

Assessment of Coal Volume Forecasts for Aurizon Network's 2017 Draft Access Undertaking

A Confidential Report by Resource Management International
to the
Queensland Competition Authority

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Gary Cochrane and Andrew Todd



*Resource Management
International*

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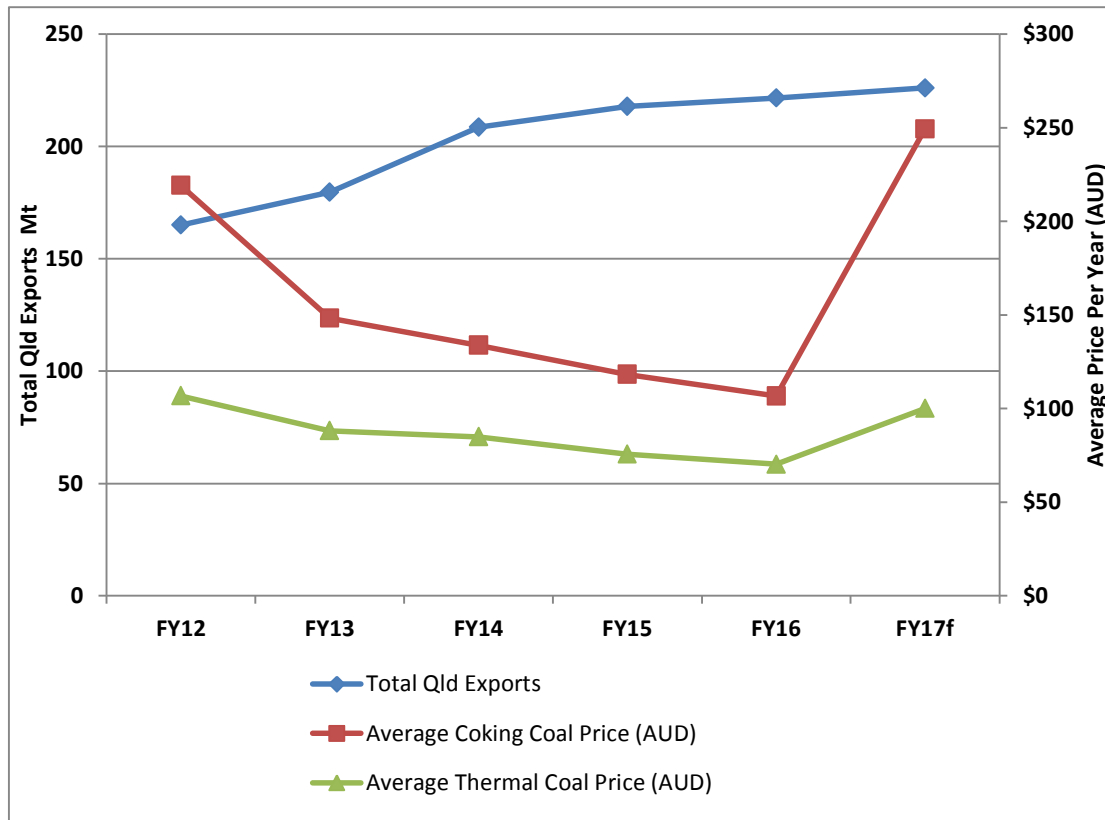
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Executive Summary

The Central Queensland Coal Network (CQCEN) has shown resilience in the face of difficult and volatile seaborne coal prices over the last five years and has continued to demonstrate consistent annual growth in coal exports and railings.

The industry has suffered from excess capacity from new mine, rail and port infrastructure developed from 2007 to 2012 and this continued to provide downward pressure on coal prices until the end of FY16. However, despite falling prices there has been no reduction in overall exports over this time. There has been a serious impact on the growth of future supply, with a number of greenfield projects put on hold and a small number of high cost mines placed on care and maintenance. The graph below shows a steady increase in Queensland coal exports despite declining or volatile pricing, with only a slowing of growth over the last 5 years. Growth in exports is now expected to return with improved profitability and competitive position of the Central Queensland mines.

Comparison of Historical Queensland Exports vs Coal Prices



Source: DNRM statistics, Commonwealth Bank Australia data; RMI

The low prices have forced the Queensland industry to dramatically improve productivity and reduce costs in response to falling coal prices. This combined with the falling Australian dollar since 2013 has improved the competitive position of not only the Australian coal industry but more particularly

the Central Queensland coal producers who typically have the highest quality coals in the seaborne market.

Since May 2016 there has been a dramatic increase in coal prices as the Chinese Government closed a number of high cost mines and also placed most mines on a 5 day rather than a 7 day roster. Since that time coal spot prices have surged to a high of US\$310/FOB tonne in January 2017 although more recently they have fallen back to US\$155-160/FOB tonne as China relaxed some of the operating constraints on their domestic coal mines. At these prices Australian coal is still US\$10 per FOB tonne cheaper than spot domestic Chinese coking coal prices. Coal prices are now stabilising but are much higher than the lows of US\$70/FOB tonne in January 2016. This has provided incentive for the re-opening of a number of mines that had been placed on care and maintenance, either by new or existing owners, and the development of a small number of greenfield projects.

Total CQCN domestic and export railings reached a record 229.6 million tonnes in FY16. RMI forecasts that railings will grow from 236.4 million tonnes in FY18 at the start of UT5 forecast period, to 264.3 million tonnes in FY21. Domestic coal railings, which are included in the following total railings forecast, are forecast to remain flat at about 7.7Mtpa over the forecast period. The RMI railings forecast assumes normal wet season conditions, and has not accounted for unusual rainfall events such as Cyclone Yassi and more recently Cyclone Debbie. The impact of the latter had yet to be fully determined at the time of writing, but is discussed in this report.

The RMI estimates compare with the lower Aurizon Network railings forecast of 226.2 million tonnes in FY18 to 228.9 million tonnes in FY21, as summarised in the table below. The Aurizon Network forecast includes up to about 7.3Mtpa of domestic railings. RMI finds that the Aurizon Network's forecasts for CQCN for the 2017 DAU regulatory period are in total not reasonable, and do not reflect the improving competitive position of the Central Queensland coal producers or on-going changes in seaborne demand for high quality coals.

RMI CQCN Forecast Domestic and Export Coal Railings Compared to Aurizon

| Year (Mtpa) | FY18 | FY19 | FY20 | FY21 |
|--------------------|--------------|--------------|--------------|--------------|
| Aurizon | 226.2 | 228.9 | 228.9 | 228.9 |
| RMI | 236.4 | 250.2 | 259.3 | 264.3 |
| Difference | <i>10.17</i> | <i>21.24</i> | <i>30.34</i> | <i>35.34</i> |

RMI forecasts seaborne coal demand is likely to grow steadily over the forecast period with major customers in China, India, Vietnam, South East Asia and the Middle East all looking for high quality coal to supply their powers stations, cement factories and steel mills. All of these countries are experiencing strong GDP growth and are all in various stages of urbanisation.

RMI forecasts demand for seaborne coking coal to grow from 293 million tonnes in FY16 to 332 million tonnes in FY21 and seaborne thermal coal to grow from 908 million tonnes in FY16 to 1,008 million tonnes in FY21. The demand for coking coal includes a significant component requiring high quality coking and PCI coal such as is supplied from the CQCN. Coking coal demand will be particularly strong from India, China (as a result of closure or constraints on high cost domestic

mines), Vietnam and even the Middle East. Thermal coal demand will be driven by construction of High Efficiency Low Emissions (HELE) thermal coal power stations with construction of new plants well advanced in Vietnam, India, Pakistan, Malaysia, Thailand and Egypt but also there will be strong support from China due to closure or constraints on high cost mines. This will provide a floor not only on imports to China but also on seaborne coal prices as the Chinese Government adjusts its production base to maintain minimum levels of profitability for their domestic coal producers.

Central Queensland will be in a strong position to meet this demand from their lower cost and importantly higher quality coals. In general Queensland coals have superior quality to Chinese, Indian and Indonesian coals. Another important factor is that Indonesia through its own strong domestic demand will be reducing its exports to the seaborne market as it increasingly supplies its own HELE power stations. Furthermore, there is very little capital required for Central Queensland producers to meet this growing demand to FY21 as it will be supplied mostly from existing mines and will utilise existing infrastructure capacity.

The major differences between the RMI and Aurizon forecasts are that we have included mines that are likely to be coming back into production from care and maintenance, or are expanding operations, often with new owners. For example:

- Blair Athol: recently sold to Terracom, and is expected to come back into operation prior to FY18;
- Baralaba: now traded out of Administration, and is expected to come back into operation with new owners prior to FY18;
- Callide: recently sold to Batchfire Resources, and is expected to expand capacity over the forecast period to FY21;
- Glencore have announced the restarting of Collinsville from care and maintenance prior to FY18;
- Carborough Downs: recently purchased by Fitzroy Resources, and will remain in production;
- Foxleigh: now owned by Realm Resources and will remain in production;
- Jax: owned by QCoal, and is expected to be restarted from care and maintenance before FY18;
- Grosvenor: operated by Anglo American, and will continue production expansion and be fully commissioned before FY18.

We note that the Aurizon forecast for FY18 of 226.2 million tonnes is less than the actual for FY16 of 229.6 million tonnes, which we consider is overly conservative in the current coal price environment.

RMI forecasts that a small number of greenfield projects will be developed during the forecast period. The largest of these will be the Byerwen Project operated by QCoal that has approval for the initial phase 1 development and will continue to ramp up to full capacity around FY22. Two other smaller projects including Meteor Downs and Dysart East are also in their final stages of project approvals and are expected to commence production during the forecast period.

Other greenfield projects, such as the Carmichael Project and other Galilee Basin projects, are not expected to be developed to production within the forecast period, unless enough confidence returns for accelerated development.

At the time of RMI's forecast in May 2017, there was significant uncertainty as to whether Cook Colliery would resume operation due to a major underground flooding event in March 2017. This uncertainty has continued, with the mine owner Caledon going into voluntary administration and an asset sale process starting (Mining Monthly). The QCA has since advised RMI in late September 2017 to exclude all Cook Colliery railings from the forecast, due to continued uncertainty surrounding the sales process and Cook Colliery operation.

