



AusNet Transmission Group Pty Ltd

Transmission Revenue Review 2017-2022

XC17 – FBTS Refurbishment: Business Case (Public)

Submitted: 30 October 2015



EPMO Business Case Review Summary

Project No / Title	XC17 – FBTS Refurbishment	
Portfolio	Transmission Company Capex	
Revision (Y/N)	Original	
Project Capex Budget for Approval (P50 + CFC's)	\$16,299k	
Total Estimated Expenditure for Approval (incl OHDs & risk)	\$17,958K	
Financial Years (FY) of Spend	2013/14 – 2017/18	
Enterprise Portfolio Review		
Project NPV (post tax)	\$732K	
IRR	7.88% (compares WACC [C-I-C])	
Payback	36.6 years	
1. Bus Case review	Minor changes were recommended and have been actioned. No further issues outstanding.	
2. NPV model review	Noted that there are NPV models, one for this BC (Stage 1) and another supplementary model which includes both stages (1 & 2) demonstrating that the chosen option is the least cost compared with other asset replacement options.	
3. Business Benefits	Noted that the main benefits derived from this project include the reduction of supply risk (unserved energy utilising revised VCRs) and plant damage risk through asset renewal. In addition, there are associated safety risk reductions, e.g., avoidance of potential explosive failures from aged and deteriorated 66 kV [C-I-C] current transformers or [C-I-C] bulk-oil circuit breakers	
4. Budget Allowance	Zero budget allowance for this project for FY14/15. The expenditure forecast of \$79K (P50 Direct +CFC) includes design and internal labour costs which will need to be managed at Portfolio level.	
5. Accounting notes	None	
6. Other issues to note	The Initiator has added helpful graphs at Appendix D to visually show the future benefits of completing this projects compared to the options considered. Necessity of concrete pad installation for future B2 transformer is questioned at this stage.	
Date review completed	31/10/2014	
Prepared by	[C-I-C]	
Approval signature		Date 6-11-14

EPMO Business Case Application for Approval

FBTS Refurbishment

Program ID: <i>(As assigned in EPPM Idea Brief)</i>	T0602
Project Number: <i>(Parent No or Stand-alone No)</i>	XC17
Project Initiator: <i>(Person who initiates idea)</i>	[C-I-C]
Initiating Dept. / Division: <i>(E.g. Stations, Asset Management)</i>	Asset Management
Prepared By: <i>Business Case Author (if different to Initiator)</i>	[C-I-C]
Contact No:	[C-I-C]
Date of Submission: <i>(Submitted for Approval)</i>	July 2014
Target Project Start Date: <i>(Project Delivery start date)</i>	April 2015
Proposed In-Service Date: <i>Expected physical In-service date at BC handover (becomes the agreed in-service date)</i>	30 September 2017
Target Project Completion Date: <i>Close out activities are complete (i.e., at Gate 5)</i>	30 November 2017

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1. PORTFOLIO

Check the relevant box below to reflect where the costs are to be directed for this proposed activity

Transmission	<input checked="" type="checkbox"/>	Electricity Dist.	<input type="checkbox"/>	Gas Dist.	<input type="checkbox"/>	ICT	<input type="checkbox"/>	Other	<input type="checkbox"/>
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Note, if the proposal spans more than a single line of business please indicate the relevant % splits (i.e., T%/E%/G%)

2. RECOMMENDATION

Approval is sought for a total expenditure of up to \$18M (including contingency allowance, overheads, finance charges and retirements) to selectively replace deteriorated 220 kV and 66 kV switchgear at Fishermans Bend Terminal Station (FBTS).

Project benefits include improved reliability of supply and reduced safety risk associated with an unlikely asset explosive failure at FBTS; consistent with the regulatory obligation to maintain the quality, reliability and security of supply of prescribed transmission services as stated in the National Electricity Rules.

The project targets a completion date of November 2017 by when annual project benefits would exceed annual project costs. This project has been included in AusNet Services' Transmission Asset Renewal Plan, which is published in AEMO's Victorian Annual Planning Report and is included in the AER's capital allowance and final determination for the 2014-17 regulatory control period.

3. FINANCIAL SUMMARY

TABLE 3a: Program / Project Expenditure & Revenue Forecasts

Project Expenditure Forecasts (\$'000s)	First 5 years					Total
	2013 / 14	2014 / 15	2015 / 16	2016 / 17	2017 / 18	
P50 Direct Expenditure (excl Delivery risk)	79	303	1,428	10,358	3,720	15,888
Capitalised Finance Charges	-	8	78	285	40	412
Project Delivery Budget - P50 Direct & CFC's	79	312	1,506	10,643	3,761	16,299
P90 Delivery Risk Adjustment**	2	7	33	239	86	366
Overheads	5	21	100	725	260	1,112
Total CAPEX for Approval (incl risk, CFC's & OH's)	86	340	1,638	11,607	4,107	17,777
Operating Expenditure	-	-	-	-	-	-
Written Down Value (WDV) of Assets retired (non-cash)	-	-	-	90	90	181
Total Estimated Expenditure for Approval	86	340	1,638	11,697	4,197	17,958
Total Revenue	4	39	128	733	1,471	78,240
NPV (post Tax)						732
Payback Period (Discounted)						36.6
Internal Rate of Return (IRR)						7.88%
Corporate WACC (Post Tax Nominal)						[C-I-C]

** Access to the P90 Delivery Risk component is subject to approval of a Change Request (CR) in EPPM and prior to exceeding the Project Delivery Budget

3.1. BUDGET PROVISION

3.1.1. CAPEX considerations

Select the most appropriate statement below (A, B or C)

A. This Program / Project is within the approved capital budget list for the financial years as shown above	<input type="checkbox"/>
B. This Program / Project is <u>not</u> within the approved capital budget list but will be managed within the <i>total portfolio</i> budget for the financial years shown above	<input checked="" type="checkbox"/>
C. This Program / Project is <u>not</u> within budget and may require MD approval (per SP Authority Manual)	<input type="checkbox"/>

3.1.2. OPEX requirements

Select the most appropriate statement below (A, B or both)

A. The relevant cost centre manager(s) have agreed to accept any operating expenditure component as shown in the forecasts table above. Management approval required at section 5	<input type="checkbox"/>
B. The relevant cost centre manager(s) have acknowledged and agreed to potential Opex benefits / savings as a result of this Program / project. (Refer s.10 – 'Benefits' for further details)	<input checked="" type="checkbox"/>

4. ENDORSEMENTS

**Note, by submitting this Business Case for approval to the EPMO it is expected that the relevant Line Managers or Program Managers have given their prior endorsement¹.

[C-I-C]

[C-I-C] Manager Enterprise PMO

[C-I-C]

John Morris

Date: 11/11/2014.

5. APPROVALS

[C-I-C]

Acting General Manager Asset
Management
[C-I-C]

David Matassoni

Date: 10/11/2014

Chief Financial Officer

[C-I-C]

Adam Newman

Date: 24/11/14.

