ESOPP GUIDE

GUIDE TO THE CONGESTION INFORMATION RESOURCE

PREPARED BY: Electricity System Operations Planning and Performance

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FINAL

Version Release History

VERSION	DATE	BY	CHANGES
2	27 June 2011	Ben Blake, Edwin Ong	Updated for 2011 consultation. Included revised disclaimer, revisions to match AEMO style guide.
1.2	6 July 2010	Ben Blake	Added AEMO disclaimer
1.1	30 April 2010	Ben Blake	Added heat map section to Appendix, minor corrections
1	28 April 2010	Ben Blake	Included extra fields for NOS, added NOS 24 hour summary
1 DRAFT	1 March 2010	Ben Blake	Document tidy up, included changes for the Final CIR, removed references to interim CIR and NER 11.30.x
Interim	28 October 2009	Ben Blake, Michael Lyons	Original document for the Interim CIR

Contents

1 Disclaimer

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b) **No substitute** – This Guide is not a substitute for, and should not be read in lieu of, the National Electricity Law (NEL), the National Electricity Rules (Rules) or any other relevant laws, codes, rules, procedures or policies. Further, the contents of this Guide do not constitute legal or business advice and should not be relied on as a substitute for obtaining detailed advice about the NEL, the Rules, or any other relevant laws, codes, rules, procedures or policies, or any aspect of the national electricity market or the electricity industry.

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2 Definitions

ABBREVIATION	DEFINITION
AEMC	Australian Energy Markets Commission
AEMO	Australian Energy Market Operator
CIR	Congestion Information Resource
FCAS	Frequency Control Ancillary Service
MCE	Ministerial Council On Energy
MT PASA	Medium Term Projected Assessment of System Adequacy
NEMDE	National Electricity Market Dispatch Engine
NEMMCO	National Electricity Market Management Company
NEM	National Electricity Market
NOS	Network Outage Scheduler
PASA	Projected Assessment of System Adequacy
TER	Transmission Equipment Ratings
TNSP	Transmission Network Service Provider

3 Introduction

The Australian Energy Market Operator (AEMO) is required under the National Electricity Rules (Rules) to establish a congestion information resource (CIR), which will consolidate and enhance existing sources of information relevant to the understanding and management of transmission network congestion risk.

To meet its (Rules) obligations AEMO has:

- Established the interim congestion information resource in October 2009
- Published the guide to the first CIR on 1st September 2010. This guide describes the CIR that is due in September 2011.

This guide describes the web based resource that is targeted to take effect on 1 September 2012 as the CIR is progressively developed in consultation with national electricity market (NEM) registered participants and interested parties.

3.1 Background

Following completion of its congestion management review in early 2008, the Australian Energy Markets Commission (AEMC) recommended to the Ministerial Council on Energy (MCE) that a congestion information resource (CIR) be established and maintained by the Australian Energy Market Operator (AEMO).

The National Electricity Rules (Rules) were subsequently changed and took effect from 1 September 2009 to reflect the Rule made by the AEMC titled “National Electricity Amendment (Congestion Information Resource Rule) No 16 2009”. Rule 3.7A requires AEMO to develop and consult upon the content and guidelines for the congestion information resource. The purpose of this document is to provide users of the CIR with a reference that will assist them to:

- readily identify what information is available in the CIR and where to find it
- interpret the information contained in the CIR
- understand how the information in the CIR is derived

A further purpose of this document is to be a reference point for consultation with stakeholders during development of the CIR.

3.2 Description of the Congestion Information Resource

The objective of the CIR is to provide information in a cost effective manner to NEM participants to enable them to understand patterns of network congestion and make projections of market outcomes in the presence of network congestion.

