



2013 Success Estimating Database – Benchmarking Summary

REPORT

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2013 SUCCESS ESTIMATING DATABASE – BENCHMARKING SUMMARY



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1 EXECUTIVE SUMMARY

In accordance with the CAPEX Estimating Database Administration procedure EG PG G2 006, the Capex Estimating Database (*Success*) has been benchmarked by way of independent verification. This is one of a number of measures used to ensure cost estimating for major capital works projects is kept sufficiently accurate.

The independent verification process used to benchmark *Success* involved obtaining independent cost estimates from contractors for a number of future projects and then comparing this information with the corresponding current *Success* project cost estimates. Summarised results of the comparisons are provided in Table 1 – Comparisons with Independent Verified Cost Estimates, below.

Table 1 – Comparisons with Independent Verified Cost Estimates.

Option Feasibility Study No	Description	Project Type	Cost Differential to Independent Estimate*
OFS 3006A	Installation of two 132kV switchbays at Vineyard Substation	Sub Aug	-7.8%
OFS 1010A	Uprating Lines 1 and 2 to 85°C	T/L Aug	+90% / -5.1% (See Note 1)
OFS 1010A	Uprating Lines 1 and 2 to 100°C	T/L Aug	+120% / +0.2% (See Note 1)
OFS 1033B	Liddell to Tamworth - New Double Circuit 330kV Line	T/Line New	-0.1%
OFS 6007A	Comms to Beryl via UGFO to Line 79 OPGW	Comms – Small	-11.5%
OFS 2014A	Sydney North Capacitors	Sub Reactive	-23% / -0.2% (See Note 2)
OFS 2016A	Sydney North Secondary System Replacement - SSB	SS Replace	+1.2%
OFS 2016C	Sydney North Secondary System Replacement – Existing Building	SS Replace	-0.5%
OFS 8006A	Vales Point Substation - 330kV In-Situ Rebuild	Sub Rebuild	+0.8%
OFS 4019B	Line 22 330kV Suspension Tower Replacement (with concrete poles)	T/L Aug	+1.0%
OFS 4058B	9U3 132kV Transmission Line - Line Rebuild	TL New	+11% / -0.7% (See Note 3)
OFS 4061B	Tamworth 330 No.2 Transformer Condition - 375MVA	Sub Tfmr/Rx	-6%
* The Cost Differential to Independent Estimate is a comparison of the <i>Success</i> generated cost estimate (using \$2012-13 pricing based on the scope as defined in the feasibility study), with the independent verification estimate.			

Notes:

- For Lines 1 and 2 uprating, the initial difference between estimates showed a significant cost difference (>90%). This resulted in a re-assessment of the estimating process for these projects (refer Section 5). After refinement of the estimating process, the cost difference for the projects reduced to -5.1% and +0.2% respectively. This process has been applied to all new uprating estimates.
- The initial difference between estimates was -23%, however, after correction for the contractor's high capacitor cost (refer Section 5) the difference reduced to -0.2%. No changes were made to TransGrid's estimating process.

3. The initial difference between estimates was +11%, however, after adjustment to compare the same scope for access and clearing (refer Section 5) the difference reduced to -0.7%. No changes were made to TransGrid's estimating process.

In terms of the total value of the projects assessed, the total difference between the TransGrid's estimates and the independent estimates was -0.2% (\$1.2m in a total of \$482m).

The review undertaken in this report shows that the estimates prepared using TransGrid's cost estimating Database are generally within a $\pm 10\%$ range of independent estimates. It is considered that this level of correlation with independent estimates is acceptable for the estimate uncertainty at the pre-DG1 stage of the Corporate Governance process ($\pm 25\%$). After adjustment of the line uprating estimating process, the benchmarking process indicates that the database remains accurate for a pre-DG1 level of estimating.

2 INTRODUCTION

Capital Program Delivery/Project Development (CPD/PD) is responsible for preparing cost estimates required for future projects. These estimates are used for the project governance process, the budgeting process and the development of forecast Capex in TransGrid's Revenue Proposal.

As part of TransGrid's process to ensure that *Success* remains accurate, regular costing reviews are undertaken, along with independent verification, in accordance with the requirements set out in the CAPEX Estimating Database Administration Procedure - EG PG G2 006.

3 Capex Estimating Database (*Success*)

The following provides a summary description of *Success* structure and functionality.

3.1 Database Structure

Success is structured to provide the user with a top down approach to defining a project scope for which *Success* provides a bottom-up estimate.

