Annual Energy Outlook 2023

Planned modeling and data updates in the transportation sector

For
AEO2023 Transportation Working Group
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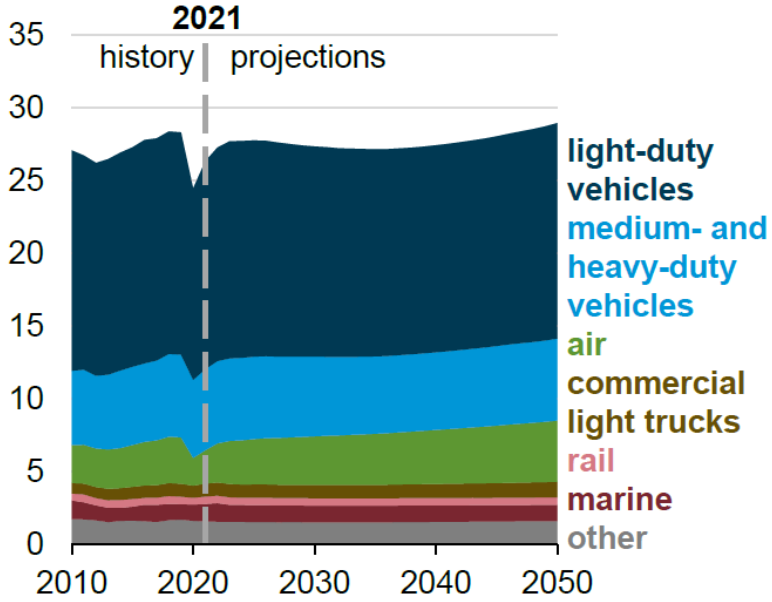
Outline

- Recap of *Annual Energy Outlook 2022* (AEO2022) Reference case
- Planned data and modeling updates for the AEO2023 Transportation Sector Demand Model
  - Light-duty vehicles (LDV)
  - Heavy-duty vehicles (HDV)
  - Other
  - Policy
- Discussion

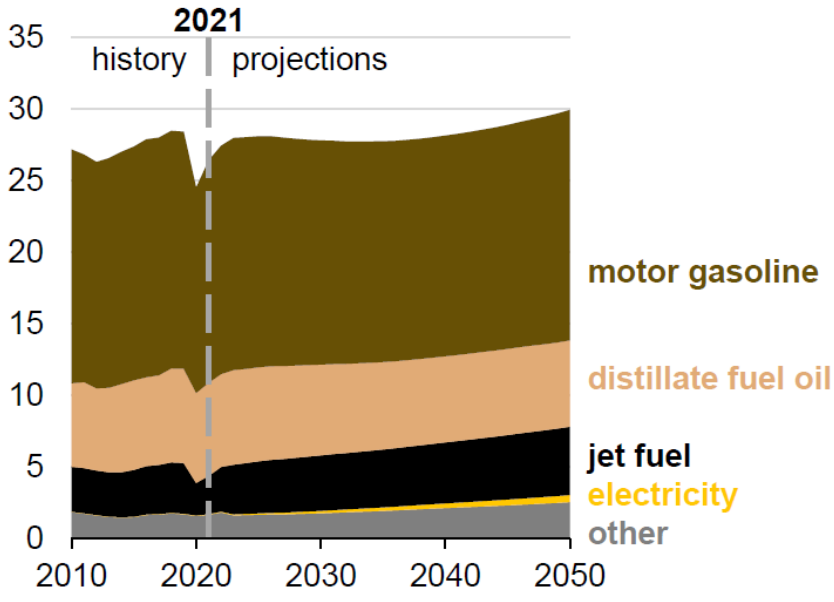
Annual Energy Outlook 2022 Recap

AEO2022: Transportation sector energy consumption

Transportation sector consumption by mode
AEO2022 Reference case
quadrillion British thermal units

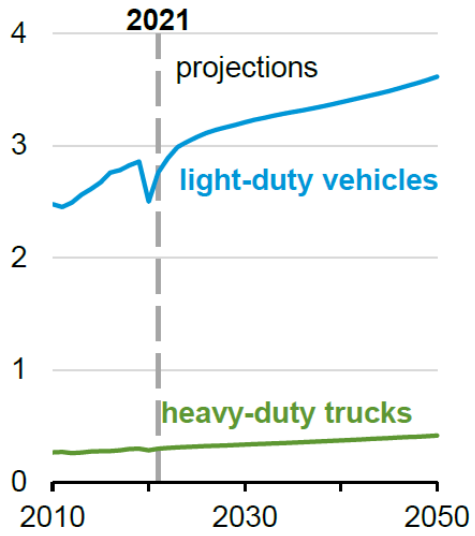


Transportation sector consumption by fuel
AEO2022 Reference case
quadrillion British thermal units

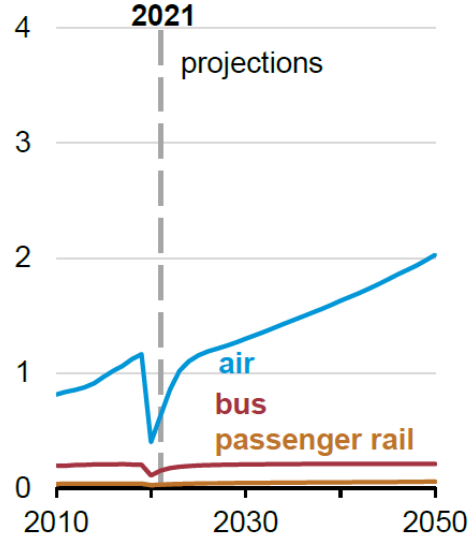


AEO2022: Passenger and freight travel by mode

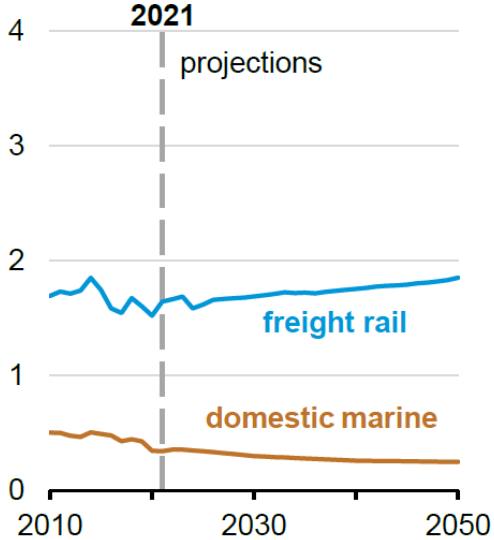
Vehicle travel
AEO2022 Reference case
trillion vehicle-miles



