

August 19, 2020

MEMORANDUM FOR: Angelina LaRose
Assistant Administrator for Energy Analysis

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

SUBJECT: Summary of First AEO2021 Coal Working Group held on August 13, 2020

The working group presentation included a summary of the *2020 Annual Energy Outlook (AEO2020)* projections and a discussion of the data, assumptions, model updates, and improvements expected for the AEO2021 development cycle. We encouraged stakeholders 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. The virtual meeting took place on the WebEx platform. 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 AEO2021. EIA will use the flip-book format again, and AEO2021 will include the Reference case and the eight core side cases (High/Low Macro, High/Low Oil Price, High/Low Oil and Gas Supply, and High/Low Renewables Cost cases) and the accompanying assumptions and costs for new/existing electric plants and levelized costs. No *Issues in Focus* articles are currently planned for AEO2021, and model documentation, which was recently updated for AEO2020, will be updated again during the AEO2022 cycle. We also discussed how EIA is assessing the implications of the global disruption related to the COVID-19 pandemic. We highlighted the upcoming macro/industrial working group meeting and planning underway for EIA to host a series of workshops on the heightened uncertainty surrounding energy outlooks over the near- and long-term. Attendees were encouraged to contact EIA staff for an invitation to those meetings.

Assumptions and Model Updates

AEO2021

Looking forward, EIA staff highlighted development initiatives for AEO2021 and beyond. EIA plans to roll forward the base year to 2019 in the Coal Market Module (CMM), which will include updates to production and prices, coal transportation rates between regions, and U.S. 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:

- Improving run result diagnostic capabilities in CMM/AIMMS (already completed)
- Implementing a revised approach to escalate real domestic coal transportation rates

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- Evaluating Integrated Resource Plans (IRP) and implications for coal retirements
- Endogenizing fuel cost assumptions in the seaborne coal trade formulation
- Modifying database feeds to the CMM to enable transition from AIMMS v. 4.37 (32-bit) to v.4.72 (64-bit) during AEO2022 development cycle

EIA staff discussed each development item in greater detail in separate subsections in the presentation. The update on the IRP evaluation included summaries of the outlook for planned and announced coal retirements based on Form EIA-860 and EIA-860M, and staff research of coal retirement announcements and IRPs.

EIA staff noted that the Coal and Uranium Analysis Team had just published a discussion paper entitled [Improving the Method for Coal Transportation Rate Escalation in the NEMS Coal Market Module](#) to the EIA website to support the revised approach discussed in the meeting and that participants should request the hyperlink to the paper if they are unable to locate it on the EIA website.

EIA staff also discussed progress toward developing and implementing an International Coal Market Module (ICMM) in the World Energy Projections System Plus (WEPS+), which is currently on schedule for application during the 2021 *International Energy Outlook* (IEO2021) cycle. The ICMM applies a linear programming-based approach using EIA's Global Hydrocarbon Supply Model (GHySMo) platform.

The Electricity Market Module (EMM) is implementing a dynamic approach to redefining regions to facilitate more timely updates to better match ISO regions.

Short-Term Coal Projections

The coal team has temporarily suspended its *Short-Term Energy Outlook* (STEO) coal forecasting working group until the first quarter of 2021 as we assess the implications of COVID-19 containment and mitigation efforts. Please contact Bonnie West (Bonnie.West@eia.gov) or Lindsay Aramayo (Lindsay.Aramayo@eia.gov) if you want to join this group.

Legislation and Regulations

EIA staff provided an in-depth review of legislation and regulations affecting coal. Two rules regarding carbon dioxide (CO₂) emissions from electric-generating units were included in AEO2020 and will continue in AEO2021. On June 19, 2019, the U.S. Environmental Protection Agency (EPA) finalized its 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. On December 6, 2018, EPA released a draft rule for New Source Performance Standards (NSPS), which limit CO₂ from new fossil-fuel plants, which was incorporated into the EMM by adding an ultra-supercritical (USC) coal electric generating option without carbon capture.

All cases, for both AEO2020 and AEO2021, include a 3% adder on the cost of financing that applies to new coal investments in facilities that do not achieve 90% carbon sequestration. As in AEO2020, key elements of the 45Q tax credit for carbon capture sequestration (CCS) are included in AEO2021.

EPA's Mercury and Air Toxics Standards (MATS) and the Cross-State Air Pollution Rule (CSAPR), both reflected in AEO2020, will remain in AEO2021. As in AEO2020, other EPA regulations on regional haze, coal combustion residuals, cooling water intakes, and effluent limitation guidelines will be reflected in

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AEO2021 as coal plant operators report resulting capacity changes on survey Form EIA-860. EIA staff noted that EPA finalized several revisions to these regulations that are discussed in the presentation and noted changes in the Black Lung Disability Trust Fund coal excise tax rates in effect for 2020. The working group also discussed the status of other federal regulations and the implications that could affect coal mining. We also presented the outlook for further development of coal export capability on the U.S. West Coast.

