# Hume Coal Update 2017

## Superior Alternatives Are Available

Institute for Energy Economics and Financial Analysis
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# Executive Summary

***"While mapping plans to build a nuclear-free, coal-free nation, the government will set up environmentally friendly energy policies. There will be many difficulties. But it is a road we must take" – Moon Jae-in, President of South Korea, June 2017***

Hume Coal, a subsidiary of South Korea's largest steel maker POSCO is seeking approval to develop an underground coking and thermal coal mine in the Southern Highlands of New South Wales. The latest Environmental Impact Statement (EIS) approval process is occurring at a time of significant energy policy change in South Korea.

IEEFA has modelled the cash flows of the proposal based on information and data disclosed publically in the Hume Coal EIS and accompanying economic study by consultant BAEconomics. We highlight the key findings of our review of the proposal as follows:

- **Negative Net Present Value:** IEEFA's modelling, based on publicly disclosed information in the project EIS and economic study shows that the project has a negative net present value (NPV) of -A$344m despite highly conservative capex assumptions. Under these circumstance it is difficult to accept that the proposed project will go ahead. Additionally, with no profits to tax, the proposal's economic contribution as laid out in the economic study seems highly questionable. The assumption of zero debt funding in the economic study also seems an improbable scenario to IEEFA. More likely, debt funding will result in interest deductions and lower taxable profits (if any).

- **Lower quality coking coal:** The proposal is expected to produce around 54% coking coal but not the higher-quality hard coking coal produced at other mining operations in the Southern Coalfield. Instead, lower quality semi-hard coking coal will be produced which will attract a lower price and further erodes the financial viability of the proposal. Coking coal has been forecast to see further price declines as world production ramps up, along with the prospect of demand declines in China.

- **High percentage of thermal coal:** Of major significance to the viability of the Hume Coal proposal is the fact that the project would produce a high percentage of lower quality, high ash thermal coal. IEEFA now understands that around 46% of product coal will be thermal coal, a much higher percentage than we had assumed in our previous report on the Hume Coal project published in August 2016.

  The product split of the proposal exposes Hume Coal to the long-term decline in global thermal coal markets. In addition, the coking coal market is likely to see increased headwinds in the future as alternative technologies are developed. One such technology has already been commercially proven by POSCO itself.

- **POSCO's FINEX technology:** The FINEX process is considered by POSCO to be the first commercially proven alternative to the blast furnace method and has lower production costs and emissions. POSCO's planned expansion of the FINEX process, which uses non-coking coal for steel making, further undermines the strategic need for the company to initiate a new coking coal project at this time.

- **Post-approval operational changes:** The pine feather mining technique limits the coal recovery rate to around 35% with significant impact on the proposal's financial viability in terms of capital cost and hence the resulting negative NPV. The possibility of Hume Coal seeking post-approval changes to the mine plan to allow a more commercially viable recovery rate would undoubtedly result in even more local concern over water impacts. With the increasing importance of social licence to operate mining ventures, any attempt to move away from an approved mine plan is likely to open the proposal to further controversy, delay, complication and financial risk.

- **Trading houses exiting Australian coal investments:** A current trend being seen in the Australian coal market is Japanese trading houses exiting their Australian coal investments. Like South Korea, Japan is a major destination for Australian coal exports and Japanese engineering conglomerates have previously seen strategic integration logic in owning or part-owning Australian coal mines but this has now reversed in the face of growing environmental and reputational concerns, plus financial losses.

- **Energy Policy Changes in South Korea:** This trend is echoed by recent events in South Korea where the newly elected President has shown strong policy reform to permanently lower Korea's reliance on imported coal amid increasing concerns about emissions and pollution. Investment in a high cost, greenfield mine that produces such a high percentage of thermal coal appears to be in conflict with this policy change. Whilst the proposal may have seemed financially attractive at the beginning of the development process when coal prices were significantly higher, the energy markets of South Korea and the world are changing rapidly. This coal project proposal seems to have been left behind in a similar way to those of Adani and GVK in the Galilee Basin, Shenhua's Watermark and Lanco Infratech's now insolvent WA Griffin coal project.

- **Existing coking coal mines are available to acquire:** Given the financial risks and cost associated with the development of a greenfield mine project, it would seem prudent for POSCO to consider the alternative to developing the greenfield Hume proposal: the purchase of an existing, operating coking coal mine. As a way to bypass strong community opposition and impossible-to-quantify water risks of the Hume proposal, this alternative is also likely to prove to be faster, simpler and better financial value.

  Obvious targets for acquisition include Glencore's Tahmoor operation and Peabody's Metropolitan mine. Both of these operations are located within the Southern Coalfield of NSW and have a similar level of output as the Hume Coal proposal. In addition, as producers of hard coking coal with relatively little thermal coal, both produce a higher quality product for a significantly smaller investment than is required to develop Hume.

  With additional coking coal operations also available in Queensland, acquisition appears to be a shrewder path forward than a new development.

IEEFA's analysis, using figures taken from Hume Coal disclosures and the economic study that accompanied the EIS, suggests that the project is held back by numerous factors that lead to a negative net present value for the proposal. On a financial basis, the proposed project should not proceed.

# Introduction

Hume Coal Pty Limited (Hume Coal), a wholly owned subsidiary of South Korea's largest 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 the fifth largest steel maker globally[1] and 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[2]. Following Cockatoo Coal's own financial distress and eventual demise, POSCO Australia then acquired Cockatoo Coal's 30% stake in 2013 for A$9.7m cash[3] making it the sole owner of the project[4].

POSCO's profitability 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 V). There was no mention of the Hume Coal project in POSCO's 2016 Financial Results presentation nor its 1Q 2017 results presentation, suggesting that the project is not material to POSCO's South Korean management or shareholders.

In financial year (FY) 2016, POSCO saw a recovery in its operating profit to KRW2.84 trillion (US$2.5bn), up 18% on the prior year, driven by the core steel-making business[5]. Net profit rose to KRW1.04 trillion (US$929m), up from a loss of KRW96 billion (-US$86m) in 2015.

## The Hume Project

The project is situated within the Southern Coalfield of New South Wales (Refer Annexure I), one of the main sources of coking coal in the state[6]. Despite this, the proposed project will extract a significant amount of thermal coal from the Wongawilli Seam. The product split is expected to be 54% semi-hard coking coal and 46% lower quality thermal. Run-of-mine (ROM) coal will be washed in order for it to meet market specifications for export coking coal[7]. Product specifications for the Hume project can be found in Annexure II. Hume Coal have stated that 50.5 million tonnes (Mt) of ROM coal is recoverable from the 115Mt indicated[8] from which 40 Mt of saleable product coal will be produced.

