

November 3, 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 Annual Energy Outlook 2021 (AEO2021)  
Working Group for Electricity, Coal, and Renewables Analysis,  
held on October 22, 2020

The working group presentation summarized the preliminary results from the *Annual Energy Outlook 2021* (AEO2021) for electricity, coal, and renewables. These preliminary results are included in the presentation materials provided in a separate document on the U.S. Energy Information Administration's (EIA) website.

### **Overview**

AEO2021 will include the eight core side cases (High/Low Economic Growth, High/Low Oil Price, High/Low Oil and Gas Supply, and High/Low Renewables Cost) and the Reference case.

We (EIA staff) asked for stakeholder feedback on topics for AEO2021 in the first working group meeting, held on August 6. During this most recent working group meeting, participants reviewed preliminary results based on the model developments discussed during the first working group meeting, and we asked participants whether the results seemed consistent with stakeholder thinking.

We began the meeting by presenting an overview of the EIA-sponsored workshops that we held in late September and early October to discuss the key issues to consider when developing near- and long-term outlooks in light of the global response to the COVID-19 pandemic. Recordings of these workshops are available on the [EIA website](#).

### **Model updates**

We reviewed the model updates to account for current laws and regulations, as well as a few of the proposed laws and regulations that we discussed at the first working group meeting that will not be included in AEO2021 for various reasons, primarily because the legislation has not been finalized.

We then discussed the preliminary results for AEO2021, including the following results:

- A largely unchanged level of total power generation from AEO2020 despite lower prices for all fossil fuels and renewable sources' move to replace natural gas and coal
- An increase in the number of coal and nuclear units expected to retire relative to AEO2020, as a result of lower electricity prices and higher renewables capacity additions

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- An increase in wind capacity additions, especially in the near term, as a result of the extension of the production tax credit for another year
- An increase in overall solar capacity additions while keeping the stand-alone storage level similar to AEO2020 as a result of the addition of the solar-battery hybrid technology option
- Electricity demand that remains relatively unchanged in total compared with AEO2020, although the sector level patterns are different (residential demand is higher, while commercial and industrial demand is lower)
- A continuation of the slight decline in coal production, in proportion with the decline in the coal used for power generation
- A slight decline in the demand for non-power related coal from AEO2020, along with a projected recovery in coal exports from the lower 2020 export level.

## Discussion

The discussion following the presentation focused on a few detailed topics.

Several participants asked how EIA handles the life cycle of renewables, how EIA handles the retirements of renewables, or if EIA assumes that renewables are automatically repowered. In addition, a participant asked if EIA includes performance degradation for wind, solar photovoltaic, or battery storage projects. We explained that although renewables are not retired within the model, the operation and maintenance cost assumptions for renewables account for the costs of maintaining a certain level of performance. Although we are not currently modeling repowering as an option for renewables, it is on our list of model developments for future consideration.

An attendee asked if EIA has any concerns for the potential of unmet load with the increase in intermittent renewable capacity. Although preliminary AEO2021 results show an increase in intermittent renewables from AEO2020, unmet load is not an issue during the projection period. We specifically account for the declining contribution of wind and solar toward meeting system planning reserve margins, which ensures that enough firm capacity is built within the model to ensure system reliability.

A participant asked how EIA has reconciled the impact of the Affordable Clean Energy (ACE) rule in the National Energy Modeling System (NEMS) compared with the U.S. Environmental Protection Agency (EPA) projections of the impact in their associated regulatory impact analysis.

We explained that to evaluate the impact of ACE in EIA's results you would have to compare the cases with and without the ACE rule, as was done for AEO2020. The AEO2020 No ACE Rule case had about 6 gigawatts less of retirements by 2050 relative to the AEO2020 Reference Case, indicating that ACE was not the primary driver of coal-fired unit retirements in NEMS. EPA's Regulatory Impact Analysis found only a few gigawatts of additional coal-fired retirements from the ACE rule as well; however, EPA's baseline retirements were not as high as those projected by EIA. EIA published analysis of the ACE rule in its [Alternative Policies for AEO2020](#).

