

# The Hume Coal Mine

## A Stranded Asset in the Southern Highlands



Institute for Energy Economics  
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# Executive Summary

IEEFA has undertaken a financial review of POSCO of Korea's Sutton Forest underground coalmine proposal in the Southern Highlands, NSW, and finds the project financially unviable and unlikely to proceed. POSCO's wholly-owned subsidiary, Hume Coal Ltd, proposes to invest capital of A\$1.28bn over the 19-year project life to produce 39 million tonnes (Mt) of export coal (2Mt/pta, 80% coking, 20% thermal).

## Key Features

- The Hume Coal proposal is for 50Mt of run of mine coal. On an assumed yield of 78%, this equates to 39Mt of product coal. With three years of construction starting 2018, first coal is assumed in 2021, with production of 2.0Mt/pta and mine life of 19 years.
- The total capital cost over the project life is estimated at A\$1.28bn. This assumes A\$720m initial capex including the associated Berrima Rail Project plus a 10% contingency, \$339m of sustaining capex during the mine life, \$80m for exploration and admin over 2016-2020, \$40m of property purchases and a \$30m rehab bond.
- The mine plan involves an innovative technique called pine feather mining, an Australian first, aimed at limiting land subsidence and water impacts. The downside is a coal deposit recovery rate Hume Coal estimates at only 35%.
- Assuming 20% thermal coal at US\$60/t and 80% hard coking coal at US\$90/t (2016 dollars, indexed for inflation), and maintaining the current A\$/US\$0.753 gives a current product value of US\$84/t or A\$112/t.
- South32's Illawarra Metallurgical Coal unit produces 7-8Mt/pta of coal (80% coking and 20% thermal). Illawarra's A\$/t cash cost of production has been cut 18% since FY2014.
- Assuming Hume Coal can replicate South32's dramatically reduced cash cost before sustaining capex for Illawarra Coal of A\$79/t, adding A\$8/t royalties & A\$30/t of depreciation, IEEFA calculates a total cost of A\$117/t product coal.
- Total costs of A\$117/t plus financing costs of \$13/t are A\$130/t (2016 dollars), well above likely revenues of A\$112/t.
- No corporate tax is likely without a sustained, sizable lift in coal prices in real terms.
- No price on carbon nor cost of water is factored in, two key financial risks.

IEEFA concludes that with a total cost (including interest) of coal of A\$130/t, absent a sustained recovery in coking coal prices and / or a collapse in the A\$/US\$ currency rate, this project will lose money with every tonne of coal produced. The negative net present value for the project of -A\$384m means the probability of this proposal proceeding is remote. POSCO is an integrated steel company, but would be commercially better off sourcing a long term supply agreement or buying one of the many distressed coal mines readily available on the market.

BHP Billiton is reported in July 2016 to have offered Anglo-American just US\$1bn for >10Mt/pta of coking coal capacity at Grosvenor & Moranbah North: US\$100 per tonne of coking coal capacity, just over one quarter of Hume Coal's proposed total capital cost US\$0.7bn (A\$0.9bn for 2Mt/pta) or US\$350/t.

# 1.0 Hume Coal Mine: Background

Hume Coal Pty Limited (Hume Coal), a wholly owned subsidiary of South Korean steel maker POSCO via its Australian subsidiary POSCO Australia Pty Ltd, has proposed to develop an underground coal mine in the Southern Highlands of New South Wales (NSW). POSCO is amongst the largest purchasers of Australian coal and iron ore.

Hume Coal was originally set up in 2010 as a joint venture between POSCO Australia and Cockatoo Coal Limited after their purchase of the project from Anglo American.<sup>1</sup> POSCO Australia later acquired Cockatoo Coal's 30% stake in 2013 for A\$9.7m cash<sup>2</sup> making it the sole owner of the Hume Coal project.<sup>3</sup> Cockatoo Coal originally paid A\$21.5m plus A\$9.7m for its share of exploration costs at Hume Coal, meaning it has lost two thirds of its investment value in just three years.

In its latest annual report, POSCO acknowledges that its revenue is closely linked to the price of raw materials its operations require. POSCO already has interests in Australian coal mines, via its subsidiary POSCO Australia, with participating interest in a number of joint venture partnerships (refer Annexure 3). There is no mention of the Hume Coal project in POSCO's 2015 Annual report, suggesting that the project is not material to POSCO shareholders.

The Hume project is situated within the Southern Coalfield of New South Wales, one of the main sources of hard coking coal in the state.<sup>4</sup> As such coking coal will be the primary product and run-of-mine (ROM) coal will be washed in order for it to meet market specifications for export coking coal<sup>5</sup>. Product specifications for the Hume project can be found in Annexure 1. Hume Coal have stated that 50 million tonnes (Mt) of ROM coal is recoverable from the 115Mt indicated<sup>6</sup> from which 39Mt of saleable product coal will be produced.

## Mining Operations ... 2Mtpa for 19 Years

Hume Coal envisage a three-year construction period followed by a mine operating life of 19 years with nominal annual production of up to 3.4 million tonnes per annum (Mtpa) ROM coal and a peak of 3.0Mtpa of product coal. Average annual production across the operating life of the mine will be around 2Mtpa. Extraction will take place at depths between 70m and 180m within the Wongawilli Seam of the Southern Coalfield. Hume intends to produce 39Mt of product coal over the life of the mine; based on their predicted production of 50Mt ROM coal, this equates to an assumed yield of 78%. The expected peak workforce during the construction phase of the project is 400 full-time equivalents (FTE) and over the life of the mine, Hume Coal is estimated to employ around 160 FTE employees (refer Section 3).

In an Australian first, the pine feather mining system (Figure 1) is to be used partly as a response to environmental concerns about groundwater. Under this system, pillars of coal

<sup>1</sup> <http://www.bloomberg.com/news/articles/2010-07-05/korea-electric-posco-buy-stakes-in-australian-mines-from-anglo-american>

<sup>2</sup> Total consideration was A\$9.74m cash and POSCO also relinquished 135 million Cockatoo Coal shares that subsequently proved to be worthless

<sup>3</sup> <https://www.australianmining.com.au/news/cockatoo-coal-sells-stake-in-coal-exploration-project/>

