UBS Investment Research

Commodities: Mining & Metals

Coal's rail solution for the Galilee

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Is this the Basin's 'silver-bullet' solution?

Aurizon and GVK-Hancock are investigating a A$6bn, 60Mtpa rail/port project in Queensland's Galilee Basin – the state's western-most commercial coal basin. The rail infrastructure may be a catalyst for the development of a range of coal projects.

Galilee vs. seaborne: how big is it?

The Galilee has more than 20bt of thermal coal Resources, among 10 projects. Multiple mining hubs of 16-60Mtpa are proposed. Australia's 160Mtpa thermal coal exports are almost 20% of the seaborne trade, and set to expand to 190Mtpa by 2020e. We already forecast a medium-term surplus for the seaborne trade. So the unmodelled, major-scale Galilee tonnes threaten to expand this further.

Is Galilee coal viable?

Public figures indicate mine-site capex of A$100-250/t and a free-on-rail cost of A$25-30/t pre-royalty; opex appears optimistic versus low-cost thermal mines in Australia. We estimate rail & port charges for the southern Galilee of A$32/t, giving a free-on-board cost of around A$60/t pre-royalty. Galilee coal will likely attract a 5-10% discount to the Newcastle benchmark. These figures imply a benchmark incentive price of around A$110/t for the Basin (Figure 1).

Who benefits?

Within our coverage, **BND** and **GUF** have Galilee Basin tenements. Development of the Basin may enable the realisation of value (most likely by sale). Assuming 20cpt* for *in-situ* Resources, BND's 589Mt and GUF's 1,678Mt may be worth A$120m (22cps) & A$336m (53cps) respectively, and not valued by the market.

Figure 1: Alpha project incentive price

		Capex (A$/t of mine capacity & A$m)			
		125	156	188	219
		4,000	5,000	6,000	7,000
Opex (A$/t fob pre royalty)	57	103	111	118	126
	62	109	116	124	132
	67	114	122	130	138
	72	120	128	136	144
	77	126	134	142	149
	82	132	140	147	155

Source: UBS Research

* unadjusted for quality differences.

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Rail solution for the Galilee

Aurizon and GVK-Hancock are investigating a 60Mtpa rail and port project to develop the Galilee Basin. The rail would be located within the QLD Government's preferred rail corridors and align with open access policy. Under the proposal, Aurizon, would acquire a majority (51%) interest in Hancock Coal Infrastructure, which owns GVK Hancock's rail and port projects. Aurizon and GVK-Hancock estimate the rail and port infrastructure to cost $6bn to deliver capacity of 60Mtpa.

- **Galilee basin overview – from p9:** The Galilee is a large undeveloped thermal coal basin in Queensland, with a collective Resource of >20bt over 10 projects. The most economic seam – Seam D, subcrops at 30-50m and dips gently to the west and north. This offers low stripping for open cut developments (6.5:1) and underground longwall extraction to the west. Multiple mining hubs of 16-60Mtpa are proposed. The coal will likely attract a 5-10% discount to Newcastle benchmark, in our view, due to energy content.

- **Cost of extraction – p5 & 10:** Public figures from the miners indicate mine-site capex of A$100-250/t and a FOR opex of A$25-30/t pre royalty. Opex appears optimistic against other low-cost thermal mines in Australia. The Galilee has economies of scale, but stripping ratios & washing yields are similar-to-worse than other projects.

- **Cost of infrastructure – p6 & 13:** We estimate rail and port charges for the Southern Galilee of A$32/t, a lower $28/t from the northern Galilee.

- **Is it viable? – p3** We estimate a Newcastle benchmark price of A$110/t is needed to develop the basin, slightly above UBSe long term price of A$106/t (US$85/t + US$0.80 currency). This is based on Alpha-project's opex & capex estimate and UBS estimates for rail and port charges. A higher price would be required if assuming more conservative mine capex/opex.

- **Impact on thermal coal market:** Australia exported 160Mt of thermal coal in 2012, part of a total 850Mt seaborne trade. We model Australia's exports growing 30Mtpa by 2020e. Large scale Galilee tonnes (30-200Mtpa) would increase our modelled surpluses.

- **Where to, for thermal coal (short term) – from p19:** We expect JFY13 contract price for Newcastle top-grade to settle above the corresponding spot price of US$90/t fob, but below our forecast of US$105/t fob (-9% yoy from JFY12's US$115/t fob). ***A reasonable short-term guide here would be recently settled prices of around US$95/t fob***.

Incentive price for the Galilee

The GVK-Hancock led Alpha project appears to be the catalyst for a basin rail link. We estimate an incentive price of A$111/t for Newcastle benchmark is needed for the project to be economic based on public figures for opex FOR and our assumed capital recovery rail and port charges (Table 1).

Key assumptions include a 15% return hurdle, mine-site capex of A$5bn, opex FOR of $25/t, arms-length rail and port charges of A$32/t.

Our long-term thermal coal price is US$85/t (real) or A$106/t using our long term currency assumption of US$0.80.

The incentive price may be lower if GVK were to accept a lower hurdle rate, or higher if capex and opex numbers are too low. We sensitise these assumptions in Charts 1-2.

Table 1: Simple Alpha project incentive price model

		Alpha
Capex	A$m	5,000
Production	Mtpa	32
Capex	A$/t of installed capacity	156
Return	%	15%
Corporate tax rate	%	30%
Capital return hurdle pre tax	A$/t	33
Capital return hurdle post tax	A$/t	23
Opex FOR pre royalty	A$/t	25
Rail and Port charges	A$/t	32
Maintenance capex	A$/t	5
Breakeven realised price pre royalty	A$/t	95
Royalty	%	7%
Breakeven realised price post royalty	A$/t	103
Discount to Newcastle benchmark	%	7%
Implied incentive price	A$/t	111

Source: UBS estimate.

Chart 1: Incentive price required for Alpha project

Opex (A$/t fob pre royalty)	Capex (A$/t of mine capacity & A$m) 125 / 4,000	156 / 5,000	188 / 6,000	219 / 7,000
57	103	111	118	126
62	109	116	124	132
67	114	122	130	138
72	120	128	136	144
77	126	134	142	149
82	132	140	147	155

Source: UBS estimates

Chart 2: Incentive price required for Alpha project

Opex (A$/t fob pre royalty)	Hurdle return (%) 0%	5%	10%	15%	20%
57	72	85	98	111	124
62	78	91	103	116	129
67	83	96	109	122	135
72	89	102	115	128	141
77	95	108	121	134	147
82	101	114	127	140	153

Source: UBS estimates

Galilee mining costs

- Alpha project is the most advanced in the basin and has published opex estimates of US$56/t FOB including royalties, broken down in Table 2.

Table 2: Alpha cost estimate

Category	US$/t
Mine	21
CHPP	3
Power and water	2
Infrastructure	*20*
Royalty	10
Total cost	56

Source: GVK.

- A number of cost estimates provided to the market fall around A$25-30/t FOR, and allow A$20/t for transport giving a FOB pre-royalty cost base for the basin of A$45-50/t.
  - The US$26/t FOR estimate ex-royalty is similar to the 2010 estimate the China First Coal project of A$22-30/t FOR pre-royalty for the O/C. The South Galilee project environmental impact statement submissions indicate an operating cost of around A$47/t FOB pre royalty at full ramp up.
- Compared against the Australian thermal coal industry, the cost base appears low. We compare costs against some of Australia's low cost mines in Table 3. The Galilee has economies of scale, but stripping ratios & washing yields are similar-to-worse and rail distance is longer.

Table 3: Galilee comparison vs other Australian low cost operations

	Galilee	Maules Creek	Moolarben
Strip ratio	6.5:1	6.4:1	3.6:1
Product Scale	30Mtpa	10Mtpa	9Mtpa
Yield	70-80%	86%	70%
LOM opex FOR excl royalties	A$25-30/t	A$45/t	A$31/t
Rail + Port	A$20/t	A$20/t	A$14/t
LOM opex FOB excl royalties	A$45-50/t	A$65/t	A$45/t
Rail distance	495km	380km	270km

Source: Company filings

Rail & Port Infrastructure Costs

The proposed Aurizon and GVK alliance, in which a consolidated rail and port solution is implemented, opens up for a combination of outcomes for the next phase of expansion pathways in Queensland coal. The deal would allow for sharing of a 60Mtpa export terminal (T3) at Abbot Point Coal Terminal (APCT) and sharing of a brownfield expansion of the 210km Goonyella to Abbot Point (GAP) line.

Aurizon has previously announced expected capital costs of c.$1bn for a 25Mtpa expansion of the GAP line. In our analysis we have modelled an eventual rail expansion of 60Mtpa to support the proposed 60Mtpa of export capacity at T3. We assume these tonnes to come from a mix of the following sources:

(1) **GVK-Hancock** in Southern Galilee Basin is expected to provide up to 30Mtpa of thermal coal from the Alpha project. We estimate total export infrastructure capital costs of $4.7bn which includes a 260km greenfield line ($2bn) and an incremental 30Mtpa brownfield expansion of GAP ($1bn).

(2) **Central Galilee Basin** including projects proposed by Adani and Vale could provide up to a further 30Mtpa of thermal coal. Within the $4bn of estimated capital costs we expect c.$0.9bn to be committed to a further 30Mtpa brownfield expansion of GAP and $1.4bn on a greenfield East-West line.

