OPTIONS EVALUATION REPORT (OER)

FY24-28 Fire Systems (Electronic) Renewal

OER- N2482 revision 0.0

Ellipse project no(s):
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Project reason: Capability - Asset Replacement for end of life condition
Project category: Prescribed - Asset Renewal Strategies

Approvals

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Change history

Revision	Date	Amendment
0	11/10/2021	First Issue

Executive summary

Buildings within TransGrid's substation and switching station sites contain electronic fire protection systems. These systems ensure our field staff, third party contractors and visitors remain safe while working within the buildings through adequate detection and alarming of any fires.

TransGrid is currently observing increasing corrective maintenance expenditure throughout the network related to electronic fire systems defects, triggering the need to consider capital investment options. Additionally, dilapidation reports prepared by Nutbrook Engineering have recommended works to ensure buildings (including fire systems) remain fit for purpose. The dilapidation reports indicate that 32 network sites have electronic fire system asset issues that are expected to be addressed in the short to medium term (within 6 years). It would be more cost effective to address these issues through a strategic and managed program of works, rather than remediation upon failure of the assets.

TransGrid is obligated to maintain safe working practices in accordance with a number of rules and regulations including the Work Health Safety Act 2011. As such there is a need to address deteriorating asset health and the associated safety risks of the identified fire protection systems.

The assessment of the options considered to address the need/opportunity appears in Table 1.

Table 1 - Evaluated options

Option	Description	Direct capital cost ($m)	Overheads ($m)	Total capital cost[1] ($m)	Weighted NPV (PV, $m)	Rank
Option A – N2482A	Renewal of individual fire system assets like-for like	3.79	0.06	3.85	0.39	1
Option B – N2482B	Complete site wide electronic fire system renewal leveraging technological advancements	9.51	0.16	9.67	-3.86	2

It is the recommendation that Option A – Renewal of individual assets be scoped in detail. This option was found to have the highest net economic benefit while also enabling TransGrid to continue to meet its obligations in work health and safety for personnel.

[1] Total capital cost is the sum of the direct capital cost and network and corporate overheads. Total capital cost is used in this OER for all analysis.

1. Need/opportunity

Buildings within TransGrid's substation and switching station sites contain electronic fire protection systems. These systems ensure our field staff, third party contractors and visitors remain safe while working within the buildings through adequate detection and alarming of any fires.

Historically, these assets have not been targeted for any renewal program to address their age and condition. TransGrid is currently observing increasing corrective maintenance expenditure throughout the network related to electronic fire systems defects, signifying a lead indicator that a portion of our asset fleet requires capital renewal.

Moreover, dilapidation reports prepared by Nutbrook Engineering have identified recommended works to ensure buildings (including fire systems) remain fit for purpose and maintain safe working conditions for personnel attending site. The dilapidation reports indicate that 32 network sites have electronic fire system asset issues that are expected to be addressed in the short to medium term (within 6 years). Repairing or replacing these assets under an emergency, after they have functionally failed, is likely to cost significantly more compared to planned remediation. For this reason it would be cost effective to address these issues through a planned program or works.

There is a need to address deteriorating asset health and the associated increasing risk of the identified fire protection systems to meet our responsibilities under the WHS Act 2011 as a Person Conducting a Business or Undertaking (PCBU). In accordance with TransGrid's Renewal and Maintenance Strategy for Network Property, a pre-emptive approach to asset renewals is required to address the increasing probability of failure of these safety critical assets.

The current estimate of electronic fire protection system assets reaching end of life between 2023/24 and 2027/28 is 71 across 32 sites.

2. Related needs/opportunities

- Need N2560 – FY24-28 Fire Systems (Mechanical) Renewal
- Need N2546 – FY24-28 Fire Extinguisher Renewal
- Need N2553 – FY24-28 Building Refurbishment

3. Options

3.1 Base case

The Base Case for this Need is to continue with TransGrid's business as usual operations and maintenance (O&M) for electronic fire systems. This approach does not address the following issues:

- Increasing risk of failure of electronic fire systems assets that are nearing end of life (as identified by Nutbrook Engineering). Repairing or replacing these assets under emergency after they have functionally failed is likely to cost significantly more than planned remediation due to the need to expedite works to bring the assets back into service as soon as possible. Moreover, planned asset replacement allows more efficient repair of assets as multiple repairs can be competed simultaneously at each site.
- Safety risk for personnel due to detection failure in the event of fires within the building.

3.2 Options evaluated

Option A — Renewal of individual assets [NOSA N2482, OFS N2482A]

This option involves the renewal of individual electronic fire systems assets (including fire indicator panels and VESDA systems) at various Network sites. The option is based on a like-for-like approach whereby the asset is

replaced by its modern equivalent. Additional system modifications or additional functionalities would not be deployed under this option.