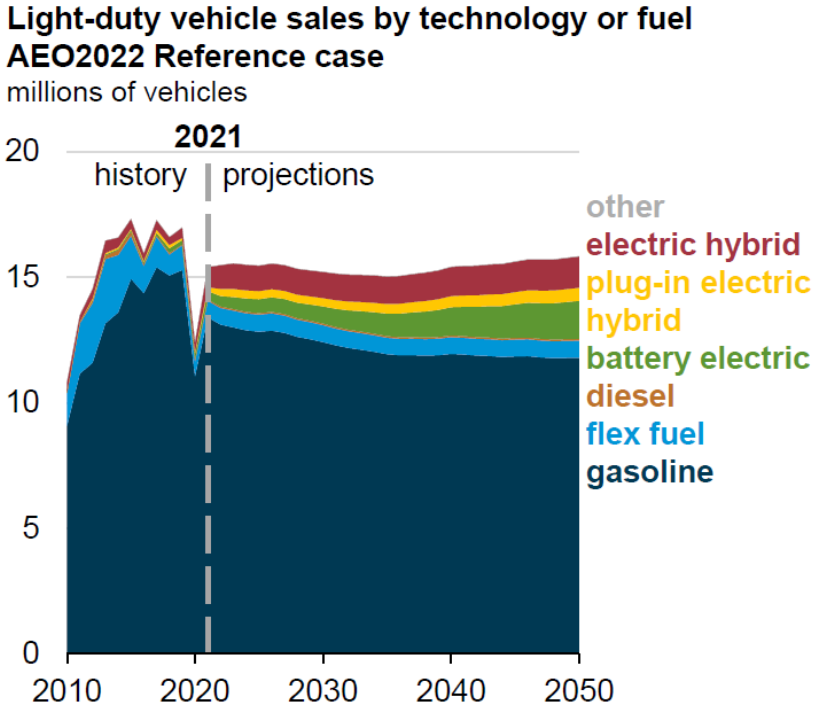
Passenger travel
AEO2022 Reference case
trillion revenue passenger-miles

