Directlink Interconnector Revenue Proposal

Public forum

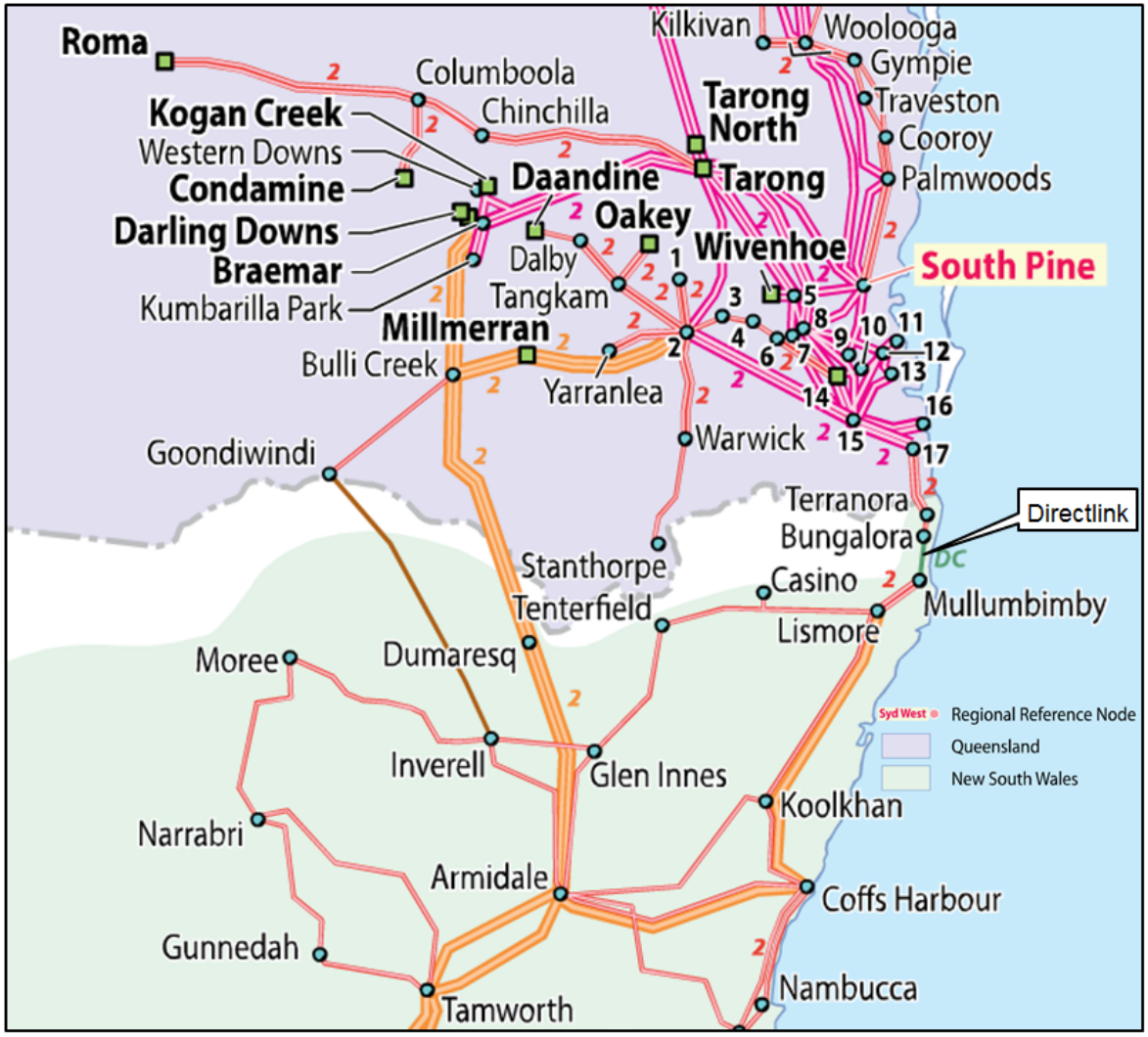
Sydney 10 July 2014

Outline

- About the Directlink Interconnector
- Historical cost and service performance
- Performance and strategies for improvement
- Capital expenditure and the Regulatory Asset Base
- Operating Expenditure
- Total Required Revenue

About the Directlink Interconnector

- The Directlink Interconnector is a 59km, 180 MW High Voltage Direct Current (HVDC) transmission link between Mullumbimby and Terranora in NSW, connecting the NSW and Queensland electricity transmission systems.