(3) **Bowen Basin** metallurgical coal expansions could also provide an incremental 30Mtpa. We estimate total capital costs of c.$3.1bn for this component.

The estimated allocated capital cost and per tonne costs of the three expansion pathways are set out in the table below. We estimate, on a cash operating cost basis, total infrastructure costs for Southern Galilee to attract $12 per tonne, $10 per tonne from Central Galilee and $8 per tonne from Bowen Basin. Adding in asset ownership and funding costs would elevate this to $32, $28 and $22 per tonne respectively. These costs are based on a required post-tax return of 10-12%.

Table 4: Galilee Basin infrastructure cost summary

	Southern Galilee to Abbot Point	Central Galilee to Abbot Point	Bowen Basin to Abbot Point
Average haulage distance (km)	470	400	310
Capacity (Mtpa)	30	30	30
Greenfield lines to Galilee	1,950	1,425	
Brownfield expansion of GAP	1,000	900	900
Brownfield expansion of Goonyella system			500
Track	2,950	2,325	1,400
Trains	625	625	600
Port	1,100	1,100	1,100
Total allocated capital cost ($m)	4,675	4,050	3,100
Track	16	12	8
Trains	11	10	8
Port	6	6	6
Total operating + funding costs per tonne	32	28	22
Of which: cash operating cost per tonne	*12*	*10*	*8*
Of which: asset ownership cost per tonne	*20*	*18*	*14*

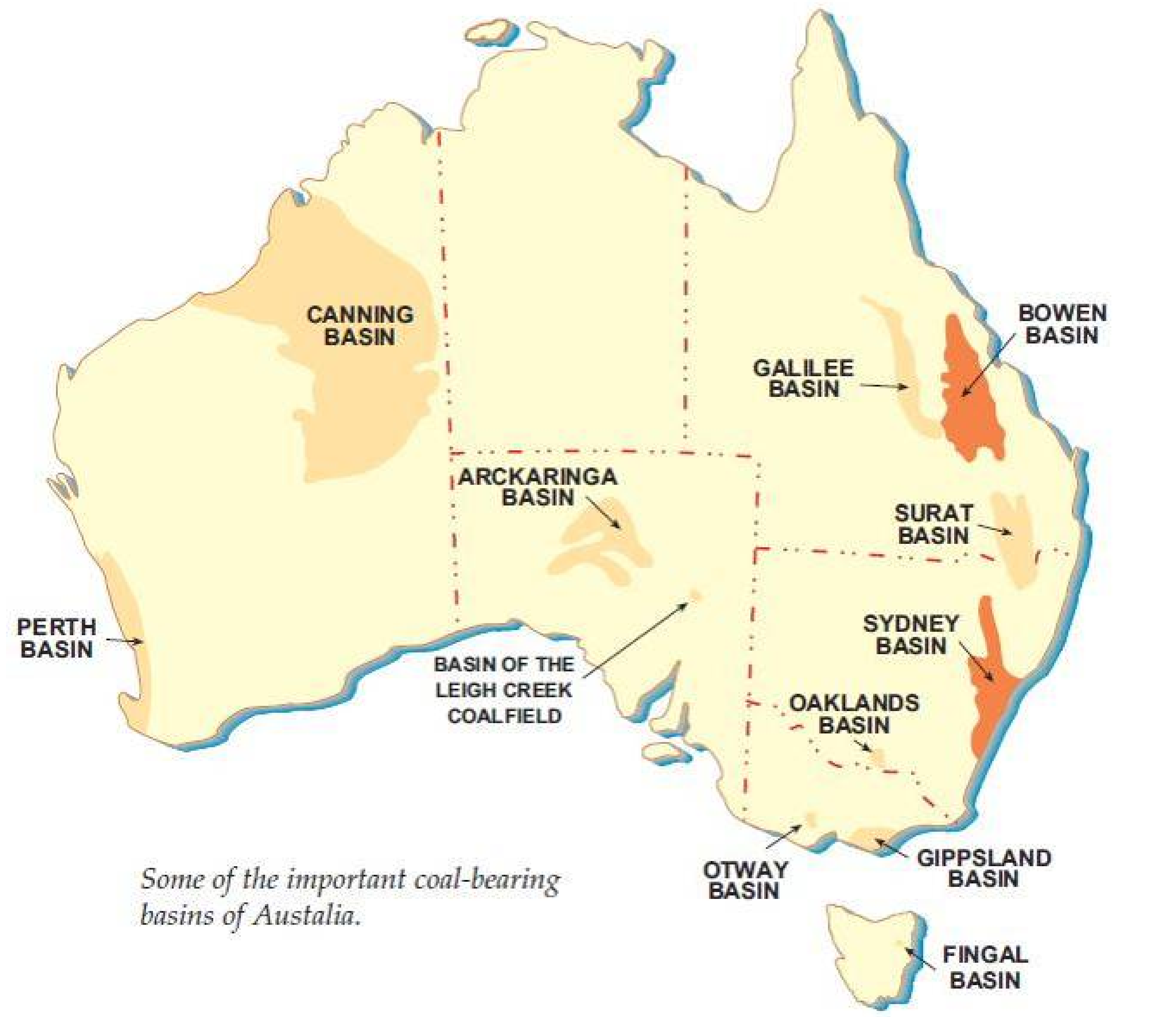
Source: UBS estimates

Where is this Basin?

Most Australian states have economic coal resources. However, the most abundant occurrences are in Queensland and New South Wales, with almost all of Australia's coal exports being shipped from the Bowen & Sydney basins. Australia's major coal basins are highlighted in Chart 3.

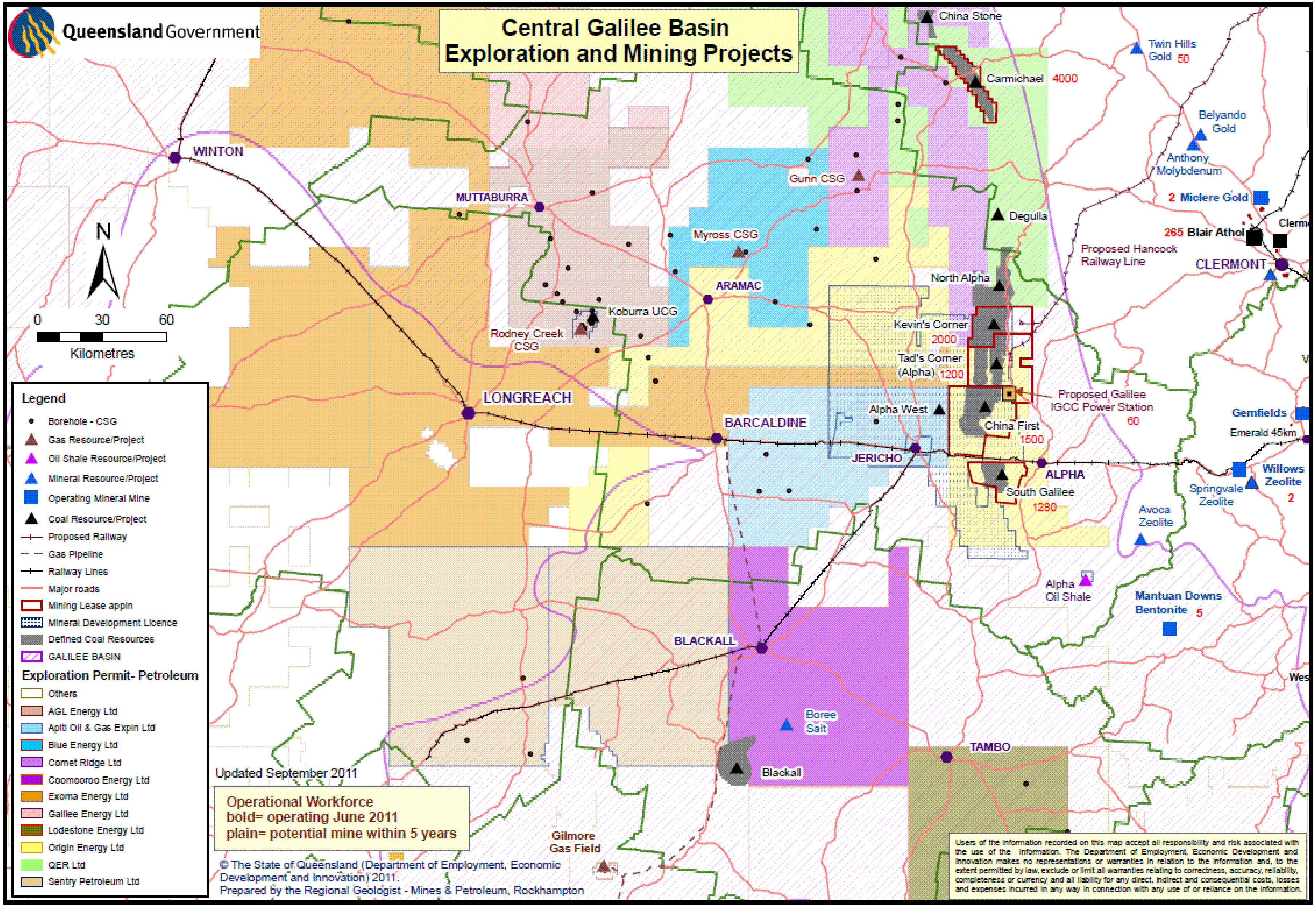
The Galilee Basin lies to the west of the Bowen Basin, both in the state of Queensland. Chart 4 has the locality of major tenement holders in this Basin.

