Global coal markets and their impacts on the US
14 March 2013

Jonny Sultoon
Lead Analyst – Atlantic Coal Markets
Wood Mackenzie

Delivering commercial insight
## Agenda

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The Global Coal Trade – 2008

Coal Production
6,781 Mt

Hard Coal 86% (sub-bituminous to anthracite)
5,832 Mt

- Domestic
  - 4,922 Mt
    - Thermal
      - 4,237 Mt
    - Metallurgical
      - 685 Mt
  - Export
    - 910 Mt
      - Seaborne
        - 815 Mt
      - Land Trade
        - 95 Mt

Brown Coal (lignite) 14%
949 Mt

- Domestic
  - 949 Mt
    - Thermal
      - 949 Mt
    - Metallurgical
      - 685 Mt

Significant growth in sub-bituminous and lignite coal exports in recent years, primarily from Indonesia

Source: Wood Mackenzie Coal Market & Coal Supply Service
China Thermal in context: record breaking 2012 imports... but still only represent 7% of domestic demand

**China vs. Seaborne Market**

- Blue bars: Chinese Seaborne Thermal Imports
- Red triangles: China as % of thermal trade
- Dark bars: Total seaborne trade

**China vs. China**

- Blue bars: Chinese Seaborne Thermal Imports
- Red triangles: Chinese imports as % of Chinese consumption
- Light grey bars: Total Chinese thermal consumption

Source: Wood Mackenzie Coal Market Service
Agenda

1. China in context and 2012 summary
2. Where are the markets for coal demand (Thermal and Metallurgical)?
3. How will the US participate?
Historically, the majority of global exports have come from just a few major exporting countries.

Key thermal exporting countries:
- Canada
- USA
- Colombia
- South Africa

Key metallurgical exporting countries:
- Russia
- China
- Vietnam

Key thermal and met exporting countries:
- Indonesia

Source: Wood Mackenzie Coal Supply Service
Global thermal coal supply will continue to be dominated by Indonesia and Australia

- Wood Mackenzie forecasts global coal supply will continue expanding to meet demand throughout the forecast period.
- Chinese and Indian demand growth are the key market drivers in this forecast.
- Global seaborne thermal coal supply is expected to increase by 1.3 billion tonnes (Bt) to 2.2 Bt by 2030.
- Wood Mackenzie’s analysis suggests that the Pacific Basin will supply 86% of the total increase and the Atlantic will supply 14%.

Source: Wood Mackenzie Coal Market Service
Where will new supply come from?

New Thermal Coal Supply Sources

- **Canada**: potential for new thermal growth; underutilised port capacity but high cost rail.
- **US**: CAPP high cost and fast depleting; potential for large volume thermal from ILB + PRB – but need lower transportation rates and new export terminals (West).
- **Colombia**: continued growth but remains infrastructure constrained; key Atlantic supplier.
- **Venezuela**: infrastructure/political limitations, no significant growth.
- **Africa**: only modest growth from South Africa (dom. consumption) but some thermal growth expected from Mozambique.
- **Russia**: large resource, but weakening export position due to transport cost; expect greater focus on Pacific.
- **Bangladesh**: large potential but politically difficult.
- **Mongolia**: enormous untapped reserves, but beholden to Chinese market and no direct seaborne access.
- **China**: imports accelerated dramatically into coastal regions. Will mine modernisation, technical reserves and rail bottlenecks ease costs and allow for renewed exports?
- **Australia**: supply will grow rapidly as infrastructure constraints ease. But very high cost environment. Surat and Galilee are l-term wild cards.

*Source: Wood Mackenzie*
Global thermal coal demand growth will be driven by China and India

- Seaborne demand for thermal coal is forecast to grow to 2.2 billion tonnes (Bt) in 2030, increasing from 909 million tonnes (Mt) in 2010.

- China will drive the large import growth – from 227 Mt in 2012 to 1 Bt by 2030 – domestic supply will not keep up with demand.

- In 2010, China’s demand exceeded that of Japan, which has been the primary destination for seaborne thermal coal since the market developed.

Source: Wood Mackenzie Coal Market Service
Global demand for thermal coal is driven by power generation

- Around 75% of seaborne thermal coal demand is used for power generation
- Thermal coal is also used in other industries, however these are not expected to drive demand
- It is therefore expected that developments in global power generation mix will drive demand for thermal coal going forward

Source: Wood Mackenzie Coal Market Service
Generation capacity mix going forward is going to be dominated by coal and gas

Almost 3 TW of new power capacity is expected to be commissioned worldwide by 2030.

Coal and gas-fired capacity will account for over half of all additions but growth is strongest in renewables.

The overwhelming majority of coal additions are in Asia Pacific (60% of which are in China) whereas gas additions are more evenly spread across the regions.

Nuclear additions are also dominated by China which accounts for 45%. The strong growth in renewables is being led by the more developed markets of North America and Europe.
Global metallurgical coal supply will remain primarily an Australia story

- Metallurgical coal prices have come down from historic highs and global steel demand was in the doldrums through 2012, but producers are still active and emerging supply regions are planning expansions to meet the burgeoning demand for metallurgical coal.

