AMS – Victorian Electricity Transmission Network

Network Performance Monitoring

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Disclaimer

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1 Introduction

The effectiveness of AusNet Services' asset management practices is measured directly by the performance of extra high voltage network elements and their impact on the availability and reliability of the Victorian electricity transmission network in which they operate.

The development of these practices requires the reliable capture of accurate information and data, effective analysis and trending and robust decision support tools. Additional comparisons with the Key Performance Indicators (KPIs) set by the Australian Energy Regulator (AER), Australian Energy Market Operator (AEMO), Energy Safe Victoria (ESV) and comparisons with externally benchmarked performance standards guide the adjustment of practices.

2 Vision

The vision for network performance management is to improve the information and data collection and analysis process to a level that will facilitate enhanced network performance and maximise the return on investment during the ten-year planning period.

This can be achieved by improving the newly implemented asset management and information technology (IT) systems that can track performance measures and report on demand, with necessary accuracy, reliability and with minimal administrative support.

Additionally, by developing the ability to model 'what if' scenarios, work planners can make informed decisions on the impact of changing capital expenditure works and asset works refurbishment programs.

3 Objectives

The main objectives of network performance management are:

- To monitor, record and accurately report the performance of the transmission network.
- To report performance as per the AER's, AEMO's and ESV's requirements.
- To report network incidents under the Network Agreement with the AEMO.
- To provide support to the Planning and Strategy and Service Delivery groups by reporting malfunctions and trends in plant and equipment performance to enable corrective action to be taken in a timely manner.

4 Regulatory Requirements

The National Electricity Rules (NER) clause 6A.17.1(b)(1) require AusNet Services to submit to the AER, in the manner and form set out in the *information guidelines*, annual statements that provide a true and fair statement of the financial and operating performance of the Victorian electricity transmission network.

Clause 3.5 of the *information guidelines* published by the AER require AusNet Services to provide actual service performance results for the previous calendar year as measured by the performance incentive scheme parameters that apply under the service target performance incentive schemes, by 1 February each year.

As per these regulatory requirements, AusNet Services is required to monitor and report the service performance on the following performance incentive schemes:

- Service Target Performance Incentive Scheme (STPIS) which includes Service Target and MIC (Market Impact Component) performance; and
- Availability Incentive Scheme (AIS).

Pursuant to the Section 142 of the Electricity Safety Act 1998 and Section 27 of the Electricity Safety (Management) Regulations 2009, AusNet Services is required to report all serious electrical incidents to Energy Safe Victoria (ESV).

5 Service Target Performance Incentive Scheme

5.1 Measures

The AER's Service Target Performance Incentive Scheme (STPIS) for the current regulatory period is a symmetrical reward and penalty scheme which, depending on performance, adjusts future revenues up to a cap of approximately $5 M per annum.

The AER determines the revenues received by transmission network service providers (TNSPs) in respect of prescribed transmission services under chapter 6A of the National Electricity Rules. Accordingly, the Final Decision on AusNet Services' transmission determination dated January 2014 is the AER's decision applicable to AusNet Services' allowable revenue for the regulatory period between 01 April 2014 and 31 March 2017.

In addition to the maximum allowable revenue as approved by the AER in its transmission determination, there is an opportunity for AusNet Services to improve its profits by reducing costs. Such cost reductions may result from either capex or opex efficiency gains, or by the inefficient deferral or reduction of either form of expenditure. As the latter may result in a decline in the level of service and impose costs on other market participants, the Service Target Performance Incentive Scheme (STPIS) or the transmission 'S' factor scheme was developed in accordance with the NER which aims to balance the incentive for TNSPs to minimise expenditure with the need to maintain and improve reliability for customers, by providing TNSPs with a financial incentive to maintain or improve service levels.

AusNet Services' Maximum Allowable Revenue (MAR) is approximately $500M and an annual reward/penalty under the AER's Service Target Performance Incentive Scheme (STPIS) is +/- 1% of the MAR ie. +/- $5 M which is a spread of approximately $10M[1].

