.

Despite this, the cumulative result of a number of inter-related factors did cause a material inter-network impact. The material inter-network impact cannot be attributed individually to either the new Tungkillo substation or the new South East to Snuggery transmission line. The problems this situation creates for the industry are discussed in Part 4 of this report.

3.1.2 Network analysis and APR obligations

Clause 5.6.2A of the NER requires each TNSP to publish, by June 30 each year, a comprehensive planning report (the APR) that sets out the results of the annual planning review conducted in accordance with, among other things, clause 5.6.2(a)[9]. This review includes analysis of the expected future operation of the TNSP's networks by reference to:

- the relevant forecast loads;

- any future generation;

- market network service;

[8] Final reports, as required under clause 5.6.6(h), were published in November 2003 and October 2005, respectively.

[9] A civil penalty provisions under the Regulations.

- demand side and transmission developments; and
- other relevant data.

In addition, clause 5.6.2A(b)(4)(v) requires that, for all proposed network augmentations, the APR must set out whether the proposed solution will have a material inter-network impact.

In South Australia, a jurisdictional derogation under clause 9.28.3 gives the responsibility of the preparation of the APR to the ESIPC. The same derogation requires the bulk of the information and technical analysis supporting the report to be prepared by ElectraNet.[10]

APRs are an integral part of the planning process. For example, clause 5.6.5 requires NEMMCO to consider each APR published in the relevant year for the purposes of publishing its ANTS by 30 October each year. The ANTS, in turn, is a key source of information to NEM participants for various purposes.[11] It is crucial, therefore, that the APR uses the latest reliable information, derived from robust processes.

Compliance assessment

ElectraNet appears to have satisfied the requirements of clause 5.6.2A and clause 5.6.2(a). However, the AER considers that ElectraNet's reporting did not fulfil the need for full and timely information regarding the derating.

The APR provisions permit TNSPs a high degree of discretion with respect to the reporting requirements. Furthermore, the APR provisions generally focus on longer-term planning horizons (often several years). This can create reporting gaps. The problem that reporting gaps creates for the industry is discussed further below (see Part 4). Part 5 of this report identifies a number of opportunities for ElectraNet to improve its processes.

3.1.3 Reports of network matters to NEMMCO

In addition to the reporting requirements discussed above, under clause 5.2.3(d)(12)[12] of the NER, Network Service Providers (**NSPs**), such as ElectraNet, must provide NEMMCO with a written report on the impact and effects of network augmentations, setting changes or other technical issues that could have an impact across regional boundaries[13]. Unlike other provisions of the NER, the reporting obligation under this clause applies irrespective of the existence of a "material impact" as defined by the IRPC.

When questioned about its compliance, ElectraNet stated that its operations group conducts analysis of the operation of the network on an ongoing basis. This analysis

[10] By 30 April each year, in conjunction with ETSA Utilities who is the sole South Australian distribution network service provider.

[11] For example, Settlement Residues Auctions under NER clause 3.18) or network planning.

[12] A civil penalty provision under the Regulations.

[13] In accordance with NER clause 5.6.2(n), which is a civil penalty provision, any such report must be provided to NEMMCO, and in turn by NEMMCO to the IRPC. Such a report may also be asked by a registered participant where such participant reasonably considers that it is or may be adversely affected by a development or change in another region.

reviews the capabilities of the network and operational limits in the short-term operational timeframe, as opposed to the long-term planning timeframe.

ElectraNet stated that network limits are modified as required to reflect changes in the network configuration and new or altered connections. ElectraNet then provides these limits to NEMMCO on a regular basis to allow NEMMCO to develop network constraints to ensure safe operation of the power system.

With respect to the augmentations considered as part of this investigation, ElectraNet stated that it engaged in regular operations meetings with NEMMCO from February 2007. These meetings were for the purposes of coordinating the form of the operational limits and its implementation, resulting in changes to Heywood's import equations, in late 2007.

Compliance assessment

ElectraNet appears to have satisfied the requirements of clause 5.2.3(d)(12). In this regard, the AER notes that NEMMCO did not raise any concerns about ElectraNet's reporting, and added that as the "reduction in Victoria to South Australia transfer capability is due to a number of inter-related factors, it is not clear whether a report is warranted under this provision". Broader issues relating to the effectiveness of the reporting obligations are discussed below in Part 4.

3.1.4 Secondary issue – generation data

Another issue arising from this investigation, which does not relate directly to ElectraNet's compliance, is the manner in which maximum generator capacity data is reported by NEMMCO.

