

Annual Energy Outlook 2018

Modeling updates in the transportation sector



For

AEO2018 Transportation Working Group #2

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By

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Updates to the Annual Energy Outlook 2018 transportation demand model

- Freight
- Updated California ZEV mandate model
- Final 2015 EPA sales data updates
- Updated LDV travel
- Autonomous vehicles

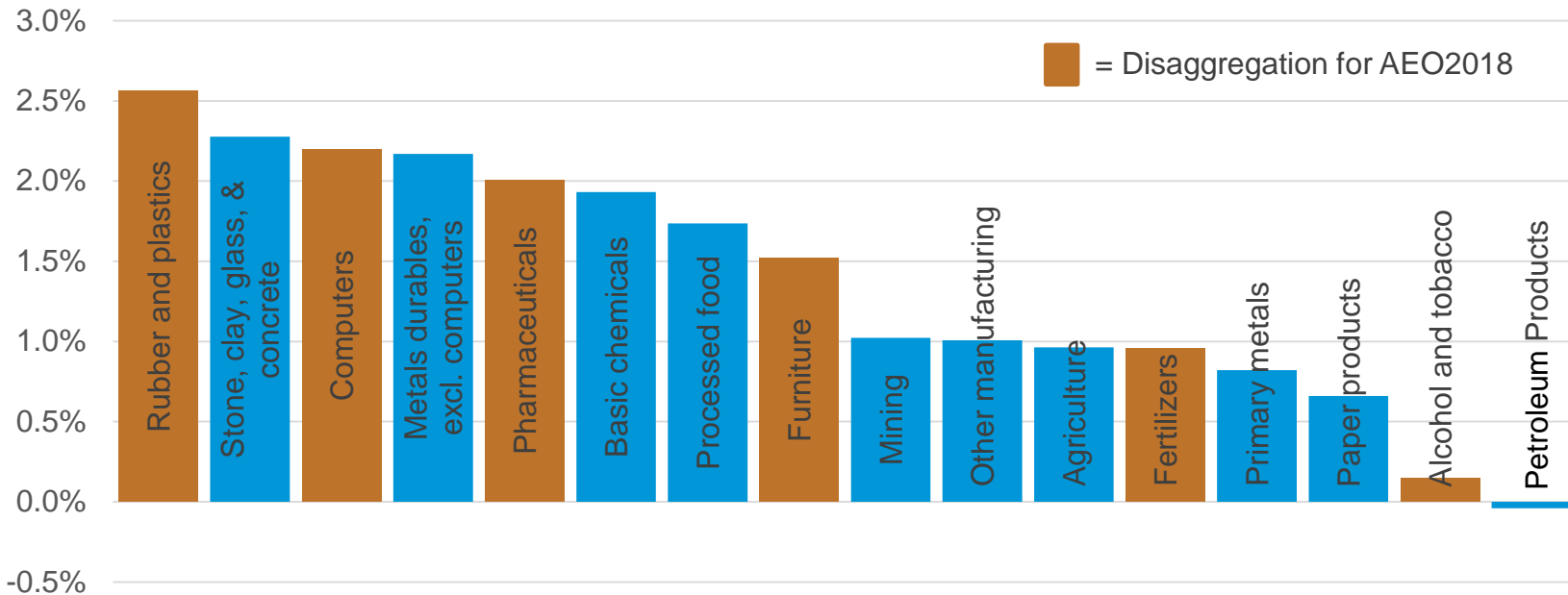
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Freight

Use of more disaggregated industrial gross output projections drive freight demand projections in AEO2018

Gross output CAGR (2016-50)

