INTERCONNECTOR-RELATED PASA LOR TRIGGER LEVELS BUSINESS SPECIFICATION

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1. Reference

1.1 Abbreviations

ABBREVIATION	ABBREVIATION EXPLANATION
MMS	Market Management System; software, hardware, network & related processes to implement the National Electricity Market (NEM); a AEMO department responsible for maintaining the system
POE	Probability of Exceedence
LOR	Lack of Reserve Conditions – refer System Operation Procedure SO_OP 2000 for definitions. LOR1 : Lack Of Reserve Level 1 LOR2 : Lack Of Reserve Level 2 LOR3 : Lack Of Reserve Level 3
PASA	Projected Assessment of System Adequacy
PD PASA	Pre-dispatch PASA : Reserve assessment in Pre-dispatch timeframe
ST PASA	Short Term PASA
MT PASA	Medium Term PASA
MSC Runs	Region-specific “Maximum Spare Capacity” LP runs in the PASA Solver.
Basslink	HVDC interconnector between Victorian & Tasmanian NEM regions, operated as an MNSP in NEM.

TABLE 1: ABBREVIATIONS

1.2 References

1. System Operating Procedure SO_OP 2000 “Glossary”
http://www.AEMO.com.au/powersystemops/powersystemops.htm

2. Introduction

2.1 Overview

This Business Specification describes market system changes to introduce interconnector flow into the PASA Solver calculations of region-based Lack of Reserve (LOR) Trigger Levels.

The changes were implemented as part of the Mid 2005 MMS release.

2.2 Background to Changes

AEMO (formerly NEMMCO) is required to provide accurate forecasts of LOR conditions in the Pre-dispatch & PASA time frames.

In September 2004, as part of the Tasmanian NEM Entry project, NEMMCO conducted some preliminary market systems functional testing of the future TAS1 NEM region & the future Basslink MNSP in order to identify any additional MMS functionality that was required prior to Basslink commissioning.

Following these tests NEMMCO identified that a change was required to the PASA Solver software to introduce interconnector flow into the PASA Solver's automatic post-calculation of minimum LOR Reserve Requirements (aka LOR Trigger Levels).

LOR Trigger Levels that vary with flow over the specified "contingency" interconnector (& therefore, over time) are required to identify the LOR Condition within a region.

As the flow over Basslink is at times significant compared to the largest credible contingent generation loss in the Tasmanian NEM region then Basslink is classed as a "contingency" interconnector & its flow is used in the PASA Solver LOR Trigger Level calculations.

2.3 Benefits of Changes

This change ensures that LOR Conditions are accurately flagged to AEMO & the market over the Pre-dispatch & PASA timeframes, particularly when the flow into a region over the specified "contingency" interconnector represents the largest contingent generation loss for that region or set of regions.

3. Status Prior to Changes

In accordance with Section 4.8.4 “Declaration of Conditions” of the NER, AEMO may declare Lack of Reserve Level 1 (LOR 1), Lack of Reserve Level 2 (LOR 2) & Lack of Reserve Level 3 (LOR 3) conditions in NEM regions.

AEMO’s operational interpretation of the above conditions is given in the System Operating Procedure SO_OP 2000 “Glossary” (Reference #1).

Static or fixed LOR Trigger Levels are currently used to identify LOR1, LOR2 & LOR3 conditions in the NEM.

For a given region:

IF
Available LOR Reserve < LOR3 Trigger Level

THEN
LOR3 condition reported

ELSE IF
LOR3 Trigger Level ≤ Available LOR Reserve < LOR2 Trigger Level

THEN
LOR2 condition reported

ELSE IF
LOR2 Trigger Level ≤ Available LOR reserve < LOR1 Trigger Level

THEN
LOR1 condition reported

ELSE

Available LOR Reserve ≥ LOR1 Trigger Level
No LOR Condition reported & all reserve requirements satisfied.

Note that the LOR3 Trigger Level = 0 MW.

The PD PASA, ST PASA & MT PASA processes all use these LOR Trigger Levels to report LOR Conditions.

4. New Business Requirements

4.1 Scope

The changes described in this Business Specification introduce “contingency” interconnector flow into the PASA Solver post-calculation of Lack of Reserve LOR1 & LOR2 Trigger Levels. These Trigger Levels are used in the determination of LOR Conditions.

There is no change to the current LOR3 Trigger Level of 0 MW.

The changes apply to the PDPASA, STPASA & MTPASA processes.

4.2 Requirements

For an interconnector defined as a “contingency” interconnector the power transfer (aka flow) calculated in the PASA Solver MSC run for connected regions is used in determining the LOR1 & LOR2 Trigger Levels for those regions in addition to the static LOR Trigger Levels currently in use.

These changes require:

- Defining an interconnector as a “contingency” interconnector in PASA Solver calculations
- Changing the post-calculations of LOR1 & LOR2 Trigger Levels
- Reporting to the market the LOR1 & LOR2 Triggers Levels used in each PASA Reserve assessment

Note that for interconnectors not defined as “contingency” interconnectors the LOR1 & LOR2 Trigger Levels are the same as the current static Trigger Levels.

