Annual Energy Outlook 2019

Review of AEO2018 and potential updates for AEO2019

For

AEO2019 Transportation Working Group

May 31, 2018 | Washington, DC

By

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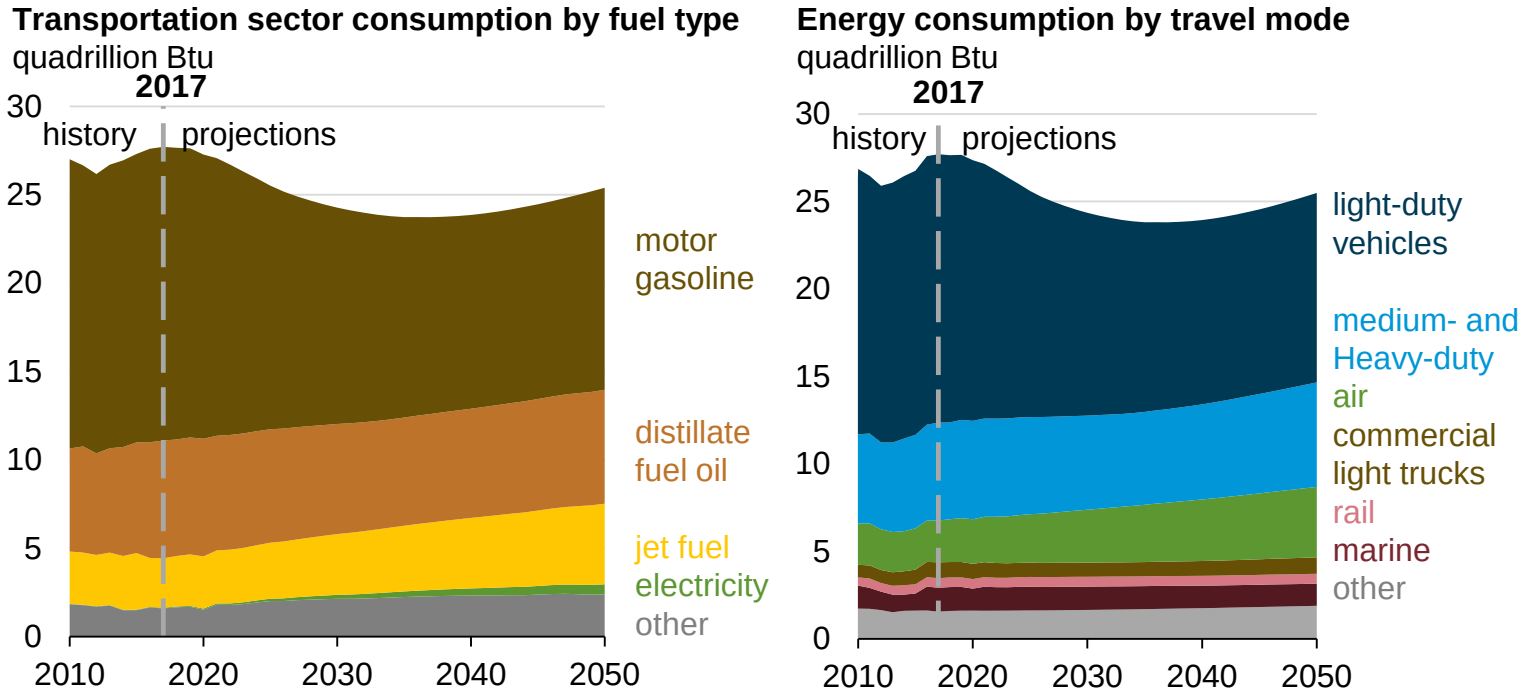
Office of Energy Consumption and Efficiency Analysis

Outline

- Recap of AEO2018 Reference case
- AEO2018 Reference case projections and discussion on proposed model updates for AEO2019 affecting key projections
- Ongoing automated vehicle model development
- Other potential updates for AEO2019

Transportation energy consumption declines between 2019 and 2035 in the Reference case



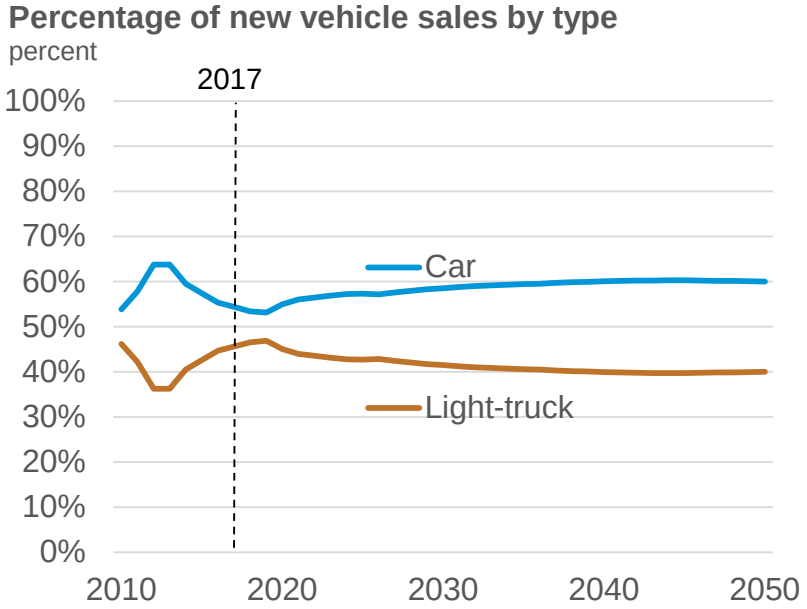
Source: EIA, AEO2018 Reference case

Discussion and request for feedback on key AEO2018 projections

Light-duty vehicles

Proposing to add crossover utility vehicle (CUV) size classes to car and light-truck groups to improve modeling

