Independent Statistics & Analysis
U.S. Energy Information Administration

October 28, 2022

MEMORANDUM FOR: Angelina LaRose
Assistant Administrator for Office of Energy Analysis

FROM: Jim Diefenderfer
Director, Office of Long-Term Energy Modeling

Subject: Summary of Oil and Gas Supply, Liquid Fuels Market, International Energy, and Natural Gas Market Modules Working Group Meeting held on September 29, 2022

This memorandum summarizes the presentation given during the *Annual Energy Outlook* (AEO) 2023 Oil and Gas Supply, Liquid Fuels Market, International Energy, and Natural Gas Market Modules Working Group meeting and the resulting discussions that took place. The meeting had three parts that focused on each of the different modules.

The presentation slides are available in a separate document on our website. All slides, charts, and discussions for AEO2023 were preliminary and, therefore, should not be quoted or cited. We will release final AEO2023 materials in early 2023.

Oil and Gas Supply Module

Will Sommer presented on this module. He discussed how updates for AEO2023, including routine data updates, changes to drilling responsiveness, and representation of the Inflation Reduction Act (IRA) will affect oil and natural gas supply projections. He highlighted several points:

Model and data updates

- Updated assumptions for tight and shale estimated ultimate recovery (EUR) of crude oil and natural gas per well
- Updated the Lower 48 states offshore and Alaska announced discoveries
- Updated historical production through 2021
- Updated drilling responsiveness

Preliminary results

We project:

- West Texas Intermediate (WTI) crude oil prices will be higher than in AEO2022.
- U.S. crude oil production will be slightly higher than AEO2022 projections with higher oil prices.
- U.S. crude oil production will grow, primarily as a result of tight oil from the Permian Basin.
- U.S. dry natural gas production will be less than in AEO2022 after 2025.

- Marcellus, Hayesville, Utica, and tight oil plays will be the primary drivers of growth in shale gas production.
- Natural gas plant liquids (NGPL) production will be lower than in AEO2022 after 2025.

Discussion

An attendee asked about including oil and natural gas provisions from the IRA in the natural gas market. We explained the increased royalty rate of 16.67% is included in the model, but leasing costs are not included because they are considered sunk costs.

Liquid Fuels Market Module and International Energy Module

Peter Colletti and Adrian Geagla presented on this module. Peter covered key data updates for AEO2023 about domestic petroleum consumption, gross product exports, diesel price spreads, and biofuels supply, in particular, renewable diesel. Adrian covered Brent crude oil prices, crude oil supply and exports, and refinery supply and utilization. They highlighted several points:

Model and data updates

- Updated international crude oil and petroleum product curves
- Updated crude oil price differentials by crude oil type
- Updated pipeline capacity and transportation costs
- Updated state and federal fuel taxes
- Updated historical and *Short-Term Energy Outlook* (STEO) liquid fuels data
- Updated refinery, biofuels, and cogeneration capacities
- Substituted unfinished oils imports from Russia with imports from other countries
- Updated annual and biannual biofuels capacities and E15 penetration rates
- Updated Renewable Fuel Standard (RFS) mandate levels
- Added a representation of Sustainable Aviation Fuel (SAF)
- Added Oregon's Clean Fuels Program (CFP) based on the existing representation of California's Low Carbon Fuel Standard (LCFS)

Preliminary results

We project:

- Brent crude oil prices will be higher over the projection period compared with AEO2022.
- The Brent-WTI price spread will rise in the near term and remain similar to AEO2022 throughout the rest of the projection period.
- Crude oil exports will decline slightly in the near term and remain under 25% of total crude oil production through the rest of the projection period.
- The total crude oil supply will be slightly lower than in AEO2022, but refinery utilization will remain strong over the projection period.
- Consumption of domestic petroleum products will be slightly lower than in AEO2022 through the projection period.
- Gross product exports will be higher than in AEO2022 to compensate for lower domestic demand, and gross product imports will remain unchanged.
- Price spreads between gasoline and diesel will be narrower in the near term before settling at a slightly higher spread compared with AEO2022.

- Biofuels supply will be slightly lower than in AEO2022.
- Renewable diesel supply will be higher than biodiesel supply throughout the projection period.