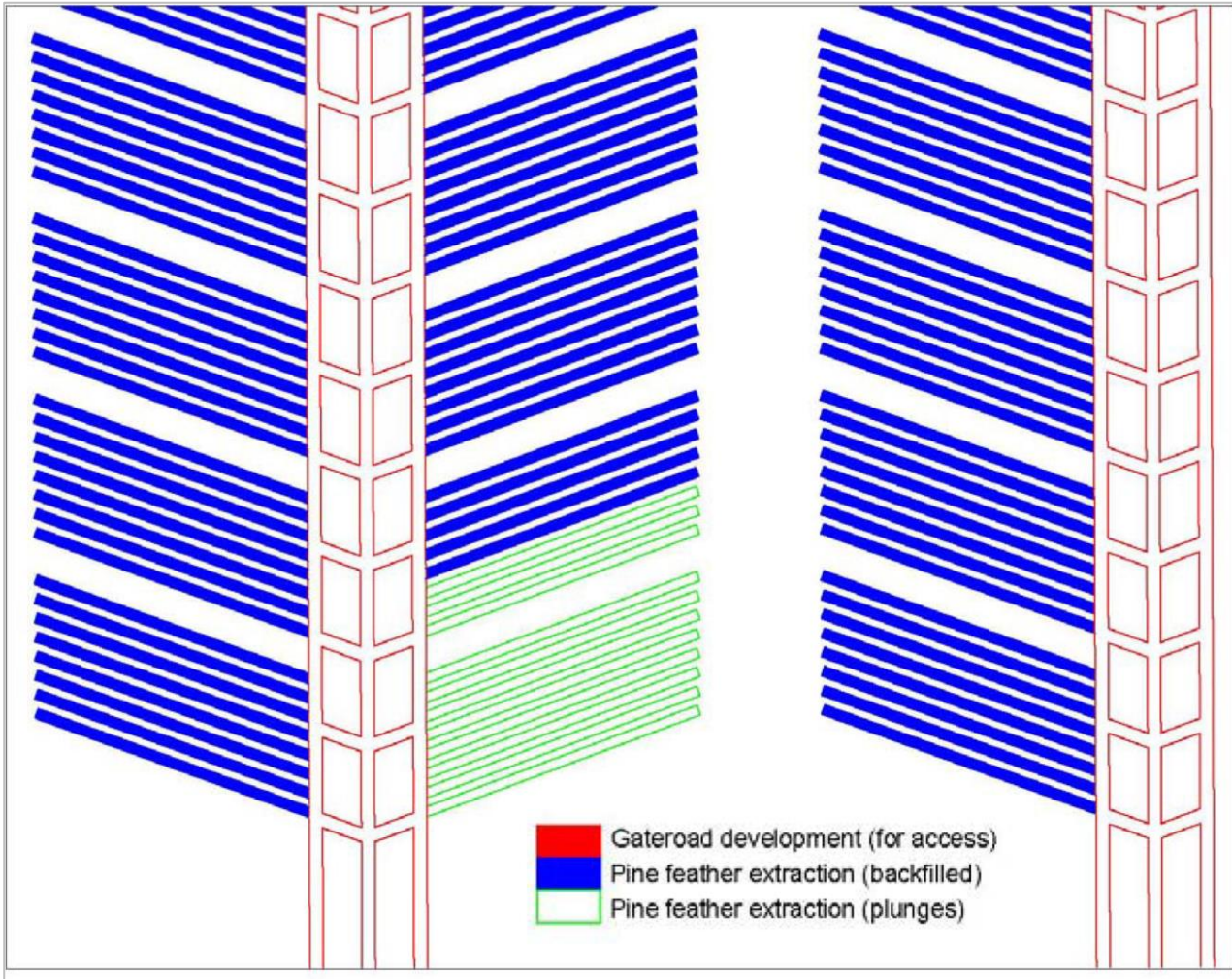
<sup>4</sup> NSW Coal Industry Profile Volume 1, 2014, p.49.

<sup>5</sup> Preliminary Environmental Assessment, EMM, July 2015, p. 11

<sup>6</sup> NSW Coal Industry Profile Volume 2, 2014, p.57

are left in place with the intention of providing stability to the overburden and negate subsidence. Additionally, this system is designed to minimise effects on groundwater as voids are to be filled with coal reject material and sealed with bulkheads in order to allow groundwater recovery.

**Figure 1: Pine Feather Mining System.**



Source: Preliminary Environmental Assessment by EMGA Mitchell McLennan.

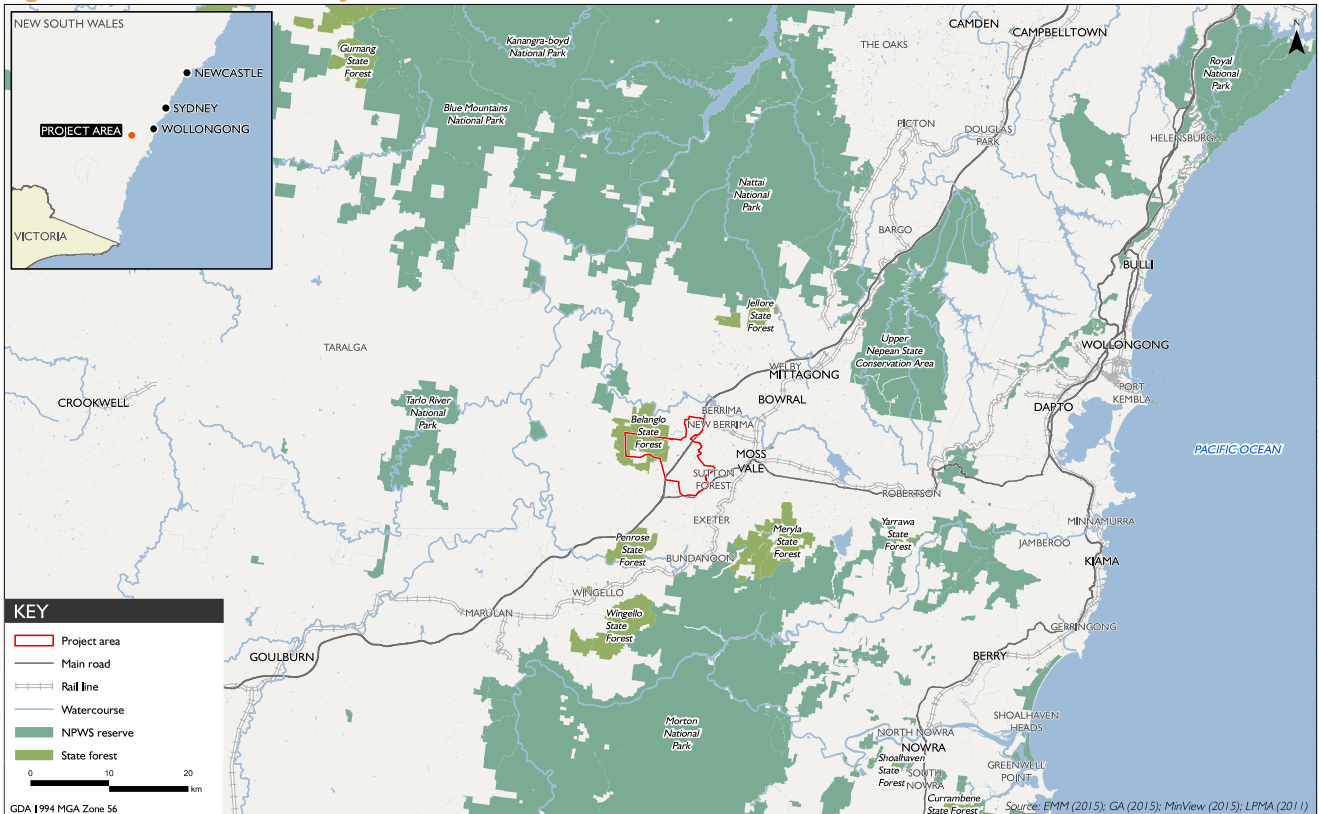
Produced coal is to be transported by rail to Port Kembla Coal Terminal in Wollongong for shipping to international or domestic markets. This will necessitate the construction of a rail connection from the Hume Coal project to the existing Berrima Branch Line. This 'Berrima Rail Project' will have its own development application, separate from the Hume Coal Project.