AEO2018 Reference case



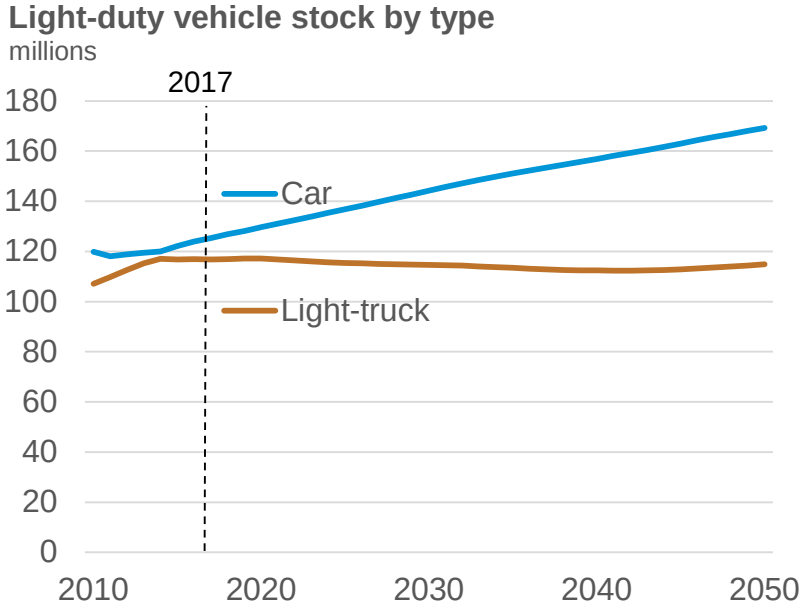
Source: EIA, AEO2018 Reference case

Discussion points

- Considering adding 2 size classes to both car and light-truck
  - Small CUV
  - Large CUV
- For cars (~26% of 2016 car sales):
  - Differentiates sedans and hatchbacks from CUVs
- For light-trucks (~54% of LTs):
  - Differentiates SUVs from CUVs

Proposing to align light-duty vehicle stock classification to NHTSA/EPA classification to better model stocks and VMT

AEO2018 Reference case



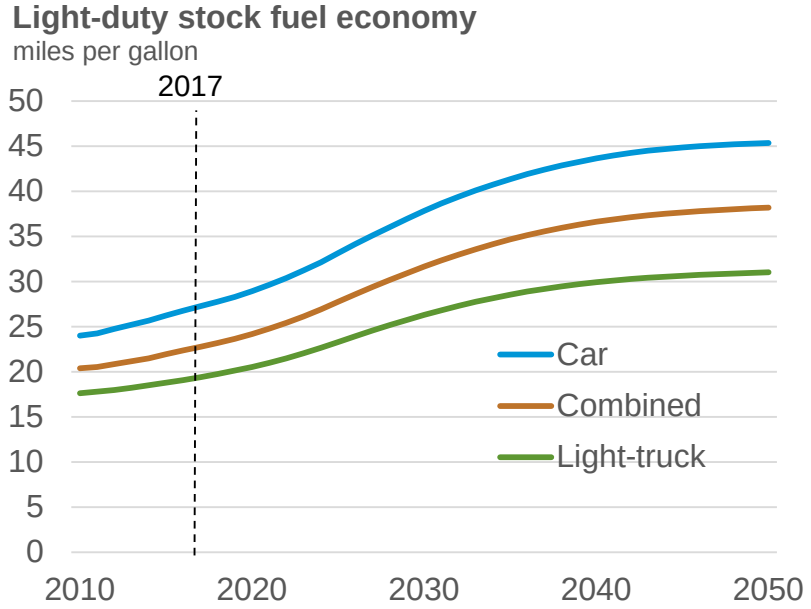
Source: EIA, AEO2018 Reference case

Discussion points

- The historic vehicle stock is based on industry classification of car versus light-truck
- Update would align stock data (sourced from Polk IHS Markit) with NHTSA/EPA classifications for car and light-truck
- Will influence scrappage and VMT

Proposing to regionalize light-duty stock fuel economy to improve modeling of regional energy consumption

AEO2018 Reference case



Source: EIA, AEO2018 Reference case

Discussion points

- Regionalizing stock fuel economy components and projections
  - VMT/vintage by car and light-truck
  - Vehicle scrappage

Policy uncertainty could affect fuel economy and sales projections in AEO2019

- Fuel economy and alternative vehicle sales projections will reflect current policy
- Technology menu could be updated with assumptions made in CAFE/GHG midterm review
- Policy changes affecting the California ZEV Mandate and adopting states would be captured