All estimates are based on standard templates defined in *Success*. The user chooses the template which is relevant to the type of project being estimated. Where a project contains more than one element (eg: a new substation and a major new transmission line connection) more than one template may be chosen to ensure correct factors are applied to each section of the estimate.

The user then selects the required quantity of switchbay types necessary to fulfil the project scope and assigns them to the estimate. *Success* generates a list of assemblies along with their respective quantities to match up with the selected switchbay types. The quantities within the assembly items list can be modified, or additional assemblies added, to satisfy specific project requirements.

Assemblies consist of one or more cost items, each cost item consisting of relevant resources. Cost items can also be individually added or removed from the estimate to satisfy specific project requirements.

The total estimate cost is a summation of the resource costs and the additional costs associated with design, project management, environmental approvals, site supervision, site management, testing and commissioning, based on the standard template selected for the estimate.

3.2 History

Success has been in use in TransGrid since 2010. Prior to that time estimating was completed using a TransGrid developed SQL database, which operated on similar principles to those employed in *Success*.

Data from the SQL database was used to develop the initial resource database in *Success*, and since that time the data has been regularly reviewed and refined to reflect changes in technology, design approaches and market price movements.

To ensure that *Success* cost data remained accurate, a CAPEX Estimating Database Administration procedure (procedure EG PG G2 006) was developed, which outlines various requirements for updating and verifying cost element data. One of these requirements involves benchmarking projects using external organisations having suitable skills and expertise to undertake the benchmarking exercise.

It was deemed prudent in 2013 that a range of project types be benchmarked due to:

- significant changes to database structures to improve estimating accuracy since conversion to *Success*; and
- the need to complete estimates as part of the 2014-19 Revenue Reset process, for project types on which TransGrid has limited delivery experience.

4 Benchmarking Method

The benchmarking of *Success* has been undertaken utilising independent pricing verification by contractors currently engaged by TransGrid under period order arrangements. Project briefs were prepared and distributed amongst three contractors on TransGrid period agreements as detailed in Table 2.

Table 2 – Projects for Independent Analysis

Option Feasibility Study No	Description	Contractor
OFS 3006A	Installation of two 132kV switchbays at Vineyard Substation	Aurecon
OFS 1010A	Uprating Lines 1 and 2	Aurecon
OFS 1033B	Liddell to Tamworth - New Double Circuit 330kV Line	Aurecon
OFS 6007A	Comms to Beryl via UGFO to Line 79 OPGW	Aurecon
OFS 2014A	Sydney North Capacitors	SKM
OFS 2016A	Sydney North Secondary System Replacement – SSB	SKM
OFS 2016C	Sydney North Secondary System Replacement – Existing Building	SKM
OFS 8006A	Vales Point Substation - 330kV In-Situ Rebuild	SKM
OFS 4019B	Line 22 330kV Suspension Tower Replacement (with concrete poles)	PB
OFS 4058B	9U3 132kV Transmission Line - Line Rebuild (excl property)	PB
OFS 4061B	Tamworth 330 No.2 Transformer Condition - 375MVA	PB

Each contractor was given:

- A copy of the Option Feasibility Request for the respective project;
- A copy of the option Feasibility Study for the respective project, minus the cost information; and
- Other relevant documents and drawings.

In respect of the scope of the brief, each contractor was asked to:

- Review the project documentation provided;
- Verify project scope, time and risks;
- Prepare an independent estimate of the expected cost for the project scope (excluding risk); and
- Provide a report outlining findings.

5 Results

Table 3 below, provides a comparison between the original OFS cost estimates (in the dollars of the year the report was issued), independent project cost estimates obtained from contractors (in \$2012-13) and the current *Success* project cost estimates (in \$2012-13 using the current factors from the 2013 DCF/NCF review).

The results indicate that in general the current *Success* estimates are within $\pm 10\%$ of the independent estimates. Exceptions to this, and other matters found during the analysis process include:

- a) The original estimate for OFS 3006A was approximately 30% lower than both the current *Success* estimate and the contractor estimate. The original OFS estimate was prepared using incorrect factors. Once this was corrected, the new *Success* estimate and independent estimate are within 10% of each other.

As part of processes for updating estimates to 2013-14 pricing, a full consistency review of all current projects has been initiated to ensure that correct estimate templates and factors are being used and consistently applied to ensure that the issue found on this estimate is not repeated.

- b) The original estimates for OFS 1010A were significantly (>90%) higher than the independent estimate. A review of the methodology being used to calculate line uprate projects was completed to determine whether there were reasons for the large difference in costs. It was discovered that in the area of structure supply and erection a significant amount of double counting was occurring and that factors had been incorrectly applied. Changes were made to the templates for both 330kV and 132kV uprating sheets.