## Location

The proposed mine site is located about 130km south-west of Sydney close to the New South Wales town of Berrima. The project would cover an area of about 5,043 hectares of which around 1,243 hectares is owned by Hume Coal with most of the balance owned by NSW State Forests, Wingecaribee Shire Council and the Crown.<sup>7</sup> Hume Coal's total land ownership, including land adjacent to the project area, is about 1,760 hectares. The Hume Coal project was previously known as the Sutton Forest proposal.

Figure 2: Hume Coal Project Location.



Source: Preliminary Environmental Assessment by EMGA Mitchell McLennan

<sup>7</sup>Preliminary Environmental Assessment, EMM, July 2015, p. 13

## 2.0 Financial Review

Based on an expected three-year construction phase and 19-year mine life, we have assumed construction begins in 2018 with mining operations commencing in 2021. A product mix of 80% coking coal and 20% thermal coal has also been assumed, based on a similar product mix from South32's nearby Illawarra Metallurgical Coal project which also mines the Wongawilli Seam of the Southern Coalfield.

### 2.1 Capital Investment: An Initial A\$942m

IEEFA sees capital expenditure over the life of the project totalling A\$1.28bn including sustaining capital expenditure. IEEFA estimates A\$720m of initial capex which includes the associated Berrima Rail Project and a A\$72m capex contingency based on 10% of this figure. On top of this there is A\$80m for exploration and administration costs over the period 2016-2020, A\$40m for property purchases and a A\$30m rehabilitation bond to give A\$942m (US\$709m) total investment.

Over the life of the project a further A\$339m would be required for sustaining capital expenditure.

**Figure 3: Hume Coal Project Capital Expenditure.**

Capital Input	A\$m	A\$m	US\$m
Nominal Capex (2018-2021)	720		
including Coal Handling and Preparation plant			
including Berima Rail Project			
Capex contingency	10%	72	
Total assumed capex		792	
Exploration & admin expenses (2017-2021)		80	
Land acquisitions		40	
Rehabilitation bond		30	
<b>Total investment (2016-2021)</b>		<b>942</b>	<b>709</b>
Sustaining investment			
Annual stay in business capex (2016 real dollars)	15		
Total (2021-2039)		339	
<b>Total Capital Investment over Project Life</b>		<b>1,281</b>	<b>964</b>
Assumes a USD/AUD exchange rate of	0.753		

Source: IEEFA estimates.

## 2.2 Coal Price

In calculating an average sales price for the coal IEEFA has assumed a product split for coking coal and thermal coal of 80% and 20% respectively, based on the last three-year average mix reported by nearby Illawarra Metallurgical Coal output. Current prices of US\$60/t for thermal coal and US\$90/t for coking coal have been assumed to give a blended average price of US\$84/t or A\$112/t based on the product split and an USD/AUD exchange rate of 0.753.

This average price of A\$112/t has been indexed for inflation assumed at 2.5% per annum throughout the life of the project in our model.

**Figure 4: Hume Coal Project Forecast Sales Price (2016 dollars).**

Forecast coal price	A\$	US\$
Hard Coking Coal price US\$/t		90
Thermal coal price US\$/t		60
Expected Hume Coal output:		
Coking coal	80%	
Thermal coal	20%	
<b>Average sales price</b>	<b>112</b>	<b>84</b>
<i>Assumes a USD/AUD exchange rate of 0.753</i>		

Source: IEEFA estimates.

Figure 5 demonstrates that the coking coal price has dropped 70% from market highs of US\$300-325/t in 2011. Although there has been a recovery in price since May 2016 towards US\$100/t, prices are still a long way off those required to make a project such as Hume Coal profitable. We note Rio Tinto in August 2016 has followed BHP Billiton in significantly lowering its long term steel demand assumptions, and with that assuming lower global iron ore and coking coal demand.<sup>8</sup>

In IEEFA's view the Hume Coal project is not commercially viable at or anywhere near current coking coal prices and AUD/USD currency rates. The project would require a significant and sustained lift in prices and/or currency fall. IEEFA is not aware on any major financial house that is forecasting such a scenario. Goldman Sachs is forecasting real long term hard coking coal prices of US\$95/t (2015 real dollars) and PCI pricing of just US\$75/t (long-term real).<sup>9</sup> The Australian Government recently forecast a coking coal price of US\$91/t out to 2017-18 in its 2016-17 Budget.<sup>10</sup> Commonwealth Bank is forecasting the rise to US\$100/t in mid-2016 will be temporary and the coking coal price will average just US\$87/t in 2016.<sup>11</sup> IEEFA acknowledges that the project would approach break-even at Macquarie Bank's long-term hard coking coal price forecast of US\$105/t.<sup>12</sup>

IEEFA notes the long-term real price of coking coal averaged below US\$100/t for the two decades prior to 2010.

<sup>8</sup> <http://www.afr.com/business/mining/why-rio-tintos-new-boss-is-prepared-to-be-boring-20160805-gqmb1r>

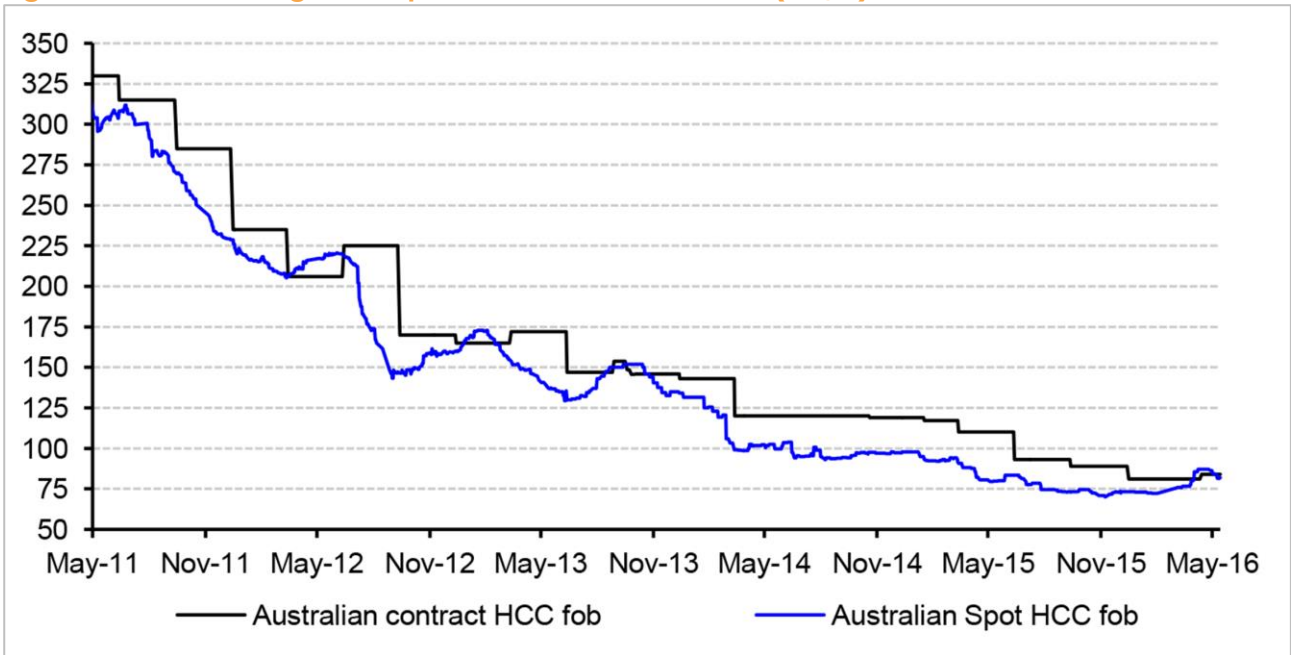
<sup>9</sup> Goldman Sachs 08 June 2016, Australia: Metals and Mining