In conclusion RMI forecasts that there will be continued demand for the typically high quality Central Queensland coking and thermal coal to FY21. The demand will be mostly met from existing production and brownfield expansion of existing mines, as well as the re-opening of mines now on care and maintenance. However, there is likely to be sufficient demand to sustain the development of a small number of advanced greenfield projects. There could be some delay in these greenfield projects due to unexpected delays in financing or securing final permitting, but there is expected to be very few constraints on re-opening or expanding existing mines.

1. Introduction

The Queensland Competition Authority (QCA) is the independent statutory body responsible for implementing competition policy in Queensland under the *Queensland Competition Authority Act 1997* (the QCA Act). This responsibility includes administering Queensland's third-party access to key rail, port and water services.

The monopoly infrastructure services of Aurizon Network's below-rail coal network in Central Queensland (CQCN) are declared for third-party access under the QCA Act.

On 30 November 2016, Aurizon Network submitted a draft access undertaking for the regulatory period commencing 1 July 2017 (2017 DAU) for the QCA's consideration under Part 5 of the QCA Act. Aurizon Network's 2017 DAU, amongst other things, sets out the terms and conditions for access to the declared service (i.e. below-rail network) that are in part based on their estimate of railings volume over the regulatory period (2017/18 to 2020/21).

The QCA has commissioned Resource Management International (RMI) to independently assess and provide expert advice on the reasonableness of Aurizon Network's coal railings volume forecasts for Aurizon Network's central Queensland coal network. RMI have formulated a view on the reasonableness of the Aurizon Network's coal railings forecast over the regulatory period, based on our evaluation of the following factors:

- Verification of mines that will use Aurizon Network's CQCN, including mines that may cease production or projects that may start up during the regulatory period;
- Global and domestic coal demand and supply conditions in both domestic and international markets that may influence the railings forecast;
- A mine by mine appraisal of mining conditions, costs, reserves, product quality and capacity, including any expansion or contraction possibilities and new mine developments;
- Existing railings contract tonnages and potential changes at the mine or company level in terms of railing practice and contractual arrangements;
- Rail network infrastructure changes, operational mode, and capacity;
- Port infrastructure changes, mine-port contractual arrangements, and port capacity; and
- Historical accuracy of the railings forecasts and factors determining variability.

We note that a final report and railings forecast was submitted to QCA in May 2017, at a time when there was significant uncertainty regarding proposed railings from Cook Colliery, due to a recent major longwall flooding event. The QCA has since requested RMI to revise the CQCN railings forecast, given continued uncertainty over the Cook operation, to eliminate Cook export railings and identify a replacement source for any domestic supplies forecast.

2. Market Analysis

2.1 Economic context

In the most recent IMF October 2016 Outlook, global growth is projected to slow to 3.1% in 2016, and then show a slight increase to 3.4% in 2017. This reflects a more subdued outlook for advanced economies following the June U.K. vote in favour of leaving the European Union (Brexit) and weaker-than-expected growth in the United States. More recent indices show some improvement in the US, due to changes being introduced by the Trump administration, but it is still too early to predict any significant changes to the IMF October outlook. These global developments have put further downward pressure on interest rates, as international monetary policy is now expected to remain accommodative for longer. Financial market sentiment toward emerging market economies has improved with expectations of lower interest rates in advanced economies, reduced concern about China's near-term prospects following policy support to economic growth, and some firming of commodity prices. However, prospects differ sharply across countries and regions, with emerging Asia in general and India in particular showing robust growth while sub-Saharan Africa is experiencing a sharp slowdown.

The key drivers for the seaborne coal market are the developing economies of China, India and South East Asia which are experiencing growth in the range of 5% - 7.5% per annum. There is also a swing to coal fired generation in the Middle East and Pakistan and this will also have a positive impact on total demand. This should provide stimulus for increased coal imports, particularly for higher quality Queensland coals, for the forecast period. Many countries in these regions are constructing High Efficiency Low Emissions (HELE) coal fired power stations to meet their growing energy demand and this will require increased import demand for higher energy coals over the forecast period. Increased urbanisation also has a positive impact on steel consumption and a direct correlation to growth in demand for seaborne metallurgical coal. Queensland also is in a very competitive position in regard to supply of high quality metallurgical coal to these markets over the forecast period.

2.2 Global Seaborne Market Outlook

The global seaborne coal market, for both metallurgical and thermal coal, has seen improved activity over last 8 months with significant short term improvement in FOB pricing due to supply cut backs in domestic Chinese production from April to December of up to 8%. This has also led to a strong increase in Chinese coal imports by over 20% year on year for 2016 or more than 30 million tonnes. The drop in domestic production comes following the implementation of the new 276-day work schedule earlier in the year. This saw miners in China forced to reduce the number of days that they could operate from a normal 330 days per year. This has now been offset by the Chinese Government allowing a number of mines to move back to 330 days production from mid November 2016.

The long term effect has been a net reduction in coal production in China as a result of older and uneconomic mines being permanently closed. This should have a positive impact on the global seaborne market with improved prospects of imports to China. Furthermore, demand from India

and the South East Asian economies should also support moderate growth in the seaborne market over the forecast period.

As a result of the increased import demand into China in the second half of FY16, total exports from Queensland showed a slight increase over FY15. There were 221.5 million tonnes of Queensland coal exports in FY16 compared to 217.8 million tonnes of coal exports in FY15.

RMI is of view that the long term seaborne demand for coal in the ASEAN region including India, South East Asia and the Middle East will be strong and positive for coal producers in Australia, South Africa and Canada. The strong US dollar will also limit competition for seaborne supply from US exporters who have seen a rapid reduction in exports over the last 2 years. A strong domestic Indonesian economy is expected to also continue to divert exports into their domestic market and reduce supply into the export market. Detailed analysis of the seaborne metallurgical and thermal coal sectors is discussed in Sections 2.4 and 2.5 respectively with review of Queensland domestic demand provided in Section 2.6.

2.3 Seaborne coal market volatility – price and volume

The Queensland coal industry has performed very well in terms of annual coal exports over the last 5 years despite severe volatility in both coking and thermal coal prices. Figure 2.1 shows total exports have grown every year from 165 Mtpa in 2012 to 221 Mtpa in FY16, based on Department of Natural Resources and Mines (DNRM) statistics, despite volatile pricing. Exports are forecast to continue to show further modest growth in FY17 to at least 224 Mtpa based on year to date performance. By the same comparison coking coal prices in particular have plunged from high's of A\$219 in FY12 to a low of A\$107 in FY16 (DNRM) and are currently on track to average at least A\$249 FY17, based on the last 3 quarters.

There was significant growth in export capacity from as early as 2007 driven by strong investment and spurred by increasing coal prices until 2011 when prices hit a peak of more than US\$310/FOBt for coking coal. This strong growth in supply led eventually to an oversupply in the coking coal market, and by FY12 led to steadily falling prices until FY16. However, despite falling prices, there has been no reduction in overall exports, just a major reduction in growth of supply with a number of greenfield projects put on hold and a small number of high cost mines placed on care and maintenance. Most mines responded to the reduced profitability by increasing productivity and reducing costs. An important feature over the last 5 years has been the ability of Queensland producers to improve productivity from effectively a fixed asset base and to remove bottlenecks and improve export competitiveness. The weakening Australian dollar which at one point was over A\$1.05 to US\$1.00 in 2013 has now fallen to less than US\$0.75 to A\$1.00, has also assisted the resilience and competitiveness of the Queensland producers.

Not only is the USA a competitor for the seaborne export market but China is also a swing buyer between domestic and import supply. Both countries competitiveness is tied to movements in the US dollar and the falling USD coal prices have impacted these two countries more severely and Australia has effectively been able to take market share and therefore maintain modest levels of growth in a difficult market. Another competitor to Australia for export thermal coal is Indonesia. Over the last 2 years in particular it has lost export market share as a result of falling coal quality coal and increasing costs, while there has also been a Government directive to supply an increasing

domestic demand. Indonesia will continue to withdraw exports to meet a 35 GW power station development program over the next 5 to 10 years.

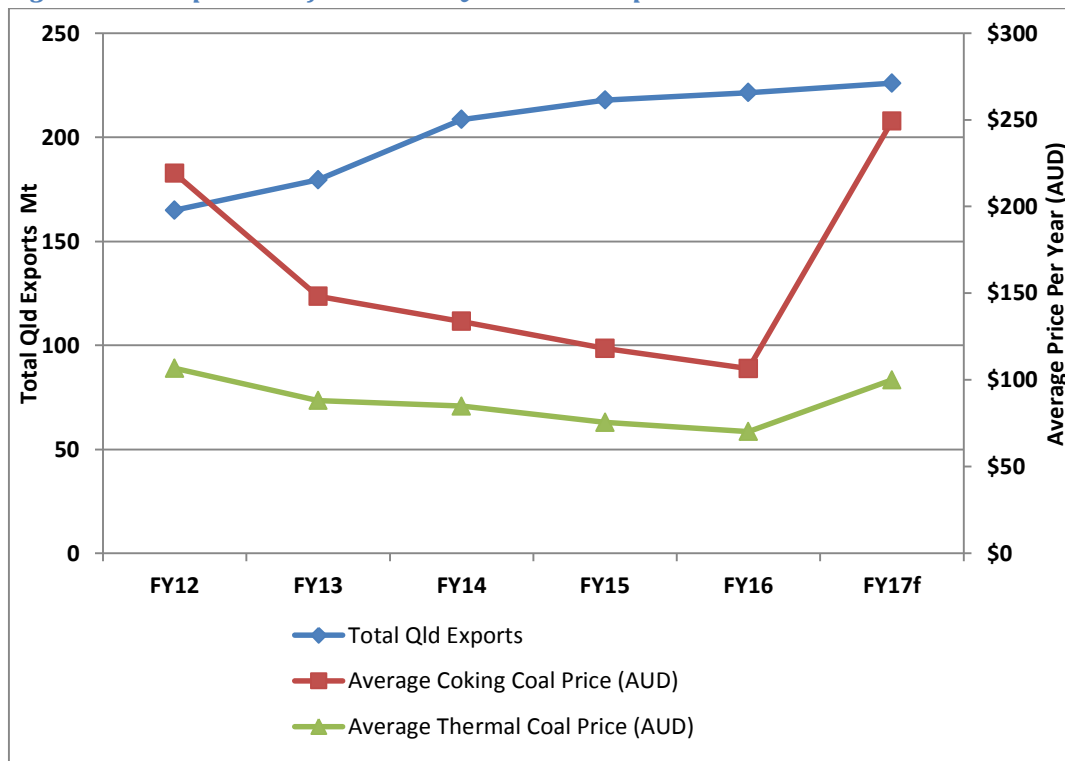
There have been some Queensland casualties during 2013 to 2016, with some mines unable to withstand the steadily falling prices and were placed in to care and maintenance including:

- Isaacs Plains;
- Collinsville;
- Blair Athol;
- Baralaba (placed in Voluntary Administration).