percent

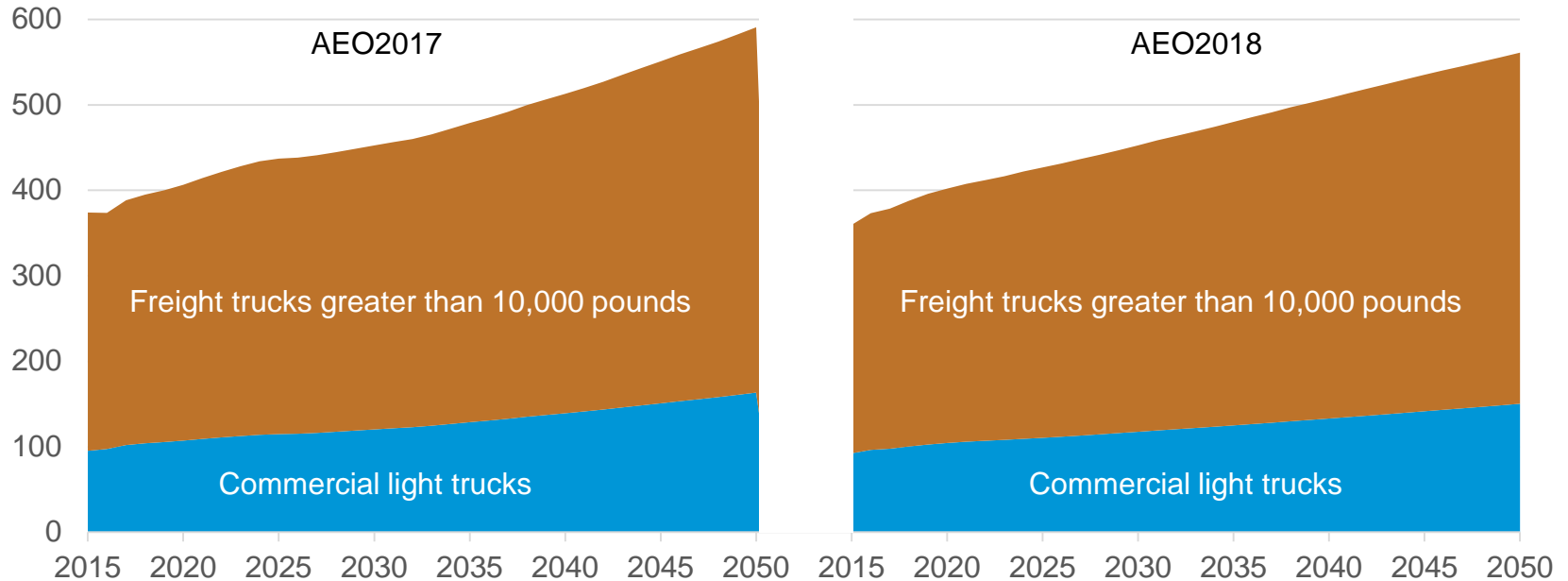


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Source: EIA, AEO2018, ref2018.0919a

Changes in industrial gross output, coupled with a greater disaggregation, yield lower demand for freight and commercial trucks

