



Independent Statistics & Analysis

U.S. Energy Information
Administration

May 21, 2019

MEMORANDUM FOR: Stephen K. Nalley
Acting Assistant Administrator for Energy Analysis

FROM: Jim Diefenderfer
Director, Office of Electricity, Coal, Nuclear, and Renewables Analysis

SUBJECT: Summary of First AEO2020 Coal Working Group held on April 9, 2019

The working group presentation included a summary of the AEO2019 projections and a discussion of the data, assumptions, model updates, and improvements expected for the AEO2020 development cycle. Stakeholders were encouraged to discuss the information provided in the presentation, EIA's coal modeling methodology, and other issues facing coal supply and use. The EIA presentation is provided as a separate document. EIA staff encouraged participants and other stakeholders to contact Greg Adams (Greg.Adams@eia.gov) or David Fritsch (David.Fritsch@eia.gov) with follow-up questions or comments.

Overview

At the beginning of the meeting, EIA staff provided an overview of the plan for AEO2020. EIA will use the flip-book format again, and AEO2020 will include the Reference case and the six core side cases (High/Low Macro, High/Low Oil Price, and High/Low Oil and Gas Resource and Technology cases). EIA will also produce *Issues in Focus* articles, along with the related side cases, and will update the accompanying assumptions and model documentation.

Assumptions and Model Updates

Legislation and Regulation

EIA staff provided an in-depth review of legislation and regulations affecting coal, including how AEO2019 modeled these rules, standards, and programs and how AEO2020 models may change. The U.S. Environmental Protection Agency (EPA) has recently proposed several rules that were not part of AEO2019, but AEO2020 may include these rules if they are completed during the AEO development cycle in 2019.

In August 2018, the EPA proposed the Affordable Clean Energy (ACE) rule, which revises the best system of emission reduction (BSER) finding for greenhouse gas (GHG) emissions from existing power plants to include only heat-rate efficiency improvements. The ACE rule would replace the 2015 Clean Power Plan. The EPA also proposed the following revisions:

- Eliminate the Carbon Capture and Sequestration (CCS) compliance requirement
- Eliminate specified CO₂ emission rates—

**WORKING GROU P PRESENTATION FOR DISCUSSION PURPOSES ONLY.
DO NOT QUOTE OR CITE AS RESULTS ARE SUBJECT TO CHANGE.**

- 2,000 lb CO₂/MWh-gross for large units (super-critical)
- 1,900 lb CO₂/MWh-gross for small units (sub-critical)
- 2,200 lb CO₂/MWh-gross for new coal refuse-fired units
- Change how rules apply to modified units

All cases, for both AEO2019 and AEO2020, include a 3% adder on the cost of financing that applies to new coal investments in facilities that do not achieve 90% carbon sequestration.

EPA's Mercury and Air Toxics Standards (MATS) and the Cross-State Air Pollution Rule (CSAPR), both reflected in AEO2019, will remain in AEO2020. As in AEO2019, other EPA regulations on regional haze, coal combustion residuals, cooling water intakes, and effluent limitation guidelines will be reflected in AEO2020 as coal plant operators report resulting capacity changes on survey Form EIA-860. The working group also discussed the status of other federal regulations and the implications stemming from potential legal actions that could affect coal mining.

We will include key elements of the 45Q tax credit for CCS, although it was not included in AEO2019. These changes affect the Electricity Market Module (EMM); the Capture, Transport, Utilization and Storage Module (CTUS); and the Oil and Gas Supply Module (OGSM). However, we don't expect any direct changes to the Coal Market Module (CMM) because 45Q would only affect coal use indirectly.

At the forefront of controlling GHG emissions from fossil power generation, we will incorporate state actions into AEO2020 as related rules are finalized. The AEO2019 included existing California regulations and the Northeast's Regional Greenhouse Gas Initiative (RGGI), Renewable Portfolio Standards (RPS), and Zero Emission Credit (ZEC) programs.

Since the AEO2019 release, New Mexico, Hawaii, and the District of Columbia have passed legislation similar to California's, which requires them to achieve carbon-free electricity generation by about 2045, with a dozen more states considering similar regulations. Any state initiatives completed during 2019 consistent with EIA's model development deadlines will be included in AEO2020. One participant pointed out that Colorado has proposed a GHG bill (House bill 1261), adding it to the list of states with proposed regulations already being followed by EIA staff. EIA also expects to reflect New Jersey's plans to participate in RGGI and the newly implemented ZEC programs in Connecticut. AEO2019 included ZEC programs in Illinois, New York, and New Jersey.