The net impact of this loss of production from these mines has been more than offset by productivity improvements at other operating mines. This has reduced net export volatility and has resulted in an overall increase in Queensland exports on an annual basis. The low prices have also not stopped development of the Grosvenor Project, which will be fully commissioned in FY17. There has been a greater impact on development of greenfield projects and many have been deferred. Therefore, while volatility in existing volume has not been significantly impacted, there has been a reduction in the rate of growth of Queensland exports over the last 3 years.

Furthermore the fall in growth of exports is now being reversed. The recent upswing in coal prices since May 2016 has provided incentives for re-starting all of the Queensland mines that were on care and maintenance and also has encouraged development of several large projects like Byerwen which should commence production by FY18.

Figure 2.1 Comparison of Historical Queensland Exports vs Coal Prices



Source: DNRM statistics; Commonwealth Bank Australia data; RMI

Very short term volatility in prices have had some impact on Queensland exports in recent times as premium coking coal prices spiked back over US\$300/FOBt in December 2016. However, prices have since fallen to US\$155-160/FOBt. This spot price is still profitable for the Australian producers, particularly with an exchange rate of US\$0.76 to A\$1.00 and more than US\$10 cheaper than Chinese domestic prices on a CIF adjusted basis. It is therefore expected that China will return to a position of steady imports of the high quality Australian coals. Australian coals are not only more competitive on a price basis but also are sought after for their high quality in the export market. The Australian coking coals have premium coking strength properties compared to most high ash Chinese and Indian coking coals and the Australian thermal coals are increasingly sought after by companies constructing HELE power stations in India, Vietnam, Thailand, Malaysia, Egypt and Pakistan.

Fluctuations in domestic production in China have had the biggest impact on seaborne coal price volatility over the last 12 months. China appears to be supporting domestic coal producers by adjusting the operating regime, and closing high cost mines, to maintain a domestic price of at least US\$155 CIF/ t for coking coal and US\$65 CIF/t for thermal coal to maintain minimum levels of profitability for a majority of domestic coal producers. This will effectively provide a floor for the seaborne market and should reduce both price and seaborne demand volatility. This will be very attractive to Queensland exporters who have lower cost of production and higher quality coals. This will not support increased exports from the USA or to stop Indonesia continuing to withdraw coal from the export market to support their growing domestic demand.

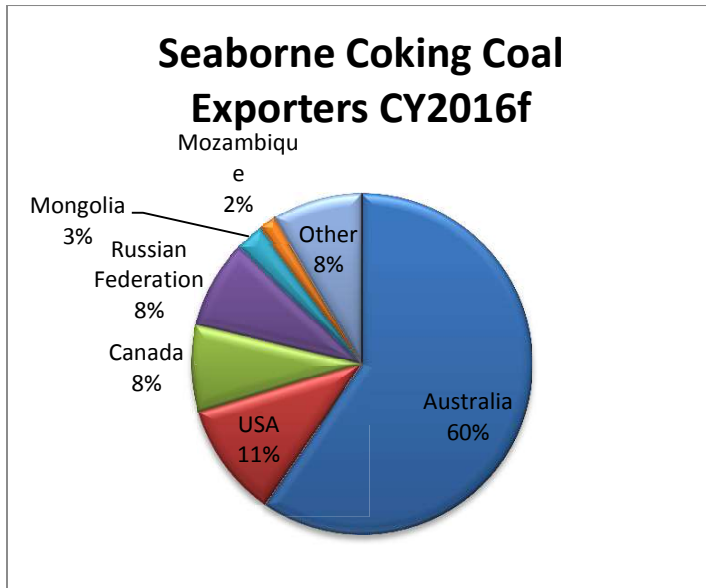
So over the next 5 years it is anticipated that growth in exports from Queensland will increase, with the immediate impact being re-opening of existing mines on care and maintenance and development of a small number of advanced projects such as Byerwen.

The rail and port infrastructure constructed during 2013 to 2016 to accommodate earlier growth forecasts that were never realised will accommodate steady increases in exports of at least 45 Mtpa over the forecast period to FY21. However, it is expected that a number of greenfield projects that have been mothballed, including further infrastructure expansions will be delayed until at least FY22.

2.4 Seaborne Metallurgical Coal Market

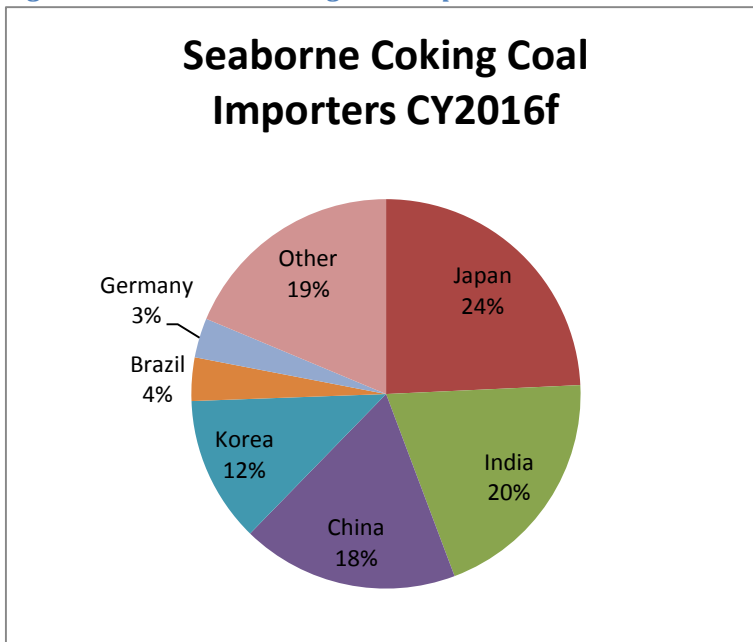
World trade in seaborne coking coal peaked at 305 million tonnes in 2014 and then fell to 286 million tonnes in 2015 and is expected to increase to 293 million tonnes in 2016 (See Table 2.1) . Australia is the dominant exporter of seaborne trade with 60% of the market (See Figure 2.2). Japan is still the dominant importer at 24% of the market with India now overtaking China and moving to overtake Japan in the next five years (See Figure 2.3).

Figure 2.2 Seaborne Coking Coal Exporters



Source: DNRM statistics, IHS Energy periodicals; RMI

Figure 2.3 Seaborne Coking Coal Importers



Source: DNRM statistics, IHS Energy periodicals; RMI

Over the next 12 months RMI forecasts that volatility in prices will stabilize. Spot prices have already fallen by more than 30% from recent highs for coking coal from US\$308/FOB tonne to recent lows of US\$155/FOB tonne although bench mark prices for Q1 will remain at US\$285/ FOB tonne at least until the end of March 2017. At these spot prices Australian coal is now competitive again with domestic Chinese pricing. Volatility in prices is expected to stabilise and move to a more sustainable long term pricing regime of between US\$160 to US\$190 per FOB tonne with a subdued

recovery in demand and price as the Asia Pacific market begins to return to balance during late 2017.

There are several new markets driving global growth in seaborne demand namely Vietnam and India, but also a broader South East Asian demand including, South Korea, Malaysia, and Myanmar. Growing Middle East markets also include Turkey, Pakistan and Egypt which will start to source imported coking coal from FY17. These economies are experiencing industrialization and urbanization at a pace and scale that are a key determinant for global coking coal demand. These markets have very little domestic coking coal supply and will have to rely on imported coal and coke to meet their growing steel mill needs. The seaborne coking coal market is also expected to benefit from a reduction of coke exports from China as this is required more for domestic consumption.

The cut back in Chinese domestic production increased recent growth in Chinese imports of coking coal to 57 Mtpa in 2016 compared to 48 Mtpa in 2015. A further steady rise is expected in 2017 as some higher cost Chinese mines continue to close and Australian imports remain competitive with domestic Chinese pricing. Indian imports are expected to rise to 57 Mtpa in 2016 and have surpassed Chinese demand, after a slower than expected growth in steel mill demand for the first 6 months of the year. Long term Indian demand is forecast to grow by at least another 16 Mtpa during the forecast period. There is also expected to be strong growth in Vietnamese and Indonesian domestic coking coal demand during 2016. Long term Vietnamese demand will grow to at least 5 Mtpa during the forecast period from less than 1 Mtpa in 2016.

