Securing Coal’s Future
Recommendations in Support of Coal’s Vital Role

Janet Gellici, CEO, National Coal Council
Lignite Energy Council
2019 Annual Meeting
April 24th, 2019 – Bismarck, ND
The National Coal Council provides advice and recommendations to the Secretary of Energy on general policy matters relating to coal and the coal industry.

Members
Appointed by Secretary of Energy to serve 2-year terms
Limited to 125-150 members representing a broad spectrum of coal interests
Reports
~ 35 reports prepared by NCC members at no cost to DOE
Extensive Range of Report Topics:

Carbon Management
Clean Coal Technologies
Coal & Coal Technology Exports
Coal Conversion
Utility Deregulation
Climate & Clean Air Regulations
Enhancing Coal’s Image
Building New Coal Plants

Industrial Coal Use
CCUS for EOR
Value of Existing Coal Fleet
Advancing CCS Technologies
Policy Parity for CCS
CO₂ Utilization
Advancing U.S. Coal Exports
**Power Reset: Existing Coal Fleet**
“A diamond is a chunk of coal that did well under pressure.”

~ Henry Kissinger
Formal request April 7, 2018 charging National Coal Council to:

... assess “opportunities to optimize the existing U.S. coal-fueled power plant fleet to ensure a reliable and resilient electricity system.”

Key question to address:

“What actions can be taken to optimize the U.S. coal-fueled power plant fleet so it can continue to provide reliable, resilient, affordable power as part of a diverse electric generation mix, and what unique benefits does coal provide?”
What We Considered

– Coal’s Unique Role in the U.S. Energy Portfolio
– Outlook for Coal Generation
– Measures to Optimize Diversity & Resiliency

ASSESS | SUPPORT | REFORM | RENEW
Power Reset

Optimizing the Existing Coal Fleet to Ensure a Reliable and Resilient Power Grid
Recommendation

ASSESS

• **ASSESS | SUPPORT | REFORM | RENEW**
  
  – Establish a uniform definition of grid resilience.
  
  – Assess the fuel security of ISOs/RTOs.
  
  – Establish quantitative metrics against which to evaluate grid resilience.
  
  – Evaluate the experience of other nations regarding the value of firm, dispatchable power and challenges associated with intermittent renewable energy deployment.
Coal’s Unique Role
Reliable & Resilient

A diverse generation portfolio is critical to maintaining a reliable and resilient grid.

Coal excels in:
- Fuel security/assurance
- Resource availability
- Price stability
- Dispatchability
Intermittent electricity is electrical energy that is not continuously available due to external factors that cannot be controlled, produced by electricity generating sources that vary in their conditions on a fairly short time scale. Sources of intermittent electricity include solar power, wind power, tidal power, and wave power. Because of this varying electrical generation these sources are considered non-dispatchable, meaning that their electrical output cannot be used at any given time to meet societies fluctuating electricity demands.

The costs of backstopping intermittent energy sources:

- Lower net generation
- Lower capacity factor
- Less revenue
- Lower efficiency
- Reduced plant life
Coal’s Unique Role
Economics

Residential Electricity Rates

Non-residential Electricity Prices
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– Provide appropriate economic and regulatory incentives to stem the tide of plant retirements.

– Establish an environment that values and compensates diversity.

– Support mechanisms to immediately compensate the U.S. coal fleet for the essential services it provides.
Today’s Coal Fleet

Start-up Year & New Generating Capacity

U.S. Coal Fleet Age in 2017
Coal Retirement
Contributing Factors

• Shale Gale: natural gas prices - $7/MMBtu (2003-2008) vs. $3.20/MMBtu (2012-2016)
• IRE Subsidies: 2010-2016 IRE’s share of subsidies increased from 42% to 45%; coal subsidies increased from 2% to 8%.
• Environmental Regulations: MATS, CWA, NSR, CCR, ELG.
• State Energy Policies: RPS, EERS.
• Aging Infrastructure
• Technology R&D Support: No existing fleet funding for nearly 10 years.
• Societal Pressures: Divestitures, anti-coal advocacy, coal infrastructure opposition, coal project financing proscriptions
Outlook for Coal Generation