The congestion information resource must include:

1. the network outage schedule
2. the incidence of congestion in the NEM through the use of historical data on mis-pricing at transmission network nodes in the NEM
3. the following information on network outages planned for the subsequent thirteen months that, in the reasonable opinion of the relevant transmission network service provider (TNSP), will have or are likely to have a material effect on transfer capabilities:
    (a) details of the forecast timing and the factors affecting the timing of planned network outages and the likelihood that the planned timing will vary
    (b) details of the reasons for the planned network outage, including the nature, and a description, of the works being carried out during the planned network outage, if any
4. the following information on planned network outages referred to in subparagraph (3)

(a) an assessment of the projected impact on intra-regional power transfer capabilities, the accuracy of which must be appropriate to implement the congestion information resource objective

(b) an assessment of the projected impact on inter-regional power transfer capabilities, the accuracy of which must be appropriate to implement the congestion information resource objective

5. any other information with respect to planned network outages referred in subparagraph (3) that implements the congestion information resource objective
6. any other information that AEMO, in its reasonable opinion, considers relevant to implement the congestion information resource objective

3.3 Layout of this Document

Information in the CIR is grouped into the following five categories:

- Policy and process documentation: contains congestion related policies and procedures that are used by AEMO in the management of network congestion in the NEM
- Educational material: contains information concerning AEMO's constraint management course
- Network status and capability: contains information relating to the forecast and past transmission outages, and the implications of those outages for electrical transfer capability
- Statistical reporting streams: contains routine analyses of specific aspects of transmission congestion, updated periodically
- Issues and transitional arrangements: contains information on aspects of congestion management that are currently under development or are subject to change

The remainder of this document provides further detail on the information contained in the CIR in each of the above categories and the location of the CIR.

3.4 Location of the CIR

The congestion information resource is located on the AEMO website at:
http://www.aemo.com.au/electricityops/congestion.html

3.5 Future Development of the CIR

AEMO is keen to ensure that the CIR is continually developed to match stakeholder needs, and consistent with the requirements of clause 3.7A(d). To manage this process:

- AEMO includes CIR development as a standing agenda item for meetings of the dispatch and pricing reference group (DPRG)
    - Under that agenda item proposals for change, viability of the proposals, and priorities would be discussed in some detail. AEMO and stakeholder groups would be expected to take action items away for analysis and discussion between meetings.
- Approximately annually, the position of the group would be crystallised for consultation in accordance with Rule 3.7A(d)
- AEMO would carry out the formal stakeholder consultation in accordance with clause 3.7A(d) to determine how the CIR guidelines should be changed
- The process would continue on an ongoing basis

In the development of the CIR there will be a need to strike a balance between the benefits of enhancing the CIR and the costs involved. This will be managed using a release planning strategy similar to that used for MMS and MSATS. Under this approach:

- all proposals accepted through the consultation process would be ranked in terms of relative benefit - based upon certain criteria – this ranking would be developed as part of the consultation process
- the resources required to implement each proposal would be identified. This would include both development costs and ongoing operational costs (including resources required by TNSPs where appropriate)
- the proposals would then be grouped into annual releases according to the ranking and the resources available for each release

This could well mean that some proposals may take a number of years to implement. If this was considered unacceptable by the proponent then the costs of accelerating this work through increased resources could be identified and a decision made by AEMO in consultation with the DPRG, to determine whether the increased cost required to accelerate the work would be justified

4 Policy and Process Documentation

This section of the CIR contains congestion related policies and procedures that are used by AEMO in the management of network congestion. A list of the policies and procedures contained in the CIR is set out below, followed by a brief description of what information is contained in each of them.

(a) Constraint formulation guidelines

(b) Constraint naming guidelines

(c) Constraint implementation guidelines

(d) Constraint violation penalty factors

(e) Confidence levels, offsets and operating margins policy

(f) Over-constrained dispatch re-run process

(g) Constraint frequently asked questions

4.1 Constraint Formulation Guidelines

The constraint formulation guidelines document details the guidelines AEMO follows when developing constraint equations. This document includes:

- the methodology used to develop the constraint equation terms and co-efficients
- the policy as to what terms appear on the left or right hand side of a constraint equation to allow AEMO to control all the variables (i.e. a fully co-optimised constraint equation).
- the circumstances when AEMO would use an alternative constraint formulation
- how AEMO receives information from market participants
- the policy on negative residue management
- the process for invoking and revoking constraint equations

This document is updated via formal rules consultation.