Hume Coal envisage a two-year construction period, a mine operating life of 19 years with nominal annual production of up to 3.5 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

[1] http://www.hellenicshippingnews.com/posco-relegated-to-5th-place-in-global-steel-production-ranking/
[2] http://www.bloomberg.com/news/articles/2010-07-05/korea-electric-posco-buy-stakes-in-australian-mines-from-anglo-american
[3] Total consideration was A$9.74m cash and POSCO also relinquished 135 million Cockatoo Coal shares that subsequently proved to be worthless
[4] https://www.australianmining.com.au/news/cockatoo-coal-sells-stake-in-coal-exploration-project/
[5] http://asia.nikkei.com/Business/AC/Posco-s-2016-operating-profit-jumps-18
[6] NSW Coal Industry Profile Volume 1, 2014, p.49.
[7] Preliminary Environmental Assessment, EMM, July 2015, p. 11
[8] NSW Coal Industry Profile Volume 2, 2014, p.57

mine will be 2Mtpa. Closure and rehabilitation is expected to take 2 years giving a total project life of 23 years.

Extraction will take place at depths between 70m and 180m within the Wongawilli Seam of the Southern Coalfield. Hume intends to produce around 40Mt of product coal over the life of the mine; based on their predicted production of 50.5Mt ROM coal, this equates to an assumed yield of 79%. The expected peak workforce during the construction phase of the project is approximately 414 full-time equivalents (FTE) and during operations, Hume Coal is estimated to employ around 325 FTE employees including contractors.

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

Produced coal is to be transported by rail to Port Kembla Coal Terminal in Wollongong for shipping to international and domestic markets. This will necessitate the construction of a rail connection from the Hume Coal project to the existing Berrima Branch Line.

**Figure 1: Hume Coal Project Proposal Summary**

| Hume Coal - Production Summary | |
|---|---|
| Coal extraction rate | 35% |
| Run of Mine (ROM) Coal (Mt) | 50.5 |
| Product Coal (Mt) | 40 |
| Product coal yield | 79% |
| Life of Mine (Years) | 19 |
| Annual average Product Coal (Mtpa) | 2.1 |

Source: Hume Coal EIS

# Australian Coal Trends: Impacts on Hume

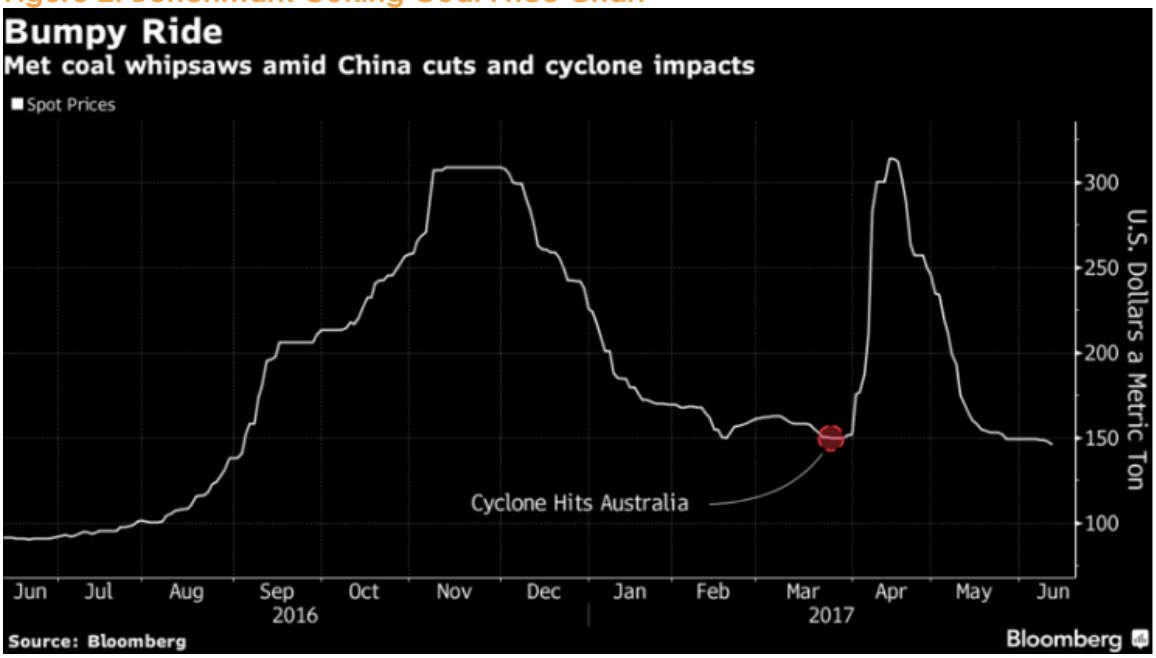
## Coking and Thermal Coal Prices

The last ten months have seen huge volatility in coking coal prices due to Chinese government restrictions on domestic coal mine production in the first instance, and then latterly due to the impact of Cyclone Debbie on coking coal production in Queensland – the world's largest coking coal exporter (refer Figure 2 below).

However June 2017 has seen coking coal prices drop to their lowest level in eight months, with benchmark prices dropping to US$146/tonne. Prices are now expected to be less volatile going forward. Importantly, benchmark prices are for the high grade hard coking coal benchmark, not the softer coking coal IEEFA expects would be produced at the Hume Coal project (refer to page 12).

The recent price volatility is likely to see the system of agreeing import prices on quarterly contracts come to an end and move towards the setting of prices based on published price assessments[10].

**Figure 2: Benchmark Coking Coal Price Chart**




Source: Bloomberg

A recent Credit Suisse Metallurgical Coal Forecast[11] sees coking coal prices falling further on oversupply. For the fourth quarter of 2017 Credit Suisse see a price drop for hard coking coal

[10] https://www.bloomberg.com/news/articles/2017-06-13/old-school-coal-deal-making-nears-end-as-nippon-flags-new-system
[11] Credit Suisse, Metallurgical Coal Forecasts, 21 June 2017

to US$125/t. For 2018 to 2020, increased coking coal output driven by the recent price spikes will see the market oversupplied with further downside to prices. U.S. and Mongolian exports have surged and will be joined by Mozambique as it unlocks the Moatize coal basin. At the same time, demand in China is forecast to decline as infrastructure projects and hence steel needs decline.

Of major significance to the viability of the Hume Coal proposal is the fact that the project would produce a high percentage of thermal coal. IEEFA now understands that around 46% of product coal will be thermal coal, a much higher percentage than we had assumed in our previous report on the Hume Coal project published in August 2016[12].