Managing Director

[C-I-C]

Nino Ficca

Date:

Note: See appendices as requested by

[C-I-C]

¹ In accordance with [AusNet Services Portfolio Framework 'Plan Phase'](#) process flows document on EPMO SharePoint site

6. STRATEGIC ALIGNMENT & IMPACT

Table 6a: Strategic Alignment & Impact

Strategic Driver	Alignment to Corporate Strategy	Response
Safety	Industry leader in safety performance	High
Business & Asset Performance	Safe, resilient and reliable networks	Extreme
Financial	Sustainable earnings and securityholder value growth	Medium
Customer	Highly developed customer service capability	Medium
People	High performing leadership, capability and culture	Medium

6.1. SAFETY > CONTRIBUTION TO MISSION ZERO

This project involves the replacement of 66 kV post-type current transformers, as they present a safety risk in the unlikely event of an explosive failure, which could potentially injure or kill personnel working on site. Throughout the period of carrying out this project, the health and safety risks of working in a live switchyard will be treated by the following actions:

- Apply proven policies and practices relating to safe working in switchyards and access to plant and equipment
- Maximise the use of vacant locations for new construction
- Monitor the condition of the plant that present a safety risk and barricade it off or take further measures should their condition deteriorate and require further action

6.2. BUSINESS & ASSET PERFORMANCE

6.2.1. REGULATORY DRIVERS

Safety <input checked="" type="checkbox"/>	Regulatory Compliance <input checked="" type="checkbox"/>	Reliability Improvement <input checked="" type="checkbox"/>	Quality of Supply <input type="checkbox"/>	Environmental <input checked="" type="checkbox"/>
Capacity <input type="checkbox"/>	Legislative Compliance <input type="checkbox"/>	Infrastructure Security <input type="checkbox"/>	Customer <input checked="" type="checkbox"/>	Asset Condition <input checked="" type="checkbox"/>

6.2.2. ALIGNMENT WITH REGULATORY SUBMISSIONS

The project has been included in the AER's capital allowance at the value of \$11.7M (direct \$2013-14)² and final determination for the 2014-17 regulatory control period.

6.3. OTHER STRATEGIC DRIVERS

N/A

² AER Draft Decision AusNet Services Transmission determination 2014-15 to 2016-17, August 2013, p.85

7. BACKGROUND

FBTS was established in the late 1960's. The terminal station is located approximately 3km south-west from Melbourne's CBD and it is the main source of supply for the inner Melbourne suburbs of Docklands, Southbank, Port Melbourne, Fisherman's Bend, Albert Park, Middle Park and St Kilda West. The geographic supply area includes the Docklands areas and an area south-west of the City of Melbourne bounded by the Yarra River in the north and west, St Kilda/Queen's Roads in the east and Hobson's Bay in the south.

FBTS is supplied from Keilor Terminal Station (KTS) and is connected in the western metropolitan 220 kV ring via four single-switched transmission lines; two lines from West Melbourne Terminal Station (WMTS), one from Brooklyn Terminal Station (BLTS) and one from Newport D Power Station (NPSD). Transformation at FBTS comprises three 150 MVA 220/66 kV transformers that provide transmission connection services to the distribution network service providers, CitiPower and Powercor. At present, the 220/66 kV [C-I-C] B1 transformer is operating as a hot standby due to the fault level limitations at FBTS.

The key asset failure risks identified at FBTS are:

- Security of supply risks presented by a failure of the 220/66 kV B1 [C-I-C] transformer, 220 kV circuit breakers or 66 kV circuit breakers
- Health and safety risks presented by explosive failures of 66 kV [C-I-C] current transformers, transformer bushings or [C-I-C] bulk-oil circuit breakers
- Collateral damage risk to adjacent plant presented by explosive failures of transformer bushings, 66 kV current transformers or [C-I-C] bulk-oil circuit breakers

7.1. ASSET CONDITION

7.1.1. 220/66 kV Transformers

The 220/66kV B1 [C-I-C] transformer at FBTS was purchased under the 66-67/31 specification and installed in 1971. The condition of the B1 transformer has been assessed as C3 – "Normal condition for age". At present, B1 transformer is operating as a hot standby due to the fault level limitations at FBTS. AMS 10-141³ describes in more detail the following key issues with the B1 transformer:

- Accelerated deterioration of the internal insulation and poor thermal performance during high loading and high ambient temperature conditions
- Major oil leaks from transformer main tank which can result in environmental and health and safety issues

7.1.2. 220 kV Circuit Breaker

There is one [C-I-C] minimum oil circuit breaker in the 220 kV switchyard at FBTS. (The remaining six circuit breakers are of SF6 type). This minimum oil circuit breaker was installed in 1982. The failure of a similar type of circuit breaker at Rowville Terminal Station in 2011 led investigations to discover that the secondary components and mechanism lubrication levels were deteriorated. According to AMS 10-106⁴, the ASEA HLR245/2504B CB fleet is obsolete, parts are no longer manufactured, and spare parts are not readily available.

7.1.3. 66 kV Current Transformers

There are six 66 kV [C-I-C] current transformers with 1978 and 1982 specifications located at FBTS. According to AMS 10-122⁵, these current transformers have manufacturing type issues associated with the original design and initial assembly, which lead to partial discharge and ultimately failure.

These units are fitted with rubber bellows in the top cap to accommodate thermal expansion of the oil. It is known that these bellows are permeable to some of the gasses dissolved in insulating oils which inhibits accurate dissolved gas analysis (DGA) based testing and the consequent underestimation of asset failure risk. The transition from sound condition to failure modes can be rapid for these units and hence ongoing monitoring is carried out.

Six single-phase 66 kV [C-I-C] current transformers at FBTS were found with 1 to 2 ppm acetylene and were urgently replaced in 2009 and 2010 to avoid explosive failures.

³ AMS 10-141 Asset Health Review for Power Transformers in Terminal Stations

⁴ AMS 10-106 Circuit Breaker – Summary Issues and Strategies

⁵ AMS 10-122 Asset Health Review for Current Transformers

7.1.4. 66 kV Circuit Breakers

Twelve 66 kV circuit breakers at FBTS are [C-I-C] bulk-oil circuit breakers. They have been in service from 41 to 49 years and are currently amongst the oldest circuit breakers installed in the Victorian electricity transmission network. Condition assessments suggest these circuit breakers are approaching the end of their technical lives. Asset Management Strategy AMS 10-106⁶ provides a summary of the key issues associated with [C-I-C] circuit breakers, which include the following:

- Age/duty related deterioration including the erosion of arc control devices, bushing leakages, wear of operating mechanisms and drive systems
- Limited fault level capability requiring restrictive network switching configurations
- Maintenance intensive technology
- Manufacturer no-longer provides technical support or spare equipment

7.1.5. Secondary Systems

The X and Y Protection for the Number 2, 3 and 4 66 kV Buses is provided by MCAG34 high impedance differential relays with MVAJ relays used for tripping. These protection schemes were commissioned in 2004 and have proved very reliable and are not considered for replacement.

DSF7 relay used for the X protection of the SO 66 kV feeder is electromechanical type pilot wire relay, which is currently more than 30 years old. This relay has problems of nonoperation or unintended operation when the pilot wire is short circuited or open circuited. The sensitivity of these relays cannot be adjusted. There is an increased failure risk due to the deteriorating condition of supervisory cables in the network. The CDG14 relay used for the Y protection is 1980s vintage electromechanical relay. Its starting and timing accuracies may drift over time and require more frequent maintenance to ensure the calibration of settings.

There are a few 250V and 50V DC control supplies distribution panels that are more than 20 years old which were manufactured from asbestos containing materials. The existing AC isolation and distribution panels at FBTS are also of the older style asbestos construction.

7.2. SAFETY AND ENVIRONMENTAL CONSIDERATIONS

7.2.1. 220/66 kV Transformers

The B1 transformer at FBTS has synthetic resin bonded paper (SRBP) 220 kV bushings. The failure of a transformer bushing has a high probability of igniting an insulating oil fire and such failures have resulted in the complete destruction of the transformer and damage to adjacent equipment.

AusNet Services' network experienced 220 kV bushing failures and transformer fires in 1965 and 1987 at Dederang Terminal Station from this failure mechanism. Four recent interstate bushing failures in Queensland and New South Wales have involved complete loss of transformers. These failure modes present a safety risk to personnel working in the vicinity of the transformer due to the nature of the failure which could sometimes result in projectiles or oil fires. AMS 10-141⁷ identifies the major oil leaks (>100 Litres per year) of the B1 transformer at FBTS, which would further increase the risk of fire due to an explosive failure.

