Appendix 9

PROJECT IRON BOOMERANG
east west line parks limited

TATA STEEL

TATA

TATA STEEL CONSULTING

Provision of Technical Assistance To

East West Line Parks Pty Ltd

Brisbane, QLD, Australia

TSC Project Code – PIB2

Project Iron Boomerang – Comments on the PIB Cost Model

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PROJECT IRON BOOMERANG
east west line parks pty ltd

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1. EXECUTIVE SUMMARY

Tata Steel Consulting (TSC) has been commissioned by EWLP to carry out a pre-feasibility study into the Project Iron Boomerang (PIB) project, in particular developing the estimated breakeven cost of slab for various stages of project development in Queensland, Australia compared to a Base Case plant of the same advanced technology located at a port in Korea. The findings of this study are included in a separate Prefeasibility Study report.

In addition TSC were requested to review the EWLP Slab Cost Model and comment on the declared benefits of the PIB scheme. This paper describes the findings of this review.

1.1 CAPEX

The EWLP cost model identifies potential CAPEX savings totalling US$330.7/ tonne of installed capacity. The TSC estimated savings is US$172/tonne of installed capacity. TSC has arrived at this figure using historical data from various sources. It is recommended that basic functional specifications be produced and submitted to steel equipment suppliers to gain updated budget prices to validate further the CAPEX cost.

1.2 OPEX

EWLP has identified a number of potential OPEX savings, the following provides a summary of TSC findings against each of these potential savings:

- Utilisation of Beneficiated magnetite. TSC has been unable to validate the EWLP view of US$34/Tonne of slab saving. TSC would recommend that approaches be made to a number of mines that would benefit from the E-W line and explore what cost of ores could be negotiated based on allowing the mines to market via the E-W rail route and the potential for a long term off-take agreement supplying ores and coals to PIB. In parallel with this, TSC could undertake process modelling once information is obtained on ore chemistry etc to arrive at a suitable blend and OPEX cost.
- OPEX savings in terms of supply chain consolidation have been largely eroded since 2007 due to the virtual collapse of the freight shipping price. The current view is that shipping prices will remain low for the foreseeable future, with companies taking orders on a marginal cost basis.
- The scale of the developed case provides the opportunity for the export of substantial quantities of surplus energy to the surrounding economy. There are various options for this considered in section 7 of the prefeasibility report to utilise the estimated 4.6GJ/tonne of slab energy surplus in the form of blast furnace, coke oven and BOS gas.
- Energy consumption of the facility would be at approximately 16GJ/tonne of slab, which is in the order of 15-20% better than typical world practice.
- The scale of the developed case should allow PIB to approach “world’s best” productivity benchmarks for slab production, TSC estimates a productivity figure of 0.25 manhours/tonne of slab produced will be achieved compared to a typical world figure of around 0.5 manhours/tonne.
- There will be substantial savings of green house gas (GHG) emissions mainly due to the supply chain consolidation by only shipping finished slab outside Australia, rather than shipping iron making raw materials (coal and iron ore) as is currently the case. In volume terms this represents a saving of over 50% in the quantities of materials shipped.

- Due to the reduced energy consumption of the developed facility there will be significant reductions in GHG emissions during the iron and steelmaking process compared to world steel average. As yet this has not been evaluated.
- Whilst there are substantial improvements in productivity for the developed scheme, these benefits are largely eroded by the relatively high employment costs in Australia. The Human resource strategy for the Developed scheme will need to address if and how it is possible to reduce this labour cost.