This option will deliver reduced costs to the consumers by achieving the following:

- Minimising costs to remediate the identified building issues in a planned manner.
- Reductions in corrective maintenance associated with these fire systems assets

There is a total of 81 fire system assets requiring renewal across 32 sites. Refer to Appendix B for the quantities of fire system assets to be renewed at each targeted site.

It is anticipated that the works will commence in 2024/25 and completed in 2027/28.

Option B — Complete electronic fire systems renewal [NOSA N2482, OFS N2482B]

This option involves the complete site wide renewal of the electronic fire systems assets. This includes installation of the following fire systems equipment to the latest standards:

- Fire indicator Panel
- VESDA system
- Fire detectors
- Alarms (smoke, visual)
- Emergency speaker
- Appropriate signage

This option will deliver benefits by achieving the following:

- Minimising costs to remediate the identified building issues in a planned manner.
- Significant and greater operational benefits (compared to Option A, albeit at a larger cost) available due to improved remote monitoring, control and interrogation, efficiency gains in responding to faults, and phasing out of obsolete and legacy systems and protocols.

Refer to Appendix B for the list of 32 targeted sites for renewal.

It is anticipated that the works will commence in 2024/25 and completed in 2027/28.

Option C — Site Dependent Approach [NOSA N2482, OFS N2482C]

This option involves implementing either Option A or Option B depending on which option is more economically feasible, on a per site basis.

It is anticipated that the works will commence in 2024/25 and completed in 2027/28.

Refer to Appendix B for the list of targeted sites for renewal.

3.3 Options considered and not progressed

Table 2 - Option considered but not progressed

Option	Reason for not progressing
Asset Retirement	This can only be achieved through retirement of the fire systems at all identified sites, which is not feasible as it will not meet TransGrid's WHS obligations.

4. Evaluation

4.1 Commercial evaluation methodology

The economic assessment undertaken for this project includes three scenarios that reflect a central set assumptions based on current information that is most likely to eventuate (central scenario), a set of assumptions that give rise to a lower bound for net benefits (lower bound scenario), and a set of assumptions that give rise to an upper bound on benefits (higher bound scenario).

Assumptions for each scenario are set out in the table below.

Table 3 - Scenarios

Parameter	Central scenario	Lower bound scenario	Higher bound scenario
Discount rate	4.8%	7.37%	2.23%
Capital cost	100%	125%	75%
Operating expenditure benefit	100%	75%	125%
Risk costs benefit	100%	75%	125%
Other benefit	100%	75%	125%
Scenario weighting	**50%**	**25%**	**25%**

Parameters used in this commercial evaluation:

Table 4 - Parameters used in commercial evaluation

Parameter	Parameter Description	Value used for this evaluation
Discount year	Year that dollar values are discounted to	2020/21
Base year	The year that dollar value outputs are expressed in real terms	2020/21 dollars
Period of analysis	Number of years included in economic analysis with remaining capital value included as terminal value at the end of the analysis period.	10 years
Safety disproportionality	Multiplier of the safety risk cost included in NPV analysis to demonstrate implementation of obligation to reduce safety to ALARP.	Refer to section 4.3 for details.

The capex figures in this OER do not include any real cost escalation.

4.2 Commercial evaluation results

The commercial evaluation of the technically and commercially feasible options is set out in Table 5. Details appear in Appendix A.

Table 5 - Commercial evaluation (PV, $ million)

Option	Capital Cost PV	Central scenario NPV	Lower bound scenario NPV	Higher bound scenario NPV	Weighted NPV	Ranking
Option A	3.05	0.23	-1.39	2.50	0.39	1
Option B	7.66	-4.09	-6.34	-0.92	-3.86	2
Option C	Option not applicable.					

Note: The evaluation of Option B has determined that it is not commercially feasible to carry out a complete electronic fire system renewal at any Network sites. Hence Option C, which is a mix of Options A and B depending on which is more commercially viable on a site basis, has not been evaluated as the option ultimately becomes the same scope as Option A.

The evaluation focuses on the cost benefits achieved by replacing the identified building assets in a planned manner, rather than repairing the assets after failure at an escalated cost. The safety risk to personnel associated with failure of the fire system assets has not been quantified. However, addressing this need would deliver additional benefits by minimising these unquantified safety risks.

4.3 ALARP evaluation

TransGrid manages and mitigates bushfire and safety risk to ensure they are below risk tolerance levels or 'As Low As Reasonably Practicable' ('ALARP'), in accordance with the regulation obligations and TransGrid's business risk appetite. Although a network safety risk reduction is expected through addressing this need, the safety and bushfire risks have not been quantified. Hence, an ALARP evaluation is not applicable in this case.