<sup>10</sup> [http://budget.gov.au/2016-17/content/bp1/html/bp1\\_bs2.htm](http://budget.gov.au/2016-17/content/bp1/html/bp1_bs2.htm)

<sup>11</sup> <http://www.couriermail.com.au/business/surge-in-coal-prices-raises-hopes-of-lifting-the-industry-out-of-financial-crisis/news-story/c38cf9094e6ebcd206dd17d132c5b8bf>

<sup>12</sup> Macquarie Bank, Commodities Comment, 19 February 2016, p. 6

Figure 5: Hard Coking Coal Spot Price Versus Contract (US\$/t).



Source: Bloomberg Finance LP, CRU, Argus, Deutsche Bank.

Figure 6: Australian Thermal Coal FOB Newcastle/Port Kembla, US\$/t.



Source: Index Mundi<sup>13</sup>

<sup>13</sup> <http://www.indexmundi.com/commodities/?commodity=coal-australian&months=60>



## 2.3 Costs

In May 2015 BHP Billiton spun off South32 Ltd as a separately listed company. Coal mines within the Southern Coalfield were amongst the assets spun off. South32's financial results for the half year ended 31 December 2015 show that its Illawarra Metallurgical Coal project has achieved a significant reduction in its operating unit cost from US\$98/t to US\$62/t.<sup>14</sup> This translates to an AUD cash operating unit cost excluding royalties of A\$79/t representing an 18% decrease in the cash cost of production since FY2014. IEEFA has conservatively assumed that Hume Coal will be able to match this significant reduction in costs and achieve the same cash cost of A\$79/t as production starts in 2021.

This figure is based on IEEFA's estimated saleable coal pit top cost of A\$62/t plus coal processing and loading costs (A\$5/t), overheads (A\$3/t) plus combined rail and port charges (A\$10/t) to give a cash cost Free on Board of A\$79/t (2016 dollars), indexed for 2.5% annual inflation over the 19-year mine life – refer Annexure 4.

On top of this Hume Coal can expect to pay around A\$8/t in royalties based on an average real sales price of A\$112/t less expected processing and loading costs of A\$5/t. As an underground mine, Hume Coal will pay a royalty of 7.2% of the value of coal recovered.

In addition, the total cost/t includes depreciation of around A\$30/t based on A\$1.2bn of depreciable assets and 39Mt total saleable coal over the life of the mine.

Finally, adding financing cost of \$13/t gives a total cost of A\$130/t. The financing cost is based on assumed debt financing of A\$425m (assuming a conservative 50% debt: 50% equity ratio against the average capital employed of an estimated A\$850m) at an average interest rate of 6% pa across the 19-year life of the project.

**Figure 7: Hume Coal Project Costs/t.**

<b>Costs at start of production (2016)</b>	<b>A\$/t</b>	<b>A\$/t</b>
Pit top cost - Run of mine coal	48	
Yield	78%	
Pit top cost - saleable coal		62
Coal processing and loading		5
Overheads		3
FOR (Free on Rail)		69
Rail & port charges		10
Cash cost FOB Port Kembla		79
Royalties (7.2% @ A\$112/t)		8
Depreciation		30
		<b>117</b>
Financing cost		13
<b>Total cost (A\$/t)</b>		<b>130</b>

Source: IEEFA estimates.

With total costs conservatively estimated at A\$130/t and an average sale price of A\$112/t (both calculated as real 2016 dollars) it is clear that the Hume Coal project is forecast to lose money for every tonne of coal produced unless there is a sustained recovery in coking coal prices going forward. In light of this, there is little prospect of Federal government revenue being generated from corporate taxes at Hume Coal.

Given the A\$384m negative net present value of the project (refer Annexure 4), IEEFA sees the prospect of the proposal going ahead as a remote possibility. Despite being an integrated steel manufacturer, POSCO would be commercially better off if it sought alternatives to the Hume Coal project (see section 7.0).

<sup>14</sup> South32 Financial Results for the half year ended 31 December 2015, p. 22.

## 3.0 Employment... to Average 160 Jobs Over the Life of the Mine

According to Hume's Preliminary Environmental Assessment the workforce of the mine will number approximately 300 Full-time equivalents (FTE) during peak operations.<sup>15</sup> The mine's production is expected to peak at 3Mtpa but given the total saleable coal production is 39Mt over the 19 years of the mine's life, the average annual production is estimated at 2Mt. This suggests that Hume Coal's estimate of the workforce employed by the mine is to average around 200 FTE.

However, we have assumed that Hume Coal will be able to match the significant cost reductions that Illawarra Metallurgical Coal has achieved since FY2014. Replicating Illawarra's cost reductions of 18% will be dependent on reducing the employment costs suggesting that the actual average workforce of the mine over the life of the operation is likely to be around 20% lower at around 160 FTE.

As a result, even in the highly unlikely event that the Hume Coal project was to proceed, it will not be in a position to provide jobs to all the coal mine employees that have lost jobs elsewhere in the region in recent months. These job losses, which include 300 contractors and permanent staff let go across South32 mines in the Illawarra region<sup>16</sup> and the announced closure in June 2016 of Glencore's nearby Tahmoor coking coal mine which employs 350 people<sup>17</sup>, are a strong indication of the distressed state of the coalmining industry in the region. Within this context, the development of a greenfield coal mine in the area seems highly speculative, particularly as even existing coking coal projects are clearly financially challenged.

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<sup>15</sup> Preliminary Environmental Assessment, EMM, July 2015, p. 2

<sup>16</sup> <http://www.abc.net.au/news/2016-02-25/south32-cuts-300-jobs-in-illawarra-region/7198856>

<sup>17</sup> <http://www.smh.com.au/business/mining-and-resources/glencore-to-close-tahmoor-coal-mine-in-nsw-due-to-low-price-20160602-gp9rmp.html>

## 4.0 Development Paralysis

Although the Hume project is unlikely to proceed under current market conditions, the investment decision uncertainty still has negative financial effects for the local area. The unviable status of the proposal means that the possibility of increased jobs and investment is unlikely to emerge. In addition to this, the threat of a new coal mine development continues to hang over local property owners, creating uncertainty and depressing property prices. The uncertainty limits the opportunity for land and business owners to make their own development plans, such investments are likely to be put on hold until a certain outcome is reached.