7.2.2. 66 kV Circuit Breakers

Twelve of the 66 kV circuit breakers at BLTS are [C-I-C] bulk-oil technology circuit breakers. Some of the failure modes of this type of circuit breaker include explosion and fire as consequences.

Due to the large volume of insulating oil within the tanks and the high voltage bushings, failures could potentially cause collateral damage to adjacent high voltage plant, cable trenches and secondary protection and control systems. Spillage of oil also poses environmental hazards as bulk-oil circuit breakers are not positioned within a bunded area.

7.2.3. 66 kV Current Transformers

As described in AMS 10-64⁸, there have been a number of current transformers removed from service in recent years due to rapid deterioration of the primary insulation and several explosive failures⁹.

The safety risk to personnel on site is AusNet Services' prime driver to replace the [C-I-C] current transformers. The [C-I-C] current transformers also present a collateral damage risk in the event of an explosive failure as well as an environmental risk due to oil spillage

⁶ AMS 10-106 Circuit Breaker – Summary Issues and Strategies

⁷ AMS 10-141 Asset Health Review for Power Transformers in Terminal Stations

⁸ AMS 10-64 Instrument Transformers

⁹ Explosive failures of 220 kV and above current transformers at Moorabool Terminal Station 2002 & 2005, Jeeralang Terminal Station 2003 and Terang Terminal Station 2006

following a failure. A progressive replacement in favour of toroidal current transformers incorporated within plant such as dead tank circuit breakers is part of AusNet Services' asset management strategy to address these risks.

7.3. DEMAND AND FUTURE DEVELOPMENT PLANS

FBTS is a summer critical station and the peak demand reached 285 MW (299 MVA) in the summer of 2013/2014. Due to the fault current limitations caused by the Synchronous Condenser and the existing embedded generation; one of the three transformers must operate in "Normally Open Auto-close" duty. Under this arrangement the B1 transformer operates in hot standby mode and it can be switched into operation if there is a forced outage of any one of the other two 220/66 kV transformers (B3 or B4) at FBTS. With this transformer operating arrangement, the N rating is approximately equal to the N-1 rating (i.e. equal to the capacity of two transformers), thus imposing a restriction that the terminal station cannot be loaded beyond the capacity of two transformers.

The 2013 Transmission Connection Planning Report (TCPR) foreshadows that there will be insufficient capacity to supply demand at both N and N-1 conditions around 2016. This would lead to involuntary supply interruptions that would cost consumers \$0.75M in 2017 and \$1.77M in 2018 (based on a value of customer reliability of \$98,151/MWh¹⁰) in the absence of any other operational response to mitigate the impact of a forced transformer outage. (Note: The value of customer reliability for FBTS has reduced to \$42,132/MWh in 2014¹¹, the monetised value of involuntary supply interruptions will be recalculated based on new value of customer reliability in the upcoming 2014 TCPR.)

The 2013 TCPR proposes to increase the station N rating to match the capacity of three 150 MVA transformers by implementing a "Normal Open Auto-close" facility on a 66 kV bus-tie circuit breaker instead of on the transformer circuit breaker prior to summer 2015/16. This will defer the need for major capacity augmentation works to meet the forecast demand growth associated with the major developments planned for the Montague, Lorimer Street, Plummer Street and Fennel Street Precincts.

AusNet Services as the transmission network service provider (TNSP) has the ownership, operation and maintenance responsibility for FBTS. The augmentation responsibility lies with AEMO for the shared transmission network and with CitiPower and Powercor for the transmission connection assets. A joint planning approach is adopted for the asset replacements at FBTS, for which AEMO, CitiPower and Powercor are consulted with their longer term shared network and connection network augmentation plans to ensure individual decisions will not compromise security of supply or impede economic future capacity augmentation.

8. WORK TO BE UNDERTAKEN/ DESCRIPTION OF PROGRAM/ PROJECT

Strategic Procurement	No long lead items that requires special consideration		
Key Milestones	The project is scheduled to be completed by November 2017		
Summary of Project / Program Delivery Requirements	Replacement of one 220 kV circuit breaker and seven 66 kV circuit breakers.		
Program Deliverables – table of rates (if applicable)			
Projects within a Program (if applicable)	Project No / Title	Approved (Y/N)	Total Cost (Inc. OHD's & CFC's)
	N/A		
Other Associated projects	Project No / Title	Approved (Y/N)	Total Cost (Inc. OHD's & CFC's)
	XC32 Synchronous Condenser Refurbishment Stage 2	N	\$6.1M

Refurbishment of FBTS is driven primarily by the deteriorated condition of both primary and secondary assets and the consequential supply risks, safety risks, and increasing operating and maintenance costs.

¹⁰ 2013 Victorian joint Distribution Business Transmission Connection Planning Report

¹¹ On 2nd October 2014 the Australian Energy Market Operator (AEMO) released revised Value of Customer Reliability (VCR) figures. AEMO's new VCR is significantly lower than the VCR that has been applied since 2008, which means that customers now value reliability less than they did the last time it was calculated. The economic analysis of this business case is based on the new VCR rate of \$42,132/MWh for FBTS.

The following is a summary of the proposed scope of work:

- Install transformer foundation in the area reserved for the future 220/66 kV B2 transformer
- Replace the existing one 220 kV minimum oil circuit breakers (No.1-3 bus tie) and associated current transformers¹² with a new 220 kV dead tank circuit breaker including associated isolators, and primary and secondary connections.
- Replace the existing six 66 kV bulk-oil circuit breakers (B1 transformer, B3 transformer, B4 transformer, No. 2-3 bus tie, No. 3-4 bus tie and No. 2 Ext-4 bus tie) with six new 66 kV connections.
- Replace the existing one 66 kV minimum oil circuit breakers (SO feeder) and associated [C-I-C] current transformers with a new 66 kV dead tank circuit breakers including associated isolators, and primary and secondary connections.
- Replace the existing three 66 kV single phase current transformers of the PM feeder and the associated primary and secondary connections.
- Replace and interface the protection and control schemes for the new 66 kV No. 2-3 bus tie, No. 3-4 bus tie and No. 2 Ext-4 bus tie and SO feeder circuit breakers.
- Modify and interface the protection and control schemes for the 220kV No.1-3 bus tie circuit breaker, 66kV buses, 220/66 kV transformers and PM feeders.
- Decommission AC and DC systems and replace with new.

¹² The three 220kV single phase Koncar current transformers are in relatively good condition and can be used to generate spares

9. OPTIONS CONSIDERED

The options considered for the redevelopment of FBTS are:

- Business as usual
- Replace selected 220 kV and 66 kV circuit breakers, and defer B1 transformer replacement and remaining 66 kV switchyard (preferred)
- Replace B1 Transformer, selected 220kV and 66 kV circuit breakers, and defer remaining 66 kV switchyard
- Integrated B1 Transformer, 220 kV and 66 kV Circuit Breaker Replacement

TABLE 9a: Analysis of Investment Options

Analysis of Investment Options (\$'000s)	Economic Least Cost Analysis				Financial Return		
	PV Capital Cost	PV Opex Costs	PV Community Costs & Benefits	Total PV Cost	NPV including Reg Return (post tax)	PV Cost Ratio	PV of Incentive / (Penalty)
1 Business As Usual	-	(178)	(28,518)	(28,696)	-	1.00	-
2 Replace selected 220 kV and 66 kV circuit breakers, and defer B1 transformer and remaining 66 kV switchyard	(12,491)	(154)	(7,789)	(20,434)	732	71.04	-
3 Replace B1 Transformer, selected 220 kV and 66 kV circuit breakers, and defer remaining 66 kV switchyard	(17,125)	(140)	(7,115)	(24,380)	998	96.99	-
4 Integrated B1 Transformer, 220 kV and 66 kV Circuit Breaker Replacement	(21,510)	(102)	(4,793)	(26,404)	1,256	121.41	-

All figures are in \$000's unless otherwise stated.
(nominal and discounted)

Note, the 'staged replacement' options (Option 2 and 3) shown in the table above are for stage 1 only. A supplementary NPV analysis was done to confirm that the PV cost of the preferred option (Option 2) is lower than the Integrated Replacement Option and the results are presented in Appendix C.

