Revised Regulatory Proposal

Supporting Information: HV Underground Cables (REUGC)

Aurora response to the AER's Draft Distribution Determination

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1. Introduction

Aurora provided the AER with its *Regulatory Proposal* on 31 May 2011 in accordance with the provisions of Chapter 6 of the *Rules*. Aurora also set out its answers to the Regulatory Information Notice (RIN) issued by the AER on 21 April 2011 in its response (*RIN Response*) of 31 May 2011.

The AER have reviewed Aurora's *Regulatory Proposal* and *RIN Response* and provided Aurora with the AER's *Draft Distribution Determination*, associated consultant's reports and AER models on 29 November 2011 in accordance with the provisions of Chapter 6 of the *Rules*.

Aurora provides its *Revised Regulatory Proposal* to the AER in response to the AER's *Draft Distribution Determination* in accordance with the provisions of Chapter 6 of the *Rules*. This document provides specific supporting information as an appended attachment to Aurora's *Revised Regulatory Proposal*

2. HV Underground Cable Replacement (REUGC)

2.1. Summary

In Aurora's *Regulatory Proposal*, Aurora proposed replacement of 0.8 km per annum of high voltage (HV) cable throughout its network. The aim of the program was to manage the risk of in-service failures associated with these assets, ensuring the security and reliability of supply is maintained at its current level.

The program would allow for proactive asset replacement of HV cables when deemed to be at their end of life. Preventative asset replacement is seen as the most prudent, and cost effective approach to managing these assets. Reactive asset replacement under fault would increase the expenditure in this area and also result in greater impact to customer supply.

Although the AER's benchmark model predicts capital expenditure in excess of Aurora's forecast and that Aurora may be under investing in cables[1], it has not fully supported the replacement program, with the funding level significantly lower and based only on historical spend.

With an aging asset base, Aurora does not believe this level of funding will be adequate to safely manage the assets. Aurora has provided additional information to support its *Revised Regulatory Proposal* and forecasts.

Aurora contends that the AER has made an error in its *draft distribution determination* and the Aurora *Revised Regulatory Proposal* forecasts expenditure for provision of 1km of underground and 1km of submarine cable replacement.

2.2. Background

In Aurora's *Regulatory Proposal*, Aurora proposed a $2.3 million program to replace 2km of HV underground cable and 2km of HV submarine cable over the forthcoming *Regulatory Control Period*. The aim of this program was to reduce the risk to security and reliability of supply through proactive replacement of ageing cables which have experienced multiple failures.

The AER considered that the supporting justification provided for this expenditure does not support increasing allowed expenditure above historical trends. Therefore an allowance of $0.3 million has been made over the forthcoming *Regulatory Control Period*, resulting in an overall reduction of $2 million.

[1] Report – Principle Technical Advisor, Aurora Electricity Distribution revenue Review Nuttall Consulting , 11 November 2011

Aurora has conducted additional analysis and has determined that the expenditure proposed by the AER is not sufficient to adequately maintain these assets, primarily due to an increasing trend in failures of HV cables. Based on the evidence presented in this document, Aurora contends that the AER has made an error in its decision to substitute the capex forecast of $1 million, or 2km total, of HV cable replacement over the forthcoming *Regulatory Control Period* is the minimum expenditure required to manage the risks associated with these assets.

2.3. Justification

Aurora has a history of cable failures on both underground and submarine cable assets. The mode of failure is a combination of failures at midspan, joints and terminations. Aurora's records of historical failures can be categorised by the type of protection that operated as a result of such failure, therefore allowing HV failures to be separated and analysed. The graph in figure 1 shows the number of underground cable historical failures that resulted in HV protection operating.