Table 2.1 Forecast Seaborne Coking Coal Demand

| Demand (Mt) | CY15 | CY16 | CY17 | CY18 | CY19 | CY20 | CY21 |
|--------------|------------|------------|------------|------------|------------|------------|------------|
| Japan | 55 | 54 | 56 | 57 | 58 | 58 | 58 |
| India | 56 | 57 | 63 | 67 | 70 | 73 | 75 |
| China | 48 | 57 | 59 | 59 | 60 | 60 | 62 |
| Korea | 36 | 37 | 40 | 40 | 40 | 42 | 42 |
| Brazil | 21 | 17 | 17 | 16 | 17 | 17 | 18 |
| Germany | 12 | 12 | 12 | 12 | 13 | 13 | 13 |
| Vietnam | 0 | 1 | 2 | 3 | 3 | 5 | 5 |
| Other | 58 | 58 | 58 | 58 | 58 | 59 | 59 |
| World | 286 | 293 | 307 | 312 | 319 | 327 | 332 |

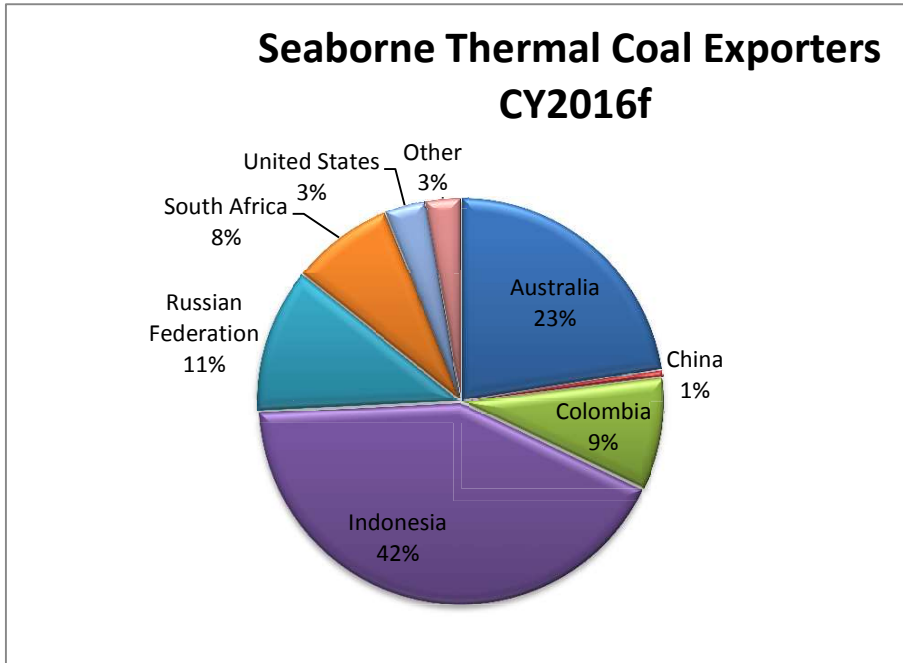
Source: DNRM, CBA, IHS, RMI

2.5 Seaborne Thermal Coal Market

World trade in thermal coal declined to 868 million tonnes in 2015, but has shown some minor recent increases due to a late surge in demand from China. Steady demand from India and Vietnam is expected to rise to at least 908 million tonnes in 2016 (See Table 2.2). Indonesia is the largest exporter at 42%, followed by Australia, but this is expected to reverse over the forecast period to FY21 due to growing Indonesian domestic demand and a reduction in Indonesian exports (See Figure 2.4). China is the largest thermal coal importer at 21.9% (See Figure 2.5).

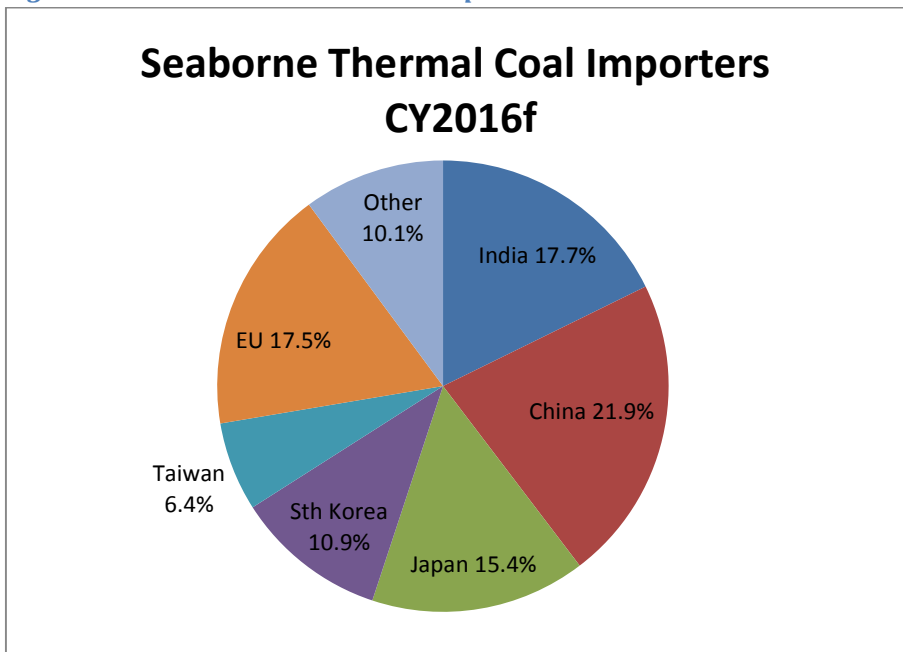
The seaborne thermal coal market is forecast to grow by more than 100 million tonnes per annum from CY16 to CY21 with most growth to the new HELE power stations in India, Pakistan, Malaysia and Vietnam. There is also expected to be a further 45 million tonnes of seaborne supply required to replace falling exports from Indonesia as their domestic generation demand grows.

Figure 2.4 Seaborne Thermal Coal Exporters



Source: DNRM statistics, IHS Energy periodicals; Commonwealth Bank reports; RMI

Figure 2.5 Seaborne Thermal Coal Importers



Source: DNRM statistics, IHS Energy periodicals; Commonwealth Bank reports; RMI

A slowing Chinese economy has impacted short term pricing prior to mid 2016 but this was offset by cut backs in domestic Chinese production which has provided short term relief to exporters. Newcastle prices fell to a low of less US\$50/ FOB tonne in January 2016 but have now risen to over US\$83/FOB tonne. The Chinese Government is now expected to influence imports by operating a price floor on domestic coal with an equivalent Newcastle pricing of US\$68/FOBt.

While RMI expects a sustained growth in demand for thermal coal over the forecast period, there are a number of supply factors that will contribute to the price outlook over this period. Most importantly are the cut backs in Chinese domestic production which should see some permanent closures of older and more expensive mines despite relaxation of the 276 day per year operating constraints. Another factor is increasing Indonesian domestic demand that will result in reduced Indonesian thermal coal exports.

The diminishing oversupply, and short term strength in Chinese imports is providing an improving market and pricing environment for all seaborne coal exporters. Discipline in major restructuring at many existing mines in China, Australia, Indonesia and South Africa, severe cost reduction strategies and improved short term pricing, are now providing better returns for an increasing number of producers. Further relief has come from a strengthening US dollar for Indonesian and particularly Australian producers who have costs mostly in Australian dollars. The Australian dollar has reduced in value by more than 25% since 2013. This all supports re-starting of Queensland mines that were on care and maintenance.

It has been seen that Australian producers have cut short term costs by more than 25% in AUD terms over the last 24 months and it is expected that this reduction is likely to be sustainable over the medium term, resulting in a more permanent impact on medium term export pricing. However, it is expected that this cost cutting has reached its limit and further savings will now start to abate. Also, Chinese domestic costs have moved higher as resources become more difficult to mine and producers have also not had the same relief as their Indonesian and Australian counterparts from a strong USD. This may provide some opportunity for further short term price movement until imports start to match domestic Chinese prices.

In the longer term, strong supply growth is still expected to underpin new mine project and infrastructure developments by producers in Australia, Indonesia, Columbia, Canada and Mongolia. However, most greenfield projects are now expected to be delayed by at least 18 months until the market moves back into balance from 2017. These developments are expected to play a key role in the long-term seaborne demand/supply balance, and further diversification of coal suppliers.

The USA export market has been hit the hardest and seaborne thermal coal exports have now fallen by more than 30%. The US exporters will continue to lose market share over the next 3 years and exports will continue to fall while the US dollar remains strong.

Indonesia faces increasing pressure to supply coal to their domestic market. It is expected that more than 45 Mtpa will be removed from the seaborne market over the next 5 years to meet this demand. Indonesia is the largest exporter of thermal coal with exports peaking at 422 mt in 2014 before falling to 373 mt in 2015 due to market pressure on pricing, reduction in demand for low quality coal and growth in domestic market demand. Exports are expected to rise to 385 mt in 2016 due to short term support from China but should continue to fall to FY21 as production is diverted to the

Indonesian domestic market. Chinese thermal coal imports increased to 199 mt in 2016 compared to 156 mt in 2015 and expected to show moderate growth during the forecast period.

Table 2.2 Forecast Seaborne Thermal Coal Demand

| Demand (Mt) | CY15 | CY16 | CY17 | CY18 | CY19 | CY20 | CY21 |
|---------------------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| India | 171 | 161 | 162 | 164 | 170 | 170 | 175 |
| China | 156 | 199 | 202 | 205 | 208 | 210 | 210 |
| Japan | 141 | 140 | 141 | 142 | 143 | 144 | 145 |
| Sth Korea | 98 | 99 | 102 | 105 | 107 | 109 | 110 |
| Taiwan | 57 | 58 | 60 | 60 | 62 | 64 | 64 |
| Vietnam | 0 | 5 | 10 | 12 | 16 | 20 | 26 |
| Pakistan | 0 | 0 | 2 | 4 | 6 | 8 | 10 |
| Africa/Middle East/Israel | 14 | 14 | 16 | 18 | 20 | 22 | 25 |
| SE Asia | 42 | 46 | 48 | 52 | 56 | 58 | 60 |
| EU | 160 | 159 | 159 | 159 | 158 | 157 | 156 |
| Other | 29 | 27 | 27 | 27 | 27 | 27 | 27 |
| World | 868 | 908 | 929 | 948 | 973 | 989 | 1,008 |

Source: Source: DNRM statistics, IHS Energy periodicals; Commonwealth Bank reports; RMI

Construction of HELE coal fired power stations in Pakistan, Malaysia, Thailand, Egypt and Africa will be drivers for thermal coal demand to FY21. Indian demand growth will be flat during the forecast period due to increasing domestic supply from Coal India and private producers, and the likelihood of Indian Government power station development plans not being achieved. The reduction in Indonesian exports and growth in the overall seaborne demand could result in a net increase of 145 Mtpa of supply or replacement supply (non Indonesian) over the forecast period to FY21.

A longer term negative impact for the seaborne coal trade is the growing debate on CO₂ emissions, future mechanisms to reduce these emissions, and increasing pressure from politicians and interest groups to move away from construction of low efficiency coal fired power stations and to an increasing push for renewables. However, this will be offset by the strengthening US dollar which has dramatically reduced thermal coal exports from the USA and also the developing Indian and South East Asian and Middle East countries that are moving to High Efficiency Low Emissions (HELE) coal fired power stations to meet their growing energy demand. Therefore increased import demand for higher energy Queensland coals over the forecast period will be required.