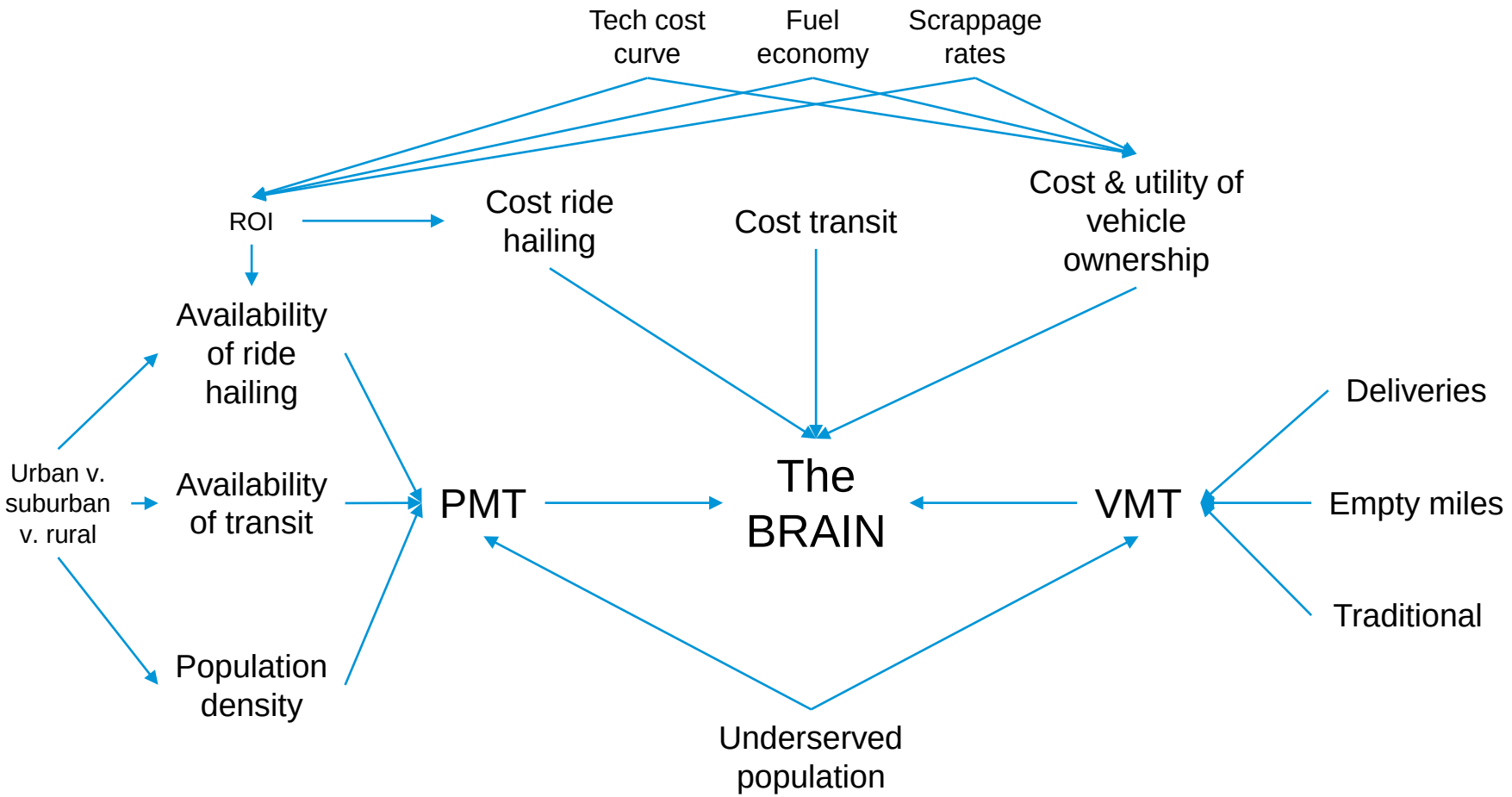
Automated vehicle model development

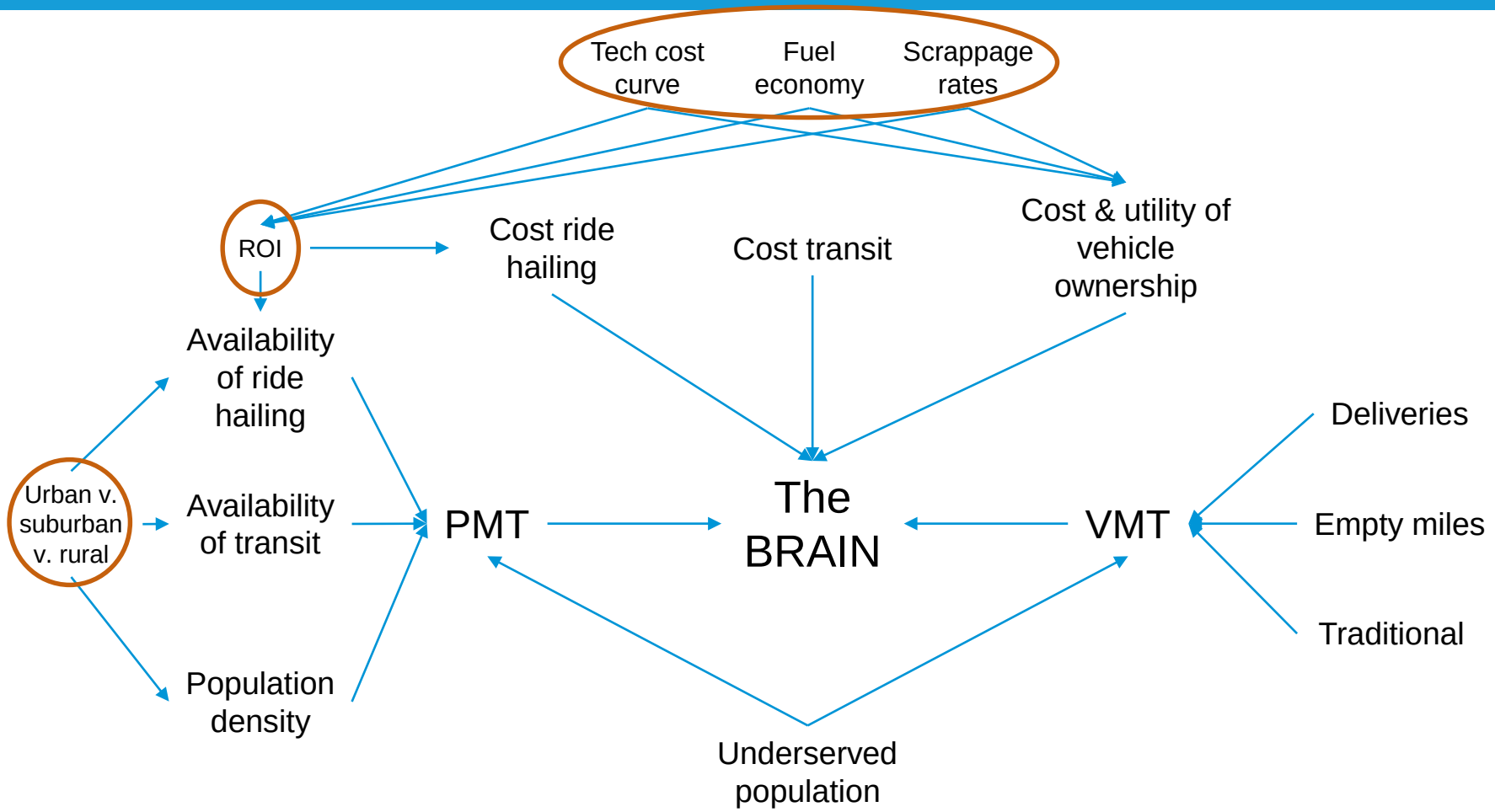
EIA plans automated vehicle working group or workshop