Such uncertainty is one of the results of the NSW Department of Planning's tendency to approve new coal mines regardless of the financial viability of the projects and/or their proponents. The NSW Government seems to see no downside to this approach as in the worst case the development does not proceed whereas in the best case the government will collect mining royalties averaging an estimated A\$22m pa and generate some 160 jobs on average. However, this does not take into account the local effects that a new mining proposal can have on the financial status and decision-making of communities, small businesses and individuals.

An example of the uncertainty that ongoing coal mining proposals cause can be found at the Cobbora Coal project south of Dunedoo in central NSW. With a coal mine development hanging over the community for the last decade, up to 90 properties have been progressively acquired by the NSW State government, with many families moving away from the area.<sup>18</sup> The NSW government decided not to develop the project in 2013 as the value of the land to farming proved to be greater than any offers made to develop the mine. The land acquired from local landowners a decade ago for the project will now be sold off at a significant overall opportunity cost to the community and erosion of farmland value.

The NSW government appears to approve coal mines on the assumption that mining is the most profitable use of the land. This makes little sense in the current depressed coal market and it will be increasingly important for the Department of Planning to move away from an approvals mentality and towards a review mentality when considering new coal projects.

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<sup>18</sup> <http://www.abc.net.au/news/2015-11-20/nsw-govt-to-sell-cobbora-coal-mine/6956274>

## 5.0 Environmental Issues

The Southern Highlands provides a rural and semi-rural setting for the project with land uses dominated by agriculture, natural areas including national parks, forestry, industry, towns and villages. The area is a popular tourist destination in part due to much of the area's rural and natural setting and its location close to Sydney, Wollongong and Canberra.

The Hume Coal project's biggest potential environmental impact is the mine's effect on groundwater in the area. Large volumes of groundwater could flow into the mine as coal is removed with subsequent effects on the local water table. This has the potential to impact agricultural and other users of groundwater. Hume Coal claims that the design of its mining operations take this into account (see section 1.0). Community action groups are campaigning against the proposed mine based, to a large extent, on the potential groundwater impacts.

One such group commissioned a groundwater study by Pells Consulting and Hydroilex Pty Ltd which concluded that inflow of groundwater into the mine would reach 13 gigalitres per annum in its base-case scenario.<sup>19</sup> Hume Coal has produced its own groundwater model which predicts that groundwater inflow rates to the mine would peak at just 3.2 gigalitres per annum.<sup>20</sup> If the project does impact water availability to other users then Hume Coal will be liable to provide equivalent water which could have very significant financial consequences for the project.

Other potential impacts of the mine include coal dust from coal stockpiles reaching local settlements and water bodies and an increase in the number of coal trains passing through the Southern Highlands on their way to Port Kembla which could potentially impact the area's popularity as a tourist destination. In addition, the Preliminary Environmental Assessment for the project notes the presence within the project area of a number of animal and plant species listed under NSW Threatened Species Conservation Act. Two species are also listed as vulnerable under the Commonwealth Environmental Protection and Biodiversity Conservation Act.

Hume Coal submitted the Preliminary Environmental Assessment to the NSW Department of Planning and Environment in 2015 and received Secretary's Environmental Assessment Requirements (SEARs) later that year. An Environmental Impact Statement (EIS), commissioned by Hume Coal, is currently being prepared which will respond to the SEARs. The EIS is expected to be submitted later in 2016.

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<sup>19</sup> Groundwater Study 2014 - Hume Project: Sutton Forest Coal Exploration Licence EL 349, p. 1.

<sup>20</sup> Preliminary Environmental Assessment, EMM, July 2015, p. 57.

# 6.0 Hume Coal Mine: Key Risks

## 1. Coal Price

IEEFA has estimated an average price of A\$112/t indexed for inflation throughout the life of the project. Any downward pressure on coking coal prices going forward further decreases the viability of the Hume Coal project compared to obtaining supply from an alternative source at the reduced price.

## 2. Currency

Given that the project generates coal revenues in US Dollars, Hume Coal is exposed to a negative currency risk if the Australian Dollar strengthens against the US Dollar, thus reducing the A\$ price received for its produced coal (and a positive variance if the A\$ depreciates). This report assumes a constant A\$ exchange rate holding at US\$0.753.

## 3. Costs

Opportunities for the project to become more viable by reducing costs seem very limited given the operating unit cost is based on that of Illawarra Metallurgical Coal which has succeeded in reducing its cash cost of production by 18% since FY2014. There is a real risk that our assumption for Hume Coal to be cost competitive with Illawarra Metallurgical Coal is unachievable, given Hume Coal's proposed implementation of the pine feather mining technique (with its recovery rate of just 35% of the coal deposit) precludes the realisation of economies of scale derived from the use of large scale longwall mining. Hume Coal's 2Mtpa is also significantly smaller scale than Illawarra's 7-8Mtpa; everything else being equal this would see higher unit production costs. In addition, the backfilling of the underground voids with coal waste will also add significant additional mining costs.

## 4. Water

Hume Coal is liable to compensate other water users if aquifer depths drop by more than 2m due to mining operations under the NSW Aquifer Interference Policy.<sup>21</sup> This policy requires that third party water users are provided with equivalent water supply through means such as deepening existing bores, constructing new bores or providing water by other means. This may cause considerable ongoing expense to Hume Coal.

## 5. Rail Risks

The railway lines used to transport Hume coal to Port Kembla are shared with passenger services and also cross roads at several points. As a result, there are restrictions on when coal can be transported; coals trains cannot operate during peak passenger hours or at night. As a consequence, there is the risk of rail bottlenecks developing which restrict the transport of Hume's coal to Port Kembla.

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<sup>21</sup> NSW Aquifer Interference Policy Factsheet (2013), Department of Primary Industries, NSW Government.



## 6. Community and Legal Opposition

A number of community organizations are campaigning against the proposed mine development. In a political and economic climate where the value of new coal mines is increasingly being questioned by local campaign groups, such community organizations have the potential to cause continued delays to project progress through planning or legal challenges or to generate bad publicity for the project. Earlier this year five families won a court appeal to stop Hume Coal accessing their land for the purposes of exploration drilling, reversing a previous court decision that allowed Hume Coal prospecting rights over their properties.<sup>22</sup>

## 7. Operational Risk

Notwithstanding minority interests in joint venture projects, POSCO has not itself developed any greenfield coal mines to our knowledge. As such POSCO's lack of hands-on operational expertise elevate the operational, and therefore, financial risks of the project.

## 8. Pine Feather Mining System

The pine feather system proposed by Hume Coal has never been used in Australia before. As such, there is a risk that inexperience with the technique will inhibit Hume's ability to extract 50 Mt ROM (and just 39Mt of product coal) from 115 Mt indicated reserves as planned without incurring considerably higher mining extraction costs. In addition, the pine feather system's ability to limit groundwater impacts is untested.