Source: AEMO

About Directlink

- At the time of its commissioning (July 2000), Directlink represented cutting-edge ‘HVDC Light’ technology.
- Directlink can control power transfers to the limit of its capacity, in both directions, between the NSW and Queensland transmission networks.
  - It can change the direction of flow in a matter of milliseconds.
- Whilst there have been a number of more recent DC transmission developments throughout the world, this type of equipment remains highly specialised.
- Compared with the static elements that comprise the great majority of conventional transmission networks, this equipment is complex and technologically advanced.

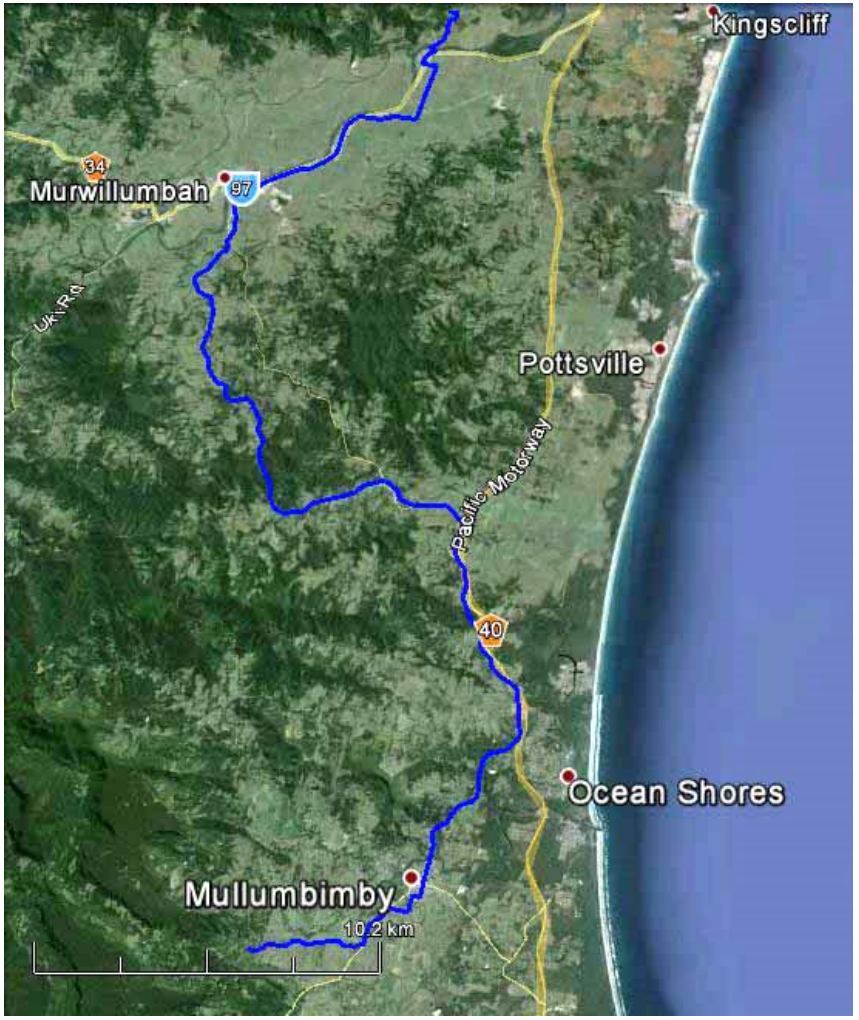
Directlink today

- Directlink was originally built to operate as an unregulated market network service provider, trading between the NSW and Queensland regions.
- In May 2006, the AER determined that Directlink would be reclassified as providing a prescribed transmission service.
  - The AER determined Directlink's Regulatory Asset Base, and Maximum Allowed Revenues for the nominal 10-year period until 30 June 2015.
- Today, the link is dispatched by AEMO, in similar manner to a generator, to control flows between the NSW and Queensland regions of the National Electricity Market and thereby minimise the costs of generation in the NEM.

- This Revenue Proposal is for a second 5-year regulatory control period, from 1 July 2015 to 30 June 2020.