- To be held later this summer
- If you would like to be involved please let us know

Automated vehicle development for AEO2019

- Adding automated levels 1-3 technologies into the tech adoption list
  - Would be added as technologies up to an assumed max penetration at different uptake rates
  - Captures cost of technology adoption
  - Assumes no fuel economy effect besides small weight addition
- Adding heavy truck platooning


Tech cost curve
Fuel economy
Scrappage rates
ROI
Cost ride hailing
Cost transit
Cost & utility of vehicle ownership
Availability of ride hailing
Urban v. suburban v. rural
Availability of transit
Population density
PMT
The BRAIN
VMT
Deliveries
Empty miles
Traditional
Underserved population


Tech cost curve
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Cost ride hailing
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Cost & utility of vehicle ownership
Availability of ride hailing
Urban v. suburban v. rural
Availability of transit
Population density
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Deliveries
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Traditional
Underserved population

Proposed automated vehicle development for AEO2019

- Create a new fleet – taxis/ride-hailing
- Economic decision for adoption of three levels of highly automated vehicles in the taxi fleet model
  - 4a – low speed level 4 vehicle
  - 4b – high speed level 4 vehicle
  - 5 – level 5 vehicle
- Production based Lidar cost projection
- Assumption driven household adoption lags fleet adoption

Proposed automated vehicle development for AEO2019

- Powertrains are assumed to be the same as non-automated taxi powertrains
  - Dedicated 48 volt battery added to vehicle
  - High voltage power for sensors and processing
  - Would have fuel economy degradation factor
  - Has to have the ability to operate 24 hours a day

- Feedback on other transportation modes
  - Reduces transit rail passenger miles traveled
  - Reduces transit bus passenger miles traveled, until automated micro-buses are introduced
  - Increases commuter rail passenger miles traveled, as a first-last-mile solution

Public transit

Public transit continues to grow in all modes

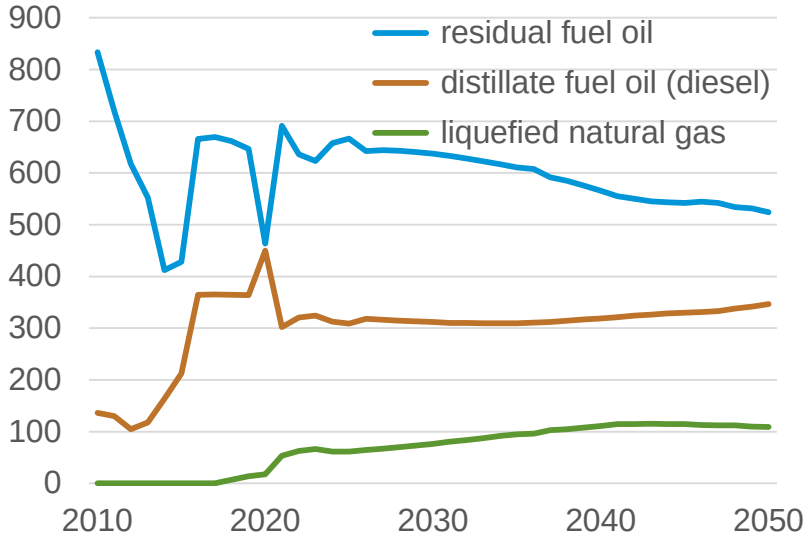
- Limited infrastructure and peaking or declining ridership in transit rail
- Competition with TNC ride-hailing is changing transit passenger miles
- Introduction of automated micro-buses

International marine

Review of NEMS integration of International Convention for the Prevention of Pollution from Ships (MARPOL)

AEO2018 Reference case

International shipping energy consumption
trillion Btu



Source: EIA, AEO2018 Reference case

Discussion points

- Ocean-going vessels will be required to use fuel with a sulfur content of no more than 0.5% m/m, against the current limit of 3.5%, or install on-board scrubbers
- New requirement takes effect in 2020
- Fuel prices are planned drivers for fuel choice

Discussion/questions

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U.S. Energy Information Administration home page | www.eia.gov