Freight truck vehicle miles traveled
billion vehicle miles

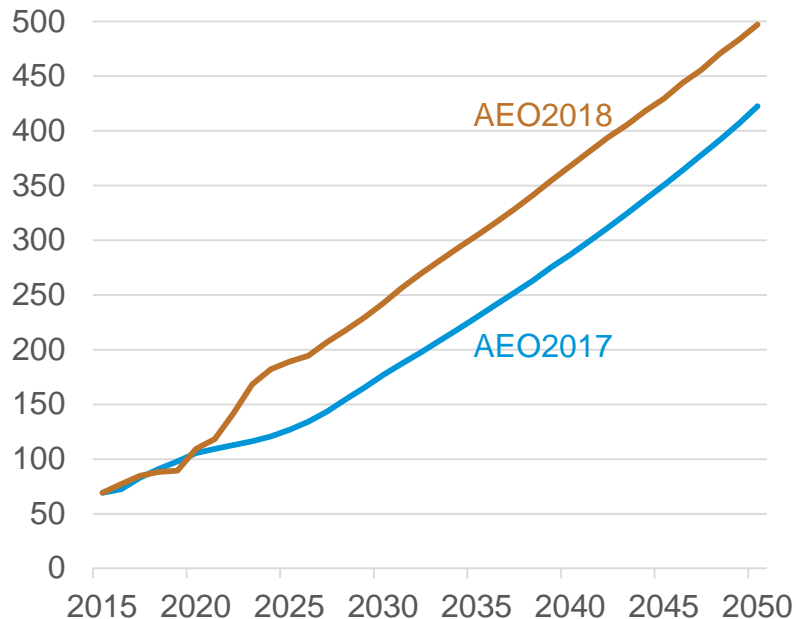


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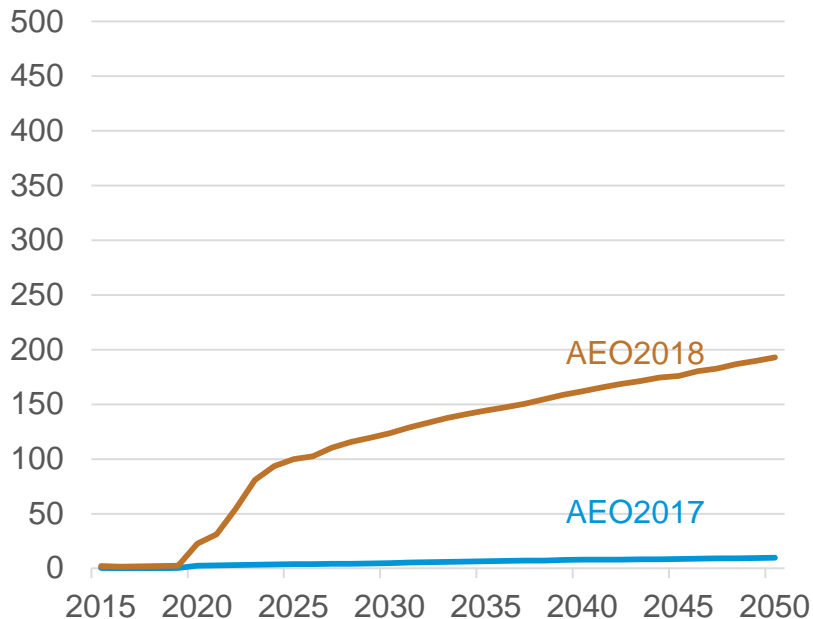
Sources: EIA, AEO2017, ref2017.1208a; AEO2018, ref2018.0919a

Rise in natural gas use between AEO2017 and AEO2018 occurs mainly from higher penetration of liquefied natural gas in int'l marine

Transportation sector natural gas use
trillion Btu



International marine natural gas use
trillion Btu



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Sources: EIA, AEO2017, ref2017.1208a; AEO2018, ref2018.0919a

ZEV Mandate

California ZEV mandate background

- Mandates adoption of zero-emission vehicles (ZEV) and transitional zero-emission vehicles (TZEV)
- Current regulation starts in 2018
- Nine adopting Section-177 states
- Credit requirements increase through 2025 with ZEVs and TZEVs producing varying credits for compliance
- AEO2017 did not include ability to bank and spend credits

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Modeling updates for California ZEV mandate

- Credit bank going into 2018 estimated from 2015 base year with addition of 2016 and 2017 sales and credit values
- Banks in each region spend down, partially meeting credit short falls until ~2030
- Sales meet remaining credit requirement short falls, as well as maintain sales buffer above requirement as risk mitigation strategy
- Sales mixture of ZEV or TZEV vehicle types is based on cost to manufacturer per credit

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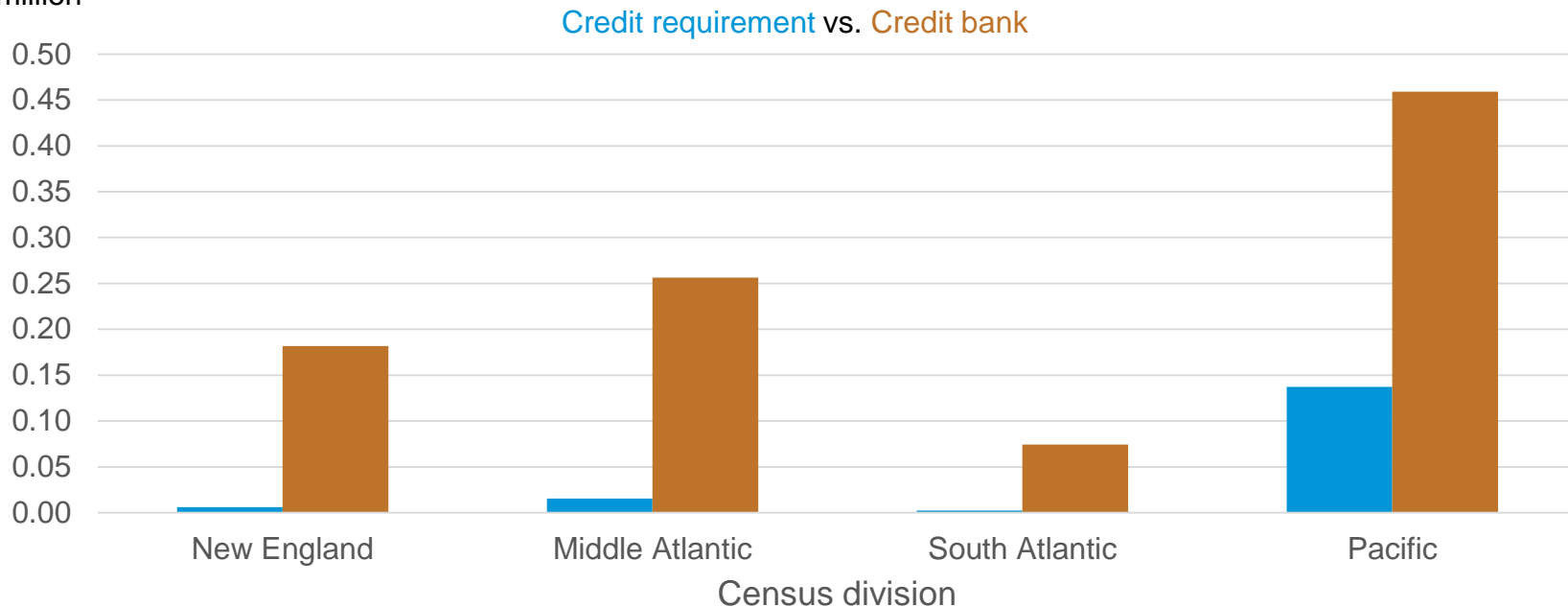
Modeling updates for California ZEV mandate - continued