4.2 Constraint Naming Guidelines

Each constraint set, constraint equation and constraint function stored in AEMO's market systems requires a unique identifier or name. This document provides the guidelines that AEMO follows

when creating the names to provide a quick way to identify the purpose, system condition and regional location of the constraint set, constraint equation and constraint functions.

This document is updated as required.

4.3 Constraint Implementation Guidelines

The constraint implementation guidelines document details:

- The structure of constraint sets, equations and functions in AEMO's market systems
- Examples of how energy and frequency control ancillary service (FCAS) constraint equations are formulated
- Examples of solutions to constraint equations

It combines information that was previously in the generic constraints due to network limitations procedure (SO_OP_3709) as well as the FCAS constraint equations guide. This document is updated as required.

4.4 Constraint Violation Penalty Factors

Occasionally, and particularly at times of power system stress, it is not possible for the national electricity market dispatch engine (NEMDE) or projected assessment of system adequacy (PASA) to identify a dispatch solution that satisfies all of the constraint equations and the regional energy balance requirements. In these situations, the solution violates one or more of the constraint equations. Constraint equation violation penalty factors provide NEMDE and PASA with information about the relative importance of all constraint equations. This allows NEMDE and PASA to make appropriate decisions about which constraint equations should be violated, and by how much, when some degree of violation is unavoidable. The violation penalty factors determine the priority of constraint equations by type, for example: FCAS, network security, direction constraints and ramp rate limits.

These factors are listed in the constraint violation penalty factors document and changes to it are made through consultation with interested parties as and when issues with the current allocation are identified.

4.5 Confidence Levels, Offsets and Operating Margins Policy

This document details the policy on who is responsible for the determination of confidence levels, offsets and operating margins and the factors that should be considered when calculating these values.

4.6 Over-constrained Dispatch Re-run Process

NEMDE uses linear programming optimization method to solve a 5-minute dispatch run. To find a feasible solution, NEMDE utilizes the CVP factor to determine the constraint priority order. If a feasible solution cannot be found without violating one or more constraints, NEMDE selects the constraints to violate based on their order of merit. Consequently, the cost of violating one or more constraints can lead to a dispatch price that is either above the market price cap (MPC) or below the market price floor (MPF). This is known as over-constrained dispatch.

National Electricity Rule 3.8.1 (c) requires AEMO to develop procedures which resolve these cases so that the dispatch price is determined by bids and offers of scheduled plant and not by the relevant constraint violation penalty factors. The procedure involves relaxing the violated constraint equations and re-running the dispatch process to obtain a revised dispatch price. The procedure has an automatic (real-time) component and a manual (next business day) component.

This procedure is amended through formal Rules consultation.

4.7 Constraint Frequently Asked Questions

This document contains a list of frequently asked questions (FAQ) on constraints and their operation in the NEM and is updated as required.

5 Educational Material

5.1 Training Courses

AEMO offers training courses on different aspects of the NEM that are designed to improve participant understanding of how the NEM works.

To assist stakeholders with their initial understanding of how congestion is managed from an operational perspective in the NEM and its impact on dispatch and pricing outcomes, AEMO offers an interactive constraints management course. The course is run face to face over a two day period, and takes place on a regular basis in various NEM jurisdictions. A fee is charged to attendees to reflect the cost of running the course.

5.2 Videos

This section of the CIR will contain brief videos explaining how constraint equations work.

6 Network Status and Capability

This section of the CIR contains information relating to the physical status of the electricity transmission network and its capability to transfer power between network locations. This includes information about anticipated and historical transmission equipment outages, and the implications of those outages for power transfer capabilities. Registered market participants are able to view this information to assist in making projections of market outcomes.