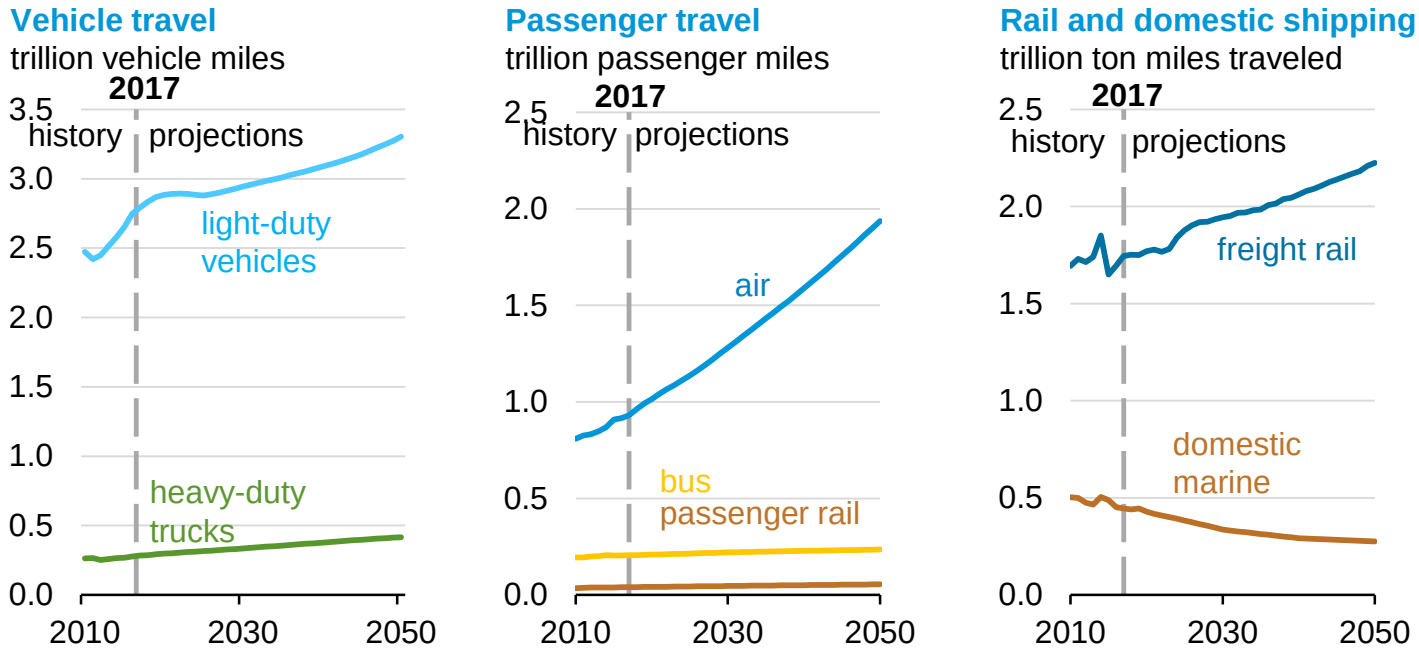
Annual Energy Outlook | www.eia.gov/forecasts/aeo

Alternative Policies Issues in Focus |
https://www.eia.gov/outlooks/aeo/section_issues.php?src=home-b1#ppg

Autonomous Vehicle Issues in Focus |
https://www.eia.gov/outlooks/aeo/section_issues.php?src=home-b1#av

Supplemental slides

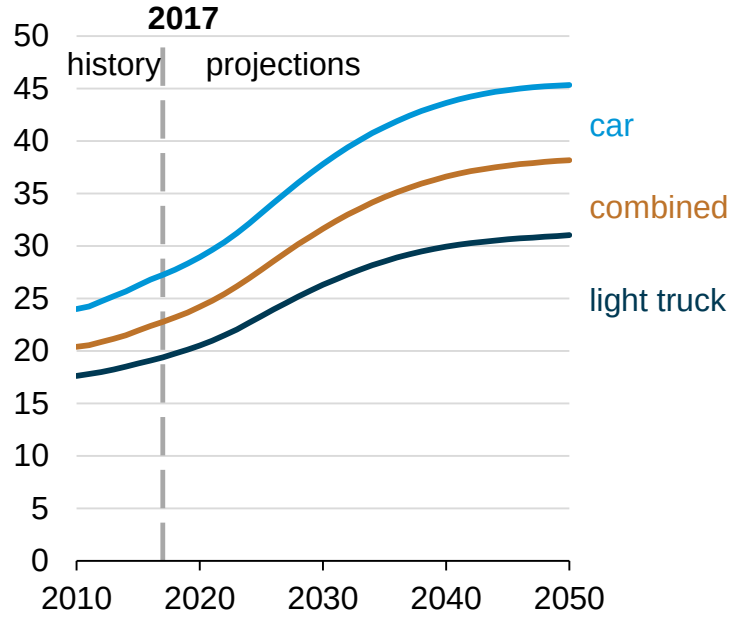
Passenger travel increases across all transportation modes in the Reference case through 2050