Chart 3: Australian Coal Basins



Source: Australian Coal Association.

Chart 4: Galilee Basin Overview



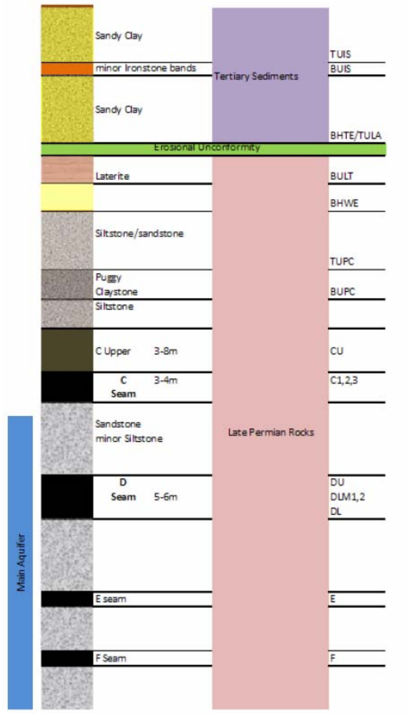
Source: Queensland Department of Mines and Energy

Overview of the Basin

The Galilee is one of 2 large coal basins in Queensland that remain undeveloped (the other being the Surat). Key features;

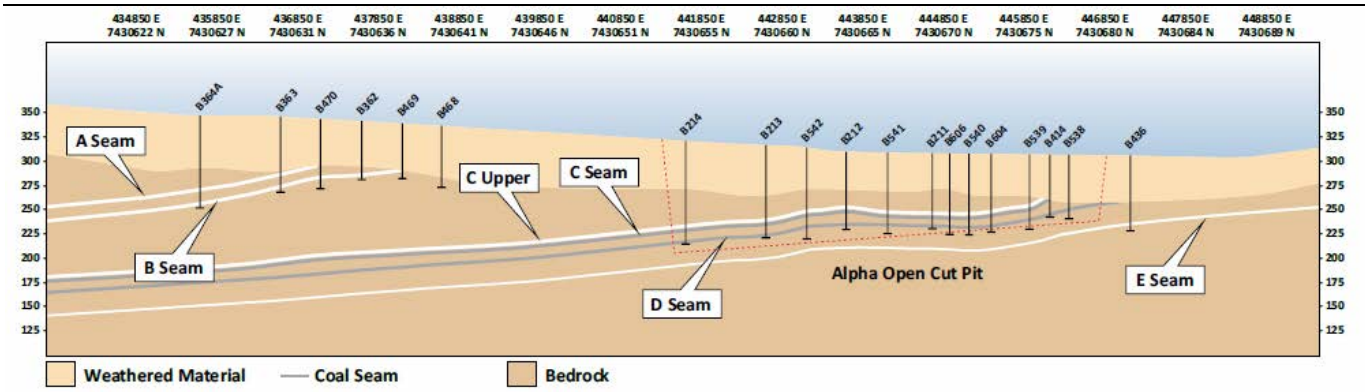
- **Scale:** The Basin covers a large area of central and western Queensland (see Chart 1). The 6 most advanced projects have announced collective resources of over 20bt to date. Each project is also planning large scale mining hubs of 16-60Mtpa.
- **Coal quality:** The Galilee is a thermal coal basin. Raw coal from the targeted Seam D has higher ash (20-25%), lower energy (5,200-5,900kcal/kg) than those from most current Australian mines. Such coal requires washing; most proponents estimate yields of 75% for 5,600-5,900kcal/kg GAR coal with 10-13% ash. Realised prices may attract a 5-10% discount to Newcastle spec (6,300kcal/kg GAR, 13% max ash).
- **Coal seams:** 4 major seams exist within the Basin, with economic potential, from 'A' through 'D'. Seams 'E' & 'F' have been intersected at lower levels.
  - Seams A-C have higher ash (25-40%), lower energy content – making them less economic than seam D. This seam is 5-6m thick.
  - Most projects target Seam D. Alpha project is also targeting Seam C; Carmichael resource includes seams A-F.
- **Depth/Dip:** seams sub-crop in the Basin's east; they dip to the west & north with a gentle incline of 0.5-2 degrees. The eastern subcrop occurs at 30-130m depth. Most projects consider an open cut in the eastern targets; underground (longwalls) for those in the west.
- **Stripping ratio:** combination of the modest depth and gentle dip means the open cut mines may benefit from a low stripping ratio. Alpha project (most advanced) expects a 6.5:1 stripping ratio. This compares favourably to many Greenfield projects in the Bowen & Sydney basins (6-10:1).

Chart 5: Coal Seams of the Basin



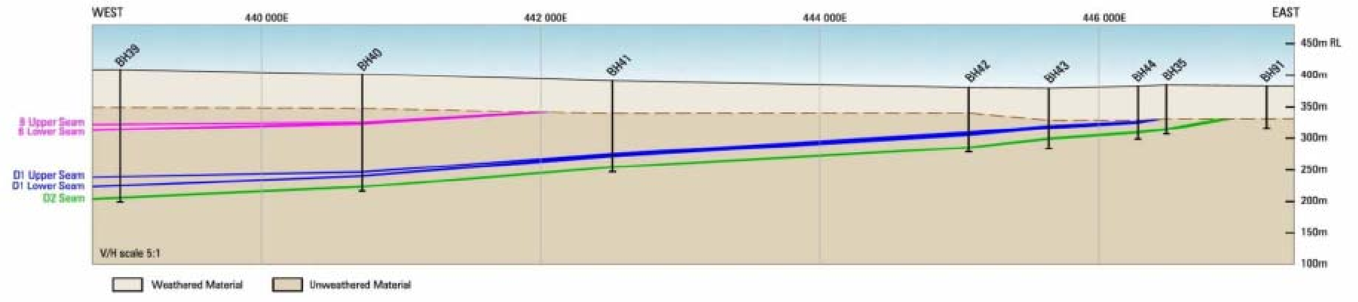
Source: GVK

Chart 6: Cross section of the Alpha project



Source: GVK.

Chart 7: Cross section of South Galilee project



Source: BND.

Key projects of the Galilee Basin

Proponents with the most advanced projects in the basin (running North to South) include;

- **Adani – Carmichael Project:** Adani purchased the tenements from Linc Energy in Aug-10, for $500m + $2/t royalty (indexed to CPI) over 20 production years. Adani also purchased a lease on the X-50 Abbot Point coal export facility in Queensland – but is planning to on-sell to the Adani family. Project has the largest published Resource at 7.8bt, but this includes Seams 'A'-'F'; Resources for economic Seam D total 3.8bt. Coal occurs at greater depths here than in southern projects (Seam D at around 130m vs. 30-75m). Preferred development option is engaging third party rail with access to Abbot Point (vs. build 400km rail to Abbot Point).

- **GVK/Hancock – Alpha, Alpha-West & Kevin's Corner projects:** These projects are the most advanced in the Basin. Also, GVK appears to be the likely candidate to provide rail & port infrastructure.

  - **Alpha:** The most advanced project has completed a bankable feasibility study and obtained both state and federal environmental approvals. A mining lease is expected in early 2013, with mining planned for Q3 2016. To date 125k ROM coal has been mined from a test-pit by utilities based in Korea and China. Costs are estimated at US$56/t fob (incl. US$10/t of royalties).

  - **Alpha-West:** underground (longwall) project; targeting extension of Seam D, to the west of Alpha.

  - **Kevin's Corner:** probably the second-most advanced project in the Basin; 100%-owned GVK. Environmental studies are submitted & await approval; a bankable feasibility study has begun. Project aims for 30Mtpa, from both open cut and underground (longwall).

- **Waratah – China First:** project is owned by Clive Palmer, who sought to list it through the *Resourcehouse* vehicle. Together with *Metallurgical Corporation of China Ltd*., Waratah proposed to develop a $4.0bn, 40Mtpa mine based on Resources located in the middle of the Basin. Waratah has also planned a $4bn integrated rail/port infrastructure, competing with the GVK/Aurizon project.

Chart 8: Alpha Test Pit

Source: GVK/Hancock.

Other tenement holders include:-

- **Bandanna/AMCI – South Galilee:** project is the southern-most of the current suite of projects in the Basin. BND's Southern Galilee project has resources of 589Mt (50% basis). Joint venture partner is AMCI. A PFS indicated that a 15Mtpa open cut and underground project with a mine life of 30+ years was possible. A draft EIS was released for public comment in October 2012.
- **Guilford:** The Hughenden, Clyde Park and Pentland projects are located in the north of the Basin. The Hughenden (100%) and Clyde Park (64.4%) projects have a 1.2Bt and 728Mt resource, respectively on a 100% basis. GUF intends to utilise the Mt Isa-Townsville rail link which traverses tenements, to export from the port of Townsville.
- **Vale:** holds exploration tenements in northern part of the Basin, south of the Carmichael project.
- **China Stone:** project lies to the north of Carmichael project; owned by Macmines. Concept is a 45Mtpa thermal coal mine, underground and open cut mining methods. Macmines plans to export via Abbot Point.