6.1 Network Outage Scheduler

Under Rule 3.7A (p), TNSPs are required to submit their current intentions and best estimates regarding planned network outages.

The TNSPs meet this obligation by providing information on all network outages via the network outage scheduler (NOS) application. This includes information on all out of service work, and any secondary bookings that are forecast to cause a constraint on the dispatch process.

The NOS creates a report that is published on the AEMO website and is updated every 1 hour starting at midnight (EST).

6.1.1 Inputs

Bookings for outages may be made up to two years in advance or at short notice in response to an emergency. The TNSPs enter the following information in the NOS about the outage:

- The equipment affected by the outage
- The planned start and end time of the outage
- Whether it is secondary or in service work
- Any notes associated with the outage

AEMO assesses the outage bookings and enter the following information into the NOS:

- Any constraint equations invoked associated with the outage
- The assessment status of the outage

- Any further notes associated with the outage

6.1.2 Outputs

The NOS publishes a report which contains the following information about each outage:

- Region name - NEM region name
- Station name - the terminal or switching station at which the work is based
- Equipment name - the element which is out of service to the system
- Equipment type - e.g.: Line, XFMR: transformer, CP: Capacitor, BUS: busbar
- kV - kilo Volt, the voltage level of the equipment
- Start time - planned date and time for the outage commencement, or actual start time if an outage has commenced.
- End time - planned date and time for the outage completion
- Recall time – the time required to recall the outage. Recall times are normally only used in emergency cases to manage security or reliability issues. The recall time should be used as a guide only and other circumstances may cause the time to be extended.
- Date / time of the original inclusion of the outage in the NOS. Outage times can change based on resource allocations/availability. In cases where TNSPs provide their 13 month outage plan independent of the NOS an outage may have been published earlier via the planned network outages (see 6.3).
- Date / time of the last change - This includes only a change to the outage date(s). It excludes minor changes to the NOS entry such as TNSP notes, outage time change on the same day and outage status updates.
- TNSP that submitted the outage
- Status – This indicates the likelihood of the outage proceeding, there are various planning stages involved with outages. At each stage the system conditions are assessed with respect to the forecast demand and the state of the power system. Unplanned events can arise which alter the likelihood of a planned outage proceeding. The status of an outage may be:
    - SUBMIT - The outage request has been submitted by the TNSP to AEMO for assessment.
    - MTLTP - medium term likely to proceed. The outage has been assessed in the medium term by AEMO and it is likely to proceed.
    - STLTP - short term likely to proceed. The outage has been assessed in the short term by AEMO and is likely to proceed.
    - PDLTP - pre-dispatch likely to proceed. The outage has been assessed in pre-dispatch by AEMO and is likely to proceed.
    - PTP - permission to proceed. The outage has been given permission by AEMO to begin.
    - PTR - permission to restore. The outage has been given permission by AEMO for restoration to begin.
    - RESUBMIT - The outage booking has been updated by the TNSP. The outage requires assessment by AEMO.
    - ISSUES - Assessment has taken place and an issue has been identified. The issue must be addressed prior to the outage proceeding. Several types of issue are defined, these include:

        - General
        - Ratings
        - Contingency
        - Constraint equation(s) required
        - UTP - issue unresolved. (The issue could not be resolved at the time of assessment and the outage is unlikely to proceed)
    - Constraint set id – constraint set identifier from constraint library.
    - Secondary/in-service flag
        - 1 = secondary or in-service work,
        - 0 = normal out of service.
    - Recall time (D) – time required to return the out or service plan during the day
    - Recall time (N) – time required to return the out or service plan during the night
    - Date/time of original inclusion of outage
    - Date/time of last change
    - TNSP that submitted the change

6.1.3 Using the NOS Report

The NOS report contains information about outages on the transmission network and any associated constraints. The constraints associated with the outage can assist participants in making projections about the market outcomes.