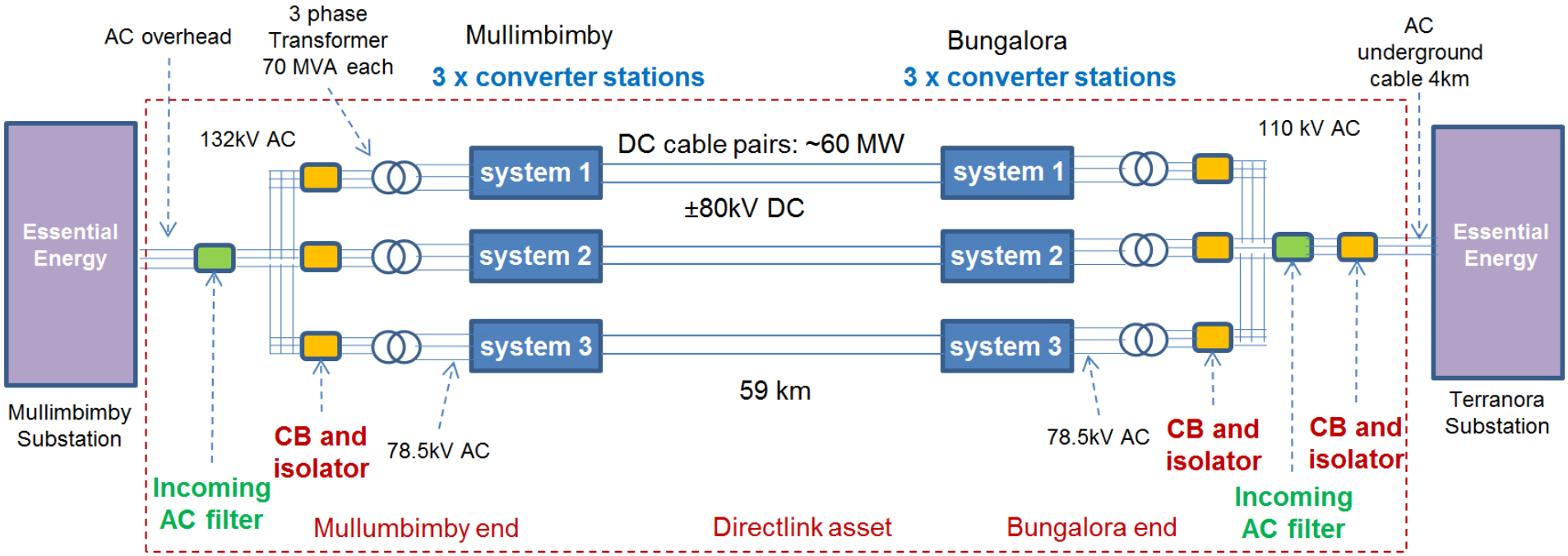
The Directlink route

- About half of the cable route length between Bungalora and Mullumbimby follows a disused rail corridor
  - Here the cable alternates between being installed above ground in steel trough and direct buried.
  - Vegetation is not being managed in the rail corridor
- For the remainder of the route, the cable is direct buried in road reserves.
- The coastal area and associated hinterland in north-eastern NSW is subject to greater development pressures than most other areas.



The Directlink Interconnector

- The three pairs of Direct Current (DC) convertor stations are connected by three pairs of XLPE cables (about 300km in total), forming 3 independent circuits of 60 MW each.



Small asset population has significant operational impact

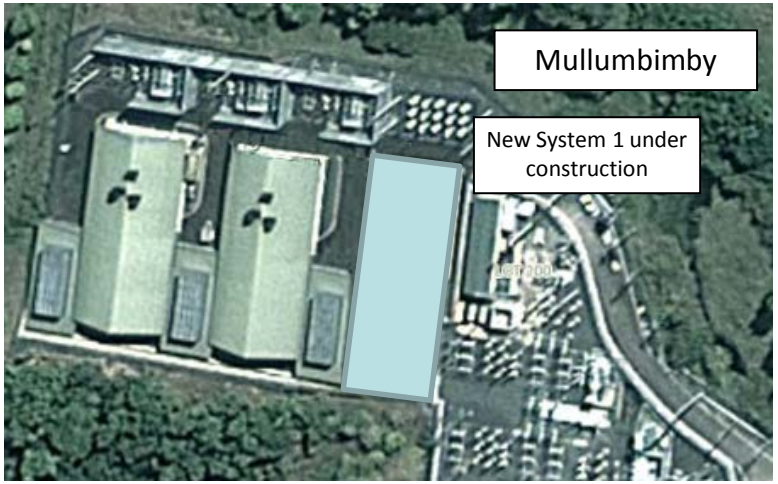
- TransGrid (transmission):
  - 96 substations and switching stations
  - 12,900 km of high voltage transmission lines
- Ausgrid (distribution):
  - 179 zone substations
  - 31,072 distribution substations

- Assets managed statistically as a population.
- Individual asset failures have small impact on overall network

TransGrid Revenue Proposal p16, AusGrid Network Management Plan p 11.

