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Project justifications for reactive replacement programs

Ausgrid

Content

1 INTRODUCTION

1.1 Program description

Ausgrid's reactive programs fund the treatment of assets associated with a broad range of asset risks and condition issues and is analogous to fault and emergency maintenance expenditure. Reactive treatment includes:

- Replacing assets, or
- Refurbishing or modifying assets to extend the asset life

The reactive programs cover investment required during the 2019-24 regulatory period that is not included in the programs described in the other replacement program attachments[1]. Reactive programs are based on the asset classes shown below:

- Replace Distribution Substation Reactive (RND_01.02.99)
- Replace Zone Substation Reactive (RND_02.02.99)
- Replace Sub-transmission Substation Reactive (RND_03.02.99)
- Replace Distribution Mains Overhead Reactive (RND_04.02.98)
- Replace Distribution Mains Underground Reactive (RND_04.02.99)
- Replace Transmission Mains Overhead Reactive (RND_05.02.98)
- Replace Transmission Mains Underground Reactive (RND_05.02.99).

Reactive programs continue from the current regulatory period, however, Ausgrid has improved its approach to reactive programs from previous periods by taking an asset class view to forecasting, allowing more accurate forecasting at this aggregated level. Ausgrid expects that $219 million is required to fund reactive expenditure during the 2019–24 regulatory period based on our forecasting approach.

1.2 Background

Ausgrid's portfolio of electrical assets varies in age, technology, configuration, make, model and condition. The large variations lead to a number of different approaches to managing individual asset risks. While the proactive programs have been developed to address known or forecasted asset issues, not all risks can be forecast or predicted. Additionally, Ausgrid may decide that a proactive program is not required based on the level of risk when compared to the cost of a proactive program to mitigate the risk.

Ausgrid's reactive program has been developed to address asset risks that arise throughout the period not covered by the proactive programs. The risk from failure is first assessed (criticality assessment) before deciding whether a proactive approach will be adopted.

The balancing between reactive and proactive treatment approaches allows Ausgrid to maximise the useful service life of assets in a prudent, safe and cost effective manner.

1.3 Need for reactive programs

The decision to repair or replace an asset following a failure depends on a range of factors including whether the failure is repairable, the cost of repairs, overall condition of the asset

[1] See Attachment 5.13.A to 5.13.J, and 5.13.L for the other replacement programs.

after repair, and the remaining asset life following repair. Reactive programs are required when:

- An asset has failed and it is not technically feasible or cost effective to repair
- New asset information leads to the need for treatment not covered by existing proactive programs.

Any of the above triggers may result in an unplanned project to reactively treat an asset. When new information drives the need for new investment not covered by an existing proactive program, Ausgrid may choose to establish a new proactive program and reallocate funding from the reactive program.

1.3.1 Asset failures

Despite Ausgrid's proactive programs to mitigate the safety and loss of supply risks associated with asset failure, asset failures will still occur. These failures may occur when:

- The probability of failure is unpredictable, or
- Ausgrid has made an economic or risk based decision not to proactively treat risks based on the principles of managing risks so far as is reasonably practicable.

Ausgrid has an established process to replace assets following a condition assessment captured in its condition based programs. However, not all failure modes can be assessed for, making some failures unpredictable.

In some cases, Ausgrid through the Maintenance Requirements Analysis (MRA) process identify that, so far as is reasonably practicable, the potential condition based assessment options available are not economically effective (efficient) when compared to the risk of failure. Additionally, the cost of undertaking planned replacement of assets may not be appropriate for the level of risk.

1.3.2 New asset information

Through routine reviews of Failure Modes Effects and Criticality Analysis (FMECA) using real information captured in the field, Ausgrid is continuously improving its understanding of its assets, their failure modes and the potential asset risks. However, throughout a regulatory period, new information may provide additional insight which requires a change in strategy and approach. This may include:

- Unforeseen consequences
- Unpredicted increases in asset failure
- Changes in legislative obligations.

For example, inherent design issues may lead to premature functional failures, reducing the expected technical life of an asset. Ausgrid expects assets will achieve their expected design life and therefore does not develop proactive programs for short lived assets unless the additional issues are known at the time of developing the regulatory proposal.

1.4 Costing and volumes

In the 2014-19 regulatory proposal, Ausgrid's forecast for reactive programs was based on a bottom-up build resulting in 141 individual reactive programs. Due to the inherent unpredictable and stochastic nature of reactive programs, this approach led to a higher consolidated forecast when compared to previous actual expenditure. Analysis of the reactive expenditure trends at the program level highlighted the volatility of reactive expenditure at a disaggregated level, which made forecasting at this level impractical.

Ausgrid has moved away from this bottom-up program level approach and introduced an aggregated pooled approach based on the assessment of historical trends in actual expenditure. The steps taken in developing the forecast are shown in Figure 1 .

