Coal Prices in New Zealand Markets: 2013 Update

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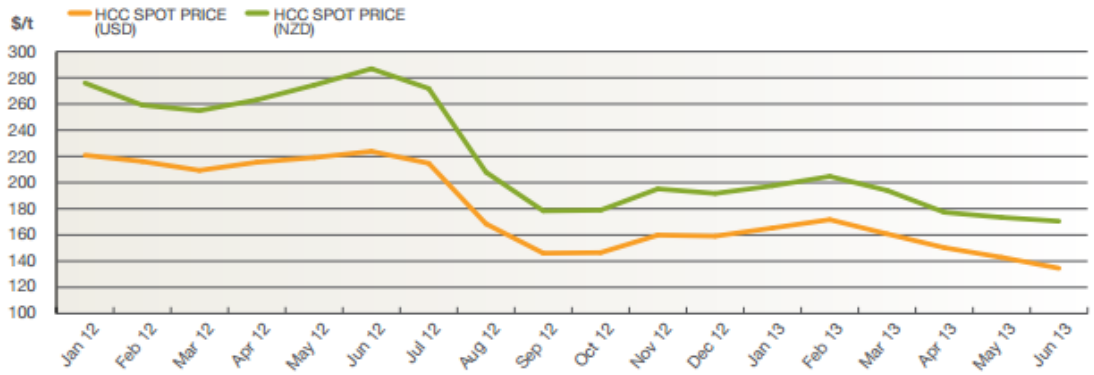
1 Introduction

Covec provided MED (now MBIE) with a report on coal prices in New Zealand in 2009 and an updated report in 2011. These reports provided an overview of current prices in different markets in New Zealand and projections of future prices. This report revisits and updates that analysis.

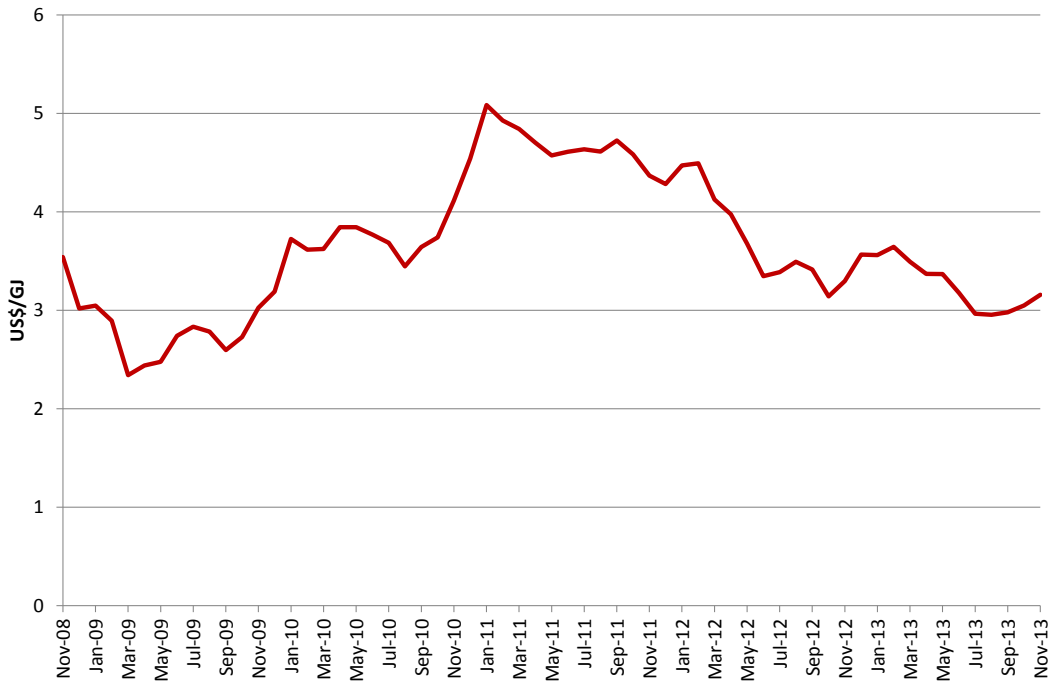
Since the release of our 2011 report coal prices have fallen significantly. Figure 1 shows the fall in prices for hard coking coal since 2012 and Figure 2 shows changes in thermal coal prices based on the export price of Australian coals; as with coking coal, prices have fallen significantly since 2011.

Figure 1 Hard coking coal spot price



Source: Solid Energy NZ Annual Report 2013

Figure 2 Australian thermal coal price (FOB Newcastle, Australia)



Note: calorific value = 12,000 btu/lb (27.91MJ/kg)
Source: Index mundi www.indexmundi.com/commodities/?commodity=coal-australian&months=60

This drop in prices combined with the continued high value of the New Zealand dollar has resulted in very significant reductions in revenues for exporters. However, the fall in prices will have resulted in favourable conditions for a number of firms that are importing coal.

The reductions in price for metallurgical coals have been attributed to over-supply.[1] However, market responses, including some international mine closures are expected to result in rebalancing of supply and demand, ensuring that prices do not fall further.[2] For thermal coals, the Australian Bureau of Resources and Energy Economics (BREE) notes that "*Although import demand has been growing, an abundance of seaborne supply has pushed prices down. The recent completion of key transport infrastructure in China has lowered the cost of delivering domestic coal to southern regions, putting additional pressure on landed coal prices. Moreover, an increasing preference for lower calorific coals has reduced the premiums paid for higher quality valued coals.*"[3]

In this report we use historical reported data for NZ market prices, including company reports and import data from Statistics NZ. For future prices we use projections from international coal analysts and combine these with historical relationships between international and domestic NZ prices. This is supplemented by discussions with NZ coal users to obtain a reality check.