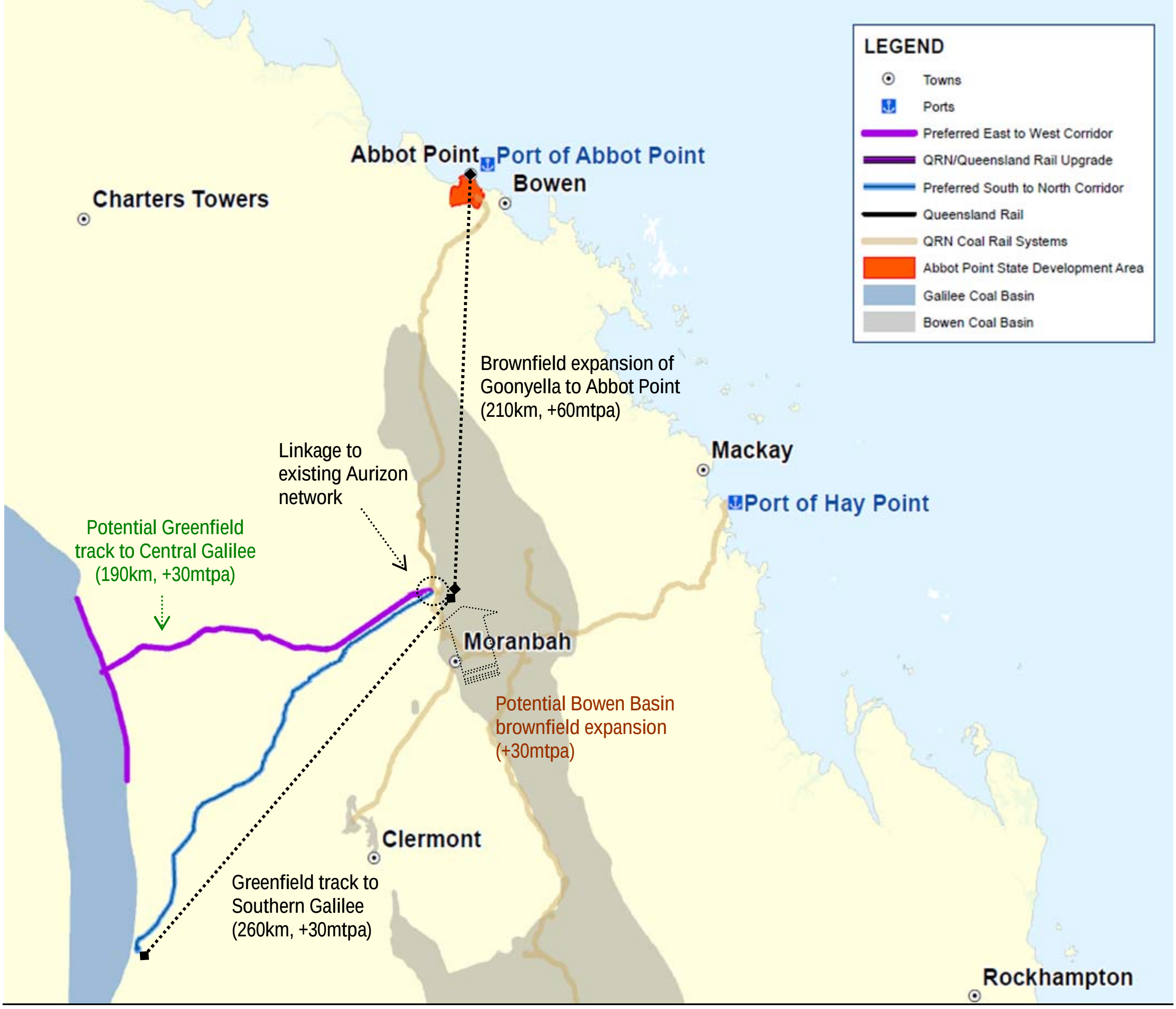
Table 5: Comparison of metrics for Galilee projects

	Alpha	Alpha West	Kevin's Corner	China First	South Galilee	Carmichael
Owners	GVK (79%), Hancock (21%)	GVK (79%), Hancock (21%)	GVK	Waratah Coal (Clive Palmer)	Bandanna (50%) / AMCI (50%)	Adani
Peak saleable production	32	24	30	40	16.6	60
Target first coal	2016	2016	2016	2017	2017	2015
Resources (Mt)*	1821	1800	4269	3684	1179	7800
Seams targeted	C & D	D	D	B, C, D	D	A, B, C, D, E, F
Resource including only the D seam	NA	NA	NA	NA	1179	3800
Marketable reserves (Mt)	1200	NA	NA	1105	218	Not disclosed
Mine type	O/C	U/G	O/C & U/G	O/C & U/G	O/C & U/G	O/C & U/G
Strip ratio	6.5:1	NM				
Mine life (years)	30+	30+	30+	30+	33	90
Mine capex	A$5.0bn	NA	A$4.2bn	$4.0bn	A$4.2bn	$5.9bn
Guided LOM opex FOR excl royalties	US$26/t			A$22-30/t O/C; $14-18/t U/G*		
Guided LOM opex FOB excl royalties	US$46/t	NA	NA	NA	A$47/t	NA
Energy Content - Raw coal (GAR)	NA	NA	NA	NA	5,350-5,950 Kcal/kg	~5,200-5,400 Kcal/kg (D seams) 4,000-5,000 Kcal/kg (other seams)
Ash- raw (GAR)	NA	NA	NA	NA	24.4%	21-23% (D seams) 25-40% (other seams)
Washing yield	78%	NA	75%	72%	74-77%	86%
Product energy content	5,847 gar (6,369 adb)	NA	5,800 gar	6,350 kcal/kg adb	5,615kca;/gar (6,250 kcal/kg adb)	
Product Ash (as received)	8.7% as received (9.5% adb)	NA	8.6%	10.5% adb	13%	NA
Beginning Depth of D seam	50m	NA	50m	NA	30m	130m

Source: Company filings. * Note all resources and reserves shown on a 100% basis.

Rail and Port Infrastructure Overview

Figure 2: Rail map for consolidated Galilee solution



Source: Industry data, UBS estimates

Track assumptions

We have modelled the following potential components to make up a track solution for projects surrounding the Galilee basin (refer to map on previous page):

- **Brownfield upgrade of GAP of c.200-210km** of the existing Aurizon network from North Goonyella to Abbot Point to increase capacity by 60Mtpa. We expect this component to cost c.$1bn for the first 30mt and c.$0.9bn for the next 30Mtpa (average cost of $5m per km). This compares to the recent GAPE Newlands upgrade which cost $665m for 140km ($4.7m per km). We expect the first 30Mtpa of this added capacity will be utilised by the more advanced projects in Southern Galilee (GVK-Hancock mines), and the remaining 30Mtpa through this line will be made up of a mix of volumes from Central Galilee and Bowen Basin. We also note that this upgrade will require a diversion around Collinsville.
- **Greenfield construction of c.250-300km** of track connecting **Southern Galilee** to the Aurizon network somewhere around Goonyella/North Goonyella. This is an alternative configuration to the previously planned 495km corridor by GVK-Hancock. Our analysis assumes the line will stretch from Southern Galilee with 260km of greenfield track required. We expect this to cost c.$1.7-1.9bn ($7.5m per track km). This compares to the GAPE Northern Missing Link of $510m for 70km ($7.3m per km).
- **Greenfield construction of c.190km** east-west line from **Central Galilee** to the Goonyella system, connecting proposed projects by Adani and Vale. We note that Aurizon is currently evaluating and scoping the required infrastructure. We estimate this to cost c.$1.3bn to build based on $7.5m/km.
- **Brownfield expansion into Bowen Basin** is also possible by allowing Bowen Basin mines to use the expanded GAP line. In our analysis, we assume a 100km brownfield upgrade project between North Goonyella and the Bowen Basin which we expect to cost $0.5bn.

The table below shows a breakdown of expected below rail costs.

Table 6: Below rail cost components and operating metrics

	Newlands upgrade Brownfield	Southern Galilee Greenfield	Central Galilee Greenfield	Bowen Basin Brownfield
Track length (km)	210	260	190	100
Gauge	Narrow	Narrow	Narrow	Narrow
Capital cost ($m per km, for 30Mtpa)	4.5	7.5	7.5	5.0
Capital cost ($m)	1,900	1,950	1,425	500
Incremental capacity (Mtpa)	60	30	30	30
Pre-tax funding cost	10%	10%	10%	10%
Capital cost per tonne ($)	32	65	48	17
Operating + funding costs per tonne ($)	5	10	7	3

Source: UBS estimates

Train assumptions

We have evaluated the cost of above rail equipment required to service the added capacity based on the following rail corridors.

- **Southern Galilee to Abbot Point:** We expect to have an average haul length of 470km with a total capital cost of $430m for 6 train sets. This results in a tariff of $10 per tonne. This reduces to $7 per tonne on a cash cost basis.
- **Central Galilee to Abbot Point:** Average haulage distance of c.400km with total capital cost of $430m for 6 train sets. This results in a tariff of $8.40 per tonne owing to lower operating costs over a shorter distance than from Southern Galilee. On a cash cost basis, this reduces to $6 per tonne.
- **Bowen Basin to Abbot Point:** We expect to have a higher infrastructure cost allocation and overall total capital cost of c.$500m but lower tariff per tonne of $7.50 per tonne ($4.50 on cash cost basis) given the shorter haulage distance of 310km.

