

September 7, 2016

## MEMORANDUM

TO: Dr. Ian Mead  
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 **AEO2017 1<sup>st</sup> Coal Working Group** held on August 31, 2016

### Attendees (62)

Name	Affiliation
Greg Adams	EIA
*Jose Alfaro	Alpha Natural Resources
*Jose Benitez	National Energy Technology Laboratory
*Andy Blumenfeld	Arch Coal
*Mike Caravaggio	Electric Power Research Institute
*Ivan Clark	Leidos
*Leslie Coleman	National Mining Association
John Dean	JD Energy, Inc.
Carol Dean	JD Energy, Inc.
Jim Diefenderfer	EIA
*Dana Echter	Excel Energy
*Neva Espinoza	Electric Power Research Institute
*Carolyn Evans	Norfolk Southern
*Jerry Eyster	General Electric
*Brian Fisher	Environmental Protection Agency
*John Fix	Leidos
*Mark Gehlhar	Department of Labor
*Stephen J. Gigliotti	Department of Labor
*Lee Gresham	Brattle Group
*Don Hanson	Argonne National Laboratory
*Keith Harrison	Southern Company
*Jamie Heller	Hellerworx, Inc.
*Whitney Herndon	Rhodium Group
*Tyler Hodge	EIA
Thad Huetteman	EIA
*Emily Hunter	Department of Labor
*John Jacobs	Basin Electric Power Cooperative
Elias Johnson	EIA
Ayaka Jones	EIA
*Serpil Kayin	Environmental Protection Agency
Diane Kearney	EIA
*Alan Krupnick	Resources for the Future

Name	Affiliation
Augustine Kwon	EIA
*Dave Lewandowski	Clean Energy
*Carl Lundgren	Department of Labor
*Greg Marmon	Wood Mackenzie
*Emily Medine	Energy Ventures Analysis
*Bill Meroney	Environmental Protection Agency
*Greg Moxness	Department of Labor
*Chris Nichols	National Energy Technology Laboratory
*Ron Oster	Peabody Energy
Brian Park	EIA
*Jamie Peters	U.S. Geological Survey
*Paul Pierce	U.S. Geological Survey
*Jay Ratafia-Brown	Leidos
*Nathan Ratledge	Resources for the Future
*Rick Roberts	Electric Power Research Institute
*Joshua Rockwell	Department of Labor
David Rosner	Department of Energy
*Brian Schaffer	U.S. Geological Survey
*Dave Schmalzer	Argonne National Laboratory
Seth Schwartz	Energy Ventures Analysis
*Cynthia Simpson	Department of Labor
*Michael Stansky	First Energy Corporation
Kevin Steinberger	Natural Resources Defense Council
*Glenn Stoner	Colorado Springs Utilities
Russell Tucker	National Rural Electric Cooperative Association
*Boddu Venkatesh	ICF International
*Ken Walsh	Leidos
*Michael Weiner	Van Ness Feldman LLP
*Thomas Wos	Tristate
*Tes Wyes	Department of Labor
*Laura Zachary	Resources for the Future
*Song Zhao	Leidos

\*Indicates participation via WebEx.

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 August 31, Greg Adams, CUAT

Team Leader, and Diane Kearney, Operations Research Analyst, presented the attached slides. While the slides provide the information presented, discussion and commentary were also encouraged. Participants and other stakeholders are encouraged to direct comments on proposed modeling methods and plans to Greg Adams ([Greg.Adams@eia.gov](mailto:Greg.Adams@eia.gov)) or Diane Kearney ([Diane.Kearney@eia.gov](mailto:Diane.Kearney@eia.gov)).

## **Regulations**

Per the presentation slides, certain new regulations (Coal Ash, Effluent Guidelines, and Cooling Water Intake Structures) were not modeled in the Annual Energy Outlook 2016 (AEO2016) nor will they be modeled in the AEO2017. Staff resource constraints, a shortened modeling cycle, the site-specific nature of the regulations, extensive structural modeling changes required to accommodate these regulations, and limited cost data availability are among the reasons for its exclusion from the AEO2017.

One participant commented that his organization has modeled these guidelines and some plants (approximately 180 units) face considerable cost, as much as \$500/kW. EIA staff asked if one regulation stood out as more expensive, i.e., more important to model, than the others, but the participant had not evaluated the regulations individually. EIA staff asked if there were certain regions that are more affected than others. According to the participant, eastern plants with wet scrubbers burning eastern coals, generally speaking, are more affected by the effluent guideline regulations.

Questions were asked about how EIA handles Regional Haze program requirements and the related 5<sup>th</sup> Circuit Stay in Texas. EIA incorporates any plant retrofits or plans that are reported via responses to Form EIA-860 capturing compliance, but otherwise does not model the program directly.

## **Coal Fleet Aging Project**

EIA staff highlighted its effort with NETL to explore coal plant data. The goal is to improve understanding of coal plant equipment maintenance and repair needs and costs as they relate to the age and sub-optimal operation of coal plants. This effort is an outcome of a recent modeler's forum held in June on the subject. That meeting's summary and presentations are found here: <https://www.eia.gov/forecasts/aeo/workinggroup/coal/>.

## **Coal Plant Retirements**

One participant commented that many utilities and independent power producer decisions are forcing coal plant retirement decisions.

