AMS 10-17 Network Performance Monitoring

2023-27 Transmission Revenue Reset

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AMS 10-17 Network Performance Monitoring

Table of Contents

AMS 10-17 Network Performance Monitoring

1 Introduction

The effectiveness of AusNet Services' asset management practices is measured by the performance of extra high voltage (EHV) 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 Objectives

The main objectives of network performance management are to:

1. Monitor, record and accurately report the performance of the transmission network.
2. Report performance as per the requirements of the AER and ESV.
3. Report Reviewable Power System Operating Incidents as per the requirements of AEMO.
4. Provide support to the Transmission Planning and Strategy and Operations and Services groups by reporting malfunctions and trends in plant and equipment performance to enable corrective action to be taken in a timely manner.

3 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 Service Target Performance Incentive Scheme (STPIS) which includes:

- Service Component (SC);
- Network Capability Component (NCC); and
- Market Impact Component (MIC).

Pursuant to the Section 142 of the Electricity Safety Act 1998 and Section 27 of the Electricity Safety (Management) Regulations 2019, AusNet Services is required to report all serious electrical incidents to ESV.

As per under clause 4.8.15 of the NER, AEMO is required to review, prepare and publish reports for certain reviewable system incidents. Under clause 4.8.15(f) of the NER, AEMO would then send requests to AusNet Services for information pertaining to those reviewable system incidents.

4 AER's Service Target Performance Incentive Scheme

4.1 STPIS – Service Component

4.1.1 Measures

The Service Component of the AER's 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 $6.8 million per annum.

AMS 10-17 Network Performance Monitoring

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 2017 is the AER's decision applicable to AusNet Services' allowable revenue for the regulatory period between 1 April 2017 and 31 March 2022.

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 effective 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 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 $545 million and the annual reward/penalty under the Service Component is +/- 1.25% of the MAR i.e. +/- $6.8 million which is a spread of approximately $13.6 million[1].

The Service Component measures applicable to AusNet Services are shown in Table 1:

Table 1: AusNet Services' Service Component measures and weightings

	Floor	Target	Cap	Weighting (% of MAR)
Average circuit outage rate (%)				
Line outage – fault	33.8	25.4	16.0	0.20
Transformer outage – fault	31.8	20.3	9.2	0.20
Reactive plant – fault	61.2	34.3	18.4	0.10
Line outage – forced	17.1	15.0	12.3	0.10
Transformer outage – forced	14.4	10.4	6.1	0.10
Reactive plant – forced	40.7	30.9	19.9	0.05
Loss of supply event frequency				
>0.05 system minutes	5	2	0	0.15
>0.3 system minutes	2	1	0	0.15
Average outage duration				
Average outage duration (mins)	334.2	75.1	3.4	0.20
Proper operation of equipment				
Failure of protection system	42.0	32.0	23.0	0.0
Material failure of SCADA	4	1.8	0.0	0.0
Incorrect Operational isolation	10.0	5.6	2.0	0.0

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

[1] For further details refer Attachment 11 of the AER's Final Decision for the AusNet Services transmission determination 2017-22.

4.1.2 Systems

AusNet Services' asset management system (SAP) is utilised to determine the network performance against the KPIs. SAP data is used in determining AusNet Services' asset management strategies/ policies. Information recorded in SAP is also used to prepare reports for internal circulation and for submission to the relevant external authorities.

4.1.3 Strategies

It is proposed to continue to use SAP system to capture outage data to monitor network performance.

4.2 STPIS – Market Impact Component

4.2.1 Measures

In addition to the 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 MIC due to AusNet Services' activities.

Performance is measured based on the number of five-minute dispatch intervals when an outage of a TNSP's network results in a network outage constraint binding with a marginal value greater than $10/MWh.

The MIC is a symmetrical scheme with revenue at risk of +/- 1% of MAR (around +/- $5.45 million). For the current regulatory period the target of 1,245 dispatch intervals is based on average performance of the median five years from 2009-2015 (i.e. the lowest and highest values are excluded from the average calculation) and was calculated in accordance with the requirements of clause 4.2(f) in version 5 of the STPIS.

The performance cap and floor are zero and 2,490 (i.e. twice the target) dispatch intervals, respectively.

4.2.2 Systems

Outage constraints are monitored on an ongoing basis, and binding dispatch intervals are assigned a cause and an exclusion if relevant via a package called "Ez2view" provided by Global Roam Reports are generated from this package.

AusNet Services also subscribes to "NEO express" provided by Intelligent Energy Systems (IES) as a back-up and for event analysis and modelling.

4.2.3 Strategies

Dramatic changes in generation mix have occurred in recent years and are expected to continue to occur in future regulatory periods.

In particular, the closure of thermal generation (e.g. Hazelwood Power Station) and the dramatic increase in renewable generation (particularly in North-Western Victoria) are having substantial implications for how AEMO manages system security which impacts our performance under the scheme.

While AusNet Services employs sophisticated planning and forecasting measures to mitigate the market impact of its planned outages, the effectiveness of these measures is limited by the current environment.

The following actions are taken to maintain scheme performance:

- Real time monitoring of the National Electricity Market, trading systems to allow deferring or, recalling of outages at short notice depending on market outcomes.
- Alarms for binding or forecast binding dispatch intervals.
- Recording of outage impacts for AER reports.
- An in-house information server was built to reliably analyse and monitor market information.
- Capture lessons learned for binding outages for improve outage planning.

