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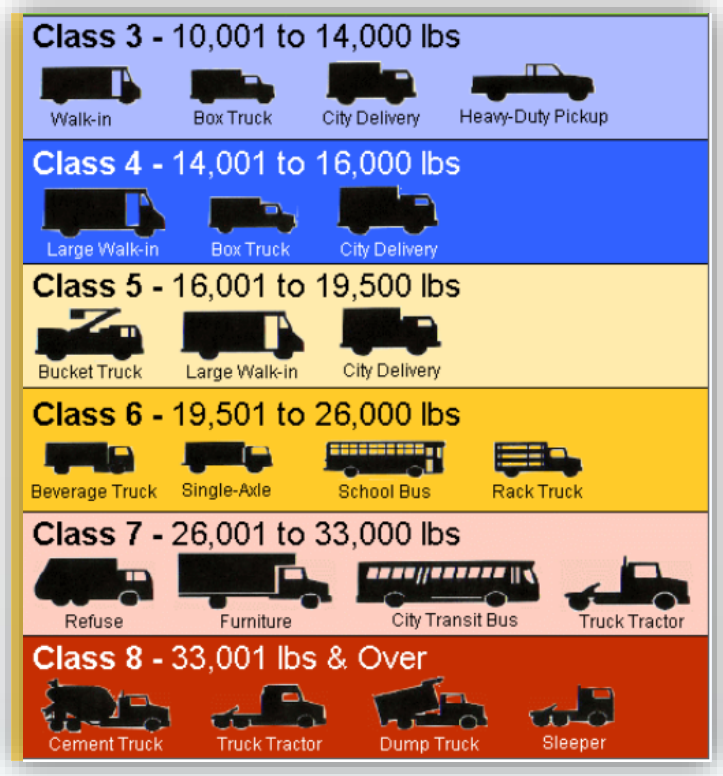
Medium- and Heavy-duty Trucks: 2020 IEPR Updates

Bob McBride

December 3, 2020

In This Presentation:



Note: No updates to bus forecast for IEPR 2020

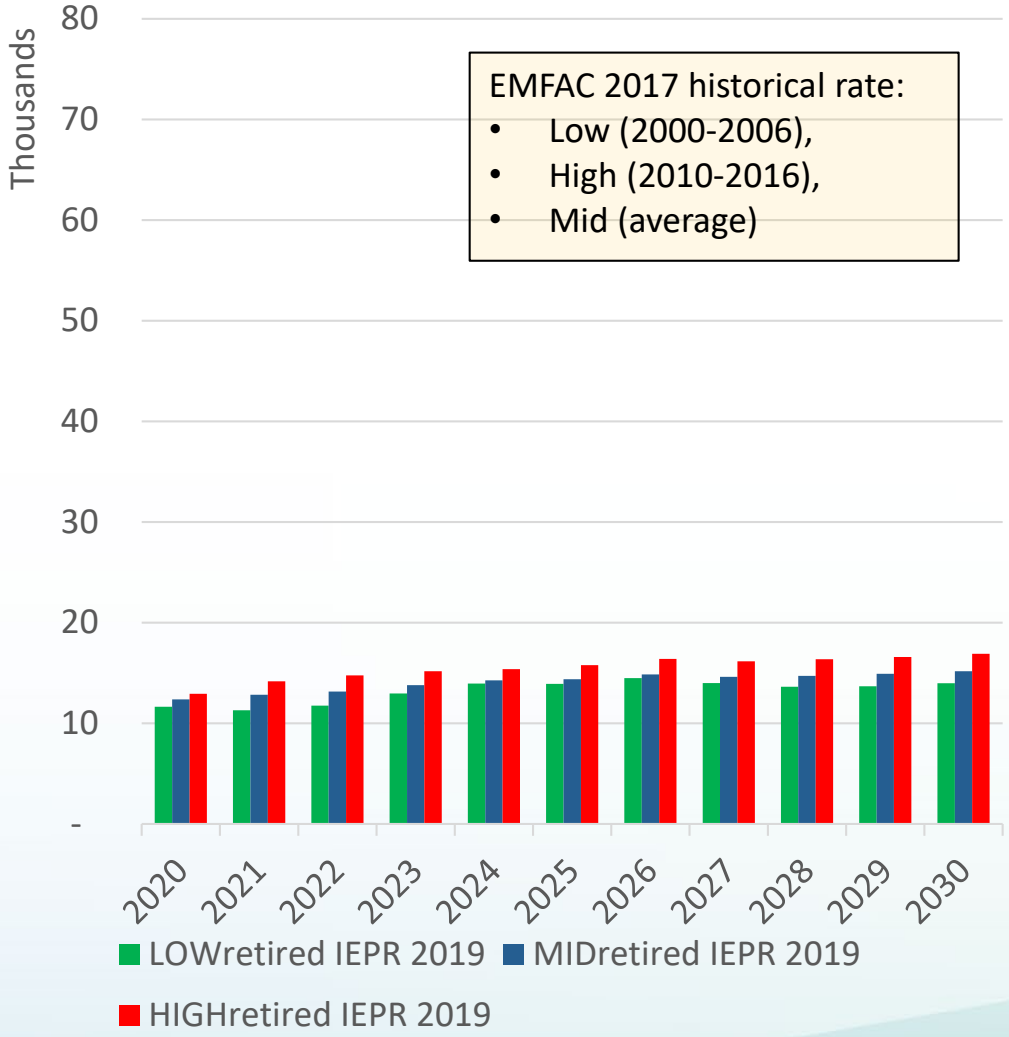
2020 updates and changes

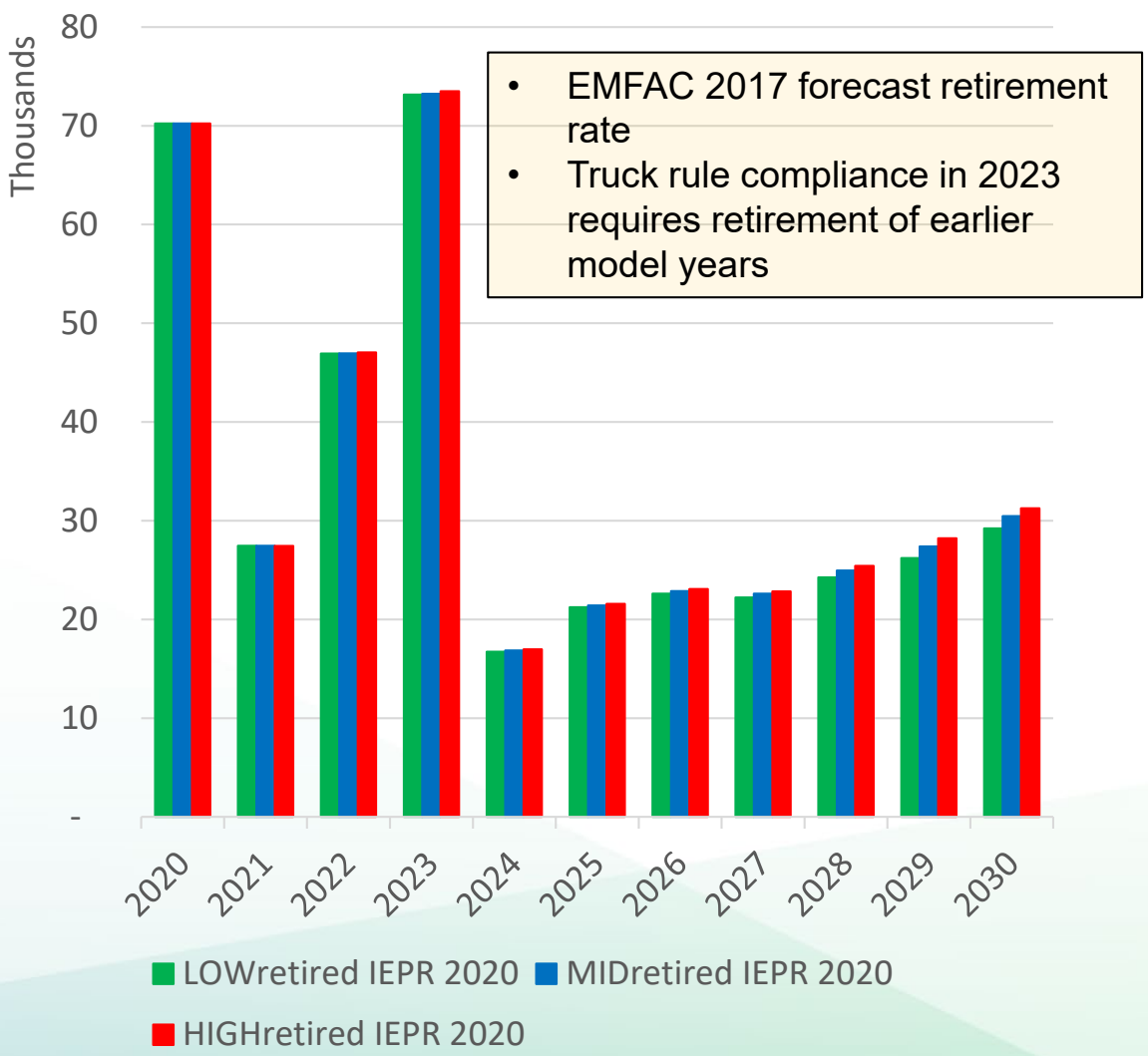
- Vehicle retirement and exports, new purchases, and used trucks imported
- HVIP incentive scheme changed
- Economic growth of goods movement
- Total of New Trucks Purchased
- ZEV stock forecast
- Total Advanced Clean Trucks manufacturer net credit requirement

Truck Retirement and Used Trucks

- For IEPR 2020, staff used
  - EMFAC 2017 ***forecast*** retirement rate in all forecast years and scenarios
  - Includes used trucks compliant with emission rules being imported to California (first time in IEPR forecast)
  - Model years from 2010 forward are imported in the years leading to 2023
  - To compensate for increased used truck prices in a COVID economy, staff reduced net used truck imported
- For IEPR 2019, staff used
  - EMFAC 2017 ***historical*** retirement rates, two time periods used
    - High turnover in high demand represented by 2010 to 2016, and low turnover in low demand represented by 2000 to 2006; averaged in mid demand
  - No accounting of used trucks imported, significant from 2020 to 2023