The high percentage of thermal coal brings down the average price that would be received for the projects production as thermal coal has a lower value relative to coking coal and this materially undermines the financial viability of the project, particularly in light of its very high capital costs and exceptionally low recovery (around 35%) on the resource (refer to page 11). Furthermore, IEEFA's view is that the long term outlook for thermal coal is one of structural decline, a significant financial risk of starting this greenfield coal project with such a high percentage of thermal product.

**Figure 3: Split of Hume Coal Product**

| Coal type by volume | Ash content | Split |
|---|---|---|
| Semi-hard coking coal | 10% | 54% |
| Thermal | 22% | 46% |
| Product total | | 100% |

Source: Hume Coal EIS, Doyle and Fitzsimmons 2017[13]

The front month Australian benchmark thermal coal price stands at less than US81/t but the market is clearly pricing in reduced demand and/or oversupply in coming years as current 2020 and 2021 contract prices are less than US$66.50/t. Upon the release of the latest BP annual review of global energy trends in June 2017, BP's chief economist noted that "The fortunes of coal appear to have taken a decisive break from the past"[14]. The BP statistics showed that global coal consumption dropped 1.7% in 2016.

In the same week as the BP energy statistics were released, Bloomberg New Energy Finance (BNEF) released its latest New Energy Outlook 2040 report which made dramatic conclusions about the impact of rapidly cheapening renewable energy on fossil fuel use. The report forecasts that thermal coal will be the most severely affected with 369 gigawatts of coal-fired capacity standing to be cancelled over the coming years[15].

The trends that are becoming ever clearer suggest that now is not the time to be investing in a high capex coking coal mine that further adds to future global oversupply and that produces such a high percentage of thermal coal.

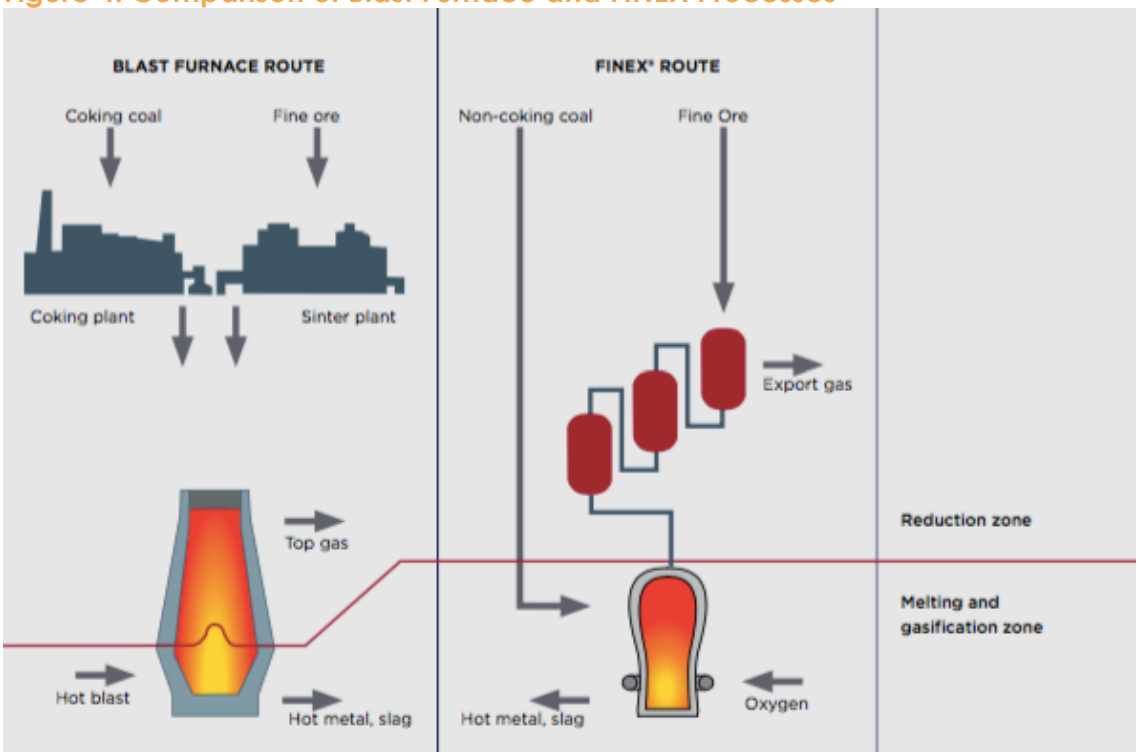
[12] http://ieefa.org/ieefa-report-australia-posco-hume-coal-project-little-chance-proceeding /
[13] http://ro.uow.edu.au/cgi/viewcontent.cgi?article=2309&context=coal
[14] https://www.bloomberg.com/news/articles/2017-06-13/coal-s-era-starts-to-wane-as-world-shifts-to-cleaner-energy
[15] https://www.bloomberg.com/news/articles/2017-06-15/solar-power-will-kill-coal-sooner-than-you-think

Adding to supply and demand headwinds, alternative steelmaking technologies that don't require the use of coking coal may further emerge, placing further pressure on prices. One such technology has already been commercially proven and is owned by POSCO itself.

# FINEX Steelmaking Process

POSCO has co-developed a steel-making process which uses non-coking coal.

**Figure 4: Comparison of Blast Furnace and FINEX Processes**




Source: POSCO

The FINEX process is considered by POSCO to be the only commercially proven alternative to the blast furnace method and has lower production costs and emissions[17]. One of the key differences between FINEX and the blast furnace approach is that non-coking coal is used in the former as a reducing agent and energy source. If the FINEX process, and other steelmaking processes that don't require coking coal become more widespread, there are obvious implications for global coking coal demand.

POSCO is operating FINEX-based operations at its Pohang steelworks. A demonstration plant was commissioned in 2003 and was then followed by two larger commercial plants at Pohang in 2007 and 2014[18].

[17] POSCO, The FINEX Process: Economical and Environmentally Safe Ironmaking, 2015
[18] http://www.afr.com/street-talk/koreas-jb-asset-management-backs-newlakes-arrium-bid-20170613-gwpzk1

It has recently been revealed that a South Korean consortium comprising POSCO, Newlake Alliance and JB Asset Management has won preferred bidder status for the assets of Arrium Australia which includes the Whyalla steelworks[19]. The bid proposal includes an investment of US$1m to implement POSCO's own FINEX process at Whyalla in order to replicate the efficiencies of the Pohang steelworks.

POSCO's expansion of its FINEX process, which uses non-coking coal, appears to lessen the need for the company to initiate a new coking coal project at this time.