[1] BREE Resources and Energy Quarterly September Quarter 2013
[2] Solid Energy New Zealand Annual Report 2013.
[3] BREE (op cit)

All prices quoted in the report are exclusive of costs of carbon allowances (New Zealand Units). The current and future prices are in real 2013 dollar values.

2 International Coal Prices

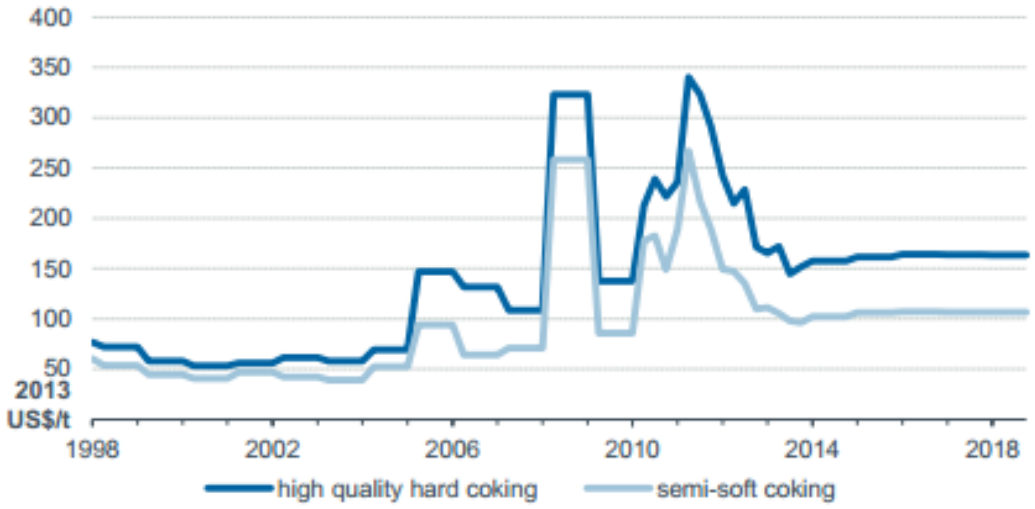
Because a number of the prices below are based on underlying international coal price projections, we firstly update our international price projections.

2.1 Benchmark Australian Prices

We noted in a previous report that New Zealand export and import prices tend to be set with reference to the annual settlement price for Australian exports to Japanese steel (metallurgical or coking coal) and thermal coal markets. These settlement prices are closely linked to spot prices. The Australian Bureau of Resources and Energy Economics (BREE) notes that the metallurgical contract prices for 2013 will average around US$159/tonne and that the 2013 Japanese financial year (to March 2014) benchmark contract price for thermal coal settled at US$95/t, down from US$115/t in JFY2012.[4]

Figure 3 and Figure 4 show the benchmark (settlement) prices for metallurgical and thermal coals respectively and future projections by BREE.

Figure 3 Metallurgical coal benchmark prices, FOB Australia



Source: BREE Resources and Energy Quarterly September Quarter 2013

Table 1 shows recent (October 2013) consensus forecast of coal prices as reported by Metal Expert Consulting and based on forecasts by a number of individual analysts; the numbers are similar to those represented in the figures above. Individual projections are shown in Table 15 in Annex 1 dating from April 2013 (the detailed results were not presented in the October dataset); comparing the April and October forecasts also illustrates the extent to which short-term forecast of prices have fallen in recent months.

We report and use the latest data, but we note that some industrial prices are set in contracts for several years and the prices agreed will depend on their timing. NZ Steel,

[4] BREE Resources and Energy Quarterly September Quarter 2013

for example, agreed a contract price with Solid Energy in August 2013 for the next five years.

Figure 4 Thermal coal benchmark prices, FOB Australia - 6000 kcal/kg (25.1 GJ/t)

Source: BREE Resources and Energy Quarterly September Quarter 2013

Table 1 Coal price forecasts (FOB Australia) by industry & financial analysts (October 2013) (2013 US$/t)

	Coking			Thermal[1]		
Analyst	**2013**	**2015**	**Long-term**	**2013**	**2015**	**Long-term**
Consensus forecast	156	174	169	89	95	99
Forecast (max)	170	228	200	95	110	113
Forecast (min)	144	129	130	75	69	78

[1] All thermal prices based on 6,600kcal/kg gross as received (27.6 GJ/t) coal
Source: Metal Expert Consulting
http://metalexpertresearch.com/research/en/global_steam_coal_price_forecast_(october_2013).html?OpenDocument
http://metalexpertresearch.com/research/en/global_coking_coal_price_forecast_(october_2013).html?OpenDocument

We do not have access to the range of individual analyst reports as used by Metal Expert Consulting. However, a spot check using one (Macquarie Securities) shows the following shift in expectations of short-run prices over the last few months.

Table 2 Macquarie coal price forecasts (FOB Australia) (2013 US$/t)

	Coking			Thermal		
Price forecast	**2013**	**2015**	**Long-term**	**2013**	**2015**	**Long-term**
April 2013(1)	185	215	155	90	90	85
September 2013(2)	159	180	155	95	96	85
% change	-14.1%	-16.3%	0.0%	5.6%	6.7%	0.0%

Source: (1) Table 15 in Annex 1; (2) Macquarie Securities (Australia) Limited. Research. Australian Mining. 26 September 2013

2.2 Indonesian Prices

In our 2009 report we noted that Indonesian coal sells at an approximate US$10-15/t discount relative to Australian prices. This comparison needs to take account of differences in calorific values. Spot prices for Indonesian coal over 2013 have been in the order of US$69-75/t for 5,800 kcal/kg (24MJ/kg) (gross as received) thermal coal. Converting this all to the same 6,600kcal/kg coal as used by Metal Expert Consulting (Table 1), suggests prices of US$78-85/t, a US$5-11/t discount on Australian benchmark prices. We assume a US$10/t reduction at a standardised energy value (equivalent to a reduction of US$0.36/GJ); this is at the lower end of the previous range used and within the range for 2013 prices internationally.

