Attachment 1 Reconciliation of 2007 EAPR with revenue reset

Predominantly Load Driven Augmentations

Constraint	Possible Network Solution	Revenue Proposal		2007 EAPR Chapter 5 summary		Reconciliation of 2007 EAPR and revenue proposal		Comments
		Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	
Security of supply to radially connected Springvale, Heatherton and Malvern terminal stations	Malvern-Heatherton 220 kV underground cable (or a overhead line - if feasible at a lower cost)	43.8	Around 2012	53	Under analysis	35	around 2012	Alternative options including overhead lines are under analysis. Project timing is around 2012, if the cost of the project is below $35M.
Outage of an eastern metropolitan 500/220 kV transformer overloads the remaining eastern metropolitan transformer, Thomastown-Ringwood 220 kV circuit and Thomastown-Templestowe 220 kV circuit	One 1,000 MVA 500/220 kV transformer at Templestowe or Ringwood	43.8	Around 2012	35	around 2014	35	around 2013	VENCorp considers this large network augmentation likely to be advanced following detailed assessment and with due consideration of risk assessment including project lead time.
Outage of Rowville-Ringwood 220 kV circuit overloads Thomastown-Ringwood 220 kV circuit								
Wind generation located in state grid.	SVC in State Grid	25.0	Around 2011	28	around 2011	28	around 2011	Following installation of significant wind generation and monitoring of network voltage control/stability. Forecast wind generation for 2011 is 1238 MW

Constraint	Possible Network Solution	Revenue Proposal		2007 EAPR Chapter 5 summary		Reconciliation of 2007 EAPR and revenue proposal		Comments
		Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	
Network reactive support in the metropolitan area	500 to 2,000 MVAr Reactive Support	25.0	From 2011 to 2014		needs driven	3.5	200 MVAr - around 2011	1x200 MVAr 220 kV cap bank - indicative size
Fault level issues	Fault limiting devices, series reactors and upgrade selected 220 kV switchgear in the metropolitan area	19.0	From 2011 to 2014		needs driven	15	needs driven	No change
Line terminations, secondary equipment and dynamic system and supply of quality monitoring equipment.	Miscellaneous works in metropolitan area	19.0	From 2011 to 2014		needs driven	15	needs driven	No change
Line terminations, secondary equipment and dynamic system and supply of quality monitoring equipment	Miscellaneous Works in state grid	12.5	From 2011 to 2014		needs driven	10.0	needs driven	No change
Network reactive support in the State Grid area	200 to 600 MVAr Reactive Support	10.0	Ongoing as required		needs driven	7.5	150 MVAr 2009-2013	6x25 MVAr 66 kV cap banks - indicative size
South Morang–Thomastown 220 kV circuit for outage of a parallel circuit	Establishment of South Morang 220 kV terminal station and cutting of existing Rowville to Thomastown 220 kV circuit into South Morang 220 kV bus to form the third South Morang to Thomastown 220 kV circuit	6.3	At time of Interconnection upgrade by 600 MW or around 2012	5	at time of Interconnection upgrade by 600 MW or around 2014	Moved to Import Scenario	at time of Interconnection upgrade by 600 MMW	This project moved to predominantly increase in import from Snowy/NSW scenario
Ballarat to Bendigo circuit overload for outage of the Bendigo to Shepparton line	Ballarat to Bendigo 220 kV line upgrade to 75°C conductor temperature	4.3	Around 2013	13	around 2015	Removed		