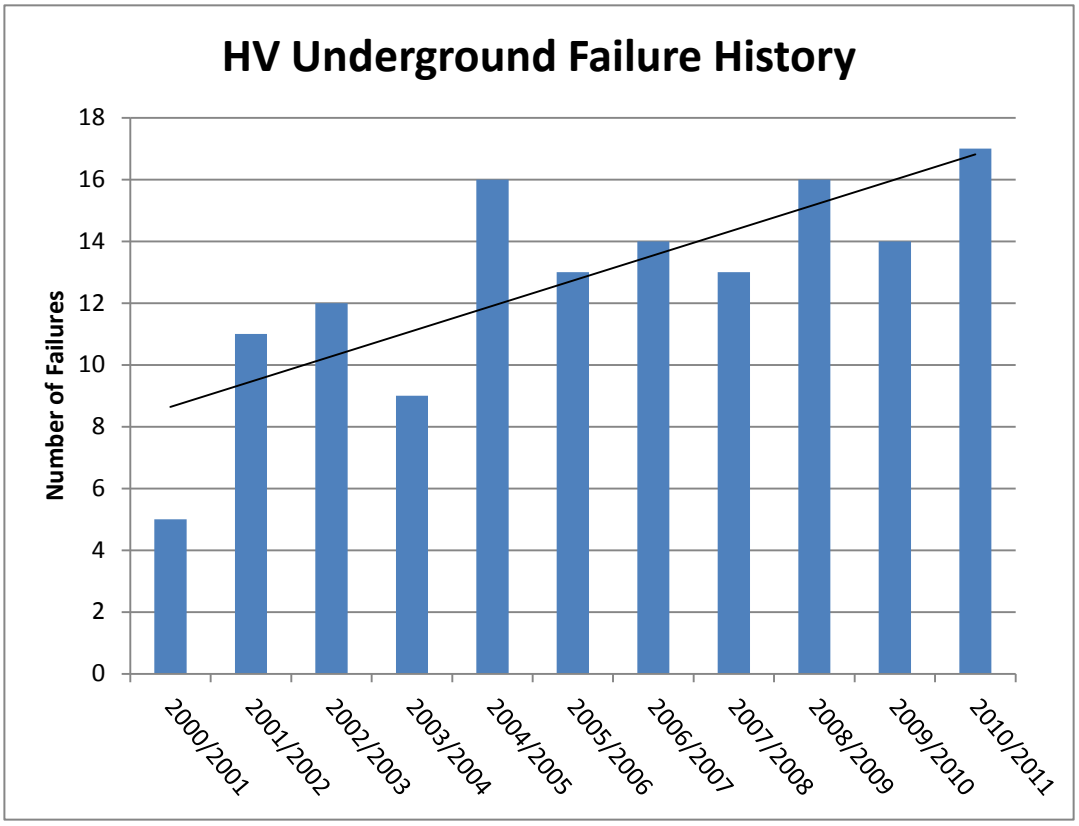

Figure 1: Aurora's HV Underground Cable Failure History

It can be seen in Figure 1 that there is a clear upward trend in underground cable failures over the past 10 years, with Aurora recording the most underground cable failures in 2010/11. It can be assumed that this trend will continue due to the ageing cable asset base shown in Chapter 3, given Aurora's current population consists of over 700km of underground cable between 30 and 80 years old.

UG cable failures cause significant disruptions to customer supply due to the complexity in locating and rectifying such faults. It is expected that an upward trend in failures will impact significantly on reliability and affect the security of supply as alternate feeder configurations must be used while rectifying faults.

An underground cable has an increased risk of subsequent failures following a failure, due to the stresses induced on the cable during a fault and the additional joint that results. Therefore in order to steady the current trend of failures proactive replacement of cables will be required where multiple failures are occurring.

Further analysis of HV underground cable failures determines the feeders on which multiple cable failures have occurred. The results are shown in figure 2.