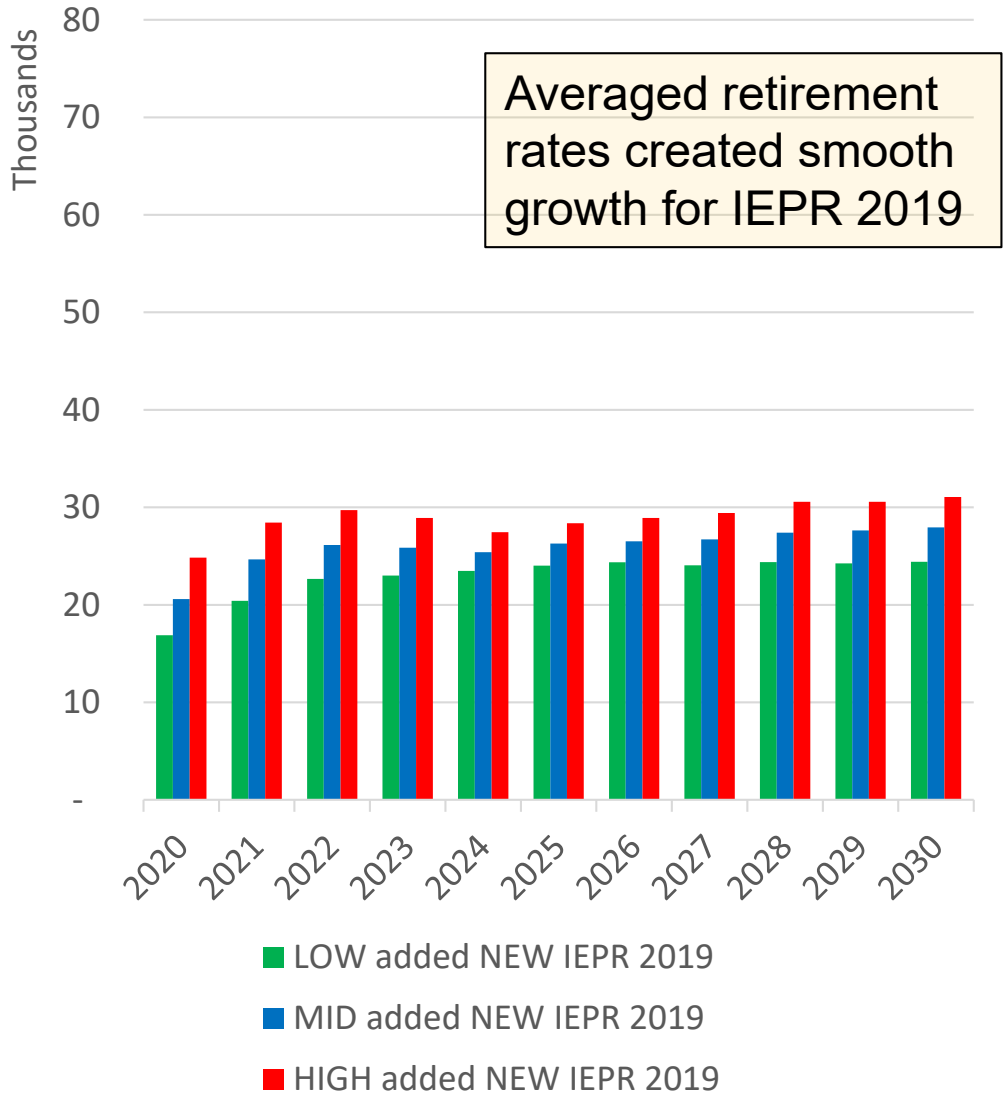
Truck Retirements or Exports
IEPR 2019 (left) IEPR 2020 (right)