2.6 Domestic Queensland Market

Coal demand in Queensland is dominated by the electricity generation sector, which accounts for 90% of coal distributions within the state (Table 2.3). The non-ferrous metals processing sector and the cement manufacturing industry are also significant coal consumers in Queensland, accounting for 8.1% and 1.0% of intra-state coal distributions, respectively. Together, these three end-use sectors account for 99% of domestic coal distributions in Queensland. Also all domestic railings are on the Blackwater and Moura lines to Gladstone Power Station and Stanwell Power Station and Gladstone domestic consumers Queensland Alumina (QAL), Cement Australia and Rio Tinto Alcan (RTA). These are stable markets with minor demand fluctuation in the context of CQCN railings,

although we note QAL has recently announced a small drop in production and workforce due to high electricity costs.

Support for domestic coal fired electricity production in Queensland has increased due to recent closures of coal fired power stations in Victoria and South Australia and the need to balance stable based load supply against more volatile but growing renewable supply. This will see Queensland and NSW electricity generators operating their existing black coal fired plants to maximum capacity. However, there is not expected to be any major growth and there will be an overall cap on domestic coal fired electricity supply with no planned construction of new coal fired capacity during the forecast period to FY21. There was a total of 23.3 million tonnes of domestic production in FY16 with 8.1 million tonnes railed to power stations and domestic customers within the CQCN.

Table 2.3 Historical Domestic Coal Deliveries by Rail Corridor (Mt)

| Domestic Railing (Mt) | Blackwater | Moura | Newlands | Total |
|------------------------------|-------------------|--------------|-----------------|--------------|
| FY12 | 5.86 | 2.31 | 0.43 | 8.60 |
| FY13 | 5.50 | 1.91 | 0.33 | 7.73 |
| FY14 | 6.01 | 2.58 | 0.36 | 8.95 |
| FY15 | 5.51 | 1.98 | 0.29 | 7.78 |
| FY16 | 6.02 | 1.87 | 0.18 | 8.07 |

Source: DNRM statistics, RMI

3: Central Queensland Coal Network (CQCN) Coal Demand

By June 2016 resurgence in export coal prices due mostly to domestic Chinese production cut backs, is expected to provide support for more rapid growth in Australian exports, over the forecast period. More particularly this will be very beneficial to Central Queensland exporters who have competitive costs and high quality coal which is in demand in the seaborne coking and thermal coal markets. Some permanent closures of domestic Chinese mines and increased imports into India, and South East Asia should see strong support for high quality Queensland coal exports. The increased production will come mostly from brown field expansions and mine re-openings but there are several new projects like Byerwen that will develop significant export capacity to FY21. This will be the only major greenfield project but operations like Grosvenor which have predominantly completed most of its development will rapidly build capacity by FY18 with minimal further capital. Although there has been a significant reduction in exploration and resource development in Queensland, supply during the forecast period will be more than adequately supplied by existing defined reserves at all mines and projects planning to produce to well beyond FY21.

As discussed in the previous section most Queensland producers have now reduced their operating costs by at least 25% in Australian dollar terms. This has also been assisted by at least a 25% weakening of the Australian dollar since 2013. The main Australian competition in the seaborne market is from the USA, domestic Chinese production and Indonesia. The USA and China have a reduced competitive position by a rising US dollar as well as increasing domestic costs. Indonesia is also losing market share as it focusses increasingly on its own domestic market.

Over 80% of Central Queensland production is from open cut mines, which are still operating at low cost bases despite steadily increasing stripping ratios over time. At present rising stripping ratios are being offset by increased productivity and introduction of new technologies. The remaining production is from high capacity longwalls, which are typically, less than 350 metres in depth are very productive by world standards and have slowly rising costs with increased depth of mining. Most Central Queensland mines are less than 400 km distance by rail to all nearby ports and domestic customers and are serviced by high capacity rail and port infrastructure providing low transport and port costs.

By comparison almost all domestic Chinese production is more than 90% from underground mining methods with depths of cover of more than 800 metres and transport distances of more than 800 km to coastal power stations and steel mills. These same power stations and steel mills are also importing coal on a lowest cost basis either from domestic producers or from seaborne imports.

A further advantage is that Central Queensland has some of the highest metallurgical and thermal coal qualities. Metallurgical hard coking and PCI coals, which comprises more than 60% of CQCN production, are highly sought after in the seaborne market. The CQCN thermal coals generally have lower ash and high energy compared to Indian, Chinese, and Indonesian competitors. Chinese coals are now increasing in ash and have calorific value (CV) in the range of 5,500 – 6,000 kcal/kg (as received). Indian coal is even higher in ash which can be as high as 40% and CV in the range of 4,000 – 5,500 kcal/kg (ar). Indonesian coal is very high moisture which can be in excess of 35% as received with CV in the range of 3,800 – 5,500 kcal/kg (ar). By comparison Central Queensland has thermal

coals generally in the 13% - 20% ash range, 8%- 9% moisture and CV above 5,800 kcal/kg (ar) and this is comparable to most Hunter Valley producers.

All Central Queensland mines have more than adequate JORC defined reserves and resources to support the forecast demand to well beyond FY21.

This leaves the Central Queensland suppliers in a strong competitive position with regard to other countries over the forecast period. The new Surat and Galilee Basin producers are not expected to pose any major supply threat to Central Queensland during the forecast period as these new areas are more likely to be fully developed after FY21. Hunter Valley producers, which have similar high quality thermal and low rank semi soft metallurgical coals, are competitive with Queensland but already the major growth from Maules Creek/Narrabri (for thermal and PCI coal) has already been taken up in the seaborne market and there are no major new suppliers during the forecast period apart from modest brown field expansions. The net result of this improvement in competitive position and move to higher quality coals will result in increasing demand for Central Queensland coals.

4. Aurizon Network's and RMI Forecasts

4.1: Forecast Analysis

RMI finds the Aurizon Network's forecasts for the CQCN for the 2017 DAU regulatory period are not reasonable, and we have provided an amended volume forecast for the CQCN for the regulatory period below. Aurizon Network's forecasts underestimate the production from a number of mines that are either in the final stages of commissioning or are old mines that have been on care and maintenance and will return to full production with new owners. The re-openings are well supported by operational restructuring, competitive production costs and growing demand for high quality Queensland coal over the forecast period. Key competitive advantages for Queensland producers are:

- Recent significant improvements in productivity leading to reduced production costs;
- A lower Australian dollar;
- Higher quality of coking and thermal coal compared to major competitors like Indonesia and most domestic coals in China and India;
- Adequate JORC defined mineable reserves and resources.

RMI considers that there is adequate capacity within existing mine, rail and port infrastructure to accommodate the railings forecast to FY21 (Refer Section 5.1.6 System Expansions and Capacity Utilisation). It is also noted that apart from Byerwen and Dysart East, there is also very little capital required to reopen existing mines or finalise development of advanced projects like Grosvenor.

For example, re-opened or recently sold mines include:

- Baralaba Coal was placed on care and maintenance in FY16 subsequent to a voluntary administration event. The company has now successfully traded out of administration and it is anticipated that production from the North Baralaba pit will commence in FY17. Construction has already commenced on civil works for the new pit operation.
- Blair Athol was placed on care and maintenance in FY15 and was recently sold to Terracom. It is anticipated that production will restart over the forecast period. The company has already let a mining contract and the contractor is building up capability for an early FY18 start date.
- The Callide open cut mine is now owned by Batchfire Resources, who have indicated that operations will continue uninterrupted and production capacity will be expanded. This is likely to mean additional railings to Gladstone port for export;
- Collinsville Coal was placed on care and maintenance by Glencore in FY16. Glencore announced in December 2016 that the mine will re-open during 2017. There are no capital requirements to restart the mine.
- Carborough Downs was recently sold by Vale to Fitzroy Resources. It is anticipated that the new owners will continue to produce coal. There are no capital requirements to continue production.
- Foxleigh was acquired from Anglo American by Realm Resources (supported by the Taurus Energy Fund). Foxleigh has been in production since FY2011, and is anticipated to continue

production for the forecast period. There are no capital requirements to maintain this production.

- Grosvenor is in the final stages of commissioning. RMI anticipates that Anglo American will continue to progress to full production of high quality coking coal in FY17
- The Jax mine, owned by QCoal, has been on care and maintenance. It is anticipated that production will resume in FY17, with total production from a complex of associated mines, increasing over the forecast period. There are no major capital requirements to restart this production.

RMI considers that there is little risk for delays in re-opening of the above mines, given the current coal price environment, and has forecast most of them to be at full capacity during FY18. There is very little capital required for these mines to reopen, and ramp up will only depend on the ability to secure or renew markets for the product coal.

In addition, RMI anticipates the development of greenfields projects during the forecast period, including:

- Byerwen, which is being developed by QCoal, is expected to commence in FY18, however it is possible that start up may be delayed by 12 months depending on when the company receives financing for the project;
- Dysart East — a greenfields project being developed by Bengal Coal. There is confidence that the mine will be in production during the forecast period but there is still a possibility that granting of a mining licence and construction will take longer than expected. We expect that production will start in FY18;
- Meteor Downs — a greenfields project owned and operated by Sojitz. It is in the early stages of construction and is anticipated to be in production before the end of the forecast period.

4.2: Wet Season Assumptions

RMI's railings forecast has been prepared assuming normal wet season conditions in Queensland, but we note that abnormally wet or abnormally dry years have in the past had a significant impact on either decreasing or increasing railings opportunity respectively. Our assessment of mine by mine production capacity has taken into account normal wet season impacts on railings.

The CQCEN has in the past been impacted to varying degree by wet season events, of which most are short term (ie within a week) events involving port loading delays and/or disruptions to raiiling and mine site production. RMI regards this as normal and considers that any lost railings resulting from such short term events would normally be made up later within the capacity of existing infrastructure, through stockpile management and rescheduling, and would have no significant impact on annual railings.

However, there have been major cyclone events that have impacted the CQCEN for several weeks and have resulted in permanently lost exports when producers have been forced to declare Force Majeure and consumers have sourced coal from elsewhere. These include the major rainfall event in 2011 and likely the late March 2017 Cyclone Debbie event occurring at the time of writing this report in May 2017. We note that these events are uncommon, and that there have been system upgrades to make the CQCEN less vulnerable to major rainfall events.