# Japanese Companies Abandoning Australian Coal Investments

Another trend being seen in the Australian coal market is Japanese trading houses exiting their Australian coal investments. Like South Korea, Japan is a major destination for Australian coal exports and Japanese companies have previously seen strategic integration logic in owning or part-owning Australian coal mines. It would appear that this logic is quickly fading in the eyes of such trading companies.

Trading houses are increasingly aware of the potential reputational risk associated with fossil fuel investments[20]. This partly explains Mitsubishi's decision to sell its stake in two Hunter Valley thermal coal mines and it is also reported to be considering a sale of its stake in the Clermont mine[21] in Queensland which would leave it with just one remaining thermal coal mine.

Mitsui has reportedly hired Nomura to seek a buyer for part of its stake in the Dawson coking and thermal coal mine in Queensland[22]. This is the latest development in Mitsui's drive to reduce its investments in thermal and lower-quality coking coal assets. Environmental concerns are behind the company's intention to focus on iron ore, LNG and oil and it has no plans for further coal investments. Sojitz President Yoji Sato has also stated that the company will seek opportunities to reduce its exposure to both thermal and coking coal mines.[23]

The recent concern about environmental and reputational issues from Japanese companies comes despite the nation's continued reliance on coal imports. This trend is echoed by recent events in South Korea where the newly elected President Moon Jae-in has shown strong indications of an intention to lower that nation's own reliance on imported coal amid growing environmental concerns relating to both air pollution and climate change. POSCO itself already has numerous investments in Australian coal (refer Annexure V).

# Strategic Change in Direction by the South Korean Government

With new government plans to bring forward the closure of old coal-fired power stations and re-consider the need for new ones, there are indications that South Korean companies may soon be following Japan's trading houses in raising environmental concerns and reducing coal investments.

[19] http://www.afr.com/business/mining/iron-ore/korean-bidder-firms-as-arrium-favourite-20170615-gwrsie
[20] http://www.reuters.com/article/japan-coal-traders-idUSL3N1JA36T
[21] http://www.afr.com/street-talk/mitsubishi-drums-up-interest-in-clermont-coal-stake-20170613-gwpzlm
[22] http://www.afr.com/street-talk/mitsui-taps-nomura-to-test-appetite-in-qld-coal-20170607-gwmw5d
[23] http://www.reuters.com/article/japan-coal-traders-idUSL3N1JA36T

The fact that the Hume proposal is to produce 46% thermal coal look increasingly out of step with the changing outlook of the South Korean government, especially after the recent election of new President Moon Jae-in. The new government has indicated that it will make the environment a priority in energy policy and shift the country away from coal and towards renewables and gas. As a result, the world's fourth largest coal importer may see coal's contribution to electricity generation fall from around 40% to 22% by 2030.[24]

As a first action, the new President ordered the temporary closure of ten of the most polluting old coal-fired power plants and has plans to bring forward the date of their closure. He also pledged to review the status of planned, new power stations; nine coal-fired and eight nuclear powered. The government has indicated that it will consider suspending new coal plant developments that are less than 10% into construction.[25] In a June 2017 speech where he also announced the scrapping of new nuclear power developments, the President stated:

> *"While mapping plans to build a nuclear-free, coal-free nation, the government will set up environmentally friendly energy policies. There will be many difficulties. But it is a road we must take*".[26]

POSCO is amongst the leading companies that will be affected by the proposed changes. POSCO Energy acquired Tongyang power in 2014 which held a licence to construct a thermal power plant in Gangwon Province. POSCO paid KRW431bn to acquire Tongyang and is believed to have invested a further KRW500bn in the project[27], a total of US$827m. The future if this project is now in question. POSCO Energy may also need to give up on its plan to build a coal-fired power station in Pohang.[28]

Even before the election of new President Moon Jae-in, South Korea had been making policy changes to reform energy markets and reduce investments in overseas mines after significant losses made by government-owned operations in overseas resource investments. With the new regime seeking to significantly decrease South Korea's reliance on coal, there exists the possibility of further efforts to withdraw support for Korean companies' investments in overseas resources. For more on developments in South Korea that preceded the recent Presidential election, refer to Annexure III.

# Australian Mines Available for Sale

Japanese trading houses are not the only companies seeking to sell off coal mining investments in Australia. Companies such as Rio Tinto, Anglo American, Peabody, Exxaro and Glencore are, or have been, looking for buyers for their coal mines. As a result, there are a number of alternative paths for POSCO to take rather than begin a greenfield project at Hume (refer to Alternatives to the Hume Proposal on page 14).

[24] https://www.reuters.com/article/us-southkorea-politics-energy-idUSKBN18V0EH
[25] http://pulsenews.co.kr/view.php?sc=30800018&year=2017&no=329319
[26] http://english.yonhapnews.co.kr/national/2017/06/19/0301000000AEN20170619003451315.html
[27] http://pulsenews.co.kr/view.php?sc=30800018&year=2017&no=329319
[28] http://www.koreaherald.com/view.php?ud=20170518000664

# Financial Weaknesses of the Hume Proposal

IEEFA has modelled the net present value of the Hume Coal proposal using data from the Hume Coal EIS prepared by EMM Consulting and dated March 2017. An economic study by BAEconomics forms an appendix to the EIS. Refer to Annexure IV for a summary of key modelling assumptions used.

## Net Present Value

**Figure 5: Hume Coal Nominal P&L**

| Hume Coal - P&L<br>Average annual nominal | A$m |
|---|---|
| Revenue | 240 |
| EBITDA | 62 |
| Depreciation | (48) |
| EBIT | 15 |
| Net interest | (22) |
| Pretax profit | (7) |
| Tax | 0 |
| Net loss (A$m) pa | (7) |
| EBITDA Margin | 26% |

Source: Hume Coal EIS, IEEFA Estimates

IEEFA's modelling, based on publicly disclosed information on the project shows that the project has a negative net present value (NPV) of -A$344m using the 7% discount rate required to be used in the economic study that was included in the Hume Coal EIS. Under these circumstances, it is difficult to believe that the ongoing approval process is anything more than attempt to secure project optionality, perhaps in the hope of a significant and permanent rise in coal prices or with a view to an attempted sale of the project post approval.

The -A$344m negative NPV obtained from IEEFA's modelling comes despite using the capex figures outlined in the economic study which appear to be highly conservative. Whereas the BAEconomics study included a total capex of A$860m, the Hume Coal Preliminary Environmental Assessment (PEA) assumed a materially higher figure of A$982 (refer Figure 6).

The reduction in capex requirement appears to have come partially from the removal of a water treatment plant from the proposal.

IEEFA would welcome the disclosure of further information and data from the Hume Coal project proponent that challenges our assumptions and makes clear how this project could generate a positive NPV given such a significant capex cost and low recovery rate of around 35%.