2.3 Impact of Carbon Prices and Policies

Although the prices included in this report do not include a carbon price, international prices are expected to be influenced by international carbon prices and policies because of the impacts on global demand for coal. The impacts are more likely on thermal coal prices for which there are available substitutes than for steel-making for which coal provides both a heat source and a component in the chemical process.

The IEA price forecasts under different scenarios are shown in Table 3. It is difficult to relate these forecasts to the forecasts of market analysts as we do not know what assumptions have been made in terms of supply and demand assumptions by the individual analysts. The "current policies" price forecasts of the IEA are higher than current consensus market forecasts (Table 1) and the long run price forecasts are close to the lowest of the range of analyst forecasts. Rather than shifting the whole range of prices downwards, we assume that stringent international carbon policies would be consistent with the lower end of the range of international price forecasts.

Table 3 OECD Steam Coal Import Prices (2012 US$/t)

Scenario	2012	2020	2025	2030	2035
Current policies	99	112	116	118	120
New policies		106	109	110	110
450 Scenario		101	95	86	75

Source: IEA (2013) World Energy Outlook 2013

2.4 Forecasts

We use the data in Table 1 to update the international price forecasts in Table 4; it includes a range of possible prices and "most likely" price forecasts. Energy value is not relevant for coking coals which are exported from New Zealand, but not imported, and we keep these values on a $/tonne basis. Metal Expert Consulting has "adjusted all the available prices to a common benchmark basis – the FOB Australia price for 6,600 kcal/kg [27.6 GJ/t] steam coal" and we use this value to convert the thermal coal values to a $/GJ basis.

Table 4 Revised International Price Forecasts (FOB Australia and FOB Indonesia) for 27.6GJ/t coal and 24GJ/t

	Hard Coking Coal (Steel-making)	Thermal Coal (Australia)		Thermal Coal (Indonesia)	
	US$/tonne[1]	US$/tonne[1]	US$/GJ[1]	US$/tonne[1]	US$/GJ[1]
2013	$160	$90	$3.26	$70	$2.90
2015	$130 - $230 ($175)	$70 - $110 ($95)	$2.54 -$3.99 ($3.44)	$52 - $87 ($74)	$2.17 -$3.62 ($3.08)
2020+	$130 - $200 ($170)	$80 - $115 ($100)	$2.9 -$4.17 ($3.62)	$61 - $91 ($78)	$2.54 -$3.8 ($3.26)

Energy content assumptions: 27.6 GJ/t (Australia) and 24 GJ/t (Indonesia)

[1] Range and most likely prices (in parentheses)

2.5 Freight Costs

Freight costs apply to imports and exports of coal. In general these costs are commercially sensitive. We do not provide forecasts of export prices for NZ coals as the main interest is in prices paid by coal users. We estimated freight costs for coal to New Zealand as $17.50/t in our 2009 report based on information provided directly by industry contacts. We note recent sources of costs include US$12.20/t (NZ$15.25/t) for transport from the US to Brazil[5] and coalspot.com has prices that vary from US$11/t (NZ$13.75/t), from Indonesia to Taiwan to US$24/t (NZ$30/t) from Queensland to India.[6] In this report we are concerned largely with import prices and assume prices of US$17.50/t (NZ$21.88/t) (Australia-NZ) and US$20/t (NZ$28.13/t) (Indonesia-NZ). These calculations all assume a current exchange rate of US$0.80:NZ$1.

3 Huntly Electricity Generation

Genesis Energy purchases sub-bituminous coal under contract from Solid Energy's Rotowaro mine and imports some from Indonesia.

3.1 Current Prices

The price paid for coal by Genesis Energy in recent years can be estimated from the value of the stockpile as included in its Annual Report. The values are shown in Table 5. The 2013 Annual Report states that "*Inventories are recognised at the lower of cost and net realisable value. Cost is determined using the weighted average cost basis which includes expenditure incurred in bringing each inventory to its present location and condition, including shipping and handling. Net realisable value is the estimated selling price in the ordinary course of business less the estimated costs necessary to make the sale.*" Given this, these figures may underestimate the purchase costs of the coal as the lowest value may be the selling price net of the cost of sales. However, the value of the stockpile is taken from an item in the Annual Report relating to the value of the fuel inventory; a note to the table states that this "consists mainly of coal used in electricity generation". These two factors have implications for fuel costs in different directions. We assume that they balance and take a price of $5.10/GJ as likely to be a reasonable estimate of current costs at Huntly.

[5] http://www.steelonthenet.com/freight.html

[6] http://www.coalspot.com/

Table 5 Estimated cost of domestic coal – Huntly

Year to 30 June	Stockpile (kt)	Stockpile (PJ)[1]	Fuel stock value ($'000)	Coal price/value ($/GJ)
2012	1,059	22.3	105,995	4.75
2013	877	18.5	94,538	5.11

[1] Uses gross calorific value of 21.08MJ/kg for Rotowaro from Energy Data File 2012
Source: stockpile size from Genesis Energy Quarterly Report Quarter Four 2012/13; fuel stock value from Genesis Energy Annual Report 2013.

Statistics NZ reports imports of sub-bituminous Indonesian coal for 2011, but nothing since that date.[7] The average price of sub-bituminous imports was $105/t or $4.77/GJ assuming a gross calorific value of 22GJ/t.[8] In addition there will be transport costs from the port, estimated as $20/t ($0.91/GJ),[9] making a total of approximately $5.68/GJ.