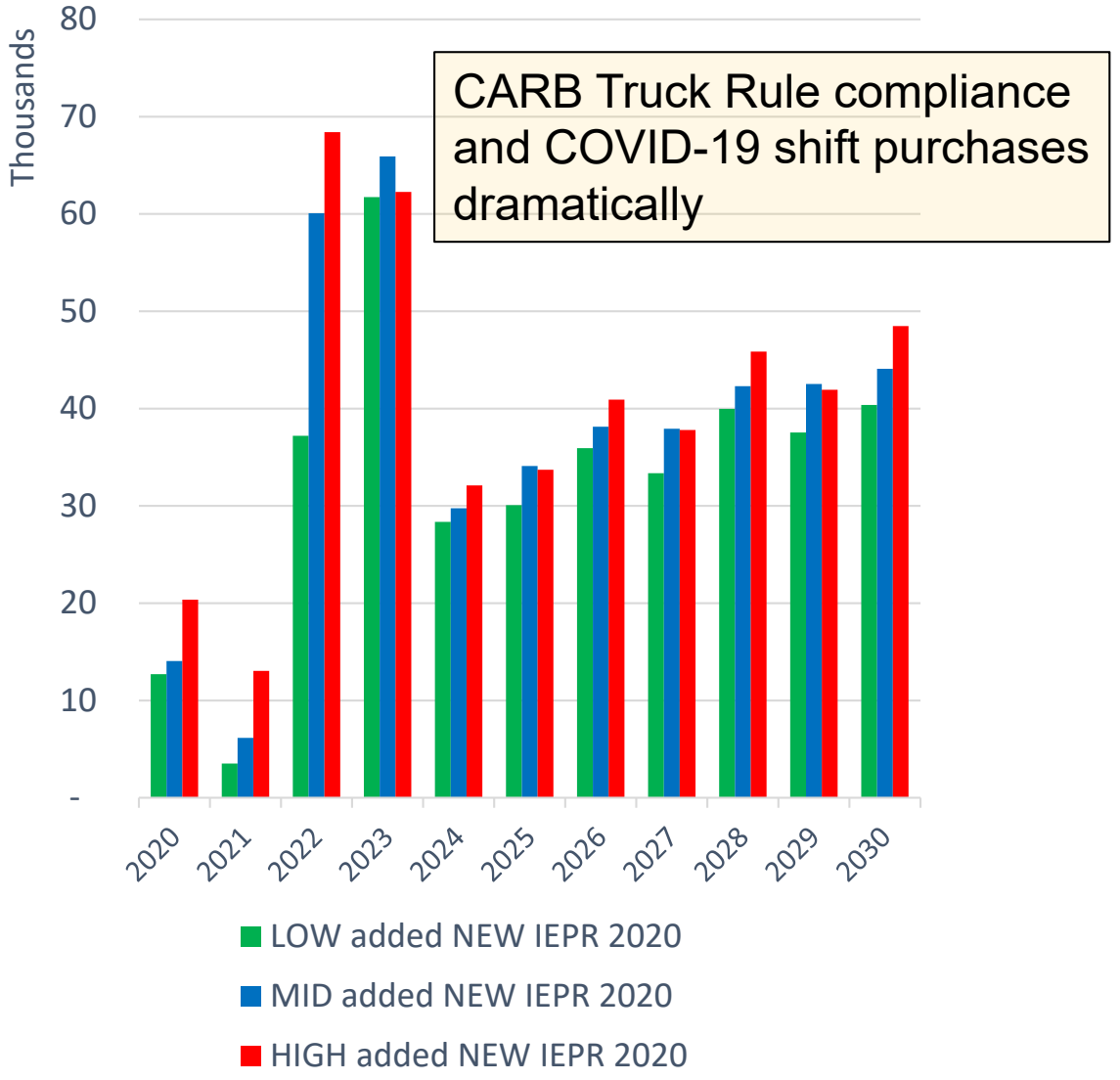


New Trucks Purchased

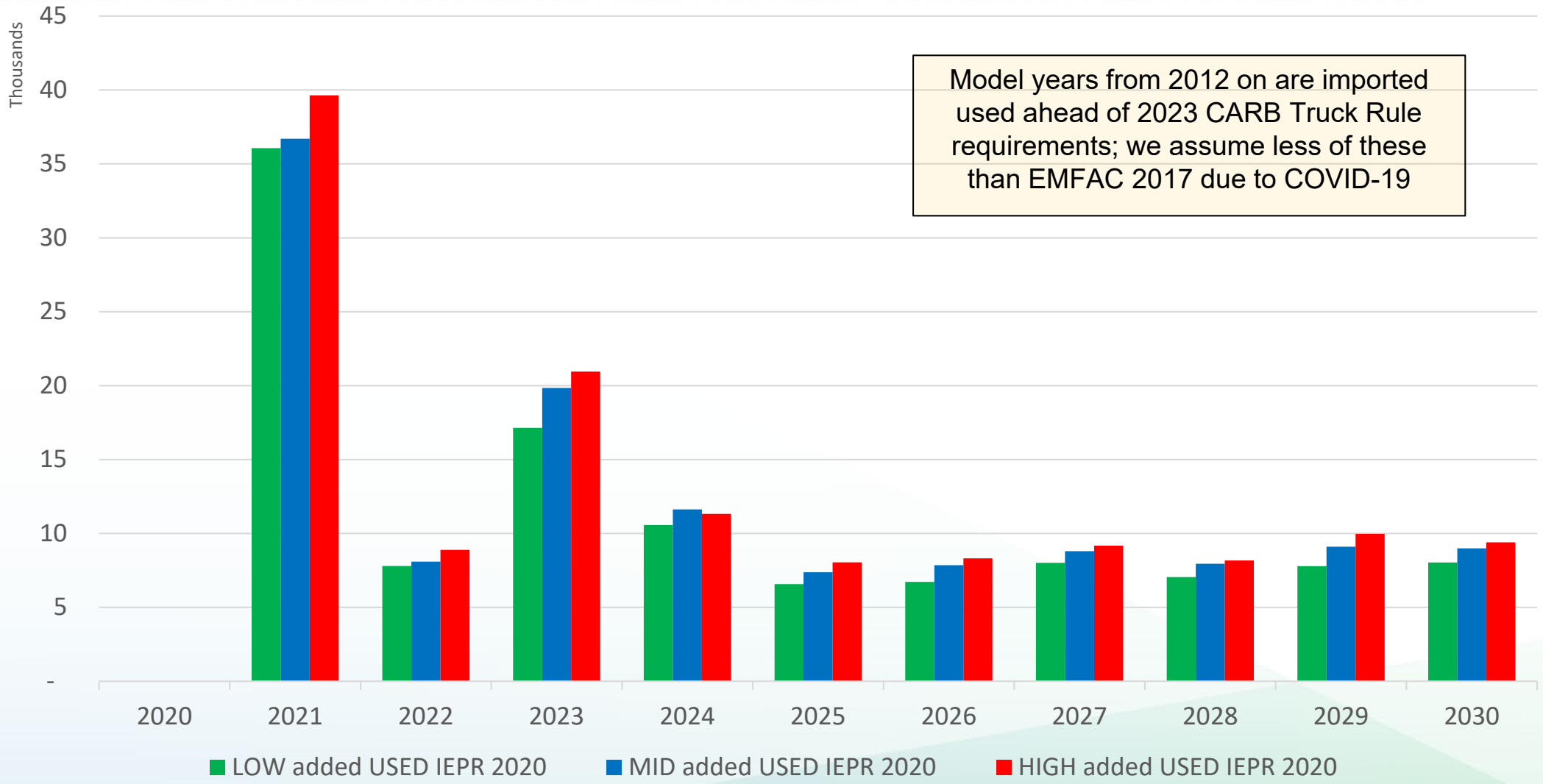
IEPR 2019 (left)