Northern Power Station comprises two similar units, each of which is the largest South Australian generating unit. It is located near Port Augusta and is operated by Babcock and Brown Power. The table below lists the Northern Power Station units' various recorded capacities:

DATA	CAPACITY (MW)
Maximum Capacity (NER Schedule 3.1)	280
Registered Capacity – full load / PMAX (NER Schedule 3.1)	273
Registered Capacity – sent out (NER Schedule 3.1)	253
Registered Capacity (NEMMCO Registration list)	265
Registered performance standard	252
Connection agreement with ElectraNet	As agreed between the parties

The existence of differing capacity data for the same generating units causes uncertainties in terms of determining which figure should be relied on for various analysis and reporting activities, and for network connection agreement purposes. Capacity changes must be captured through a variety of processes, including:

- NEMMCO's registration process for the purposes of Schedule 3.1 of the NER (Registered Bid and Offer data);
- the technical performance standards of Chapter 4;
- the publication of the SOO and related documents; and
- the network connection processes under Chapter 5 (altering generating systems and varying network connection agreements).

Differing output data is particularly significant in this instance given a relatively small increase in maximum output of Northern Power Station units can significantly reduce the capability of Heywood. The timing of output data changes is also critical. In this instance, increases to Northern Power Station's output, closer to its maximum rated output, were first reported by NEMMCO in the 2003 SOO.

NEMMCO advised that it is currently working with Northern Power Station to update the station's registered performance standards to reflect the requested increase of the registered capacity. NEMMCO also advised that it is preparing a rule change proposal to clarify the collection and use of generators' capacity data.

4 Analysis of reporting issues

While this investigation has not revealed any specific breaches of the NER, it has identified a number of information quality issues. In particular, these issues arise in the context of TNSPs timely integration of information from their short-term operational analysis with the results of their long-term planning. Poor quality information can have significant ramifications for other market participants, who rely on such publications for the purposes of their operational and investment decisions.

This report identified three key relevant reporting obligations on ElectraNet.

- Clause 5.6.6 – the network planning and development process. This clause is designed to identify the implications of establishing new large network assets many years in advance. No augmentation technical report is required where a development does not cause a material inter-network impact. This is despite the fact that the cumulative result of a number of inter-related factors may be material.
- Clauses 5.6.2A, 5.6.2, and 9.28.3 – the APR obligations. These obligations are designed to bring together the results of all the planning and analysis issues each year to allow the preparation of a detailed forecast of the network's future operation. There is significant discretion in the way in which this analysis is undertaken and reported.

- Clause 5.2.3(d)(12) – reporting of network matters to NEMMCO. This is a general obligation that requires NSPs to provide NEMMCO with information about the impacts of network augmentations, setting changes or other technical issues that could impact across regional boundaries. As with clause 5.6.6, it was not clear whether the obligations required a report where each individual development has a limited effect.

Despite these reporting requirements, an important information gap appears to have arisen in the case of the Heywood derating. The following factors gave rise to the information gap:

- The Tungkillo substation, Snuggery transmission line, and power station developments did not individually have significant effects on Heywood's rating, and therefore did not trigger the need for certain reports.

- Despite each individual network development not having a significant effect on Heywood, there was a significant cumulative effect on Heywood when the network developments were considered together.

- Although these cumulative effects were detailed in shorter-term operational network reporting by ElectraNet, the expectation of cumulative effects was not analysed fully in the advanced longer-term planning or reporting (such as under the APR provisions). In other words, ElectraNet's long-term planning arrangements, and its reporting under the APR provisions, did not have significant regard to the collective impact of multiple network developments.

The information gap meant that market participants received inadequate warning of the Heywood derating, which is likely to have contributed to higher electricity prices in South Australia.

While the AER did not find that ElectraNet breached the NER, it did find a number of opportunities for ElectraNet to improve its processes, which are presented below. In discussions with the AER, ElectraNet also considered that it could improve the quality of its network planning and reporting, and integrate its detailed operational analysis into long-term planning at an earlier stage.

5 Outcomes of the investigation

To safeguard the principle of transparency within the NEM, and to achieve efficient market outcomes through informed decisions by all participants, the AER has requested that ElectraNet commit to improving its processes by:

- better integrating changes to the network capability through the planning process into its ongoing analysis of, and reporting on, the expected future operation of its networks; and

- disseminating reliable, prompt and full information relating to major network factors (such as those contributing to Heywood derating) as soon as its analysis and studies reveal issues likely to have significant NEM impacts.

The AER has asked ElectraNet to provide written confirmation of this commitment by 31 January 2009. The commitment reflects the obligations under NER clauses 5.6.2(a) and 5.2.3(d)(12).