3.2 Future Prices

The future price of coal at Genesis Energy's Huntly coal plant is uncertain as this report is written during the negotiations of a new contract. In its 2013 Annual Report, Solid Energy notes that "*In August 2013, we successfully concluded negotiations to agree a new five-year North Island supply arrangement with long-term customer, New Zealand Steel and negotiations are well advanced on a four-year North Island supply arrangement with Genesis Energy.*" The terms had not been agreed as of December 2013. Solid Energy went on to note that "*these customers' ability to import similar thermal grades of coal effectively caps the price we receive for our North Island product. As an indication, the price of Newcastle thermal coal, an indicator of the international thermal market, has dropped 35% in the last 18 months ...*" This suggests that Solid Energy had an expectation of reduced prices in the new contracts, and this appears to be confirmed for NZ Steel (see below). However, because they are multi-year contracts, the prices would not be expected to reflect short-term price troughs. Thus a continuation of current prices in real terms is not an unreasonable starting point for estimates of future contract prices. First we examine the expectations for future import costs as these set an upper ceiling on price.

In Table 6 we estimate the costs of importing coal from Australia and Indonesia. We take the 2013 Australian thermal price from Table 4; the Indonesian price is assumed to be a US$10/t discount at an equivalent energy value or US$0.36/GJ (see Section 2.2). We take freight costs of US$17.50/t and US$20/t respectively for Australian and Indonesian coals (Section 2.5). We estimate import prices of NZ$5.50 – 5.59/GJ for 2013 and include a range and "most likely" estimates for 2015 and 2020. Internal freight costs have been estimated at NZ$20/t based on rail from Tauranga to Huntly (see above). As a check on these prices, Table 10 below reports the costs for Golden Bay Cement of importing thermal coal from Australia in 2013; the cif costs are estimated at NZ$138/t ($5.10/GJ) at Whangarei using Statistics NZ data, compared with $134/t as calculated in Table 6.

[7] We understand that these figures have not been reported following an industry request relating to confidentiality of the data
[8] This is the cif (costs, insurance and freight) cost divided by the quantity (tonnes) of imports
[9] This is a price for rail freight from Tauranga to Huntly. It is estimated relative to freight prices of approximately $40/tonne for shipping coal from Greymouth to Lyttleton; this is a much shorter and easier journey.

Table 6 Estimated costs of importing Australian and Indonesian thermal coal

	Australian coal		Indonesian coal	
Element	**Cost (US$)**	**Cost (NZ$)**	**Cost (US$)**	**Cost (NZ$)**
2013 FOB price	$90		$70	
Freight to NZ	$17.50		$20	
Landed price (cif) NZ	$108	$134	$90	$112
Internal freight		$20		$20
Total ($/t)		**$154**		**$132**
Total ($/GJ) 2013		**$5.59**		**$5.50**
Total ($/GJ) 2015		**$4.69 - $6.5 ($5.82)**		**$4.59 - $6.4 ($5.72)**
Total ($/GJ) 2020		**$6.61 - $8.73 ($7.82)**		**$6.45 - $8.56 ($7.66)**

Exchange rate: US$0.82:NZ$1 for 2013 and 2015, US$0.60:NZ$1 for 2020
Source: 2013 price taken from Table 4 and assuming calorific value of 27.6 GJ/t (Australia) and 24GJ/t (Indonesia) (as used for Table 4 prices)

These estimates of import prices are based on coal with different energy contents to the domestic coal used at Huntly (locally sourced coal is 22 GJ/t). Power plants and other users of thermal coal are purchasing its energy content, so estimating prices (on an energy basis, ie $/GJ) for a coal with a different calorific value is still appropriate. However, care needs to be taken with transport costs as these apply per tonne transported; this requires either:

- that the coals used for making price estimates have an energy content typical of coals that potentially would be imported; or
- for more generalised prices to be adjusted to take account of the energy value of coals likely to be imported.

Low calorific coals, such as used at Huntly, are more likely to be imported from Indonesia than from Australia. Thus the Indonesian price estimated in Table 6 provides a useful ceiling price.

Another possible input to the price agreement might be the potential sales price for the coal if Genesis Energy chooses not to purchase, eg it scales back coal-fired generation. This might be the thermal coal export market[10] which could provide a theoretical lower bound to the price, but it is more likely that alternative domestic markets would be sought for such a low value coal (if exported).

Historically the price paid by Genesis Energy has been at a discount over the import price. This reflects the fact that both sides have some market power in the contract negotiations: Solid Energy's ability to raise the price to the import price is constrained because they lose if Genesis Energy chooses to import – there is no other large customer for this coal. This suggests that there is likely to be some discount below the import

[10] This will be the international benchmark price (US$90/t = US$3.26/GJ) which is specified as FOB Newcastle; we might presume that the transport costs to export markets will be approximately the same as from New Zealand so the FOB price at Tauranga might be similar (US$69/t or NZ$86/t for 22GJ/t coal). The price in Huntly would be less the costs of transport to port (assumed to be NZ$20/t for domestic freight); the price reduces to NZ$66/t or $2.41/GJ.

price in the new contract. However, in the longer run consumption of coal by Genesis Energy is expected to reduce significantly, particularly reflecting expected future increases in carbon prices. By 2020 we would expect prices to rise to the import price. Although there may be a contract that determines price, for modelling purposes we suggest using the estimated spot price for imports.