IEPR 2020 (right)



IEPR 2020 Used Trucks Imported



Model years from 2012 on are imported used ahead of 2023 CARB Truck Rule requirements; we assume less of these than EMFAC 2017 due to COVID-19

Changes in HVIP-derived Incentives

IEPR 2019

- Low demand case award of 60% of incremental price
- Mid demand case award of 80% of incremental price
- High demand case award of 100% of incremental price

IEPR 2020

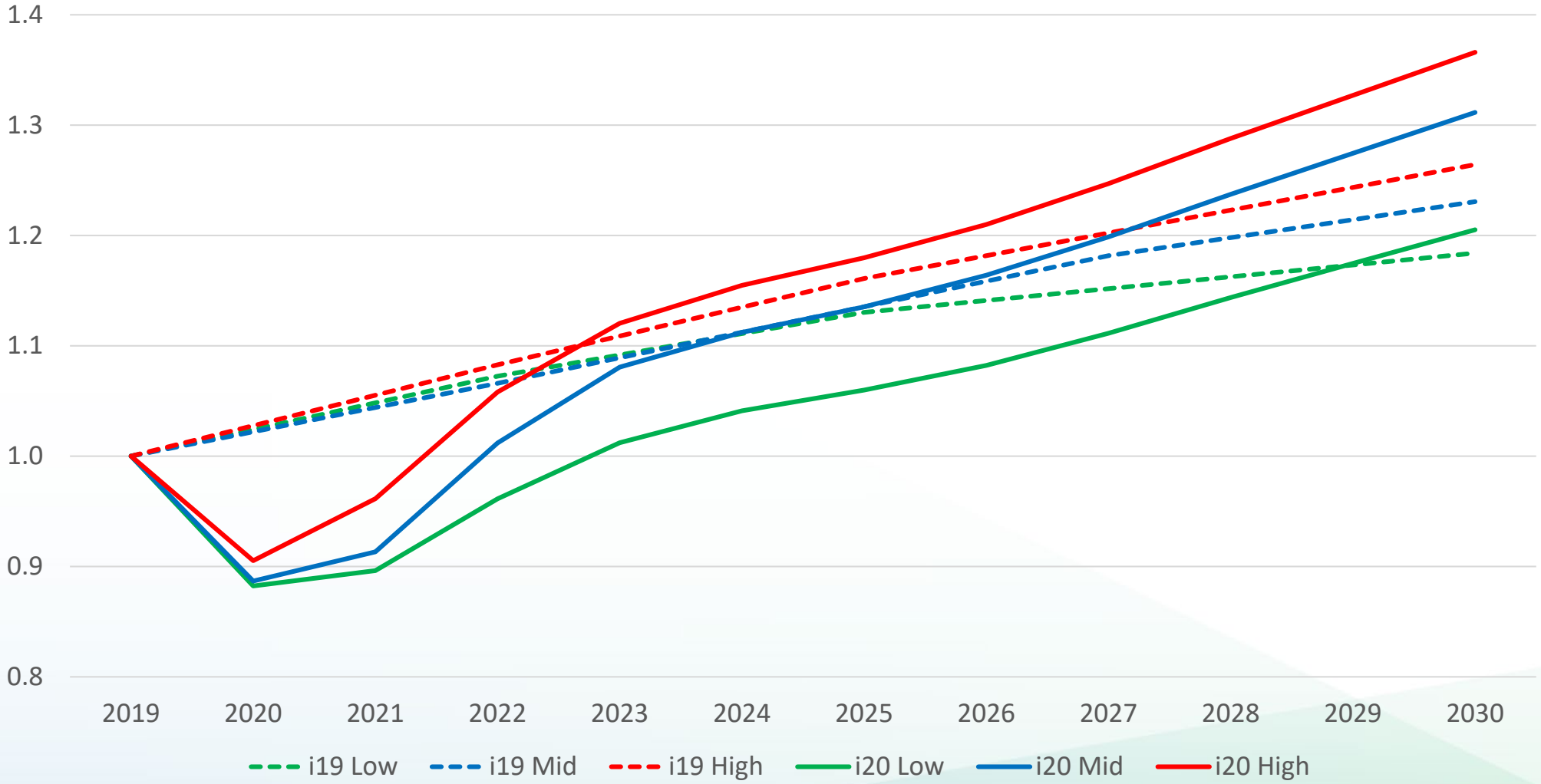
- All three cases share the same incentive as a percentage of incremental purchase price
- Calculated based on HVIP voucher awards through mid-2019 for the most common weight class
- Award averages 86.5% of incremental price