**Figure 6: Comparison of Capex Assumptions**

| Hume Coal - Capex Assumptions<br>Nominal, A$m | Hume Coal PEA<br>Jul'2015 | BAEconomics<br>Feb'2017 | IEEFA<br>Jun'2017 |
|---|---|---|---|
| Project Cost upfront | 682 | n.a. | 612 |
| Stay in business capex over project life | 300 | n.a. | 217 |
| Total Capex (over project life) | 982 | 860 | 860 |

Source: Hume Coal EIS, IEEFA Estimates

# Coal quality

One of the key issues holding back the financial viability of the Hume proposal is the large proportion of high-ash thermal coal to be produced. This significantly reduces the average price that is likely to be achieved for the product coal of the project. This coal's relatively high ash content will mean it will attract a discount (estimated at around 10%) to the benchmark Australian thermal coal price.

Furthermore, despite the EIS being vague about the lower quality of coal to be produced, it would appear that the coking coal would be classified as semi-hard coking coal rather than the hard coking coal that achieves the higher benchmark prices. This is deemed via the forecast royalty figures provided in the economic study that accompanied the EIS. As a result, the average price achieved is brought down further still as a result of the approximate 10% discount that Hume coal would achieve relative to the average benchmarks.

Although thermal and coking coal prices are higher than they were at the time of writing of IEEFA's first Hume Coal report in August 2016[29], assessment of the mine's viability is held back now that it has become clear that a greater proportion of the product coal will be thermal. In August 2016, IEEFA had assumed 20% thermal coal based on the output of nearby operations in the Southern Coalfield. In fact, 46% of the proposed Hume output would be high-ash thermal coal.

**Figure 7: Coal Product Pricing**

| Coal Pricing | 2020 | Over mine life | |
|---|---|---|---|
| | US$/t Real | US$/t Real | A$/t Real |
| Thermal (Ash at 22%) | 55 | 67 | 86 |
| Hard Coking Coal | 93 | 111 | 144 |
| USD/AUD forex | | | 0.770 |

Source: Hume Coal EIS, IEEFA Estimates

# Tax Contributions

Aside from the key point that on IEEFA's calculations the proposal has a distinctly negative NPV based on available data, there are other reasons to doubt the stated tax contributions of the proposal as set out in the economic Cost Benefit Analysis that accompanied the EIS.

An assumption that the project is fully equity funded appears to have been made which IEEFA considers to be an unlikely scenario. A one-third equity to two-thirds debt funding split is a more likely prospect; in Figure 8 below IEEFA has assumed a debt to total investment ratio of 50% which produces an annual interest expense of A$22m per annum whereas BAEconomics have assumed zero interest expense.

[29] http://ieefa.org/ieefa-report-australia-posco-hume-coal-project-little-chance-proceeding /

In the event that the project could generate a positive cash flow, a more realistic funding profile would lead to interest deductions from profit before tax is calculated. As such, tax contributions would be significantly lower than outlined in Hume Coal's economic study; in fact on IEEFA's estimates corporate tax recovery to Australia would be zero.

**Figure 8: Hume Coal Tax and Royalties**

| Hume Coal - Corporate Tax, Royalties, Gearing & NPV | BAEconomics | IEEFA |
|---|---|---|
| Corporate Tax (A$m) - NPV | 84 | Nil |
| NSW Royalties (A$m) - NPV | 114 | 114 |
| Assumed Debt / total investment (%) | 0% | 50% |
| Annual interest expense (A$m) | Nil | 22 |
| NPV (A$m) @ 7% pa | Positive | (344) |

Source: Hume Coal EIS, IEEFA Estimates

Furthermore, IEEFA would note that our project NPV of -$344m is prior to examining the financial structure likely to be applied.

# Post Approval Operational Changes

It is not unknown for mining companies to seek changes to their operational plans once approval to begin mining has been granted. This may be one key way in which Hume Coal may attempt to make the project viable.

As it stands, the project is set to use the pine feather system in an attempt to reduce subsidence and allay local landholders concerns about the mine's impact on the water table. The use of this mining technique restricts the coal recovery rate of the project to around 35%.

If the recovery rate were higher it could have a significant impact on NPV of the project and, as a result, IEEFA would highlight the possibility that Hume Coal may attempt to change their plans post-approval, possibly involving the abandoning of or at least watering down of the pine feather mining technique. Given the level of concern already shown by local landholders on water impacts, we would note the significant further erosion of the mine's social licence that would be likely if this path were taken.

With the increasing importance of social licence to mining operations, any attempt to move away from an approved mine plan is likely to open the proposal to further controversy, delay, complication and financial risk.

# Alternatives to the Hume Proposal

Given the risks and cost associated with the development of a greenfield coal mine project, it would seem prudent for POSCO to consider the alternative to developing the Hume proposal: the purchase of an existing, operating coking coal mine available for sale. As a way to bypass strong community opposition to the Hume proposal, such an alternative may also prove to be quicker and simpler. It would also avoid a further increase to global coking coal supply at a time when increased exports from countries like the U.S. and Mongolia threaten to place downward pressure on prices. With an increasing number of coking coal operations for sale in Australia, POSCO would not be left wanting for options.

## Tahmoor Coal Mine - Glencore

The Tahmoor coal mine 100% owned by Glencore would appear to be the most obvious option if POSCO were to purchase an existing coking coal operation in the Southern Coalfield. Tahmoor has a similar output and profile to the Hume proposal and has also been clearly marked for sale by its current owner.

Previously announcing in June 2016 that it will close the Tahmoor mine due to poor viability (an analysis consistent with our financial review of Hume Coal), Glencore announced in May 2017 that it will keep the mine operating with a view to selling it. Standard Chartered Bank has been appointed to manage the sale which includes Glencore's stake in the Port Kembla coal terminal.[30]

This underground mine, which has been in operation since 1979, produces around 2Mt of coal a year from the Bulli seam (hard coking coal with a small amount of thermal coal) matching the expected average 2Mtpa output of the Hume proposal but with significantly less lower-value thermal coal product. If POSCO are genuinely committed to sourcing coking coal out of the Southern Highlands via Port Kembla it would make far more financial sense to make an offer for Tahmoor than to begin a new greenfield development at Hume.

