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Dear David

Additional information for use in peer review

In May 2016 Deloitte Access Economics prepared a report titled “Cost Benefit Analysis and Economic Impact Analysis of the Mount Owen Continued Operations Project” (Our Report). Umwelt has been requested by the Department of Planning and Environment to provide some additional information for use in the peer review of Our Report that is being undertaken by the CIE. In particular, Umwelt has been requested to provide:

- a disaggregated table of costs and benefits using revised market conditions;
- a sensitivity analysis of the total net benefit based on the net benefits to NSW and utilising a central case that reflects updated market condition;
- a justification of the attribution of greenhouse gas emission costs to NSW; and
- a sensitivity analysis of the attribution of 100% of greenhouse gas emission costs to NSW.

Each of these items is considered below.

In this document, revised/updated market conditions refers to prices that were developed from contract price consensus forecasts published by Consensus Economics in March 2016 and presented in section 7.3 of Our Report.

A disaggregated table of costs and benefits using revised market conditions

A disaggregation table of costs and benefits using revised market conditions is shown in the tables below.

Table 1.1: Overall CBA results for NSW community

Discount rate	Overall net benefit of Project for NSW community (\$m, NPV)
4%	231.5
7%	185.7
10%	151.4

Source: Deloitte Access Economics calculations

Table 1.2: Breakdown of CBA results by item

Item	Incremental effect (\$m, NPV)	NSW community share (%)	Net benefit to NSW (\$m, NPV)	Net cost to NSW (\$m, NPV)
Royalties	197	100%	197	
Company income tax	19	32%	6	
Net environmental, social and transport costs	47	See Table 6.3		18
Total			204	18

The following table presents the full set of estimated costs and benefits of the Project without attributing them to NSW.

Table 1.3: Incremental benefits and costs for the project as a whole

No.	Item	Baseline NPV (\$m)	Proposal NPV (\$m)	Incremental benefit (\$m)	Incremental cost (\$m)
1	Gross mining revenue	1,065.18	3,573.29	2,508.11	-
2	Other onsite revenue	-	-	-	-
3	Exploration costs	-	-	-	-
4	Capital investment costs	0.00	140.03	-	140.03
5	Operating costs excluding taxes	738.89	2,937.78	-	2,198.89
6	Rehabilitation costs	2.49	12.09	-	9.60
7	Decommissioning costs	49.13	51.57	-	2.44
8	Residual value of capital	0.00	0.00	0.00	-
9	Residual value of land	5.91	6.71	0.80	-
10	Offsite agricultural revenue*	-	-	-	-
11	Related public expenditure*	-	-	-	-
12	Groundwater quality*	-	-	-	-
13	Surface water quality*	-	-	-	-
14	Carbon emissions	12.02	46.84	-	34.82
15	Air quality impacts – particulate matter	0.00	4.59	-	4.59
16	Air quality impacts – other pollutants*	-	-	-	-
17	Noise impacts	0.05	0.16	-	0.10
18	Visual amenity*	-	-	-	-
19	Traffic costs	1.02	0.23	0.79	-
20	Biodiversity	0.00	2.51	-	2.51
21	Conservation*	-	-	-	-
22	Quality of open space*	-	-	-	-
23	Rural amenity and culture	0.00	8.60	-	8.60
24	Aboriginal heritage*	-	-	-	-
25	European heritage*	-	-	-	-
26	Health*	-	-	-	-
				2,509.70	2,401.61

Source: DAE calculations – note numbers may not add due to rounding

NPV measured in real 2015 dollar terms, as at the end of 2016, using a 7% discount rate

* Considered qualitatively

A sensitivity analysis of the total net benefit based on the net benefits to NSW and utilising a central case that reflects updated market condition

Starting from the updated market conditions given in Our Report, the following tables present sensitivity analysis of coal prices. The variations undertaken as part of this analysis are:

- increasing coal price forecasts by 30% from their 2016 level;
- decreasing coal price forecasts by 20% from their 2016 level;

The sensitivity ranges for the export coal prices were arrived at through an analysis of data over the period from January 1995 to January 2016. Specifically, the range used covers 67% of the range of historical monthly coal prices over this period. The minimum price in the lower sensitivity scenario, forecast for 2016, is placed at the 9th percentile of historical coal prices. Meanwhile, the maximum price in the upper sensitivity scenario, forecast for 2020, is placed around the 77th percentile.