We base the short run (new contract) price on the value of the current stockpile and this is assumed to stay the same in real terms for the new contract period (2014-17). After that we assume that prices will rise to reflect import prices. We assume that future prices (2020 and beyond) will be in the range of $6.40 - $8.60/GJ, with a "most likely" estimate of $7.50/GJ (Table 7); these are based on rounding the Indonesian import costs and using a 2020 exchange rate of US$0.6:NZ$1.[11] Table 7 includes suggested prices for the 450 (low carbon) scenario based on the lowest price in the range of possible prices.

Table 7 Price recommendations for modelling – Huntly (2013 prices)

Period	Range ($/GJ)	Suggested price for modelling ($/GJ)	Suggested price (450 scenario) ($/GJ)
Current	$5.10	$5.10	$5.10
2015	$4.50 – $6.50	$5.10	$4.50
2020 forward	$6.40 - $8.60	$7.50	$6.40

4 Other Electricity Generation

We base the estimates of other electricity generation on imported Indonesian coal prices. We assume that the location of any plant will be chosen to limit the transport costs, so we continue with the assumption of $20/t.

Table 8 Estimated costs of coal for new coal electricity generation

Time period	Price ($/GJ)
2013	$5.50
2015	$4.60 - $6.45 ($5.75)
2020+	$6.40 - $8.60 ($7.50)

Source: Table 6

Lignite prices will be set domestically. We note that additional coal for Edendale dairy factory is priced at approximately $2.75/GJ. This is from an existing mine. It is likely that a power plant would be located near a mine but would face mine development costs. We assume costs would be in the order of $3.50 - $4/GJ.

5 Industrial Coal Prices

5.1 NZ Steel

In 2009 we reported that the price paid for coal by NZ Steel had risen to over $6.50/GJ.[12] This was based on data included in the Tasman Steel Annual Report. The latest Annual

[11] As agreed with MBIE. A range of different exchange rates are used by MBIE for modelling purposes.
[12] Covec (2009) Coal Prices in New Zealand Markets. Report to MED.

Report notes that a new contract was entered into in August 2013 with Solid Energy to purchase coal, that the term of the contract is five years, with a value of $400 million.[13] Annual purchases from Solid Energy are typically 0.77 million tonnes of coal that is railed to Glenbrook.[14] Assuming that the contract is for some proportion of this, say 0.70–0.75 million tonnes per annum, suggests a price of $107-114/t or approximately $4.85 - $5.20/GJ (assuming 22GJ/t). This is an approximate 20-25% price reduction from the previous contract and might be confirmed by the statement in the Solid Energy Annual Report as noted above, ie that NZ Steel's and Genesis Energy's "*ability to import similar thermal grades of coal effectively caps the price we receive for our North Island product. As an indication, the price of Newcastle thermal coal, an indicator of the international thermal market, has dropped 35% in the last 18 months…*"

In addition, a recent Fairfax Media report notes that the price agreed is 40% above the price that was paid up until 2008.[15] Our understanding is that the price paid under that earlier contract was approximately $3.50/GJ; a 40% increase above this would be $4.90/GJ, which is within the range suggested above.

5.2 Dairy Processing

5.2.1 Fonterra – Edendale

The Edendale dairy factory has a contract for lignite coal supply through to 2025 at a low price. The coal is sourced from the Solid Energy-owned New Vale Mine located on the Waimumu lignite coal field east of Mataura, Southland. In 2009 we noted that the price was below $2/GJ but that the plant is looking to expand and would be expected to pay a more commercial rate for these new coal purchases, estimated at approximately $2.67/GJ as an ex-mine price (the factory is close to the mine).

In 2011 we estimated the weighted average price paid at Edendale as being $1.95/GJ based on an original contract price of $1.80/GJ and a price of $2.70 for additional consumption following plant expansion.

We have no data that would change this view and continue with these assumptions.

5.2.2 Fonterra – Clandeboye (Sub-bituminous)

Clandeboye dairy factory obtains coal largely from the Takitimu mine in Nightcaps, Southland. In 2011 we estimated the delivered price as $6.12/GJ based on an ex-mine price of $66/t. Bathurst Resources (NZ) that operates the Takitimu mine, plus mines in Buller (Cascade) and Canterbury, notes that contract prices are currently $110-$120/tonne, with estimated average production costs of $70-80/tonne.[16] Southland was the dominant source of its coal so average costs are also likely to be significantly influenced by Takitimu production costs and the Clandeboye contract.

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[13] Tasman Steel Holdings Limited and Subsidiaries 2013 Annual Report

[14] Pattrick Smellie (2012) NZ Steel 'emotionally committed' to Solid Energy coal. National Business Review. September 26, 2012; Bluescope Steel (2013) BlueScope Australia & New Zealand (BANZ) Investor Briefing Day. Presentation.

[15] http://www.stuff.co.nz/business/727559/Solid-Energy-gets-NZ-Steel-deal

[16] Bathurst Resources (New Zealand) Ltd Investor Presentation November 2013.

We increase the assumed ex-mine price to $75/t and assume the same transport cost in estimating a delivered price of $6.58/GJ.

Table 9 Clandeboye Price Estimates

Cost element	2010	2013
Mine price ($/t)	$66.27	$75
GJ/t	19	19
$/GJ	$3.49	$3.95
Delivery ($/t)	$50	$50
Delivered ($/t)	$116.27	$125.00
Delivered ($/GJ)	$6.12	$6.58

5.3 Bituminous

The main domestic industrial user of bituminous coal is Golden Bay Cement (GBC). Costs can be estimated from import costs published by Statistics NZ (Table 10). As with prices in general, import costs have fallen in 2013. There were effectively no imports of Australian bituminous coal in 2012; this is partly explained by GBC's shift to use biomass as an energy source for some percentage of its fuel requirement, but this does not explain all of the drop in quantities.