It can also help them in determining if the outage affects them (directly or indirectly). For example an outage on a transmission line close to a generator may affect the output of the generator. An outage that affects the flow on an interconnector may also affect the business decisions of various participants.

6.2 Transmission Equipment Ratings (TER)

Under Rule S5.1.12, network service providers (NSP)s are required to advise AEMO, the rating of their transmission lines, distribution lines or other equipment. The ratings may be provided as static data for use under specified conditions, telemetered dynamic real time data for use in dispatch timeframe, or may be hand dressed by AEMO in urgent circumstances.

The report published on AEMO's website contains information about static ratings for use under specified conditions.

This report is updated when AEMO receives new information and loads it into their EMS.

6.2.1 Inputs

The NSPs provide information about their equipment including the rating application levels, application rules and the rating values.

This information is provided by NSPs if they add a new equipment into their network or if the ratings of an existing equipment changes.

6.2.2 Outputs

The following information is published in the TER report:

- Site name - the substation, terminal station, or power station name
- Plant type - transmission lines may be 'LINE', 'TIE', 'SUMM' for summated lines, or 'S_REACT' for series reactors. Transformers may be 'TRANS', 'TX', or 'TF'

- Plant ID - the equipment identifier
- Region - the NEM region
- Measurement - all values included in the publication process are MVA quantities
- Level - NORM, EMER, or LDSH
- Alternate value - An identifier which describes when the rating is applicable, such as summer, winter, etc. Note that any rating with an associated alternate value suffix of '_DYN' has a real time telemetered rating supplied by the asset owner. This telemetered value would normally be the rating applied in real time processes. If telemetered data is available, any associated static ratings will be used for Predispatch. It may also be used for dispatch on telemetered data failure.
- Low and high - The low and high provide a directional feature in the application of the rating. When associated with the site name, the low and high are interpreted using the convention of a positive value represents power flow from the site into the equipment.

6.2.3 Using the Transmission Equipment Ratings

The information in the TER can help participants with network analysis.

The TER can also be used to determine what rating was used in a particular constraint equation and thus help with constraint analysis.

6.3 Planned Network Events

Rule 3.7A(b)(1) requires AEMO to determine and publish information on *planned network events* that are likely to materially affect *network constraints* in relation to a *transmission system* in order to implement the *congestion information resource objective*.

The CIR includes information on network outages planned for the subsequent thirteen months that, in the reasonable opinion of the relevant *Transmission Network Service Provider*, will have or are likely to have a material effect on transfer capabilities. TNSPs are required to provide to AEMO this information by the fifth business day of each month in accordance with the timetable for the provision of information to medium term PASA.

An assessment of the projected impact of planned *network outages* on intra- and inter-regional power transfer capabilities is provided by publishing the indicative limit equations and plain english descriptions of the impact of planned network outages. plain english descriptions are available via the MMS web portal (see 6.4.2) and the constraint set ID is included in the outage plan.

6.3.1 Indicative Limit Equations

AEMO will publish indicative limit equations (as provided by the relevant TNSP) for each planned network outage where available. It is possible that limit equations will not be available for network outages that are further out in the forecast period.

These equations will describe the outage in a mathematical form, which although potentially quite complex, will allow participants to identify how other parameters may influence the limit, and the likely impact of the limit on generating units, etc.

Implementation of this approach requires timely limit equations and clear linkage between the transmission element outage and the limit equation(s) that describe network capability during the outage.

There will be no limitation on the types of variable that can be used in the limit equations.

6.3.2 Timeframe for Publishing Planned Network Event Information

AEMO is required to publish the planned network event information by 1600 hrs on the fifteenth business day of each month in accordance with the timetable for the provision of information to medium term PASA.

6.4 Electricity Market Data Available via the MMS Web Portal

The MMS web portal provides current market information inside a secure zone which is only available to registered electricity market participants. Each participant has access to these web pages and the security model allows participants to manage the rights of the users in their organisation. AEMO provides information in the CIR on how participants can gain access and configure the MMS web portal.