Constraint	Possible Network Solution	Revenue Proposal		2007 EAPR Chapter 5 summary		Reconciliation of 2007 EAPR and revenue proposal		Comments
		Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	
Fishermans Bend to West Melbourne circuit overload for outage of a parallel circuit	Replacement of inter-plant connections and primary plant of Fishermans Bend to West Melbourne line	3.8	Around 2012	4	around 2014	Removed		
Keilor to West Melbourne-circuit overload for outage of a parallel circuit	Replacement of circuit breakers and inter-plant connections at Keilor and West Melbourne of the Keilor to West Melbourne 220 kV lines	3.8	Around 2012	4	around 2014	Removed		
Ballarat to Moorabool circuit overload for outage of parallel Ballarat to Moorabool circuit at high load.	Up-rate the Ballarat to Moorabool No 1 circuit to 75°C conductor temperature	4.3	Around 2010	9	around 2015	Removed		
DSM & QOSM equipment as required by NEMMCO		2.0	Around 2008			2	around 2008	No change
Geelong to Moorabool 220 kV circuit overload for outage of a parallel circuit	Upgrade terminal station plants at Moorabool and Geelong	1.3	Around 2012	1.3	around 2009, to be coordinated as part of asset replacement	1.3	around 2009	
Rowville-Springvale circuit overload for outage of a parallel circuit.	Uprate Rowville-Springvale line to 82°C	1.3	Around 2012	1.5	around 2013	1.5	around 2013	
Eildon-Thomastown line for outage of South Morang to Dederang line	Wind monitoring scheme on Eildon-Thomastown 220 kV line	0.8	Around 2012	0.8	around 2013	0.8	around 2013	
Rowville to Richmond circuit overload for outage of parallel circuit	Wind monitoring scheme on the Rowville-Richmond line	0.6	Around 2012	0.6	around 2013	0.6	around 2013	

Constraint	Possible Network Solution	Revenue Proposal		2007 EAPR Chapter 5 summary		Reconciliation of 2007 EAPR and revenue proposal		Comments
		Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	
Ballarat to Bendigo circuit overload for outage of the Bendigo to Shepparton line	Wind monitoring scheme on the Ballarat to Bendigo circuit	0.6	Around 2012	0.6	around 2014	Removed		
Rowville to Malvern circuit overload for outage of a parallel circuit	Wind monitoring scheme on the Rowville-Malvern lines	0.5	Around 2012	0.5	around 2013	0.5	around 2013	
Springvale-Heatherton circuit overload for outage of a parallel circuit	Wind monitoring scheme on the Springvale-Heatherton lines	0.5	Around 2012	0.5	around 2013	0.5	around 2013	
Hazelwood transformer overload for an outage of a parallel line	Generator tripping control scheme at Hazelwood			1.0	2008	1	2008	

Predominantly Generator Driven Augmentations

Predominantly Latrobe Valley Generation

Constraint	Possible Network Solution	Revenue Proposal		2007 EAPR Chapter 5 summary		Reconciliation of 2007 EAPR and revenue proposal		Comments
		Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	
Inadequate thermal capacity of Loy Yang to Hazelwood 500 kV lines	Fourth 500 kV line from Loy Yang to Hazelwood	37.5	At the time of about 500 MW new generation connected at Loy Yang	45	At the time of about 1000 MW new generation connected at Loy Yang	45	At the time of about 1000 MW new generation connected at Loy Yang	
Outage of a Hazelwood 500/220 kV transformer overload the parallel transformers	Additional 220/500 kV transformation at Hazelwood and fault level mitigation	27.5	At the time of additional new generation connected at Hazelwood or Jeeralang 220 kV	40	At the time of additional new generation connected at Hazelwood or Jeeralang 220 kV	40	At the time of additional new generation connected at Hazelwood or Jeeralang 220 kV	
Network reactive support in the metropolitan area	500 to 2,000 MVAr Reactive Support	25.0	Ongoing as required		Needs driven	16	700 MVAr 2011-2013	2x200 MVAr 220 kV & 6x50 MVAr 66 kV cap banks - indicative size
Thermal loading of lines in the Malvern area	220kV line uprate to 82deg Rowville to Malvern	21.3	Contingent on the transfer of 70MW of load from Richmond Terminal Station by Citipower	26	Contingent on the transfer of significant load from Richmond Terminal Station	26	Contingent on the transfer of significant load transfer from Richmond Terminal Station	