## 9. Carbon Price

South Korea imposed a tax on coal imports in 2014 with tax increases in 2015 and again in 2016. Although this tax applies to thermal coal only, it is an example of the increasing trend worldwide of carbon price implementation. Similarly, a carbon cap-and-trade system was introduced in Korea in January 2015.<sup>23</sup> In 2010 India introduced a US\$/t coal tax applying to both imported and domestic coal. This was doubled in 2014<sup>24</sup> and then doubled again in 2016 to now sit at US\$4/t.<sup>25</sup> Turkey in July 2016 also implemented a tax on imported thermal coal sourced from outside the EU.<sup>26</sup> In the second half of 2017, China is expected to launch its national ETS,<sup>27</sup> and this follows Canada's move to implement a national ETS by the end of 2016.<sup>28</sup> Such developments are likely to become increasingly common going forward with the possibility of extensions to cover coking coal.

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<sup>22</sup> <http://www.abc.net.au/news/2016-05-10/southern-highlands-families-win-appeal-against-hume-coal/7402054>

<sup>23</sup> <http://thinkprogress.org/climate/2015/01/12/3610553/south-korea-cap-and-trade/>

<sup>24</sup> <http://cleantechnica.com/2014/07/20/india-doubles-tax-coal-fund-clean-energy-environmental-projects/>

<sup>25</sup> <http://www.climatechangenews.com/2016/02/29/india-to-double-coal-tax-under-2016-17-budget/>

<sup>26</sup> <http://www.argusmedia.com/news/article/?id=1286565>

<sup>27</sup> <http://carbon-pulse.com/17057/>

<sup>28</sup> <http://www.bloomberg.com/news/articles/2016-07-15/canada-to-introduce-national-carbon-price-in-2016-minister-says>

## 7.0 Alternatives to the Project

Across Australia, Peabody Energy, Vale SA, Anglo American, Rio Tinto, BHP Billiton, KORES, Glencore, Mitsui, Mitsubishi and Whitehaven Coal have all recently and / or are looking to sell down coal mining assets. Buyers are almost entirely absent other than vulture funds offering to pay little more than \$1 per mine.<sup>29, 30</sup>

An option for POSCO is to purchase one of the many distressed coal mines that are increasingly available on the market.

### BHP Bids Just US\$1bn for 10Mtpa Coking Coal Capacity

Anglo American is looking to sell off two of its coking coal projects in the Bowen Basin. In July 2016 it was reported that both BHP Billiton Mitsubishi Alliance and a private equity firm are amongst those that are showing a close interest.<sup>31</sup> BHP is reported to have tabled a cash bid of US\$1bn for Anglo's Moranbah North and Grosvenor projects which will have a total combined output of more than 10Mtpa of coking coal. This compares very favourably to the total investment of A\$1.2bn POSCO is considering making in Hume Coal for an output of up to 3Mtpa.

Figure 8 below demonstrates this comparison. The Grosvenor and Moranbah North mines have combined annual production of 10.9Mtpa, however Moranbah North is only 88% held by Anglo American therefore total annual production available for sale is 10.2Mtpa (equity share) compared to Hume's average output of around 2 Mtpa. At an investment of A\$942m Hume's annual output costs A\$471m per Mt, over three and a half times higher than the price per Mt for the purchases of Grosvenor and Moranbah North.

**Figure 8: Comparing Investment in Hume to the Purchase of Anglo American Available for Sale Coking Coal Mines.**

Comparison: Hume versus mine purchase		Annual Production Mtpa	Investment/ purchase		Price per Mtpa A\$m
			A\$m	US\$m	
Hume	2 Mtpa 100% owned by POSCO	2.0	942.0		471.0
Grosvenor Mine	5 Mtpa 100% owned by Anglo American	5.0			
Moranbah North	5.9 Mtpa 80% owned by Anglo American	5.2			
		10.2	1,328.9	1,000.0	130.3
Assumes a USD/AUD exchange rate of		0.753			

Source IEEFA estimates.

<sup>29</sup> <http://www.abc.net.au/news/2016-07-12/rio-tinto-selling-massive-queensland-coal-mine-for-dollar/7588916>

<sup>30</sup> <http://www.smh.com.au/business/mining-and-resources/aussie-coal-mine-isaac-plains-snapped-up-for-bargain-basement-price-just-1-20150730-ginsy8.html>

<sup>31</sup> <http://www.afr.com/street-talk/anglo-american-shaves-qld-coal-valuations-as-sale-nears-20160728-gqfln3>

## Glencore Closes Tahmoor

In June 2016 Glencore announced the closure of its Tahmoor mine in the Southern Highlands. This underground mine, which has been in operation since 1979, produced 2.1Mt of coking coal last year<sup>32</sup> which closely matches the expected average 2Mtpa output of the Hume proposal. If POSCO were genuinely committed to sourcing coking coal out of the Southern Highlands it would make far more financial sense to make an offer for Tahmoor than to begin a new greenfield development at Hume.

POSCO is a vertically integrated steel manufacturer however the current low price of coal, and the likelihood of it remaining low in the future, is still a relevant consideration for the company. At current prices POSCO would be commercially better off obtaining coking coal from an alternative source via a long-term supply agreement that locks in a price, rather than proceeding with the development of a new mine and rail link. This is particularly true given the community and legal opposition the Hume project will face.

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<sup>32</sup> <http://www.smh.com.au/business/mining-and-resources/glencore-to-close-tahmoor-coal-mine-in-nsw-due-to-low-price-20160602-gp9rmp.html>

## 8.0 Coal Mining – Wealth Destruction

IEEFA calculates that the Hume Coal project proposal would generate a negative net present value at anywhere near current or projected coal prices. As such, this proposal is unlikely to be approved for development by POSCO. It would be commercially sensible to acquire an existing producing coking coal mine at a fraction of its historic development cost and avoid the financial, legal and reputational risks of continuing to pursue this proposal.

The share market provides a barometer of the financial risks of investing in coal mining. In the last five years, the remaining listed pure play coal mining companies in Australia have seen their equity capitalisation eroded 70-99%, an enormous shareholder wealth destruction.

As per Figure 9, Whitehaven Coal Ltd's (WHC, blue) share price is down 71% in the last five years. New Hope Corporation (NHC, green) is down 68% and Yancoal Australia (YAL, brown) is down more than 90% in the same time frame. Hume Coal's proposed neighbour Wollongong Coal Ltd (WLC, light green) is down 95%, having closed its only two underground coking coal mines at Wongawilli and Russell Vale over the last two years due to operational problems and financial distress.<sup>33</sup>

Against this, the overall Australian equity market has risen by 35% (ASX All Ords, red), such that the opportunity cost of investing in coal in the last five years has been extreme.