6.4.1 Outputs

Interconnector results lists:

- Interval
- Interconnector ID
- Total cleared
- Initial MW
- Import limit and import constraint equation ID
- Export limit and export constraint equation ID

Constraint equation results list:

- Interval
- Constraint equation ID
- RHS value
- LHS value
- Marginal value
- Violation degree

The constraint equation results are sorted by the constraint equation ID with violating constraint equations first, then binding and non-binding constraint equations.

Where constraint equation IDs are listed a link is provided to the “plain English” converter.

6.4.2 “Plain English” Constraint Equations

The “plain English” constraint equation converter available in the MMS web portal produces a version of a constraint equation which can be more easily understood by participants.

The conversion tool changes the IDs used on the left and right hand sides of constraint equations to a description (e.g. Q_DIRLK_H31MDNR_TRFMR becomes "MW flow on Molendinar 275/110 kV transformer" and NBAY1 is converted to “Bayswater unit 1”) and the reverse polish notation (RPN) calculations are converted into conventional algebraic form.

6.4.3 Transmission Line Diagrams

AEMO has produced single line diagrams of the national transmission network as part of the National Transmission Network Development Plan (NTNDP). This information is updated annually as part of the NTNDP.

- Interactive map provides information regarding modelled projects, market simulation outputs and other information
- High-level overview of the main transmission networks and interconnections for each region
- Detailed network diagrams contains further network details at the bus level

7 Statistical Reporting Streams

This section of the CIR contains continuous reporting streams that provide stakeholders with specific views of the congestion that are updated regularly through time. These reports aim to provide information at a higher level than that of raw data, so that trends might be revealed in the specific reporting area.

7.1 Comparison of Regional and Locational Prices

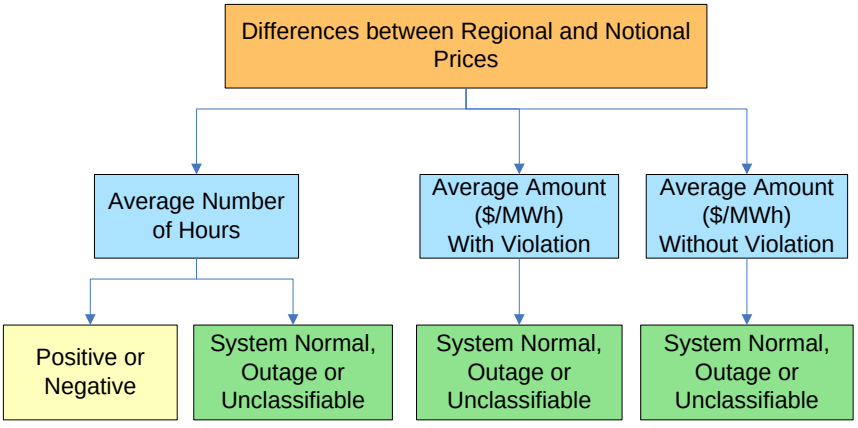
One of the recommendations by AEMC in the congestion management review is to amend the Rules to 'require AEMO to publish analysis on the extent and pattern of "mis-pricing" cause by congestion'. This requirement is captured in Rule clause 3.7A(b)(2). The term mis-pricing is defined in chapter 10 of the Rules (the glossary). It is essentially the comparison of the regional reference price at reference nodes and the notional prices at connection points.

The intention of this report is to provide an indicator of historical trends when the prices are different between the regional and the notional prices in the presence of network congestion. Information on the trends may assist market participants in understanding and managing the risk associated with network congestion. This difference in prices occurs when a dispatched quantity of a generator is directly subjected to a binding constraint equation. Impact of losses is ignored, except those which are inherently included in some constraint equations.

7.1.1 Outputs

The information published mainly consists of graphs and tables showing the differences between regional and notional prices for the historical time period that is covered by the CIR.