Coal Retirement Projections by 2030
Various Sources, 2017-18

- EIA AEO 2018 reference case
- Navigant
- NETL Report, 2018
- Rhodium Group "Taking Stock 2018"
- EIA AEO 2018 high oil and gas case
- MAKE Consulting / Wood MacKenzie
- IHS Markit

*2017 Coal Capacity of 254 GW is from EIA Data
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  – **Policy**: NSR, PURPA, CCR, ELG, CO2 storage on federal lands, engage on the Affordable Clean Energy plan

  – **Market**: FERC capacity reform initiatives, ISO/RTO price formation, standards for essential reliability services, fuel security and resilience assessments

  – **Taxes**: O&M expenses for coal plants, 45Q support, 48Q
Optimize Diversity & Resiliency
Policy & Tax Considerations

- New Source Review
- Tax Credits
  - O&M Tax Credit
  - 45Q Implementation
  - 48A Investment Tax Credit
- Land Use Policies on CCUS
- PURPA Reform
- Coal Combustion Residuals
- Effluent Limitation Guidelines
Optimize Diversity & Resiliency Market Considerations

U.S. ISOs & RTOs

- Federal Energy Regulatory Commission Action
  - Price Formation
  - Essential Reliability Services
  - Capacity Market Reforms
  - Forward Resiliency Market
  - Demand Response Compensation Reform
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  – Support the development and deployment of advanced coal technologies that enhance the competitiveness, efficiency and environmental performance of the existing coal fleet
  – Advance public-private partnerships to accelerate advanced coal technology deployment
  – Promote initiatives to enhance transparency about the inherent costs and benefits associated with all U.S. energy resources
## Optimize Diversity & Resiliency

### Technology Considerations

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Capital Cost</th>
<th>B/C Ratio</th>
<th>B/C Ratio Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circulating Water Pump Refurbishment</td>
<td>Low</td>
<td>High</td>
<td>1</td>
</tr>
<tr>
<td>Sootblowing Steam Source</td>
<td>Low</td>
<td>High</td>
<td>2</td>
</tr>
<tr>
<td>Coal Mill Inerting Source</td>
<td>Low</td>
<td>High</td>
<td>3</td>
</tr>
<tr>
<td>Add Condensate Polishing</td>
<td>Medium</td>
<td>High</td>
<td>4</td>
</tr>
<tr>
<td>HP/IP/LP Turbine Upgrade</td>
<td>High</td>
<td>High</td>
<td>5</td>
</tr>
<tr>
<td>Coal Mills Replacement</td>
<td>High</td>
<td>High</td>
<td>6</td>
</tr>
<tr>
<td>Boiler Feed Pump Refurbishment</td>
<td>Low</td>
<td>Moderate</td>
<td>7</td>
</tr>
<tr>
<td>Helper Cooling Tower Replacement &amp; Pumps</td>
<td>Medium</td>
<td>Moderate</td>
<td>8</td>
</tr>
<tr>
<td>Replace Flame Scanners</td>
<td>Low</td>
<td>Moderate</td>
<td>9</td>
</tr>
<tr>
<td>VFD’s for Forced Draft Fans</td>
<td>Medium</td>
<td>Low</td>
<td>11</td>
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<tr>
<td>Air Heater Overhaul</td>
<td>Medium</td>
<td>Low</td>
<td>10</td>
</tr>
<tr>
<td>Replace Air Preheat Coils</td>
<td>Low</td>
<td>Low</td>
<td>12</td>
</tr>
<tr>
<td>VFD’s for Induced Draft Fans</td>
<td>Medium</td>
<td>Low</td>
<td>13</td>
</tr>
<tr>
<td>Alternate Air Heater Overhaul</td>
<td>Medium</td>
<td>Low</td>
<td>14</td>
</tr>
<tr>
<td>Alternate Air Preheat Coils Modification</td>
<td>Medium</td>
<td>Low</td>
<td>15</td>
</tr>
</tbody>
</table>