**Figure 9: Australian Listed Coal Companies Destroy Shareholder Wealth.**



Source: Yahoo Finance

<sup>33</sup> <http://ieefa.org/wollongong-coal-stranded-asset/>

## 9.0 Conclusion

IEEFA concludes that with total costs estimated at A\$130/t (including interest) and a product value of A\$112/t, this project would lose money with every tonne of coal produced. Without a sustained recovery in coking coal prices and/or a collapse in the A\$/US\$ currency rate the Hume project will not be profitable and therefore has a remote chance of proceeding. The project's proposed pine feather extraction system, partly a response to environmental concerns such as subsidence<sup>34</sup> and water availability, is new to Australia which may cause unexpected production issues and, in addition, the system's ability to prevent high volumes of groundwater inflow is untested. A significant additional cost for providing an equivalent water supply could be the result.

Although POSCO is a vertically integrated steel producer, current low prices for coking coal remain relevant as the company has the option of purchasing coking coal from an alternative source. Additionally, coking coal mines are available for sale in this country at a price likely to be significantly lower than the expected investment in Hume, and with greater production capacity. In light of the options available, and the current and expected future state of the coal market, IEEFA sees little chance that the Hume Coal project will move forward to development.

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<sup>34</sup><http://www.abc.net.au/news/2016-08-02/ipswich-sinkhole-swallows-backyard-west-of-brisbane/7682332>



# Annexure I

## NSW Coal Industry Profile – Hume Project

<b>HUME PROJECT</b>		<b>S4</b>
<b>Lease numbers</b>	A 349	
<b>Operating company</b>	Hume Coal Pty Limited	
<b>Locality</b>	10 km west of Moss Vale	
<b>Major shareholders</b>	POSCO Australia Pty Ltd 100%	
<b>Major seams present and working thickness (m)</b>	Wongawilli 2–4	
<b>Seams currently mined</b>		
<b>Resources (Mt)</b>		
Measured		
Indicated	115.00	
Inferred		
<b>Total</b>	115.00	
<b>Transport</b>	70 km by rail to Port Kembla.	
<b>Proposed mining method</b>	Underground	
<b>Remarks</b>	Previously known as Sutton Forrest proposal.	
<b>Product specifications</b>		
Moisture %	(ad)	2.3
	(ar)	8.0
Ash %	(ad)	11.0
VM %	(ad)	34.3
TS %	(ad)	0.59
SE	(kcal/kg)	
	(Mj/kg) daf	30.7
CSN		7.0
AFT (°C)	Deform	1 600
	Flow	1 600
HGI		57
Gray–King		G1
Phosphorus %	(ad)	
Max.Fluid.	(ddm)	850

Source: NSW Coal Industry Profile 2014 vol. 2, Department of Industry, Resources and Energy, NSW Government.

## Annexure 2

### Strategic Change in Direction by the South Korean Government

After a previous strategy of significant leveraged expansion by state owned enterprises into overseas resource and energy sector projects, the South Korean government in June 2016 took a major change in direction after significant losses in overseas projects of government owned operations.

A recent press release from South Korea's Ministry of Strategy and Finance announced, among other measures, the downsizing of the Korea Coal Corporation (KOCOAL), that KEPCO (Korea Electrical Power Corporation) is to cease developing overseas power generation resources and sell of its interests in nine mines, and increases in new energy investment by public enterprises. It was also announced that Korea Resources Corp (KORES, owner of the Wallarah 2 coal mine proposed on the NSW Central Coast)<sup>35</sup> will withdraw from overseas resource project development due to excess financial leverage and project losses. In addition, energy markets are to be opened up to the private sector with private companies to be allowed to join the electricity retail market currently dominated by KEPCO.<sup>36</sup>

The South Korean government has also instituted a coal tax on thermal coal beginning in 2014 and with tax increases in both 2015 and 2016. This was followed by the launching in 2015 of the world's second largest carbon market, a cap-and-trade system that limits the emissions of the 525 largest companies in South Korea.<sup>37</sup> The government also recently announced that ten ageing coal-fired power plants would shut by 2025 and that the country was aiming for US\$37bn in renewable energy investment by 2020.<sup>38</sup>

Although POSCO is no longer a state run company, a shift away from vertical integration and inefficient overseas projects by the Korean government is an interesting strategy shift that may influence the direction of a vertically integrated company such as POSCO seeking to develop greenfield resources projects overseas.

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<sup>35</sup> <http://www.smh.com.au/nsw/wallarah-2-800m-coal-mine-back-in-play-in-ultramarginal-dobell-20160510-gos522.html>

<sup>36</sup> <http://english.mosf.go.kr/eco/view.do?bcd=E0001&vbcd=N0001&seq=4092&bPage=1>

<sup>37</sup> <http://thinkprogress.org/climate/2015/01/12/3610553/south-korea-cap-and-trade/>

<sup>38</sup> <http://www.reuters.com/article/us-southkorea-coal-idUSKCN0ZM06A>

# Annexure 3

## Background Information: POSCO and its Australian Operations

POSCO, formerly known as Pohang Iron and Steel Company, is one of the world's largest steel-makers and is headquartered in Pohang, South Korea. The company's crude steel production totalled 42 million tonnes in 2015.<sup>39</sup> POSCO's Pohang and Gwangyang Steel Works are the largest single steel mills in the world.<sup>40</sup> In addition to steel making, POSCO also operates trading, construction, energy and chemicals units. POSCO was privatised in 1998 and currently more than 50% of POSCO shares are foreign-owned.<sup>41</sup> As a multi-national company, POSCO has operations across Europe, North and South America, Asia and Australia.

POSCO Australia, POSCO's fully owned Australian subsidiary, and its controlled entities had net assets of A\$555m as at 31 December 2014 and reported a loss of A\$12m for that year.<sup>42</sup> POSCO Australia holds investments in mining ventures including Hume Coal via its subsidiary Hume Coal Pty Ltd. In addition, POSCO Australia trades in steel products and metal commodities.

Mining ventures entered into by POSCO Australia include:

- The Mount Thorley open cut coal mine which produced 11.9Mt of semi-soft coking coal and thermal coal in 2014.<sup>43</sup> POSCO owns a 20% participating interest.
- The Ravensworth Underground Mine Joint Venture, a coal mine in the Hunter Valley of NSW where production was suspended in 2014.<sup>44</sup> POSCO owns a 10% interest.
- Carborough Downs mine in Queensland produces hard and semi hard coking coal and PCI. It is majority owned and operated by Vale who are reportedly considering selling their interest in the project.<sup>45</sup> POSCO owns a 5% minority stake.
- The Integra underground coal mine in the Hunter Valley was placed in care and maintenance in 2014 before being sold by the joint venture partners along with the amalgamated Camberwell open cut coal mine to Glencore and Bloomfield in 2015.<sup>46</sup> POSCO held a 2.35% interest in Integra and an 8.39% stake in Camberwell Coal.
- The Posmac Joint Venture is majority-owned by BHP Billiton and operates the Mincing Area C iron ore mine in the Pilbara, Western Australia. POSCO owns a 20% participating interest.

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<sup>39</sup> POSCO Annual Report 2015, p. 9.

<sup>40</sup> POSCO Annual Report 2015, p. 29.