Prediction of the size, frequency and likely degree or location of the impact of major wet weather events over the forecast period is obviously fraught with uncertainty. RMI considers that climate modelling of El Nino/La Nina weather patterns is not useful in predicting major rainfall events as far forward as the forecast period. However, history shows the impact of major events such as Cyclone Yasi in 2011 and the recent Cyclone Debbie can significantly disrupt railings and impact annual railings volume and timing. A recent analysis of lost exports made by IHS Energy Coal (Australian Coal Report 5 April, 2017) estimates 17.4Mt spread over the entire CQCN, of which 12.8Mt is on the Goonyella system to DBCT or HPCT. RMI considers that a large proportion of this tonnage will be made up through stockpile management (source and destination) and rescheduling, but that potentially 10 of the 17.4Mt could be permanently lost from FY17 railings.

We have not accounted for this amount (10Mt) of lost railings in our forecast, but note that it has occurred twice within a 7 year period. We note also that catch up railings from the Cyclone Debbie event could flow over into the FY18 railings year, but we also have not accounted for this in our forecast.

4.3: RMI Railings Forecast

RMI forecasts total CQCN railings, including domestic and export production, will rise from an actual of 229.6 million tonnes in FY16 to 236.4 million tonnes by FY18, and then grow over the UT5 forecast period to 264.3 million tonnes by FY21 (Table 4.1). Domestic coal railings, which are now railed only on the Moura and Blackwater lines are forecast to remain flat at about 7.7Mtpa over the forecast period (see below), and are included in the following total railings forecast.

Table 4.1 RMI CQCN Forecast Domestic and Export Coal Railings Compared to Aurizon

| Year (Mtpa) | FY18 | FY19 | FY20 | FY21 |
|-------------------|--------------|--------------|--------------|--------------|
| Aurizon | 226.2 | 228.9 | 228.9 | 228.9 |
| RMI | 236.4 | 250.2 | 259.3 | 264.3 |
| Difference | <i>10.17</i> | <i>21.24</i> | <i>30.34</i> | <i>35.34</i> |

Source Aurizon UT5 Draft Access Undertaking; RMI

Aurizon Network’s forecast for total railings in FY18 is 226.2 million tonnes, which we note is smaller than the FY16 actual of 229.6 million tonnes. RMI considers that, cyclone impacts aside, the Aurizon Network’s forecast for FY18 and subsequent years do not reflect the current positive market environment. A detailed forecast of railings by system is shown in Table 4.2.

At the time of RMI’s forecast in May 2017, there was significant uncertainty as to whether Cook Colliery would resume operation due to a major underground flooding event in March 2017. This uncertainty has continued, despite the mine owner Caledon going into voluntary administration and an asset sale process having started. The QCA consequently advised RMI in late September 2017 to exclude all Cook Colliery railings from the forecast, due to continued uncertainty surrounding the sales process and Cook Colliery operation. RMI has not included production from the Galilee Basin projects during the forecast period to FY21. There is still considerable uncertainty as to the actual start date for construction on the most advanced of these projects, Carmichael, which is operated by the Adani Group. The mine has received almost all of the required approvals and is in the early stages of road shows and discussions with future suppliers. It is anticipated that the mine may start

construction within the next 12 months and that it may be in the early stages of production in late FY21. However, RMI considers it prudent to leave Galilee Basin out of the forecast due to this uncertainty.

Table 4.2 System Forecast Railings

| Million tonnes | FY18f | FY19f | FY20f | FY21f |
|--------------------------|---------------|---------------|---------------|---------------|
| Aurizon 2016 DAU | | | | |
| Moura | 10.18 | 10.18 | 10.18 | 10.18 |
| Blackwater | 60.33 | 61.06 | 61.06 | 61.06 |
| Goonyella | 117.20 | 117.20 | 117.20 | 117.20 |
| GAPE | 16.16 | 17.51 | 17.51 | 17.51 |
| Newlands | 9.21 | 9.21 | 9.21 | 9.21 |
| WIRP | 13.12 | 13.77 | 13.77 | 13.77 |
| Total Aurizon | 226.21 | 228.94 | 228.94 | 228.94 |
| RMI | | | | |
| Moura | 14.30 | 17.50 | 18.50 | 18.50 |
| Blackwater | 59.38 | 60.58 | 61.58 | 61.58 |
| Goonyella | 124.75 | 128.45 | 130.25 | 130.25 |
| GAPE | 16.15 | 19.15 | 24.15 | 29.15 |
| Newlands | 11.70 | 14.20 | 14.20 | 14.20 |
| WIRP | 10.10 | 10.30 | 10.60 | 10.60 |
| Total RMI | 236.4 | 250.2 | 259.3 | 264.3 |
| Differences | | | | |
| Moura | 4.12 | 7.32 | 8.32 | 8.32 |
| Blackwater | -0.95 | -0.48 | 0.52 | 0.52 |
| Goonyella | 7.55 | 11.25 | 13.05 | 13.05 |
| GAPE | -0.01 | 1.64 | 6.64 | 11.64 |
| Newlands | 2.49 | 4.99 | 4.99 | 4.99 |
| WIRP | -3.03 | -3.48 | -3.18 | -3.18 |
| Total Differences | 10.17 | 21.24 | 30.34 | 35.34 |

Source Aurizon UT5, RMI

Significant differences with the Aurizon Network forecasts occur on the Moura, Goonyella and Newlands lines, and on the GAPE system from FY20. Some of the major differences in the two forecasts are that RMI has included the re-opening of a number of mines that have been placed into care and maintenance over the last 3 years including Blair Athol and Baralaba. RMI have also considered mines that have been recently sold and restructured including Carborough Downs and Foxleigh. Finally RMI has also included production from new projects including Byerwen, Meteor Downs, and Dysart East as discussed above. Some delays have also been included in the RMI forecasts for Meteor Downs, Byerwen and Dysart East, and this is our best view on the basis of current information on their development ramp up.

4.4: Domestic Railings

Domestic railings are forecast to be similar to FY16. Although there may be some changes over the forecast period in the suppliers to Gladstone Power Station (GPS) or Queensland Alumina (QAL), the

overall tonnages railed to domestic customers are expected to be consistent at about 7.7Mtpa. Recent closures of Collinsville and Queensland Nickel power stations, and a possible small reduction at QAL, are likely to have only a minor impact on demand, due to increased demand from remaining coal fired electricity producers.

Forecast domestic demand by year is shown below in Table 2.4 in comparison with the Aurizon Network forecast. The difference between the forecasts of 0.5-0.7Mt is due to there being no railings to RTA and Cement Australia, and less railings to GPS, in the Aurizon Network forecast.

Table 2.4 RMI Forecast Central Queensland Domestic Railings

| Year (Mtpa) | FY18 | FY19 | FY20 | FY21 |
|--------------------|-------------|-------------|-------------|-------------|
| Aurizon | 7.02 | 7.28 | 7.28 | 7.28 |
| RMI | 7.73 | 7.73 | 7.73 | 7.73 |

5. Central Queensland Coal Transport Infrastructure

Aurizon Network's 2017 DAU relates to below-rail infrastructure access services provided by Aurizon Network within the CQCN, as dealt with in section 250(1)a of the *Queensland Competition Authority Act 1997* (the Act). Below-rail services include the rail infrastructure and all activities associated with its construction, maintenance and management as required for safe operation. The CQCN includes the Newlands, Goonyella, Blackwater, and Moura physical rail systems, as shown in Figure 5.1. The Goonyella extension rail line, which connects the Goonyella and Newlands systems, forms part of the conceptual Goonyella-Abbot Point rail system (defined below).

Above rail services, which include services associated with the rolling stock, terminals, crewing, and handling of freight, are provided by a number of carriers within the Central Queensland region, including Aurizon Limited, Pacific National and the BHP Billiton-Mitsubishi Alliance (BMA) Rail.

Coal is transported via the CQCN to domestic consumers within Queensland, and to one of five coal export terminals at the Abbot Point, Hay Point or Gladstone ports for export. The bulk of this coal is exported, while a very minor proportion is shipped interstate.

Some coal is also transported by conveyor from Callide mine to the Callide Power Station, while the Stanwell and Gladstone Power Station domestic consumers receive coal entirely via the Blackwater rail system. Small quantities of coal are also transported by truck from some mines to domestic consumers.

Table 5.1 summarises total tonnages transported by rail, conveyor and truck within the Central Queensland region in the 3 years from FY14 to FY16, based on DNRM statistics.

Table 5.1: Coal Transport Summary FY14 - FY16

| <i>Row Labels</i> | <i>RAIL</i> | <i>ROAD</i> | <i>BELT</i> | <i>Grand Total</i> |
|-------------------|-------------|-------------|-------------|--------------------|
| FY16 | 229.68 | 0.25 | 15.03 | 244.96 |
| FY15 | 225.84 | 0.22 | 14.26 | 240.33 |
| FY14 | 217.65 | 0.26 | 13.58 | 231.47 |

Source: DNRM statistics, RMI

Figure 5.1: Queensland Coal Transport Infrastructure



Source: Dept of Infrastructure and Regional Development Freightline 4 – 2015- data. Note the Rolleston branch line of the Blackwater System is now electrified.

5.1 Central Queensland Rail Network

The completion of the Goonyella – Abbot Point Expansion (GAPE) project in FY12, on behalf of coal customers BMA, Rio Tinto, QCoal, Macarthur Coal and Lake Vermont Resources, means the QCN now provides a continuous rail link from the port of Abbot Point in the north to the port of

Gladstone in the south, as well as various domestic consumers. The GAPE project involved construction of a 69km rail section connecting the Goonyella system to the Newlands system.

The component rail systems referred to in Aurizon Network's 2017 DAU rail volume forecasts are generally described below.

5.1.1 Moura system

The rail corridor from the Moura and Baralaba mines in the south to the port of Gladstone, including domestic coal terminals in the vicinity of Gladstone. The Moura system, which is not electrified, comprises 235km of 1067mm gauge rail line. The maximum allowable train rake is 100 wagons at from 15.75 to 26.5 tonne axle loading, depending on location. Short peripheral sections from Moura mine Junction to Moura, Graham - Taragoola, and Gladstone Station Precincts have a 15.75 tonne axel loading, which corresponds to a maximum train rake tonnage of 6,300 tones. The remaining major part of the Moura system has a 26.5 tonne axel loading with up to 10,600 tonnes per train allowable.