Our modelling assumes that the network will be based on Aurizon's existing narrow gauge compared to GVK's plans for standard gauge. We assume a consist payload based on the current Goonyella average of c.10kt per train for the Bowen Basin expansion, and c.15kt per train for Galilee versus GVK's original proposal of 25kt per train.

Table 7: Above rail cost components and operating metrics

	Southern Galilee to Abbot Point	Central Galilee to Abbot Point	Bowen Basin to Abbot Point
Average haulage distance (km)	470	400	310
Gauge	Narrow	Narrow	Narrow
Incremental capacity (Mtpa)	30	30	30
NTKs (mil)	14,100	12,000	9,300
Yield per train set (Mtpa)	4	4	3
Train sets required	8	8	10
Cost per train set ($m)	70	70	50
Infrastructure cost allocation ($m)	100	100	100
Capital cost ($m)	625	625	600
Pre-tax funding cost	13%	13%	13%
Capital cost per tonne ($)	21	21	20
Operating + funding costs per tonne ($)	11	10	8

Source: UBS estimates

Port assumptions

Abbot Point's third terminal (T3) is expected to be developed by GVK to an export capacity of 60Mtpa based on current approvals from the Qld government. We note that GVK in October 2012 signed a JV agreement with Samsung C&T to develop the terminal for a cost of $1.8bn over 36 months.

We believe the contract is likely to be designed as an EPC with financial close expected in second half of 2013 and first coal 36 months from construction start. We have assumed construction costs of $2.1bn-2.3bn which is more in keeping with recent terminal projects at NCIG (Stage 2AA) of $0.9bn for 23Mtpa capacity and Abbot Point (T2) of $1.5bn for 40Mtpa capacity.

Terminal 3 is expected to have the following fit out for 60Mtpa capacity:

- **Inbound:** Two rail receival dump stations and two inloading conveyor streams with eight inloading conveyors;
- **Stockyard:** One stockyard with four stockpile rows and two machine bunds with two stacker/reclaimers;
- **Outbound:** Two outloading conveyor streams each with five outloading conveyors, surge bin, sample plant and shiploader.

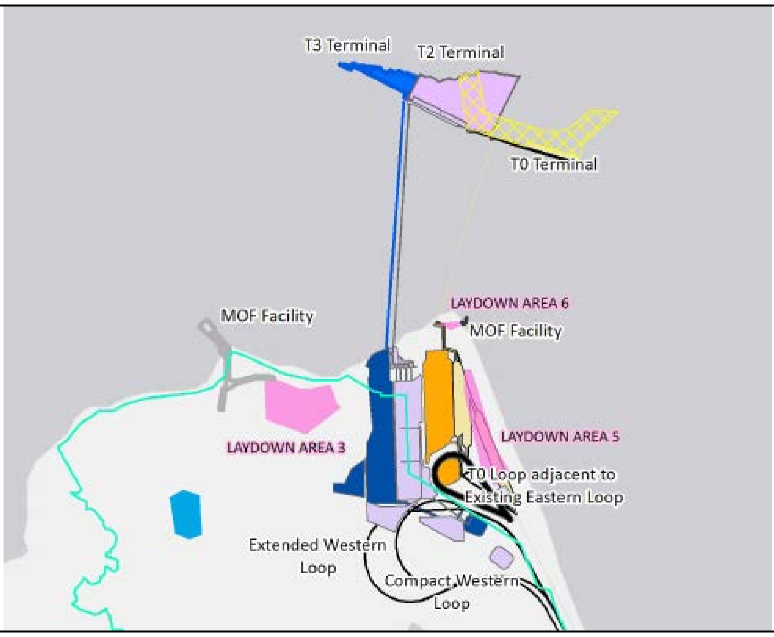
As shown in the table below, we expect the T3 project to require a c.10% pre-tax return on capital, which translates to $6 per tonne in costs for the first 60Mtpa of capacity ($2 per tonne on a cash cost basis).

Table 8: Port cost components and operating metrics

Incremental capacity (Mtpa)	60
Capital cost ($m)	2,200
Pre-tax funding cost	10%
Capital cost per tonne ($)	37
Operating + funding costs per tonne ($)	6

Source: UBS estimates

Figure 3: Ariel view of proposed Abbot Point T3



Source: GVK-Hancock

Equities that matter

Should the Hancock/GVK project go ahead, we believe the commercialisation of the basin would be positive for those companies that possess a resource in the Basin as Hancock/GVK are more than likely to open up the infrastructure for third party access.

- Recent sales of thermal coal resources are shown in Table 9. This suggests a value per in-situ resource of 1.45cpt.
- The sell down by Hancock to GVK was done at US$1,260m or 18cpt of in-situ resource.

Bandanna Energy: The value of BND's 50% interest in the South Galilee project or 589Mt resource is $120m or 22cps based on 20cpt of in-situ resource. Our valuation for BND of 49cps, is only for the Springsure Creek asset in the Bowen Basin. Crystallisation of any value for BND's South Galilee project would be positive for the stock, in our opinion, as we believe the market is attributing zero value to the South Galilee resource at the moment.

Guildford Coal: Guilford's projects are in the northern-most part of the Galilee basin. While the projects are not likely to seek access to the potential GVK-Aurizon rail and port infrastructure proposal, GUF could like BND benefit from the market attributing value to what is currently considered an unlikely project to go ahead. GUF and Asciano are investigating transport solutions for the Northern Galilee. This plan may utilise the Mt Isa-Townsville rail link which traverses tenements, to export from the port of Townsville. GUF has a total resource (equity share) in the Galilee Basin of 1,678Mt, which at 20cpt is worth $336m or 53cps to GUF. Again this is not in our base case valuation for GUF of $0.98ps, which is only for GUF's Mongolian assets.

Table 9: Australian undeveloped, pre-production thermal coal transactions

Project	Acquiror	Date	Deal value (A$m)	% acquired	Implied EV (US$m)	Reserves (Mt)	Resources (Mt)	EV/Reserves (US$/t)	EV/Resources (US$/t)
Sonoma Coal Project from Qcoal	Clidds	Jan-07	140	45%	243		97	na	2.50
Felix's Moolarben	Sojitz	Jul-07	90	10%	773	234	616	3.31	1.26
Centennial's Anvill Hill	Xstrata	Sep-07	425	100%	354	158	500	2.24	0.71
Monto Coal from Macarthur	Noble	Dec-07	49	10%	429	23	519	19.00	0.83
Moolarben	Korean consortium	Jan-08	140	10%	1,237	234	616	5.29	2.01
Whitehaven's Narrabri	Yudean Group	Feb-08	68	7.5%	854	112	405	7.62	2.11
Whitehaven's Narrabri	J-Power/ EDFT	Aug-08	254	15%	1,574	112	438	14.05	3.59
NSW Watermark tenements	Shenhua	Aug-08	500	100%	465			na	na
Waratah Coal	Mineralogy	Dec-08	123	100.0%	81		4,355	na	0.02
Whitehaven's Narrabri	Korean consortium	Aug-09	136	7.5%	1,522	255	718	5.97	2.12
Coal & Allied's Vickery	Whitehaven Coal	Oct-09	32	100%	29		300	na	0.10
Coal & Allied's Maules Creek	Aston Resources	Nov-09	480	100%	437		398	na	1.10
Anglo's Bylong	KEPCO	Jul-10	403	100%	338		423	na	0.80
Northern Energy	New Hope	Oct-10	242	100%	215	112	519	1.93	0.42
Aston Resources sell down	ITOCHU	Dec-10	345	15%	2,261	356	610	6.35	3.71
Coalworks placement	Boardwalk	Dec-10	19	20%	77		21	na	3.73
Sienna and Electra Coal Projects	Boardwalk	Dec-10	30	100%	30	0	57	na	0.52
Rocklands Richfield	Jindal Steel	Apr-11	75	86%	68		481	na	0.14
Anglo's 51% interest in Surat projects	Cockatoo	Jul-10	106	51%	174		606	na	0.29
Linc Energy's Galilee tenement	Adani	Aug-10	1,500	100%	1,369		7,800	na	0.18
Monash	Gloucester	May-11	30	100%	32		287	na	0.11
Hancock Coal assets	GVK	Sep-11	1,216	90%	1,393	1,081	7,890	1.29	0.18
Aston Resources sell down	J-Power	Oct-11	370	10%	3,526	356	610	9.90	5.78
Aston Resources	Whitehaven	Dec-11	2,295	100%	1,943	272	509	7.14	3.82
Boardwalk	Whitehaven	Dec-11	506	100%	421.1	0	0	na	na
Coalworks	Whitehaven	May-12	145	83%	162.9	0	1,551	na	0.11
Endocoal	Yima Coal	Oct-12	71	100%	71.1	0	499	na	0.14
Average								7.01	1.45
Median								6.16	0.80
Average of Galilee Deals								1.29	0.12

Source: Company filings.

Supply-demand outlook

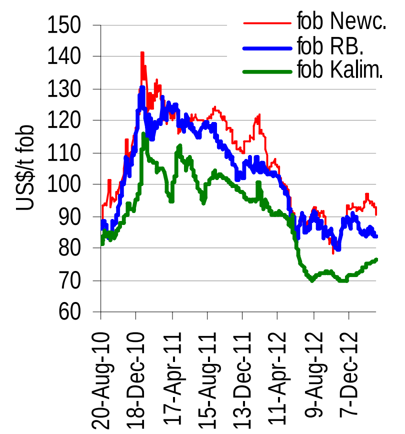
Stability at last, after 2012's grief

Seaborne trade's still recovering from a tough 2012...