<sup>41</sup> <https://www.posco.co.kr/homepage/docs/eng3/html/invest/stock/s91b4010164c.jsp>

<sup>42</sup> POSCO Australia Pty Ltd Financial Report 31 December 2014, pp. 5-6.

<sup>43</sup> <http://www.riotinto.com/australia/rtca/mount-thorley-warkworth-10427.aspx>

<sup>44</sup> <http://www.ravensworthoperations.com.au/EN/RavensworthUndergroundMine/Pages/default.aspx>

<sup>45</sup> <http://www.smh.com.au/business/mining-and-resources/coal-20160308-gne24l.html>

<sup>46</sup> <http://www.theaustralian.com.au/business/mining-energy/glencore-bloomfield-group-buys-vales-integra-coal-operation-in-nsw/news-story/58d1c571710c2c9f65e257e4febd7367>

# Annexure 4

## Hume Coal Financial Model – Key Assumptions

Pricing		
Coking Coal	US\$/t	90
Thermal Coal	US\$/t	60
Coking coal split	%	80%
Thermal coal split	%	20%
Blended Coal Price	US\$/t	84
Forex - USD to AUD		0.753
Blended Coal Price	A\$/t	112
Price escalation	%	2.5%
Capital cost		
Total Capital cost (2017-2021)	A\$m	942
Stay-in business capex	A\$m pa	15
Construction starts	Year	2018
Mining Assumptions		
Life of mine	Years	19
Commercial production start	Year	2021
Coal Production	Mt ROM	50
Average production	Mtpa ROM	2.63
Peak production	Mtpa ROM	3.40
Yield	%	78%
Coal Sales	Mt Product	39
Average production	Mtpa Product	2.05
Peak production	Mtpa Product	3.00
Production Cost Assumptions		
Pit top coal cost	A\$/t ROM	48.00
Yield from ROM to Product coal	%	78%
Pit top coal cost	A\$/t Product	61.54
Coal Prep & Handling	A\$/t Product	4.60
Overhead	A\$/t Product	3.00
Rail & Port charges	A\$/t Product	10.00
Product cost (FOB)	A\$/t Product	79.14
Cost escalation	%	2.5%
Royalties, Tax & Debt		
Royalty rate	%	7.2%
Royalty charge	A\$/t Product	7.71
Debt : equity funding	%	50.0%
Interest rate	%	6.0%
Average capital employed	A\$m	850
Net Debt - Average	A\$m	425
Interest expense	A\$m pa	25.5
Corporate tax rate	%	30.0%

\* Note: all per tonne prices and costs are 2016 values and then indexed at CPI

# Hume Coal Financial Model – Model of Cash Flows

All figures are nominal																								
Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	
Capital costs	A\$m	138	115	293	321	75																		
Sustaining capex	A\$m																							
Saleable yield	78%																							
ROM Production	Mt					0.5	1.0	1.8	2.5	3.2	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	2.9	2.3	1.3	0.6	
Saleable Coal	Mt					0.4	0.8	1.4	2.0	2.5	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.3	1.8	1.0	0.4	
Coal to stockpile	Mt					0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	
Coal Stockpile	Mt					0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.0	
<b>Net saleable Coal</b>	<b>Mt</b>	<b>0.2</b>	<b>0.7</b>	<b>1.4</b>	<b>2.0</b>	<b>2.5</b>	<b>2.7</b>	<b>2.7</b>	<b>2.7</b>	<b>2.7</b>	<b>2.7</b>	<b>2.7</b>	<b>2.7</b>	<b>2.7</b>	<b>2.7</b>	<b>2.7</b>	<b>2.7</b>	<b>2.7</b>	<b>2.7</b>	<b>2.3</b>	<b>1.8</b>	<b>1.0</b>	<b>0.7</b>	

Average Product Coal Mt 2.05

Unit price and costs																																
	A\$/t																															
Price	A\$/t	123	126	129	133	136	139	143	146	150	154	158	162	166	170	174	178	183	187	192												
Product Cost of mining	A\$/t	68	70	71	73	75	77	79	81	83	85	87	89	91	94	96	98	101	103	106												
CHPP cost	A\$/t	5	5	5	5	6	6	6	6	6	6	6	6	7	7	7	7	7	8	8												
Overheads	A\$/t	3	3	3	4	4	4	4	4	4	4	4	4	4	4	5	5	5	5	5												
FOR (Free on Rail)	A\$/t	76	78	80	82	84	86	89	91	93	95	98	100	103	105	108	111	113	116	119												
Rail & port charges	A\$/t	11	11	12	12	12	12	13	13	13	14	14	14	15	15	16	16	16	17	17												
<b>FOB Pt Kembla</b>	<b>A\$/t</b>	<b>87</b>	<b>90</b>	<b>92</b>	<b>94</b>	<b>96</b>	<b>99</b>	<b>101</b>	<b>104</b>	<b>106</b>	<b>109</b>	<b>112</b>	<b>115</b>	<b>117</b>	<b>120</b>	<b>123</b>	<b>127</b>	<b>130</b>	<b>133</b>	<b>136</b>												

Revenue	A\$m	23	86	177	259	339	370	379	388	398	408	418	429	439	450	462	404	328	190	140												
Royalty	A\$m	-2	-6	-12	-18	-23	-26	-26	-27	-27	-28	-29	-30	-30	-31	-32	-28	-23	-13	-10												
Gross cash cost (FOB)	A\$m	-17	-61	-125	-183	-241	-262	-269	-275	-282	-289	-297	-304	-312	-319	-327	-286	-233	-135	-99												
EBITDA	A\$m	5	19	39	57	75	82	84	86	88	91	93	95	98	100	103	90	73	42	31												
Depreciation	A\$m	-16	-35	-87	-171	-157	-127	-99	-77	-62	-50	-42	-36	-32	-29	-27	-26	-26	-25	-22												
<b>EBIT</b>	<b>A\$m</b>	<b>-11</b>	<b>-16</b>	<b>-48</b>	<b>-114</b>	<b>-82</b>	<b>-45</b>	<b>9</b>	<b>27</b>	<b>40</b>	<b>51</b>	<b>59</b>	<b>65</b>	<b>71</b>	<b>75</b>	<b>63</b>	<b>47</b>	<b>17</b>	<b>9</b>													

Net Cashflow before funding																																		
Capital cost	A\$m	-138	-115	-293	-321	-75	-17	-17	-18	-18	-19	-20	-20	-21	-21	-22	-22	-23	-24	-25	-11	0												
EBITDA	A\$m	5	19	39	57	75	82	84	86	88	91	93	95	98	100	103	90	73	42	31														
Net cashflow pre interest	A\$m	-138	-115	-293	-321	-70	2	22	40	57	63	65	67	68	70	72	73	75	77	79	66	48	32	31										

**Net Present Value** A\$m **-384**  
**Discount rate (WACC, pretax)** 7.0%



# Institute for Energy Economics and Financial Analysis

The Institute for Energy Economics and Financial Analysis (IEEFA) conducts research and analyses on financial and economic issues related to energy and the environment. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy and to reduce dependence on coal and other non-renewable energy resources.

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