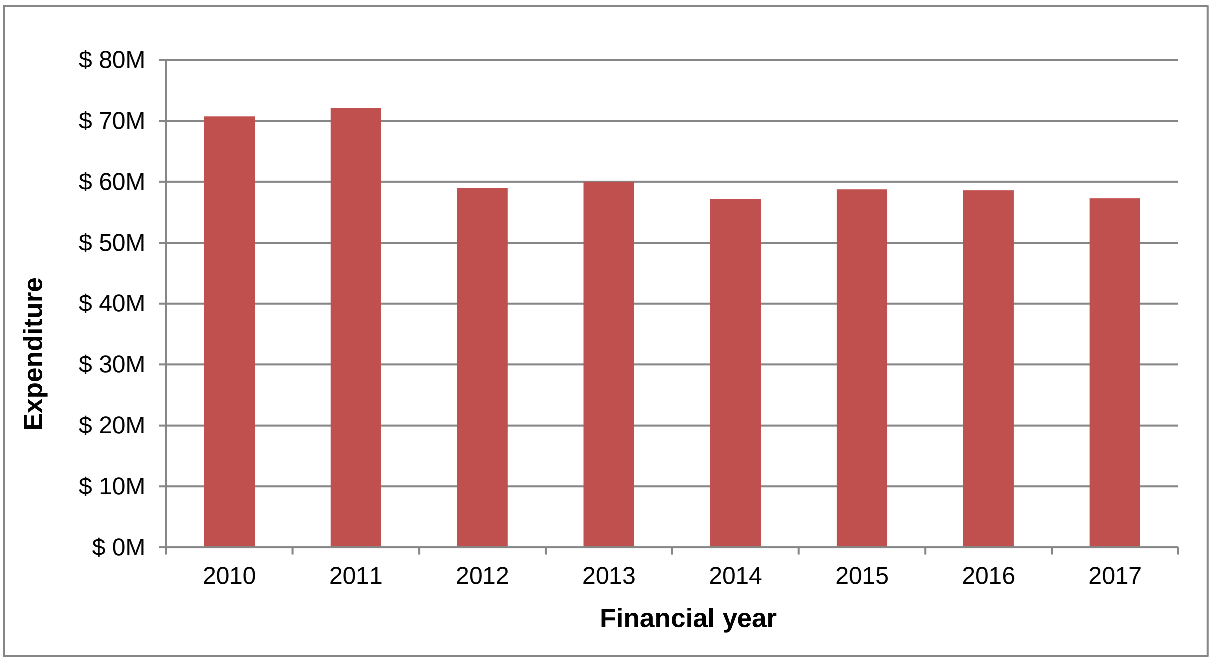
Figure 1. Forecasting approach for reactive replacement programs

1. Historical trend analysis
2. Determine the appropriate trend period
3. Consider variations
4. Forward forecast

1.4.1 Step 1: historical trend analysis

Before the new approach could be adopted, Ausgrid assessed the viability of the approach by reviewing historical reactive expenditure to evaluate its consistency year on year. The outcome of this review over the last eight years is shown in Figure 2. The costs shown are total costs ($, real FY19).

Figure 2. Trend in actual reactive capital expenditure 2009/10 to 2016/17, ($m, real FY19)



The trend highlights that while there was a step change between 2010/11 and 2011/12, reactive expenditure has remained relatively stable since 2011/12. The maximum deviation from the average in the six year period from 2011/12 to 2016/17 has not exceeded $1.6 million (less than 3% deviation). This outcome reflects the appropriateness of utilising a historical averaging approach.

1.4.2 Step 2: Determine the appropriate trend period

Despite the minimal variation in reactive expenditure over the last six years, Ausgrid considers the reactive expenditure incurred in the past three years to be the most accurate and appropriate expenditure data to use for forward forecasting of reactive allocation across the asset classes. Therefore reactive expenditure from 2015 through to 2017 was selected as appropriate trend expenditure.

1.4.3 Step 3: Consider variations

In evaluating potential changes from the historical average, Ausgrid considered the following:

- Expected changes to failure rates or age profiles over the period
- Impact from other investment changes such as proactive programs or maintenance.

Ausgrid is seeing a modest increase in failure rates as reflected in System Average Interruption Frequency Index (SAIFI) and unassisted pole failures which is suggesting upward pressure on reactive expenditure. Furthermore, at the level of proposed investment for the 2019-24 period, it is expected that the age of Ausgrid's assets will on average increase, however, given the targeted risk based approach to proactive programs informed by strong asset condition information, it is not expected that the increases in age and failure rate will require an increase reactive investment over the period.