Note, on 2nd October 2014 the Australian Energy Market Operator (AEMO) released revised Value of Customer Reliability (VCR) figures. AEMO's new VCR is significantly lower than the VCR that has been applied since 2008, the economic analysis of this business case is based on the new VCR rate of \$42,132/MWh for FBTS.

9.1. BUSINESS AS USUAL (MANDATORY)

The "Business as usual" (BAU) option quantifies the base line risk (primarily health and safety risk and supply risk) at FBTS. It is only used for modelling purposes in the economic cost-benefit analysis to determine the economical time for the option with the lowest PV cost to proceed. The "Business as usual" option does not address the following AusNet Services' obligations:

- under the National Electricity Rules to maintain the quality, reliability and security of supply of prescribed transmission services
- under the Electricity Safety Act to operate, maintain and decommission the supply network to minimise as far as practicable the hazards and risks to the safety of any person arising from the supply network

PV of Capex and Opex	<ul style="list-style-type: none"> No Capex for The "Business as usual" option PV of Opex (\$178k) quantifies the asset maintenance cost at FBTS over the 20 years analysis period.
PV of Community Costs & Benefits	<ul style="list-style-type: none"> PV of community costs and benefits is \$28.5M. The key service constraints at FBTS are: <ul style="list-style-type: none"> Security of supply risks presented by a failure of the 220/66 kV B1 [C-I-C] transformer or 220kV, 66 kV circuit breakers Health and safety risks presented by explosive failures of 66 kV [C-I-C] current transformers, transformer bushings or [C-I-C] bulk-oil circuit breakers Collateral damages to adjacent plant due to explosive failures of transformer bushings, 66 kV current transformers or [C-I-C] bulk-oil circuit breakers <p>Note: Refer to Appendix D for station risk costs.</p>

9.2. PREFERRED OPTION 2 – REPLACE SELECTED 220 KV AND 66 KV CIRCUIT BREAKERS, AND DEFER B1 TRANSFORMER REPLACEMENT AND REMAINING 66 KV SWITCHYARD

Project: Project XC17 - FBTS Refurbishment

This option involves replacing assets in two discrete, separate projects and allows deferral of capital expenditure for Stage 2 of the refurbishment of FBTS. The first stage replaces assets with higher monetised failure risk and includes the following assets:

- one 220kV minimum oil circuit breaker (No. 1-3 bus tie)
- six 66 kV bulk-oil circuit breakers (B1 transformer, B3 transformer, B4 transformer, No. 2-3 bus tie, No. 3-4 bus tie and No. 2 Ext-4 bus tie)
- one 66 kV minimum-oil circuit breakers (SO feeder) and associated three 66 kV single-phase [C-I-C] current transformers
- three 66 kV single-phase [C-I-C] current transformers of the PM feeder

This option addresses the safety risks presented by the 66 kV [C-I-C] current transformers in Stage 1. It allows for efficient replacement of minimum-oil circuit breakers and associated current transformers with dead-tank circuit breakers¹³. Stage 1 also includes installation of a transformer foundation in the area reserved for the future 220/66kV B2 transformer. This will reduce the time required for a spare transformer to be put into service in the event of a transformer failure and allows for the economic deferral of the replacement of the B1 220/66kV transformer to the second stage of the FBTS refurbishment based on its assessed condition of C3 – "Normal condition for age".

Stage 2 of the refurbishment of FBTS includes replacement of the 220/66 kV B1 [C-I-C] transformer, the remaining six 66 kV bulk-oil circuit breakers (DLF No.3, WG, E, DLF No.1, two Synchronous Condenser transformer connections to the No.3 and No.4 busses), the remaining two 66kV minimum oil circuit breakers (AP and SB) and 66 kV busbars scheduled for completion around 6 years after Stage 1.

The staged replacement has the best economic outcome with the lowest PV cost (\$20.4M) of all technically feasible options. Asset Management processes have identified the need, and analysis has determined that the economic timing for Stage 1 of the project is completion in 2016.

PV of Capex and Opex	<ul style="list-style-type: none"> • PV of Capex is \$12.5M. • PV of Opex (\$154k). Lower than the BAU option as some assets at FBTS are replaced by end 2017 and the new assets have a relatively lower maintenance cost.
PV of Community Costs & Benefits	<ul style="list-style-type: none"> • PV of community costs and benefits is \$7.8M. • The network risks that are reduced by option 2 are: <ul style="list-style-type: none"> - Security of supply risks presented by a failure of the 220 kV or 66 kV circuit breakers - Health and safety risks presented by explosive failures of 66 kV Tyree current transformers or [C-I-C] bulk-oil circuit breakers - Collateral damage risk due to explosive failures of 66 kV current transformers or [C-I-C] bulk-oil circuit breakers <p>Note: Refer to Appendix D for station risk costs.</p>

9.3. OPTION 3 – REPLACE B1 TRANSFORMER, SELECTED 220 KV AND 66 KV CIRCUIT BREAKERS, AND DEFER REMAINING 66 KV SWITCHYARD

This option is similar to option 2, but involves replacing the 220/66kV B1 transformer in Stage 1 of the staged replacement (rather than stage 2). The PV cost for this option is \$24.4M.

PV of Capex and Opex	<ul style="list-style-type: none"> • PV of Capex is \$17.1M. • PV of Opex (\$140k). Lower than the BAU option as some assets at FBTS are replaced by end 2017 and the new assets have a relatively lower maintenance cost.
PV of Community Costs & Benefits	<ul style="list-style-type: none"> • PV of community costs and benefits is \$7.1M. • The network risks that are reduced by option 3 are: <ul style="list-style-type: none"> - Security of supply risks presented by a failure of the 220/66 kV B1 [C-I-C] transformer, 220 kV circuit breakers or 66 kV circuit breakers - Health and safety risks presented by explosive failures of 66 kV [C-I-C] current transformers, transformer bushings or

¹³ The new dead tank circuit breakers include toroidal current transformers integrated in the circuit breaker.

	<p>[C-I-C] bulk-oil circuit breakers</p> <ul style="list-style-type: none"> - Collateral damage risk due to explosive failures of transformer bushings, 66 kV current transformers or [C-I-C] bulk-oil circuit breakers
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9.4. OPTION 4 – INTEGRATED B1 TRANSFORMER, 220 KV AND 66 KV CIRCUIT BREAKER REPLACEMENT

This option involves replacing all assets with material risk in a single integrated project. It has a high initial capital investment and does not allow deferral of capital expenditure. The PV cost for the integrated replacement option is \$26.4M.

PV of Capex and Opex	<ul style="list-style-type: none"> • PV of Capex is \$21.5M. • PV of Opex (\$102k). Lower than the BAU option as some assets at FBTS are replaced by end 2017 and new assets have a relatively lower maintenance cost.
PV of Community Costs & Benefits	<ul style="list-style-type: none"> • PV of community costs and benefits is \$4.8M. • The network risks that are reduced by option 4 are: <ul style="list-style-type: none"> - Security of supply risks presented by a failure of the 220/66 kV B1 [C-I-C] transformer or 220kV, 66 kV circuit breakers - Health and safety risks presented by explosive failures of 66 kV [C-I-C] current transformers, transformer bushings or [C-I-C] bulk-oil circuit breakers - Collateral damages to adjacent plant due to explosive failures of transformer bushings, 66 kV current transformers or [C-I-C] bulk-oil circuit breakers

9.5. CONCLUSION AND RECOMMENDATION

The most economic option to address the emerging constraints at FBTS is Option 2, which involves replacing one 220 kV circuit breaker, seven 66 kV circuit breakers and six 66 kV [C-I-C] current transformers in Stage 1. This option has the lowest present value cost (\$20.4M) with a total capital expenditure of \$17.8M (including contingency allowance, overheads, and finance charges).