In our earlier report we provided an estimate of costs building up from the different components. We reproduce this as an updated set of data in Table 11. The GBC imports are bituminous with an energy value of approximately 27GJ/t;[17] the pricing is based on a thermal fuel price, in the same way as for imports for electricity generation above.

Table 10 Estimates of import costs for Golden Bay Cement

Year	Tonnes	Costs (cif $)	$/t	$/GJ (@27GJ/t)
2007	85,560	7,269,887	85.0	3.15
2008	79,631	6,339,886	79.6	2.95
2009	92,891	17,182,863	185.0	6.85
2010	59,365	8,734,689	147.1	5.45
2011	54,317	9,033,047	166.3	6.16
2012	885			
2013	31,212	4,300,434	137.8	5.10

Source: Statistics NZ Infoshare (imports of bituminous coal from Australia)

The 2013 cost estimate in Table 11 are very similar to the StatsNZ data on costs in Table 10; this provides some confirmation for the numbers used in calculations.

[17] Between 2002 and 2009, New South Wales bituminous coals used by GBC ranged in calorific values between 26.51 to 27.34 MJ/kg (Hennessy W and Matheson T (2009) Review of Default Emissions Factors in Draft Stationary Energy and Industrial Processes Regulations: Coal. CRL Report for Ministry for the Environment).

Table 11 Golden Bay Cement Coal Costs Estimate

	2011	2013	2015	2020-35
Coal price (Newcastle thermal) (US$/t)	130	90	70 - 110	80 - 115
Freight to Whangarei/Marsden Point (US$/t)	15	17.5	17.5	17.5
Landed price (US$/t)	145	107.5	87.5 - 127.5	97.5 - 132.5
Landed price (NZ$/t)	181	134	109 - 159	163 - 221
Local transport cost (NZ$/t)	5	5	5	5
Total ($/t)	186	139	114 - 164	168 - 226
$/GJ (@ 27MJ/kg)	**6.90**	**5.16**	**4.24 - 6.09**	**6.2 - 8.36**

Exchange rate: US$0.82:NZ$1 for 2013 and 2015, US$0.60:NZ$1 for 2020

5.4 Sub-Bituminous and Lignite

5.4.1 Relationship to International Price

Costs for sub-bituminous coals for large industrials are likely to be similar to those for new electricity generation (Table 8). The definition of large industrial is related to consumption rates and whether they can import coal directly versus having to purchase via a wholesaler. This comes down to whether the industry is large enough to purchase a shipload of coal on a regular basis. The smallest single loads of coal delivered to New Zealand ports are in the order of 30,000 tonnes.

Other large industrials are defined by their location next to a mine. For these plants the costs of coal transport is significantly large that it, rather than proximity to market, determines the location.

There are very few large industrials, however. Smaller industrial users in New Zealand are purchasing coal either directly from mine owners or via wholesalers that mix and blend coals to specification, including energy content and size categories.[18] The relationship between NZ and international coal prices is unclear. Industry contacts suggested to us that domestic supply costs and competition between domestic suppliers (mine operators) largely determines price. However, in the long run, prices could not rise significantly above import prices. Otherwise wholesalers could participate in the market by importing a shipload of coal and selling it over time, or current importers of coal may find that it is more profitable at the margin to sell coal domestically than to produce more output of their own product. This suggests that there will be some long run influence on price, and for modelling purposes, it is useful to assume a link. However, domestic competition is likely to mean prices do not change directly with international prices. For modelling purposes we suggest an approach in which prices move with international prices, but that price rises are limited to 2% per annum in real terms (or 3% per annum in our high price estimates).

Lignite is not traded internationally and is not transported over significant distances. We assume that prices will always bet set domestically based on costs of supply.

[18] This includes mixing bituminous and sub-bituminous coals with a low energy content to produce a higher energy content sub-bituminous coal.

5.4.2 Price Forecasts

Prices vary significantly currently between approximately $6/GJ and $10/GJ for sub-bituminous coals, and between $4 and $7/GJ for lignite. Typically delivered prices are made up of the components listed in Table 12. It shows potential prices for a range of possible scenarios.

We have noted previously a good "rough and ready" estimate used by industry is for transport costs to be $10/100km/tonne. We have included a range of transport costs in Table 12, with the assumption that lignite is not transported so far as sub-bituminous coals. Sub-bituminous coals are transported further than lignite, at a cost of up to $100/t. There are higher processing costs and/or margins than for lignite because it will often involve blending coals, eg bituminous and low calorific value sub-bituminous coals; it may also require preparation to meet size specifications.

Table 12 Components of Industrial Coal Prices – range and most likely (in parentheses)

	Sub-bituminous (25 MJ/kg)		Lignite (15 MJ/kg)	
Component	**$/t**	**$/GJ**	**$/t**	**$/GJ**
Ex mine price	110	4.40	40	2.67
Transport	20 – 100 (50)	0.80 – 4.00 (2)	10 – 50 (25)	0.67 – 3.33 (1.67)
Processing/margin	20 – 30 (25)	0.80 - 1.20 (1)	10	1.33
Total	150 – 240 (185)	6.00 - 9.60 (7.40)	60 – 100 (75)	4.00 – 6.67 (5.00)

Comparing these prices to those estimated for large industrials (the other electricity price as estimated in Table 8), a reasonable proxy for small industrials is to assume a $2/GJ margin. This would suggest the following prices (Table 13). We assume that lignite prices stay the same in real terms.