Constraint	Possible Network Solution	Revenue Proposal		2007 EAPR Chapter 5 summary		Reconciliation of 2007 EAPR and revenue proposal		Comments
		Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	
Inadequate thermal capacity on Latrobe Valley (LV) to Melbourne 500 kV lines	Upgrade terminations and circuit breaker thermal ratings at Hazelwood	7.5	At the time of about 500 MW new generation at LV 500 kV		At the time of about 800 MW new generation at LV 500 kV or to be coordinated with asset replacement	7.5	At the time of about 800 MW new generation at LV 500 kV or to be coordinated with asset replacement	
Network reactive support in the State Grid area	200 to 600 MVAr Reactive Support	5.0	Ongoing as required		Needs driven	5	100 MVAr 2010-2013	4x25 MVAr 66 kV cap banks - indicative size

Predominantly South West Generation

Constraint	Possible Network Solution	Revenue Proposal		2007 EAPR Chapter 5 summary		Reconciliation of 2007 EAPR and revenue proposal		Comments
		Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	
Outage of a Hazelwood 500/220 kV transformer overload the parallel transformers	Additional 220/500 kV transformation at Hazelwood and fault level mitigation	27.5	At the time of additional new generation connected at Hazelwood or Jeeralang 220 kV	40	At the time of additional new generation connected at Hazelwood or Jeeralang 220 kV	40	At the time of additional new generation connected at Hazelwood or Jeeralang 220 kV	
Thermal loading of lines in the Malvern area	220kV line uprate to 82deg Rowville to Malvern	21.3	Contingent on the transfer of 70MW of load from Richmond Terminal Station by Citipower	26	Contingent on the transfer of significant load from Richmond Terminal Station	26	Contingent on the transfer of significant load from Richmond Terminal Station	
No suitable connection point for possible large generators around Mortlake	Establishment of a 500 kV terminal station near Mortlake to connect to the existing Moorabool-Heywood 500 kV lines	15	At the time of additional new generation connection to 500 kV in the South West corridor		At the time of additional new generation connection to 500 kV in the South West corridor	15	At the time of additional new generation connection to 500 kV in the South West corridor	
	Reactive Support in metropolitan area			Needs driven		1.5	50 MVAr around 2013	1x50 MVAr 66 kV cap bank - indicative size
	Reactive Support in state grid area	5	Ongoing as required		Needs driven	5	100 MVAr 2011-2013	4x25 MVAr 66 kV cap banks - indicative size

Predominantly Increase in import from Snowy/NSW

Constraint	Possible Network Solution	Revenue Proposal		2007 EAPR Chapter 5 summary		Reconciliation of 2007 EAPR and revenue proposal		Comments
		Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	
Inadequate thermal capacity of Loy Yang to Hazelwood 500 kV lines	Fourth 500 kV line from Loy Yang to Hazelwood	37.5	At the time of about 500 MW new generation connected at Loy Yang	45	At the time of about 1000 MW new generation connected at Loy Yang	Removed		
South Morang 330/220 kV transformer overload for a outage of a parallel transformer	Third 700 MVA 330/220kV South Morang transformer	25	At time of Interconnection Upgrade by 600 MW	28	At time of Interconnection Upgrade by 600 MW or 2014	28	At time of Interconnection Upgrade by 600 MW or 2014	
Thermal loading of lines in the Malvern area	220kV line uprate to 82deg Rowville to Malvern	21.3	Contingent on the transfer of 70MW of load from Richmond Terminal Station by Citipower	26	Contingent on the transfer of significant load from Richmond Terminal Station	26	Contingent on the transfer of significant load from Richmond Terminal Station	
Murray to Dederang 330 kV line overload for outage of parallel circuit	60-65% series compensation on Wodonga to Dederang and/or Wodonga-Jindera 330 kV lines & 150 MVAr shunt cap bank at Wodonga/Dederang	15	At time of Interconnection Upgrade by 600 MW	15	At time of Interconnection Upgrade by 600 MW	15	At time of Interconnection Upgrade by 600 MW	
Dederang 330/220 kV transformers overload for an outage of a parallel transformer	Fourth Dederang 330/220 kV transformer	13.8	At time of Interconnection Upgrade by 180 MW	21	At time of Interconnection Upgrade by 180 MW	21	At time of Interconnection Upgrade by 180 MW	