Without a doubt, 2012 was one of seaborne thermal coal's toughest years: hit by an extraordinarily wide range of bearish factors, including weak global economic activity; a warm northern winter; robust production in Australia, Asia, the Americas; collapsing US gas prices – are all contributing to a lift in inventories worldwide + price weakness across Asia.

But over the last few months, Asia's seaborne thermal coal prices (Newcastle; Indonesia) have recovered some of 2012's sell-off: up 8-15% since Nov-12. But adequate inventories across the region still weigh somewhat on the trade's value – despite announcements of production cuts & project delays in most of the coal producing countries (Australia, US, China, Indonesia), and the support of mine & infrastructure strikes in Australia & Colombia.

Chart 9: Thermal coal prices (US$/t fob)



Source: UBS Research, Tex Report, Platts

This is the backdrop for the important the Australia-Japan JFY contract price negotiations, now underway. We expect a price to be settled by late-March. What are the short-term drivers of these talks?

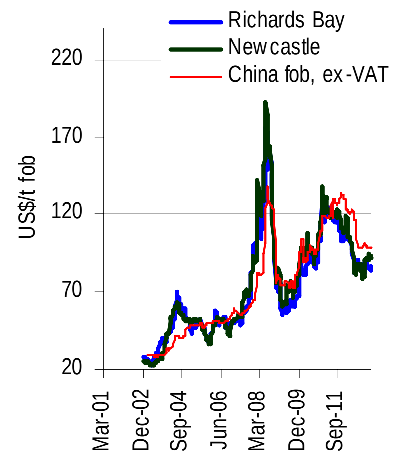
(4) demand-side drivers: China is still willing to engage the seaborne trade in a price-supporting way, whenever the trade weakens; gas prices have recovered in US + remain high in Europe, boosting regional coal demand/prices; India's economy is recovering, promising a lift in coal imports.

(5) supply-side drivers: above-normal rainfall during the wet seasons of Australia & Indonesia (all up, Nov=>May); strike & labour disputes in Colombia (partly resolved).

More generally, the topical points of these talks will likely be:

- **Queensland rain/floods** (no tonnes lost, but poses short-term risks);
- **US gas-coal switch** (2011's collapse in gas price saw coal demand there collapse; this has reversed in the last 12 months);
- **Index Pricing** (idea appeared Dec-12; Xstrata/JPUs working on index for some contracts, incorporating index pricing; probably features a base contract value, adjusted through the JFY by a spot-linked scaling factor);
- **China's import needs** (shocked the market in 2012, with record-high 180Mt of imports, 20% of seaborne demand; strong imports at start of 2013 too; but post-winter, a lift in domestic production could hurt import demand/prices);
- **Economic recovery in India** (economic activity to lift in 2013; Coal India's domestic production expansion story carries risk, good for import demand).

Chart 10: Thermal coal prices (US$/t fob)



Source: globalCOAL, Bloomberg

We expect JFY13 contract price for Newcastle top-grade to settle above the corresponding spot price of US$90/t fob, but below our forecast of US$105/t fob (-9% yoy from JFY12's US$115/t fob). ***A reasonable short-term guide here would be recently settled prices of US$96-97/t fob*** for several Australian coal loads to Japan (6 x Panamaxes; 7-8 Mar).

Supply

Global thermal coal's 2013 **supply** is forecast to lift just 1.1%yoy to 862Mt, but lifting a further 3%/year over the next five years – dominated by exports from Indonesia and Australia (together, 60% of the seaborne total).

While Indonesia's wet season has limited the country's export flows as always, the closure of smaller mines late last year – in response to recently weakened prices – has become a key support for the trade's recent value. Based on company expectations, we forecast another 4% in 2013 to 350Mt. The growth rate moderates thereafter, at 5%/yr to reach 410Mt by 2016.

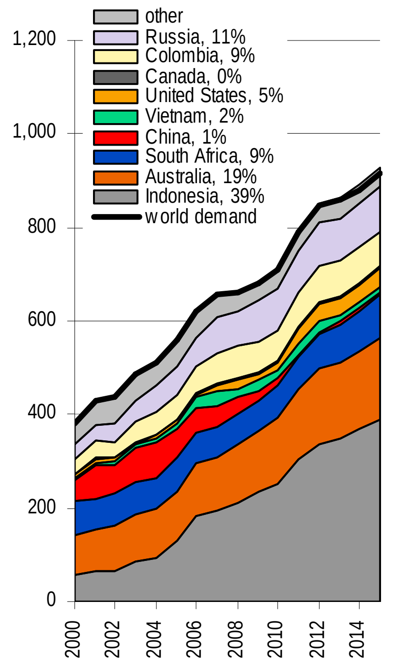
Australia's thermal production rate perversely lifted in 2012, when coal prices worldwide were collapsing. This shift reflected the impact of third-party rail take-or-pay deals, established in recent years. Basically, the least-cost option for many producers was to continue shipping during 2012's weakened markets. Australia delivered 11% more coal, 163Mt in that year.

Conversely for 2013, Australia's production growth is expected to be flat at 162Mt, thanks to widespread project delays. Going forward, we only have growth of 2%/year out to 2016, to 178Mt.

US exports lifted sharply in 2011, up 98%yoy to 32Mt; another 23% to 39Mt in 2012. Trade has lifted strongly, in line with the country's met-coal exports – capitalising on the strong coal demand growth in Asia. The main source of exports is the Powder River Basin. Coal there is being delivered via the west coast (Canada & US) into the Asian market.

But because of the relatively high rail + freight costs of US coal, it remains the marginal (or 'swing') supplier of Asia's thermal coal trade – and so is vulnerable to recent spot price weakness. We forecast 37Mt from the US in 2013 (-6%yoy), remaining at these levels to 2016, declining thereafter as its higher cost coal is marginalised by cheaper Indonesian and Australian coals.

Chart 11: Internationally-traded thermal coal exporters (Mtpa)



Source: McCloskey's, Tex Report, UBS Research; % of total, 2012

Demand

Global thermal coal (traded) **demand** is forecast to lift 1.2%yoy in 2013 to 858Mt, and 3%/yr out to 2016, to top 949Mt. Key drivers of this outlook include China's net imports (+171%yoy in 2009 to 92Mt; 160Mt in 2013; >150Mtpa to 2016) & India, increasing 14%/yr out to 2016, to almost 170Mt. Growth in Europe & the US is expected to remain modest over the medium term: 1-3%/yr.

Demand is forecast to lift just 1%yoy in 2013 to 858Mt; 3%/yr to 2016

Japan's trade data indicate that the national power sector has recovered from the earthquake, with import flows back at normal levels of 10Mt/mth (vs 8Mt/month lows post-quake). It imported 131Mt in 2012, up 8%yoy in this troubled trading year. We forecast an on-going lift of 3%yoy out to 2016 to 139Mt.

Concerns persists over the ability of India's power sector to drive greater thermal coal import flows, given deteriorating economic activity, a weakening exchange rate, as well as insufficient investment in rail infrastructure.

Removing price caps on domestic coal would probably allow the industry to finance greater industry investment. Coal India has approval to invest abroad, but few seem to believe this programme will be effectively deployed.

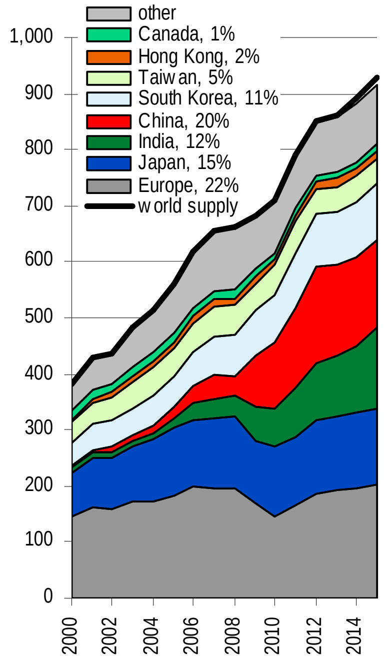
Elsewhere, China's import flows are forecast to moderate in 2013 at around 160Mt – after the 18%/year lift in 2011 & 2012, first when the country attempted to meet a drought-hit hydro-capacity shortfall with a lift in coal-fired power, then opportunistically buying cheap, high-grade coals.

For 2012-16, China is expected to import at around 150-160Mtpa until 2016 – we see import demand being undermined by the falling cost of domestic coal distribution.

After its major recovery lift of 30% in 2011-12 (weak economic activity, but coal is much cheaper than gas), Europe's thermal coal imports are forecast to expand at a more modest 2-3% in 2013 to >190Mt – a strong return to pre-GFC-highs of close to 200Mtpa. Trade should expand at +2%/yr in the long term.

We forecast a ballooning surplus for international trade: 4Mt in 2013, lifting to >10Mt by 2016 (<1%). Surpluses largely reflect a strong lift in both Indonesian and Australian exports over the medium to long term.