EIA staff reported that, according to the Form EIA-860, there are still some plants that have not reported the addition of retrofits to comply with the Mercury Air Toxics Standards (MATS) yet they have also not retired, stated that they plan to retire, or stated that they plan to convert to natural gas. A small number of plants (roughly 7 Gigawatts) have asked EPA for an extension on MATS compliance, but the number of plants with inconclusive retrofit/retirement information exceeds this number. EIA will be following up with these plants to determine their status.

There are also plants that have not been operating. EIA plans to follow-up with respondents to determine if these plants also plan to retire. One participant cautioned that EIA should be careful not to presume that zero generation indicates an intention to retire because natural gas prices were particularly low in this

period. EIA staff indicated that they are looking at months where natural gas prices are not as low to try and mitigate this concern.

One participant recommended that showing remaining coal plant capacity would be more useful than showing coal plant retirements in the graphic on slide 19.

## **Productivity**

The emphasis of the discussion part of the meeting was focused on productivity. EIA staff stated that the AEO2016, with the exception of the Eastern Interior, assumed year-over-year declining productivity from 2014 levels. EIA staff continues to be pessimistic about productivity for most regions. EIA staff attributes recent upticks in productivity mostly to the retirement of less productive mines, which are no longer diluting the average productivity numbers. EIA staff posed some questions to the participants to see how they thought economy of scale (or reduction of the benefits of economies of scale because of reduced coal demand) might impact productivity. EIA staff noted that the currently active mines in most regions have enough recoverable reserves to fulfill production levels. This, in combination with lower coal demand, may provide a disincentive for investing in new mines and may contribute to declining productivity as more difficult geology is encountered at existing mines.

EIA staff asked if participants had any insight into evolutionary or revolutionary technologies that may affect productivity. One participant stated that driverless vehicles have the potential to reduce the number of workers required at a mine and improve efficiency. He also suggested that splitting productivity assumptions by geological considerations and technological advances may be an appropriate way to tackle the derivation of productivity assumptions, although technological advances are hard to predict.

In addition, the participant commented that some operators may hold onto employees during a period of lower coal demand if the situation were seen as generally temporary, noting recent trends in the Powder River Basin (PRB). Therefore, if productivity is calculated based on the number of employees, this has potential for misinterpretation of the resulting productivity numbers. [Note: EIA uses a productivity calculation that divides tons by employee hours rather than number of employees.] The participant also noted that lower demand would reduce the productivity decline due to geological considerations, e.g., the Pitt Seam in Northern Appalachia could run longer at higher productivity.

One participant highlighted the importance of regulations when evaluating productivity. The example provided is the soon-to-be released Stream Protection Rule. EIA staff clarified that the Stream Protection Rule, the final version of which has not been published, will not be considered in the AEO2017. The participant noted that production at certain mines will be severely curtailed in North Dakota and about 60% of North Dakota's reserves would be sterilized if the draft rule were enacted, affecting the power plants that rely upon those mines. EIA staff stated that specific examples such as these are helpful to our assessment of existing and pending regulations. A participant also noted that compliance with this regulation will likely require additional employees.

## **Investment**

One participant stated that when a downturn in coal demand occurs, capital expenditures will likely fall immediately, but eventually companies will be forced to invest in more productive equipment over time if

they want to stay in business. Another participant stated that if an investment makes economic sense, the expenditure will take place. An example of this is driverless vehicles.

One participant asked if investment is explicitly modeled. EIA staff responded that although it is not modeled directly, it might be worthwhile to look at investment in terms of its impact on productivity.

### **Side Cases**

A participant asked if there had been a determination of what the side cases might be for the AEO2017. The participant is interested in seeing side cases using both the Reference case where the Clean Power Plan is included and the case where the Clean Power Plan case is excluded as reference scenarios. In other words, there would be two sets of side cases, one where the Clean Power Plan is included and one where it is excluded. Though EIA staff stated that this would be unlikely given that the AEO2017 will be a short edition, the final set of side cases has not been formally declared. Typical side cases for a short edition include: high and low economic growth cases, high and low oil price cases, and high low natural gas resource cases.

EIA staff stated that generators are including the Clean Power Plan (CPP) in their planning framework, and this is an argument to keep the Clean Power Plan in the AEO2017 Reference case. One participant stated that he did not think that this thinking is universal, and many merchant generators have not explicitly incorporated the CPP into their planning.

### **Federal Coal Leasing Activity**

A participant asked if the AEO considers the three year moratorium on federal coal leasing in the outlook, or a potential ban on coal production from federal lands. EIA noted that BLM is currently in a listening phase of its review, and therefore no assumptions about changes to federal coal leasing policies have been made in its modeling thus far. Regarding the moratorium, EIA staff indicated that it is not represented but also stated that based on a preliminary calculation, the Wyoming Powder River basin production (100% of which is produced from federal lands) should largely be able to satisfy the production levels projected in the AEO2016 through about 2035, especially in light of the allowance exceptions to the moratorium. EIA staff also noted that while coal production might represent a significant volume on a percentage basis for some western states, the volume in tons for those states (not Wyoming) is relatively small. Another participant commented that a change in federal coal leasing is likely to be focused on an increase in the royalty rate for coal produced from federal lands.

### **Coal Plant Technologies**

A participant recognized that EIA used a 30% capture technology in the AEO2016, but he stated that his work indicated that a 90% capture technology would be more economically attractive. Recognizing that EIA currently has a limit on the number of technologies it can represent, he wondered if EIA might test this 90% technology. EIA staff promised to relay this request to the electricity team. EIA staff mentioned that an effort is underway to evaluate an ultra-super-critical with 90% CCS technology option and expand the technology options available in the electricity model.