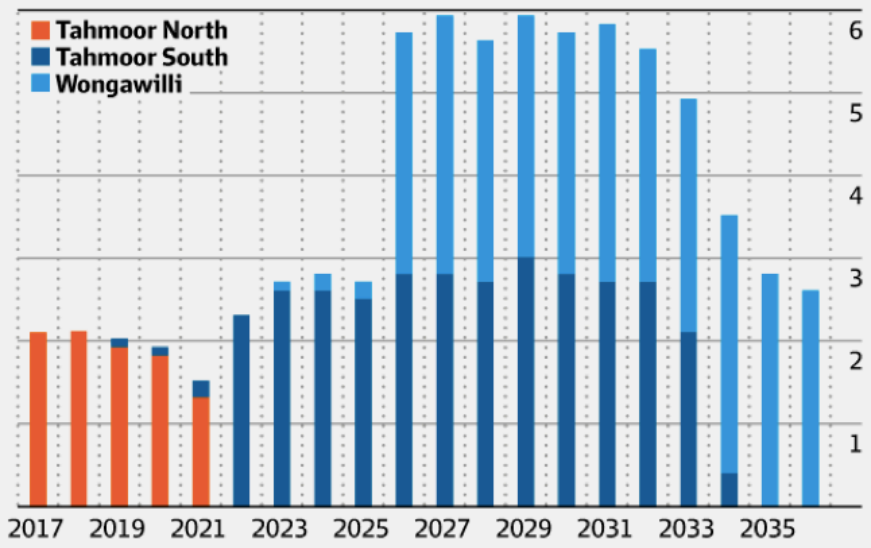
The existing Tahmoor mine has marketable reserves of 19Mt[31], lower than the Hume proposal's 50Mt ROM and 39Mt of product coal expectation. However, there is an extension proposal (Tahmoor South), also owned by Glencore and which could extend the life of the mine for a further 18 years to 2040 with an additional 31Mt of marketable reserves[32]. In addition, Glencore claim the Wongawilli coal seam can also be mined at Tahmoor.

Another advantage for any potential buyer is that rail infrastructure is already in place; if POSCO were to purchase Tahmoor there would be no need for the accompanying Berrima Rail Project to proceed either. By continuing to operate an existing mine, no additional freight volume would need to be added to the rail logistics of the Southern Coalfield. This is particularly relevant considering the limitations placed on coal rail freight during times of peak passenger rail transport which could increase with additional freight volumes.

[30] http://www.theaustralian.com.au/business/dataroom/glencore-to-sell-share-in-coal-terminal-tahmoor-mine/news-story/bfe36247644087ff4ab38994aa8b3a6a
[31] NSW Government, NSW Coal Industry Profile Volume 2, 2014, p.60
[32] NSW Government, NSW Coal Industry Profile Volume 2, 2014, p.61

Additional freight capacity would also have an increased impact on road traffic at the numerous crossings between the Hume mine site and Port Kembla.

**Figure 9: Tahmoor Forecast Saleable Production by Coal Seam (Mt)**




Source: Glencore, Australian Financial Review

The longwall mining technique is used at Tahmoor, a more straight-forward and higher margin system than the proposed pine feather technique intended to be used at the Hume project. Chosen in response to concerns about the possible effects of the Hume project on groundwater, the pine feather system has yet to be employed in a mine in Australia. The purchase of the Tahmoor mine would circumvent the need to use this more complicated approach.

# Metropolitan Coal Mine - Peabody

The recent attempt by South32 to acquire the Metropolitan mine owned by Peabody Energy is a useful reference point in consideration of POSCO's alternatives to the Hume Coal proposal. South32 pulled out of the deal after the Australian Consumer and Competition Commission (ACCC) raised concerns that the deal would leave South32 as the only major supplier of coking coal in the Southern Coalfield of NSW[33]. At the time, it was expected that Glencore's Tahmoor mine was to be closed, Glencore has since taken the decision to continue mining with a view to selling the mine.

Before the ACCC concerns came to light, it had been announced in November 2016 that South32 would pay US$200m for the acquisition of Metropolitan, which included the purchase of Peabody's 16.67% stake in the Port Kembla Coal Terminal[34]. The US$200m price tag was obviously considerably lower than the A$612m capex required to bring the Hume project into

[33] http://www.afr.com/business/mining/coal/accc-raises-concerns-about-south32s-metropolitan-coal-acquisition-20170222-guj1jv

[34] South32 press release: South32 Agrees to Acquire Peabody's Metropolitan Colliery, 3rd November 2016.

operation. Per Figure 10 below, the US$200m price equates to A$137m per million tonnes of saleable coal per annum which compares to A$306m per million tonnes for the Hume project.

**Figure 10: Hume, Metropolitan and Byerwen Comparison**

| Comparison: Hume versus mine purchase | | Average Annual Production | Investment/ purchase | | Price per Mtpa |
|---|---|---|---|---|---|
| | | Mtpa | A$m | US$m | A$m |
| Hume | 2 Mtpa 100% owned by POSCO | 2.0 | 612.0 | | 306.0 |
| Metropolitan | 1.9 Mtpa 100% owned by Peabody | 1.9 | 259.7 | 200.0 | 136.7 |
| Byerwen | 10 Mtpa owned by Qcoal and JFE Steel | 10.0 | 1,760.0 | | 176.0 |
| | *Assumes a USD/AUD exchange rate of* | *0.77* | | | |

Source: Hume Coal, South32

The large price differential between the Hume project and the existing Metropolitan mine can be partially explained by a difference in coal reserves. Metropolitan has 35Mt of marketable reserves[35] compared to an expected 50Mt of ROM coal and 39Mt of saleable coal over the life of the Hume project. However, there is also a difference in coal quality between the two projects that favours Metropolitan. Peabody's existing project mines the Southern Coalfield's Bulli seam, producing lower ash, hard coking coals. The majority of saleable coal is exported as premium hard coking coal with around 700,000 tonnes sold domestically.

In comparison, the Hume proposal would mine the Wongawilli seam. Product coal would be washed to meet export coking coal market specifications but 46% of the product will be lower quality and sold as thermal coal. Taking reserves and coal quality into account, IEEFA sees a strong argument for POSCO to consider purchasing an existing mine operation instead of the more expensive option of developing a greenfield site.

Whereas an acquisition by South32 was seen by the ACCC as placing too much market dominance in the hands of one company, an acquisition by POSCO within the Southern Coalfield may be seen more positively.

# Byerwen

Another data point for comparison comes from the Byerwen coal project in Queensland which began which began construction in May 2017[36]. Owned by QCoal and JFE Steel, this open cut operation is expected to produce up to 10Mtpa of coking coal. With an expected investment of A$1.76bn[37], this equates to A$176m per million tonnes of production, less than half the expected cost of the Hume proposal (see Figure 10 above). Another option for

[35] NSW Government, NSW Coal Industry Profile Volume 2, 2014, p.58
[36] https://www.australianmining.com.au/news/construction-begins-byerwen-coal-project/
[37] http://statedevelopment.qld.gov.au/assessments-and-approvals/byerwen-coal-project.html

POSCO is to look at existing open cut operations in Queensland as an alternative to the greenfield underground project at Hume.