4.2.1 Change to LOR2 Trigger Level calculation

For each region ‘R’ connected to a “contingency” interconnector ‘CI’:

LOR2 Trigger Level$_R$

= Maximum (Static LOR2 Trigger Level$_R$,
Interconnector Flow$_{CI}$, as reported in Region ‘R’ MSC run)

Where;

Static LOR2 Trigger Level$_R$ = Capacity of largest generating unit in region ‘R’
Interconnector Flow$_{CI}$ = Flow into Region ‘R’ as reported in the Region ‘R’ MSC run

Note that the flow into a region over a “contingency” interconnector represents the maximum power that can be transferred on that interconnector into the region subject to:

- The interconnector capacity (aka the MNSP Offer Availability for an MNSP such as Basslink);
- Other flow limits defined by AEMO in the form of generic constraints;
- The spare capacity available in other regions.

4.2.2 Change to LOR1 Trigger Level calculation

For each region ‘R’ connected to a “contingency” interconnector ‘CI’:

LOR1 Trigger Level$_R$

= Maximum { Static LOR1 Trigger Level$_R$,
[Maximum (Static LOR2 Trigger Level$_R$,
Interconnector Flow$_{CI}$ + LOR1 Trigger Level$_R$] }

Where;

Static LOR1 Trigger Level$_R$ = Capacity of two largest generating units in region ‘R’
Interconnector Flow$_{CI}$ = Flow into Region ‘R’ as reported in the Region ‘R’ MSC run

4.2.3 Reporting Requirements

The calculated LOR1 & LOR2 Trigger Levels for each interval of PD PASA, ST PASA & MT PASA are reported to market participants.

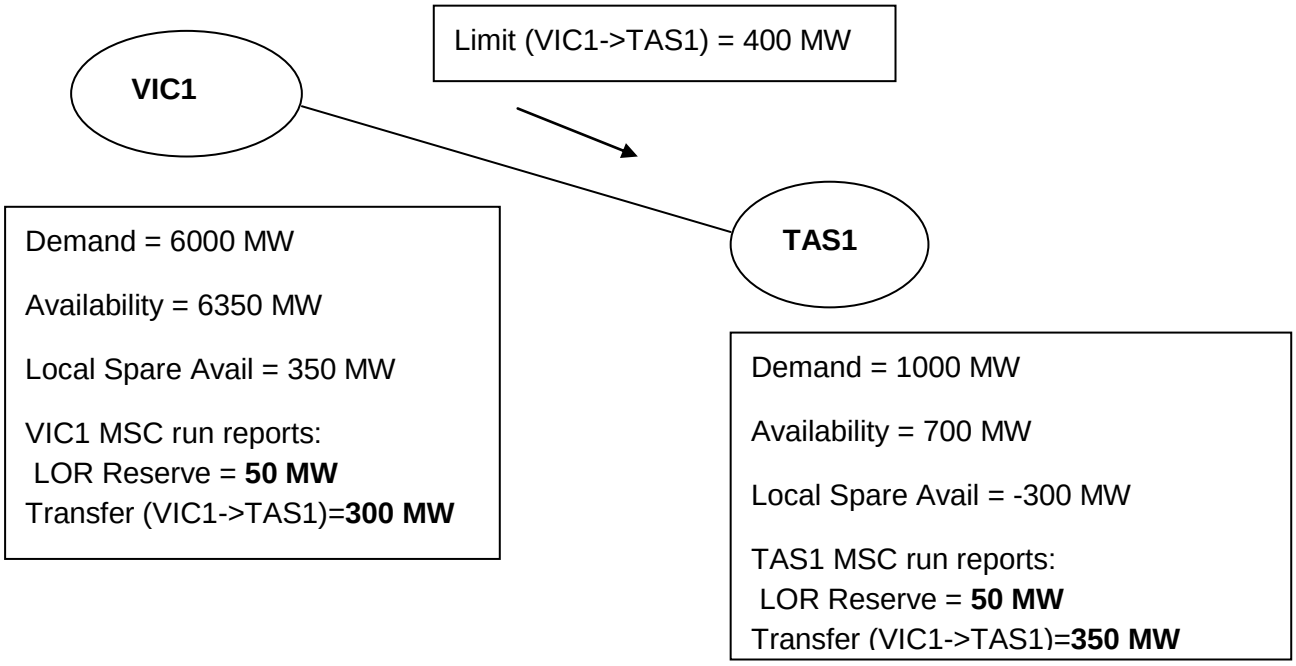
5. Business Scenarios

The functionality of the modified LOR Trigger Level calculation is demonstrated using the following two simplified scenarios involving Basslink flow & the connected Tasmanian (TAS1) & Victorian (VIC1) NEM regions.