- 300-mile battery electric vehicle type was added
- Optional Section-177 state compliance path was used as primary path
- Updated vehicle credit multipliers to most recent regulation
- Account for credit traveling provision from and to California with other Section-177 states
- Inclusion of credit bank “switch” from PZEV and ATPZEV to TZEV in 2018

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ZEV credit bank in 2018 starts higher than credit requirements in all regions

ZEV credits
million

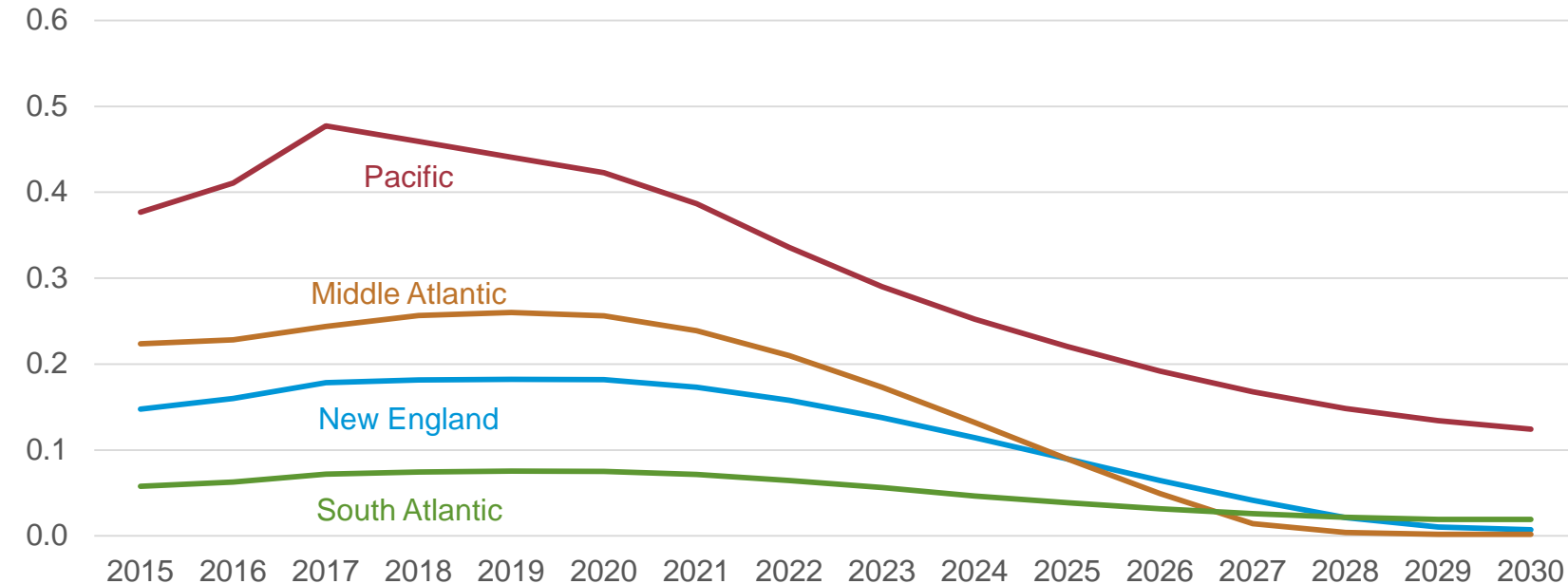


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Source: EIA, AEO2018, ref2018.0919a

ZEV credit bank is used to meet credit mandate, along with credits earned from ZEV sales

ZEV credits
million



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Source: EIA, AEO2018, ref2018.0919a