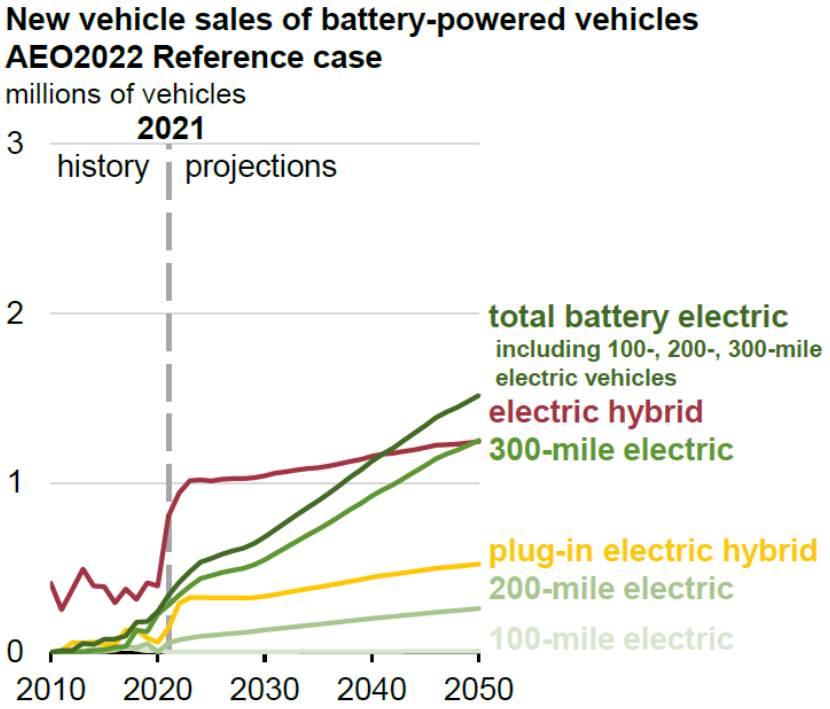


Rail and domestic shipping
AEO2022 Reference case
trillion ton-miles traveled



AEO2022: Light-duty vehicle sales by powertrain

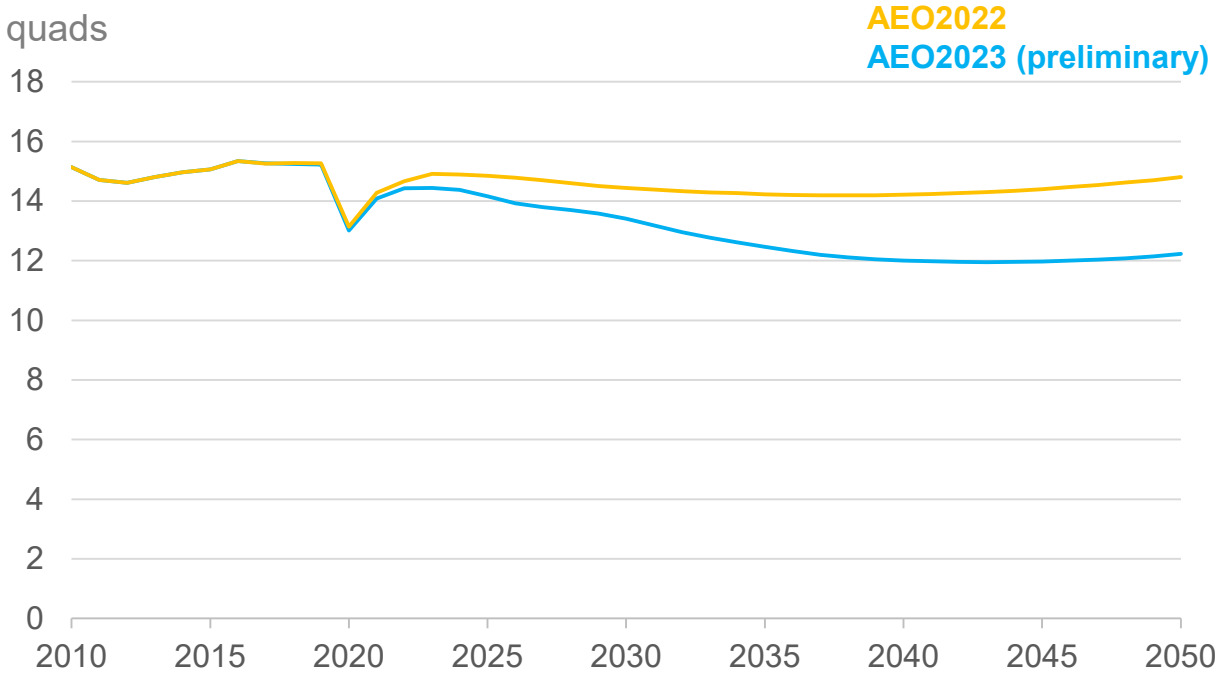




AEO2023 Updates and Preliminary Results

Light-duty vehicle

