February 1, 2016

MEMORANDUM

TO: John Conti
Assistant Administrator for Energy Analysis

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

FROM: Coal and Uranium Analysis Team

SUBJECT: Notes from the **First AEO2016 Coal Working Group Meeting** workshop held on December 1, 2015

Attendees (47)

Name	Affiliation
Ross, Joey	Alliance Resource Partners, L.P.
Alfaro, Jose L.	Alpha Natural Resources
Blumenfeld, Andy	Arch Coal, Inc.
Lewandowski, David	Clean Energy
James, Revis	Electric Power Research Institute
Holmes, Mike	Energy & Environmental Research Center
Medine, Emily	Energy Ventures Analysis, Inc
Eyster, Jerry	General Electric
Sutton, Jim	General Electric
Heller, Jamie	Hellerworx, Inc.
Venkatesh, Boddu	ICF International
Zhao, Song	Leidos
White, Larry	Mitsubishi Hitachi Power Systems America
Coleman, Leslie	National Mining Association
Yeh, Starla	Natural Resources Defense Council
Rosner, David	U.S. DOE
Schmitter, John	U.S. DOE: Argonne National Laboratory
Jones, Ayaka	U.S. DOE: EIA
Park, Brian	U.S. DOE: EIA
Kearney, Diane	U.S. DOE: EIA
Khan, Ehsan	U.S. DOE: EIA
Adams, Greg	U.S. DOE: EIA
Jones, Jeff	U.S. DOE: EIA
Arena, JenAlyse	U.S. DOE: EIA
Diefenderfer, Jim	U.S. DOE: EIA
Martin, Laura	U.S. DOE: EIA
Aniti, Lori	U.S. DOE: EIA
Lintner, Michael	U.S. DOE: EIA
Mellish, Mike	U.S. DOE: EIA
Treiger, Mordechae	U.S. DOE: EIA
Jell, Scott	U.S. DOE: EIA
Huetteman, Thad	U.S. DOE: EIA
Matuszak, Daniel	U.S. DOE: FE
Zelek, Charles	U.S. DOE: National Energy Technology Laboratory
Balash, Peter	U.S. DOE: National Energy Technology Laboratory
Meroney, William	U.S. Environmental Protection Agency
Fisher, Brian	U.S. Environmental Protection Agency
Kayin, Serpil	U.S. Environmental Protection Agency
Pierce, Paul	U.S. Geological Survey
Lundgren, Carl	U.S. Mine Safety and Health Administration
Moxness, Greg	U.S. Mine Safety and Health Administration
Bailie, Alison	Union of Concerned Scientists
Sattler, Sandra	Union of Concerned Scientists
Peters, Jamie	Union Pacific Railroad
Weiner, Michael	Van Ness Feldman, LLP
Marmon, Greg	Wood Mackenzie
Shattuck, Paul	Xcel Energy

In an effort to solicit feedback each year, the Coal and Uranium Analysis Team (CUAT)invites stakeholders to participate in coal working group meetings discussing EIA's coal modeling methodology as well as a general discussion of issues facing coal supply and use. On December 1, Greg Adams, CUAT Team Leader, presented the attached slides. While the slides provide the information presented, discussion and commentary were also encouraged. The highlights of the meeting are provided here. In addition, where greater certainty in EIA's modeling approach has been determined subsequent to the meeting, additional information is also provided below as 'supplemental clarification.' Participants and other stakeholders are encouraged to direct comments on proposed modeling methods and plans to Greg Adams (Greg.Adams@eia.gov).

Coal Fleet Aging

• On June 16, 2015, EIA conducted a workshop on the aging of the coal fleet and how aging might impact the costs incurred by plants in the future and the capacity of these older plants. If interested in attending a future workshop on this topic, please contact Diane Kearney (Diane.Kearney@eia.gov).

• The Electric Power Research Institute (EPRI) has been conducting research regarding the investment needs of older plants and how to capture the 'lumpy' nature of these investments within a modeling platform. This research will be publicly available shortly.

EIA Coal Survey Form Changes

• EIA is currently in the process of re-clearing many of its survey forms including some that are relevant to the coal industry. In many instances, this process includes modification to the forms. Among these forms are the Forms EIA-3, -5, -7A, -8A, -923, and 860. For concerns, comments, or information about changes to Forms EIA-3 thru -8A, direct correspondence to JenAlyse Arena (JenAlyse.Arena@eia.gov) or Brian Park(Brian.Park@eia.gov). For changes to the Forms EIA-923 and EIA-860, please send comments to the email address: Electricity2017@eia.gov.

Capital Cost Updates

• EIA is updating capital costs for power-sector technologies. A clarifying question was asked if ultra-supercritical plants would be updated. EIA responded that this technology is included in the update.