2. COMMENTS ON THE PIB COST MODEL

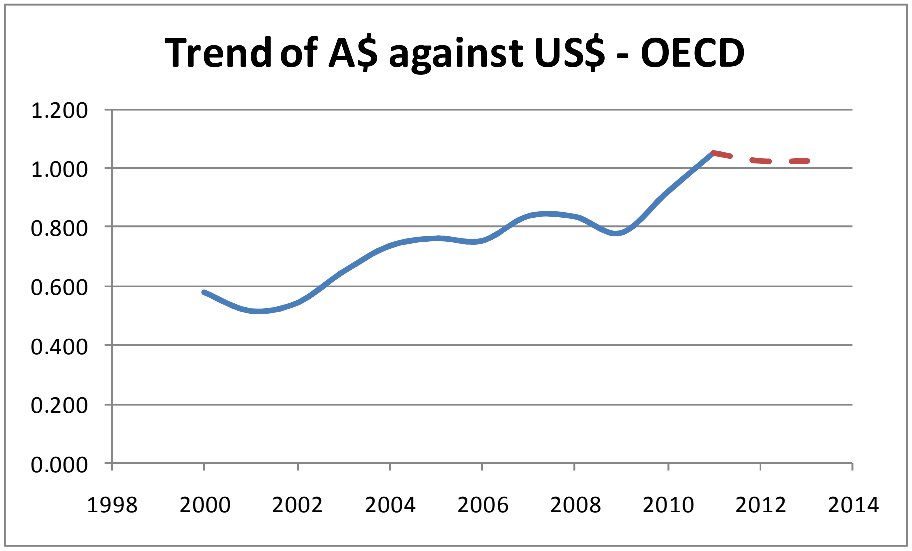
The EWLP slab cost model is a detailed spreadsheet, which calculates the possible savings that could be achieved in the cost of slab production by the PIB concept.

As part of the overall prefeasibility study work undertaken by Tata Steel Consulting, TSC were requested to comment on the model and the assumptions made.

The model was produced over the period 2007/08 and is based on the economic conditions prevailing at that time. The TSC analysis compares these assumptions based on current and likely future trends.

2.1 AUSTRALIAN DOLLAR EXCHANGE RATE

The PIB model assumed an Australian dollar exchange rate of A$1=US$0.75. The current rate is A$1=US$1.05. The trend from the OECD in terms of historical exchange rates and expected movements in the next 2 years is shown below.

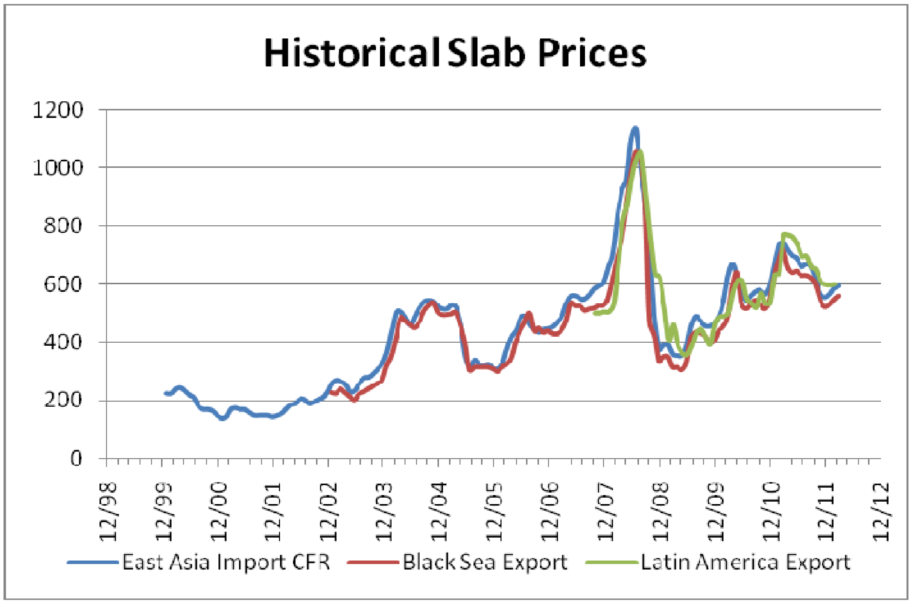


The above shows that for the medium term the A$ is likely to remain at a significantly higher level than that used in the PIB model based on the 2007 rates.

2.2 SLAB PRICES

The merchant slab market has been approximately 28MT per annum for the past 5 years with over 60% of the market being sold in Asia.

Analysis of the price of slab yields the following trends.