4.3 STPIS – Network Capability Component

4.3.1 Measures

The Network Capability Component (NCC) of the AER STIPS scheme provides incentives to deliver low cost, one-off projects that increase network capability and deliver value for money to customers. Each TNSP is required to submit, as part of its revenue proposal, a Network Capability Incentive Parameter Action Plan (NCIPAP). The TNSP must consult AEMO in developing the NCIPAP.

In Victoria, the involvement of AEMO is more substantial – as the planner of the Victorian transmission network it is responsible for identifying and scoping projects and working with AusNet Services to quantify project benefits. This is because under the Victorian planning arrangements, AusNet Services' ability to identify the limit for each transmission circuit or load injection point is limited by access to data and tools which are accessible to AEMO.

4.3.2 Systems

As part of the development of the first NCIPAP, AusNet Services and AEMO undertook an exercise to identify the reason for the limit for every transmission circuit and injection point on AusNet Services' transmission network.

Each limit was then assessed to determine whether the limit could be increased through operating or minor capital expenditure and whether this would result in wholesale market benefits or increased capability at times when network users place greatest value on the reliability of the transmission system.

Many projects that fit the criteria of the NCC formed part of the 2014-17 NCIPAP. Fewer new projects were identified at the start of the 2017-22 period, however additional projects emerged during the period as a result of AEMO studies and Regulatory Investment Tests.

The projects identified for the 2017-22 period reached the cap for the NCC scheme.

AusNet Services is developing future NCC projects for the 2023-27 period in conjunction with AEMO. Emerging network limitations that are observed through AusNet Services operation of the network together with insights developed by AEMO through analysis of the changing generation mix will form the basis for the next phase of NCC projects.

4.3.3 Strategies

The transformation of the generation mixes and the resulting changes in power flows are continuously revealing new network limitations which provide possibilities for NCC projects. AusNet Services strategy is to leverage the many industry studies that are being produced by AEMO, Australian Energy Market Commission (AEMC), Energy Security Board (ESB) and other industry bodies to identify minor projects that fit the NCC criteria. Identification of as many projects as possible for the 2023-27 period and commencement of these projects as early in the period as feasible will maximise the value of the incentive scheme and deliver benefits to customers as early as possible.

5 System Incident Reporting (SIR)

5.1 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 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 System Incident Report (SIR) is created by Customer Energy and Operations Team (CEOT) in SAP as a ZL

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

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 transmission network. TOC 1201-09 *TOC Incident Reporting Procedure* outlines the procedure for reporting system incidents and defective apparatus.

The SIR record thus created by CEOT is forwarded to the Network Performance and Investigation Team or further investigations and analysis and finalising its technical report. The final version of the SIR is recorded in SAP and sent out to internal and affected external stakeholders when necessary.

5.2 Systems

AusNet Services utilises the SAP system to provide a versatile platform for recording, analysing and reporting of system incidents.

5.3 Strategies

AusNet Services' strategy is to utilise the data for reporting purposes based on the recorded System Incident (ZL) notifications in SAP.

6 Serious Electrical Incidents

6.1 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 (Major Electricity Company (MEC) 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 10-01 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 "Incident and Safety Performance Reporting Guidelines".

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.

6.2 Systems

Information on serious electrical incidents arising from the transmission network is recorded in AusNet Services Issues Management System, Enablon, and reports are derived from this system as required.

The Enablon system is an intranet-based system that supports five sub-systems (Incidents, Actions, Complaints, Claims and Corrective action) all related to the management of issues and incidents across AusNet Services and its workforce partners.

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

6.3 Strategies

The current issues management system is working satisfactorily with no enhancements planned.

7 Plant Performance Indicators

7.1 Measures

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 enough 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 an object damage and cause. In depth analysis is performed on this ODC data on circuit breakers and reported in 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.

7.2 Systems

Information on plant failures and defects arising from the transmission network are recorded in the AusNet Services Enterprise Asset Management system SAP that allow a versatile platform for recording, analysing and reporting.

7.3 Strategies

The following are key improvements for the Plant Performance Indicators:

- Continue to track, investigate, and report major primary plant failures and explosive plant failures
- Continue to track and report Protection operation performance, and maintain dependability targets
- Target Improvements in completion and the accuracy of coding corrective maintenance - Object Damage Cause coding.
- Target increased digitisation and analysis of condition and performance data, collected during preventative maintenance
- Target increase plant performance analysis through utilising SCADA PI Historical data

Appendix A Schedule of Revisions

Issue	Description
5	Editorial review.
6	Review and update.
7	Editorial review.
8	Review and update.
9	Review and Update.
10	Updated Strategies and Systems of each STPIS component, including Network Capability Component. Updated Plant Performance Indicator, System Incident Reporting and Serious Electrical Incidents Systems and Strategies. Removed AER Benchmarking

Appendix B Acronyms

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
CAPEX	Capital Expenditure
CEOT	Customer Energy and Operations Team
EHV	Extra High Voltage
ESB	Energy Security Board
ESMS	Electricity Safety Management Scheme
ESV	Energy Safe Victoria
IES	Intelligent Energy Systems
KPI	Key Performance Indicator
LHS	Left Hand Side
MAR	Maximum Allowable Revenue
MEC	Major Electricity Company
MIC	Market Impact Component
MTFP	Multilateral Total Factor Productivity
NCC	Network Capability Component
NCIPAP	Network Capability Incentive Parameter Action Plan
NEM	National Electricity Market
NER	National Electricity Rules
OPEX	Operational Expenditure
PCR	Problem, Cause, Remedy
SAP	AusNet Services' asset management system
SC	Service Component
SIR	System Incident Report
STPIS	Service Target Performance Incentive Scheme
TNSP	Transmission Network Service Provider