Chart 12: Internationally-traded thermal coal importers (Mtpa)



Source: McCloskey's, Tex Report, UBS Research; % of total, 2012

UBS price forecasts

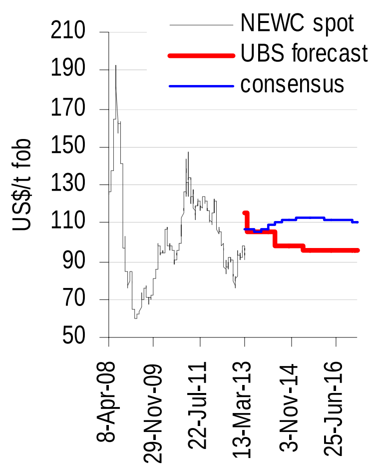
Trade's pricing customs explained

At UBS, we forecast only the JFY benchmark contract price of the Newcastle 6,300 kcal/kg thermal coal trade – the primary reference for the short- to medium-term free-on-board (spot and contract) value of other important seaborne coal brands – particularly 5,500kc/kg Newcastle; 5,800kc/kg Richards Bay; 5,000kc/kg Kalimantan.

Because of the price-setting power of 'top-grade' Newcastle, and its link to Japan's large, stable trade – the north Asian preference for JFY contracts has become a dominant pricing term of trade, too.

Of the international thermal coal trade, we estimate that 60% is based on spot transactions (recent, large lift in spot's share attributable to China's expanding seaborne imports); 20% is JFY contract (most of the Japanese trade uses JFY annual contract pricing); various calendar-year and semi-annual contracts (Jul, Oct) represent the other 20%. Typically, contract prices set in line with the prevailing spot price, guided by recently set annual & semi-annual contracts.

Chart 13: Thermal coal prices: history; forecast; consensus (US$/t fob)



Source: UBS Research, Bloomberg

JFY's annual chat: recent deals are important guides

JFY price contract negotiations typically begin in November-January, with a review of the fundamental outlook for the trade. Price discussions are guided by the prevailing spot prices, as well as the most recent contract price settlements (for the next JFY13 contract talks, relevant recent deals include US$94/t fob for annual contracts of Jul-12 + Oct-12). Price settlement usually occurs Feb-Mar, ahead of the next 12-month period that begins 1 April.

This year's seaborne thermal coal's JFY13 contract price negotiations – Xstrata is representing the coal producers of Australia; Tohoku for the coal-burning power utilities of Japan. Key deals year-to-date that will be guides for current talks include:

i. JYF12 contract US$115/t fob;

ii. Xstrata & Tepco settled Jul-12 annual contract price at US$95/t fob;

iii. Xstrata & Tohoku settled Oct-12 annual contract at US$96.9/t fob ($15/t above prevailing spot for eqv. product).

Because these are majors players in the trade, price terms of their deals are widely accepted as benchmark prices by all other players of the trade (for similar product; before quality factors are applied).

Newcastle's dominance is passing

Significantly, the pre-eminence of top-grade Newcastle is in decline. Once the dominant export thermal coal of Australia, top-grade now only represents about 40% of the port's total deliveries (8% of total international trade) – simply because resources of this coal type are also in decline.

As a result, we are considering expanding the range of thermal coal price forecasts, in order to more accurately determine the value of the broader trade.

JFY13's forecast of US$105/t fob carries downside risk

For JFY13, we forecast US$105/t fob (-9%yoy; +13% vs. spot price of US$90/t fob for equivalent NEWC product; please see our publication '*Snakes and Ladders*', 11-Dec-12). This makes us modest bulls on thermal coal's outlook.

We're modest short-term bulls on the thermal coal price outlook (but bearish longer-term)

Why are we bulls? Factors that undermined 2012's trade (weak global macroeconomic growth; warm northern winter; record-high production rates; collapse in US gas prices) are now passing => trade has since re-balanced (mostly in 2012Q4) => now reporting stable price signals for coal out of Australia & South Africa; general lift in Indonesia's prices (reflects improving demand out of China).

We expect JFY13 contract price for Newcastle top-grade to settle above the corresponding spot price of US$90/t fob, but below our forecast of US$105/t fob (-9% yoy from JFY12's US$115/t fob). A reasonable short-term guide here would be recently settled prices of US$96-97/t fob for several Australian coal loads to Japan (6xPanamaxes; 7-8 Mar).

Our longer-term price forecast profile is unchanged (please see '*Snakes and Ladders'*, 11-Dec-12), and generally bearish: JFY14 US$98/t fob; >US$90/t fob indefinitely; unchanged long-term price US$85/t fob real.

Risks to thermal coal price forecasts

- Strikes action persists in Australia (rail) & Colombia (mines + rail; partly resolved): BULLISH
- Indonesia and South Africa redirect exports to domestic markets to supply growing domestic demand: BULLISH
- Recovery in US dollar undermines quantity demanded of US dollar-denominated coal: BEARISH
- China ramps up domestic coal production capacity, undermining demand for coal imports: BEARISH
- India also expands domestic coal production capacity, undermining demand for coal imports: BEARISH
- India is unable to lift imports (inadequate receiving port/rail infrastructure; lack of credit; weak exchange rate/economic activity): BEARISH
- Colombian/US deliveries into Asia lift at >US$100/t fob prices: BEARISH
- Global gas supply lifts (probably from coal seam/shale options), gas price falls, gas demand lifts: BEARISH (via gas-coal cross-substitution)

(This report is based on corporate websites, presentations and a number of filings by the companies, government bodies, etc)

Global Thermal Coal Market

Table 10: Global Thermal Coal Market (*Global I/O: Snakes and ladders*, 11-Dec-12)

		2009	2010	2011	2012e	2013e	2014e	2015e	2016e
Global Power Generation	TWhr	20,064	20,940	21,455	21,970	22,484	22,999	23,514	24,083
YoY growth	%	5%	4%	2%	2%	2%	2%	2%	2%
Coal-fired power (major economies)	%	48%	49%	48%	48%	48%	48%	48%	48%
Weighted average efficiency	t/MWhr	0.479	0.480	0.480	0.481	0.481	0.481	0.481	0.482
Total traded thermal coal demand	Mt	681	710	791	848	858	881	916	949
YoY growth	%	3.1%	4.4%	11.4%	7.2%	1.2%	2.6%	3.9%	3.6%
Japan imports	Mt	110.9	125.4	121.4	131.2	133.2	134.5	136.5	138.6
India imports	Mt	60.1	68.1	88.5	101.6	105.9	119.4	145.5	169.6
EU net imports	Mt	51.8	21.5	45.0	61.2	69.1	71.8	74.7	79.1
US net imports	Mt	8.1	3.4	-22.0	-32.6	-28.7	-28.6	-28.5	-28.6
Total traded thermal coal supply	Mt	681	710	792	852	862	893	930	959
YoY growth	%	3.0%	4.3%	11.5%	7.6%	1.1%	3.7%	4.1%	3.2%
Indonesia exports	Mt	235.5	252.0	305.6	335.5	349.7	368.9	390.4	409.7
Australia exports	Mt	127.6	141.3	147.5	163.2	162.4	167.3	174.8	178.3
South Africa	Mt	66.9	70.1	68.2	73.8	81.2	85.2	89.5	94.0
Colombia	Mt	63.4	65.0	75.0	75.2	74.4	75.5	76.7	77.8
China net exports	Mt	-74	-104	-137	-166	-157	-154	-151	-148
Balance	Mt	0.6	0.1	0.7	3.6	3.5	12.4	14.2	10.5
US total utility year-end inventories	Mt	179	165	166	183	176	180	178	179
Export thermal coal JFY contract price	US$/t	71.0	98.0	130.0	115.0	105.0	98.0	95.0	95.0
Newcastle spot (CY avg)	US$/t	68.7	98.7	120.8	94.0	105.0	99.8	95.8	95.0
Richards Bay spot (CY avg)	US$/t	62.8	91.5	116.5	92.8	104.3	97.8	93.8	93.0
China Thermal Coal Market									
Power Production									
China	TWhr	3,712	4,201	4,432	4,663	4,894	5,124	5,355	5,587
Global ex-China	TWhr	16,352.0	16,738.5	17,022.6	17,306.6	17,590.7	17,874.7	18,158.8	18,495.9
China's trade									
Imports	Mt	92.9	117.2	143.9	170.8	162.2	159.0	155.8	152.7
Exports	Mt	18.5	13.6	6.7	4.8	4.9	4.9	5.0	5.0
Net imports	Mt	74.4	103.7	137.1	166.0	157.3	154.1	150.9	147.7
Global trade, ex-China									
Supply	Mt	662.9	696.9	785.2	847.1	856.8	888.3	924.8	954.2
Demand	Mt	587.8	593.1	647.3	677.6	696.0	721.8	759.8	796.0
Balance	Mt	75.0	103.8	137.9	169.6	160.8	166.4	165.0	158.3
Net export growth									
China	Mt	-74.4	-103.7	-137.1	-166.0	-157.3	-154.1	-150.9	-147.7
Global ex-China	Mt	401.4	432.8	469.5	481.6	492.8	522.5	557.1	584.2
YoY growth	%	-4%	8%	8%	3%	2%	6%	7%	5%

Source: published data, UBS Research

■ Statement of Risk

We point out to investors the potential risks inherent in commodities markets, including but not limited to, their volatile nature, which may differ materially from expectations. Furthermore, this asset class is exposed to political, financial, operational and liquidity risks, each of which has the potential to significantly impact returns.