The above shows that current slab prices are of the order of US$600 per tonne. The original work undertaken by EWLP for PIB was based on 2007 costs. From the above graphs it can be seen that the 2007 figure was around $500/tonne selling price. The PIB model quotes a 2007 "Benchmark" of US$340 per tonne. This is assumed to be broadly the production cash cost of slab at the "works gate" and does not include the capital element.

2.3 PIB CAPEX SAVINGS

The PIB model assumes CAPEX savings for the construction of the steel complex from 4 main elements; these are each discussed in turn.

2.3.1 Shared Services (CAPEX)

This element is based on the assumption of having large shared stockyards, sinter plants, coke ovens etc; which according to the PIB estimate would result in a CAPEX saving of US$125 / tonne of installed capacity for PIB when compared with an individual plant unit.

TSC has made the same assumptions in terms of sizing and sharing of facilities in estimating the total CAPEX for a 22MT pa facility at Abbot Point in Queensland. On this basis the TSC estimated savings in CAPEX amounts to US$96 / tonne of installed capacity when compared with a 4.4 MTPA plant in Korea of equivalent technology.

This is based on the assumption that the PIB Steel Producers will share sinter production across 4 large sinter plants and coke production across three large twin battery coke ovens. The assumption is that there would be 5 blast furnaces and 5 steel plants complete with continuous slab casters. Additional savings could be made if the Steel Producers were willing to share steelmaking capacity, however at this stage this has not been evaluated in detail.

2.3.2 Prefabrication of Modular Construction – Built in China

The PIB Model assumes that US$83.3/tonne of installed capacity can be saved from modular construction built in China.

From TSC's experience, modular construction is very much a part of current steel plant erection strategy, with processing units being constructed in large units off line. Therefore, at this stage and without detailed discussion with plant suppliers, TSC cannot validate these potential savings.

In terms of Chinese manufacture, this report has attempted to evaluate the possible savings that could be made from Chinese manufacture; TSC estimates that this could amount to US$76/Te of installed capacity based on the cost of the 22MTPA plant in Queensland.

2.3.3 Standard order of unit construction

The PIB model assumes that US$111.3/tonne of installed capacity can be saved by ordering multiple units of the same design.

TSC has included savings on this item within the Shared services evaluation in 2.3.1 above. This is further detailed within the Prefeasibility report, section 11.

2.3.4 Feasibility Study Cost

The PIB model assumes a saving of US$11.1/tonne of installed capacity in developing a 22MTPA facility as opposed to individual 4.4MTPA facilities.

TSC would agree with this figure having estimated a saving in engineering charges of US$11.6/Te installed compared to the base case plant in Korea . This figure is already built into the overall cost estimates outlined in section 11 of the Prefeasibility report.

2.3.5 Overall summary CAPEX savings

The PIB model assumes the base case CAPEX cost of the steel complex of US$625/Te of installed capacity, which would reduce with the savings above to US$294.3/Te of Installed capacity. This gives an overall saving in CAPEX of US$M7275 based on a 22MTPA plant.

TSC estimate a base case CAPEX cost of the steel complex of US$887 /Te of Installed capacity which would reduce with the savings above to US$715/Te of Installed capacity.

This gives an overall saving in CAPEX of US$M3784, which is 52% of the PIB calculated savings.

This report shows that the cost of capital accounts for some 21-26% of the total cost of slab production. This is obviously an area to explore further in terms of seeking budget prices for the equipment from plant suppliers.

The comparison on CAPEX savings is tabulated below:

CAPEX Element	EWLP Assumption	TSC Assumption
Cost of Complex/Te of Installed capacity – Base Case (US$/Te)	625	887
Savings in shared Services (US$/Te)	125	96
Modular construction in China	83.3	76
Standard construction	111.3	Included above
Feasibility cost saving	11.1	11.6 Included above
Overall saving per Te installed capacity	330.7	172

(US$)		
Revised Cost – Developed case US$/Te installed capacity	294.3	715

2.4 PIB OPEX SAVINGS

The PIB model assumes OPEX savings for the steel complex from 6 main elements; these are each discussed in turn.