10. BENEFITS

10.1. FINANCIAL BENEFITS

TABLE 10a: Financial Benefits derived from the Program / Project

Project Financial Benefits (\$'000s)	First 5 years					Total
	2013 / 14	2014 / 15	2015 / 16	2016 / 17	2017 / 18	
Incremental Opex (Costs) / Savings	-	-	-	-	-	83
Distribution Incentive Revenue (S Factor / GSL's)	-	-	-	-	-	-
Transmission Incentive Revenue (AIS, AER, MIPS)	-	-	-	-	-	-
Unregulated Revenue	-	-	-	-	-	-

All figures are in \$'000's unless otherwise stated. (nominal)

Note, the above financial benefits represent incremental benefits in comparison to the Business As Usual option.

10.1.1. OPEX Savings

TABLE 10b: Incremental Opex Savings (if applicable)
(Directly enter values in table below)

Unit of Measure	No of Units	Annual Rate (Real)	Annual Savings (Real, \$'000's)	Expenditure Category
Estimated Reduced Operating and Maintenance Cost	8 CBs	\$14k	\$3k	Labour

10.1.2. Incentive Scheme Benefits (if applicable)

TABLE 10c: Distribution Incentive Scheme Benefits
N/A

10.2. NON-FINANCIAL BENEFITS

TABLE 10d: Non-Financial Benefits derived from the Program / Project

Project Non-Financial Benefits (\$'000s)	First 5 years					Total
	2013 / 14	2014 / 15	2015 / 16	2016 / 17	2017 / 18	
Safety	-	-	-	-	-	-
System Capacity	-	-	-	-	-	57,886
Bushfire Mitigation	-	-	-	-	-	-
Environmental Risks - Other	-	-	-	-	-	12
Regulatory Compliance	-	-	-	-	-	-
Legislative Compliance	-	-	-	-	-	-
Corporate Image	-	-	-	-	-	-

All figures are in \$'000's unless otherwise stated. (nominal)

The above table represents the incremental benefits / (costs) comparing the chosen project option to the "Business As Usual" option.

Note, the above non-financial benefits represent incremental benefits in comparison to the Business As Usual option.

The system capacity benefit in the table above is calculated based on the reduction of supply risk and plant damage risk due to asset renewal.

10.3. OTHER QUALITATIVE BENEFITS

N/A

11. RISK ASSESSMENT

11.1. EXISTING RISKS ADDRESSED BY THE PROJECT

Risk(s) addressed by project	Division owning risk	Category of risk (where listed)	Managing Risk – Project specific impact(s)
• Customer Supply Risk	• Asset Management	• Emerging Risk	• Significantly reduce the security of supply risks presented by a failure of the 220 kV or 66 kV circuit breakers
• Safety Risk	• Asset Management	• Safety risk	• Significantly reduced the health and safety risks presented by explosive failures of 66 kV [C-I-C] current transformers or [C-I-C] bulk-oil circuit breakers

• Safety Risk	• Asset Management	• Safety Risk	• Removal of asbestos in existing control building where disturbed
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11.2. PROJECT DELIVERY RISKS (KNOWN)

What are the known delivery risks attributable to this project and how are these being managed?

Project Risk	What could occur / Consequence	Likelihood	Actions and controls in place to manage/reduce risk
• Failure of 220kV or 66 kV switchgear prior to replacement	<ul style="list-style-type: none"> • Customer supply impacted • Project scope changes and likely cost increases 	• Low	• Emergency replacement
• Delays in Planning Approval processes	<ul style="list-style-type: none"> • Project Delays • Additional costs • Design rework 	• Low	<ul style="list-style-type: none"> • Early preparation of environmental investigation • Early submission of planning permit • Early discussion with council
• Environmental hazards present or caused by work	<ul style="list-style-type: none"> • Contamination of water/air • Health Issues • Protests from Neighbours • Corporate Image suffers • Litigation • Involvement of the Environment Protection Authority (EPA) • Project Delays 	• Low	<ul style="list-style-type: none"> • PCB/Asbestos Handling Procedures • Oil Handling Procedures • HSE Procedures • Field Work Procedures • Experienced Management Team • Corporate Communication Team • Legal support

(Refer to the Risk Management Guide for assistance in populating this table)

12. OTHER REGULATORY CONSIDERATIONS**12.1. REGULATORY INVESTMENT TEST (R-I-T)**

A Regulatory Investment Test (RIT-T) is not required for this project because it does not enhance the capacity to transmit or distribute more electricity, and the proposed expenditure relates to maintenance or replacement and is not intended to augment the transmission network.¹⁴

12.2. REGULATORY FUNDING

Regulatory funding concerns are dealt with under sections 13.3 (Revenue) and 13.4 (Financial Risks), p.19.

¹⁴ National Electricity Rules v50, section 5.6.5C

13. FINANCIAL IMPACTS

13.1. EXPENDITURE CATEGORY/WORK CODE:

CI20 – Other Station Works

13.2. FINANCIAL ANALYSIS OF PREFERRED OPTION

For the full Financial Evaluation of the options considered and supporting financial details refer to the attached FBTS Refurbishment Project NPV 0.07 in EPPM. Appendix C contains the supplementary NPV analysis confirming that the chosen option is the least cost option in the long run compared with the Integrated Replacement Option.

TABLE 13.3a: Summary Profit & Loss Statement

TABLE 15.5a: Summary Profit & Loss Statement						
Summary Profit and Loss (\$'000s)	First 5 years					Total
	2013 / 14	2014 / 15	2015 / 16	2016 / 17	2017 / 18	
Revenue	[C-I-C]					[C-I-C]
Incentive Scheme Revenue						
Opex Costs						
Opex Savings						
Net Gain / (Loss) on Disposal of Replaced Assets						
EBITDA						
EBIT						
NPAT						
Earnings / (Loss) per Share, cents						
NPV (Post Tax)						
Internal Rate of Return (IRR)						
Corporate Discounting WACC (Post Tax Nominal)						

All figures are in \$000's unless otherwise stated. (nominal)

TABLE 13.3b: Summary Cashflow Statement

Summary Cashflow (\$'000s)	First 5 years					Total
	2013 / 14	2014 / 15	2015 / 16	2016 / 17	2017 / 18	
Net Operating Cashflow s	4	22	98	674	1,344	64,474
Investing Cashflow s (including Capex)	(84)	(325)	(1,528)	(11,083)	(3,981)	(17,000)
Financing Cashflow s	48	(49)	647	6,095	1,489	(47,474)
Total Cashflows	(32)	(352)	(783)	(4,314)	(1,148)	0
Payback Period (Discounted)						36.6

TABLE 13.3c: NPV Breakdown

NPV Breakdown	PV (000's)
Reg Revenues	18,328
S-Factor	-
GSL Benefits	-
Transmission Incentive Scheme	-
Non-Regulated Revenues	-
Opex Costs	(224)
Opex Savings	32
Proceeds From Sale of Replaced Assets	-
Capex	(13,172)
Tax	(4,232)
Total	732

(nominal and discounted)