Table 13 Estimated industrial coal prices

Time period	Sub-bituminous Price ($/GJ)	Lignite Price ($/GJ)
2013	$7.50	4.00 – 6.67 (5.00)
2015	$6.60 - $7.95 ($7.75)	4.00 – 6.67 (5.00)
2020+	$8.50 - $9.50 ($8.75)	4.00 – 6.67 (5.00)

Source: Table 8 (plus $2/GJ margin or maximum price rise of 2% per annum or 3% per annum in high scenario)

6 Commercial Coal Prices

Commercial demand represents consumption by large institutions, eg hospitals and schools. Prices for commercial users of coal have a margin over those for industrial users of approximately $1-1.50/GJ. We have assumed a $1.25 margin on the basis that there has been no fundamental change in the sectors. A reasonable range and "most likely" price (in parentheses) for sub-bituminous and lignite is shown in Table 14.

Table 14 Estimated Commercial Coal Prices ($/GJ)

Time period	Sub-bituminous Price ($/GJ)	Lignite Price ($/GJ)
2013	$8.75	$5.25 - $7.92 ($6.25)
2015	$7.85 - $9.20 ($9.00)	$5.25 - $7.92 ($6.25)
2020+	$8.75 - $10.75 ($10.00)	$5.25 - $7.92 ($6.25)

Source: Table 13 (plus $1.25/GJ margin)

7 Price Projections

The price projections for the individual uses are provided in Annex 2. The sources for the different projections are noted below the Table. The prices shown are delivered based on broad assumptions about location of customers relative to supply sources (mines and import ports).

Annex 1: Additional Data

Table 15 Coal price forecasts (FOB Australia) by industry and financial analysts – April 2013, US$/t

	Coking			Thermal		
Analyst	**2013**	**2015**	**Long-term**	**2013**	**2015**	**Long-term**
Goldman Sachs	178	205		99	100	100
Deutsche Bank	178	180		95	100	95
ABARE	172	180	188	99	104	96
World Bank				93	90	100
Renaissance Capital	172	183	170	90	100	100
Citigroup Inc.	174	213	200	99	115	105
Macquarie Bank	185	215	155	90	90	85
Credit Suisse	171	190	170	98	118	110
CBA	165	195	172	96	100	91
Merill Lynch	183			95	100	103
ANZ	170	170		100	113	
ABN AMRO	173	160				
Consensus forecast	**175**	**190**	**173**	**96**	**103**	**99**
Forecast (max)	**185**	**215**	**200**	**100**	**118**	**110**
Forecast (min)	**165**	**160**	**155**	**90**	**90**	**85**

Source: Metal Expert Consulting
http://metalexpertresearch.com/research/en/global_coking_coal_price_forecast_(april_2013).html?OpenDocument

Annex 2: Price Projection Tables

The following tables summarises the price projections, building up from international price projections. The data shown in the detailed tables below use the "most likely" or central scenario, but alternative projections are estimated for the main body of the report for high and low scenarios using alternative inputs, as explained below. The starting assumptions are shown in Table 16.

Table 16 Assumptions used in projections

Assumptions	Value
Energy content	
Australia thermal	27.6 GJ/t
Indonesia thermal	24 GJ/t
Lignite	15 GJ/t
Indonesia discount	US$0.36/GJ
Industry margin (above import price)	NZ$2/GJ
Commercial margin (above industry price)	NZ$1.25/GJ
Industrial price rise limit	2% per annum 3% pa in high scenario

In Table 17 we show the assumed thermal benchmark prices for Australian coal with an energy content of 27.6GJ/t. This is combined with the assumptions in Table 16 to provide price projections for Indonesian coal.

Table 17 International price assumptions and estimates (2013$)

	Thermal benchmark (@ 27.6GJ/t) (US$/t)	Thermal benchmark (US$/GJ)	Indonesian (US$/GJ)	Indonesian (24 GJ/t) (US$/t)	Exchange rate (US$:NZ$1)
2013	$90	$3.26	$2.90	$70	0.80
2014	$92.50	$3.35	$2.99	$72	0.80
2015	$95	$3.44	$3.08	$74	0.80
2016	$96	$3.48	$3.12	$75	0.76
2017	$97	$3.51	$3.15	$76	0.72
2018	$98	$3.55	$3.19	$77	0.68
2019	$99	$3.59	$3.22	$77	0.64
2020	$100	$3.62	$3.26	$78	0.60
Long run	$100	$3.62	$3.26	$78	0.60

Low and high scenarios are undertaken using the alternative inputs for thermal benchmark price (27.6 GJ/t) as shown in Table 18. Prices in intermediate years are linearly extrapolated

Table 18 Alternative input assumptions (2013$)

Year	Low	High
2015	US$70/t	US$110/t
2020	US$80/t	US$115/t

In Table 19 we show estimates of prices for sub-bituminous coals in different NZ markets. This starts with the Indonesian import price for 24GJ/t coal. A landed price is estimated and this is converted to NZ$ values using the exchange rates in Table 17. A generalised market location is used to justify a domestic transport cost of NZ$20/t and this is converted to a $/GJ figure assuming 24GJ/t. The Huntly price is a contract figure and is assumed to be just below the international price for the new (2014-17) contract reflecting historical contract arrangements, but after this we assume that prices reflect import spot prices; Huntly (from 2018), new electricity and large industry is assumed to face this full Indonesian import cost. Costs for medium sized industry and for commercial customers is estimated from this base price, plus the margins shown in Table 16. Note the data in this table are rounded in producing price projections in "most likely" Table 8, Table 13 and Table 14 above.