## Dawson - Mitsui

One such Queensland open cut operation is Dawson, a thermal and coking coal mine 51% owned by Anglo American and 49% by Mitsui of Japan. Anglo have previously attempted to sell its stake in the mine and now Mitsui is keen to offload half its own holding (around 25% of the project) which has produced a total of 4.3-4.6Mtpa over the last two years[38].

## Moranbah South – Exxaro

In addition to the possibility of one or more of Glencore's Queensland coking mines becoming available, South African miner Exxaro is also reportedly keen to sell[39]. The company owns 50% of the Moranbah South underground project in Queensland (Anglo American owns the other 50%). Anglo has first refusal on the acquisition but even if they do take full ownership of the mine there is even a chance that the operation becomes available for sale in full. Anglo had been keen to sell its Australian coking coal operations but changed its mind once coking coal prices recovered. However, with coking coal prices now dropping to more sustainable levels, the company may again be tempted to look at a sale.

## Kestrel and Hail Creek – Rio Tinto

Rio is seeking to sell its Kestrel and Hail Creek operations in Queensland and is reported to be appointing Credit Suisse to run the sale process[40]. Kestrel is an underground mine producing around 5Mtpa of coal and Hail Creek is an open cut operation producing up to 10Mtpa with potential for an underground project. Both mines produce coking and thermal coal.

## Curragh – Wesfarmers

Wesfarmers put its Bengalla (thermal) and Curragh (coking and thermal) coal mines up for sale in late 2016[41] and after some initial interest was reported, the market for these mines appears to have gone quiet[42]. The Curragh coal mine is in Queensland's Bowen Basin and produces 8.5Mtpa of coking coal and 3.5Mtpa of thermal coal.[43]

[38] http://www.afr.com/street-talk/mitsui-taps-nomura-to-test-appetite-in-qld-coal-20170607-gwmw5d
[39] http://www.afr.com/street-talk/exxaro-looks-for-the-exit-20170522-gwa1rn
[40] http://www.theaustralian.com.au/business/dataroom/credit-suisse-set-to-handle-sale-of-rio-tinto-coal-assets/news-story/545a9d7f674141d70aa524270da72863
[41] http://www.smh.com.au/business/mining-and-resources/wesfarmers-has-kicked-off-2-billion-sale-of-curragh-and-bengalla-coal-mines-sources-say-20161115-gsq7ys.html
[42] http://www.smh.com.au/business/retail/skewered-officeworks-sale-raises-wider-wesfarmers-questions-20170517-gw6ob2.html
[43] http://www.afr.com/business/mining/coal/wesfarmers-coal-mines-attract-bids-from-fortescue-apollo-20170227-gumnny

# Conclusions

The abundance coking coal operations currently available, or likely to be available, for sale points to an obvious alternative to the development of the Hume Coal proposal which is clearly the more expensive option. In addition, with the greenfield Hume proposal likely to face continued local community opposition, the acquisition of an existing operation is likely to prove to be simpler and easier.

Furthermore, the availability of the Tahmoor mine owned by Glencore means that, not only is there a clear option in the same locality as Hume, but it is one that is already producing higher quality product. The financial viability of the Hume Coal proposal is significantly handicapped by the fact that it will produce a higher percentage of thermal coal than other Southern Coalfield coking coal operations. Not only that, but the coking coal that is produced will be of lower quality than the benchmark standard - the hard coking coal produced by Tahmoor and other Southern Coalfield operations.

The impact of the lower quality coal that could be expected to be produced at Hume is to lower the average price that would be received for its output. As it stands, and with the information available, the proposal appears to have a significantly negative NPV, as such IEEFA cannot see the proposal as being likely to receive head office approval to proceed on the current basis. Without the possibility of operating profitably, there is no question of corporation tax contributions benefitting the wider economy.

The fact that the Hume proposal is to produce 46% lower-than-benchmark-quality thermal coal looks increasingly out of step with the changing outlook of the South Korean government, especially after the recent election of new President Moon Jae-in. The new government has indicated that it will make the environment a priority in energy policy and shift the country away from coal and towards renewables and gas. The world has moved on since the inception of the Hume Coal proposal and the project appears to have been left behind in a similar way to the Australian coal projects of Adani, GVK, Shenhua and Lanco Infratech.

IEEFA notes the possibility that approval for the proposal is being sought in order to secure the optionality of selling the approved project or to wait for a long-term uptick in coal prices beyond the temporary, sudden increases in coking coal prices in the wake of Chinese government output restrictions and Cyclone Debbie. There exists the possibility that Hume Coal may seek to change the mine plan after approval has been obtained. By moving away from the pine feather mining method proposed, Hume Coal may be able to increase the coal recovery rate beyond the current figure of around 35% with subsequent impact on the mine's financial viability. With the increasing importance of social licence to mining operations, any attempt to move away from an approved mine plan is likely to open the proposal to further controversy, delay, complication and financial risk.

IEEFA's analysis, using figures taken from Hume Coal disclosures and the economic study that accompanied the EIS, suggests that the project is held back by numerous factors that lead to a negative net present value for the proposal. On a financial basis, the proposed project should not proceed.