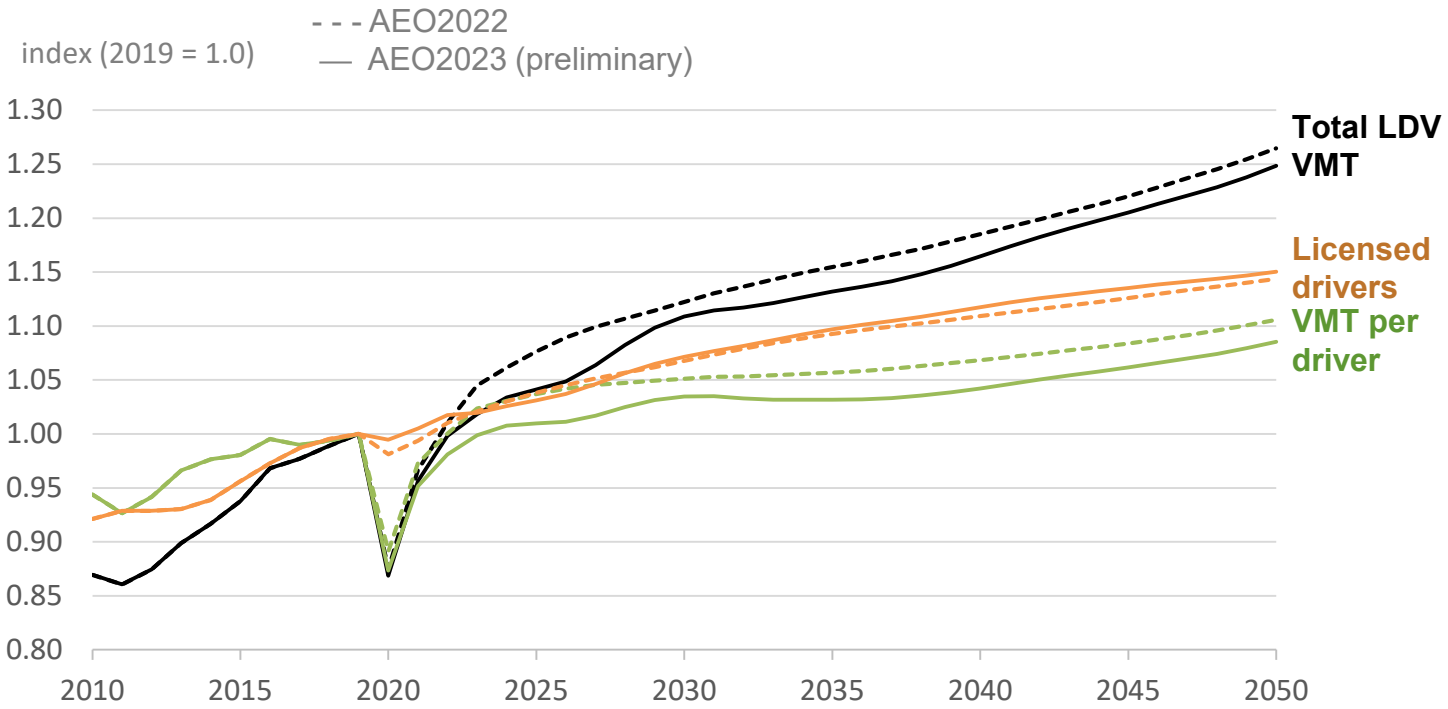
Transportation sector gasoline consumption



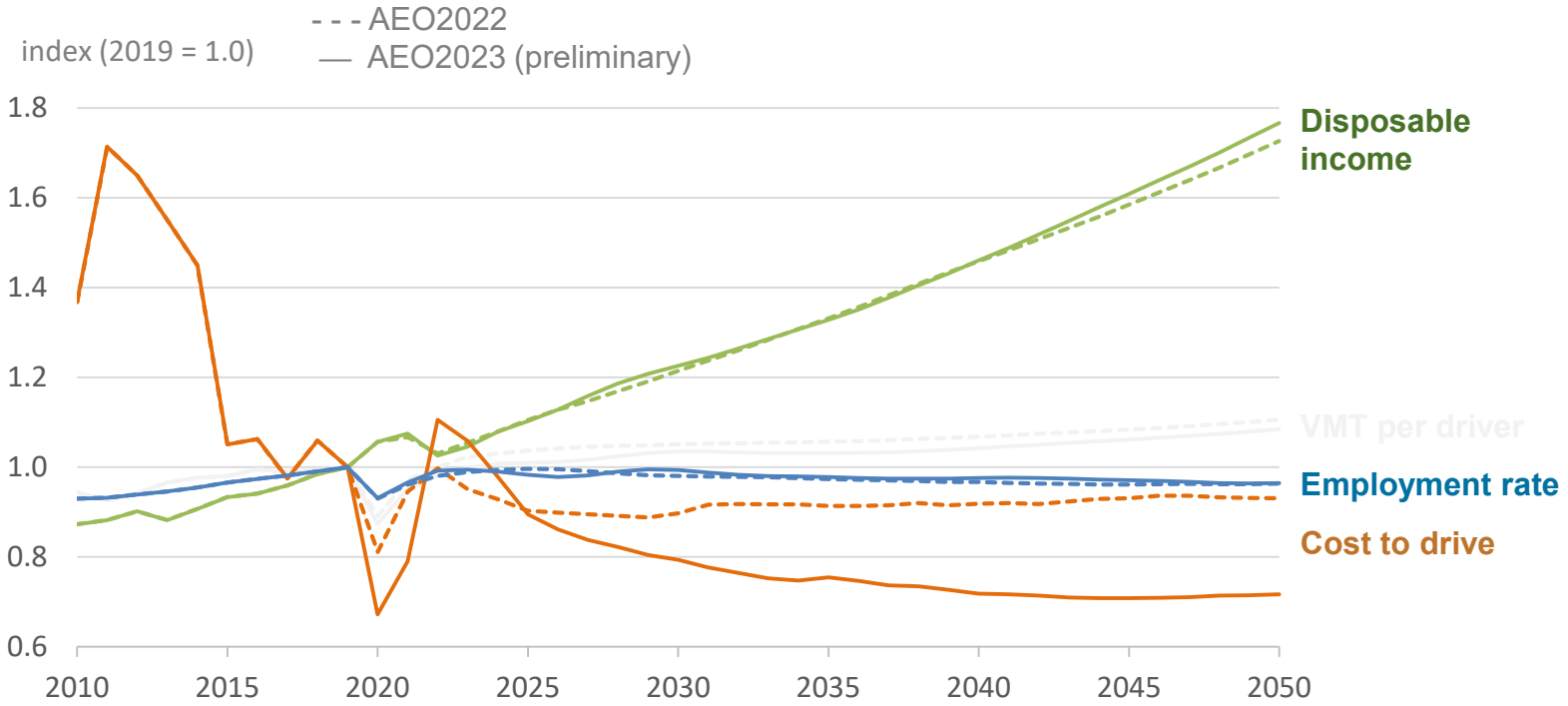
Travel (VMT)

Efficiency (MPG)

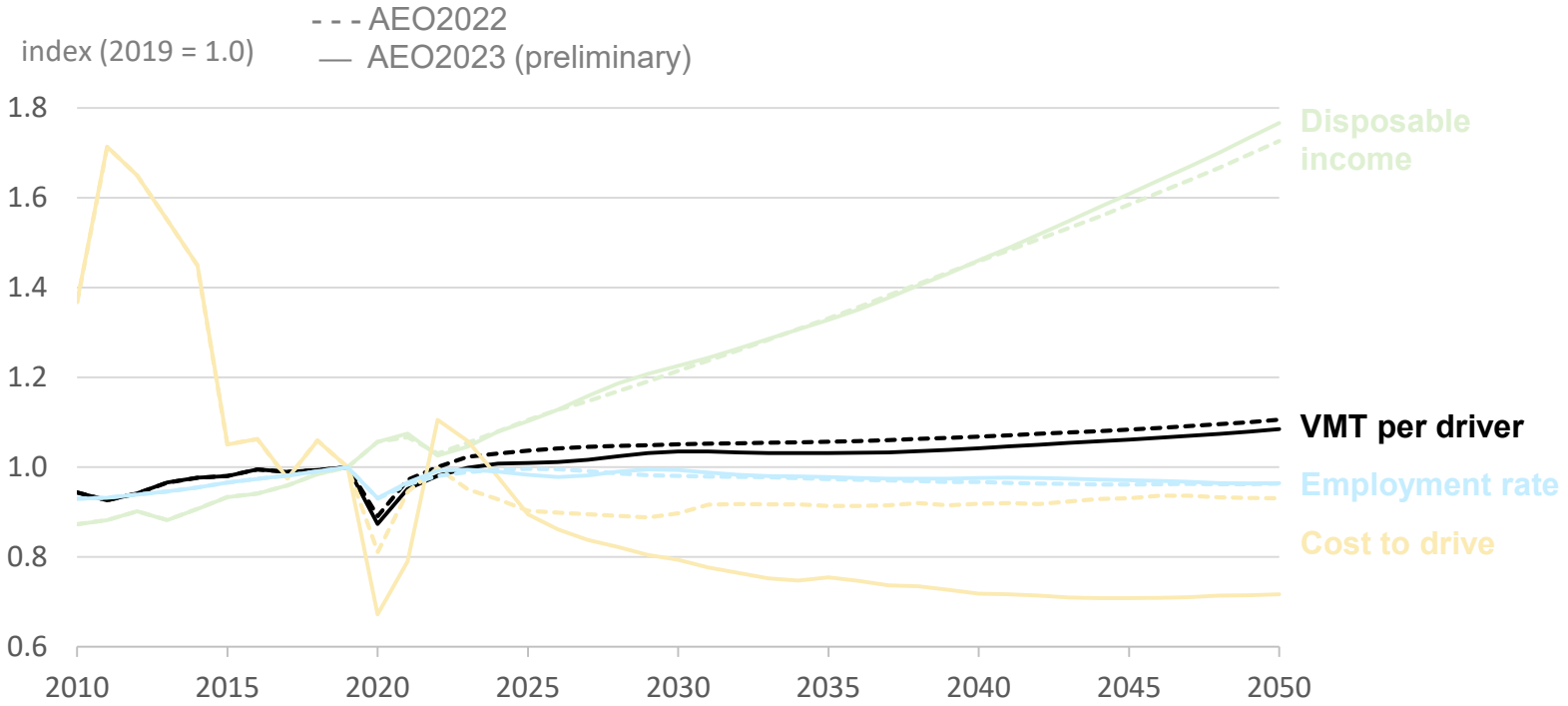
Slightly higher population offset by reduced VMT per driver