Ausgrid has reduced its maintenance program requirements over the current regulatory period and established a new base year for the 2019-24 period. These changes are predominately informed by new technology, improved data and increased risk certainty. Changes to the maintenance program have been undertaken within acceptable risk boundaries and are therefore not expected to increase asset failure rates leading to the need for additional reactive capital expenditure.

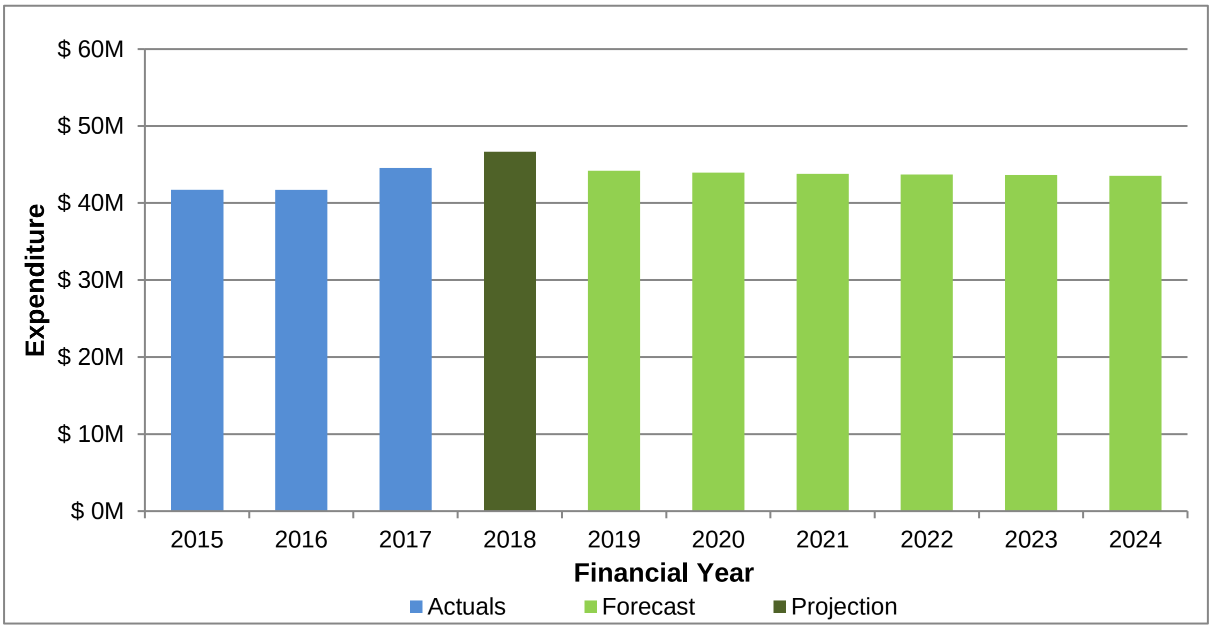
It is therefore appropriate that no significant adjustment is required to the historical average for reactive expenditure for the 2019–24 regulatory period.

1.4.4 Step 4: Forward Forecast

The average from 2015-17 was used to forecast future expenditure requirements. Based on current performance, the projected year-to-date expenditure in 2017/18 has increased as shown in Figure 3 below. The current forecast for the 2019-24 regulatory period does not include the projected performance for 201718, despite the upward pressure on the need for increased expenditure.

The costs shown are direct costs only and as such 2014/15 to 2016/17 appear lower than the total costs shown for these years in Figure 2.

Figure 3. Reactive Forecast



The summary forecast for these reactive programs is shown in Table 1 and equates to approximately $44 million per year during the 2019-24 regulatory period. The costs shown are direct costs only. These programs form part of the overall investment being proposed for the different asset categories - refer to the Ausgrid Reset RIN template ‘2.2 REPEX’ for details in regard to the overall investment proposed for all asset categories during 2019-24.

Table 1. Reactive forecast by asset class

Direct Costs (real $FY19)	FY20	FY21	FY22	FY23	FY24
Distribution Substations ($m)	$8.2	$8.1	$8.1	$8.1	$8.1
Zone Substation Reactive ($m)	$4.4	$4.4	$4.4	$4.3	$4.3
Sub-transmission Substation ($m)	$2.9	$2.9	$2.9	$2.9	$2.9
Distribution Mains Overhead ($m)	$10.7	$10.7	$10.7	$10.6	$10.6
Distribution Mains Underground ($m)	$14.0	$13.9	$13.9	$13.8	$13.8
Transmission Mains Overhead ($m)	$2.5	$2.5	$2.5	$2.5	$2.5
Transmission Mains Underground ($m)	$1.3	$1.3	$1.3	$1.3	$1.3
Total reactive ($m)	**$44.0**	**$43.8**	**$43.7**	**$43.6**	**$43.5**