The measures in the AER-PI Scheme or STPIS as applicable to AusNet Services are given in Table 1:

	Collar	Target	Cap	Weighting (% of MAR)
Average circuit outage rate (%)				
Line outage – fault	42.0	25.9	14.8	0.2
Transformer outage – fault	31.7	16.1	7.4	0.2
Reactive plant – fault	46.4	35.1	2.5	0.1
Line outage – forced	17.7	14.9	12.3	0.0
Transformer outage – forced	17.6	12.0	6.2	0.0
Reactive plant – forced	32.7	15.4	6.2	0.0
Loss of supply event frequency				
>0.05 system minutes	6	2	0	0.15
>0.3 system minutes	2	1	0	0.15
Average outage duration				
Average outage duration (mins)	293.5	98.0	5	0.2
Proper operation of equipment				
Failure of protection system	n/a	n/a	n/a	0.0
Material failure of SCADA	2	1	0	0.

Table 1 – AusNet Services' Service Target Performance Incentive Scheme values and weightings

[1] For further details refer Attachment 5 of the AER's Final Decision of "SP AusNet transmission determination".

Performance against the above mentioned KPIs for each calendar year of the regulatory period is submitted to the AER for its annual audit by 1st of February in the following year. AusNet Services' performance incentive is calculated as explained in the applicable AER STPIS publication.

5.2 Systems and Strategies

Until April 2015, an Excel spread sheet using input from the outages recorded in MAXIMO (AusNet Services' asset management system) was utilised to determine the network performance against the KPIs. Recently, a SAP based outage management system has been developed and implemented. It is expected that the embedded tools of the new system will be used to analyse data efficiently and prepare reports automatically in predetermined formats for submission to the relevant authorities.

With the deployment of SAP the following key improvements for the Performance monitoring including STPIS monitoring and reporting is expected to be achieved:

- Systems to capture outage data to monitor network performance and network availability.
- Data analysis modules have been incorporated in SAP to analyse network performance data.
- All proposed works will be recorded in SAP at the earliest point identified to build a database of identified works 13+ months ahead of scheduled requirements, to meet AusNet Services regulatory requirements under, National Electricity Rules, chapter 3, clause 3.7A.
- An on-line Outage Planning tool will provide for best selection of individual works into defined groups, including outage evaluation and identification of rebate attracting elements in the decision making process.
- The access request then proceeds through a series of steps to create or capture all written applications and approvals for permits and other key documentation required before approval is sought from the Operating Authority for access to the Transmission network.
- All checks and status changes in this process must be tracked (status level / signatories) via SAP to a timeline of triggers and approvals until all switching and field works are complete and the Transmission assets are returned to service.
- As part of the process, data will be captured to allow the calculation of values needed to report to the Service Target Performance Incentive Scheme (STPIS).
- Develop the ability to monitor and report on more KPIs which are additional to the STPIS.

6 Network Availability Incentive Scheme (AIS)

6.1 Measures

AusNet Services owns and maintains the major part of the extra high voltage network and the associated equipment and facilities to provide network services to VENCorp (now part of AEMO). In return, AEMO pays monthly Transmission Charges to AusNet Services. The contractual details of this arrangement are given in the Network Agreement between VENCorp (now part of AEMO) and AusNet Services. One of the contractual obligations for AusNet Services is to pay AEMO the non-availability penalty associated with the unplanned as well as planned outages of its plant or network elements. As a result, AEMO receives Outage Rebates in its monthly payments to AusNet Services.

A monthly statement indicating total outage hours and the corresponding outage rebate payable is submitted to AEMO for its acceptance and approval.

The objective of this scheme is to encourage and incentivise asset management practices that deliver high network reliability, and to seek equipment outages at times when the expected cost of the outage to the network users is minimal. Therefore, although referred to as 'Outage Rebate Scheme' by AEMO, AusNet Services refers this scheme as 'Availability Incentive Scheme' (AIS).

6.2 System

Similar to the AER STPIS reporting, an Excel spread sheet using input from the outages recorded in MAXIMO (AusNet Services' asset management system) used to be utilised to determine the cost of monthly outages.

As explained in section 5.2 the recently implemented Outage Management system using SAP have replaced current Excel based performance monitoring tools those extract outages data from MAXIMO.

6.3 Strategies

As explained in section 5.2 with the deployment of SAP the key improvements for the Performance monitoring including STPIS monitoring and reporting are expected to be achieved.