**Coal Power Plant Efficiency Audit Results**
Technology Considerations

CCUS

- CCUS could play a critical role in reducing coal plant retirements.
- Retrofit options would need improved operational economics, either through reduced costs for CCUS and/or increased revenue from CO$_2$ sales.
- More projects are needed to achieve technical advances.
- Multiple CCUS technologies would spur competition.
- Government support is essential for demonstration of new CCUS technologies at commercial scale.
Coal in a New Carbon Age

Mr. Dock Slone  
Chairman, The National Coal Council  
1000 Independence Avenue SW, Room 4G-036  
Washington, DC 20585

August 31, 2018

Dear Chairman Slone:

I am writing today to request the National Coal Council (NCC) develop a white paper assessing opportunities to enhance the use of U.S. coal beyond power markets.

The white paper should focus on new markets for “coal to products” including coal conversion (coal to liquids, coal to gas, coal to chemicals); carbon engineered products (value-added non-Btu products); rare earth elements; coal combustion products, methanol; biotechnology approaches (agriculture, liquid fuels); and beneficiated coal for non-power uses, among others.

The key questions to be addressed include:

- What significant market-scale opportunities exist for new markets for coal?
- What are the economic, energy security, trade, and other issues the U.S. faces now that can be addressed with new markets for coal?
- Considering the current uses for coal overseas (syngas, chemicals, synthetic oil, transportation fuels, etc.), where and how are these markets operating today and what is the outlook for these markets going forward?
- What has been the domestic history of coal utilization and what can be learned from past successes/failures in coal utilization?
- How can domestic markets for utilization (other than for CO2) be developed similar to those underway in other countries?

The white paper should be managed under the auspices of the Executive Advisory Board within the NCC. I ask that the white paper be completed no later than April 12, 2019.

Upon receiving this request and establishing your internal working group, please advise me of your schedule for completing the white paper. The Department looks forward to working with you in this effort.

Sincerely,

Rick Perry

Rick Perry
Coal in a New Carbon Age

Diagram showing the coal mining process and its various outputs through additional processing and manufacturing, leading to high-value products. The diagram includes coal mine, coal prep plant, coking process, steel mill, syngas production/liquefaction, coal power plants, and high-value products. The outputs include carbon fibers, critical minerals, coking process by-products, structural & building materials, carbon nanomaterials, plastic composites, energy storage materials, and 3D printing materials.
# Coal Rocks

## Global Coal Reserves

<table>
<thead>
<tr>
<th>Country</th>
<th>Million Tonnes</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S</td>
<td>258,709</td>
<td>25.0%</td>
</tr>
<tr>
<td>Russia</td>
<td>160,364</td>
<td>15.5%</td>
</tr>
<tr>
<td>Australia</td>
<td>144,918</td>
<td>14.0%</td>
</tr>
<tr>
<td>China</td>
<td>139,919</td>
<td>13.5%</td>
</tr>
<tr>
<td>India</td>
<td>97,728</td>
<td>9.4%</td>
</tr>
<tr>
<td>Germany</td>
<td>36,100</td>
<td>3.5%</td>
</tr>
<tr>
<td>Ukraine</td>
<td>34,375</td>
<td>3.3%</td>
</tr>
<tr>
<td>Poland</td>
<td>25,811</td>
<td>2.5%</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>25,605</td>
<td>2.5%</td>
</tr>
<tr>
<td>Indonesia</td>
<td>22,598</td>
<td>2.2%</td>
</tr>
<tr>
<td>Other</td>
<td>88,885</td>
<td>8.6%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,035,012</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

Source: BP Statistical Review of World Energy, June 2017