Coal-Natural Gas Competition: Coal and Rail Industry Impacts

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Presented by:

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US Coal Equities Market Value

Source: Dow Jones U.S. Coal Total Stock Market Index (INDEX)
Henry Hub Gas Prices
### Representative FOB Mine Steam Coal Prices

<table>
<thead>
<tr>
<th>Month</th>
<th>Colombian</th>
<th>CAPP</th>
<th>NAPP</th>
<th>ILB</th>
<th>PRB</th>
<th>COLO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-06</td>
<td>$4.66</td>
<td>$5.65</td>
<td>$5.33</td>
<td>$5.63</td>
<td>$9.19</td>
<td>$1.30</td>
</tr>
<tr>
<td>Apr-06</td>
<td>$5.08</td>
<td>$6.45</td>
<td>$6.33</td>
<td>$6.63</td>
<td>$10.30</td>
<td>$1.90</td>
</tr>
</tbody>
</table>

**Price increases Sept 07 - mid July 08 ($/MMBtu)**
- Colombian: $4.78
- CAPP: $5.49
- NAPP: $5.74
- ILB: $0.40
- PRB: $0.47
- COLO: $0.19

**Price decreases mid July 08 - Sept 08 ($/MMBtu)**
- Colombian: ($4.78)
- CAPP: ($5.49)
- NAPP: ($5.74)
- ILB: ($0.40)
- PRB: ($0.47)
- COLO: ($0.19)

**Price increases Sept 09 - Sept 11 ($/MMBtu)**
- Colombian: $3.21
- CAPP: $3.09
- NAPP: $0.93
- ILB: $0.65
- PRB: $0.64
- COLO: $0.04

**Price increases Sept 09 - Sept 11 ($/short ton)**
- Colombian: $49.90
- CAPP: $27.25
- NAPP: $27.05
- ILB: $22.06
- PRB: $7.93
- COLO: $1.00

**Price decreases mid July 08 - Sept 09 ($/MMBtu)**
- Colombian: ($4.78)
- CAPP: ($5.49)
- NAPP: ($5.74)
- ILB: ($0.40)
- PRB: ($0.47)
- COLO: ($0.19)

**Price decreases mid July 08 - Sept 09 ($/short ton)**
- Colombian: ($107.96)
- CAPP: ($83.15)
- NAPP: ($86.50)
- ILB: ($41.13)
- PRB: ($7.45)
- COLO: ($11.00)

**Price increases Sept 11 - mid Apr 16 ($/MMBtu)**
- Colombian: $2.21
- CAPP: $3.77
- NAPP: $1.80
- ILB: $0.93
- PRB: $0.80
- COLO: $0.04

**Price increases Sept 11 - mid Apr 16 ($/short ton)**
- Colombian: $49.90
- CAPP: $27.25
- NAPP: $27.05
- ILB: $22.06
- PRB: $7.93
- COLO: $1.00

**Price decreases Sept 11 - mid Apr 16 ($/MMBtu)**
- Colombian: ($2.71)
- CAPP: ($1.77)
- NAPP: ($1.38)
- ILB: ($1.29)
- PRB: ($0.47)
- COLO: ($0.04)

**Price decreases Sept 11 - mid Apr 16 ($/short ton)**
- Colombian: ($61.24)
- CAPP: ($44.15)
- NAPP: ($35.80)
- ILB: ($24.66)
- PRB: ($7.45)
- COLO: ($13.25)

**Price increases mid Apr 16 - mid June 17 ($/MMBtu)**
- Colombian: $1.30
- CAPP: $0.79
- NAPP: $0.78
- ILB: $0.12
- PRB: $0.14
- COLO: $0.04

**Price increases mid Apr 16 - mid June 17 ($/short ton)**
- Colombian: $29.48
- CAPP: $19.80
- NAPP: $19.90
- ILB: $2.85
- PRB: $2.45
- COLO: $1.01

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# Coal v. Gas Competition

Exhibit 1 – Coal vs. Gas Generating Cost Comparison, Southeastern US Fall 2016

<table>
<thead>
<tr>
<th></th>
<th>Coal - Illinois Basin with SO₂ Removal</th>
<th>Gas Combined Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivered Cost of Fuel ($/MMBtu)</td>
<td>2.54</td>
<td>3.25</td>
</tr>
<tr>
<td>Fuel use per MWh, “heat rate” (MMBtu/MWh)</td>
<td>10.5</td>
<td>7.0</td>
</tr>
<tr>
<td>Fuel cost per MWh ($/MWh)</td>
<td>27.0</td>
<td>23.0</td>
</tr>
<tr>
<td>Non-Fuel Variable O&amp;M ($/MWh)</td>
<td>3.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Total Variable Cost ($/MWh)</td>
<td>30.0</td>
<td>25.0</td>
</tr>
</tbody>
</table>