For simplicity the scenarios assume that:

- There are only two NEM region: VIC1 & TAS1
- Basslink interconnector flow from TAS1 to VIC1 is positive
- Only consider the LOR2 Trigger Level calculation
- Static LOR2 Trigger Level$_{TAS1}$ = Largest TAS1 generation source = 150 MW
- Static LOR2 Trigger Level$_{VIC1}$ = Largest VIC1 generation source = 500 MW

Scenario 1



Using the method of determining LOR2 Trigger Level:

TAS1 LOR2 Trigger Level

= Maximum (Static LOR2 Trigger Level$_{TAS1}$,
Basslink Transfer from VIC1 to TAS1 reported in TAS1 MSC run)

= Maximum (150, 350)
= 350 MW

VIC1 LOR2 Trigger Level

= Maximum (Static LOR2 Trigger Level$_{VIC1}$,
- Basslink Transfer from VIC1 to TAS1 reported in VIC1 MSC run)

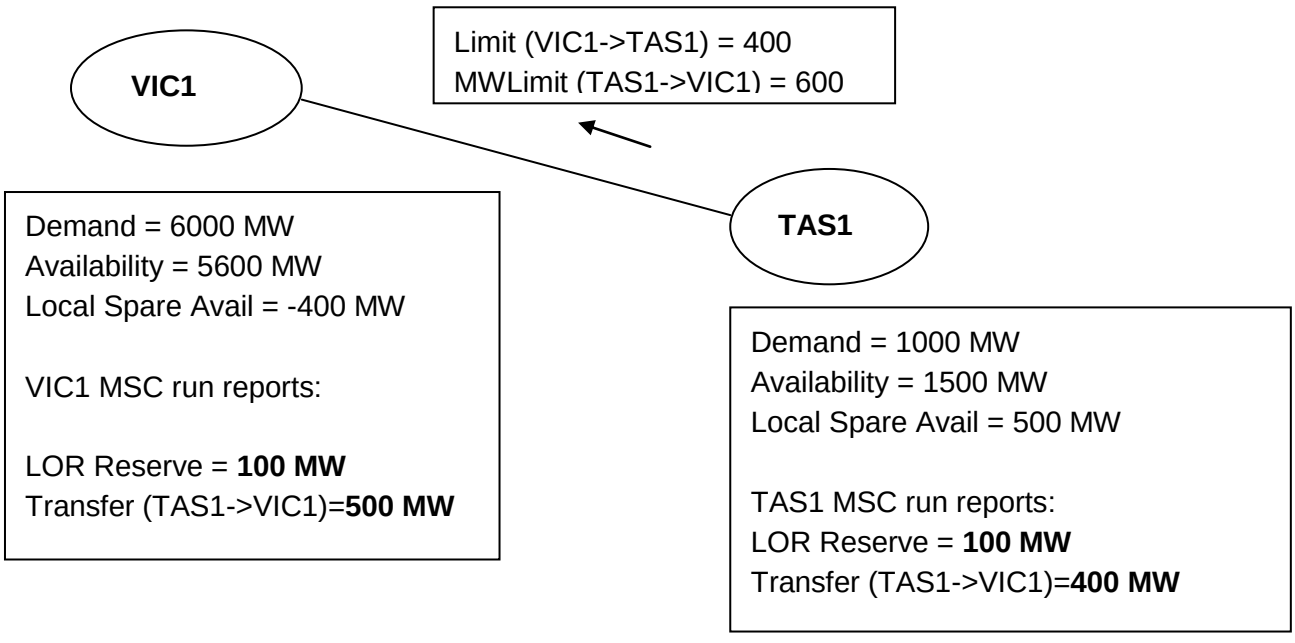
= Maximum (500, -300)
= 500 MW

In this case the largest contingent generation loss in the TAS1 region is the loss of 350 MW of Basslink flow into TAS1. Hence the appropriate TAS1 LOR2 Trigger Level = 350 MW.

For the VIC1 region the largest contingent generation loss is the largest VIC1 generating unit so the VIC1 LOR2 Trigger Level = 500 MW.

As the VIC1 & TAS1 LOR Reserves are only 50 MW then LOR2 Conditions are reported for both VIC1 & TAS1 regions.

Scenario 2



Using the method of determining LOR2 Trigger Level:

TAS1 LOR2 Trigger Level

= Maximum (Static LOR2 Trigger Level$_{TAS1}$,
Basslink Transfer from VIC1 to TAS1 reported in TAS1 MSC run)

= Maximum (150, -400)
= 150 MW

VIC1 LOR2 Trigger Level

= Maximum (Static LOR2 Trigger Level$_{VIC1}$,
- Basslink Transfer from VIC1 to TAS1 reported in VIC1 MSC run)

= Maximum (500, 500)

= 500 MW

Note in this case that the largest contingent generation loss in the TAS1 region is now the loss of a 150 MW generating unit. Hence the appropriate TAS1 LOR2 Trigger Level = 150 MW.

For the VIC1 region the largest contingent generation loss is equally the largest VIC1 generating unit AND the Basslink flow into VIC1, so the VIC1 LOR2 Trigger Level = 500 MW.

As the VIC1 & TAS1 LOR Reserves are only 100 MW then LOR2 Conditions are reported for both VIC1 & TAS1 regions.