Light-duty vehicle updates

Final model year 2015 light-duty vehicle data update

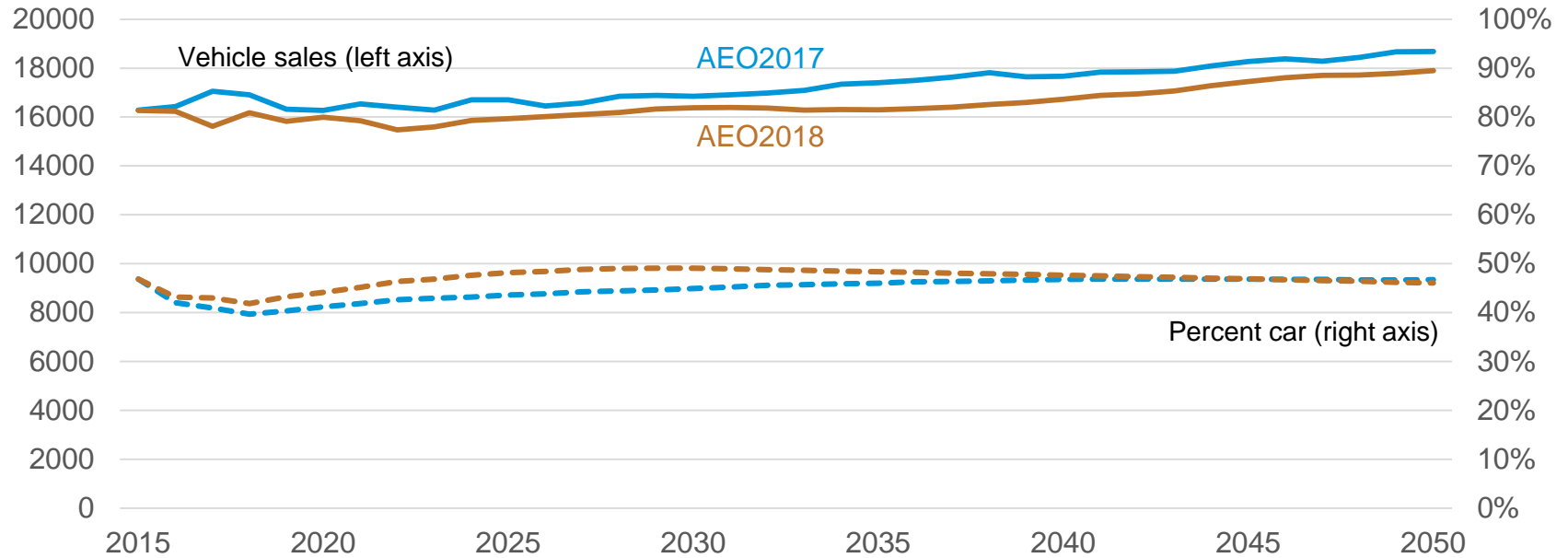
- *AEO2017* set the base year to 2015 using estimated mid-model year data from VOLPE
- *AEO2018* updates the sales information to final model year data
- Greatest change is significant switch between cars and light trucks
 - Mid-model year data overestimated light-trucks as a whole
 - Mid-model year data did not effectively capture rise of car-classified crossover vehicles

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Change in light-duty vehicle sales