5.1.2 Blackwater system

The rail corridor connecting Oaky Creek mine in the north, Minerva mine in the west and Rolleston mine in the southwest, to the RG Tanna (RGCT) and WICET coal export terminals at the port of Gladstone. The Blackwater system includes branch lines near Blackwater, a section of the North Coast line south of Rockhampton and lines to domestic coal terminals in the vicinity of Gladstone. The system has a total of 697km of 1067mm gauge rail line, with 26.5 tonne axle loading and a maximum allowable train rake of 100 wagons (10,600 tonnes per train).

There is a bidirectional duplicated line from the Rolleston Branch line junction eastward to port and a single line elsewhere. The majority of the system is electrified, with peripheral sections off the North Coast line to the East End and Fisherman's Landing balloon loops, and the branch line to Minerva mine not electrified. The Bauhinia Electrification Project, which involved upgrading the branch line to the Rolleston mine, was completed in 2014 with other upgrades to match the Wiggins Island Project.

The Blackwater system is connected to the Goonyella Rail System. The Blackwater Rail System therefore provides a potential rail link option to the RG Tanna and WICET coal export terminals near Gladstone, for mines on the Goonyella system. For example Lake Vermont mine has railed coal to the port of Gladstone in the past few years.

The Blackwater and Moura systems have a combined carrying capacity of 120Mtpa, post WIRP expansion, which is sufficient capacity to meet all current contracts. The 2015 Aurizon Network Development Plan identified current limits on additional capacity that would trigger system upgrades, as follows:

- Sections along the Rolleston branch line have 0-5Mtpa additional capacity potential, before a passing loop would be required for an additional 5Mtpa.
- The North Coast Line is a major constraint, rated by Aurizon as having 5-10Mtpa uncommitted capacity, due to a mix of operational speed constraints. Tonnage throughput beyond this would require triplication of this corridor;

- Moura sections east and west of the Callide junction have up to 10-20Mtpa additional capacity, before upgrades are required.

5.1.3 Goonyella system

The rail corridor connecting Hail Creek and North Goonyella mines in the north, Blair Athol mine in the west and the junction with the Gregory Branch line in the south, to coal export terminals at Dalrymple Bay and Hay Point. The system comprises 635km of electrified 1067mm gauge line that can accommodate up to 26.5 tonne axle loadings and train rakes of up to 124 wagons (13,144 tonnes per train). All branch lines are electrified and have the same axel loading characteristics.

The Goonyella system has a carrying capacity of 140Mtpa, which is sufficient to meet all current contracts. The 2015 Aurizon Network Development Plan identified current limits on additional capacity that would trigger system upgrades, as follows:

- “...limited remaining capacity on the trunk...” of 0-5Mtpa, due mainly to grade and speed constraints in the loaded direction between Hatfield and Yukan (ie approaching the North Line junction). Additional capacity would require triplication and other changes to allow increased speed.
- Other current additional capacity limits include 0-5Mtpa from Riverside to Moranbah North; 10-20Mtpa port side of South Walker Creek junction; 20-30Mtpa in sections between Dysart and Peak Downs; 10-20Mtpa from Oaky Creek north to Bundoora; and 20-30Mtpa on the South Goonyella branch, with passing loop required for additional throughput.

5.1.4 Goonyella-Abbot Point system

This conceptual system is defined as any rail corridor that uses the 69km Goonyella-Newlands system link, and any part of the Newlands and/or Goonyella systems, for delivery of coal to the Port of Abbot Point. This system has the properties of the Goonyella and Newlands sections being used, while the Goonyella-Newlands part is electrified, and comprises 7.746 km with 26.5 tonne axle loading traffic at a maximum speed of 80 km/h. This would allow train rakes of up to 13,144 tonnes per train on the link, but train capacity to Abbot Point is limited by the capacity of the Newlands system.

5.1.5 Newlands system

The rail corridor from the Newlands mine to the port of Abbot Point, and branch lines that link to it. This system, which comprises 255km of 1067mm gauge single line is not electrified. The maximum train rake is 82 wagon at 26.5 tonne axel loading, which equates to a maximum of 8,692tonnes per train.

Current capacity on the Newlands and Goonyella-Abbot Point systems is sufficient to meet the 50Mtpa of contracted tonnage. The 2015 Aurizon Network Development Plan identified current limits on additional capacity that would trigger system upgrades, as follows:

- A deviation around Collinsville if the haulage through the section south of Collinsville increases by more than 5Mtpa, due to impacts on Collinsville township;
- A passing loop near Newlands if haulage through this section increases beyond 5Mtpa;
- An additional passing loop if haulage increased beyond 10Mtpa; and
- Duplication east of Collinsville if haulage increased beyond 20Mtpa.

Such works would achieve an additional capacity of up to 20Mtpa, to achieve a total systems capacity of 70Mtpa.

5.1.6 System Expansions and Capacity Utilisation

Major rail upgrades recently completed include:

- the \$130 million Goonyella Rail Expansion Project supporting the 11 million tonnes per annum (Mtpa) expansion of BMA’s Hay Point Coal Terminal, and
- the \$831 million Wiggins Island Rail Project (WIRP) involved construction of a balloon loop, track duplications, and track upgrades to increase capacity within the Blackwater and Moura systems by 27 Mtpa. This was to support the 27Mtpa Stage 1 of the new Wiggins Island Coal Export Terminal development. Aurizon Network completed the Wiggins Island Rail Project (WIRP) in late 2015.
- The Aurizon 2016 Annual Report notes a number of initiatives during FY16, including technological improvements and new asset management software systems introduced to achieve improved operational efficiency.

Total historical railings by rail system are summarised in Table 5.2 based on Aurizon data for FY13-FY15 (2015 Development Plan) and DNRM Statistics. We note that Aurizon Network’s latest guidance for FY 2017 in their Q3 2016 operational report is 200-212Mt (Aurizon 2016a).

Table 5.2: Historical Railings by Rail System

| System | FY13 | FY14 | FY15 | FY16 | FY17 | Current capacity |
|----------------|--------------|--------------|--------------|--------------|------------------|------------------|
| Newlands | 14.5 | 12.0 | 14.7 | 11.7 | | 50 |
| GAPE | 4.5 | 12.5 | 15.3 | 14.9 | | |
| Goonyella | 97.6 | 114.5 | 119.6 | 116.1 | | 140 |
| Blackwater | 54.9 | 63.1 | 63.7 | 68.4* | | 120 |
| Moura | 10.8 | 12.4 | 12.3 | 11.7 | | |
| Total Railings | 182.3 | 214.5 | 225.7 | 225.9 | 200-212** | 310 |

Notes: *: Comprising about 4Mt originating from within the Goonyella system, railed to Gladstone.

** : Q3 2016 Aurizon Network guidance.

Source: Aurizon 2015 Network Development Plan, Aurizon 2016 Annual Report, DNRM Statistics

Utilisation of the various rail system capacities in FY15 and FY16 ranged from:

- 53-60% for the Newlands system, including GAPE railings, to Abbot Point terminals;
- 83-85% for the Goonyella system to Hay Point terminals;
- 63-67% for the Blackwater/Moura systems to Gladstone terminals.

The 2015 Aurizon Network Development Plan reports that contracted tonnage for the total system has been consistently more (by 17-20%) than total railings for FY14 and FY15, but remains within (82-85%) the total system capacity of 310Mt. This left about 45Mt – 56 Mt of unallocated capacity

across the CQCN as at end FY15. Actual total railings for FY16 were similar to FY15 (Table 5.20), while Aurizon guidance for FY17 is for up to 212Mt (Table 5.2).

RMI concludes that the existing total CQCN infrastructure is sufficient to handle our forecast volumes, including:

- Newlands/Gape system – Increasing to 43Mtpa in FY21, or up to 86% of capacity 50Mtpa;
- Goonyella system – Increasing to 132Mtpa in FY20 and FY21, or up to 94% of capacity 140Mtpa;
- Blackwater/Moura system – Increasing to 85Mtpa from FY19, or up to 71% of capacity 120Mtpa.

Conceivably some bottleneck improvements may be required, including within the Goonyella system, which is approaching maximum capacity. There may also be pressure for localised improvements on the North Goonyella line and Blackwater/Bauhinia lines, if the Byerwen mine development and the Rolleston and Meteor Downs mine developments respectively, exceed our expectations.

These and other potential rail capacity expansion scenarios have been considered by Aurizon Network in the 2015 Aurizon Network Development Plan. Those within and around the regulatory period are summarised Table 5.3, in association with Port expansion planning as shown.

Table 5.3: Rail Expansion Scenarios Envisaged

| System | Current Capacity | Branch Line source | Tonnage (Mtpa) | Starting | Related Port expansion | Coal Type |
|--------------------|------------------|--------------------|----------------|-----------|------------------------|----------------|
| Newlands / GAPE | 50 | Galilee | 30 | 2018-2020 | APCT T3 | Thermal |
| | | Galilee | 30 | 2021-2023 | APCT T3 | Thermal |
| Goonyella | 140(*1) | Nth Goonyella | 4 | 2018 | DBCT Zone 4 | Coking |
| | | Blair Athol | 10 | 2019 | DBCT 8X | Thermal |
| | | Nth Goonyella | 3 | 2019 | DBCT 8X | Coking |
| | | Sth Goonyella | 14 | 2021 | HPCT X4 | Coking |
| | | Nth Goonyella | 6 | 2022 | HPCT X4 | Coking |
| Blackwater / Moura | 120 | Sth Goonyella | 12 | 2019 | RGT 4 | Coking |
| | | Blackwater trunk | 4 | 2019 | RGT 4 | Coking/Thermal |
| | | Rolleston | 8 | 2020 | RGT 4 | Thermal |
| | | Moura | 6 | 2020 | RGT 4 | Thermal |
| | | Sth Goonyella | 9 | 2022 | WICET 2 | Coking |
| | | Blackwater trunk | 4 | 2022 | WICET 3 | Coking/Thermal |

Note *1: Based on Port of Hay Point capacity (DBCT + HPCT; Aurizon Network 2015)

Source: Aurizon, 2015 Network Development Plan.