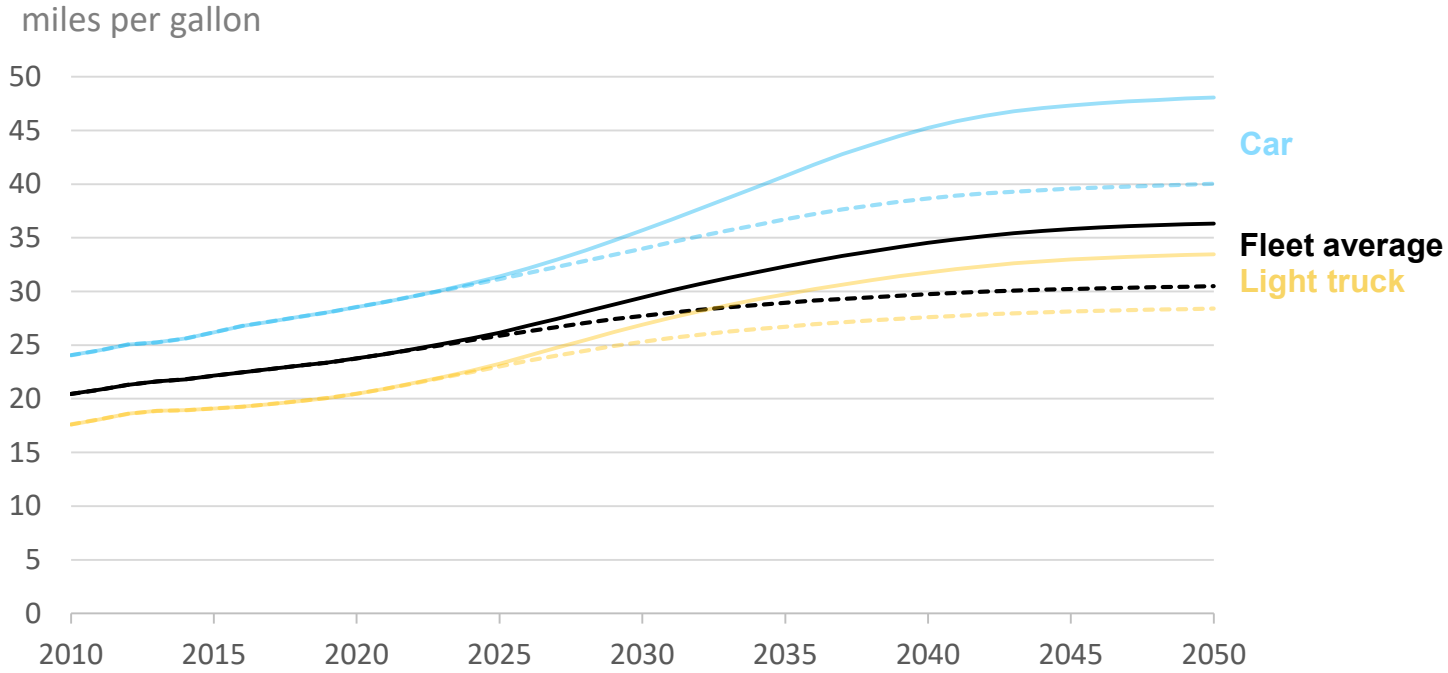
VMT per driver



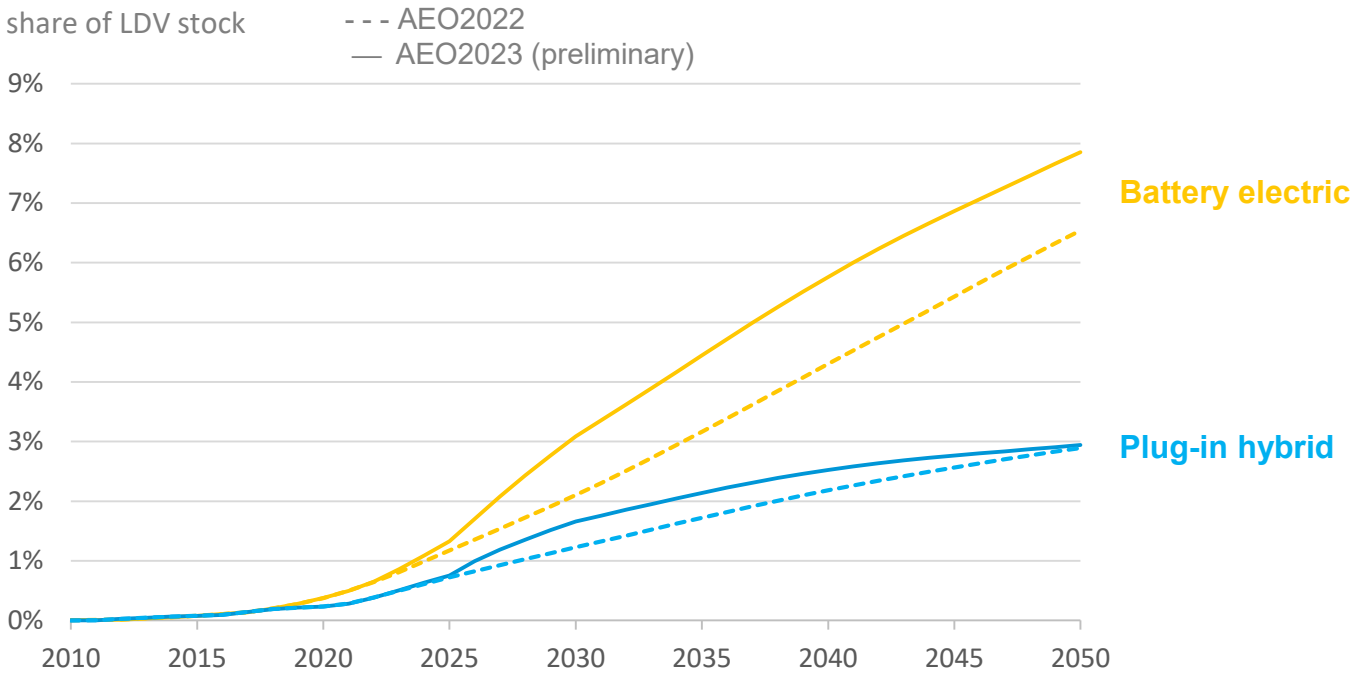
VMT per driver



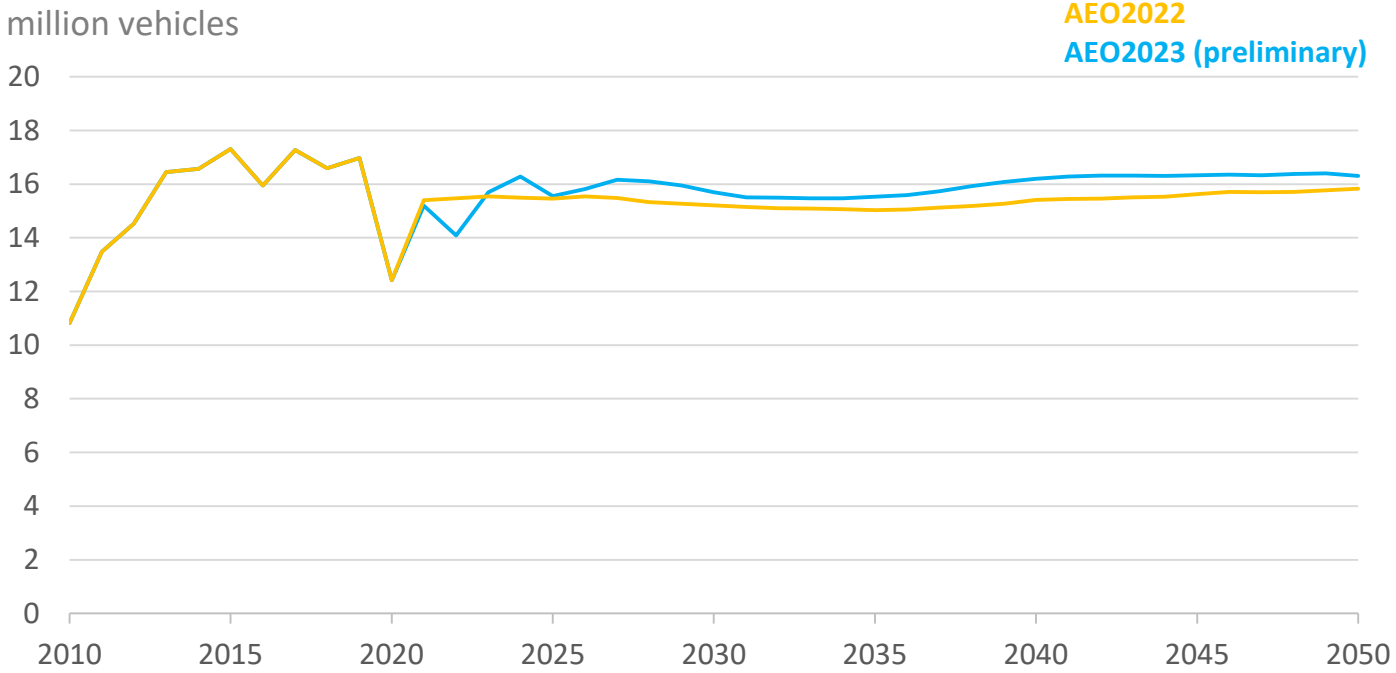
Light duty vehicle **stock** fuel economy



Electric vehicle sales and stock



Higher sales projection (more new efficient vehicles in the fleet)



Summary – Light duty vehicles

- Less VMT (lower employment and higher gasoline prices earlier on)
- Higher fuel economy (new vehicles are more efficient, more EVs, *and* more new vehicles in general)
- **Less energy**

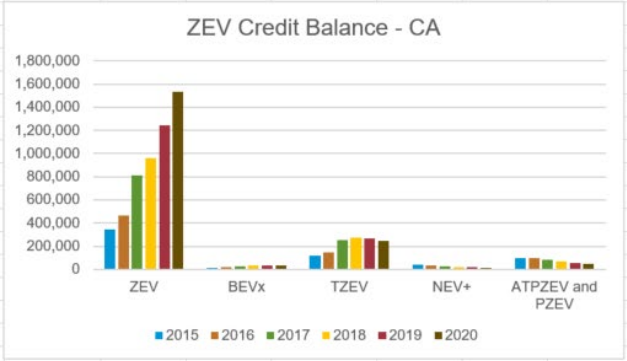
Other LDV updates

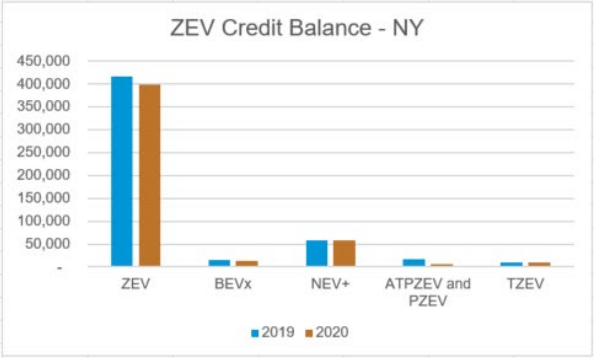
LDV ZEV credit update

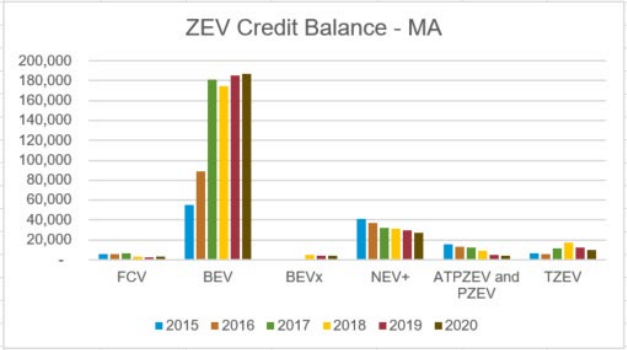
Re-activated and refreshed ZEV mandate code.

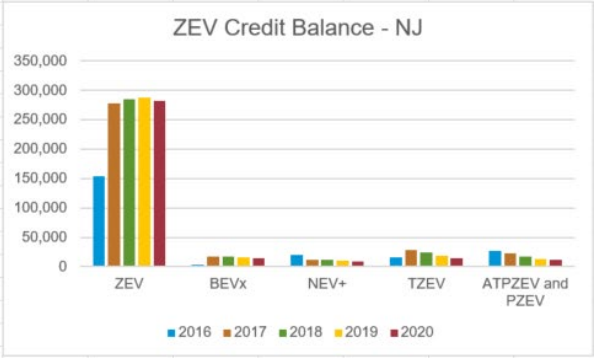
Now includes additional states that have joined since it was active (a couple years ago). Required re-processing Polk data as well as getting the latest state-level data on credit status