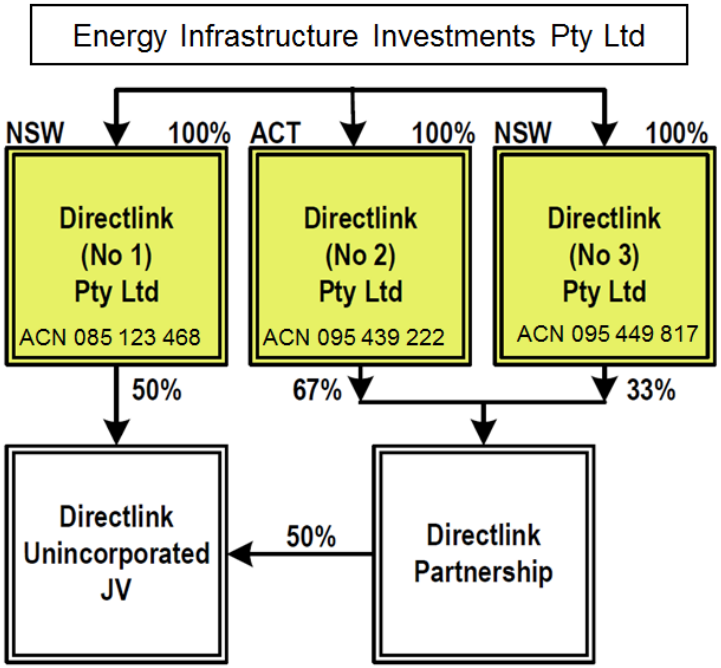
- Directlink:
  - 3 circuits
  - 6 converter stations; 18 phase reactors
  - 6 cables (300 km total)

- Assets managed individually
  - Spikes in opex from periodic maintenance
- Individual asset failures have significant impact on overall network
  - A failure of any one element can take one third of the capacity off line



Directlink ownership and operation

- Directlink is owned through a Joint Venture 100% owned by Energy Infrastructure Investments Pty Ltd (EII), which in turn is owned by a consortium of investors:



Energy Infrastructure Investments

Shareholder	Ownership percentage
Dalmeny Gas & Power Holdings BV	24.95
Midstream Investment First BV	24.95
Osaka Gas Energy Europe BV	30.20
Australian Pipeline Limited	19.90
Total	100.0

- Directlink is operated by APA Group on behalf of EII.

Directlink assets

- There are two classes of equipment that comprise the link:
  - Major elements of equipment (main transformers, conversion equipment, filters and DC cable).
    - These have a standard life of 40 years or more, and are approaching the mid-period of their useful service lives; and
  - Ancillary equipment necessary for the operation of the link (notably air conditioners, water pumps, control and protection systems).
    - These elements have service lives of 7 - 20 years and in many cases, are approaching this stage.
- Directlink is now well into its second decade of operation.
  - There are a number of elements of ancillary equipment that will require refurbishment or replacement during the 2015-20 regulatory control period.
  - These elements have been factored into the capital expenditure program.
- Directlink's RAB is divided into 3 asset classes – Substations, Cables and Easements.
  - This revenue proposal aligns the remaining lives of the converter stations and cables.

Directlink reliability and strategies

- Directlink's historic service performance has been below expectation.
- Strategies are in place to address performance:

Cable faults:

- Frequent
- Relatively minor to repair
- Stochastic in nature
- Variable locations
- *Focus on:*
  - *Fast response/repair strategy (opex)*
  - *Trouble spot replacement (capex)*

Converter station faults:

- Rare
- Significant in nature
- Causes indeterminate
- *Focus on:*
  - *Prevention - Gotland Solution (capex)*
  - *Prevention - GEIP Maintenance (opex)*

Historical operating expenditure

- Directlink's opex has been in excess of regulatory allowance due to unforecast costs:
  - Reactive opex responding to cable faults (138);
  - Management of phase reactor partial discharge tracking;
  - IGBT and fibre optic failures (195).
- The asset has not been "unmanned and maintenance free" as was promoted.

