MEMORANDUM FOR: Ian Mead
                        Assistant Administrator for Energy Analysis

FROM: Jim Turnure
                         Director, Office of Energy Consumption and Efficiency Analysis

SUBJECT: Summary of AEO2018 Transportation Working Group held on Tuesday,
                         August 8, 2017

The working group presentation provided discussion of the data and modeling updates expected for the AEO2018 Reference case, along with potential side case scenarios. These updates are included in the presentation materials provided as a separate document.

Model updates

EIA staff presented anticipated updates in two separate categories:

- *Historical data*—bus and passenger rail travel, efficiency, and fuel use; truck, rail, and domestic maritime freight travel demands; light- and heavy-duty vehicle stocks; military fuel use; and recreational boating fuel use.

- *Model*—expansion of macroeconomic drivers and realignment of industrial and service groupings used in freight travel demand projections; addition of manufacturer Zero Emission Vehicle (ZEV) credit banking for light-duty vehicles; addition of autonomous vehicles, ridesharing, and carsharing into Reference case and scenarios.

Discussion

During the discussion, participants asked several questions related to both historical data and modeling updates.

<u>Historical data updates</u>

Participants asked about the reasons behind the differences in historical passenger bus and rail data. EIA staff explained how the data updates include additional datasets and changes in source reporting methodology. A follow-up question related to how EIA will use these new data to project school bus energy demand and if school district specific data are available for use to better estimate historical and projections of school bus demand. EIA staff expressed interest in using new data and techniques and asked for references to any of these data that are available.

Discussants asked for clarification on the level of disaggregation of data that EIA uses as a source for on-road vehicle stock updates, including both light- and heavy-duty. EIA staff answered that the original data are at the zip code level but are aggregated to nine U.S. Census Divisions. A related question asked how Class 2b trucks are modeled in NEMS. EIA staff indicated that Class 2b trucks are reported in the

fleet vehicle section of light-duty vehicles and fuel economy compliance is modeled with heavy-duty vehicles as part of the HD National Program Phase I and Phase II standards.

Model updates

Most of the participant's questions and related discussion centered on model updates, especially as it related to EIA's planned inclusion of autonomous vehicles and shared mobility in both the AEO2018 Reference case and potential Issues in Focus side cases.

A question arose regarding what levels of vehicle automation will be considered, to which EIA staff responded that the primary focus of the analysis will be on the energy impact of Level 4 and 5 autonomous vehicles. The goal at this stage is to think of the issues that might impact transportation energy demand and begin to quantify them, and this is expected to be a multiyear process.

Participants asked if and how EIA intends to incorporate endogenous factors and dynamics of autonomous vehicles and ridesharing, such as individual versus business use, rates of adoption, and the impact on sales. EIA responded that this is the start of a multiyear process of understanding and refining factors and dynamics affecting the transportation sector in more granularity as more data and analysis are available. EIA looks to modeling household and fleet use separately and will reach out to the transportation community for feedback on how to best model these and other elements.

Questions arose regarding how EIA will explore the impact of autonomous vehicles on public transit, vehicle sales, scrappage rates, or understanding mobility as a service. EIA staff discussed how this is the start of an analysis of these factors, including building and structuring models to include important determinants and assumptions in such a way as to allow deeper work over the next several Annual Energy Outlooks.

Discussants asked if and how EIA will include automated vehicles and ridesharing in the Reference case, or if analysis will only be in AEO2018 side cases. EIA staff explained that there will be inclusion in both the AEO2018 Reference case and in side cases. The side cases will explore various levels of uncertainty surrounding important dynamics and assumptions. In response to a question of whether the Reference case will be a "no-autonomy" case, EIA staff expressed the view that analysis is still underway on how to incorporate autonomous vehicles into the Reference case, but we do not expect it to be a "no-autonomy" case. A query as to details on the decision process for what will be included in the Reference case, EIA explained that this is a multiyear process and does not expect to include major changes this year but instead to start the process of modeling and analyzing important factors.

Participants asked the reason for EIA's inclusion of autonomous vehicles in the Reference case and not exclusively in side cases for the AEO2018, to which EIA staff responded that it is important to include relevant technology and market factors that will impact transportation energy consumption in the Reference case.

Detailed questions followed requesting more specifics on what EIA intends to include in an automated vehicle and ridesharing analysis. Participants asked if EIA will include automated trucking and the impact of platooning. EIA staff described how they follow market news and dynamics and as information becomes available and will consider ways to include updates such as platooning, as this is touted as a potentially attractive option for heavy-duty vehicles.

Another question related to EIA's expectation of when driverless vehicles will be on the road in any number. EIA staff explained that this analysis is currently underway but do not yet have projections. A question arose regarding how EIA expects to model factors such as the impact on 2nd or 3rd vehicle ownership or the impact on vehicle miles traveled of autonomous vehicles and ridesharing.

EIA staff answered that analysis includes as many micro factors as possible such as vehicle usage and vehicle miles traveled data at a vehicle level, including urban, suburban, and rural usage and by number of vehicles in the household. Participants asked how and if EIA will look at nexus between automated vehicles and electric vehicles. EIA described how they will look into how automated vehicles and ridesharing could impact EV sales, and vice-versa, without explicitly looking at EV penetration as a cap on automated vehicles.

Participants asked EIA about whether policies incentivizing autonomous vehicles or ride sharing will be included. EIA staff explained how only current laws and regulations will be included the analysis. Discussants requested that EIA accept suggestions on the nomenclature of terms used in its analysis of autonomous vehicles, ridesharing, and carsharing. EIA attendees reiterated that they seek and look forward to finding the clearest and most accurate descriptions of the technology and market.

A final section of questions related to EIA's modeling of California and Section 177 States Zero Emission Vehicle (ZEV) mandates. Specifically, participants asked if ZEV mandate calculations interact with the Corporate Average Fuel Economy (CAFE) standards. EIA staff answered that, yes, the impact of ZEV mandates, specifically the sale of electric vehicles, impacts the fuel economy performance of other vehicle fuel types in meeting CAFE standards.

A follow-up question asked if EIA's modeling of the ZEV mandates are based on existing regulation or is there consideration of additional mandates beyond 2025. EIA explained that only current laws and regulations are included in the Reference case, not proposed laws and regulations. Finally, participants asked if ZEV mandates are in the transportation models consumer and manufacturer choice routines. EIA staff responded that these mandates are included into these sections of the model.

Attendees

Guests (in person)
Alicia Birky	Energetics
Sarah Garman	DOE
David Gohlke	DOE
Siddiq Khan	ACEEE
James Kliesch	Honda
Jennifer Li	DOE
Rachael Nealer	DOE
Kara Podkaminer	DOE
Dennis Smith	DOE
Tom White	DOE

Guests (WebEx/phone)
Daniel Bizer-Cox	EPA
Austin Brown	UCDavis

John Davies   DOT
Kevin Green   DOT
Brianna Jean   DOT
Ken Katz   DOT
Christopher Ramig   EPA
Tom Stephens   ANL
Hideharu Takemoto   Honda
Luke Tonachel   NRDC
John Van Schalkwyk   DOT
Frances Wood   OnLocation
Yan Zhou   ANL

EIA attendees (in person)

Nicholas Chase   EIA
John Conti   EIA
David Daniels   EIA
Howard Gruenspecht   EIA
Melissa Lynes   EIA
John Maples   EIA
Beth May   EIA
Shirley Neff   EIA
Mark Schipper   EIA
Nicholas Skarzynski   EIA
David Stone   EIA

EIA attendees (WebEx/phone)

Mindi Farber-DeAnda   EIA