

NEED/OPPORTUNITY STATEMENT (NOS)

50V and 110V NiCad Battery Condition

NOS- 000000001360 revision 3.0



Ellipse project no.: P0007988

TRIM file: [TRIM No]

Project reason: Capability - Asset Replacement for end of life condition

Project category: Prescribed - Replacement

Approvals

Author	Hazam Khamis	Secondary Systems Strategist
Endorsed	Mark Jones	Secondary Systems and Communications Asset Manager
Approved	Lance Wee	M/Asset Strategy
Date submitted for approval	17 October 2016	

Change history

Revision	Date	Amendment
0	31 May 2016	Initial issue
1	17 October 2016	Update to 2016/17 dollars
2	17 November 2016	Update to format

1. Background

Nickel Cadmium batteries are used throughout the NSW network to provide a continuous supply of power to site equipment during a loss of primary supply across all voltage levels. The availability of an uninterruptible power supply is crucial particularly during a black event. There are currently 299 battery banks installed within TransGrid's network with install dates between 1984 and 2016.

The assets investigated under this need are aged battery banks that have reached the end of their technical life resulting in reduced capabilities to meet backup supply performance requirements.

The use of battery banks to provide backup power supplies during an outage event are a continuing requirement of the Australian Energy Regulator (AER) as outlined in the National Electricity Rules (NER). Backup power supply systems are required into the foreseeable future.

2. Need/opportunity

The following battery banks are covered by this need:

Battery Age	Battery Systems	Number of Banks
0-10 years	NiCd	74
11-20 years	NiCd	90
21-30 years	NiCd	14
31-40 years	NiCd	2

The risk cost associated with the 180 battery banks is \$27.1m per annum. The most significant element of concern is the reliability consequence associated with the failure of a network segment due to malfunction of the battery bank resulting in the loss of the No1 or No2 protection supply. Relays protect the network at all voltage levels and duplication is a requirement of the NER. It is estimated that 8 hours would be required to recover any loss of load after a battery bank failure. The risk costs are based on 2015/16 probabilities of failure derived from Ellipse historical failure data. These probabilities are forecast to continue increasing over the coming years as the assets continue past their expected life.

3. Related needs/opportunities

The following need would benefit from coordination with these works:

- > Need ID 1362 - 50V and 110V Battery Charger Condition

4. Recommendation

It is recommended that options be considered to address the identified need/opportunity.

Attachment 1 – Risk costs summary

Summary of results is attached below. Refer to supporting document in PDGS for full risk assessment.

Current Option Assessment - Risk Summary

Project Name: 110V and 50V NiCd Battery Condition

Option Name: 1360 - Base Case

Option Assessment Name: 1360 - Base Case - Assessment 1

Rev Reset Period: Next (2018-23)



Major Component	No.	Minor Component	Sel. Hazardous Event	LoC x CoF (\$M)	Failure Mechanism	NoxLoC xCoF (\$M)	PoF (Yr-1)	Total Risk (\$M)	Risk (\$M) (Rel)	Risk (\$M) (Op)	Risk (\$M) (Fin)	Risk (\$M) (Peo)	Risk (\$M) (Env)	Risk (\$M) (Rep)
< 10 yrs Battery System	128	Battery	Uncontrolled Electrical Contact / Discharge (< 10 yrs Battery System)	\$0.50	Failure	\$64.26	9.10%	\$5.85	\$5.36		\$0.44	\$0.05	\$0.00	\$0.00
< 10 yrs Battery System	128	Battery	Unplanned Outage - HV (< 10 yrs Battery System)	\$0.52	Failure	\$66.65	9.10%	\$6.07	\$5.36		\$0.70			\$0.00
11-20yrs Battery System	89	Battery	Uncontrolled Electrical Contact / Discharge (11-20yrs Battery System)	\$0.50	Failure	\$44.68	7.50%	\$3.35	\$3.07		\$0.25	\$0.03	\$0.00	\$0.00
11-20yrs Battery System	89	Battery	Unplanned Outage - HV (11-20yrs Battery System)	\$0.52	Failure	\$46.34	7.50%	\$3.48	\$3.07		\$0.40			\$0.00
21-30 yrs Battery System	10	Battery	Uncontrolled Electrical Contact / Discharge (21-30 yrs Battery System)	\$0.50	Failure	\$5.02	48.30%	\$2.42	\$2.22		\$0.18	\$0.02	\$0.00	\$0.00
21-30 yrs Battery System	10	Battery	Unplanned Outage - HV (21-30 yrs Battery System)	\$0.52	Failure	\$5.21	48.30%	\$2.51	\$2.22		\$0.29			\$0.00
31-40yrs Battery System	1	Battery	Uncontrolled Electrical Contact / Discharge (31-40yrs Battery System)	\$0.50	Failure	\$0.50	338.00%	\$1.70	\$1.56		\$0.13	\$0.01	\$0.00	\$0.00
31-40yrs Battery System	1	Battery	Unplanned Outage - HV (31-40yrs Battery System)	\$0.52	Failure	\$0.52	338.00%	\$1.76	\$1.56		\$0.20			\$0.00
				\$4.09		\$233.19		\$27.14	\$24.42		\$2.60	\$0.11	\$0.00	\$0.00
								Total VCR Risk:	\$24.42			Total ENS Risk:	\$0.00	