Session Overview

- A frosty winter – impacts to the market
- Domestic outlook 2014 – drivers of production and price
- Coal plant retirements – the real impact of 2015
- Export opportunities – where does coal have headroom?
- Pacific Northwest coal terminals – the latest
- Questions
Coal and Natural Gas Markets – Recent Developments
Natural gas as a fuel for power generation taking on increased importance

- In New England, natural gas-fired generation accounts for 43% of the region’s winter capacity. In New York, the total is 53%.
- In PJM, gas accounts for about 30% of the region’s total winter capacity, compared to 38% held by coal.
Historic storage deficits lend momentum to coal demand

After historic surpluses of Winter ’11-12, producer cutbacks in dry gas and a strong Winter ’12-13 close balanced markets this past year

Early arriving winter this year has tested the shale supply paradigm

In PJM, Western hub prices for Jan. 22 were pegged as high as $442/MWh.
Pricing picture looks better for producers than it has in nearly two years

PRB 8,800 Btu/lb firming above $13/ton over the next two years as supply constraints and competitiveness against natural gas boost demand compared to recent history.
- Ongoing improved economics vs. natural gas has allowed price growth in spot CAPP coal and has supported improved coal generation levels
- International growth opportunities limited
## Estimated price floors for coal/gas switching

<table>
<thead>
<tr>
<th></th>
<th>Northern App</th>
<th>Central App</th>
<th>Ill. Basin</th>
<th>Rockies</th>
<th>PRB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Avg. Btu/lb</strong></td>
<td>13,000</td>
<td>12,000</td>
<td>11,500</td>
<td>11,500</td>
<td>8,800</td>
</tr>
<tr>
<td><strong>Sulfur (%)</strong></td>
<td>2.00%</td>
<td>1.67%</td>
<td>2.50%</td>
<td>0.60%</td>
<td>0.33%</td>
</tr>
<tr>
<td><strong>SO₂ (Lb/MMBtu)</strong></td>
<td>3.1</td>
<td>2.8</td>
<td>4.3</td>
<td>1.0</td>
<td>0.8</td>
</tr>
<tr>
<td><strong>Coal Market Price</strong></td>
<td>68.25</td>
<td>51.00</td>
<td>56.28</td>
<td>35.50</td>
<td>11.79</td>
</tr>
<tr>
<td><strong>Estimated shipping costs ($/Ton)</strong></td>
<td>18.00</td>
<td>25.00</td>
<td>10.00</td>
<td>22.50</td>
<td>22.50</td>
</tr>
<tr>
<td><strong>Cost of Coal Delivered</strong></td>
<td>86.25</td>
<td>76.00</td>
<td>66.28</td>
<td>58.00</td>
<td>34.29</td>
</tr>
</tbody>
</table>

**Sulfur Dioxide (SO₂)**
- Allowance Price per Ton of SO₂: 10.00
- Cost of SO₂ per Ton of Coal: 0.40
- Cost of SO₂ per MMBTU: 0.015
- MMBtu per Ton of Coal: 26.00
- MWh @ selected Heat Rate: 2.60
- Total Coal Cost per MMBtu Before Nox: 3.33

**Nitrogen Oxide (NOₓ)**
- NOₓ Rate of marginal coal generation (Lb/MMBTU): 0.15
- NOₓ allowance price ($/Ton): 50.00
- Cost of NOₓ per Ton of Coal ($/Ton): 0.05
- Cost of NOₓ per MMBTU: 0.004
- Total/all-in cost of coal ($/ton): 86.70
- Estimated Additional Plant O&M ($/MWh): 1.50
- Total marginal cost per MWh from Coal ($/MWh): 34.85
- Total Coal Cost per MMBtu ($/MMBtu): 3.34

**Efficiency adjustment vs. CCGT power plant (%)**
- 33%

**Floor on natural gas ($/MMBtu) - efficiency adjusted**
- 4.60

Source: SNL Energy
Coal Fleet – Demand Impacts of Environmental Regulations
Coal Fleet Retirements -- has the storm passed yet?

- Fleet overview and regulatory constraints
- Market drivers of coal generating fleet
- Current and incremental retirement estimates
- Market impacts – reserve margins and coal demand
Makeup of coal fleet

- Of ~320 GW fleet, 93 GW appear fully MATS compliant
- 60 GW have announced retrofit plans, 44 GW announced to retire/convert
- 115 GW need some retrofits and have no announced compliance plans
Makeup of announced retirements

- 44 GW announced to retire/convert in 2012-2021
- Units are smaller in size with lower average utilization
- Generated ~4% of the nation’s electricity in 2011