Assumptions and Trends

The meeting included a review of assumptions and trends affecting the AEO2019 projections. EIA staff highlighted three key assumptions affecting the Reference case coal projection:

- Coal mine labor productivity by region
- Global seaborne coal trade demand
- Capital costs for adding new coal-fired electric generation relative to renewables and natural gas

EIA staff also noted key trends affecting the coal projections:

- Relatively low electricity demand growth
- Increasing cost competitiveness of electricity generated by renewable sources
- Modestly increasing projected real prices for natural gas, which are influenced by the natural gas supply/demand balance

AEO2019 Results

EIA staff highlighted the results for the AEO2019 Reference case for coal demand and supply and demonstrated how the coal generation and capacity projections are sensitive to changes in natural gas prices. Additional coal plant retirements in 2018 combined with planned retirements result in 151 GW of coal-fired generating capacity in operation in 2050. This capacity is 30 GW lower than in AEO2018. The results showed how the decline in coal-fired electric generating capacity is projected to be offset by increasing capacity factors for the remaining coal fleet, resulting in a projection of flat coal-fired electricity generation and coal production after the initial decline from losses associated with retired coal capacity. EIA staff also presented coal production trends by region, with Eastern Interior production from the Illinois Basin showing modest gains relative to the other regions, partly because of differences in projected labor productivity trends. Employment and mine-mouth coal price projections reflect the general decline in labor productivity in an environment of flat production. Export demand for coking and steam coal is projected to peak in about 2020 then stabilize between 80 million and 100 million tons of coal exports per year.

AEO2020

Looking forward, EIA staff highlighted development initiatives for AEO2020 and beyond. EIA plans to roll forward the base year to 2018 in the Coal Market Module (CMM), which will include updates to production and prices, coal transportation rates between regions, and coal export upper and lower bounds by region and coal type. EIA will also review firm coal contracts between electric generators and coal producers.

Model development items include:

- Implementing a revised approach to modeling seaborne coal shipping costs for AEO2020
- Evaluating a revised approach to escalate real domestic coal transportation rates (These rates are currently estimated for completion by AEO2021, but they may be completed for AEO2020.)
- Developing a revised approach for modeling international coal supply curves (ICSC) in the CMM for AEO2021

EIA staff discussed each development item in greater detail during the last part of the meeting in separate subsections in the presentation.

Ongoing efforts for the *International Energy Outlook* (IEO) will include developing an International Coal Market Module (ICMM) in the World Energy Projections System Plus (WEPS+). EIA is studying a linear programming-based approach as part of the IEO2020 cycle using EIA's Global Hydrocarbon Supply Model (GHySMo) platform and the efforts discussed above to improve the modeling of ICSC and seaborne coal shipping costs.

The Electricity Market Module (EMM) plans to change the electricity region mapping to better match ISO regions and will update capital costs and performance characteristics for various generation technologies, including

- Ultra-supercritical coal with zero, 30%, and 90% CCS
- Combustion turbines and combined-cycle units
- Advanced nuclear and small nuclear reactors (SMR)

Short-Term Coal Projections

The coal team is initiating plans for a *Short-Term Energy Outlook* (STEO) coal forecasting working group in the summer of 2019. Please contact Bonnie West (Bonnie.West@eia.gov) or Elias Johnson (Elias.Johnson@eia.gov) if you want to join this group.

Discussion

Attendees asked questions during the legislation and regulations part of the meeting. One commenter noted that EIA should address the implications of the [International Marine Organization's](#) 2020 requirements to reduce sulfur emissions from ocean vessels in its modeling of seaborne coal freight rates. EIA staff agreed to research the issue and address this concern in the model assumptions.

Questions and comments from participants mainly revolved around the proposed approach for the model changes. One commenter suggested that, with respect to the coal transportation rate escalation, it might be better to include fewer representative variables than a broad range of variables. Several participants also requested access to the unpublished reports by Hellerworx, Inc. on seaborne coal transportation rates and domestic coal transportation rate escalation. EIA will provide the reports, on request, to members of the coal working group.

Please contact Greg Adams (Greg.Adams@eia.gov) or David Fritsch (David.Fritsch@eia.gov) if you want to join this group or if you have questions or comments to include in these minutes.

Attendees

Name	Affiliation
<u>Guests (in person)</u>	
José Benitez	Deloitte

Guests (WebEx/phone)

Natalie Biggs	Woodmac
Jamie Heller	HELLERWORX, INC
Osmond Lindo	U.S. Department of Labor, MSHA
Carl Lundgren	U.S. Department of Labor, MSHA
Greg Moxness	U.S. Department of Labor, MSHA
Paul Pierce	USGS
Joshua Rockwell	OSMRE
Craig Romer	Xcel Energy
Cynthia Simpson	U.S. Department of Labor, OCFO
William Wolf	JT Boyd
Thomas Vos	Tri-State G&T

EIA attendees (in person)

Greg Adams	EIA
Kien Chau	EIA
Kenneth Dubin	EIA
Jim Diefenderfer	EIA
David Fritsch	EIA
Thad Huetteman	EIA
Elias Johnson	EIA
Chris Namovicz	EIA
Terry Yen	EIA

EIA attendees (WebEx/phone)

Beth May	EIA
Bonnie West	EIA