



Independent Statistics & Analysis

U.S. Energy Information
Administration

January 21, 2021

MEMORANDUM FOR: Angelina LaRose
Assistant Administrator for Energy Analysis

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

SUBJECT: Summary of AEO2021 Macro-Industrial Working Group held on
Thursday, September 17, 2020

This memorandum summarizes the presentation and discussion at the *Annual Energy Outlook 2021* (AEO2021) Macro-Industrial Working Group meeting. First, the Industrial team presented

- A review of key *Annual Energy Outlook 2020* industrial sector energy trends
- Preliminary results, focusing on trends in gross domestic product (GDP) and business investment
- Module updates incorporated into AEO2021
- Changes to the value of shipments (which come from the macroeconomic module and are the primary driver of industrial energy use) and industrial energy consumption
- Plans for longer-term modeling and data enhancements

After the presentation, presenters addressed questions and comments from attendees.

Macroeconomic Activity Module updates

EIA staff discussed the key updates to the Macroeconomic Activity Module. Because of the severe and lasting economic impacts of the COVID-19 pandemic along with the uncertainty about the timing and strength of the recovery, in the fall of 2020, EIA staff updated, for a second time, the IHS Markit long-term U.S. model scenarios for the Reference case and high and low economic activity cases.

Industrial Demand Module updates

EIA staff discussed the key updates made to the industrial module, including

- Implementing *Manufacturing Energy Consumption Survey* benchmarking of process flow industries

- Updating relative energy intensities (REIs) for equipment in the food, metal-based durables, and bulk chemicals industries
- Implementing technology possibility curves for process flow industry technologies
- Aligning petroleum coke consumption data with the refinery industry

Changes to macroeconomic shipments also affected industrial energy use. Although most industries experienced a decrease in shipments relative to AEO2020 because of responses to the COVID-19 pandemic, total shipments from energy-intensive industries returned to approximately the same level by 2030, while total shipments from non-energy-intensive industries never return to AEO2020 levels. As a result, energy consumption in the industrial sector remains lower over the projection period than in AEO2020.

Discussion

An attendee asked about the increased GDP growth rate between AEO2020 and AEO2021, and whether it was all a result of recovery from the pandemic. EIA staff said the difference resulted from computing the growth rate at 2020's low, pandemic-driven level. If the projection for 2020 from AEO2020 was used as the starting point, the growth rate in AEO2021 would be the same as AEO2020, i.e., 1.9%.

An attendee asked where the industrial module got its natural gas price. EIA staff responded that natural gas prices came from the Natural Gas Markets Module (NGMM) and EIA's *Short-Term Energy Outlook* (STEO). The attendee was also referred to the NGMM working group.

An attendee asked whether technology specifications in the process flow part of the industrial module were publicly available. EIA staff responded that this and other unpublished inputs were available upon request.

An attendee asked for more details on how petroleum coke (petcoke) projections were derived. EIA staff responded that petcoke is used in refineries (where it is produced), other industries such as cement, and to a minor extent in the power sector. EIA does not consider petcoke to be a feedstock. EIA staff explained that there are two kinds of petcoke: catalytic coke (catcoke), which is unusable outside of refineries, and marketed coke, which is used as a fuel in industries outside petroleum refining. EIA's *Petroleum Supply Annual* provides historical data and the STEO provides short-term projections of petcoke consumption. Published data representing marketed petcoke is a residual and is computed as total petcoke minus catcoke. EIA staff said they were working with the Liquid Fuels Market Module to increase the accuracy of the historical split in petcoke consumption between refining and the rest of the industrial sector.

An attendee asked whether the primary driver of combined-heat-and-power (CHP) growth in the bulk chemicals industry was either chemicals growth or the return of chemical industries to the United States. EIA staff responded that both factors drive CHP growth because we base CHP growth on that industry's large power and heat/steam demand.

An attendee asked more generally about the reshoring of supply chains to the United States and whether EIA's projections reflect that reshoring effect was reflected in EIA's projections. EIA staff responded that the module did not currently have that ability, but it would be considered in the future.