7 Market Impact Component of STPIS

7.1 Measures

In addition to AIS and STPIS Service Component, a Market Impact Component (MIC) of the AER STPIS has applied since 1 August 2011. The objective of this component is to promote efficient outcomes in the National Electricity Market (NEM), by rewarding TNSPs when their actions cause fewer price differentials in the market than their historic performance. AusNet Services is obligated to report on the AER's measure of market congestion, the Market Impact Component (MIC) due to AusNet Services' activities.

During the current regulatory period, under the Market Impact Component, AusNet Services is entitled to additional revenues of up to approximately $10M based on the number of 5 minute market dispatch intervals (DI) where an AusNet Services' initiated outage causes a constraint to bind with a marginal value greater than $10/MWhr.

For the current regulatory period the target is based on a rolling average calculated in accordance with the AER's determination.

7.2 System

Constraints are monitored continuously and outages are allocated to dispatch intervals via a package called "Ez2view" provided by Global Roam. Reports are generated from this package and further refined as Excel spread sheets.

As a backup AusNet Services also subscribes to "NEO express" provided by Intelligent Energy Systems (IES).

Also unlike other TNSP's, AusNet Services does not have real time access to single generator Left Hand Side (LHS) constraints. In cases where these constraints are known, generator outputs can be monitored directly to estimate if there is an impact.

7.3 Strategies

AusNet Services embraces the objectives of the scheme and wishes to optimise its network operations to maximise additional revenue; ultimately improving market efficiency.

To achieve a preferable outcome in the long run the following actions are being implemented:

- Real time monitoring of the National Electricity Market, trading systems to allow suspending, recalling or deferring of outages at short notice depending on market outcomes.
- Recording of outage impacts for AER reports.
- Building an in-house information server to reliably analyse and monitor market information.
- Investigate the possibility of using the SAP system to improve operational efficiencies and provide greater immediate market transparency of AusNet Services' operations.

8 System Incident Reporting (SIR)

8.1 Measures

Victorian electricity transmission network performance is dependent on the availability of its transmission network elements which collectively provide shared network asset services to its connected parties such as generators, distribution businesses and EHV customers via VENCorp (now part of AEMO).

Moreover, AEMO's system security needs are largely dependent on planned outages within Victorian electricity transmission network and contingencies arising from unplanned outages occurring on the network elements.

Consistent with the definition of a System Incident as given in the System Code[2], as a rule of thumb a SIR (System Incident Report) record is created by Customer Energy and Operations Team (CEOT) in SAP (AusNet Services' asset management system) as a ZL notification for any unplanned outage of a primary plant element or a critical alarm condition within the Victorian electricity transmission network including the AusNet Services owned or managed non-regulated transmission network. Similarly, a ZK/ZA notification record is created by CEOT in the event when plant auxiliaries or other secondary systems are affected without causing an outage of a primary plant.

The SIR record thus created by CEOT is forwarded to an internal group for further investigations /analysis and finalising its technical report. The final version of the SIR is sent out to internal and affected external stakeholders.

AusNet Services tracks a Customers Off Supply Index (Transmission System Minutes Lost) that is an internally set company KPI. It uses System Incident Reporting (SIR) system as a base.

8.2 System

Until April 2015, a MAXIMO based system was used to generate, finalise and communicate system incidents and the corresponding reports. This system has been replaced with the SAP system. It is expected that, once fully implemented, the SAP system will provide a more versatile platform for recording, analysing and reporting of system Incidents.

8.3 Strategies

The following are key improvements for System Incident Reporting:

- Accurate recording of System Incidents in SAP system.
- Develop incorporated modules for analysing System Incidents.
- Using SAP to generate System Incident reports automatically in predetermined format.

[2] Refer AMS 10-115 for further information.

9 Serious Electrical Incidents

9.1 Measures

In relation to serious electrical incidents, AusNet Services is required to report to ESV measures including fatal and serious injuries (due to electrical causes) to MEC (Major Electricity Company) workers or the public and electrical shocks from MEC assets. The timing of the reporting is defined by ESV and depends on the relative seriousness of the incident.

The Electricity Safety Management Scheme (ESMS) for the Victorian electricity transmission network specifies the requirements for reporting all serious, non-serious and "other" specified electrical incidents to ESV. ESMS 10-03 describes the process for monitoring electrical incident Key Performance Indicators and the process for implementation of improved safety outcomes.