After re-estimating using the new templates, the new Success estimates were found to be within $\pm 10\%$ of the independent estimate. This has been corrected in all current relevant estimates in the *Success* database. It is proposed to create new assemblies in Success to address this issue and minimise the risk of future miscalculations.

- c) The independent estimate for OFS 2014A is 20% higher than both the original OFS and current Success estimates. The primary reason for this is a high cost estimate for each capacitor bank (\$1.95m compared to TransGrid's cost of \$1.2m). The TransGrid cost is based on recent contracts and is considered more accurate than the one-off supplier sourced value. Once adjustments are made for this cost variation, the independent estimate was found to be within 1% of the current Success estimate.
- d) The current Success estimate for OFS 4058B is 10.7% greater than the independent estimate. This is primarily due to a difference in assessment of access and clearing requirements. At a desktop assessment level, clearing categories can be difficult to determine. It is considered that TransGrid's assessment of the route conditions is valid. In order to check the consistency of the database, a further benchmark check was completed using the contractor's assumptions. This resulted in an estimate which aligned closely with the contractor's estimate (-0.7%), indicating that the database costing is valid.
- e) OFS 4061B was originally 24% higher than the independent estimate. The original OFS was based on the 2011-12 library for which transformer costs were significantly higher than current market values. Once the costs were updated to \$2012-13 costs, the estimates are within $\pm 10\%$ of each other.

Table 3 – Comparisons with Independent Cost Estimates.

Description	Original OFS Value	OFS Approval Date	Independent Estimate (\$2012-13)	Current Success Estimate (\$2012-13)	OFS Cost compared with Independent Estimate	Current Success Cost compared with Independent Estimate
OFS 3006A - Installation of two 132kV switchbays at Vineyard Substation	2,300,000	28/06/2012	3,296,865	3,039,596	-32.8%	-7.8%
OFS 1010A - Uprating Lines 1 and 2 to 85°C	20,200,000	16/10/2012	10,786,975	10,238,342	91.9%	-5.1%
OFS 1010A - Uprating Lines 1 and 2 to 100°C	35,700,000	16/10/2012	16,302,505	16,329,053	118.8%	0.2%
OFS 1033B - Liddell to Tamworth - New Double Circuit 330kV Line	212,000,000	2/11/2012	224,833,330	224,695,309	-5.7%	-0.1%
OFS 6007A - Comms to Beryl via UGFO to Line 79 OPGW	1,000,000	11/09/2012	1,523,585	1,348,340	-38.8%	-11.5%
OFS 2014A - Sydney North Capacitors	5,700,000	6/06/2012	6,739,192	5,168,494	-20.1%	-23.3%
OFS 2014A - Sydney North Capacitors (adjusted)	5,700,000	6/06/2012	5,185,192	5,168,494	10.0%	-0.3%
OFS 2016A - Sydney North Secondary System Replacement - SSB	38,000,000	11/06/2013	37,432,232	37,897,993	1.5%	1.2%
OFS 2016C - Sydney North Secondary System Replacement – Existing Building	38,000,000	11/06/2013	37,959,602	37,787,496	0.1%	-0.5%
OFS 8006A - Vales Point Substation - 330kV In-Situ Rebuild	48,000,000	7/11/2012	47,418,785	47,797,376	1.2%	0.8%
OFS 4019B - Line 22 330kV Suspension Tower Replacement (with concrete poles)	36,000,000	22/07/2012	37,012,020	37,368,090	-2.7%	1.0%

Description	Original OFS Value	OFS Approval Date	Independent Estimate (\$2012-13)	Current Success Estimate (\$2012-13)	OFS Cost compared with Independent Estimate	Current Success Cost compared with Independent Estimate
OFS 4058B - 9U3 132kV Transmission Line - Line Rebuild (excl property)	48,000,000	17/12/2012	47,997,910	53,154,242	0.0%	10.7%
OFS 4061B - Tamworth 330 No.2 Transformer Condition - 375MVA	15,000,000	26/04/2012	12,256,184	11,514,266	23.8%	-6.1%

6 Conclusion

The comparisons between the current *Success* project cost estimates and the independent project cost estimates, generally correlates within $\pm 10\%$ of one another. This demonstrates that the process implemented to maintain and update the CAPEX Estimating Database is appropriate and the estimates prepared using the Database are suitable for the pre-DG1 phase of the corporate governance process.