The Future of Coal

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National Mining Association
Mining Jobs

- Direct employment: ~600,000
- High family-wage jobs; often twice average industrial wage in mining states
- Total job creation: ~ 2 million
- Total value add from coal and minerals =15% GDP
Coal Leads in Jobs Creation

Jobs created per $1 million invested

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Total Jobs</th>
<th>Permanent Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>9,166</td>
<td>806</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>7,640</td>
<td>387</td>
</tr>
<tr>
<td>Solar</td>
<td>3,582</td>
<td>210</td>
</tr>
<tr>
<td>Wind</td>
<td>1,053</td>
<td>102</td>
</tr>
</tbody>
</table>

Source: Energy Ventures Analysis; DOE National Energy Technology Laboratory
U.S. is Home to Largest Coal Reserves in the World

- U.S. recoverable coal reserves of 262 billion tons will last >250 years
- Recoverable U.S. coal reserves are more than all of the proven oil reserves of the Middle East, Africa and Russia combined

U.S. Coal Reserves
906.3 billion barrels of oil equivalent (BOE)

Middle East / Africa / Russia Oil Reserves
899.8 billion barrels of oil

Source: Energy Information Administration
Coal = Economic Growth & Environmental Progress

- Since 1970, coal use has increased more than 180% while regulated emissions have decreased 57%
- Advanced technology coal plants built today emit 90% fewer regulated emissions than the typical plants they replace
- New advanced higher efficiency coal plants create more permanent jobs/$billion invested than gas or wind projects (e.g., 900 for coal, 350 for gas, 100 for wind)
- EPA’s next rule (Greenhouse gas standards) will prevent the construction of new advanced higher efficiency coal plants

Sources: Environmental Protection Agency; Energy Information Administration
* Coal based PM10 data for 2008 not available – 2008 estimated from 2008 national PM10 emissions.
Global Growth in Coal Consumption

Source: EIA's Rising Asian demand drives global coal consumption growth
Global Megatrends

Hyper-Urbanization
Half the population resides in urban centers today — 75% by 2050

Explosion in ‘world middle class’
Rising middle class in developing world is shifting global consumption and supply patterns

Technology
2 billion connected people and 1 trillion connected objects = more energy
New Coal Generation 2011-2015 (GW)

- ~400 GW of new coal generation
- ~1.4 billion tons of new annual coal supply over next five years
U.S. Coal Consumption Projections, 2009-2035
(Million Short Tons)

16% Increase

Million Short Tons

2009  2015  2020  2025  2030  2035

US Energy Information Administration
Regulatory Challenges

- Cross-State Air Pollution Rule (CSAPR) – issued but stayed
- Utility MACT – issued and published; subject to litigation
- Coal Combustion Residuals (Coal Ash) – proposed
- 316(b) water intake rule – proposed
- GHG New Source Performance Standards for new and modified plants – proposal any day now
- Greenhouse Gas permitting rules – on appeal
## Regulatory Accounting

### Regulations
- Cross-State Air Pollution Rule
- Utility MACT Rule
- GHG Performance Standards
- Coal Ash
- Cooling Water Intake Structures

### Projected Impacts

<table>
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<th>Retirement Projection (GW)</th>
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<td>EVA</td>
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<td>NERA Economic Consulting</td>
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<td>U.S. Energy Information Administration</td>
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<td>North American Electric Reliability Corporation</td>
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<tr>
<td>Environmental Protection Agency</td>
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</table>
What the Future Holds

- 17,000 MW coming on line by 2014
- Greater Utilization of larger high-efficiency plants
- Sustained offshore demand for Appalachian met coal
- Expanded access to Asian markets for PRB thermal coal
- The outcome of litigation
- Congressional intervention
- Public perception
- Elections and future policies
Technology Solutions vs. Fuel Bridges