These changes tend to make shares of incentivized vehicles higher in the Low Demand case and lower in the High Demand case.
Note: Incremental cost is the difference between the purchase price of an incentivized truck and the least expensive truck in the same class

Economic Growth in Goods Movement

- In addition to adjusting for COVID-19 and the China trade agreement, we are now conforming to trends in the economic and demographic forecasts
- Update based on Freight Analysis Framework 4.5 (FAF45, 2019)
  - FAF includes three cases of commodity-specific origin-destination (OD) regions, six regions in California plus routes out of state
  - China trade agreement and COVID-19 have changed forecast conditions, accounted for in recent Moody's forecast
- Moody's Transportation and Distribution GSP forecast is used as our Mid case baseline. County data is aggregated to the FAF zone level.
- Low and High cases are created by applying the ratio of the high case and low case to the mid case GSP.

Growth of Goods Movement Indexed Comparing IEPR 2019 and IEPR 2020



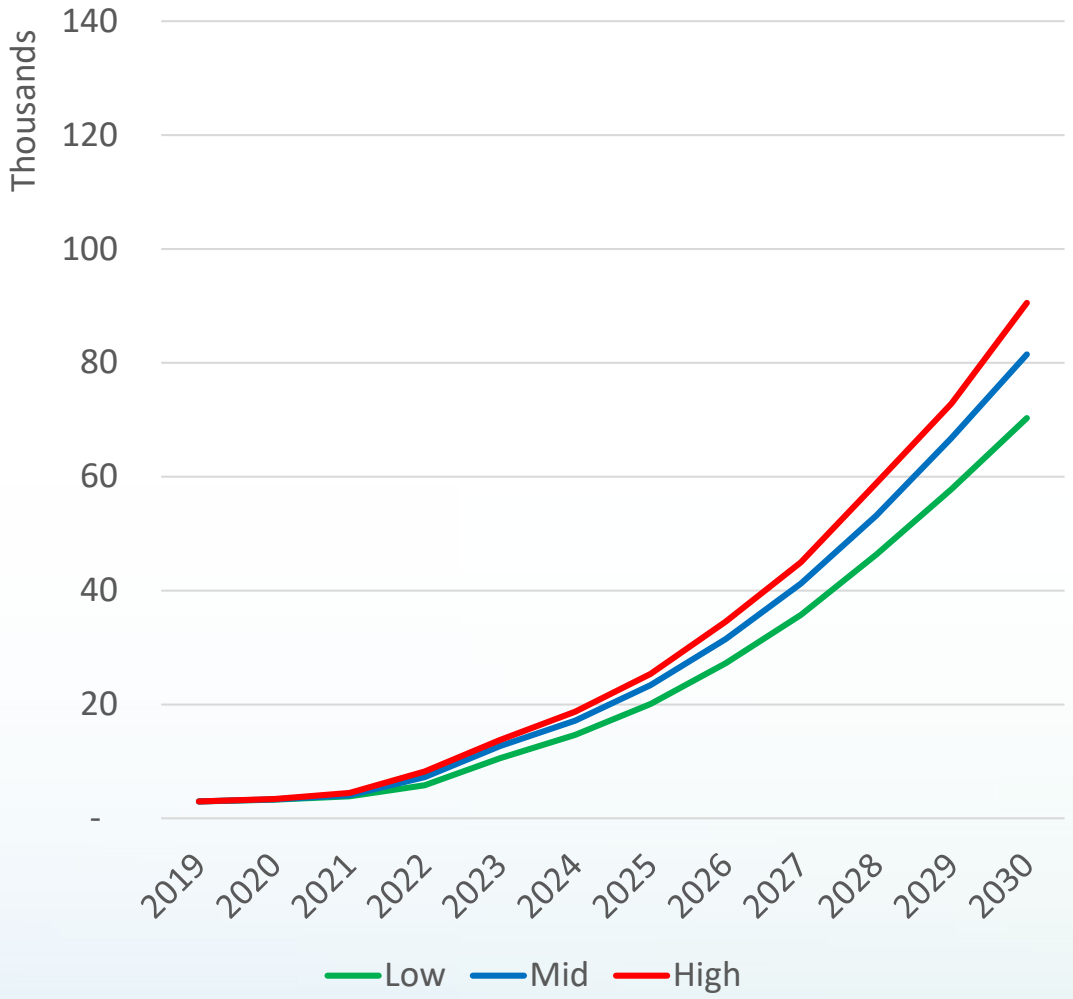
Sources: FHWA, Moody's Analytics

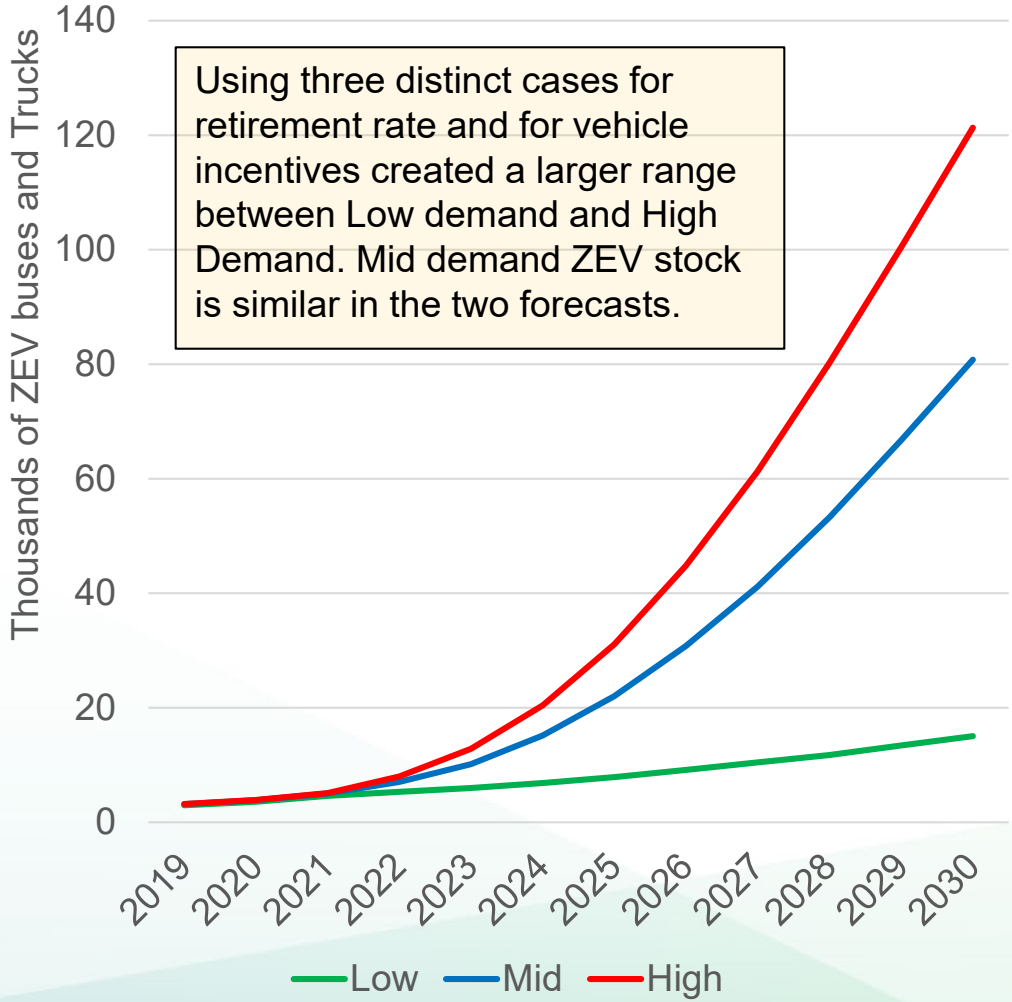
Zero Emission Truck (ZET) Inputs and Assumptions