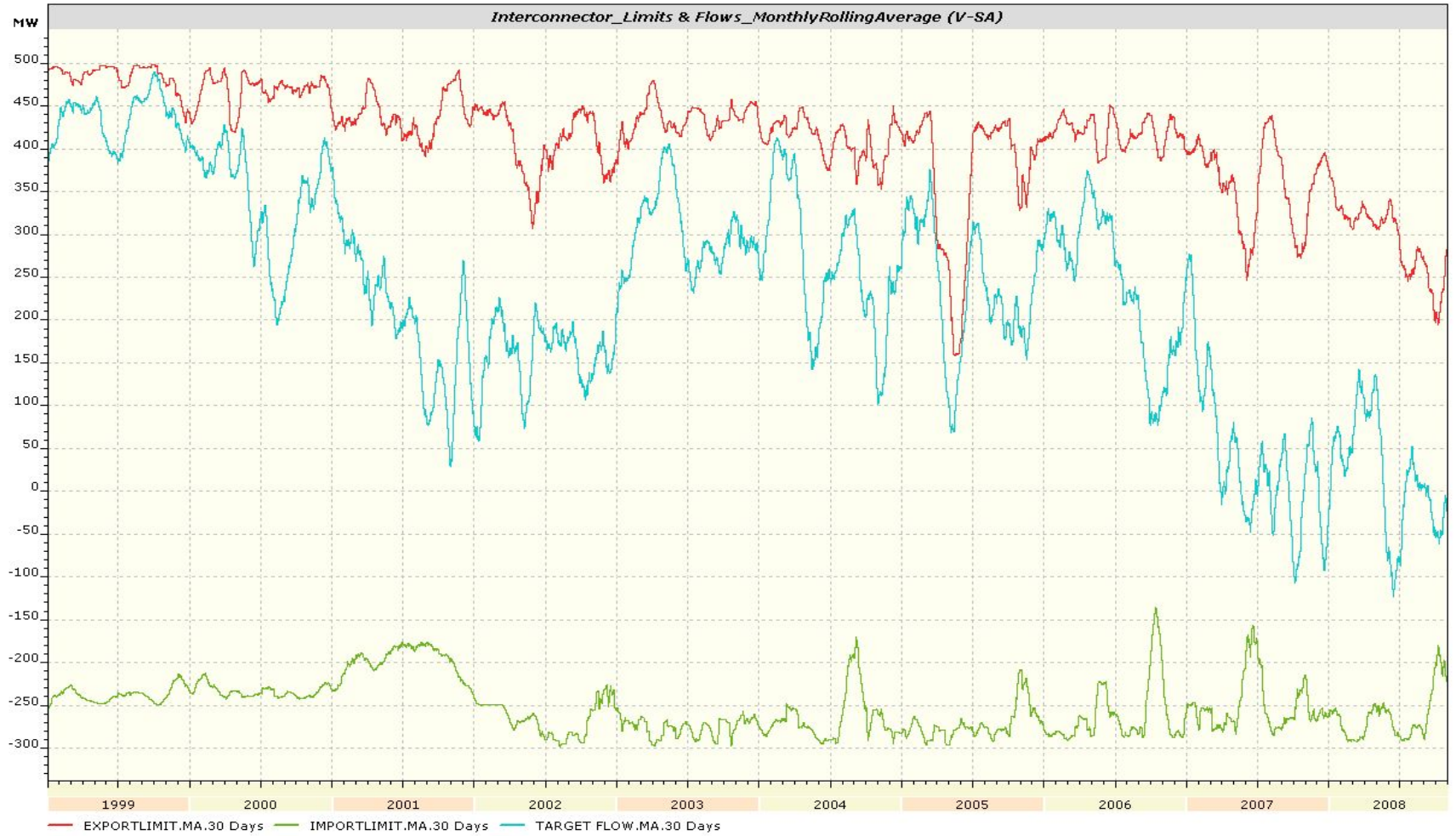
Although this matter involves only ElectraNet, for the purposes of compliance with the NER obligations examined in this report, the AER expects every TNSP to use reasonable endeavours to provide timely quality information in this regard.

This investigation also brings to light broader issues associated with the coordination of transmission network planning and reporting across the NEM. The AER is hopeful that most of the inadequacies under the current network development and planning process (e.g. poor or inadequate information from TNSPs) will be addressed through the implementation of a National Transmission Planner framework in 2009.

The AER will raise the findings of this investigation with industry participants in the context of the development of the new national planning framework. Its objective is to better understand how each TNSP meets these obligations and to develop a consistent best practice guideline for the industry.

Finally, with respect to the registration of generator capacity covered by this report, the AER will contribute to the Rule change proposal being prepared by NEMMCO.

Appendix 1: Monthly rolling average of the Heywood interconnector's limits and flows from Victoria to South Australia[14] (source: AER).



[14] By convention, the export limit depicted corresponds to the South Australian import capability referred to in this report (source: AER).

Appendix 2: Victoria to South Australia calculated stability limit for the Heywood Interconnector (source: NEMMCO)