Initiatives Plan Update

March 2016
Introduction

This document provides an update to our [July 2015 Initiatives Plan](#) covering our development plans for:

- asset health modelling
- cost estimation.

Our Initiatives Plan covers the RCP2 period and details a programme of asset management planning improvements, of which asset health modelling and cost estimation are key parts. Our plans for RCP3 are closely tied to this programme.

The two development plans include:

- explanations and background for the two areas
- an outline of recent progress
- high level improvement plans.
Introduction: Asset Management Planning

[Diagram showing the process of asset management planning, including steps like data collection, asset health modeling, criticality framework, prioritization of problems, decision framework, asset management plan, works planning, and cost estimation.]
Improvement Plan: Asset Health
Background

Asset Health models help us understand the probability of our assets failing today and in the future, based on organisational information and knowledge about an asset’s condition and performance.

Asset Health models focus on failure modes we cannot manage through our operational and maintenance practices. They allow us to plan to address these problems through asset refurbishment and replacement.

Asset Health is one of several key inputs into our new decision-making processes, aimed at understanding and managing the current and future risk profile of the grid.
Background

We first developed asset health models in RCP1, and used them to help develop our RCP2 refurbishment and replacement plans. Our understanding of how to model and use asset health is continuously growing and developing. We have learned a lot from our initial attempts to use the models.

Asset health models will be used to develop our regulatory submission for RCP3, in a new and improved way.
Background – Previous Work

During RCP1 we developed our first asset health models. We used them to support RCP2 expenditure proposals for seven major fleets:

- Power transformers
- Outdoor circuit breakers
- Tower steel
- Poles
- Insulators
- Attachment points
- Tower foundations (including grillages)

Plus two optimisation models:

- 33kV Outdoor to Indoor conversions (incorporating circuit breaker asset health)
- Tower painting optimisation
Recent Progress

Since RCP2 submission:

• Automated models have been developed for some fleets, which easily access the latest data in our system

• Investigating and developing new models for:
  • Instrument transformers
  • Indoor switchgear
  • Conductors
  • Tower paint

• Developing higher maturity models for major fleets:
  • Power transformers – further refining and developing model
  • Outdoor circuit breakers – further refining and developing model
Related Work

Asset planning decision framework:
Decision-making process designed to achieve a more systematic, risk-informed way of scoping, prioritising and optimising our grid work plan.

Grid strategy review:
Rewriting our fleet strategies to support risk-based grid works planning.

Improving processes for getting feedback about assets:
Ensure we have access to and use appropriate knowledge and information from people all around the business to support strategic and tactical asset management decisions.
Related Work

Data quality:

Project started to define and improve the asset management information and data we use to inform ourselves about our assets in a systematic way.
Improvement Plan

In the following sections we explain the improvement plan, in terms of:

• the management of the asset health modelling function
• the use of asset health models and their outputs in decision-making processes
• our asset health modelling capability, including the maturity, and the inputs used to inform the models
Improvement Plan – Management

Documentation
• We are rolling out new documentation of the health models. This documentation creates a clear linkage between the failure modes each model is measuring or predicting, and the measurements / data / subject matter expertise which informs us about the progression of those fail modes through the asset’s life.

Controls
• We are migrating models to our SharePoint system and into our Business Intelligence system. This enables us to manage versions of the models, and separate working drafts from production models.

Integrated development
• We are developing the models following an integrated plan, which is aligned to our wider business improvement plan.
Improvement Plan – Uses

Risk estimation

- As part of our new decision framework, we are trialling using asset health forecasts with information from our asset criticality framework, along with other data sources, to estimate the risk profile for each asset. This will provide us with an understanding of the current risk profile of each grid asset and system of assets.

Risk forecasting

- We are trialling using degradation curves and load growth predictions to forecast risk estimates into the future. The forecast should allow us to understand the way risk changes over time, and the cost of keeping the risk profile of the grid steady, on an asset by asset basis or for a system of assets. This trial has highlighted a wide range of improvement opportunities which we aim to pursue.
Improvement Plan – Uses

Asset Management Planning

• Once the trials of the decision framework are complete in March 2016, we will better understand how the process should work, and will have identified the gaps in our current tools.