4.4 Preferred option

The preferred option to meet the identified need by 2027/28 is Option A. Option A is the only option identified that has resulted in a positive NPV evaluation. Moreover, it will enable TransGrid to continue to meet its obligations in work health and safety for personnel.

Option A involves renewal of the individually assessed components in an old for new replacement. Efficiencies will be achieved by reusing existing infrastructure where practicable.

Refer to Appendix B for the list of targeted sites including the quantities of fire system assets required to be renewed.

Capital and Operating Expenditure

There is negligible difference in predicted ongoing planned routine operational expenditure between the option and the Base Case. However, there is a cost trade-off between replacing the fire system assets under a planned capital program and remediation upon asset failure. Generally, the cost required to repair failed assets (as in the Base Case) under corrective works is likely to be significantly greater than refurbishing the assets prior to failure (as in the preferred option) as a significant portion of assets identified are expected to fail in the short to medium term, that is, in under 6 years.

Regulatory Investment Test

The program and estimate allows for the appropriate Regulatory approvals as required.

5. Optimal Timing

The test for optimal timing of the preferred option has been undertaken. The approach taken is to identify the optimal commissioning year for the preferred option where net benefits (including avoided costs and safety disproportionality tests) of the preferred option exceeds the annualised costs of the option. The commencement

year is determined based on the required project disbursement to the meet the commissioning year based on the OFS.

The results of optimal timing analysis is:

- Optimal commissioning year: 2027/28
- Commissioning year annual benefit: $0.78 million
- Annualised cost: $0.49 million

Based on the optimal timing, the project is expected to commence in the 2023/24-2027/28 Regulatory Period.

6. Recommendation

It is the recommendation that Option A – Renewal of Individual Assets be scoped in detail.

The total project cost is $3.85 million including an amount of $283,000 to progress the project from DG1 to DG2.

Appendix A – Option Summaries

Project Description	FY24-28 Fire Systems (Electronic)		
Option Description	Option A - Renew individual assets		
Project Summary			
Option Rank	*1*	Investment Assessment Period	*10*
Asset Life	*10*	NPV Year	2020/21
Economic Evaluation			
NPV @ Central Benefit Scenario (PV, $m)	0.23	Annualised CAPEX @ Central Benefit Scenario ($m)	Annualised Capex - Standard (Business Case) 0.49
NPV @ Lower Bound Scenario (PV, $m)	-1.39	Network Safety Risk Reduction ($m)	Network Safety Risk Reduction 0.00
NPV @ Higher Bound Scenario (PV, $m)	2.50	ALARP	ALARP Compliant? No
NPV Weighted (PV, $m)	0.39	Optimal Timing	Optimal timing (Business Case) 2023/24
Cost (Central Scenario)			
Total Capex ($m)	3.85	Cost Capex (PV,$m)	3.05
Terminal Value ($m)	0.00	Terminal Value (PV,$m)	0.00
Risk (Central Scenario)	**Pre**	**Post**	**Benefit**
Reliability (PV,$m)	Reliability Risk (Pre) 0.00	Reliability Risk (Post) 0.00	Pre – Post 0.00
Financial (PV,$m)	Financial Risk (Pre) 0.00	Financial Risk (Post) 0.00	Pre – Post 0.00
Operational/Compliance (PV,$m)	Operational Risk (Pre) 0.00	Operational Risk (Post) 0.00	Pre – Post 0.00
Safety (PV,$m)	Safety Risk (Pre) 0.00	Safety Risk (Post) 0.00	Pre – Post 0.00
Environmental (PV,$m)	Environmental Risk (Pre) 0.00	Environmental Risk (Post) 0.00	Pre – Post 0.00
Reputational ($m)	Reputational Risk (Pre) 0.00	Reputational Risk (Post) 0.00	Pre – Post 0.00
Total Risk (PV,$m)	Total Risk (Pre) 0.00	Total Risk (Post) 0.00	Pre – Post 0.00
OPEX Benefit (PV,$m)			OPEX Benefit 0.00
Other benefit (PV,$m)			Incremental Net Benefit 3.28
Total Benefit (PV,$m)			Business Case Total Benefit 3.28