In the end, very little impact on model results



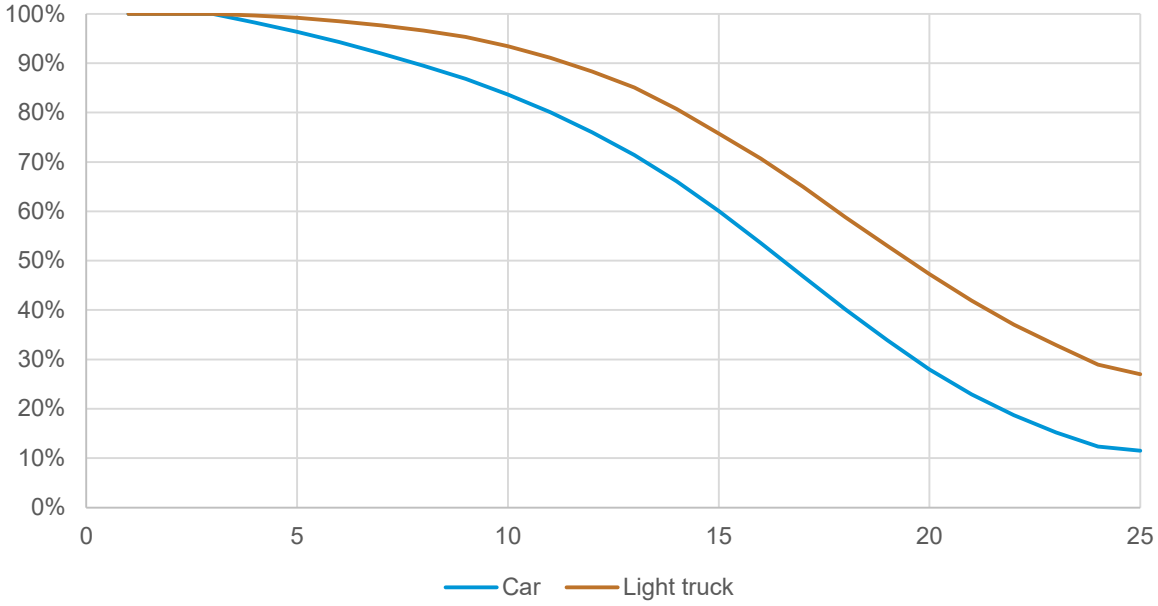




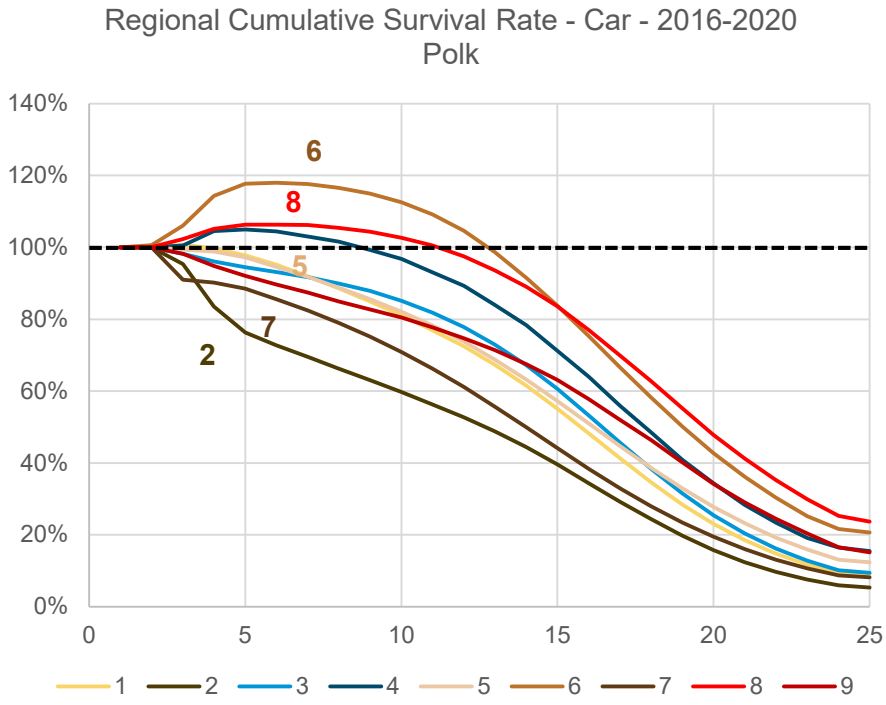


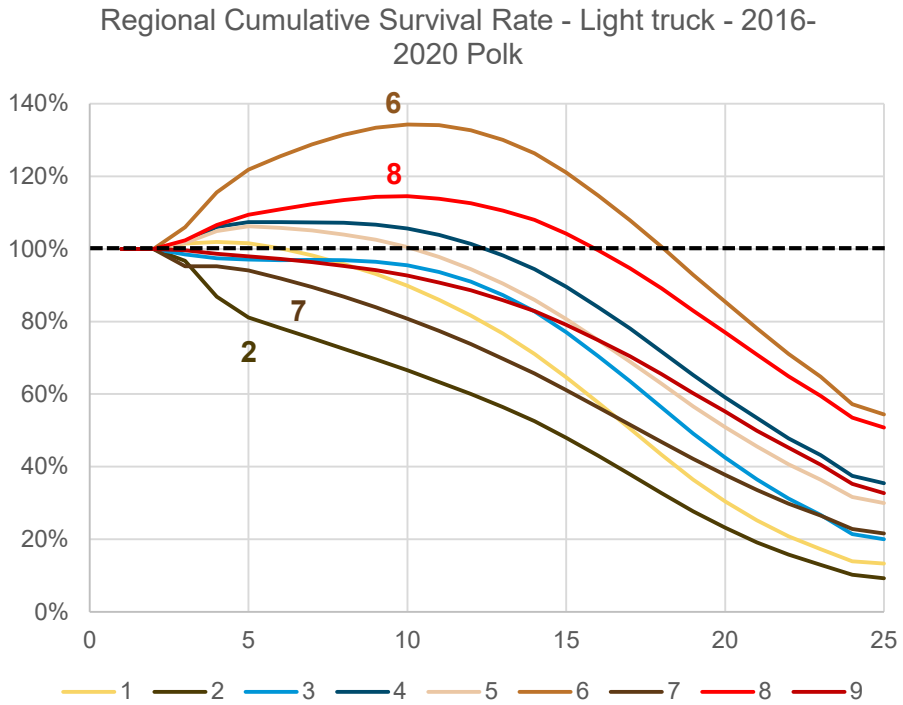
LDV Scrappage regionalization – Scrappage in AEO2022