2.4.1 Beneficiation of Magnetite 10-20% to Blended Hematite ores 80-90%

The PIB model assumes that a 10% saving in slab cost (based on $340/Tonne of slab) can be achieved through blending a small amount of magnetite with the largely haematite ores, which would give an OPEX saving of US$34 per tonne of slab.

At this stage TSC has been unable to validate this saving, on the basis that it would need to consider the chemical composition of the Magnetite concentrate available and evaluate this blend in the TSC burden models. EWLP have submitted a single Magnetite chemistry to TSC but this ore would be unsuitable due to the high level of alkalis in the composition.

This element of OPEX savings is a major component of the EWLP total OPEX saving as such it requires further investigation.

2.4.2 Precinct shared services (OPEX)

The PIB model assumes savings from shared services covering both shift labour and maintenance costs and in terms of Energy consumption.

EWLP have assumed that labour and maintenance costs amount to 23% of the product cost and would aim to save 10% through PIB, which would equate to US$7.8 per tonne of slab (based on $340/Tonne of slab).

In terms of energy costs EWLP have assumed energy accounts for 16% of the production cost and would save 15% of the energy costs through PIB. This would equate to US$8.16 per tonne of slab (based on $340/Tonne of slab).

The TSC study has been based on comparing a new base case slab making facility in Korea of nominal 4.4 MTPA output of slabs with the developed case in Queensland of 22 MTPA. It has been assumed that both facilities would be modern with up to date technology with high levels of automation and energy saving processes. As such whilst there are savings in terms of manpower requirements, it is considered unlikely that there would be significant differences in energy utilisation between the base and developed cases.

The modelling work actually indicates that the labour and maintenance elements of the slab cost are less with a 4.4MTPA plant in Korea than with a 22MTPA plant in QLD on a cost per tonne basis, purely as a function of the relative labour cost differential of Korea compared to Australia.

When comparing current world benchmarks for energy use however and manpower utilisation as already stated in the Prefeasibility report, TSC's view of the PIB facility with this scale and modern efficient technology, the potential savings are:

- Energy requirements for PIB would be the order of 16GJ/Tonne of slab compared with a world average of some 20GJ/ Tonne of slab. Even assuming a 10% improvement of world average levels over the past decade for the best blast furnace route producer's shows that PIB should still be 10-15% more efficient compared to world average.
- Labour requirements for PIB equate to some 0.25 hrs/tonne of slab, which compares with figures for China of 1.21 and average of a number of "Western plants" of 0.59. Actual labour cost savings however would need to take into account the relative employment costs of Australia compared to other nations.

2.4.3 FOB Slab-Steel supply chain consolidation

The PIB model for this element looks at the cost of transporting ore and coal by rail across Australia on the E-W line and producing slab at each end, then shipping the slab to Asia as opposed to the conventional method of shipping ores and coals from Australia to a slab plant in Asia.

Based on the 2007/08 rates quoted in the PIB model, EWLP assume that this logistical saving amounts to US$10.6/te saving based on the exchange rate of AS$1=US$=0.75 and producing 21.9MT of slab at each complex.

TSC has reviewed these figures and would not have any comments regarding the rail and handling costs within Australia. The areas where TSC would comment however are on the shipping rates used.

PIB Shipping Rates

PIB have assumed a Capesize shipping rate of coal from Abbot Point to Asia for A$35/Te, which is equivalent to US$26.25/te based on the model exchange rate. Similar figures for iron ore are US$21/te and slab shipping of US$33.75/te.

