Independent Statistics & Analysis
U.S. Energy Information Administration

June 4, 2021

MEMORANDUM FOR: Angelina LaRose
Assistant Administrator for Energy Analysis

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

SUBJECT: Summary of AEO2022 Transportation Working Group held on Thursday, May 27, 2021

This memorandum summarizes our presentation and discussion at the *Annual Energy Outlook 2022* (AEO2022) Transportation Working Group meeting. The Transportation Working Group presentation summarized AEO2021 Reference case transportation projections. It also highlighted the planned historical transportation data and modeling updates for the Transportation Demand Module (TDM) for the AEO2022 Reference case, as set up in our National Energy Modeling System (NEMS). After the presentation, meeting participants commented on additional model and data topics. The presentation for this meeting is available in a separate document on our website.

Model Updates (AEO2022)

Highlights from the presentation primarily relate to planned updates. These updates include

- Model improvements to incorporate a new battery model for light- and heavy-duty vehicles, including a dynamic relationship between battery size, pack size, and vehicle weight
- Anticipated policy changes
- Aviation model updates
- Historical data updates across all of the transportation modes

We presented planned updates on five model areas:

- Light Duty—Light-duty vehicle stock data update, new battery model integration, regional sales and stock distribution revision, pending policy changes under consideration
- Heavy Duty—Regional travel and stock data update, new electric vehicle (EV) powertrain, and battery model integration
- Public transit—Bus and passenger rail travel update, travel demand equation re-estimation, transit bus fuel choice update
- Air—Historical data update, model assumptions update, demand projection re-estimation
- Other—Freight rail and domestic marine shipping update

Discussion

During the discussion, participants' questions primarily focused on previous AEO projections, electric vehicles, and potential policy changes.

Previous projections

Attendees asked, given electric vehicle (EV) production announcements from many of the major automakers, if we were surprised to see that gasoline vehicles are projected to make up such a large portion of the light-duty fleet in 2050. Participants also asked what data and assumptions we used for AEO projections. We responded that automakers announced their EV sales intentions recently, after AEO2021 was finalized. We will consider the recent announcements for AEO2022, but projections of EV sales will be closely tied to advancements in battery research and development, performance improvement, chemistries, design, and packaging and how those factors will affect cost. We also explained that we do not model revolutionary change in battery cost and performance, so the potential impact that lithium sulfur or solid state batteries might have on EV sales is not currently reflected in the model. In addition, pending policies to create incentives to build infrastructure and to boost EV sales will affect the growth rate in sales.

Participants asked for more information about the regional differences in scrappage, vehicle miles traveled (VMT) by age, sales, and stock for light-duty vehicles. We responded that we obtain vehicle registration data every year. A few years ago we began analyzing the annual change in vehicle registrations at the state and zip code levels and observed increases in vehicle stocks for older vehicles in some regions. We also observed significant differences in the distribution of vehicle registrations by vehicle age, average annual travel, and average annual travel by vehicle vintage. We plan to add this detail to the model to better capture the energy impacts associated with vehicle sales, stocks, and travel.

Specific to the coal outlook, participants commented that coal is the largest bulk material carried by rail. We confirmed that coal shipments do account for a significant portion of rail travel, and the projections of rail ton-miles reflects the change in future U.S. coal demand. Growth that occurs beyond 2025 reflects rail shipments associated with a projected growth in industrial sector output by region, assuming rail does not lose market share in the industries it currently serves.

A participant asked about our projection for population growth given reports on declining birth-rate trends. We answered that population projections in the AEO reflect U.S. Census Bureau projections. High and low macro cases provide sensitivity cases to the rate of population growth. The transportation model uses detailed projections of population growth by age cohort and gender; the rate of population growth does affect projected growth in energy demand.

Participants asked for the location of Class 2b vehicle efficiency, travel, and energy use reported in the AEO. We responded that sales, stocks, travel, and energy consumption are reported in the fleet tables and include both household and fleet vehicles. Class 2b new vehicle fuel economy and stock fuel economy is reported in Table 7.

Electric vehicles and potential policy changes

A participant asked if annual EV VMT displaces conventional internal combustion engine (ICE) vehicle travel at a one-to-one ratio. We affirmed and explained the model assumes that EV travel is the same as comparable ICE vehicles. Some recent studies have shown that, on average, EVs are driven less than half as much as comparable ICE vehicles, which could be due to the travel behavior characteristics of initial EV buyers. We would expect this factor to change as EVs become a viable alternative for a greater number of consumers. A participant asked a follow-up question about the consequences of EV uptake on gasoline demand and prices. We responded that the impacts are fairly small.

Participants asked what impact electrification would have on supply chain minerals such as lithium and cobalt. We stated we are not aware of any groups in EIA that are specifically analyzing demand for materials critical to support EV battery and powertrain production, or if future supply constraints could affect the cost of those minerals and, as a result, battery prices.

Regarding vehicle electrification, a participant asked if a California-sponsored order for more EV, plug-in electric vehicles (PHEV) or fuel cell vehicles by 2035 would apply to states that have not adopted ICE bans. We answered that states have not yet specified proposed policies related to ICE bans. Once those policies are enacted, we will include them in the model and will also research California's ICE ban to better understand how or if that ban will be tied the ZEV program and if other states that adopt California's light-duty vehicle emission regulations are affected.

Participants asked whether or not the U.S. Environmental Protection Agency (EPA) and EIA are collaborating. We confirmed that the transportation group coordinates with EPA on fuel economy data and regulations. We are unaware of EPA tracking state and local EV polices. If EPA has information or data that can be shared, we would appreciate the opportunity to collaborate on this issue.

Attendees

Guests (Webex/phone)

Megan Beardsley	U.S. Environmental Protection Agency
Daniel Bizer-Cox	U.S. Environmental Protection Agency
Naveen Dasari	Rhodium Group
Michael Freels	Oregon Department of Energy
David Gohlke	Argonne National Laboratory
Michael Hartrick	Alliance For Automotive Innovation
Darek Imadi	OnLocation, Inc
Raphael Isaac	Energetics
Bryan Just	American Petroleum Institute
Ken Katz	U.S. Department of Transportation
Ben King	Rhodium Group
Jim Kliesch	Honda
Hannah Kolus	Rhodium Group
Alice Lee	Honda
Amanda Levin	Natural Resources Defense Council
Tiffany Mo	U.S. Environmental Protection Agency
Eric O'rear	Rhodium Group
Thomas Perrot	Energetics
Hannah Pitt	Rhodium Group
Kara Podkaminer	U.S. Department of Energy
Cassie Powers	National Association of State Energy Officials
Christopher Ramig	U.S. Environmental Protection Agency
Alfredo Rivera	Rhodium Group
Hideharu Takemoto	Honda
Clayton Vernon	Sunoco
Jacob Ward	U.S. Department of Energy
Jarrett Whistance	University of Missouri
Frances Wood	OnLocation, Inc
Arthur Yip	National Renewable Energy Laboratory
Yan Zhou	Argonne National Laboratory

EIA attendees (Webex/phone)

Erin Boedecker	Perry Lindstrom	Nicholas Skarzynski
Caroline Campbell	John Maples	Manussawee Sukunta
Jim Diefenderfer	Elizabeth May	Russ Tarver
Michael Dwyer	Kyle Morley	Thomas White
Kathryn Dyl	Kelly Perl	
Mindi Farber-Deanda	James Preciado	
Mala Kline	Mark Schipper	