• We will develop our tools and information by December 2016, to enable us to use estimated risk values to inform the prioritisation of assets replacements in the grid.

• We will then be in a position to use that information to develop an asset replacement and refurbishment works plan by June 2017. This plan will be based on our understanding of which asset-related risks need to be controlled, to ensure we continue to meet our performance expectations long term. This plan will form part of our broader Asset Management Plan.

• The first part of this relationship is established by our criticality framework, which creates a connection between service performance expectations, and will also inform our expenditure plan.
Improvement Plan – Capability

Asset health maturity

• We are adopting the asset health maturity scale proposed by Deloitte for the Canadian Electricity Association.
• We have determined a target maturity level for the asset fleets we currently believe would benefit from health modelling.
• We have agreed the scope of models we plan to develop to support our emerging approach to decision making (risk-based).
• We have prioritised the models for development to their appropriate maturity level: higher priority models will be matured in time to inform our Integrated Transmission Plan (ITP) in June 2017; and the lower priority models will follow for the ITP in June 2018.
• This prioritisation is based on a range of factors influencing the model’s perceived importance as an input to the wider decision-making process.
Improvement Plan – Maturity

We are moving from a mix of reactive, controlled, and proactive approaches, towards predictive or proactive depending on cost / benefit.

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<tr>
<td>Predictive</td>
<td>All data being collected has a defined use within the business. Unnecessary data collection has been stopped. Internal and external data is utilized.</td>
<td>Optimization and simulation of asset condition, leveraging internal/external data and automated sensors</td>
<td>Health Indices are consistent across asset classes</td>
<td>Data-driven, fact-based decision making</td>
<td>AHI’s form an integral building block to broader asset management practices, and are regularly updated and improved</td>
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<tr>
<td>Proactive</td>
<td>Abundant data collection; with some analysis of data requirements</td>
<td>Starting to build predictive models with limited set of asset data elements</td>
<td>Health indices are consistently used to compare similar assets</td>
<td>Data-driven decision making with engineering support</td>
<td>Asset Management demonstrates predictive asset analytics</td>
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<tr>
<td>Controlled</td>
<td>Regular/consistent asset data collection</td>
<td>Some operational reports, queries, and key performance indicators (KPIs) are in place.</td>
<td>Some Health Indices are in place but consistency is questioned</td>
<td>Engineer-driven decision making with supporting analysis</td>
<td>Asset Management practices supported by limited analysis</td>
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<tr>
<td>Reactive</td>
<td>Limited or no consistent data on most assets</td>
<td>Limited or no analysis being done, “Fix when broken”.</td>
<td>Health Indices not used</td>
<td>Engineer-driven</td>
<td>Asset Management practices in place</td>
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Deloitte’s Asset Health Index – maturity model
Improvement Plan – Capability

Asset data quality

• Define requirements for new data we require, based on asset health model, to inform our decision-making process.
• Review existing data collected, quality of data we hold, and reset collection systems where processes are non-functional.
• Data clean-up where quality does not meet required level.

IST projects to support decision framework include

• Quantitative Asset Risk Assessment Tool – to embed best practice risk modelling techniques. Tender evaluation process currently underway.
• Asset Planning Tracking Tool – to manage the process of forecasting the risks and identifying other problems with the grid, then identifying solutions to those issues. Needs registration and stakeholder requirements being drafted
# Improvement Plan – Timeline

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<td>Trialling new decision-making processes</td>
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<td>Developing supporting data and tools</td>
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<td>Developing high priority health models</td>
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<td>Developing lower priority health models</td>
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<td>Integrated Transmission Plans</td>
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Improvement Plan: Cost Estimation
Background

We have a centralised estimating team and enterprise system (Transpower Enterprise Estimation System, or **TEES**) to support asset planning decisions and expenditure forecasts.

Our centralised approach ensures consistency across project budgets, ensures that rates are defendable and traceable, and provides portfolio-wide tools and reporting.