An attendee asked if the National Energy Modeling System needed to address plastic recycling. EIA staff agreed that it needed to be thought about, both in the plastics industry and for bulk chemical feedstocks. EIA staff hopes to model it in the future.

An attendee asked about the granularity of REIs, and if they went as far as industrial subsectors. EIA staff responded that REIs exist for specific end-use activities, such as heating and cooling, and sub-industries, such as grain milling in food or organic chemicals in bulk chemicals.

An attendee asked if there was any meaningful macroeconomic growth given national factors. EIA staff responded that the only positive growth in 2020 was in government spending at 1.9%. We project real GDP to decline 4.8% in 2020 and the economy to resume growing in 2021 (real GDP growth of 3.1%). Further, the economy won't match its 2019 performance until 2022 (real GDP growth of 4.4%).

An attendee asked what accounted for the decline in the *share* of government spending relative to AEO2020. EIA staff responded that the decline in the share of government spending was the result of unwinding stimulus packages that will be gone by 2050. EIA staff noted that *overall* growth of government spending is 0.7%, up 0.2 percentage points from AEO2020.

EIA staff were asked to say more about differential recovery pathways in terms of value of shipments for energy-intensive versus non-energy-intensive industries. EIA staff said many of the non-energy-intensive industries supply retail (textiles, printing), household formation (furniture, paint, appliances), shipping (wood products), the automotive sector (transportation equipment), and capital investment (machinery), which are sectors of the economy that may experience more lasting impacts from the COVID-19 pandemic.

An attendee asked if EIA was considering running decarbonization cases in the Reference case or side cases for AEO2021. Another attendee asked about electrification of industries in terms of a decarbonization strategy, which EIA staff said was not yet modeled as a method of decarbonization. EIA staff said it would consider it in the future, as well as the potential use of hydrogen as a large part of decarbonization.

Attendees

Guests (Webex/phone)

Martha Moore	ACC
R. Neal Elliott III	ACEEE
Andrew Hoffmeister	ACEEE
Ed Rightor	ACEEE
David Shin	American Petroleum Institute
Kevin Dubina	BLS
Katy Laurence	BLS
Carl Bozzuto	CIBO
Joe Cresko	DOE
Bob Gemmer	DOE
Keith Jamison	DOE
Betsy Dutrow	EPA
Serpil Kayin	EPA
Danny Macri	EPA
Walt Tunnessen	EPA
Dylan Sawyer-Villers	Equitrans Midstream
Paul Kress	ETRN
Rishi Garg	FERC
Eric Fox	Itron, Inc.
Mike Russo	Itron, Inc.
William Morrow	Lawrence Berkeley National Laboratory
John Meyer	Leidos
Sugandha Tuladhar	NERA
Peri Ulrey	NGSA
Rob Boteler	Nidec Motor Corporation
Cheryl Marcum	Nidec Motor Corporation
Alberta Carpenter	NREL
Frances Wood	OnLocation, Inc.
Robert Hershey	Professional
Robert Terry	Professional
Whitney Herndon	Rhodium Group
Ben King	Rhodium Group
Hannah Kolus	Rhodium Group
Hannah Pitt	Rhodium Group
Brian Atkins	Southern Company
Francesco Memoli	Tenova Inc.
Eric Masanet	UC Santa Barbara
Sarah Kuhnell	Worthington Industries
Shellee Simmons-Taylor	Worthington Industries

EIA attendees (Webex/phone)

Daniel Agee	EIA
Lindsay Aramayo	EIA
Nicholas Chase	EIA
Jim Diefenderfer	EIA
John Duff	EIA
Joshua Eiermann	EIA
Mindi Farber-DeAnda	EIA
David Fritsch	EIA
Peter Gross	EIA
Angelina LaRose	EIA
Perry Lindstrom	EIA
Tom Lorenz	EIA
Farah Naz	EIA
Kelly Perl	EIA
Elizabeth Sendich	EIA
Nicholas Skarzynski	EIA
John Staub	EIA
Russ Tarver	EIA
James Turnure	EIA
Warren Wilczewski	EIA