In general, the graphs and tables can be divided into two sets. The first set focuses on the average number of hours of differences while the second set focuses on the average amount of differences (in $/MWh). The different concentrations are summarised in the figure below.



7.1.1.1 Average number of hours

This set of data shows the average number of hours when the regional and notional prices are different. The three sets of data displayed are:

- Base case data – Shows the average number of hours when there is a mis-match between the regional and notional energy prices
- Positive or negative differences – base data is categorised to either positive (typically when notional price < RRP) or negative (typically when notional price> RRP)
- System normal, outage or unclassifiable – Base data is classified according to power system conditions

This information will provide participants with a better understanding of the frequency of when a generating unit was either constrained on or off by constraint equations and an indication of whether this coincides with a system normal or outage condition.

7.1.1.2 Average amount in $/MWh

This set of data shows the average amount (in $/MWh) of differences between the regional and notional prices. It is assumed that the notional prices are also capped between the floor and market cap prices. Two sets of data are shown, where one shows the average amount with violated constraint equations and the other ignores violated constraint equations. These two sets are then classified according to power system conditions.

The two sets of information provide an indication of the upper and lower bound of average amount of differences between regional and nodal prices.

7.1.2 Inputs

The main input to the report is the data on the differences between regional and notional prices. Information that is required to obtain this base data includes:

- List of all binding constraint equations which have one or more scheduled generators, loads or network service connection points on the left hand side
- Raw marginal values of binding constraint equations in the dispatch scope
- Text of prior outage condition

The above information is stored in AEMO's database.

7.1.3 Using the Report

The report is sectionalised into NEM regions so participants can easily concentrate on the region(s) of their interest. NEM regions with a large amount of connection points (such as Queensland) are further grouped into subregions.

7.1.4 Other Mis-pricing Information

The raw data for each dispatch interval that is used to calculate the quarterly mis-pricing reports will be provided to all registered participants the following business day via the MMS data model.

7.2 Interconnector Quarterly Performance Report

Clause 3.13.3(p) of the National Electricity Rules states that AEMO must publish, on a quarterly basis, details of:

- interconnector transfer capability
- the discrepancy between interconnector transfer capability and the capacity of the relevant interconnector in the absence of outages on the relevant interconnector only

for each day of the preceding quarter for all interconnectors.

AEMO satisfies this requirement through the publication of:

1. the constraint set(s) enabled at each point in time as part of the NEMDE input file
2. the observed medium term projected assessment of system adequacy (MTPASA) interconnector capabilities with and without outages

7.2.1 Outputs

The quarterly interconnector performance report provides MTPASA interconnector capabilities with and without outages as published over the last three months (i.e. the publication in #2 above) as well as a description of the most likely network limitations determining the interconnector power transfer capabilities.

The interconnector capabilities without outages are determined using the results of RELIABILITY_LRC runs (please see the details in the Inputs section below).

The interconnector capabilities with outages are determined using the results of “Outage_LRC” runs (please see the details in the Inputs section below).

7.2.2 Inputs

MTPASA produces two sets of interconnector limits for use in assessing reserve. These are denoted as RELIABILITY_LRC and OUTAGE_LRC in the public MTPASA file.

RELIABILITY_LRC interconnector limits are determined using constraint equations designed to reflect maximum power transfer capabilities (without taking into account the planned network outages) and use the MTPASA 10% POE demand forecast where the constraint equation contains a demand term.

OUTAGE_LRC interconnector limits are determined using constraint equations reflecting power transfer capability, taking also into account planned network outages. These constraint equations reflect expected network outage conditions and use the MTPASA 50% POE demand forecast where the constraint equation contains a demand term.

All constraint equations in MTPASA use PASA availability of generating units submitted to AEMO market systems. The PASA availability is defined in the Rules as the physical plant capability of a scheduled generating unit, scheduled load or scheduled network service, including any capacity that can be made available within 24 hours.

7.3 Interconnector Limits for MT PASA

This is an additional report published to supplement the MT PASA outputs for the purpose of meeting AEMO obligations with regards to Rule 3.7A.