Project Description	FY24-28 Fire Systems (Electronic)		
Option Description	Option B - Complete fire system renewal		
Project Summary			
Option Rank	*3*	Investment Assessment Period	*10*
Asset Life	*10*	NPV Year	2020/21
Economic Evaluation			
NPV @ Central Benefit Scenario (PV, $m)	-4.09	Annualised CAPEX @ Central Benefit Scenario ($m)	Annualised Capex - Standard (Business Case) 1.24
NPV @ Lower Bound Scenario (PV, $m)	-6.34	Network Safety Risk Reduction ($m)	Network Safety Risk Reduction 0.00
NPV @ Higher Bound Scenario (PV, $m)	-0.92	ALARP	ALARP Compliant? No
NPV Weighted (PV, $m)	-3.86	Optimal Timing	Optimal timing (Business Case) N/A
Cost (Central Scenario)			
Total Capex ($m)	9.67	Cost Capex (PV,$m)	7.66
Terminal Value ($m)	0.00	Terminal Value (PV,$m)	0.00
Risk (Central Scenario)	**Pre**	**Post**	**Benefit**
Reliability (PV,$m)	Reliability Risk (Pre) 0.00	Reliability Risk (Post) 0.00	Pre – Post 0.00
Financial (PV,$m)	Financial Risk (Pre) 0.00	Financial Risk (Post) 0.00	Pre – Post 0.00
Operational/Compliance (PV,$m)	Operational Risk (Pre) 0.00	Operational Risk (Post) 0.00	Pre – Post 0.00
Safety (PV,$m)	Safety Risk (Pre) 0.00	Safety Risk (Post) 0.00	Pre – Post 0.00
Environmental (PV,$m)	Environmental Risk (Pre) 0.00	Environmental Risk (Post) 0.00	Pre – Post 0.00
Reputational ($m)	Reputational Risk (Pre) 0.00	Reputational Risk (Post) 0.00	Pre – Post 0.00
Total Risk (PV,$m)	Total Risk (Pre) 0.00	Total Risk (Post) 0.00	Pre – Post 0.00
OPEX Benefit (PV,$m)			OPEX Benefit 0.00
Other benefit (PV,$m)			Incremental Net Benefit 3.58
Total Benefit (PV,$m)			Business Case Total Benefit 3.58

Appendix B – Sites Requiring Renewal Works

Listed below are the 32 network sites with electronic fire system assets that are to be renewed in this Need.

A summary of the commercial evaluation and asset replacement quantities for each targeted site are also included (under the preferred Option A).

Site Code	Site Name	No. of VESDA units	No. of Fire Indicator Panels	Cost	Weight NPV	ALARP	Optimal Timing
ALB	Albury	0	1	$96,078	$4,968	N/A	2023/24
AR1	Armidale	2	1	$156,138	$16,526	N/A	2023/24
BRD	Balranald	1	0	$30,030	$9,338	N/A	2023/24
COF	Coffs Harbour	1	0	$30,030	$12,897	N/A	2023/24
CW2	Cowra	0	1	$96,078	$3,188	N/A	2023/24
DNT	Darlington Point	2	1	$156,138	$4,068	N/A	2023/24
ER0	Eraring	2	1	$156,138	$7,628	N/A	2023/24
FB2	Forbes	0	1	$96,078	$3,188	N/A	2023/24
GN2	Gunnedah	1	1	$126,108	$3,628	N/A	2023/24
HYM	Haymarket	1	1	$126,108	$44,559	N/A	2023/24
ING	Ingleburn	2	1	$156,138	$18,305	N/A	2023/24
JDA	Jindera	3	1	$186,168	$8,068	N/A	2023/24
KCR	Kemps Creek	4	1	$216,198	$15,626	N/A	2023/24
KLK	Koolkhan	0	1	$96,078	$1,408	N/A	2023/24
LD1	Liddell	3	1	$186,168	$6,288	N/A	2023/24
LP1	Liverpool	0	1	$96,078	$8,527	N/A	2023/24
LSM	Lismore	1	1	$126,108	$19,645	N/A	2023/24
LT1	Lower Tumut	3	1	$186,168	$16,966	N/A	2023/24
MN1	Munmorah	2	1	$156,138	$14,746	N/A	2023/24
MOL	Molong	0	1	$96,078	$1,408	N/A	2023/24
MRE	Moree	0	1	$96,078	$1,408	N/A	2023/24

Site Code	Site Name	No. of VESDA units	No. of Fire Indicator Panels	Cost	Weight NPV	ALARP	Optimal Timing
MRK	Muswellbrook	0	1	$96,078	$15,645	N/A	2023/24
MTP	Mt Piper	3	1	$186,168	$9,847	N/A	2023/24
NAM	Nambucca	0	1	$96,078	$3,188	N/A	2023/24
PKS	Parkes	0	1	$96,078	$4,968	N/A	2023/24
RGV	Regentville	1	0	$30,030	$14,677	N/A	2023/24
SYS	Sydney South	6	2	$372,336	$55,287	N/A	2023/24
TGH	Tuggerah	1	1	$126,108	$5,408	N/A	2023/24
UT1	Upper Tumut	2	0	$60,060	$7,999	N/A	2023/24
WL1	Wellington	2	0	$60,060	$7,999	N/A	2023/24
WOR	Wollar	1	0	$30,030	$440	N/A	2023/24
WW1	Wallerawang 330kV	1	0	$30,030	$7,559	N/A	2023/24