Trends in Shipping Rates

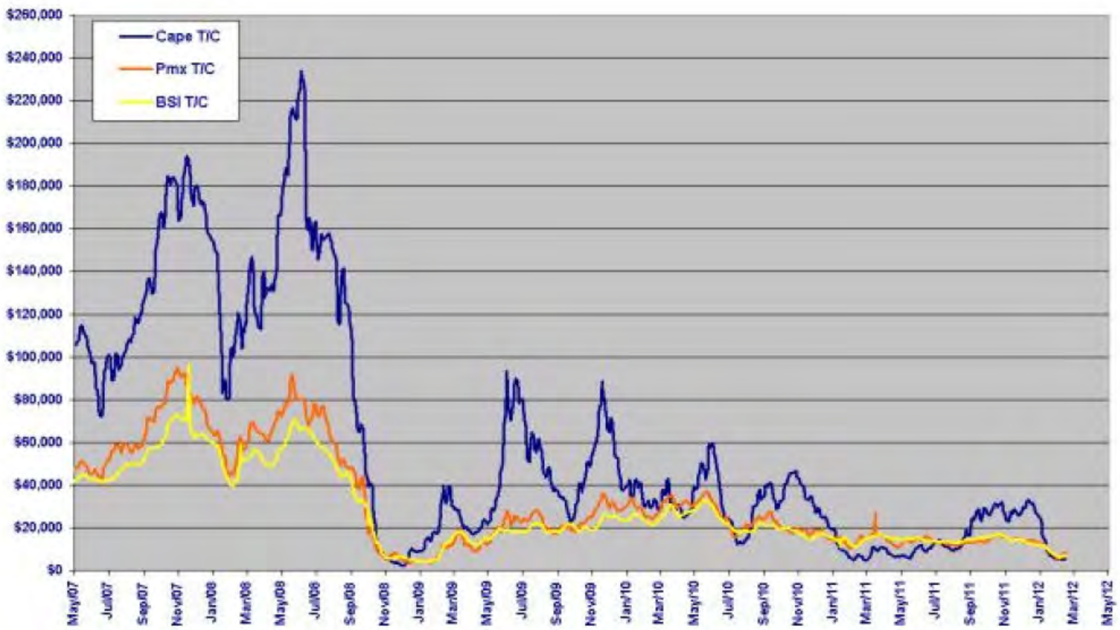
Shipping of ores, coals and steel slabs are driven by supply and demand of shipping. Throughout 2007/08, the cost of shipping was at record highs and subject to large volatility up to the point of the Global Financial Crisis. The inbalance between supply and demand within the shipping industry meant that there was an insufficient cargo space available, prompting high shipping prices.

Over this period a massive construction programme of bulk carriers took place, to the extent that since 2005 the world bulk fleet capacity has nearly doubled in size. The United Nations Conference on Trade and Development Review of Maritime Transport 2011 concluded that:

"The surge in vessel supply is the result of orders placed before the economic crisis. This, combined with lower than-expected demand, has led to a situation where there is an excess supply of shipping capacity. In the dry bulk and container sectors especially, analysts forecast an oversupply of tonnage in coming years. In both sectors, recent and upcoming record-sized new buildings pose a further challenge to owners, who will need to find cargo to fill their ships."

The above is summarised in the relative Daily Charter rate produced by Dryships.com.

As an example, the daily charter rate of a Capesize ship was around US$100,000/day in early 2007 rising to over US$220,000/day in June 2008.



Current charter rates quoted are as follows:

	Hire Period	Period Rate US$/Day
Cape Size – Pacific Delivery	1 year	17,200
	3 years	17,000
	5 years	18,500
Panamax – Pacific Delivery	1 year	12,200
	3 years	13,000
	5 years	14,500

For the purposes of this study TSC has used corporate 2011 screening values for shipping based on $30,000/day for a capsize ship, a figure significantly higher than the charter rates shown above.

On the basis of the above analysis TSC has reviewed the PIB cost model for this element and produced the following comparison.

	EWLP Estimate			**TSC Estimate**		
	Quantity	***Rate***	***Annual cost***	***Quantity***	***Rate***	***Annual cost***