It is important to note that this sensitivity analysis assumes that these price changes apply permanently over the entire duration of the project. In practice, it is likely that periods of higher and lower prices will occur rather than extended periods of either high or low prices. This indicates that the sensitivity analysis results below present broad ranges within which the net benefits to NSW could be expected to lie.

Table 1.4: Sensitivity analysis – comparison of net benefits for NSW

Parameter	Variation in Parameter	Net Benefits for NSW (\$m)		
		4%	7%	10%
Central CBA	N/A	231.5	185.7	151.4
Export coal price forecasts	+ 30%	387.2	312.3	255.8
	- 20%	169.9	136.2	111.1

Source: Deloitte Access Economics calculations

A justification of the attribution of greenhouse gas emission costs to NSW

The attribution of greenhouse gas emissions to NSW is challenging and reflects the broader challenge of conducting a regionally focussed cost benefit analysis. The challenge in attributing greenhouse gas emission costs within a regionally focussed cost benefit analysis comes from the underlying way in which the costs of emissions are often estimated. Most approaches to estimating the value of carbon emissions ultimately rely on modelling that estimates the social cost of carbon or on market prices that derive from restrictions on carbon emissions – often these restrictions are made with a social cost of carbon in mind. The social cost of carbon is normally assessed at a global scale, not a regional scale.

Given these considerations and the lack of clear guidance on how to apportion these costs geographically, we have assumed that all costs of carbon emissions can be attributed to Australia. This cost can then be apportioned to NSW based on NSW's share of Australian population.

A sensitivity analysis of the attribution of 100% of greenhouse gas emission costs to NSW

Attributing 100% of the greenhouse gas emission costs to NSW will reduce the net benefits of the project by \$23.7 million in the central case when discounting at 7%. This is shown in the following table.

The table also shows the results of other greenhouse gas emission sensitivities. In particular, one sensitivity involves pricing the cost of carbon according to alternative prices used in the Australian Treasury Clean Energy Future Policy Scenario (288% higher than the prices used in the central case scenario, on average) while the other involves pricing the cost of carbon according to alternative US EPA Social Cost of Carbon estimates (5% discount rate scenario) (87% higher than the prices used in the central case scenario, on average).

These alternative prices for the cost of carbon have been identified in the Review of the NSW Energy Savings Scheme (NSW Government, 2015). As the cost of carbon series used in both the central case of the CBA and this sensitivity analysis rely on assumptions that are not completely transferable to the Australian context, the sensitivity analysis series have been used to provide a range of the potential costs associated with greenhouse gas emissions.

Further, these alternative prices have been applied over the entire duration of the Project. In reality it is likely that, a transition between these different pricing scenarios could occur over time with the Clean Energy Future Policy Scenario prices being more applicable towards the end of the Project's life.

Table 1.5: Overall CBA results for NSW community

Discount rate	Overall net benefit of Project for NSW community (\$m, NPV)			
Carbon price	Review of the NSW Energy Savings Scheme	Australian Treasury Clean Energy Future Policy Scenario prices (approx. + 300%)	US EPA Social Cost of Carbon prices 5% discount rate scenario (approx. + 80%)	
4%	202.0	86.6		164.8
7%	162.0	70.7		132.0
10%	132.1	58.5		107.5

Source: Deloitte Access Economics calculations

Yours sincerely,



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(PAC report) and further feedback provided by the Department of Planning and Environment which includes an updated economic analysis of the refined Mount Owen Continued Operations Project. You should not refer to or use our name or the advice for any other purpose.