Vehicle sales
thousands

percent cars

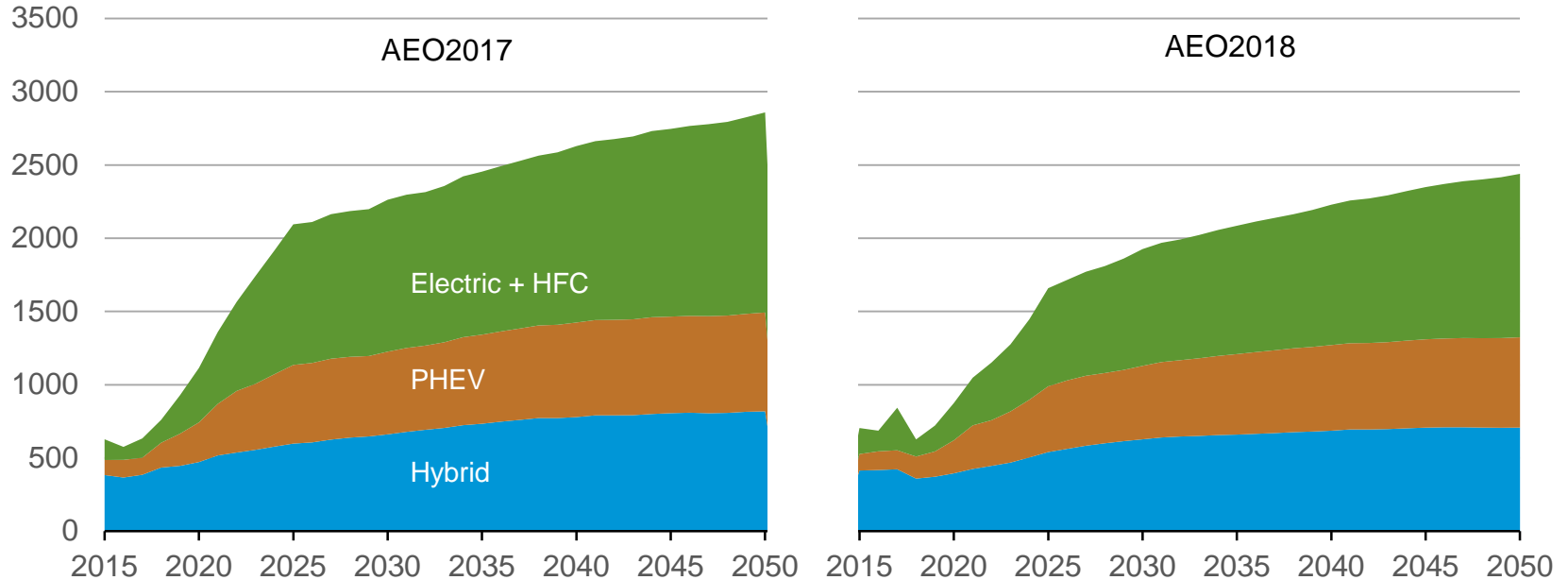


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Sources: EIA, AEO2017, ref2017.1208a; AEO2018, refngmm.092617a

Electrified powertrain light-duty vehicle sales

Vehicle sales
thousands

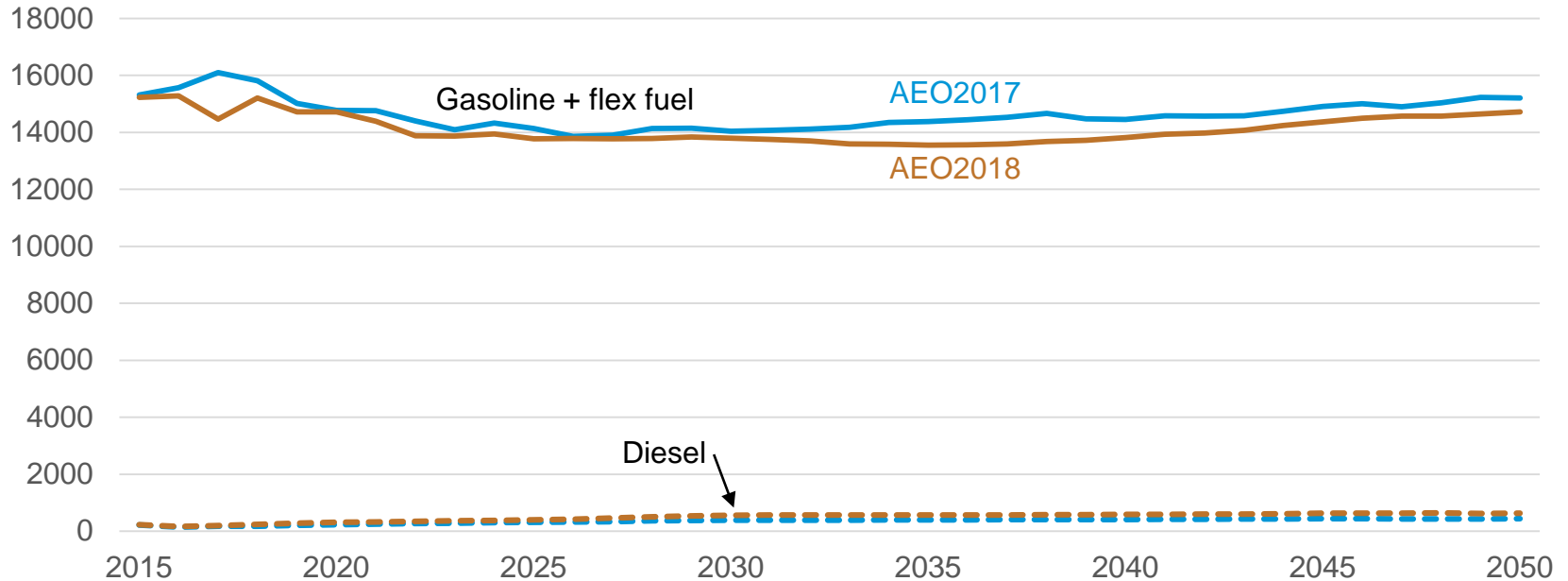


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Sources: EIA, AEO2017, ref2017.1208a; AEO2018, refngmm.092617a