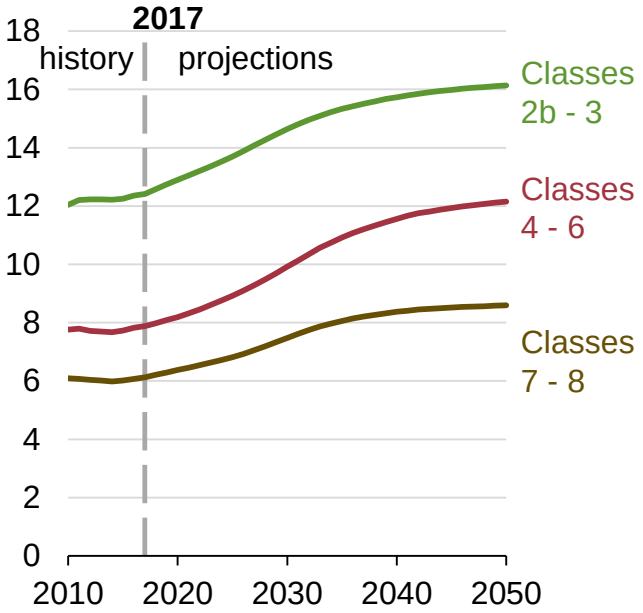
Source: EIA, AEO2018 Reference case

Fuel economy of all on-road vehicles increases in the Reference case

Light-duty vehicle stock fuel economy
miles per gallon

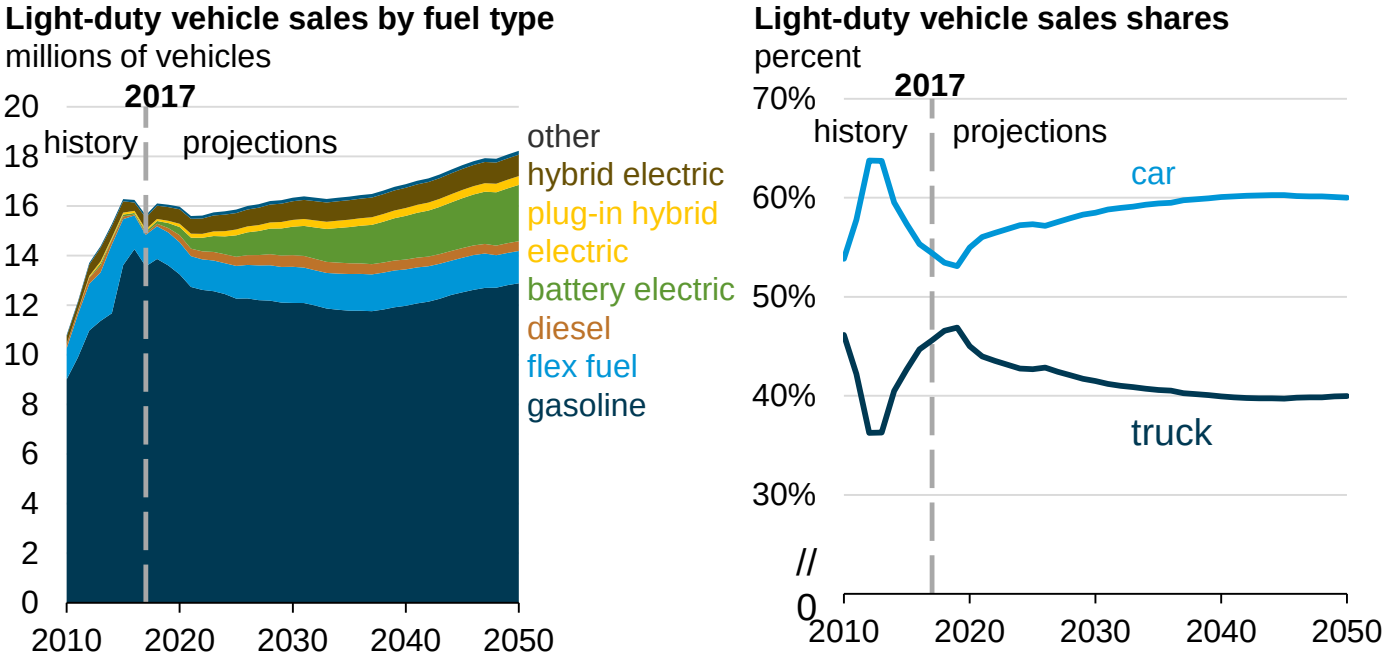


Heavy-duty vehicle stock fuel economy
miles per gallon



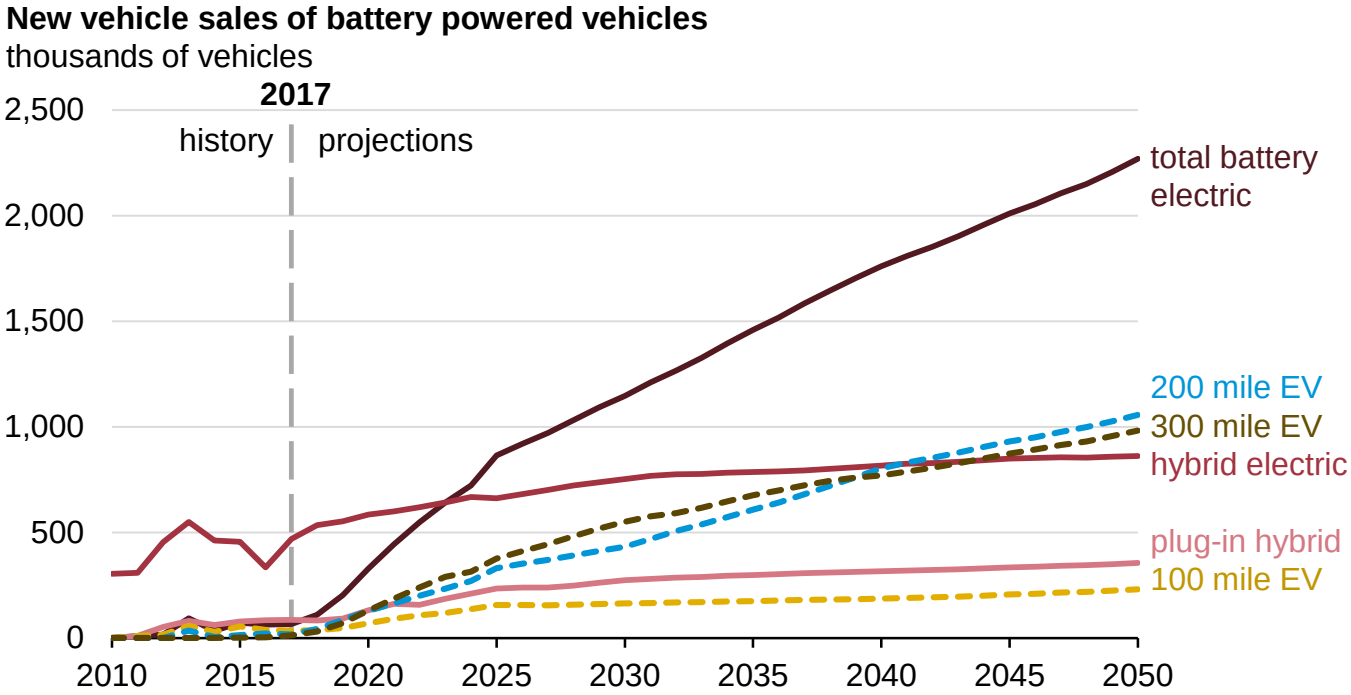
Source: EIA, AEO2018 Reference case

Light-duty vehicle fuel economy improves as sales of more fuel-efficient cars grow and as electrified powertrains gain market share