	Mtpa	***A$/t***	***A$M***	***Mtpa***	***A$/t***	***A$M***
COAL						
Rail to port	39.6	6	237.6	29.146	6	174.876
Qld Port charge	39.6	3.5	138.6	29.146	3.5	102.011
		EWLP Estimate			**TSC Estimate**	
Demurrage	39.6	3	118.8	29.146	3	87.438
Shipping (Cape size)	39.6	**35**	1386	29.146	**14**	399.16141
Port charge-destination	39.6	3	118.8	29.146	3	87.438
Demurrage	39.6	2	79.2	29.146	2	58.292
Transport to mill	39.6	3	118.8	29.146	3	87.438
	Totals	**55.5**	**2197.8**	***Totals***	**34.2**	**996.65441**
IRON ORE						
Rail to port	65.8	7.5	493.5	64.9	7.5	486.8
WA Port charge	65.8	2	131.6	64.9	2	129.8
Demurrage	65.8	2	131.6	64.9	2	129.8
Shipping	65.8	**28**	1842.4	64.9	**12**	764.3
Port charge	65.8	2.5	164.5	64.9	2.5	162.3
Demurrage	65.8	2	131.6	64.9	2	129.8
Transport to mill	65.8	2	131.6	64.9	2	129.8
	Totals	**46**	**3026.8**	***Totals***	**29.8**	**1932.5**
Total			**5224.6**			**2929.1**
ABBOT POINT SMELTER PARK						
	Quantity	***Rate***	***Annual Cost***	***Quantity***	***Rate***	***Annual Cost***
	Mtpa	***A$/t***	***A$M***	***Mtpa***	***A$/t***	***A$M***
Rail coal to APSP	19.8	6	118.8	14.57	6	87.4
Rail iron ore to APSP	32.9	**36.13**	1188.8	32.45	**36.13**	1172.5
Steel to ship	21.9	**1**	21.9	22	**1**	22.0
Demurrage	21.9	0	0.0	22	0	0.0
Port charge (AP)	21.9	5	109.5	22	5	110.0
Shipping	21.9	**45**	985.5	22	**14**	297.9
Port charge (East Asia)	21.9	3	65.7	22	3	66.0
Demurrage	21.9	0	0.0	22	0	0.0
Port to mill	21.9	2	43.8	22	2	44.0
		Total	**2534.0**		***Total***	**1799.9**
NEWMAN SMELTER PARK						
Rail iron ore to NSP	32.9	**1.44**	47.4	32.45	**1.44**	46.7
Rail coal to Moranbah Hub	19.8	3	59.4	14.57	3	43.7
Tranship at Hub	19.8	**2.5**	49.5	14.57	**2.5**	36.4
Rail coal to NSP	19.8	**32.12**	635.9	14.57	**32.12**	468.0
Steel to NSP stockyard & load	21.9	**1**	21.9	22	**1**	22.0
Train to Port Hedland	21.9	**3.5**	76.7	22	**3.5**	77.0
Stockyard & ship load	21.9	**4**	87.6	22	**4**	88.0
Port charge (Port Hedland)	21.9	0.3	6.6	22	0.3	6.6
Demurrage	21.9	0	0.0	22	0	0.0

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	EWLP Estimate			TSC Estimate		
	Quantity	***Rate***	***Annual cost***	***Quantity***	***Rate***	***Annual cost***
	Mtpa	***A$/t***	***A$M***	***Mtpa***	***A$/t***	***A$M***
Shipping	21.9	**45**	985.5	22	**11**	243.0
Port charge (East Asia)	21.9	3	65.7	22	3	66.0
Demurrage	21.9	0	0.0	22	0	0.0
		EWLP Estimate			TSC Estimate	
Port to mill	21.9	2	43.8	22	2	44.0
		Total	**2079.9**		***Total***	**1141.5**
Total			**4613.9**			**2941.4**
Saving ASM			**610.7**			**-12.2**
Saving US$M			**458.0**			**-12.8**
Saving US$/Te			**$10.46**			**-$0.29**

On the basis of the above, the potential savings for supply chain consolidation have been eroded due to the lower cost of shipping which is likely to remain so in the medium term.

2.4.4 Sales of Surplus Energy

The PIB model evaluates the benefit of energy sales at some A$M297 which is equivalent to some US$5.16 per tonne of slab produced.

The TSC work estimates that energy sales will amount to some US$10.18 per tonne of slab produced. In addition to this there is a further US$13.51 benefit in terms of sales of By-products.