Cumulative national vehicle survival rates, AEO2022

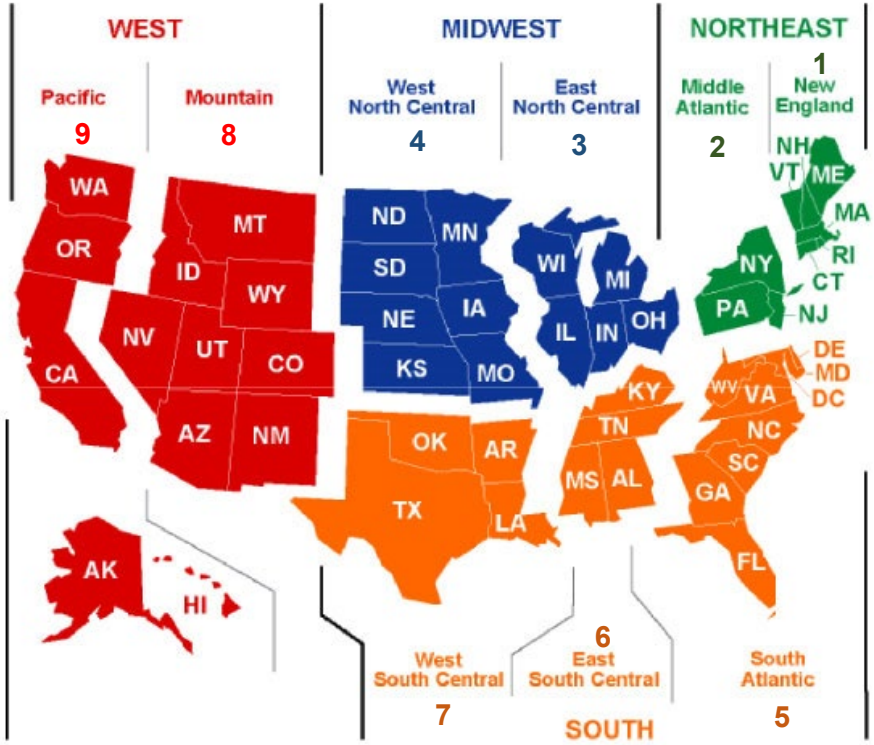


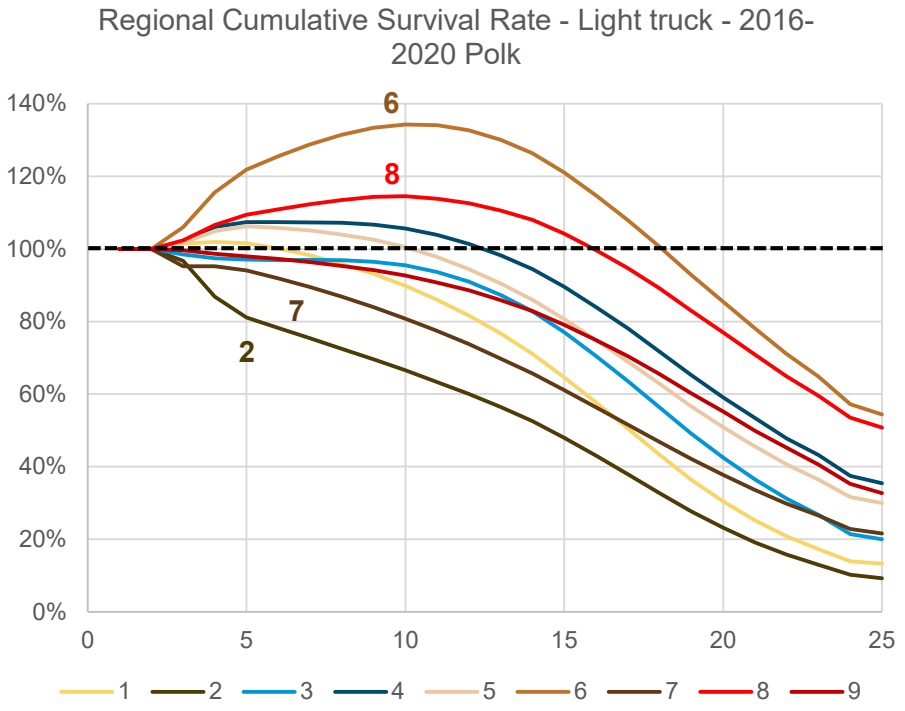
LDV Scrappage regionalization – scrappage in AEO2023





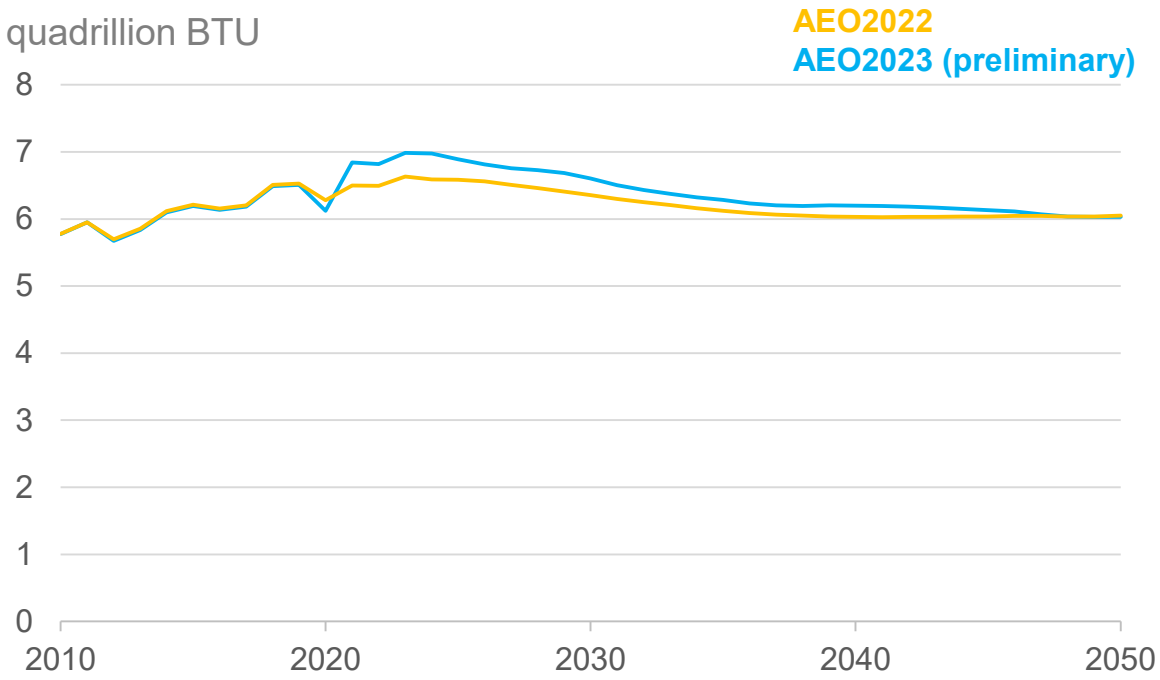
LDV Scrappage regionalization – scrappage in AEO2023