TABLE 13.3d: Project Expenditure Forecasts

Project Expenditure Forecasts (\$'000s)	2013 / 14	2014 / 15	2015 / 16	2016 / 17	2017 / 18	Total
Design	[C-I-C]					
Internal Labour						
Materials						
Plant & Equipment						
Contracts						
Meter Costs						
Other						
Project P50 Direct Expenditure	79	303	1,428	10,358	3,720	15,888
Finance Charges	[C-I-C]					
Project P50 Direct & CFC's						
Delivery Risk Adjustment =(P90-P50)						
Project P90 Direct (incl risk adj) & CFC's						
Overheads						
Total CAPEX for Approval	86	340	1,638	11,607	4,107	17,777
Operating Costs	[C-I-C]					
WDV (Written Down Value) of Assets to be retired						
Total Estimated Expenditure for Approval	86	340	1,638	11,697	4,197	17,958
NPV (Post Tax)	[C-I-C]					
Corporate WACC (Post Tax Nominal)						

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TABLE 13.3e: Capitalised Finance Charges (Interest during Construction)

Financial Year (\$'000s)	Month	Project Direct Expenditure				Net Monthly Expenditure	Cumulative WIP Balance	Transferred Into RAB (Sarcoded)	Customer Contribution Received Into Trust	Finance Charges	Total Finance Charges	Cumulative Finance Charges
		Project Direct Expenditure \$Real	Project Direct Expenditure \$Nominal	Overheads	Totals							
2013 / 2014	Apr-13	1	1	0		1	1	-	-	-		-
	May-13	4	4	0		4	5	-	-	-		-
	Jun-13	3	3	0		3	8	-	-	-		-
	Jul-13	8	8	1		9	17	-	-	-		-
	Aug-13	12	12	1		13	30	-	-	-		-
	Sep-13	1	1	0		1	31	-	-	-		-
	Oct-13	4	4	0		4	35	-	-	-		-
	Nov-13	5	5	0		5	40	-	-	-		-
	Dec-13	1	1	0		1	41	-	-	-		-
	Jan-14	11	11	1		12	53	-	-	-		-
	Feb-14	12	12	1		12	66	-	-	-		-
	Mar-14	17	17	1	84	18	84	-	-	-	-	-
	Apr-14	12	12	1		13	97	-	-	-		-
	May-14	10	10	1		11	108	-	-	0		0
2014 / 2015	Jun-14	4	4	0		4	113	-	-	0		1
	Jul-14	4	4	0		4	118	-	-	1		2
	Aug-14	4	4	0		4	122	-	-	1		3
	Sep-14	4	4	0		4	127	-	-	1		4
	Oct-14	4	4	0		4	132	-	-	1		5
	Nov-14	4	4	0		4	137	-	-	1		6
	Dec-14	18	18	1		19	157	-	-	1		7
	Jan-15	18	18	1		19	177	-	-	1		8
	Feb-15	87	89	6		95	273	-	-	1		9
	Mar-15	129	133	9	325	142	417	-	-	2	8	10
	Apr-15	129	136	10		145	565	-	-	3		11
	May-15	129	136	10		145	713	-	-	4		12
	Jun-15	186	196	14		209	927	-	-	5		13
	Jul-15	186	196	14		209	1,141	-	-	6		14
2015 / 2016	Aug-15	186	196	14		209	1,357	-	-	7		15
	Sep-15	186	196	14		209	1,573	-	-	8		16
	Oct-15	158	166	12		177	1,758	-	-	9		17
	Nov-15	87	91	6		98	1,864	-	-	9		18
	Dec-15	87	91	6		98	1,970	-	-	9		19
	Jan-16	8	8	1		9	1,987	-	-	9		20
	Feb-16	8	8	1		9	2,005	-	-	9		21
	Mar-16	8	8	1	1,528	9	2,022	-	-	9	78	22
	Apr-16	8	8	1		9	2,040	-	-	9		23
	May-16	766	827	58		885	2,938	-	-	13		24
	Jun-16	770	832	58		890	3,845	-	-	17		25
	Jul-16	770	832	58		890	4,756	-	-	21		26
	Aug-16	775	837	59		896	5,677	-	-	25		27
	Sep-16	937	1,012	71		1,082	6,789	-	-	30		28
2016 / 2017	Oct-16	941	1,017	71		1,088	7,911	-	-	34		29
	Nov-16	943	1,019	71		1,090	9,041	-	-	39		30
	Dec-16	943	1,019	71		1,090	10,175	-	-	44		31
	Jan-17	941	1,017	71		1,088	11,312	-	-	49		32
	Feb-17	938	1,013	71		1,083	-	12,396	-	-		33
	Mar-17	857	926	65	11,083	990	995	-	-	4	285	34
	Apr-17	857	950	66		1,016	2,019	-	-	9		35
	May-17	857	950	66		1,016	3,049	-	-	13		36
	Jun-17	774	858	60		918	3,984	-	-	17		37
	Jul-17	772	856	60		916	-	4,900	-	-		38
	Aug-17	80	88	6		94	94	-	-	-		39
	Sep-17	5	6	0		6	101	-	-	0		40
	Oct-17	6	7	0		7	109	-	-	0		41
2017 / 2018	Nov-17	6	6	0		7	-	116	-	-		42
	Dec-17	-	-	-		-	-	-	-	-		43
	Jan-18	-	-	-		-	-	-	-	-		44
	Feb-18	-	-	-		-	-	-	-	-		45
	Mar-18	-	-	-	3,981	-	-	-	-	-	40	46
	Total				17,000					412	412	
Cash flow amount should equal the total direct as shown on page 1 of the A to P												
Total Including Finance Charges											17,412	

13.3. REVENUE

It is reasonable to assume that all costs incurred in this project will be included in the RAB and generate revenue accordingly for the following reasons:

NER Schedule 6A.2.1 "Establishment of opening regulatory asset base for a regulatory control period" Clause (f) (1) requires that:

"The previous value of the regulatory asset base **must be increased by the amount of all capital expenditure incurred** during the previous control period, including any capital expenditure determined for that period under clause 6A.8.2(e)(1)(i) in relation to contingent projects where the revenue determination has been amended by the AER in accordance with clause 6A.8.2(h) **(regardless of whether such capital expenditure is above or below the forecast capital expenditure for the period that is adopted for the purposes of the transmission determination (if any) for that period).**" (Emphasis added)

Furthermore, the AER recognises that it does not approve individual projects. For example, in the January 2008 AusNet Services Revenue Determination:

"... the AER reiterates that the total forecast capex approved is an allowance only, and is not tied to a fixed, project specific, work program. Within the approved allowance, SP AusNet retains the discretion regarding the allocation and expenditure of capex, and is expected to be responsive to changing conditions in order to meet the prescribed capex objectives."

13.4. FINANCIAL RISKS

The project has been included in the AER's capital allowance and final determination for the 2014-17 regulatory control period. Noting that the AER does not approve individual capital projects and AusNet Services has the ability to prioritise works within the period, it is unlikely AusNet Services would be required to fund a capital shortfall due to the FBTS refurbishment. Any shortfall in funding would at worst be limited to the financing cost incurred until the end of the period, as the National Electricity Rules (NER) require that "the value of the regulatory asset base must be increased by the amount of all capital expenditure incurred regardless of whether such capital expenditure is above or below the forecast capital expenditure for the period".

Reprioritisation of transmission asset renewal projects will release sufficient funds for the business to proceed with the FBTS Refurbishment Project without exceeding the regulatory approved capital budget for the current regulatory control period. The new assets will roll into the Regulatory Asset Base (RAB) at the end of the next regulatory period at their depreciated constructed value.

The financial risks are being treated as follows:

- AEMO, CitiPower and Powercor have confirmed the ongoing need of the FBTS facilities in accordance with the proposed refurbishment,
- A detailed Project Execution Plan will minimise the number and duration of outages, limiting the associated rebate cost;
- The project cost estimate includes the additional cost that may arise from a brown field development, and
- Capital efficiency will be targeted by a combination of foreign exchange hedging, period order purchasing, fixed-price subcontracts and in-house project execution processes.