Source: “The future of coal versus gas competition” /
Coking Coal Price History
## Bankruptcies

<table>
<thead>
<tr>
<th>Company</th>
<th>Bankruptcy</th>
<th>Acquisition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peabody Energy</td>
<td>April 2016</td>
<td>MacArthur $5.2B</td>
</tr>
<tr>
<td>Arch Coal</td>
<td>January 2016</td>
<td>ICG $3.4B</td>
</tr>
<tr>
<td>Alpha Natural Resources</td>
<td>August 2015</td>
<td>Massey $7B</td>
</tr>
<tr>
<td>Walter Energy, Inc.</td>
<td>July 2015</td>
<td>Western Cdn $3B</td>
</tr>
<tr>
<td>Patriot Coal Corp.</td>
<td>May 2015</td>
<td></td>
</tr>
<tr>
<td>Xinergy Corp.</td>
<td>April 2015</td>
<td></td>
</tr>
</tbody>
</table>
Environmental regulations (MACT and CPP) accelerated shutdown of coal units further reducing coal volumes. But these were responsible for only about a third of lost coal generation volume.

<table>
<thead>
<tr>
<th>National Total Coal GWh</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008 Generation of Plants</td>
<td>18.112</td>
<td>201,907</td>
<td>51,217</td>
<td>1,440,726</td>
<td>1,711,962</td>
</tr>
<tr>
<td>2015 Generation of Plants</td>
<td>0</td>
<td>34,014</td>
<td>30,107</td>
<td>1,091,619</td>
<td>1,155,741</td>
</tr>
<tr>
<td>Change 2008–2015</td>
<td>(18,112)</td>
<td>(167,892)</td>
<td>(21,110)</td>
<td>(349,107)</td>
<td>(556,221)</td>
</tr>
<tr>
<td>Net Loss from Shutdowns</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(186,005)</td>
</tr>
<tr>
<td>Net Loss from Shutdowns as % of 2008 GWh</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-11</td>
</tr>
</tbody>
</table>

Exhibit 8 - Analysis of Effect of Closures on Coal Generation Since 2008
• Surviving coal producers will normalize to new lower levels of production. Further consolidation likely among remaining producers.

• Difficulty will be adjusting production volumes to match volatile coal demand as gas prices fluctuate.

• Between $2.50 and $4/MMBtu gas prices, coal demand for power could swing a maximum of 315 million tons¹.

1. Source: “The future of coal versus gas competition”
Railroads
Rail Shipments of Coal Declining

U.S. Rail Carloads of Coal: YTD Through May 2017
(millions)

2017 was up 19.0% (286,450 carloads) over 2016.

Data are originations, do not include intermodal, and do not include the U.S. operations of CN and CP. Source: AAR
Rails Lost Major Tons from Peak

Coal Traffic Volumes - Largest Coal Hauling Railroads in US (millions of short tons except BNSF which is thousands of carloads)

Source: Company financial reports

Annualized % Change in Volume

Source: Company financial reports
Modest Rail Rate Declines

Average Coal Rates Per Ton Mile
Largest US Coal Hauling Railroads
(mills per ton-mile; one mill = 1/10 cent)

Source: Company financial reports
Note: BNSF stopped reporting rates on a per ton-mile basis after being acquired by Berkshire Hathaway (effective February 12, 2010)

Annualized % Change in Average Coal Rate

Source: Company financial reports
Note: BNSF stopped reporting rates on a per ton-mile basis after being acquired by Berkshire Hathaway (effective February 12, 2010)
Domestic steam coal: Hold rates and accept volume declines. (Rails maintain high margins)

Export steam coal: Reduced rates and tried to mitigate volume declines.

CSX created fixed and variable pricing mechanism to improve perceived dispatch economics of coal units.

Reduced rates on short term basis to allow specific coal power units to use greater volumes.
Railroads are “right sizing” their systems for new lower coal shipment levels.

- CSX: Erwin, Corbin yards closure
- NS: Closing WV Secondary, combine Virginia and Pocahontas Divisions, idle Ashtabula Dock
- BNSF: Reduce operating regions and divisions

Railroads have also stored hundreds of locomotives and reduced train crews

- Railroads are focusing on intermodal, chemicals and growth commodity sectors.
- Rapid, unexpected increases in rail volume will cause congestion
- Railroads may experiment with gas/power sensitive rail pricing to mitigate volume losses. Working on this approach now.
Coal v Gas Study

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