Supplemental clarification: EIA staff is requesting that plants with partial carbon capture (less than 90%) are included in the capital cost update. The Electricity Working Group covered this topic in additional detail. Please refer to the meeting notes and presentation slides from the Electricity Working Group meeting held on December 8 for additional information.

CSAPR, MATS, and Other Regulations Affecting Coal

• EIA staff stated that the Cross State Air Pollution Rule (CSAPR) -- replacing the Clean Air Interstate Rule in the model -- and the Mercury Air Toxics Standard --already modeled for AEO2015—will be included in the AEO2016. One meeting participant indicated that both of these are being subjected to further scrutiny by the courts and perhaps should be excluded from the AEO2016. EIA staff responded that both would be included unless the courts actually stayed or vacated the regulations. The court rulings on CSAPR only affect a few states. It is possible that EIA could either update the targets for these states or potentially exclude them, but it is staff's current understanding that CSAPR is largely intact. EIA also

mentioned that many of the large number of coal retirements already underway and being reported to EIA are related to MATS. Even without explicit representation of MATS in the model, EIA would continue to include these retirements as an input into the modeling process.

Supplemental clarification: In AEO2016, EIA will likely exclude those states from CSAPR compliance that are currently under review.

• The 'unscrubbed plant type' for existing coal plants (not new plants) in the model is a misnomer because – due to MATS – this plant type includes dry sorbent injection equipment (DSI). To comply with MATS, the electricity model requires that plants either retire, add scrubbers, or add DSI equipment.

• In response to a question regarding EPA's effluent guideline regulation, EIA staff stated that though the regulation prohibits the disposal of coal ash wastewaters in water bodies, for wastewater streams coming from flue desulfurization equipment (scrubbers), a total dissolved solids limit for discharge to water bodies is applied.

Clean Power Plan (CPP)

• EIA anticipates including the final Clean Power Plan (CPP) as part of its Reference case. EIA does not have a plant type representing partial carbon capture and sequestration (below a 90% capture rate). This technology is allowed in the final CPP. EIA is considering the possibility of adding a plant type with lower capture rates.

• Replacement of the new advanced pulverized coal plant type with a new plant type that includes partial capture technologies would require additional coding within the electricity model, and the National Energy Modeling System (NEMS) would no longer be able to model scenarios where coal plants without carbon capture are economic or supported by policy (e.g. high gas prices, lower coal plant capital costs, no Clean Power Plan, high economic growth, or combinations of such assumptions). Stakeholders that use the NEMS for their own independent modeling scenarios could be impacted by such a change. EIA will need to be careful about making permanent changes to plant types in the event that the CPP is stayed or vacated by the courts. Also, EIA anticipates having a side case where the CPP is excluded. CCS retrofits are allowed in the model but also capture 90% of the carbon dioxide emissions (rather than partial capture).

Supplemental clarification: EIA will likely replace the new plants and retrofits having a 90% capture capability with a plant having a lower capture rate (rather than adding a new plant type or using another 'slot' in the model). The use of this lower capture technology is dependent upon cost estimates from the capital cost study mentioned above.

Cost of Capital Adder for Coal

• EIA currently plans to continue using an incremental 3% cost of capital adder for new coal plants that either do not capture or capture less than 90% of carbon dioxide emissions in the AEO2016. Several meeting participants objected to the use of this cost of capital adder suggesting that the CPP has reduced the uncertainty of carbon regulation, and coal plants are unlikely to be built anyway. Currently, EIA's opinion is that a great deal of uncertainty remains, e.g. the CPP could be tightened further, making the financial community very risk averse to investing in coal technologies in the United States. EIA staff asked participants to provide written correspondence with EIA if they hold strong opinions regarding this

assumption. Written comments can be directed to Greg Adams (Greg.Adams@eia.gov) and will be shared with EIA's upper management.

Additions, Retirements, and Conversion Assumptions

• In response to one participant's inquiry, EIA staff stated that coal-to-gas conversions are modeled in the NEMS. In the AEO2015, EIA included approximately 4 gigawatts of coal-to-gas conversions as an input into the projection.

• The retirement assumed in 2025 is the Intermountain coal plant which currently serves California.

• Among the new coal plants that have been reported to EIA and will be included as inputs for the AEO2016 are the Healy plant and the Kemper County IGCC plant. The Healy plant in Alaska is an existing plant that was retired years ago and is being restarted. The Kemper County IGCC plant is currently running on natural gas but once its gasifiers are in place, it is expected to be fueled by coal. The Kemper plant is expected to be running on coal in 2016.

• For the participants' reference, the slides included a short list of new plants that are reported to EIA, but EIA does not include them as an input because they are less than 50% complete. One participant agreed that the Two Elk Generating Station is unlikely to be completed.

Other Assumptions and Clarifications

• In response to a question, EIA staff stated that the coal model does not represent foreign exchange rates.

• EIA staff clarified that slide 32 showing minemouth prices does not include transportation rates.