Discussion

One attendee asked about cost and availability of feedstock in SAF representation. We explained that although we have no explicit assumptions about costs of feedstock, the SAF demand for feedstock competes with demand for renewable diesel and biodiesel production. Other attendees asked about SAF representation in the AEO2023 published data tables. We stated that SAF will be accounted for in the AEO tables for the first time but will not be separated like the renewable diesel and biodiesel projections. An attendee asked about SAF credits in 2023 and 2024 as set forth in the IRA. We stated that a flat credit for SAF production will be included, but scaling credits based on carbon intensity are not included in AEO2023.

An attendee asked about the drop off in supply of renewable diesel and biodiesel in 2024. We explained biofuels credits apply through 2024, and then a lack of economic incentive comes into play starting in 2025.

Natural Gas Market Module

Stephen York presented updates for AEO2023 that were related to natural gas production and consumption, spot prices, pipeline trade with Canada and Mexico, and liquefied natural gas (LNG) exports and facilities. He highlighted several points:

Model and data updates

- Incorporated data from the *Natural Gas Annual*, released September 2021 (2020 annual data)
- Incorporated data from the *Natural Gas Monthly* through April 2022 (complete 2021 history)
- Updated pipeline capacity data, natural gas spot price data, and historical data for Mexico and Canada
- Updated in-service dates of LNG export facility projects and the first year of allowed endogenous LNG builds
- Notable non-model updates include the world oil price assumptions, impacts from the Inflation Reduction Act (IRA) in the upstream and electric sectors, and changes to STEO
- Restructured the representation of projected natural gas flows within Texas into three distinct demand nodes based on Texas Railroad Commission Districts

Preliminary results

We project:

- U.S. natural gas consumption and production will be lower in the long-term projections compared with AEO2022 due to the IRA provisions.
- Henry Hub natural gas spot prices will fall from 2022 highs before settling around $4.00 per million British thermal units (MMBtu) by 2050.
- Large declines in natural gas consumption in the electric power sector relative to AEO2022 due to impacts from the IRA.

- Imports from Canada will increase, but we expect overall imports to remain mostly unchanged compared with AEO2022.
- Pipeline exports to Mexico will be lower than in AEO2022, with projected growth in exports to Mexico will peak near 2035.
- Some LNG facilities will be completed earlier than assumed in AEO2022. In addition, we are exploring some updates to the number of trains that can come online in a given year.
- LNG exports will be higher in AEO2023 as LNG export economics will be more favorable compared with AEO2022.

Discussion

An attendee asked about model consideration of pipeline exports to Mexico for LNG export projects. We explained that this LNG export project is not being represented, and we do not currently allow for the construction of LNG export facilities in Mexcio at this time.

Attendees

Registered guests (Webex and phone)

Jenna Bloxom	Advanced Biofuels USA
Ray Boswell	U.S. Department of Energy
Phillip Brown	Library of Congress, Congressional Research Service
Claire Dodinval	ICF
Andrew Foss	U.S. Department of Energy
Kathy Gramp	Congressional Budget Office
Tim Grant	U.S. Department of Energy
Joyce Kim	U.S. Environmental Protection Agency
Eric Kreig	ICF
Brian Lavoie	U.S. Department of Energy
Beth Lau	Canadian Association of Petroleum Producers
Tony Radich	U.S. Department of Agriculture
Michael Schaal	OnLocation Inc.
Kristen Strellec	Bureau of Ocean Energy Management
Wyatt Thompson	University of Missouri, Food & Agriculture Policy Research Institute
Ken Walsh	Leidos Inc.
Jarrett Whistance	University of Missouri, Food & Agriculture Policy Research Institute
Frances Wood	OnLocation Inc.

EIA participants (Webex and phone)

Erin Boedecker	Ari Kahan	Will Sommer (presenter)
Hannah Breul	John Maples	Stephanie Tsao
Michael Cole	James Preciado	Mary Webber
Peter Colletti (presenter)	Mark Schipper	Stephen York (presenter)
Matt Corne	Elizabeth Sendich	
Jim Diefenderfer	Estella Shi (presenter)	
Michael Dwyer	Sauleh Siddiqui	
Kathryn Dyl	Nicholas Skarzynski	
Mindi Farber-DeAnda	Andrew Smiddy	
Adrian Geagla (presenter)	Manussawee Sukunta	