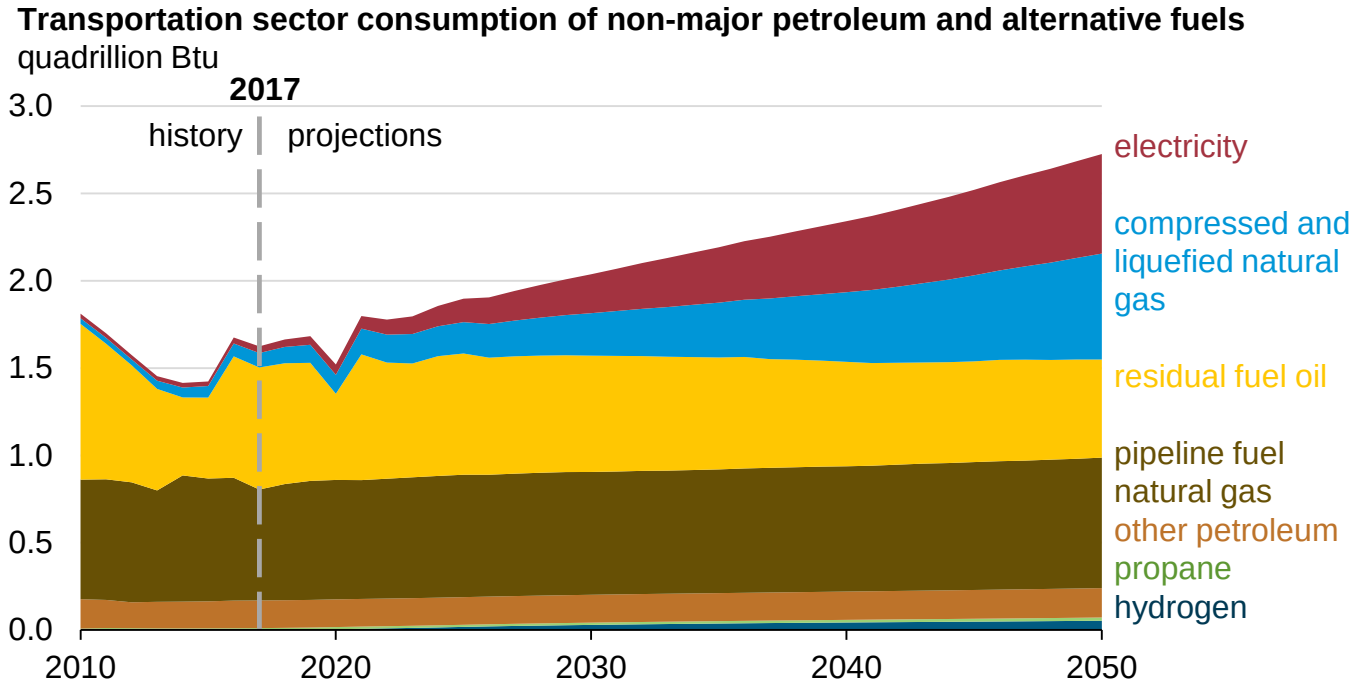
Source: EIA, AEO2018 Reference case

Sales of electric and plug-in hybrid electric light-duty vehicles increase in the Reference case



Source: EIA, AEO2018 Reference case

Consumption of total non-major transportation fuels grows in the Reference case between 2017 and 2050