EIA staff will incorporate state actions into AEO2021 as related rules are finalized. The AEO2021 will continue to include existing California regulations and the Northeast's Regional Greenhouse Gas Initiative (RGGI), Renewable Portfolio Standards (RPS), and Zero Emission Credit (ZEC) programs. The state of Virginia recently authorized its participation in RGGI in conjunction with the Virginia Clean Economy Act, which sets carbon reduction targets, a 100% clean energy standard by 2050, and a schedule for Dominion Energy and Appalachian Power to retire carbon-emitting electric generating units by December 31, 2045. AEO2020 included ZEC programs in Illinois, New York, New Jersey and Connecticut. EIA staff noted that it is following developments in Illinois and Ohio that could affect the ZEC programs in those states, along with the potential implications from FERC's Minimum Offer Price Rule (MOPR), which would also affect subsidized renewables.

Assumptions and Trends

The meeting included a review of assumptions and trends affecting the AEO2020 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

AEO2020 Results

EIA staff highlighted the results for the AEO2020 Reference case for coal demand and supply and demonstrated how the coal generation and capacity projections are sensitive to changes in natural gas prices. The current increase in coal plant retirements continues apace through approximately 2025 as a result of compliance with the ACE rule, already-planned retirements, and low natural gas prices, before slowing thereafter, resulting in 125 GW of coal-fired generating capacity in operation in 2050. This capacity is 26 GW lower than in AEO2019. 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 2025 then stabilize near 100 million tons of coal exports per year.

The discussion concluded with a comparison of the AEO2020 and August *Short-Term Energy Outlook* (STEO) results from 2019 to 2021. EIA staff noted that the AEO is benchmarked to the STEO and that coal consumption in the electric power sector in 2021 is forecast to a level higher than the corresponding AEO2021 projection as a result of higher forecasted natural gas prices in the STEO.

Discussion

One attendee sought clarification on whether the ACE rule implementation in the EMM requires every coal plant to implement a Heat Rate Improvement (HRI), or whether some are exempt based on the [2015 EIA study](#) of heat rate improvement (HRI) potential and costs for existing coal units. The clarification was sought because the EPA allows states to consider recent heat rate improvements in forming their State Implementation Plans (SIP), which will take time to prepare and implement. EIA staff responded that the 2015 EIA study divided the coal fleet into quartiles based on the level of investment that would be required to achieve compliance. AEO2021 will continue to use the same quartile rankings to determine which coal plants must upgrade to comply with the ACE rule. The plants in the upper quartile are assumed to have already complied and would not need to make further improvements.

Another attendee inquired about EIA's assumptions for coal export capacity out of California ports, including Oakland, Richmond, and Long Beach. EIA staff responded that Long Beach is assumed to continue operating at a level of about 2 million tons of coal export each year. The Oakland Terminal is not assumed to export any coal until the court cases with the city and the exporting states are resolved. Western exports through Westshore are assumed to continue at current levels, although, as stated on page 24 in the presentation, additional capacity may be available at Westshore because of a recent agreement by Teck to ship additional volumes through the Ridley Terminal. EIA staff noted that the CMM allows up to approximately 14 MMst of coal to be exported from western U.S. regions, which includes coal exported through Westshore in British Columbia.

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 this summary.

Attendees

Name	Affiliation
Guests (WebEx/phone)	
Brian Atkins	Southern Company
John Brewer	U.S. Department of Energy, National Energy Technology Laboratory (NETL)
Michael Caravaggio	Electric Power Research Institute (EPRI)
Leslie Coleman	National Mining Association (NMA)
Regis Conrad	U.S. Department of Energy, Office of Fossil Energy
Evalyn Dale	U.S. Department of Energy, NETL
Mark Gehlhar	U.S. Department of Interior, Office of Surface Mining Reclamation and Enforcement (OSMRE)
Philip Graeter	Energy Ventures Analysis Inc. (EVA)
Jordan Kislear	U.S. Department of Energy, Office of Fossil Energy
Greg Marmon	WoodMac
Emily Medine	EVA
Greg Moxness	U.S. Department of Labor, MSHA
Gavin Pickenpaugh	U.S. Department of Energy, NETL
Paul Pierce	U.S. Geological Survey (USGS)
Joshua Rockwell	U.S. Department of Interior, OSMRE
Stephen Storm	Electric Power Research Institute (EPRI)
Ken Walsh	Leidos

EIA attendees (WebEx/phone)

Greg Adams	EIA
Lindsay Aramayo	EIA
Rosalyn Berry	EIA
Richard Bowers	EIA
Michael Cole	EIA
Alonah Creswell	EIA
Kenneth Dubin	EIA
David Fritsch	EIA
Thad Huetteman	EIA
Scott Jell	EIA
Slade Johnson	EIA
Augustine Kwon	EIA
Joel Lou	EIA
Laura Martin	EIA
Mark Morey	EIA
Fadi Shadid	EIA
Manussawee Sukunta	EIA
Bonnie West	EIA

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