7.3.1 Outputs

The key outputs of this report are the forecasts of interconnector capabilities in the MT PASA timeframe. In addition, the report explains various power system characteristics that could determine the power transfer limits of the interconnectors.

7.3.2 Inputs

The interconnector power transfer capabilities determined in the Reliability_LRC calculation of the MT PASA process. Refer the previous section on the details of the constraint equations used in Reliability_LRC calculation.

7.4 Annual Constraint Report

The main purpose of this annual report is to provide information to market participants on the performance of constraints and to highlight transmission congestion related issues in the NEM over the previous year.

The report contains, but is not limited to, the major binding / violating constraint equations, timing of major outages as well as commentary on these. Where possible this information is represented graphically so trends throughout the reporting year can be visualised.

The constraint report will be published annually covering the previous calendar year.

7.5 AEMO Incident Reports

AEMO produces reports on both power system and market incidents. Not all reports are related to congestion, but the full list is linked to the CIR for completeness.

8 Issues and Transitional Arrangements

Network congestion management is an area that is often the subject of development and change in the NEM. It is therefore important that the CIR provides users with a portal to the most significant current developments that impact network congestion. This section of the CIR will serve as the portal to current developments in congestion management.

8.1 National Transmission Network Development Plan (NTNDP)

The national transmission network development plan (NTNDP) annual plan is produced by the AEMO planning department as an indicator of the expected generation and transmission outcomes for the next 20 years. The scenarios covered in the report have been created based on information obtained through consultation with market participants and includes rigid planning practices to cover for variables such as the impact of carbon prices and the renewable energy target. .

8.2 TNSP Annual Planning Reports

TNSPs have an obligation through arrangements with the NER to produce an annual planning report, published around mid-year

In these reports TNSPs are required to analyse the future operation of their transmission network based on load forecasts developed through consultation with their distributors. As demand within a region grows, new connection points are required and these planning proposals need to be discussed. The TNSP also needs to forecast the potential constraints in the power system and propose ways to alleviate these constraints by proposing system augmentations and ensuring that the solutions will meet the regulatory tests. In addition, existing network assets that need to be replaced are also discussed in the report.

9 Appendix 1: Items for Future Versions of the CIR

This section details items which were submitted to AEMO as part of the CIR consultations conducted and are detailed here for consideration in future versions of the CIR via the process outlined in 3.5.

9.1 "Heat Map" Display of Mis-pricing

Mis-pricing information would be displayed graphically using a "heat map" overlay on a geographical map located in the MMS web portal. Different colours would be used represent different price ranges.

9.2 Visual Image of NEM Outages

NOS outages would be represented visually on a network diagram. The network model would allow additional outage information to be viewed by selecting the outage in the network diagram. Generator outages could also be included provided confidentiality issues surrounding the publication of this information were resolved.

9.3 Visual Image of Constraint Equations

This network diagram would allow a visual representation of the constraint equation by location in real time.

9.4 Indicator of Accuracy of Planned Outage Schedules

This report would detail the accuracy and completeness of planned outage schedules 1, 3 and 6 months ahead.

Additionally reporting would include statistics on the number of outages which are planned, short notice (within 4 days) and forced outages.

9.5 Statistics on the Performance of Network Ratings in Pre-dispatch Forecasts

The content and nature of this report will be determined through consultation with the DPRG. In general this would compare the value of the rating used in dispatch time with the rating forecast in Predispatch 4, 12 and 24 hours out.

9.6 Publishing NOS and TER Data via MMS Data Interchange

As well as publishing the NOS and TER data file on the CIR this information would be made available to market participants via the MMS Data Interchange.

9.7 Improved Information in the TER File

Additional columns would be added to the transmission equipment rating file. These are:

- Dynamic Rating – Indicates whether dynamic ratings are applied
- SPD_ID – the identifier used in the dispatch engine for the transmission equipment