Our estimating cycle is illustrated on the following page.
Background – Estimation Cycle

FUNCTION

- Needs Document
- Delivery Business Case (approval gate)
- Estimating Team & TEES
- Final Project Costs

OBJECTIVE

- RCP2 submission
  - Comparison of RCP2 allowances and actual costs incurred
- RCP3 submission
  - Revise building blocks, resources and FX periodically and apply changes to all unapproved projects
Background

Centralised cost estimation had a minimal role in our RCP1 submission but we used it more extensively for our RCP2 submission. We developed and implemented a number of system and process improvements in preparation for the RCP2 submission, including:

• moving from a desktop to an enterprise estimating tool (TEES)
• introducing standardised ‘building blocks’ as a means to quickly create budgets for volumetric projects
• introducing ‘deliverables’ to measure the main asset outputs of the planned works
• applying standardised ‘spend curves’ to profile spend over the life a project
• introducing the ability to collate foreign currency and CPI exposures across multiple projects and time periods.
Background

For our RCP2 proposal we used TEES for volumetric (large volume, small value) capital projects, and large AC stations, lines and secondary systems capital projects. We also used TEES for some maintenance projects.
Recent Progress

Developments since our RCP2 proposal:

• developed a project cost classification system (work breakdown structure, WBS) that is consistent with our approval estimates and can be integrated into our information systems and project processes
• introduced cross-portfolio reporting for material purchase requirements and Service Provider resourcing requirements
• introduced ability to collate FX and CPI exposure and plant / equipment / external labour requirements across multiple projects
• used TEES to determine asset costs for insurance purposes
• improved our processes for documenting adjustments and updates to cost components
• developed enhanced, project-specific spend curves
• implemented direct integration between TEES and our finance system (project PEARL)
Improvement Plan

• In the following section we:
  – describe a set of initiatives
  – map initiatives to improved outcomes, business benefits and our strategic priorities
  – set out a timeline for implementation.

• We are currently scoping each of the initiatives and testing implementation costs and benefits. From this work we will determine a final list of initiatives that we intend to progress and will programme their development and implementation.
## Initiatives

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<th>Initiative</th>
<th>Description</th>
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<tr>
<td>Extend estimation beyond the approval gate</td>
<td>Currently TEES is used to estimate cost of a project up to the point of our approval stage gate. Initiative would extend use of TEES to the detailed design phase.</td>
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<tr>
<td>Produce tender pricing schedules</td>
<td>Improve tender processes by using TEES to generate standardised pricing schedules for use by service providers.</td>
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<td>Provide QS project support service</td>
<td>Increase the extent to which we use our quantity surveying resources to support project managers during the delivery phase.</td>
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<td>Develop productivity analysis and feedback process</td>
<td>Field assessment of tasks to improve understanding of actual resource needs to support productivity analysis.</td>
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<td>Initiative</td>
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<tr>
<td>FUR project (finance system upgrade and reporting enhancements)</td>
<td>Contribution from cost estimation team to a project that is upgrading and enhancing our enterprise financial system. Moves enterprise forecasting of CPI, real price effects (RPE) and foreign currency costs into TEES.</td>
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<tr>
<td>Expand building block documentation</td>
<td>‘Building blocks’ are cost estimation units that aggregate multiple inputs into a single item. We have full documentation of the inputs for 20 of our 214 building blocks.</td>
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<tr>
<td>Accuracy performance tracking</td>
<td>Develop improved suite of accuracy metrics and implement tracking processes.</td>
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<td><strong>WBS implementation (work breakdown structure)</strong></td>
<td>We have developed a WBS for tracking actual project costs. Implementation involves changing our delivery processes to capture cost information in FMIS using this structure.</td>
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<td><strong>Site locality factors</strong></td>
<td>Introduce ability for TEES to automatically adjust estimates to take into account extra costs associated with remote or difficult sites.</td>
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<td><strong>Standard design change process</strong></td>
<td>Introduce process for consistently updating TEES estimates for changes in our standard engineering designs.</td>
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<td><strong>Cost item improvements</strong></td>
<td>Project to improve accuracy and completeness of the low-level cost items used to assemble building block and bespoke estimates.</td>
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## Improvement Plan – Timeline

### Timeline for Development

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- **Identify initiatives**
- **Scope, challenge and schedule**
- **Project FUR**
- **Implementation - Phase 1**
- **Implementation - Phase 2**
- **Integrated Transmission Plans**

### Years

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**Legend:**
- Blue boxes indicate ongoing work.
- Red diamonds indicate key milestones.