F/Y ending June ($000 nominal)	2011	2012	2013	2014E	2015F
Regulatory Allowance (indexed)	**2,261**	**2,208**	**2,027**	**2,027**	**2,025**
Operating and maintenance costs	2,391	2,327	2,379	2,431	2,824
Management fees and expenses	416	367	398	373	416
Insurance	353	355	489	512	1,267
Tax on property and capital	3	8	9	9	9
Accounting/audit fees	9	0	9	11	10
Other	4	-99	79	1	1
Total Actual opex	**3,176**	**2,958**	**3,363**	**3,338**	**4,527**
Difference	(915)	(750)	(1,336)	(1,311)	(2,502)

Historical capital expenditure

- Directlink has historically had to incur capital expenditure in excess of allowance.
  - Primarily for “Stay in Business” capex
- Historical ($000):

F/Y ending June ($000 nominal)	2011	2012	2013	2014E	2015F
Regulatory Allowance	0	0	0	0	0
Actual Expenditure (as incurred)	2,105	1,639	704	3,679	3,030
Difference	2,105	1,639	704	3,679	3,030

- Key projects:
  - “Igloo” replacement.
  - Ventilation (“Gotland” solution) pilot project.
  - Ongoing cable and IGBT replacement.

Forecast capital expenditure

- Forecast ($000):

F/Y ending June ($000)	2016	2017	2018	2019	2020	Total
Refurbishment	2,548	2,354	1,520	2,632	1,492	10,545
Compliance	473	437	036	0	0	945
Other	2,836	2,619	2,472	2,472	13,304	23,703
Total	5,856	5,409	4,028	5,104	14,796	35,193

- Key projects:
  - Ventilation system (“Gotland” solution) remaining 4 converter stations.
  - Fire suppression system.
  - Trouble spot cable replacement program (3km per year).
  - End of life control system replacement (2020).

Regulatory Asset Base

F/Y ending June ($m)	2006	2007	2008	2009	2010	2011	2012	2013	2014E	2015F
Opening RAB	116.68	119.16	119.72	121.52	121.11	121.13	123.78	123.73	123.78	127.39
Capex	2.11	0.85	0	0.01	0.02	2.21	1.71	0.74	3.86	3.17
Depreciation	-3.11	-3.20	-3.28	-3.42	-3.50	-3.60	-3.72	-3.78	-3.87	-3.99
Indexation	3.48	2.90	5.08	3.00	3.50	4.04	1.96	3.10	3.63	3.18
Closing RAB	119.16	119.72	121.52	121.11	121.13	123.78	123.73	123.78	127.39	129.76

F/Y ending June ($m)	2016	2017	2018	2019	2020
Opening RAB	129,76	134.22	138.10	140.33	143.63
Capex	6.16	5.84	4.46	5.79	17.19
Depreciation	-4.95	-5.31	-5.67	-5.99	-6.36
Indexation	3.24	3.36	3.45	3.51	3.59
Closing RAB	134.22	138.10	140.33	143.63	158.05

Cost of capital (indicative)

- Cost of capital parameters driven by AER Rate of Return Guidelines.
- Parameters consistent with February 2014 NSW Electricity Transmission Transitional Determination.
- Will be updated prior to AER Final Determination.

Nominal Risk Free Rate	Rf	4.30%
Real Risk Free Rate	Rrf	1.73%
Inflation Rate	f	2.5%
Cost of Debt Margin	DRP	3.20%
Nominal Pre-tax Cost of Debt	Rd	7.50%
Real Pre-tax Cost of Debt	Rrd	4.85%
Market Risk Premium	MRP	6.50%
Corporate Tax Rate	T	30.00%
Proportion of Equity Funding	E/V	40.00%
Proportion of Debt Funding	D/V	60.00%
Equity Beta	βe	0.70
Nominal Vanilla WACC		**8.06%**

Forecast operating expenditure

- Not possible to apply the base-step-trend approach
  1. Small number of assets – trend analysis not representative
  2. Not possible to identify a representative base year:
  - Mullumbimby converter station fire August 2012 – System 1 off line until mid-2015
  - Systems 2 and 3 taken off line for igloo replacement August 2013 – January 2014

- Approach – bottom-up cost study. Directlink:
  - Reviewed its entire operations relative to Good Electricity Industry Practice with the learnings from the Mullumbimby converter station fire;
  - Conducted a risk assessment and cost-benefit analysis;
  - Identified activities and resources required; and
  - Costed the activities and functions to be undertaken.

- This forms the foundation of the forecast operating expenditure.