Light-duty conventional vehicle sales

Vehicle sales
thousands

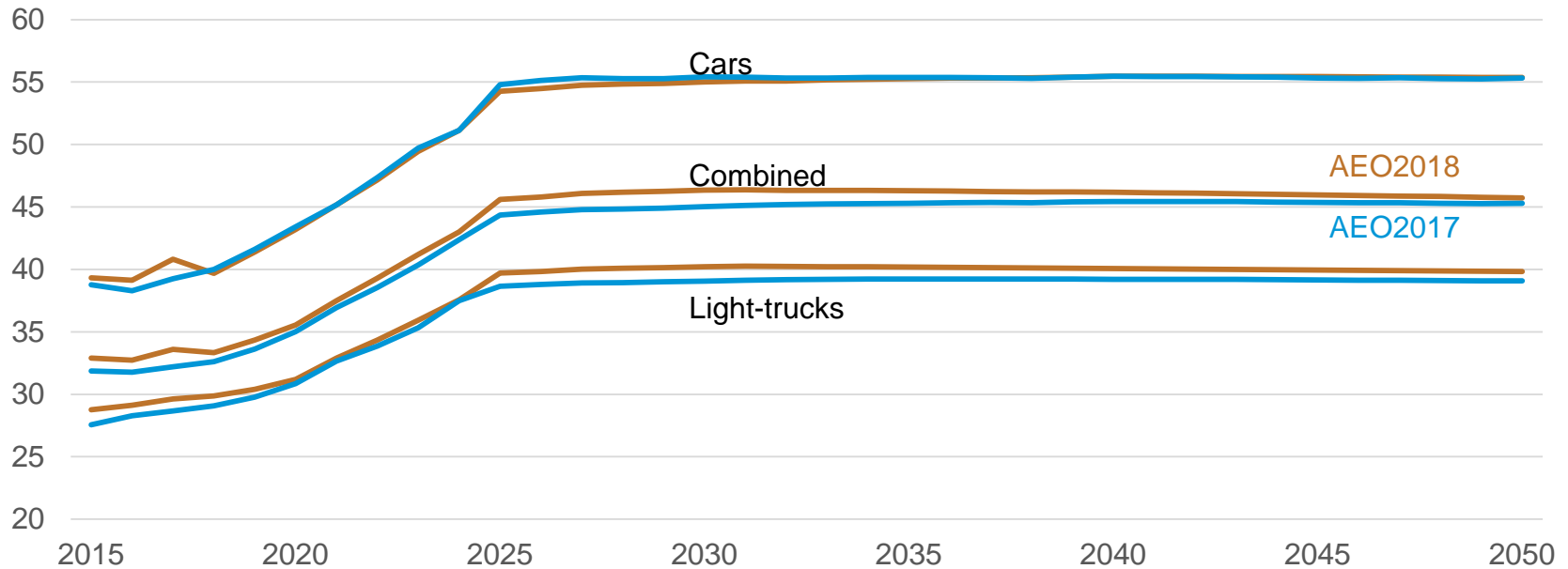


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Change in light-duty vehicle fuel economy