Constraint	Possible Network Solution	Revenue Proposal		2007 EAPR Chapter 5 summary		Reconciliation of 2007 EAPR and revenue proposal		Comments
		Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	
South Morang to Dederang 330 kV line and series capacitors overload for outage of parallel circuit	Uprate of South Morang to Dederang 330 kV lines and increase in rating of South Morang to Dederang series compensation to match line uprate	9.3	At time of Interconnection Upgrade by 600 MW	10	At time of Interconnection Upgrade by 600 MW	10	At time of Interconnection Upgrade by 600 MW	
Eildon-Thomastown line for outage of South Morang to Dederang line	Upgrade of Eildon to Thomastown 220 kV line	3	At time of Interconnection Upgrade by 600 MW or around 2013	5	At time of Interconnection Upgrade by 600 MW	5	At time of Interconnection Upgrade by 600 MW	
Eildon-Thomastown line for outage of South Morang to Dederang line	25% series compensation on the Eildon to Thomastown 220 kV line	8.8	At time of Interconnection Upgrade by 600 MW	9	At time of Interconnection Upgrade by 600 MW	9	At time of Interconnection Upgrade by 600 MW	
Inadequate thermal capacity on Latrobe Valley (LV) to Melbourne 500 kV lines	Upgrade terminations and circuit breaker thermal ratings at Hazelwood	7.5	At the time of about 500 MW new generation at LV 500 kV		At the time of about 800 MW new generation at LV 500 kV	7.5	At the time of about 800 MW new generation at LV 500 kV	
Dederang-Glenrowan circuit overload for outage of a parallel circuit	Installation of a phase angle transformer on the Bendigo-Shepparton 220 kV line	6.3	At the time of Interconnection Upgrade by 600 MW or around 2013	23	At time of Interconnection Upgrade by 600 MW or 2015	23	At time of Interconnection Upgrade by 600 MW or 2015	
Bendigo-Fosterville-Shepparton circuit overload for outage of a Ballarat to Bendigo circuit	Bendigo-Fosterville-Shepparton 220 kV line upgrade to 90°C	6.3	At time of Interconnection Upgrade by 600 MW			Removed		

Constraint	Possible Network Solution	Revenue Proposal		2007 EAPR Chapter 5 summary		Reconciliation of 2007 EAPR and revenue proposal		Comments
		Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	
Reactive support at Wadonga and Dederang	Installation of a 150 MVAr capacitor bank at Wodonga and control & communications	5	At time of Interconnection Upgrade by 180 MW	4	At time of Interconnection Upgrade by 180 MW	4	At time of Interconnection Upgrade by 180 MW	
Network reactive support in the Metroplotian area	Reactive Support in metropolitan area				Needs driven	16	700 MVAr 2011-2013	2x200 MVAr 220 kV & 6x50 MVAr 66 kV cap banks - indicative size
Network reactive support in the State Grid area	Reactive Support in state grid area	5	Ongoing as required		Needs driven	5	100 Mvar 2010-2013	4x25 MVAr 66 kV cap banks - indicative size
South Morang–Thomastown 220 kV circuit for outage of a parallel circuit	Cutting of existing Rowville to Thomastown 220 kV circuit into South Morang 220 kV bus to form the third South Morang to Thomastown 220 kV circuit	6.3	at time of Interconnection upgrade by 600 MW or around 2012	5	at time of Interconnection upgrade by 600 MW or around 2014	5	at time of Interconnection upgrade by 600 MMW	This project moved from predominantly load driven augmentation