The final question was whether we consider small-modular reactors (SMRs) as a stand-alone nuclear technology or include them in either the existing conventional nuclear or advanced nuclear technology options. We said that we created a new technology slot in the model for SMRs. As a result, for AEO2021

we will include two different nuclear technologies as options for electric generating unit capacity expansion.

### **Attendees**

EIA hosted this online working group meeting, which was attended by 61 people, including EIA staff and external participants.

### Guests

<b>First Name</b>	<b>Last Name</b>	<b>Affiliation</b>
Misha	Adamantiades	U.S. Environmental Protection Agency
Barry	Basile	U.S. Department of Energy
Jose	Benitez	U.S. Department of Energy
James	Bernhart	First Energy Corporation
Wesley	Cole	National Renewable Energy Laboratory
Leslie	Coleman	National Mining Association
Regis	Conrad	U.S. Department of Energy
Rachel	Goldstein	Solar Energy Industry Association
John	Hensley	American Wind Energy Association
Jeff	Hubbs	Georgia Institute of Technology
Tina	Kaarsberg	U.S. Department of Energy
Serpil	Kayin	U.S. Environmental Protection Agency
Lauren	Khair	National Rural Electric Cooperative Association
Ben	King	Rhodium Group
Jordan	Kislear	U.S. Department of Energy
Hannah	Kolus	Rhodium Group
Danielle	Koren	U.S. Department of Energy
Yanghe	Liu	Energy
Trieu	Mai	National Renewable Energy Laboratory
Cara	Marcy	U.S. Environmental Protection Agency
Gregory	Marmon	Wood Mackenzie
Jim	Moore	Spire Energy
Greg	Moxness	U.S. Department of Labor
Chris	Nichols	National Energy Technology Laboratory
Hannah	Pitt	Rhodium Group
Alfredo	Rivera	Rhodium Group
Robert	Schrecengost	U.S. Department of Energy
Sharon	Showalter	On Location
Don	Wehbey	U.S. Department of Labor
David	White	Synapse Energy
Robin	White	Environment and Climate Change Canada
Tom	Wilson	Electric Power Research Institute
Tom	Wos	Tri-State Generation and Transmission Association

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## EIA staff attendees

<b>First Name</b>	<b>Last Name</b>	<b>Affiliation</b>
Greg	Adams *	U.S. Energy Information Administration
Lori	Aniti	U.S. Energy Information Administration
Lindsay	Aramayo	U.S. Energy Information Administration
Erin	Boedecker	U.S. Energy Information Administration
Richard	Bowers *	U.S. Energy Information Administration
Michelle	Bowman	U.S. Energy Information Administration
Michael	Cole	U.S. Energy Information Administration
Jim	Diefenderfer *	U.S. Energy Information Administration
Kenneth	Dubin	U.S. Energy Information Administration
Kathryn	Dyl	U.S. Energy Information Administration
Mindi	Farber-DeAnda	U.S. Energy Information Administration
Meera	Fickling	U.S. Energy Information Administration
David	Fritsch	U.S. Energy Information Administration
Tyler	Hodge	U.S. Energy Information Administration
Thaddeus	Huetteman *	U.S. Energy Information Administration
Kevin	Jarzomski	U.S. Energy Information Administration
Scott	Jell	U.S. Energy Information Administration
Slade	Johnson	U.S. Energy Information Administration
Ari	Kahan	U.S. Energy Information Administration
Perry	Lindstrom	U.S. Energy Information Administration
Vikram	Linga	U.S. Energy Information Administration
Nilay	Manzagol	U.S. Energy Information Administration
Laura	Martin *	U.S. Energy Information Administration
Chris	Namovicz *	U.S. Energy Information Administration
Andri	Rizhakov	U.S. Energy Information Administration
John	Staub	U.S. Energy Information Administration
Manussawee	Sukunta *	U.S. Energy Information Administration
Edward	Thomas	U.S. Energy Information Administration

\*Presented during the working group