New vehicle compliance fuel economy
miles per gallon

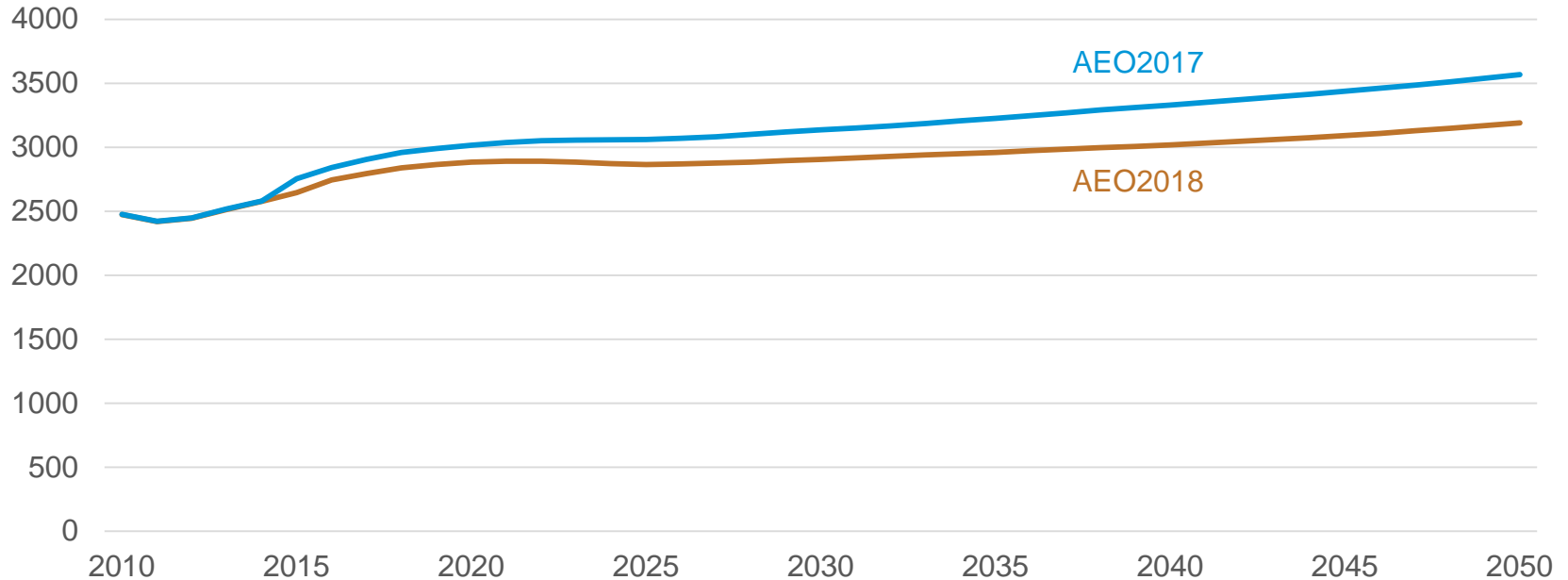


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Change in light-duty vehicle miles travelled

Vehicle miles travelled
billion vehicle miles



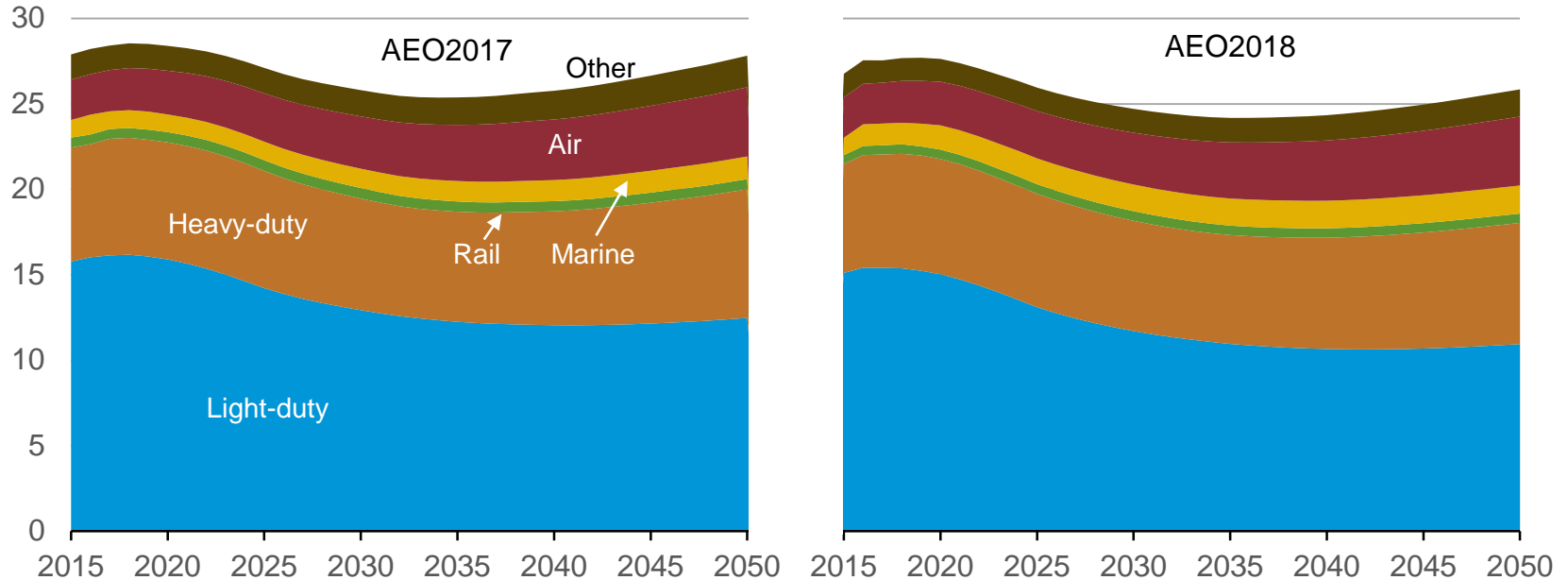
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Total transportation

Total transportation energy consumption by sector

Energy consumption
quadrillion Btu



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Sources: EIA, AEO2017, ref2017.1208a; AEO2018, refngmm.092617a

Autonomous vehicles

Planned model updates

- To account for autonomous vehicles we will be adjusting
 - Travel profiles
 - Vehicle scrappage rates
- There will be feedback effects on
 - Household vehicle ownership and travel
 - Bus and rail travel
- The scenarios will vary market penetration of
 - Autonomous vehicles
 - Ridesharing

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Discussion/questions

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