Table 19 Projections of prices for sub-bituminous coals in different markets (2013$)

	Indonesian price	Shipping	Landed price	Landed price	Transport (internal)	Total	Total	Huntly Contract amount	Other Electricity/ large industry	Industry	Commercial
	US$/t	US$/t	US$/t	NZ$/t	NZ$/t	NZ$/t	NZ$/GJ	NZ$/GJ	NZ$/GJ	NZ$/GJ	NZ$/GJ
2013	$70	$20	$90	$112	$20	$132	$5.50	$5.10	$5.50	$7.50	$8.75
2014	$72	$20	$92	$115	$20	$135	$5.61	$5.10	$5.61	$7.61	$8.86
2015	$74	$20	$94	$117	$20	$137	$5.72	$5.10	$5.72	$7.72	$8.97
2016	$75	$20	$95	$125	$20	$145	$6.03	$5.10	$6.03	$7.88	$9.13
2017	$76	$20	$96	$133	$20	$153	$6.37	$5.10	$6.37	$8.04	$9.29
2018	$77	$20	$97	$142	$20	$162	$6.75	$6.75	$6.75	$8.20	$9.45
2019	$77	$20	$97	$152	$20	$172	$7.17	$7.17	$7.17	$8.36	$9.61
2020	$78	$20	$98	$164	$20	$184	$7.66	$7.66	$7.66	$8.53	$9.78
Long run	$78	$20	$98	$164	$20	$184	$7.66	$7.66	$7.66	$8.70	$9.95

Lignite prices are estimated in Table 20. These are based on NZ domestic supply costs and do not move with international prices. The ex-mine price is assumed to be $40/t and any use of lignite in electricity generation is assumed to be very close to a mine (transport costs are only $5/t). For dairy factories we include a separate delivered price for Edendale, the largest dairy factory, and a price for other dairy factories. These are assumed to be further away (energy costs are likely to be a lower proportion of total costs) and the transport costs are assumed to be $12.50/t to produce a rounded $3.50/GJ (at 15GJ/t). Industry is more likely to be located at a greater distance (energy costs will be even less significant in determining location) and are assumed to be double the dairy factory costs. There is an additional processing margin in which the lignite is prepared for use. Commercial prices are estimated using the same margin as for sub-bituminous coals (Table 16).

Table 20 Projections of prices for lignite in different markets (2013$)

	Lignite	Electricity			Edendale[1]	Other Dairy			Industry				Commercial
	Mine price (NZ$/t)	Transport (NZ$/t)	Total (NZ$/t)	Total (NZ$/GJ)	Total (NZ$/GJ)	Transport (NZ$/t)	Total (NZ$/t)	Total (NZ$/GJ)	Transport (NZ$/t)	Processing margin (NZ$/t)	Total (NZ$/t)	Total (NZ$/GJ)	Total (NZ$/GJ)
2013	$40	$5	$45	$3.00	$1.95	$12.50	52.50	$3.50	$25	$10	$75	$5.00	$6.25
2014	$40	$5	$45	$3.00	$1.95	$12.50	52.50	$3.50	$25	$10	$75	$5.00	$6.25
2015	$40	$5	$45	$3.00	$1.95	$12.50	52.50	$3.50	$25	$10	$75	$5.00	$6.25
2016	$40	$5	$45	$3.00	$1.95	$12.50	52.50	$3.50	$25	$10	$75	$5.00	$6.25
2017	$40	$5	$45	$3.00	$1.95	$12.50	52.50	$3.50	$25	$10	$75	$5.00	$6.25
2018	$40	$5	$45	$3.00	$1.95	$12.50	52.50	$3.50	$25	$10	$75	$5.00	$6.25
2019	$40	$5	$45	$3.00	$1.95	$12.50	52.50	$3.50	$25	$10	$75	$5.00	$6.25
2020	$40	$5	$45	$3.00	$1.95	$12.50	52.50	$3.50	$25	$10	$75	$5.00	$6.25
Long run	$40	$5	$45	$3.00	$1.95	$12.50	52.50	$3.50	$25	$10	$75	$5.00	$6.25

[1] Edendale price is a weighted average based on $1.80/GJ for 171,500 tonnes pa, $2.67/GJ for 35 tonnes pa and an energy content of 14.8GJ/t

Table 21 summarises the prices in the individual markets. The data in this table are rounded in producing "most likely" price projections in Table 8, Table 13 and Table 14 above.

Table 21 Summary of prices in individual markets (2013$)

	Industrial forecasts ($/GJ)			Commercial forecasts ($/GJ)		Electricity forecasts ($/GJ)			
	Industrial (excluding NZ Steel, elec gen) – Sub bit	Industrial (excluding NZ Steel, elec gen, dairy) - Lignite	New Dairy Lignite	Commercial - Sub bit	Commercial - Lignite	Huntly – Sub bit	New NI electricity generation - Sub bit	New SI electricity generation - Sub bit	New SI electricity generation - Lignite
2013	$7.50	$5.00	$3.50	$8.75	$6.25	$5.10	$5.50	$5.50	$3.00
2014	$7.61	$5.00	$3.50	$8.86	$6.25	$5.10	$5.61	$5.61	$3.00
2015	$7.72	$5.00	$3.50	$8.97	$6.25	$5.10	$5.72	$5.72	$3.00
2016	$7.88	$5.00	$3.50	$9.13	$6.25	$5.10	$6.03	$6.03	$3.00
2017	$8.04	$5.00	$3.50	$9.29	$6.25	$5.10	$6.37	$6.37	$3.00
2018	$8.20	$5.00	$3.50	$9.45	$6.25	$6.75	$6.75	$6.75	$3.00
2019	$8.36	$5.00	$3.50	$9.61	$6.25	$7.17	$7.17	$7.17	$3.00
2020	$8.53	$5.00	$3.50	$9.78	$6.25	$7.66	$7.66	$7.66	$3.00
long run	$8.70	$5.00	$3.50	$9.95	$6.25	$7.66	$7.66	$7.66	$3.00