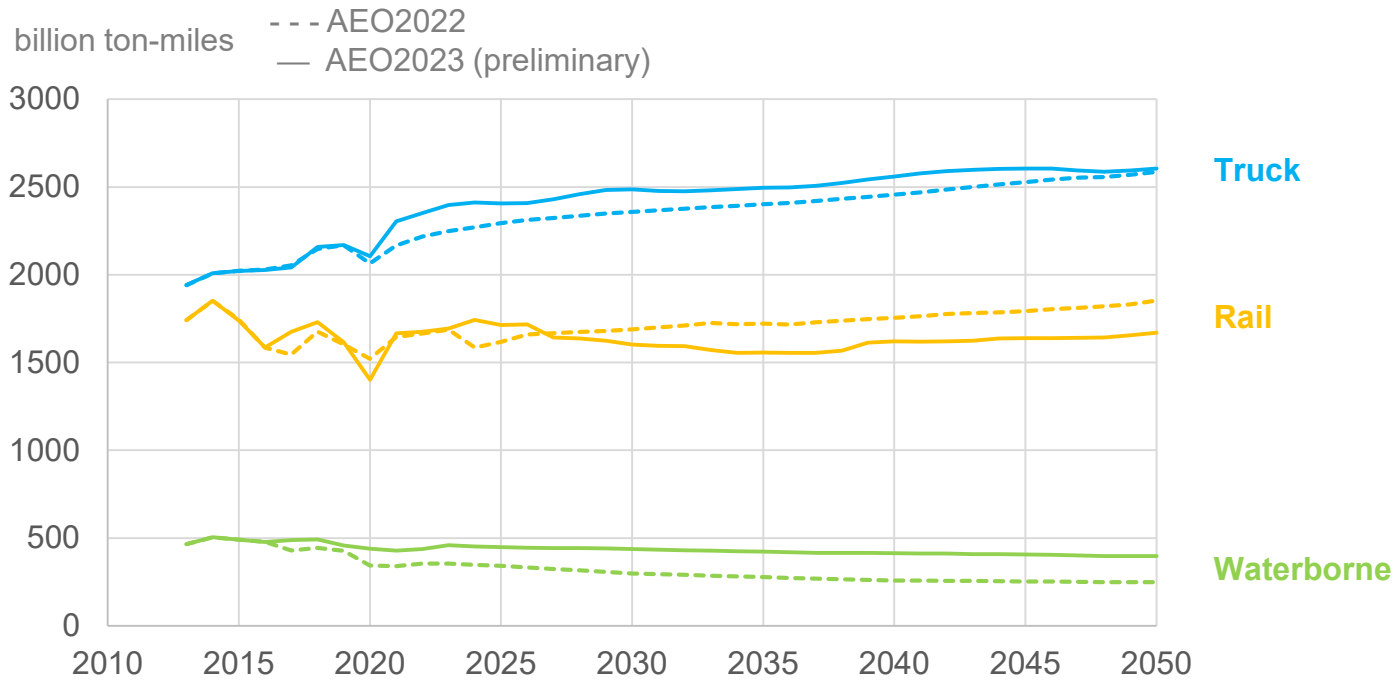
Diesel

Transportation sector diesel consumption



Freight

Ton-mile demand by mode

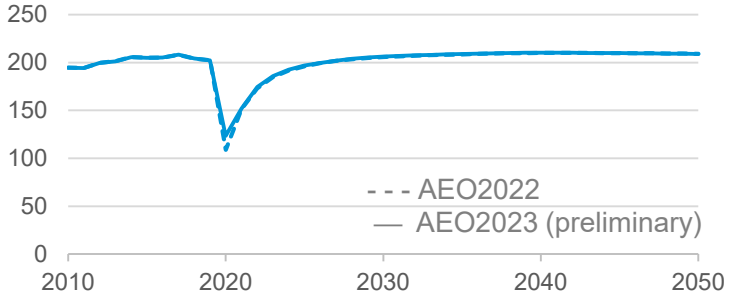


Public Transit

Transit Update

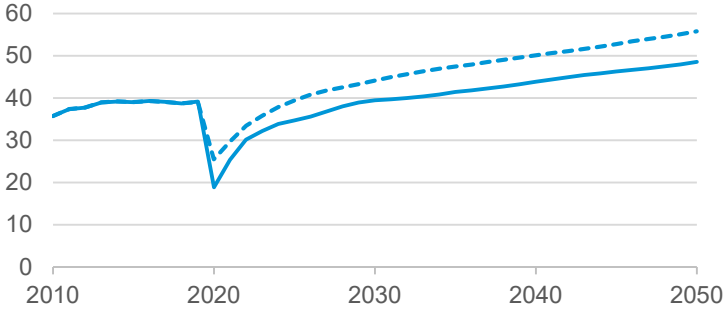
Passenger bus travel demand

billion passenger-miles



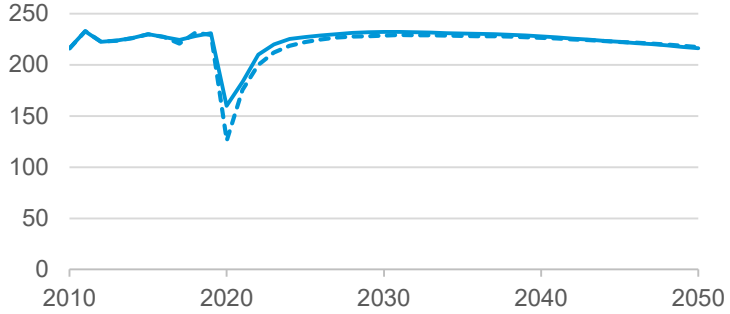
Passenger rail travel demand

billion passenger-miles



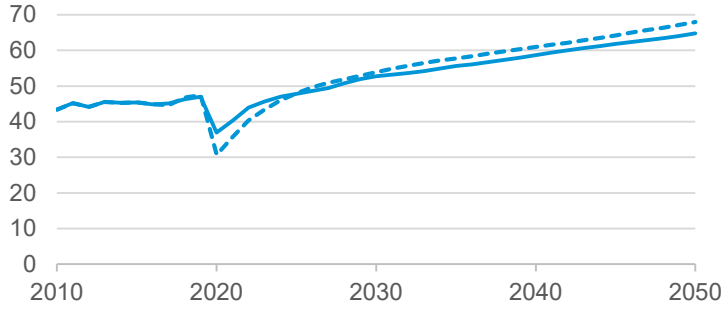
Passenger bus energy consumption

trillion btu



Passenger rail energy consumption

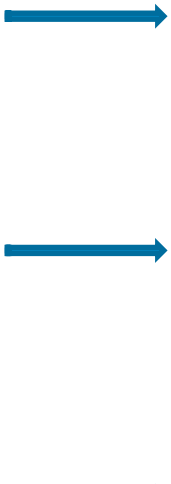
trillion btu



Air

Air model re-regionalization

1	United States
2	Canada
3	Central America
4	South America
5	Europe
6	Africa
7	Middle East
8	Russia
9	China
10	Northeast Asia
11	Southeast Asia
12	Southwest Asia
13	Oceania



1	United States
2	Canada
3	Mexico
4	OECD Europe
5	Japan
6	Australia/New Zealand
7	South Korea
8	Russia
9	Other Europe
10	China
11	India
12	Other Asia
13	Middle East
14	Africa
15	Brazil
16	Other Central/South America

Policy Updates

Key transportation policies in NEMS

- Federal plug in electric vehicle tax credit: up to $7500 tax credit for BEVs and PHEVs
- **2020**: Safer Affordable Fuel Efficient (SAFE) Rule
- **2021**: NHTSA repeals SAFE I (12/21/2021)
- **2022**: EPA reinstatement of California's CAA waiver (3/14/2022)
- **2022**: NHTSA CAFE update (3/21/2022)
- **2022**: Inflation Reduction Act (8/16/2022) – vehicle tax credit with materials, manufacturing, income, and vehicle MSRP constraints
- **2021**: Infrastructure Investment and Jobs Act / Bipartisan infrastructure law (11/15/2021)
- **2022**: Pending policies (e.g. CA ICE vehicle ban, Advanced Clean Trucks Rule)

Included in AEO2022

Included in AEO2023

Partially in AEO2023

Not in AEO2023

NEMS Transportation modeling of the 2022 IRA

Planned for inclusion in AEO2023

Clean vehicle tax credit

- Minimum battery capacity (increase from 4 to 7 kWh)
- Point of sale provision (already assumed in TRAN)
- *Not* be modeled explicitly as written in the regulation but *will likely* be represented by application of CBO's projected expenditures:
  - OEM sales cap removal
  - Foreign entity of concern exclusion
  - Battery component source constraints
  - Critical mineral source constraints
  - Household income constraint
  - Vehicle MSRP constraint

***Not* to be included in AEO2023**

Previously-owned clean vehicle credit

Qualified commercial clean vehicle credit

Updates still pending

- EPA base year update: now have official 2020 Model Year sales, so we will adjust the LDV model base year from 2019 to 2020. This will adjust vehicle attributes (fuel economy, price, curb weight, etc) as well as sales shares by size class and manufacturer
- NHTSA CAFE tech menu update: will impact the possible efficiency improvement pathways available to manufacturers in TRAN
- Calibrate LDV sales shares for 2021 and 2022 (will increase EVs)
- LDV travel by powertrain
- Potentially a battery model update (costs going up now)
- Polk vehicle registration update: Year-end 2021 data will arrive soon, and will need to be processed to update total vehicle stocks (LDV and HDV) as well as scrappage inputs.
- Final covid update for the air model
- Adjust freight rail LNG projection

Discussion

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