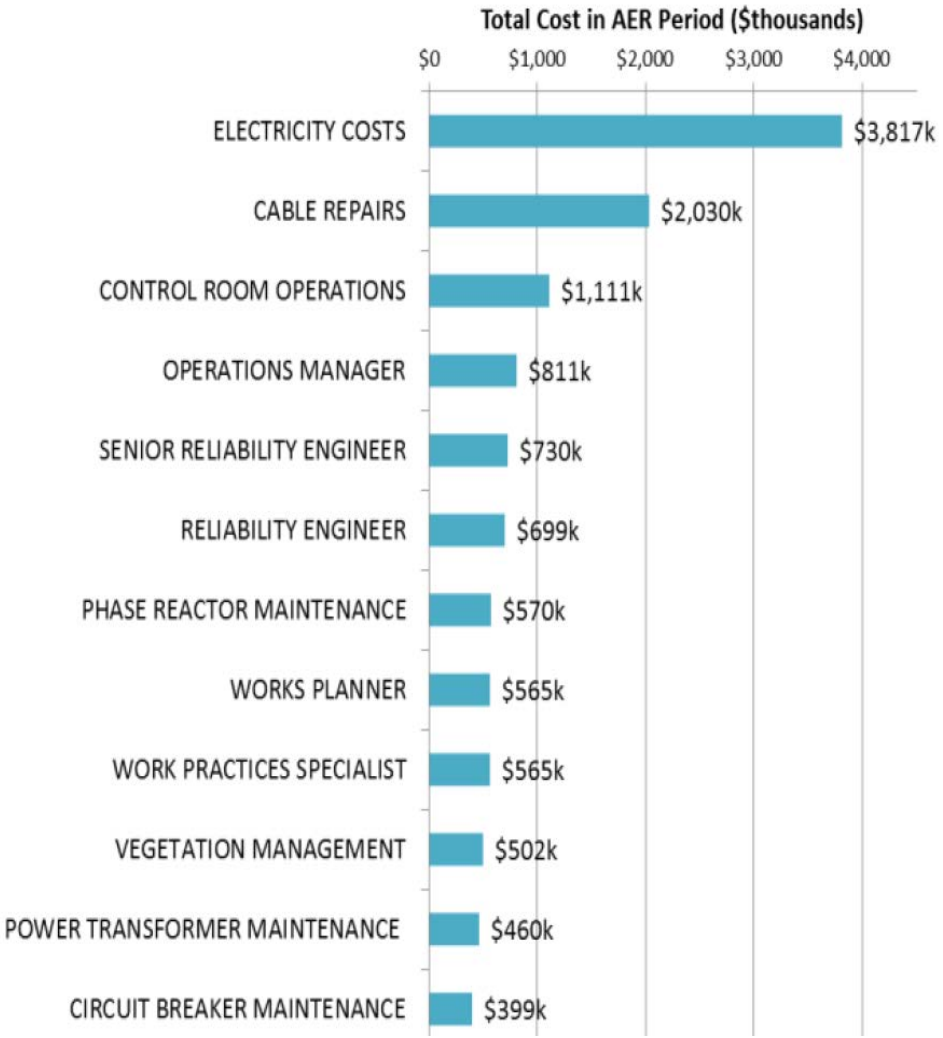
Forecast operating expenditure

- Key drivers relative to historical actuals:
  - Increased operation and maintenance activity following GEIP review based on learnings from Mullumbimby converter station fire;
  - 2016 spike due to 15-year scheduled maintenance;
  - Insurance cost increases based on claims history and revised insurer risk assessment.

F/Y ending June (000 real)	2016	2017	2018	2019	2020
Operating and maintenance costs	3,720	3,092	3,169	3,114	3,142
Management fees and expenses	561	561	561	561	561
Insurance	1,402	1,370	1,390	1,422	1,394
Tax on property and capital	9	9	9	9	9
Accounting/audit fees	10	10	10	10	10
Other	1	1	1	1	1
Debt raising costs	82	83	83	82	82
Total Forecast opex	5,786	5,127	5,224	5,200	5,200

Forecast opex – cost drivers

- Electricity and cable repairs are the most significant cost items
  - Together accounting for about one third of total opex costs
- Bottom-up cost study analysed 60 operational and maintenance costs.
  - The top 20 cost categories account for 87% of Directlink costs



Revenue Requirement

- Directlink (unsmoothed)

FY ending	2016	2017	2018	2019	2020
Return on capital	10,458	10,818	11,130	11,310	11,577
Return of capital	1,703	1,956	2,220	2,480	2,774
Total operating expenditure	5,930	5,387	5,625	5,740	5,883
Tax allowance	764	817	871	922	979
Unsmoothed revenue requirement	18,856	18,978	19,847	20,452	21,212

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