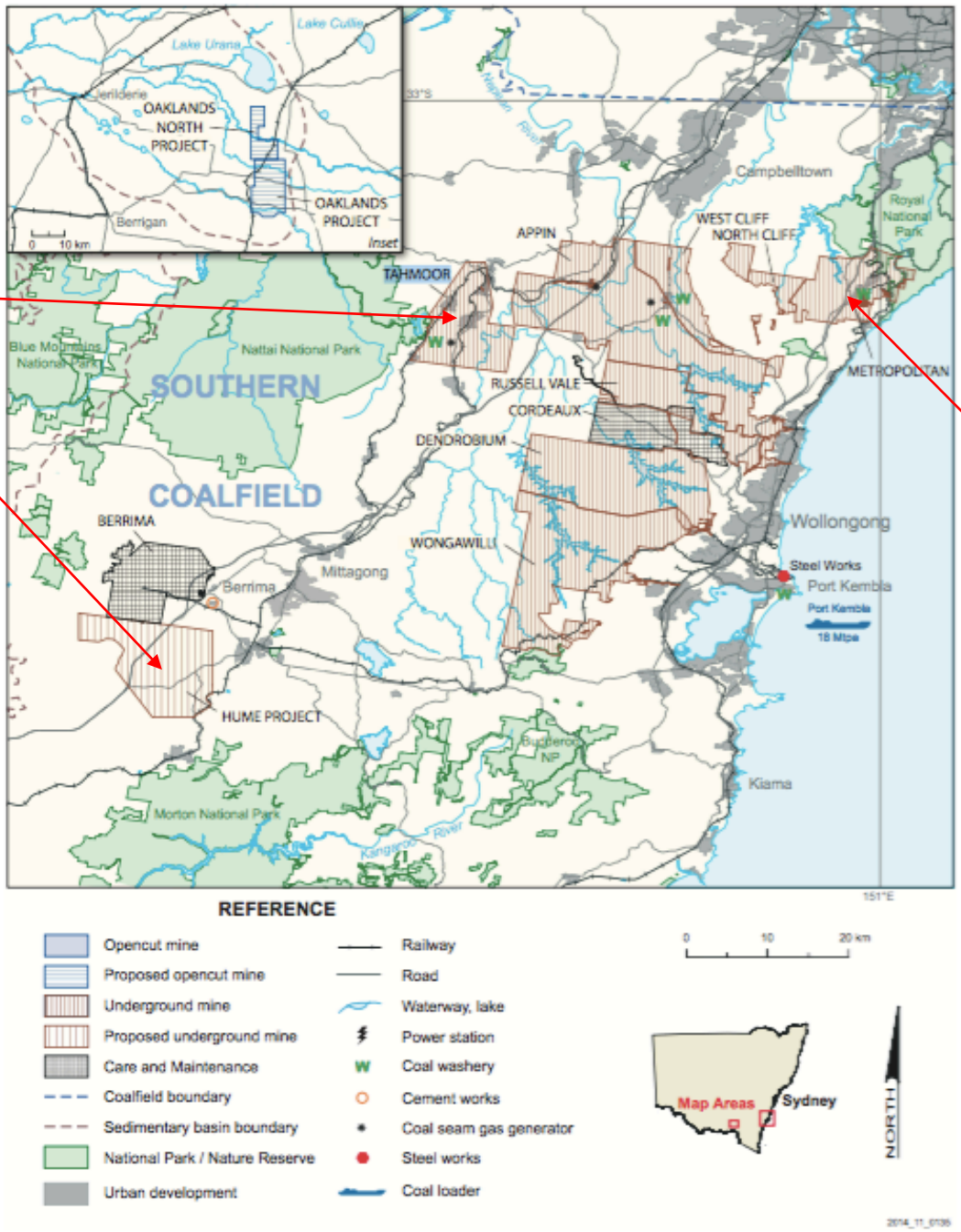
# Annexure I

## Relative Locations of Hume Proposal, Tahmoor and Metropolitan Mines.

Tahmoor

Hume

Metropolitan




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

# Annexure II

## Hume Coal Project Overview

| HUME PROJECT | | S4 |
|---|---|---|
| **Lease numbers** | | A 349 |
| **Operating company** | | Hume Coal Pty Limited |
| **Locality** | | 10 km west of Moss Vale |
| **Major shareholders** | | POSCO Australia Pty Ltd 100% |
| **Major seams present and working thickness (m)** | | Wongawilli 2–4 |
| **Seams currently mined** | | |
| **Resources (Mt)** | | |
| Measured | | |
| Indicated | | 115.00 |
| Inferred | | |
| Total | | 115.00 |
| **Transport** | | 70 km by rail to Port Kembla. |
| **Proposed mining method** | | Underground |
| **Remarks** | | Previously known as Sutton Forrest proposal. |
| **Product specifications** | | |
| | | |
| 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 |
| Phosporus % | (ad) | |
| Max.Fluid. | (ddm) | 850 |

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

# Annexure III

## Strategic change in direction by the Previous South Korean Government

Even before the election of the new government, South Korea had already taken a number of policy reform steps through 2016.

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 made a significant change after significant losses in overseas projects of government owned operations.

A 2016 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) was to cease developing overseas power generation resources and sell off its interests in nine mines. It was also announced that Korea Resources Corp (KORES, owner of the Wallarah 2 coal mine proposed on the NSW Central Coast[44]) would 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[45].

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[46]. The government also announced in 2016 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[47].

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.

[44] http://www.smh.com.au/nsw/wallarah-2-800m-coal-mine-back-in-play-in-ultramarginal-dobell-20160510-gos522.html
[45] http://english.mosf.go.kr/eco/view.do?bcd=E0001&vbcd=N0001&seq=4092&bPage=1
[46] http://thinkprogress.org/climate/2015/01/12/3610553/south-korea-cap-and-trade/
[47] http://www.reuters.com/article/us-southkorea-coal-idUSKCN0ZM06A

# Annexure IV

## IEEFA Hume Coal Modelling Assumptions

| Hume Coal - Key Modelling Assumptions | |
|---|---|
| | |
| Royalty Rate | 7.2% |
| Corporate Tax Rate | 30.0% |
| Forex - USD/AUD | 0.77 |
| Inflation rate (pa) | 2.5% |
| Discount rate for NPV | 7.0% |
| Exploration & admin expenses (2017-2020, pa) | 20 |
| Initial capex (A$m) (2018-2021) * | 612 |
| Sustaining capex - per t | US$4.50 |
| Total capex (A$m) - nominal ** | 860 |
| First Full Year of Product Coal | 2022 |

** Down from $720m in original EIS*

*** includes sustaining capex and rehabilitation*

# Annexure V

## 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[48]. POSCO's Pohang and Gwangyang Steel Works are the largest single steel mills in the world[49]. 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[50]. 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[51]. 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[52]. 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[53]. 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[54]. 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[55]. 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 Mining Area C iron ore mine in the Pilbara, Western Australia. POSCO owns a 20% participating interest.

[48] POSCO Annual Report 2015, p. 9.
[49] POSCO Annual Report 2015, p. 29.
[50] https://www.posco.co.kr/homepage/docs/eng3/html/invest/stock/s91b4010164c.jsp
[51] POSCO Australia Pty Ltd Financial Report 31 December 2014, pp. 5-6.
[52] http://www.riotinto.com/australia/rtca/mount-thorley-warkworth-10427.aspx
[53] http://www.ravensworthoperations.com.au/EN/RavensworthUndergroundMine/Pages/default.aspx
[54] http://www.smh.com.au/business/mining-and-resources/coal-20160308-gne24l.html
[55] http://www.theaustralian.com.au/business/mining-energy/glencore-bloomfield-group-buys-vales-integra-coal-operation-in-nsw/news-story/58d1c571710c2c9f65e257e4febd7367

# Institute for Energy Economics and Financial Analysis

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