13.5. CORPORATE ACCOUNTING AND TAX ADVICE

13.5.1. Accounting Review

The project is a standard business transaction and does not require any special corporate accounting, tax advice, or sign off.

13.5.2. Asset Retirements

The projected written down value for the 220 kV and 66 kV circuit breakers including associated current transformers and isolators to be retired by November 2017 is \$180.5K. This value was calculated by the fixed assets accounting team. Refer to the attached WDV XC17_received 160714.xls in EPPM for further details.

13.5.3. Contributed (Gifted) Assets

N/A

14. PROPERTY & ACCOMMODATION CONSIDERATIONS

14.1. PROPERTY

[C-I-C]

The Victorian Government has rezoned 250 hectares of land to Capital City Zone to kick start the Fishermans Bend Urban Renewal Area. The Fishermans Bend Urban Renewal Area is bound by Williamstown Road and Boundary Street to the south,

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City Road to the east, the West Gate Freeway and Lorimer Street to the north and City Link and Todd Road to the west.¹⁵ FBTS is situated in an industrial area in close proximity to the Fishermans Bend Urban Renewal Area.

The preferred option proposes to selectively replace assets. The station refurbishment with new air insulated switchgear (AIS) will be consistent with its location and purpose. The remote risk of council rejection or resident objections is managed by early discussion with council and preparation of a planning permit.

14.2. ACCOMMODATION

N/A

14.3. HARDWARE & PERIPHERALS

N/A

¹⁵ <http://www.dpcd.vic.gov.au/planning/projects-and-programs/fishermans-bend-urban-renewal-project>

APPENDIX A – STAGED FUNDING

Refer to 'Staged Fund_BA' sheet within the NPV model. Costs are to be assigned to each phase of the project lifecycle (Idea, Plan, Build, and Close) as per the AusNet Services Portfolio Framework.

Project Expenditure Forecasts	IDEA	PLAN	BUILD	CLOSE	Total
Design	[C-I-C]				
Internal Labour					
Materials					
Plant & Equipment					
Contracts					
Meter Costs					
Other					
P50 Project Direct Expenditure	49	64	14,763	181	15,058
Delivery Risk Adjustment =(P90-P50)	[C-I-C]				
P90 Project Direct Expenditure incl risk					
Operating Costs					
WDV (Written Down Value) of Assets to be retired					
Total Expenditure for Approval Excl Overhead and CFC's	50	65	15,194	276	15,585

All figures are in thousands and expressed in 2014/15 real dollars

APPENDIX B - DELIVERABLES

Note: 'AMIS' refers to Asset management information systems, which include the following systems for Transmission and Distribution: Q4, Maximo 5 (Transmission), Maximo 6 (Distribution), SDME (Spatial Data Management – Electricity), Radar (Transmission equipment and protection ratings) and Tesis (device setting information). SAP will replace a number of these systems in 2015.

B.1 DESIGN DELIVERABLES

- Detailed Design Service Provider (DSP) Scope
- Detailed design drawings
- AMIS deliverables:
 - Creation of "Proposed Assets" and updates on all known asset data to be delivered as a component of the design/scoping stage.
 - Creation of preventive / inspection maintenance cycles to occur as a component of the Asset creation in AMIS – Q4, Maximo5, Maximo6 or SAP.
 - Work order creation for build/retirements in AMIS – Q4, Maximo5, Maximo6 or SAP.
- AMIS Closeout – Detailed Asset information and as-built drawing (redlines) to be updated upon Practical completion.

B.2 PROCUREMENT DELIVERABLES

Item	Type	Quantity	Estimated Delivery Month
Circuit Breaker	220kV	1	Sept-16
Circuit Breaker	66kV	7	Sept-16 to March-17
Current Transformer	66kV	3	Sept-16

B.3 CONSTRUCTION/BUILD DELIVERABLES

- Refer Appendix B.5 for a more detailed scope
- Progress reporting
- AMIS (Asset Management Information Systems):
 - Data updated according to as-built drawings and installed equipment data (e.g. serial numbers). This must be completed either before the installation is placed into operation on the network.
 - Each Work Order to be closed upon completion of the activity

B.4 HANDOVER DELIVERABLES

- As built drawings
- Commissioning documents
- Equipment manuals (if applicable)
- Warranties/Guarantees (if applicable)
- Spare parts (if applicable)

B.5 SCOPE (IF AVAILABLE)

Refer to the attached XC17 FBTS Planning Estimate Rev2.doc in EPPM.

APPENDIX C - SUPPLEMENTARY NPV ANALYSIS

The following tables are contained in the NPV model FBTS Refurbishment Project NPV Model V0.07 in PET - Please select 'both Stage 1 & 2' in the 'Bus_Case_BO' tab.

The written down value due to assets retirements for stage 2 of the project is excluded from the supplementary NPV analysis, if any.

TABLE 9a: Analysis of Investment Options

Analysis of Investment Options (\$'000s)	Economic Least Cost Analysis				Financial Return		
	PV Capital Cost	PV Opex Costs	PV Community Costs & Benefits	Total PV Cost	NPV including Reg Return (post tax)	PV Cost Ratio	PV of Incentive / (Penalty)
1 Business As Usual	-	(178)	(28,518)	(28,696)	-	1.00	-
2 Replace selected 220 kV and 66 kV circuit breakers, and defer B1 transformer and remaining 66 kV switchyard	(18,816)	(129)	(6,242)	(25,187)	1,214	106.43	-
3 Replace B1 Transformer, selected 220 kV and 66 kV circuit breakers, and defer remaining 66 kV switchyard	(20,545)	(121)	(5,652)	(26,317)	1,259	116.09	-
4 Integrated B1 Transformer, 220 kV and 66 kV Circuit Breaker Replacement	(21,510)	(102)	(4,793)	(26,404)	1,256	121.41	-

All figures are in \$000's unless otherwise stated.
(nominal and discounted)

TABLE 13.3a: Summary Profit & Loss Statement

Summary Profit and Loss (\$'000s)	First 5 years					Total
	2013 / 14	2014 / 15	2015 / 16	2016 / 17	2017 / 18	
Revenue	[C-I-C]					
Incentive Scheme Revenue						
Opex Costs						
Opex Savings						
Net Gain / (Loss) on Disposal of Replaced Assets						
EBITDA						
EBIT						
NPAT						
Earnings / (Loss) per Share, cents						
NPV (Post Tax)						
Internal Rate of Return (IRR)						
Corporate Discounting WACC (Post Tax Nominal)						

All figures are in \$000's unless otherwise stated. (nominal)