Predominantly Metropolitan and State Grid Generation

Constraint	Possible Network Solution	Revenue Proposal		2007 EAPR Chapter 5 summary		Reconciliation of 2007 EAPR and revenue proposal		Comments
		Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	
Outage of a Hazelwood 500/220 kV transformer overload the parallel transformers	Additional 220/500 kV transformation at Hazelwood and fault level mitigation	27.5	At the time of additional new generation connected at Hazelwood or Jeeralang 220 kV	40	At the time of additional new generation connected at Hazelwood or Jeeralang 220 kV	40	At the time of additional new generation connected at Hazelwood or Jeeralang 220 kV	
Fault level issues	Fault limiting devices, series reactors and upgrade selected 220 kV switchgear in the metropolitan area	25.0	Ongoing as required		Needs driven	20	Needs driven	No change
Wind generation located in state grid.	SVC in State Grid	25.0	As required	28	As required	28	As required	
Thermal loading of lines in the Malvern area	220kV line uprate to 82deg Rowville to Malvern	21.3	Contingent on the transfer of 70MW of load from Richmond Terminal Station by Citipower	26	Contingent on the transfer of significant load from Richmond Terminal Station	26	Contingent on the transfer of significant load from Richmond Terminal Station	
Fault level issues	Fault limiting devices, series reactors and upgrade selected 220 kV switchgear in the state grid	12.5	Ongoing as required		Needs driven	10	Needs driven	No change

Export Driven Augmentations

Constraint	Possible Network Solution	Revenue Proposal		2007 EAPR Chapter 5 summary		Reconciliation of 2007 EAPR and revenue proposal		Comments
		Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	
Outage of a Heywood-South East 275 kV circuit overloads the parallel circuit	Third Heywood-South East 275 kV circuit	68.8	At the time of 300 MW additional export to SA via Heywood	145	At the time of 300 MW additional export to SA via Heywood	145	At the time of 300 MW additional export to SA via Heywood	
South Morang 500/330 kV transformer overload with increased export to Snowy/NSW	Second 1,000 MVA 500/330 kV transformer at South Morang	43.8	At the time of increase in export to Snowy/NSW	38	At the time of increase in export to Snowy/NSW	38	At the time of increase in export to Snowy/NSW	
Reactive support and voltage control in the Heywood area	One SVC at Heywood (+200/-200 MVAr)	27.5	At the time of 300 MW additional export to SA via Heywood	28	At the time of 300 MW additional export to SA via Heywood	28	At the time of 300 MW additional export to SA via Heywood	
Outage of a Heywood 500/275 kV transformer overloads the parallel transformer	Third 370 MVA 500/275 kV Heywood transformer and 500 kV bus-tie at Heywood	22.5	At the time of 300 MW additional export to SA via Heywood	36	At the time of 300 MW additional export to SA via Heywood	36	At the time of 300 MW additional export to SA via Heywood	

Constraint	Possible Network Solution	Revenue Proposal		2007 EAPR Chapter 5 summary		Reconciliation of 2007 EAPR and revenue proposal		Comments
		Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	Estimated Cost ($millions) real excluding GST	Estimated Timing	
Transient stability limit for a fault on Hazelwood-South Morang 500 kV line	A 500 MW, 500 kV braking resistor at Loy Yang	8.8	At the time of 150-200 MW increase in export to Snowy/NSW or 300 MW increase in export to SA (Scenario 5)	16	At the time of 150-200 MW increase in export to Snowy/NSW or 300 MW increase in export to SA (Scenario 5)	16	At the time of 150-200 MW increase in export to Snowy/NSW or 300 MW increase in export to SA (Scenario 5)	
Overload of the Moorabool-Ballarat 220 kV lines for an outage of a parallel line	Uprate Moorabool-Ballarat 220 kV line			9	At the time of increase in export to Snowy/NSW	9	At the time of increase in export to Snowy/NSW	