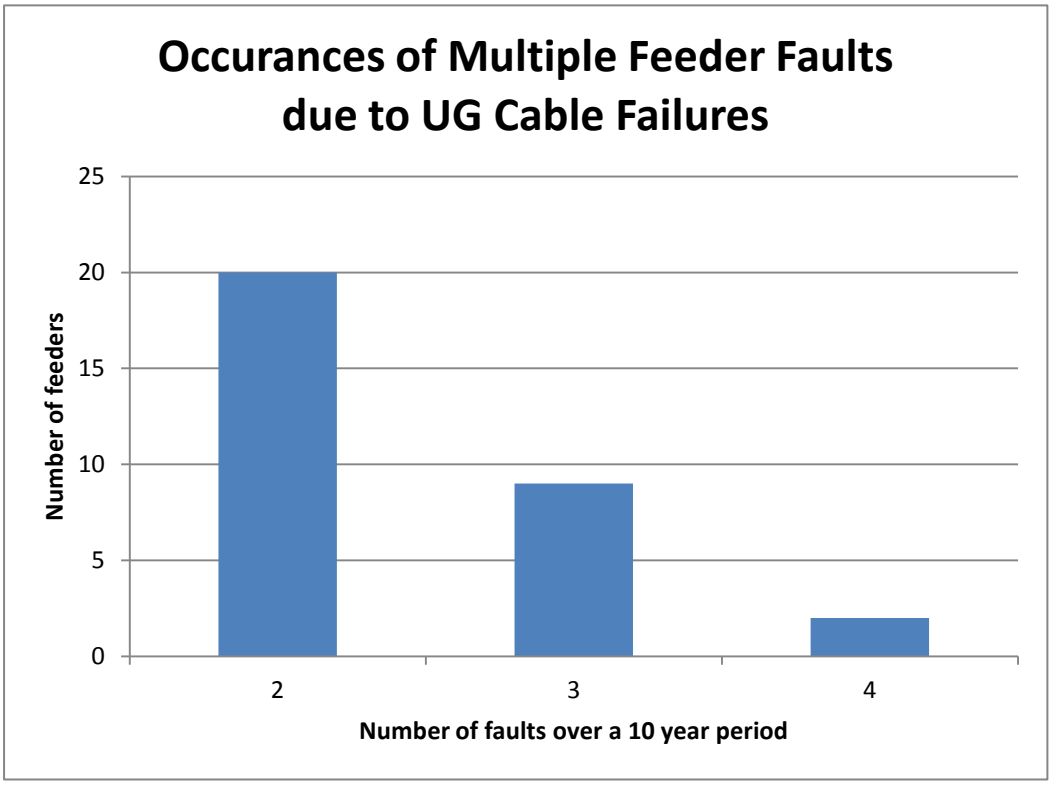

Figure 2: Occurrences of Multiple Feeder Faults

As an example, there are 20 feeders which have experienced 2 recorded faults due to underground cable failures, over a 10 year period. In instances where more than one fault has occurred on older assets, proactive replacement will be considered to ensure that the current trend of failures will not increase to a level that significantly affects customer supply. This is because the majority of areas which have experienced multiple failures are urban and therefore a significant number of customers are affected by the resultant feeder outages.

It is clear that the historical expenditure for this category has been inadequate due to the increasing trend in failures and therefore an increase is necessary to adequately manage this trend.

It is estimated that the expenditure forecast in Aurora's *Revised Regulatory Proposal* will allow for the replacement, or part thereof, of approximately 3 underground cables and 1 submarine cable. Given the current population, only a very limited replacement program is possible with this proposal and it is considered the absolute minimum required to maintain these assets effectively.

2.4. Recommendation

It is recommended that the AER support this capital program by revising their allowed expenditure for provision of 1km of underground and 1km of submarine cable replacement.

2.5. References

1 NW-#30199642-Justification: REUGC - Replace HV UG Cables

2 NW-#30245020-Underground Cable Failures History Analysis Dec 2011

3. Asset Base

The cables installed in Aurora's distribution system are detailed in table 1.

Table 1: Cables installed in Aurora's distribution system by type

Description	Voltage	Installation period	Installed length (km)
Paper insulated, oil draining	HV	1920-1960	30
	LV	Pre-1960	15
Paper insulated, mass impregnated non-draining (MIND)	HV	1960-1992	505
	LV	1960-1978	207
Paper insulated, oil-filled	HV	1964-1971	16
XLPE insulated, PVC/HDPE sheathed	HV	1992- 2010	447
XLPE-TR insulated, PVC/HPDE sheathed	HV	2007 - Current	100
CONSAC	LV	1971-1980	189
XLPE insulated, PVC sheathed (single to four core)	LV	1978-current	687
Submarine cable – Draining type	HV	1914-1960	6
Submarine cable – MIND	HV	1960-1992	15
Submarine cable – XLPE insulated, PVC/HDPE sheathed with overall metallic sheath and steel wire armouring	HV	1992-2008	9

4. Confidentiality

Aurora does not consider any information contained within this document to be confidential.