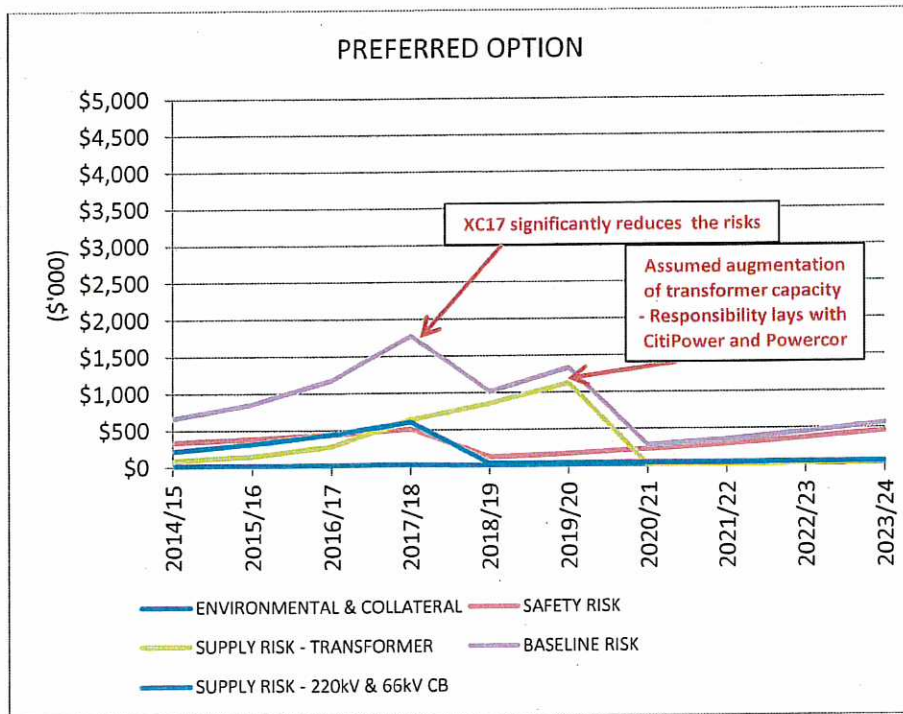
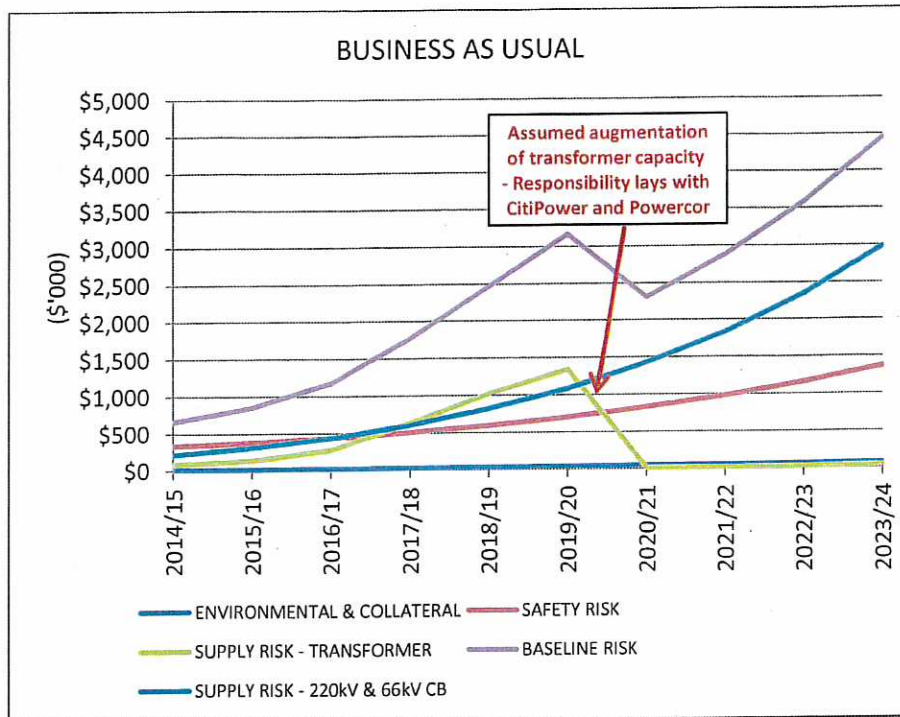
TABLE 10d: Non-Financial Benefits derived from the Program / Project

Project Non-Financial Benefits (\$'000s)	First 5 years					Total
	2013 / 14	2014 / 15	2015 / 16	2016 / 17	2017 / 18	
Safety	-	-	-	-	-	-
System Capacity	-	-	-	-	-	58,334
Bushfire Mitigation	-	-	-	-	-	-
Environmental Risks - Other	-	-	-	-	-	22
Regulatory Compliance	-	-	-	-	-	-
Legislative Compliance	-	-	-	-	-	-
Corporate Image	-	-	-	-	-	-

All figures are in \$000's unless otherwise stated. (nominal)

The above table represents the incremental benefits / (costs) comparing the chosen project option to the "Business As Usual" option.

APPENDIX D – FBTS RISK COSTS

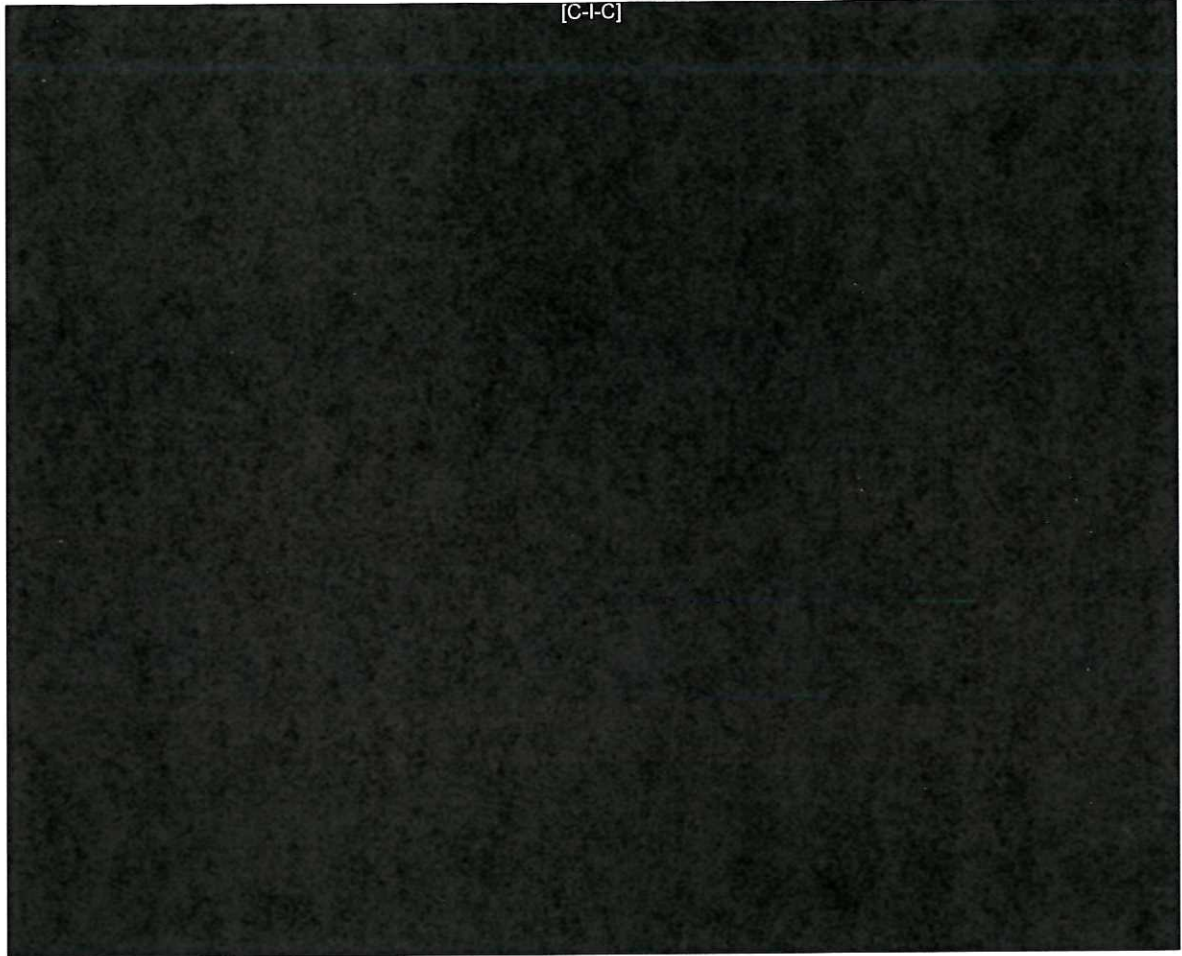


Memo date:	01/12/2014
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