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UBS Investment Research: Global Equity Rating Allocations

UBS 12-Month Rating	Rating Category	Coverage[1]	IB Services[2]
Buy	**Buy**	48%	34%
Neutral	**Hold/Neutral**	42%	35%
Sell	**Sell**	9%	18%
UBS Short-Term Rating	**Rating Category**	**Coverage[3]**	**IB Services[4]**
Buy	**Buy**	less than 1%	33%
Sell	**Sell**	less than 1%	0%

1:Percentage of companies under coverage globally within the 12-month rating category.
2:Percentage of companies within the 12-month rating category for which investment banking (IB) services were provided within the past 12 months.
3:Percentage of companies under coverage globally within the Short-Term rating category.
4:Percentage of companies within the Short-Term rating category for which investment banking (IB) services were provided within the past 12 months.

Source: UBS. Rating allocations are as of 31 December 2012.

UBS Investment Research: Global Equity Rating Definitions

UBS 12-Month Rating	Definition
Buy	FSR is > 6% above the MRA.
Neutral	FSR is between -6% and 6% of the MRA.
Sell	FSR is > 6% below the MRA.
UBS Short-Term Rating	**Definition**
Buy	Buy: Stock price expected to rise within three months from the time the rating was assigned because of a specific catalyst or event.
Sell	Sell: Stock price expected to fall within three months from the time the rating was assigned because of a specific catalyst or event.

KEY DEFINITIONS

Forecast Stock Return (FSR) is defined as expected percentage price appreciation plus gross dividend yield over the next 12 months.

Market Return Assumption (MRA) is defined as the one-year local market interest rate plus 5% (a proxy for, and not a forecast of, the equity risk premium).

Under Review (UR) Stocks may be flagged as UR by the analyst, indicating that the stock's price target and/or rating are subject to possible change in the near term, usually in response to an event that may affect the investment case or valuation.

Short-Term Ratings reflect the expected near-term (up to three months) performance of the stock and do not reflect any change in the fundamental view or investment case.

Equity Price Targets have an investment horizon of 12 months.

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Core Banding Exceptions (CBE): Exceptions to the standard +/-6% bands may be granted by the Investment Review Committee (IRC). Factors considered by the IRC include the stock's volatility and the credit spread of the respective company's debt. As a result, stocks deemed to be very high or low risk may be subject to higher or lower bands as they relate to the rating. When such exceptions apply, they will be identified in the Company Disclosures table in the relevant research piece.

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UBS Securities Australia Ltd: Daniel Morgan; Simon Mitchell; Glyn Lawcock; Tom Price.

Company Disclosures

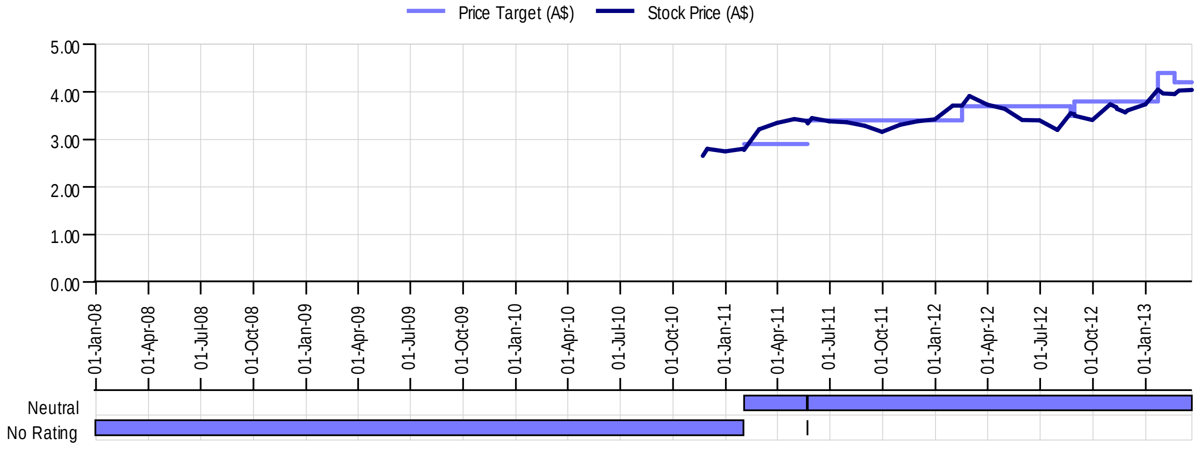
Company Name	Reuters	12-mo rating	Short-term rating	Price	Price date
Aurizon[2, 4, 5, 13]	AZJ.AX	Neutral	N/A	A$4.04	22 Mar 2013
Bandanna Energy Limited[4]	BND.AX	Neutral	N/A	A$0.19	22 Mar 2013
Guildford Coal[13]	GUF.AX	Buy	N/A	A$0.39	22 Mar 2013

Source: UBS. All prices as of local market close.
Ratings in this table are the most current published ratings prior to this report. They may be more recent than the stock pricing date

2. UBS AG, its affiliates or subsidiaries has acted as manager/co-manager in the underwriting or placement of securities of this company/entity or one of its affiliates within the past 12 months.
4. Within the past 12 months, UBS AG, its affiliates or subsidiaries has received compensation for investment banking services from this company/entity.
5. UBS AG, its affiliates or subsidiaries expect to receive or intend to seek compensation for investment banking services from this company/entity within the next three months.
13. UBS AG, its affiliates or subsidiaries beneficially owned 1% or more of a class of this company`s common equity securities as of last month`s end (or the prior month`s end if this report is dated less than 10 days after the most recent month`s end).

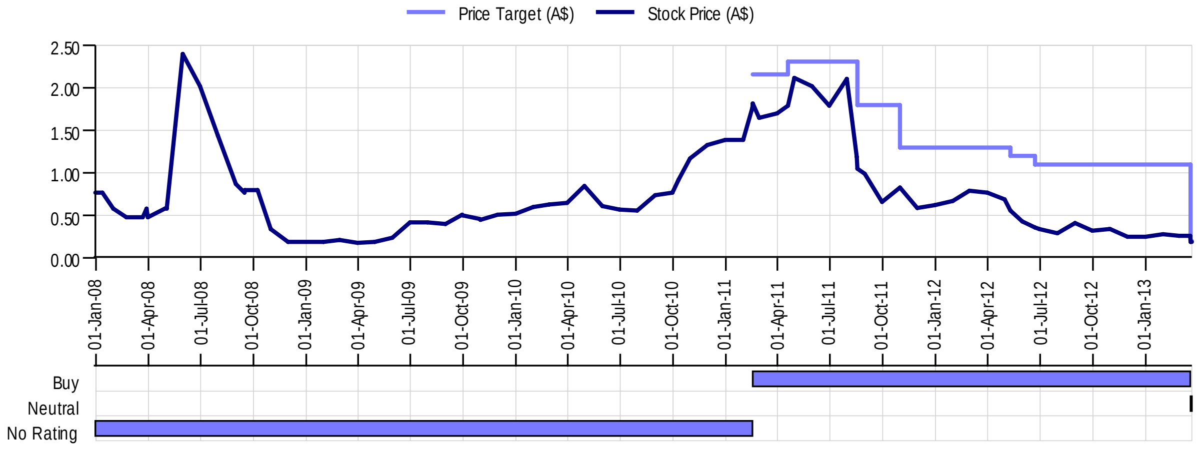
Unless otherwise indicated, please refer to the Valuation and Risk sections within the body of this report.

Aurizon (A$)



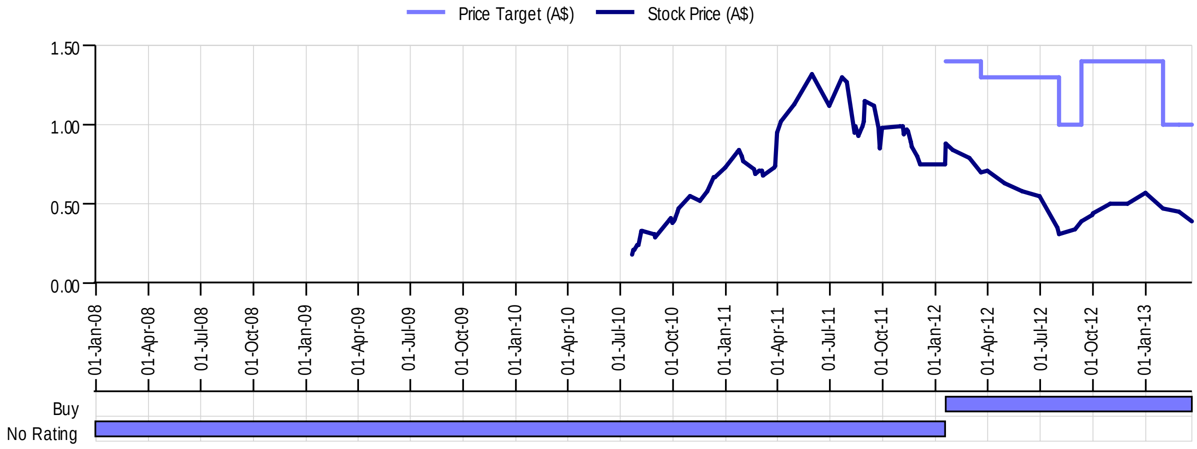
Source: UBS; as of 22 Mar 2013

Bandanna Energy Limited (A$)



Source: UBS; as of 22 Mar 2013

Guildford Coal (A$)



Source: UBS; as of 22 Mar 2013

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