- Asian demand growth provided impetus to the expansion of global seaborne metallurgical coal supply in 2010, despite the worldwide economic slowdown. That pattern of growth has continued through 2011 and through most of 2012.

- Traditional supply regions, primarily Australia, will provide the majority of the expansion, but new growth areas such as Mongolia and Mozambique will become increasingly important.

- We forecast seaborne supply of metallurgical coal will increase by 60% over the next 18 years, from a 2012 level of 245 Mt to 391 Mt in 2030.

Source: Wood Mackenzie Coal Market Service
Where will new supply come from?

**New Metallurgical Coal Supply Sources**

- **Canada**: Large pipeline of projects with guaranteed port offtake.
- **Colombia**: Limited growth.
- **Venezuela**: Mainly PCI and infrastructure constrained.
- **US**: Re-energised with higher prices and exports running at high levels already. Can lower grade coal make an impact?
- **Russia**: Elga is likely to be developed for the Asian market.
- **Australia**: Supply will grow rapidly as infrastructure constraints ease, but high costs an issue.
- **Mongolia**: Enormous untapped reserves, but beholden to Chinese market and no direct seaborne access.
- **Mozambique**: Numerous projects will progressively come into the market over the next 3 to 10 years, is quality good enough?
- **Indonesia**: Large high quality resources in Central Kalimantan but infrastructure constrained.
Global metallurgical coal demand will be dominated by Japan, China and India

Source: Wood Mackenzie Coal Market Service
Metallurgical coal demand growth will be driven by upward trend in steel production

Global steel production and metallurgical coal imports

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2012: Delivered coal prices were too expensive vs. natural gas in key regions, leading to extra supply availability onto global markets

Delivered costs
- >$3.50/mmbtu
- $3-3.49/mmbtu
- $2.50-2.99/mmbtu
- $2-2.49/mmbtu
- <$1.99/mmbtu

No relief valve: too costly / uncompetitive

Total Exports = 128 Mst

Sources: Wood Mackenzie (North America Coal Market Service), EIA 423
Sources of European thermal supply: where will they make largest return?

Source: Wood Mackenzie Coal Market and Coal Supply Service
Ocean freight rates are at historical lows – new ship orders in response to the 2008 commodity bubble has over-supplied the market for some considerable time

- The 2013 vessel fleet will show a net increase of about 38 MDWT
- This will continue to exert downward pressure on ocean freight rates through 2013
- Severe weather and natural disasters can disrupt shipping schedules and cargos causing temporary volatility in freight rates

**Baltic Ocean Freight Index**

Source: The Baltic exchange index
**Thermal: Colombia will always be the most competitive supply source into Europe**

**Stylized margin comparison ($/t, 6,322 kcal/kg coal)**

Source: Wood Mackenzie Coal Supply and Coal Market Service
Will we see re-positioning of domestic assets to export exposure? Many challenges remain

**Gateway Pacific**
- SSA Marine, Peabody partnership (26 Mtpa) – recently CLD
- Cherry Point, WA
- Permitting underway, environmental delay?

**Millenium Bulk Terminals**
- Ambre Energy/Arch Coal (25-44 Mtpa) – recently CLD
- Longview, WA
- Brownfield renovation of Alcoa site
- Mid-streaming option

**Others**
- Portland: closed
- LAXT: small potential
- Richmond: small potential
- Morrow: gaining traction
- St. Helens (Port Westward), Coos Bay: step backwards

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Source: Wood Mackenzie

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... and the near term will be testing for PRB exports, with ramifications for export terminals

**Stylized margin comparison ($/t, 5,000 kcal/kg coal)**

**Indonesia, Tutupan**

**US PRB, Spring Creek**

*Source: Wood Mackenzie Coal Market & Coal Supply Services*
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Jonny Sultoon

Lead Analyst – Atlantic Coal Markets

T +1 410 295 4233
E jonny.sultoon@woodmac.com

Jonny currently fronts analysis and research for the Atlantic Coal Markets, both thermal and metallurgical. His areas of expertise are in short and long-term demand forecasting for the international coal markets, competition between multi-fuels in the power generation sector, corporate analyses of the major producers and utilities, and fundamentals-based price forecasting for the coal market. Prior to joining the Coal Markets Research team in 2008, Jonny fulfilled a similar role as a member of the European Gas and Power Research team in Wood Mackenzie's London office. He drove short and long-term European gas market fundamentals and provided expert support on bespoke consulting projects in the European Gas and Power arena.

Before joining Wood Mackenzie in 2006, Jonny spent five years at Gas Strategies Consulting. He managed their European Gas supply and demand service and also project managed a number of consulting assignments, including; market entry and pricing strategy into Europe for an integrated major, project due diligence for a consortium operating an LNG liquefaction project in West Africa, and a pipeline monetization strategy routing into the Indian Subcontinent. He also provided expert support for QG2 and RG2 LNG liquefaction projects.

Jonny holds a BA (Hons) and MA (Hons) in Physics from the University of Oxford, UK.
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<td>Australia</td>
</tr>
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</tr>
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