We note that over 19Mt of expansion in Table 5.3 is scheduled for FY22, which is outside the regulatory period but included for completeness. Also 60Mt of capacity expansion is for the Galilee Basin, and 10Mt for a Blair Athol expansion, which we consider are both unlikely to be required within the regulatory. The remainder, comprising about 51Mt is for potential railings capacity envisaged by Aurizon that is not included in the RMI forecasts.

5.1.7 Rail Access Agreements and contract tonnages

While rail distance from mine to destination is a major cost factor in determining which rail and port infrastructure will be used by individual mines, many mines have below-rail access contracts for multiple destinations, presumably to afford logistical flexibility. This and the relative take-or-pay penalties, have been considered in our review of Aurizon Network’s rail volume forecasts, as detailed in the mine by mine appraisals in Appendix A.

5.2 Port Infrastructure

Figure 5.1 shows the location of the three Queensland export ports in relation to the CQRN.

The Port of Abbot Point, which is located 25km north of Bowen, currently has one coal loading terminal with a capacity of 50Mtpa. The Port of Hay Point, which is located 38 km south of Mackay, is the largest coal export port in Queensland, with 140Mtpa combined capacity from two separately run loading terminals. The Port of Gladstone, which is located about 100km southeast of Rockhampton, has a current loading capacity of about 100Mtpa from two separately run terminals. A third coal export terminal at Gladstone Port, the Barney Point Terminal, ceased operations for coal in May 2016.

Table 5.4: Central Queensland Coal Export Terminals

| Port | Terminal | Current Capacity | FY2015 | | FY2016 | |
|--------------|--------------|------------------|------------|---------------|------------|---------------|
| | | | Tonnage Mt | Utilisation % | Tonnage Mt | Utilisation % |
| Abbot Point | AAPCT | 50 | 26.4 | 52.8 | 28.7 | 57.4 |
| Hay Point | DBCT | 85 | 71.5 | 84 | 73.2 | 86 |
| | HPCT | 55 | 43.4 | 99% of 44Mtpa | 48.3 | 88% of 55Mtpa |
| Gladstone | RGCT | 75 | 64.4 | 86 | 62.5 | 83 |
| | WICET | 27 | 0.46 | 1.7 | 7.99 | 29.6 |
| | Barney Point | 0 | 3.7 | N/A | 1.6 | N/A |
| Total | | 290 | | | | |

Source: Department of Transport and Main Roads, 2015.

5.2.1 Adani Abbot Point

The port of Abbot Point currently has one coal loading terminal known as Adani Abbot Point Coal Terminal (AAPCT). It is operated by Abbot Point Bulk Coal under a 99 year lease from the Queensland Government (Nth Queensland Bulk Ports Corporation). The AAPCT has a loading capacity of 50Mtpa. DNRM statistics indicate 26.4Mt and 28.7Mt were exported from AAPCT in FY15 and FY16 respectively, suggesting a spare capacity of up to 21-24Mtpa (42-48%).

The Adani Group has plans under the Abbot Point Growth Gateway Project to build a second terminal with a capacity of 70 million tonnes per annum to support the development of its Carmichael Coal Project in the Galilee Basin. The project would increase port capacity to 120Mt, and which would support other prospective mine expansions in the region. It is expected to be completed during late FY21 and has not been included in current forecasts.

GVK Hancock has also has been given approval to build a 60 Mtpa capacity third terminal at Abbot Point. However this is not expected to be commissioned during the forecast period.

Hancock Coal Infrastructure Pty Ltd (HCIPL) has announced they have State and Federal Government approvals, but the rail and port project has not yet progressed beyond approval. It not expected that the mine or infrastructure will be developed during this forecast period to FY21.

5.2.2 Dalrymple Bay Coal Terminal

The DBCT is a multi-user coal export facility, which is leased to DBCT Management Pty Ltd (DBCTM). The DBCT is currently managed by Brookfield Infrastructure through DBCTM. The capacity of the DBCT is currently 85Mtpa, after an expansion project completed in 2009. Utilisation, which has increased over the last 3 years to 84% in FY15 (71.5Mt loaded) and 86% in FY16 (73.2Mt loaded), has been significantly less than the contracted tonnage due to reduced global demand growth for both thermal and coking coal. Metallurgical coal accounts for 82-85% of DBCT throughput.

Due to recent difficult coal market conditions DBCT therefore prefer an incremental expansion approach to any major upgrades. Implementation of any major expansion beyond 85Mtpa is entirely dependent on a significant increase in mining company demand for access to DBCT.

Expansion scenarios envisaged within the regulatory period include (Brookfield, 2016):

- Zone 4 expansion: An additional 4.1Mtpa capacity to 89.1Mtpa would be provided by stockpile enhancement, an additional stacker and reclaimer upgrade;
- 8X expansion: An additional 12.5Mtpa capacity to 101.6Mtpa is conceptually possible by terminal upgrades and stockpile enhancements;
- 9X expansion: An additional 34.0Mtpa capacity to 135.6Mtpa is conceptually possible by the addition of a second stockpile area and loading facilities.

5.2.3 Hay Point Coal Terminal

HPCT is owned and operated by BHP Billiton Mitsubishi Alliance (BMA), and used solely for coal exports from BHP controlled mines on the Goonyella Rail Network. Some coal from BMA and BHP Billiton Mitsui Coal (BMC) controlled mines is exported through the DBCT, including coal from the BMC Poitrel and South Walker Creek mines (Wood Mackenzie, 2015). The BMA/BMC throughput entitlement at DBCT is unknown, but has been estimated to be 3-5Mtpa (Energy Economics, 2005).

BMA increased capacity at HPCT from 44 to 55 Mtpa during calendar year 2015. Utilisation of the HPCT had in prior years increased to 99% in FY15 at the old capacity. We expect greater utilisation of the upgraded HPCT capacity during FY17 and subsequent years, as use of the new capacity ramps up.

The Goonyella- Riverside mine is approximately equidistant between Hay Point and Abbot Point terminals, while other BMA/BMC mines on the Goonyella line are significantly closer to HPCT and

DBCT. Blackwater mine is closest to Port Gladstone terminals. Aside from occasional logistical advantages of haulage to more distant terminals and BMA/BMC's take-or-pay rail and port obligations with Abbot Point and RGTCT, HPCT and DBCT are likely to be the favoured export terminals for all but Blackwater mine.

BMA/BMC exports from Queensland Ports in FY2015 and FY2016, based on Government statistics are summarised in Table 5.5.

Table 5.5: BMA/BMC Queensland Exports

| Port | FY15 | FY16 | Mines |
|---------------------------|-------------|-------------|--|
| Abbot Point | 7.1 | 6.0 | Caval Ridge; Daunia, Goonyella Riverside; Peak Downs(FY2015 only) |
| DBCT | 6.0 | 3.7 | Caval Ridge; Daunia, Goonyella Riverside, Peak Downs, Saraji |
| Gladstone (RGTCT / WICET) | 17.8 | 17.8 | Blackwater (14.7Mt - all), Gregory complex; minor Caval Ridge & Peak Downs in FY2016 |
| Hay Point | 42.9 | 48.3 | All mines except Blackwater in FY2016; All mines in FY2015 |
| Total | 73.9 | 75.9 | |

Source: DNRM statistics, RMI

RMI is unaware of any future BMA plans to significantly increase capacity at the HPCT from 55Mtpa, and none would be expected in the near term given the existing capacity and expected moderate demand for Bowen Basin metallurgical coal.

5.2.4 RG Tanna Coal Terminal

The RG Tanna Coal Terminal (RGTCT) is owned and operated by the Gladstone Ports Corporation (GPC). It has a throughput capacity of about 75Mtpa (GPC Strategic Plan, 2012). Gladstone Ports Corporation 2016 Annual Report indicates 64.4Mt and 62.5Mt of coal were exported from the RGTCT in FY2015 and FY2016 respectively, indicating a utilisation rate of 88% and 86% respectively. This suggests there is currently a spare capacity of only about 8-10Mtpa (12-14%) at the RGTCT.

The GPC 50 year Strategic Plan (GPC, 2012) states that current RGTCT capacity is 75Mtpa from 4 berths and three ship loaders. Potential expansion options include the addition of a fourth ship loader and the addition of a fifth berth, which would collectively increase capacity to 90-100Mtpa.

RMI is unaware of any specific plans to implement these strategies within the regulatory period. Development of the WICET terminal is discussed below. The Gladstone Ports Corporation 2016 Annual Report also states that a section of the port entrance channel will need to be duplicated at some time in the future, but this is unlikely to be required within the next five years, based on current and predicted shipping demand.

We note the Barney Point coal terminal ceased operations in May 2016, to be converted to a multi-commodity loading terminal excluding coal, while the WICET coal terminal was opened in April 2015.

5.2.5 WICET Coal Terminal

The WICET coal export terminal, which is located within the port of Gladstone to the west of the RGTCT, is privately owned and operated by a consortium of mining companies comprising Wiggins Island Export Terminal Pty Ltd. These currently include Aquila Resources, Glencore, New Hope Group, Wesfarmers Curragh and Yancoal, after some of the original participants, such as Bandanna Energy and Caledon, having gone into administration. Notably Baralaba Coal (previously named Cockatoo Coal), has now emerged from administration free of the previous take-or-pay commitments to WICET, and will commence mining from May 2017. We have assumed that Baralaba will not access WICET, but this remains a possibility. Caledon was still in administration as at September 2017, and we think it is likely that Caledon's previous take-or-pay commitments to WICET will be released.

Stage 1 of the development comprises a single berth, with 27Mtpa of contracted throughput. The terminal can potentially expand to an export capacity of 120Mtpa (WICET web site).

Long term capacity rights are allocated through Take or Pay Agreements between WICET and any Gladstone Coal Producer (GCP) that applies for access. In some circumstances, capacity may also be made available on a short term basis. A GCP is defined as any actual or potential coal producer which holds a specified type of mining tenure in an area that has, or potentially has, rail transport connections to the Port of Gladstone. This effectively encompasses the whole the existing CQCN plus coal resource areas within the Surat and Galilee Basins.

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