The Net-Negative CO$_2$ Baseload Power Initiative

Addressing Climate Change Concerns

Protecting the Baseload Power Infrastructure

Securing the Economic Future of Coal Communities

West Virginia Public Energy Authority
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Net-Negative CO$_2$ Baseload Generation Technology

• Established in June, 2021 as a 501(c)(6)

• The Team

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• Our Sponsors
  • CONSOL Energy
  • Peabody
  • PFBC-EET
Situation Assessment
The Facts

• Coal is not the problem – CO₂ is the problem – but coal opponents have demonized coal and the public largely accepts this demonization.

• India and China came to coal’s defense at COP26. Small word changes matter:
  • “Phase down” not “Phase out”
  • Unabated coal, not all coal

• An Administration change in three years is unlikely to substantially mitigate ESG, shareholder, State and international pressures that work against conventional coal.

• Coal opponents are well-funded, getting “richer”, and view any coal win as a temporary stay of execution.

• The net effect of expanded renewable tax credits, renewable portfolio standards and other renewables incentives are reducing coal plant dispatchability and degrading the investment returns on coal power projects.

• EPA is ramping up its regulatory assault on coal – both production and use.

• Power producers are moving away from coal.

• The coal industry needs to continue its defense, but defending the status quo is not enough.

• Offense is needed – Coal needs to be “For Something”.

### Existing Coal Fleet

**Installed Coal Generation Capacity, MWe**

- **Harrison**: 1954 MW
- **Amos**: 2900 MW
- **Mitchell**: 1560 MW
- **Mt. Storm**: 567 MW
- **Pleasants**: 1288 MW
- **TOTAL**: 8269 MW

- **Ft. Martin**: 1098 MW
- **Mt. Storm**: 1126 MW
- **TOTAL**: 2224 MW

- **Grant Town**: 80 MW
- **Morgantown**: 50 MW
- **TOTAL**: 130 MW

- **Mountaineer**: 1299 MW
- **Longview**: 710 MW

### Installation Periods

- 1950s
- 1960s
- 1970s
- 1980s
- 1990s
- 2000s
- 2010s
- 2020s
There Can be a Future for Coal

- Positioning the existing coal fleet for the future
  - Need to protect the value of the existing infrastructure
  - Forestall premature coal plant retirements

- Tax Credit Parity
  - Generation only qualifies if generator is dispatchable on demand.
  - Generation only qualifies if there is significant CO$_2$ reduction

- 45Q Revisions
  - Building a post-2030 future that adds new profit streams and creates societal value, including addressing climate change concerns:
    - Coal-to-Products
    - Coal-derived CO$_2$-to-Products
    - Net-Negative CO$_2$ Coal-to-Energy Generation
      - Net-Negative CO$_2$ Baseload Power Technology
      - Net-Negative CO$_2$ Hydrogen Technology
Net-Negative CO$_2$ Baseload Power Technology
Coal with Biomass Co-firing and CCS

Coal → Fuel Transport → Power Generation → CO$_2$ Storage → CO$_2$ Footprint → Baseload Power → Net-Negative CO$_2$ Footprint
Proposed DOE Net-Negative CO$_2$ Baseload Power Program

Additional Details

• Qualifying projects:
  • Must have a positive economic impact on coal communities.
  • Must have net-negative emissions using coal/biomass co-firing with CCS

• $300M for plant-specific engineering and economic studies

• $30B to cost-share deployment of the initial ~10 net-negative plants

• Power plant owners may competitively apply
  • Grants for engineering/economic Project Concept Studies
  • Cost-share for pre-FID Project Development Activities
  • A package of incentives to attract commercial co-investment and limit ratepayer impacts
U.S. Biomass Resource
Quantities are Sufficient to Sustainably Support Coal-Biomass Co-Firing

• Existing Coal Generation Infrastructure
  • 212 GW of utility-scale coal plants
  • Transmission, supply chain, and permitting infrastructure for the plants are in place
  • 59 GW (28%) are scheduled to retire by 2035 with many of these plant sites candidates for retrofitting or repowering

• Abundant Domestic Coal Resources
  • World’s largest reserves
  • 470-year supply at 2020 consumption rates

• Sustainable Domestic Biomass Resources
  • 20% co-firing of entire existing coal fleet would require 125 millions tons/yr of biomass.
  • The 2030 domestic, available biomass resource is estimated to be 625 million tons.
  • The U.S. is the world’s largest exporter of wood fuel pellets with 9 million tons of 2020 exports to fuel international coal plants.

Biomass Resource Available for New Uses

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<th>2017 Actual</th>
<th>2030 Estimated</th>
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<td>344 Million DT/yr</td>
<td>625 Million DT/yr</td>
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Renewable Production and Investment tax credits

- Initiated to reduce cost of renewables
- 30 years of renewable tax credits
- **Mission accomplished!**
New Imperatives

- Maintain U.S. electricity grid stability & reliability – dual challenge
  - Intermittent renewables presenting grid stability and reliability challenges
  - Exasperated by the need to expand electrification to industry, commercial, residential and transportation sectors

- Aggressive Administration CO₂ reduction targets

- Need for affordable electricity requires maximizing existing infrastructure
• Investment and Production Tax Credits (ITCs and PTCs)
  • Incentivize low-carbon, reliable power
    • Minimum dispatchability requirement
    • Nuclear, Renewable, CCS-enabled fossil plants, and Net-Negative fossil plants can all meet a dispatchability requirement either stand-alone or with battery/low-carbon power back-up
    • Zero-carbon emitting plants would be eligible for a Base PTC.
  • CCS-enabled fossil plants with <100% capture would be eligible for a reduced PTC.
  • Net-Negative plants, effectively with >100% capture would be eligible for an increased PTC.
• 45Q Carbon Capture & Storage Tax Credit
  • Amount should be indifferent to the carbon capture technology employed (e.g., amine capture, ammonia-based capture, or direct air capture). The result “tons captured” not the technology type should be incentivized.
Policy commitment to facilitate deployment of net-negative CO₂ baseload power, including:

- Enactment of The Net-Negative Baseload Power Act (H.R. 4891), which
  - Establishes a Net-Negative Baseload Power Program at DOE
  - Authorizes $300M in immediately available grant funding for engineering and economic studies at existing coal power plants sites
  - Provides DOE with new management tools and directs the acceleration of projects that will reduce the carbon footprint of the existing coal fleet with Net-Negative Technology (CCS and biomass co-firing)
- Appropriating the $300M in grant funding.
- Providing ~$30B in funding for the DOE Net-Negative Baseload Power Program for cost-shared retrofits/repowering of a first tranche of plants
  - Accelerates the reduction of the coal fleet’s carbon footprint
  - Protects grid reliability and coal communities
- Tax Credit Parity
- 45Q Revisions