Electrical incidents are reported to ESV in accordance with ESV's document "Distribution Business Electrical Safety Performance Reporting Guide".

ESV carries out an annual audit of AusNet Services' bushfire mitigation plan and several audits each year on the various regulations contained within the Electricity Safety (Management) Regulations, in order to verify compliance.

9.2 System

Information on serious electrical incidents arising from the transmission network is recorded in the Issues Management System (IMS) and reports are derived from this system as required.

The IMS system is an Intranet based system that supports 5 sub-systems (Incidents, Actions, Complaints, Claims & Corrective action) – all related to the management of issues and incidents across AusNet Services and its workforce partners[3].

Once an incident is reported to the CEOT, and recorded in the IMS, it generates the initial report and facilitates the process of routing the incident to relevant stakeholders for investigation, review, approval and subsequently prepares the final detailed report to be sent to both internal stakeholders and ESV.

9.3 Strategies

The current IMS incident reporting system is working satisfactorily. However a major information technology change is in progress as the underlying Lotus Notes database supporting IMS is obsolete. It is proposed that incident data will be based in an Enterprise Data Warehouse environment and accessed using PI portal tools. The following are key strategies:

- Enhance data handling capability.
- Develop data analysis techniques.
- Investigate system improvement possibilities of IMS system and implement.

[3] For further information refer IMS Basic Principles, IMS User Guide, 30-2010: Electrical Investigation and Reporting.

10 Benchmarking

The company uses benchmarking where possible to evaluate its performance and practices against the industry and, where possible, other industries. Regulators have expressed interest in using benchmarking to help determine revenue requirements. Therefore, this activity is increasing in importance.

AusNet Services presently participates in benchmarking studies that are focussed on network performance and maintenance costs.

At present, the systems AusNet Services has in place to capture and save data for benchmarking purposes are not particularly robust. Much time and effort is expended extracting and cleansing data each time it is required to be submitted for each study. AusNet Services has no permanent systems in place to capture CIGRE (the Conseil International des Grands Réseaux Électriques) related data.

There is a need to improve the adequacy of current benchmarking systems and activities. AusNet Services must also develop a strategic plan for the development of benchmarking activities to identify opportunities for business improvement and to develop potential benchmark measures for use by internal managers and regulators.

10.1 Strategies

The key improvements for benchmarking are:

- Build a capability in proposed EAM / ERP system to capture data for various benchmarking studies.
- Develop integrated modules to enable data analysis.
- Incorporate systems that can prepare reports in predetermined formats for various benchmarking requirements.
- Review the benefit and adequacy of current benchmarking activities.

11 Plant Performance Indicators

The network performance indicators are a measure of network performance at a macro level. As a result of this, the performance indicators that make up these measures are not sufficient to help AusNet Services monitor the performance of specific plant types at a micro level.

Network design is also a factor that can mask individual plant type performance. For example, the unavailability of a specific plant item may not necessarily result in the outage of a transmission element. This results in the outage of individual type of plant items not being captured in scheme that measures network performance.

Since asset management strategies and practices focus on specific plant types rather than transmission elements, monitoring the performance of individual plant categories is a valuable early warning tool. It is also a more sensitive indication of performance degradation, providing information before it is reflected in the higher level measures.

Performance measures need to be supplemented with indicators that monitor the performance of specific plant items of individual types.

All major plant failures; that is, failures that require major part replacement or repair, and corrective maintenance of defects are investigated for a root cause. All unscheduled work orders for corrective maintenance activities are coded with a problem, cause and remedy (PCR). In depth analysis is performed on this PCR data on circuit breakers and reported in AMS – Plant Condition reports (Asset health documents) and on other plant items for strategy formulation. The information is used in assessing a condition score for equipment types which is used in building various risk models and the development of appropriate detailed plant strategies.

11.1 Strategies

The following are key improvements for the Plant Performance Indicators:

- Target Improvements in completion and the accuracy of coding corrective maintenance Problem Cause Remedy (PCR) coding. Target 100% to be coded, and less than 10% of corrective maintenance to be coded ‘Other’.
- Automate PCR analysis of all equipment types for benchmarking.