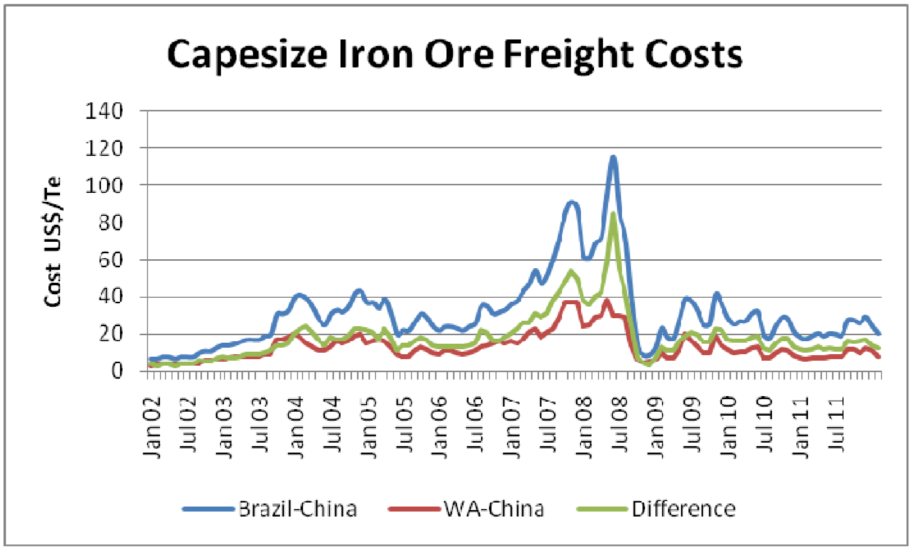
Due to the scale of the proposed steel facilities there are other potential options to generate more surplus energies as stated in section 7.5 of the Prefeasibility report. As yet these have not been evaluated in detail.

2.4.5 Brazil versus Port Hedland for Shipping Iron Ore to East Asia

The analysis work in section 2.4.3 above was on the base case assumption that all ores and coals would be shipped from Australia. The PIB model is based on 40% of the iron ores coming through a longer shipping route from Brazil.

The model assumes that supplementing this iron ore supply from Australia would save an additional US$15.2 per tonne of slab on top of the supply chain consolidation.

An analysis of historic shipping rates shows the following from SBB in terms of Capesize ore freight rates on the Brazil – China and Western Australia-China routes.



It can be seen from the above graph that the same volatility is present as per the freight hire cost graph in section 2.4.3. The PIB assumptions made in 2007/8 indicated a difference of some US$38 per tonne of ore in favour of WA. The more likely figure moving forward is in the range $20-22 per tonne of ore, which would equate to a cost saving of US$8-9 per tonne of slab.

2.4.6 Environmental CO_2 Savings

The PIB model indicates a saving of 8.69 MTPA in CO_2 production. This is made up of savings in shipping, reduced energy consumption and selling of surplus energy for local use. The bulk however is due to shipping savings

The financial benefit of this saving has been evaluated on the basis that carbon dioxide emissions will be charged at a rate of US$20 per tonne of CO_2 which equates to a slab cost saving of US$4.0 per tonne of slab.

The worldwide development of Emissions Trading is still in its early stages, as yet there is not a "level playing field" with regards to this strategy. The latest view on trading in Australia is a fixed starting price of AU$23/t$CO_2$e (US$24.15) from 1st July 2012 then rising at 5% per year. This is compared with for example the current price of the EU ETS traded price of around US$12/ t$CO_2$e.

TSC would need to study the situation of emissions trading in Australia and the Far East to comment on this element further.

2.4.7 Summary of OPEX Savings

The PIB and TSC views on OPEX savings can be summarised as follows comparing the Base and Developed cases:

Item	EWLP View US$/Tonne Slab	TSC View US$/Tonne Slab
Beneficiation of Magnetite in the blend	34	?

Precinct Shared Services	16	-5.98
FOB Slab steel supply chain consolidation	10.46	-0.29
Sales of surplus energy	5.2	0*
Brazil vs Port Headland	15.2	8.5
Environmental CO_2 saving	4	?

*There is no difference in terms of energy saving between the base and developed cases, both plants were based on using identical modern technology. The cost of slab however in both cases is offset by $23.69tonne due to sales of excess energy and by-products.