### Vital stats for announced coal retirements/conversions (2012-2021) in select regions

<table>
<thead>
<tr>
<th>Region</th>
<th>2011 capacity factor (%)</th>
<th>2011 net gen (MWh)</th>
<th>2011 avg. heat rate (Btu/kWh)</th>
<th>Avg. age at retirement</th>
<th>Average size (MW)</th>
<th>Capacity retiring (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MISO</td>
<td>38.00</td>
<td>6,775,252</td>
<td>11,458</td>
<td>56</td>
<td>61</td>
<td>2,069</td>
</tr>
<tr>
<td>PJM</td>
<td>39.25</td>
<td>73,175,560</td>
<td>10,488</td>
<td>53</td>
<td>175</td>
<td>21,380</td>
</tr>
<tr>
<td>SOU</td>
<td>43.79</td>
<td>17,689,676</td>
<td>10,285</td>
<td>50</td>
<td>210</td>
<td>4,612</td>
</tr>
<tr>
<td>AZNMSN</td>
<td>80.73</td>
<td>5,765,347</td>
<td>10,940</td>
<td>40</td>
<td>408</td>
<td>815</td>
</tr>
<tr>
<td>SPP</td>
<td>80.42</td>
<td>7,086,773</td>
<td>10,330</td>
<td>35</td>
<td>335</td>
<td>1,006</td>
</tr>
<tr>
<td>VACAR</td>
<td>30.06</td>
<td>10,814,426</td>
<td>10,865</td>
<td>54</td>
<td>111</td>
<td>4,116</td>
</tr>
<tr>
<td>CENTRL</td>
<td>37.20</td>
<td>10,086,700</td>
<td>11,419</td>
<td>58</td>
<td>129</td>
<td>3,095</td>
</tr>
<tr>
<td>All regions</td>
<td>42.98</td>
<td>163,854,731</td>
<td>10,636</td>
<td>52</td>
<td>150</td>
<td>43,707</td>
</tr>
</tbody>
</table>
Projected retrofits under SNL Energy base case

- 97 GW appear economic to retrofit
- 32 GW of DSI, 13 GW wet scrubbers, 21 GW of dry scrubbers
- ~90 GW install activated carbon injection for mercury control
- 75 GW of fabric filters installed + 28 GW upgrade ESP
Regulations facing coal plants

- **EPA MATS** - Control of acid gases, particulate and mercury aerosols (2015 compliance)

- **CAIR/CSAPR** - Control of NO\textsubscript{x} and SO\textsubscript{2}, CAIR currently in place and CSAPR return uncertain

- **Regional haze rule** - Uncertain outcome after CSAPR stay

- **Coal ash and water “effluent guidelines”** - Update to wastewater guidelines and coal ash disposal rules (final rules likely in 2014)

- **316(b)** - Cooling water intake structures rule (not finalized, expected in 2014)

- **Carbon regulation** - Becoming a bigger issue, but mostly in regions where coal is not prominent (California, Northeast)
Announced coal retirements through 2022
Map of at-risk coal retirements vs. announced retirements

U.S. summary of announced coal retirements and capacity at risk of retiring

States are shaded by total at-risk and announced coal retirements (2012-2021) as a percentage of the state's total 2012 installed capacity (adjusted for availability)
As of Sep. 30, 2013
Source: SNL Energy
Map credit: Whit Varner
Coal Production and Price – Basin Overview
Illinois Basin growth not enough to stop US coal production slide

- Total U.S. coal output in 2013 was down more than 3% compared to 2012 and nearly 9% below 2009 levels
- Illinois Basin production surpasses Central App; Northern App is closing quickly on Central App
2014 Production & Price Outlook – Southern Powder River Basin

- Production growth driven by tight inventories and reverse switching, but limited by transportation issues
- Some market share growth versus Appalachia
- No expected contribution from export growth

Source: SNL Energy
Northern App holding steady, but Central and Southern App are in decline

2013 decline of 5% expected to increase to 6%, but 1H volumes expected reasonably healthy

Price growth expected behind firmer natural gas and export opportunities

Source: SNL Energy
2014 Production & Price Outlook – Illinois Basin

- Production growth of 6% expected for 2014 behind reverse switching and capture of Appalachian market share
- 2013 Q4 price rally may indicate broader integration of Illinois Basin coal trade into bituminous markets
- May be able to sustain production growth in the face of coal plant retirements

Source: SNL Energy
Currently constrained by weak export market, tepid demand for Colorado coal

Longwall sealed at large Elk Creek mine
Recent coal production history and 2014 production forecast

Source: SNL Energy
Incremental Export Opportunities for 2014
Seaborne coal – U.S. outlook seen flat to declining

Source: SNL Energy
Spreads to Europe – 2014

- Baltimore to ARA runs $16/ton after recent rally in seaborne dry freight
- Despite rate concessions from rail carriers, prospects of incremental export growth to Europe appear slim
- Illinois Basin prospects out of New Orleans marginally better -- $20/ton btu-equivalent spread against 21.50 in freight. Discounted grades may find headroom @ barge rates of $15/ton

Source: SNL Energy
Spreads to Asia – Illinois Basin via New Orleans

New Orleans to Kalimantan runs $44/ton, leaving Illinois Basin producers to compete with higher grade seaborne coal (Newcastle, Richard’s Bay)
Push for terminal capacity along West Coast hitting massive opposition

**Existing and proposed Pacific Northwest terminals**

[Map showing various terminals along the Pacific Northwest]

- **Canadian Terminals**
- **U.S. Terminals**
- **Major Rail Lines**
- **Powder River Basin**

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Source: SNL Energy
Pacific Northwest terminal update

- Gateway Pacific Terminal: Broad scope announced in July 2013
- Millennium Bulk Terminals: Broad scope announced in February 2014
- Morrow Pacific: Decision likely in 2014
- Fraser Surrey Docks: Under Port Metro Vancouver review
Key Takeaways – 2014 Coal Volumes

Production Growth

- Illinois Basin momentum
- Reversal of coal/gas switching
- 1.1% Generation growth

Production Decline

- Appalachian rebalancing
- Lack of export growth – steam and met
Key Takeaways - 2014 Coal Prices

Price decrease

- Weak electricity demand growth
- Accelerated coal plant retirements

Price increase

- Firmer natural gas prices in 1H
- Greater domestic demand
- 2013 production discipline
Thank You!

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Rail Energy Transportation Advisory Committee Meeting

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