AUFLS Review

Scope and Objectives

Natalie Bartos

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SYSTEM OPERATOR

Keeping the energy flowing

TRANSPOWER

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1 Background

Automatic under-frequency load shedding (AUFLS) capability is fundamental to preventing cascade failure for extended contingent events and rarer undefined events which have the potential to cause a system blackout. The existing AUFLS arrangements are based on historical practice, and the system operator considers that there is an urgent need to undertake a substantive review of the role of AUFLS given the number of limitations with the existing arrangements and the number of changes to the power system since AUFLS was first introduced. The current rule obligation is for distributors in the North Island and grid owners in the South Island to provide 2 x 16% blocks of AUFLS.

Accordingly, the system operator is undertaking a review of the AUFLS system and is seeking input from industry participants on the scope of the review. The system operator met directly with interested parties in early 2010 to discuss the scope and other related AUFLS issues. During the same time the system operator committed resources to the AUFLS Review and commenced work on aspects of the technical review. The scope of the AUFLS Review is outlined in further detail below.

2 Objective of Review

There has not been a significant review of AUFLS since the system was implemented. Its effectiveness and uses are a matter of some conjecture and assertion which is an inappropriate basis for the operation of a modern power system. The purpose of the review is to provide clarity as to how AUFLS will operate on today's power system so that the benefits, risks and opportunities for New Zealand can be discussed with a basis of fact and a development roadmap for AUFLS can be put in place.

3 Scope of the Review

The review will cover a number of broad areas as detailed in this section.

3.1 Technical Review

In order to have a discussion on what is the optimal number and size of AUFLS blocks for the New Zealand power system, we must identify the absolute limitations of our system and identify what events AUFLS will and won't cover. This work stream includes:

- Studying examples of high impact low probability risks for both islands
- Identifying acceptable frequency, voltage, line loading and stability limits following an AUFLS event
- Reviewing the use of capacitors and line switching in relation to AUFLS events
- Identifying the absolute limitations of the system – includes generator response and frequency limits
- Reviewing the operation and stability of automatic control systems in relation to an AUFLS event
- Identifying the separate AUFLS requirements for different regions of the system
- Identifying whether known risk such as the ECE can be managed in other ways (AUFLS versus Special Protection Schemes)
- Identifying the time needed to restore AUFLS

3.2 Survey

The objective of the survey work is to provide a broader (international) context for the recommendations from the technical and economic reviews. The survey work will review international practice and developments while also considering the unique characteristics of our system. This work stream includes:

- A collation of international policies for reserves and AUFLS in response to an under-frequency event
- A summary of international blackout events and the key contributing factors

3.3 Economic and Policy Review

The objective of the economic review is to evaluate the economics of AUFLS as an insurance policy and the consequences of insufficient insurance. In undertaking this task, this work stream includes:

- Identifying the value of lost load (VoLL) for all types of load based on previous studies – to be used as a benchmark to conduct further economic analysis
- Identifying the costs and impact on the energy market of treating the ECE as a CE (i.e. what is the cost to the market of not having AUFLS?)
- Evaluating the costs and consequences of an AUFLS event compared with a blackout event
- Economic analysis of the options presented from the AUFLS technical review

Additional aspects of this part of the review include:

- Reviewing who has the obligation to provide AUFLS - evaluating the risks and incentives for various parties to provide AUFLS
- Reviewing whether any class of participant should be exempt from providing AUFLS and the appropriate process to grant such exemptions
- Investigating the viability of secondary markets for AUFLS such as equivalence arrangements.

3.4 Industry Discussion

Several rounds of industry discussion will be required following the detailed analysis work. The objective is to inform industry participants of the key findings from the technical, survey, economic and policy work, and use the findings to facilitate an informed discussion on:

- The optimal number and size of AUFLS blocks
- The preferred policy options that will meet New Zealand's AUFLS needs and provide the correct incentives in an efficient manner.

3.5 Implementation Plan

Following the industry discussion, the project team will produce a range of options, including analysis of each option and an overall recommendation. Analysis will include:

- Identifying the rules and regulations under review for each option
- Reviewing the model requirements (e.g. SPD and RMT) for each option

The system operator will also put an implementation plan in place to ensure that the options from the AUFLS Review are appropriately assessed and to deliver the best option that meets technical and economic criteria including the needs of consumers and suppliers.

4 Timetable

An indicative timetable (as at May 2010) of project milestones is provided below:

Date	Milestone
Dec 2009	Draft Scope released for industry comment
Feb 2010	System operator to meet with interested parties to discuss AUFLS Review
Apr 2010	Scope finalised
Nov 2009 - May 2010	Technical Review & Survey Work
Apr – Jul 2010	Economic & Policy Review
Jul – Oct 2010	Industry Discussion on findings
Nov 2010	Develop implementation plan
Dec 2010	Kick off implementation project