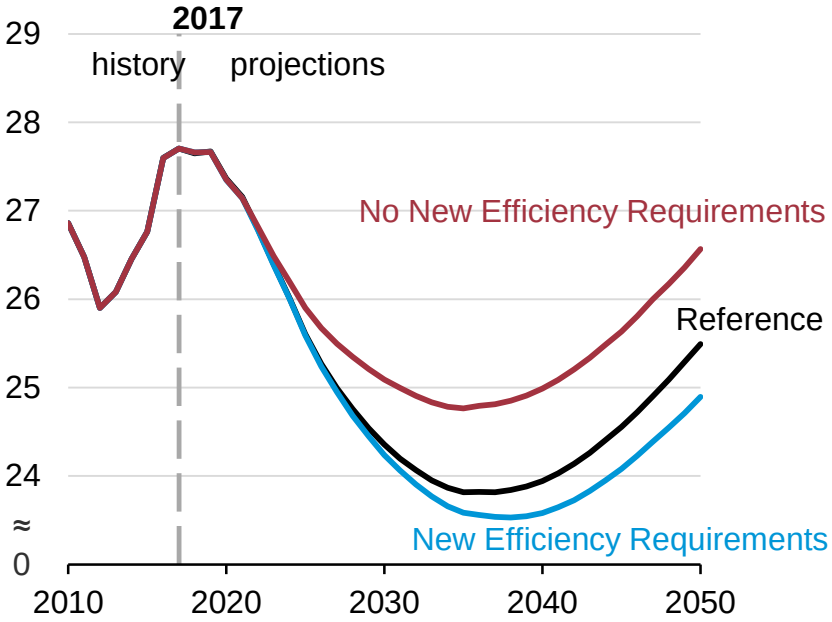
Source: EIA, AEO2018 Reference case

Transportation related Issues in Focus side cases in AEO2018

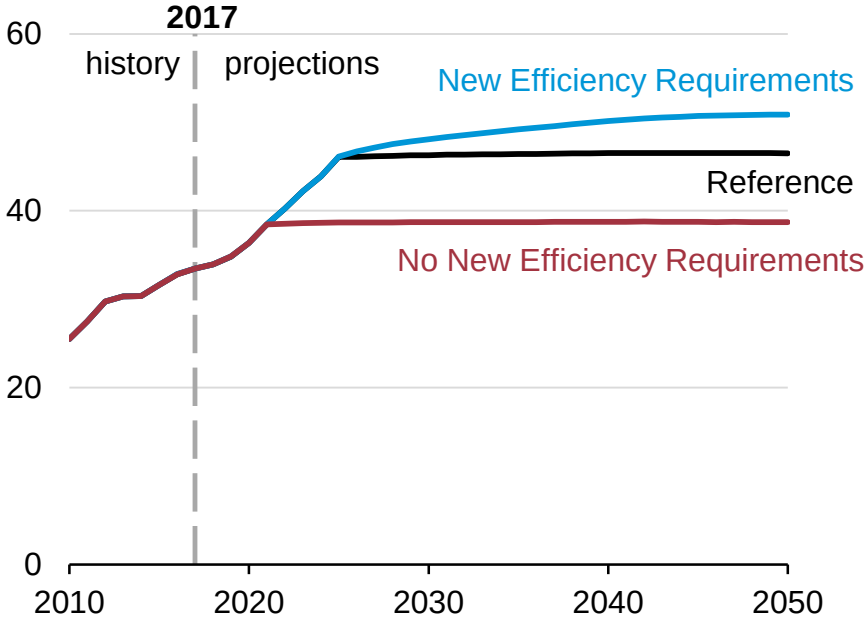
- Alternative Policies in Power Generation and Energy Demand Markets
  - New Efficiency Requirements case
    - Increases LDV CAFE and GHG emissions standards through 2050
  - No New Efficiency Requirements case
    - Holds LDV CAFE and GHG emission standards constant at MY 2021 levels
- Autonomous Vehicles: Uncertainties and Energy Implications
  - Autonomous Battery Electric Vehicle case
    - More widespread autonomous LDVs that are increasingly battery electric by 2050
  - Autonomous Hybrid Electric Vehicle case
    - More widespread autonomous LDVs that are increasingly hybrid electric by 2050

Alternative Policies in Power Generation and Energy Demand Markets case

Transportation delivered energy consumption
quadrillion Btu



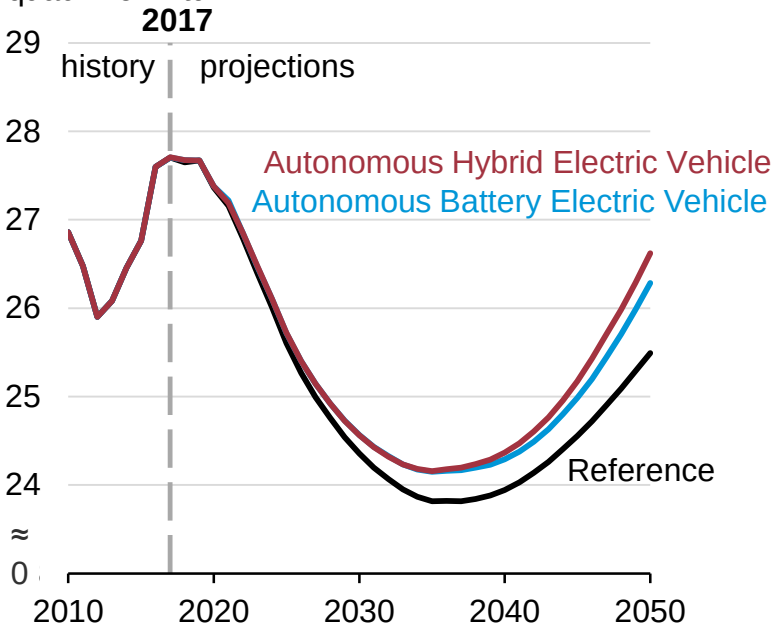
New LDV CAFE standard
miles per gallon



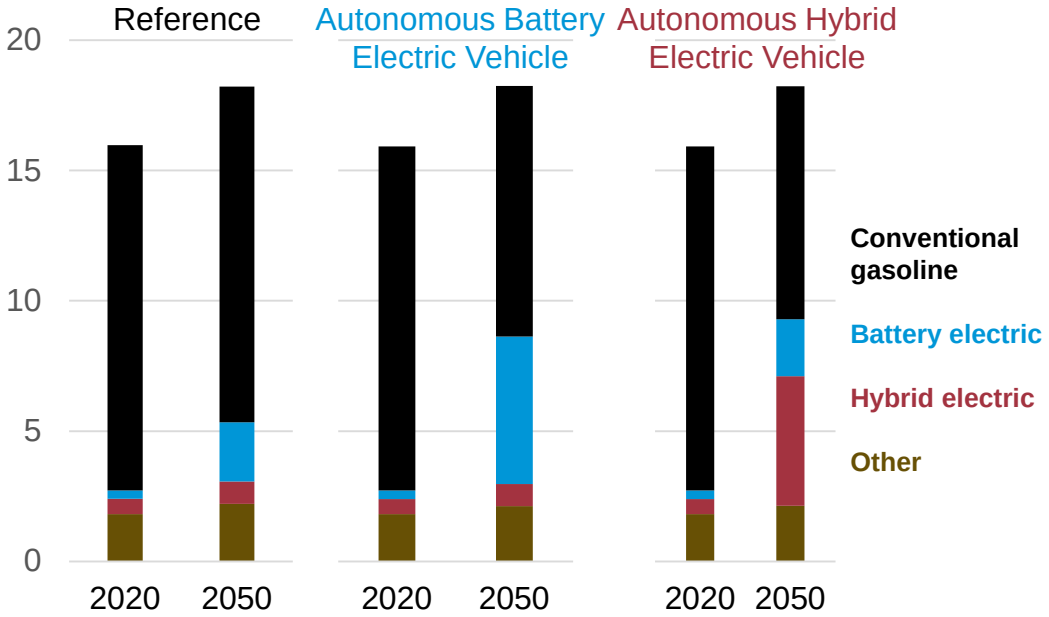
Source: EIA, AEO2018 Reference case, New Efficiency Requirements case, and No New Efficiency Requirements case

Autonomous Vehicles: Uncertainties and Energy Implications case

Transportation delivered energy consumption
quadrillion Btu



Light-duty vehicle sales
million vehicles



Source: EIA, AEO2018 Reference case, Autonomous Battery Electric Vehicle case, and Autonomous Hybrid Electric Vehicle case