DEMAND CASE	LOW	MID	HIGH
REGULATIONS	California Regulations	California Regulations	California Regulations
CARB Regulations	Innovative Clean Transit Rule, Zero-Emission Airport Shuttle Regulation	Innovative Clean Transit Rule, Zero-Emission Airport Shuttle Regulation	Innovative Clean Transit Rule, Zero-Emission Airport Shuttle Regulation
SCAQMD Regulations	Implicit for refuse trucks and urban transit buses	Implicit for refuse trucks and urban transit buses	Implicit for refuse trucks and urban transit buses
INCENTIVES	Incentives	Incentives	Incentives
HVIP (all years)	Current HVIP voucher plus stacked incentives, 86.5% of vehicle incremental cost in all years	Current HVIP voucher plus stacked incentives, 86.5% of vehicle incremental cost	Current HVIP voucher plus stacked incentives, 86.5% of vehicle incremental cost
FUEL PRICES	Fuel Prices	Fuel Prices	Fuel Prices
Hydrogen Price	NREL high price	NREL mid price	Based on “right-sized dedicated fleet” fueling station
Electricity Rates	Commercial Rates, High	Commercial Rates, Mid	Commercial Rates, Low
ATTRIBUTES	Attributes	Attributes	Attributes
BEV Truck Prices given battery pack price in 2030	BEV prices based on battery price declining to ~$120/kilowatt hour (kWh)	BEV prices based on battery price declining to ~$100/kWh	BEV prices based on battery price declining to ~$80/kWh
Miles Per Gallon (conventional / alternative)	High / Low	Mid / Mid	Low / High
Range of Operations	Battery-electric range to 150 miles (was 100 miles for IEPR 2019)	Battery-electric range to 150 miles (was 100 miles for IEPR 2019)	Battery-electric range to 150 miles (was 100 miles for IEPR 2019)

Comparing Truck Fuel Cost per Mile Low, Mid, and High Cases

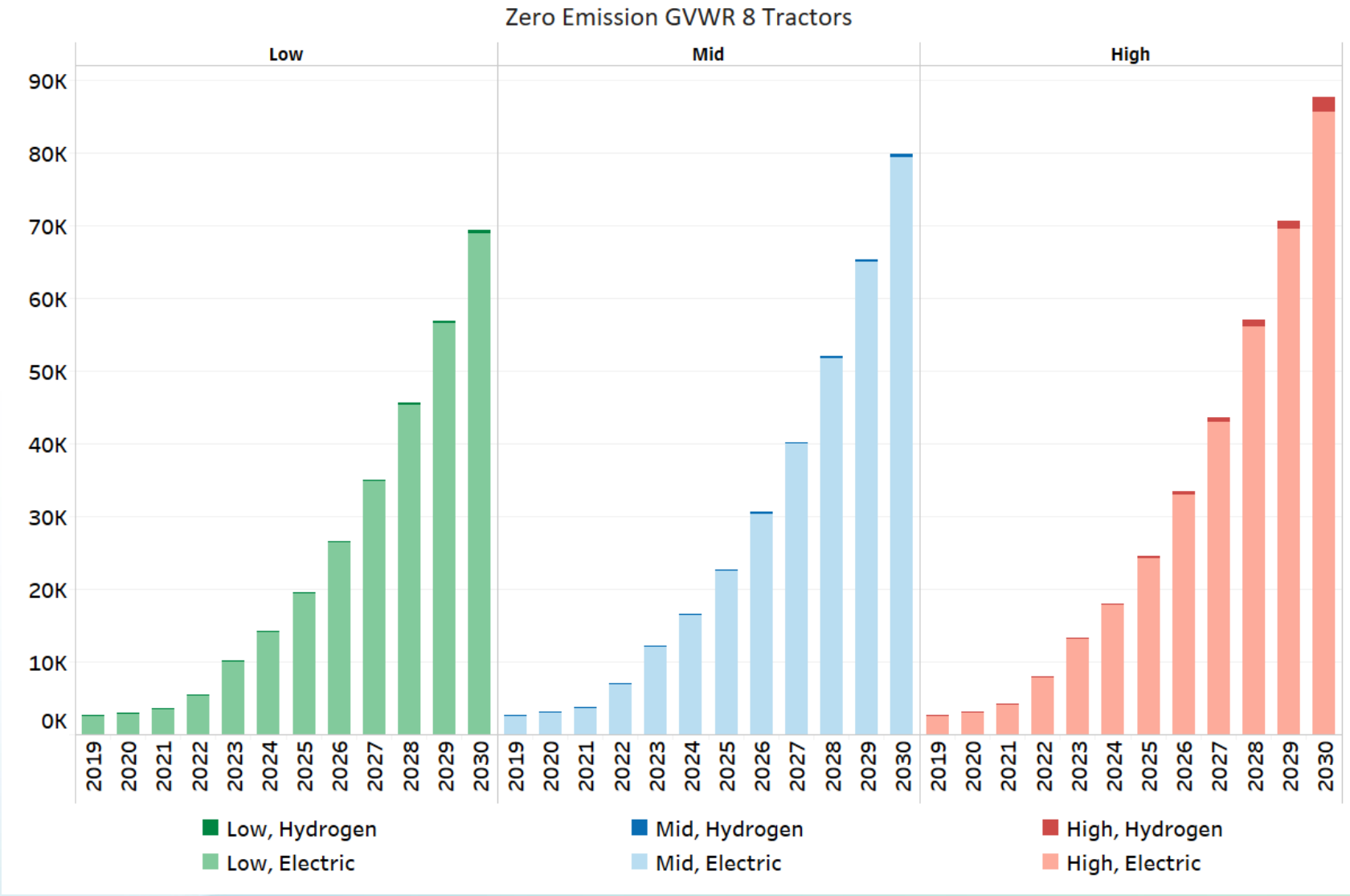
Medium and Heavy Duty ZETs and ZEBs
IEPR 2020 (left) IEPR 2019 (right)



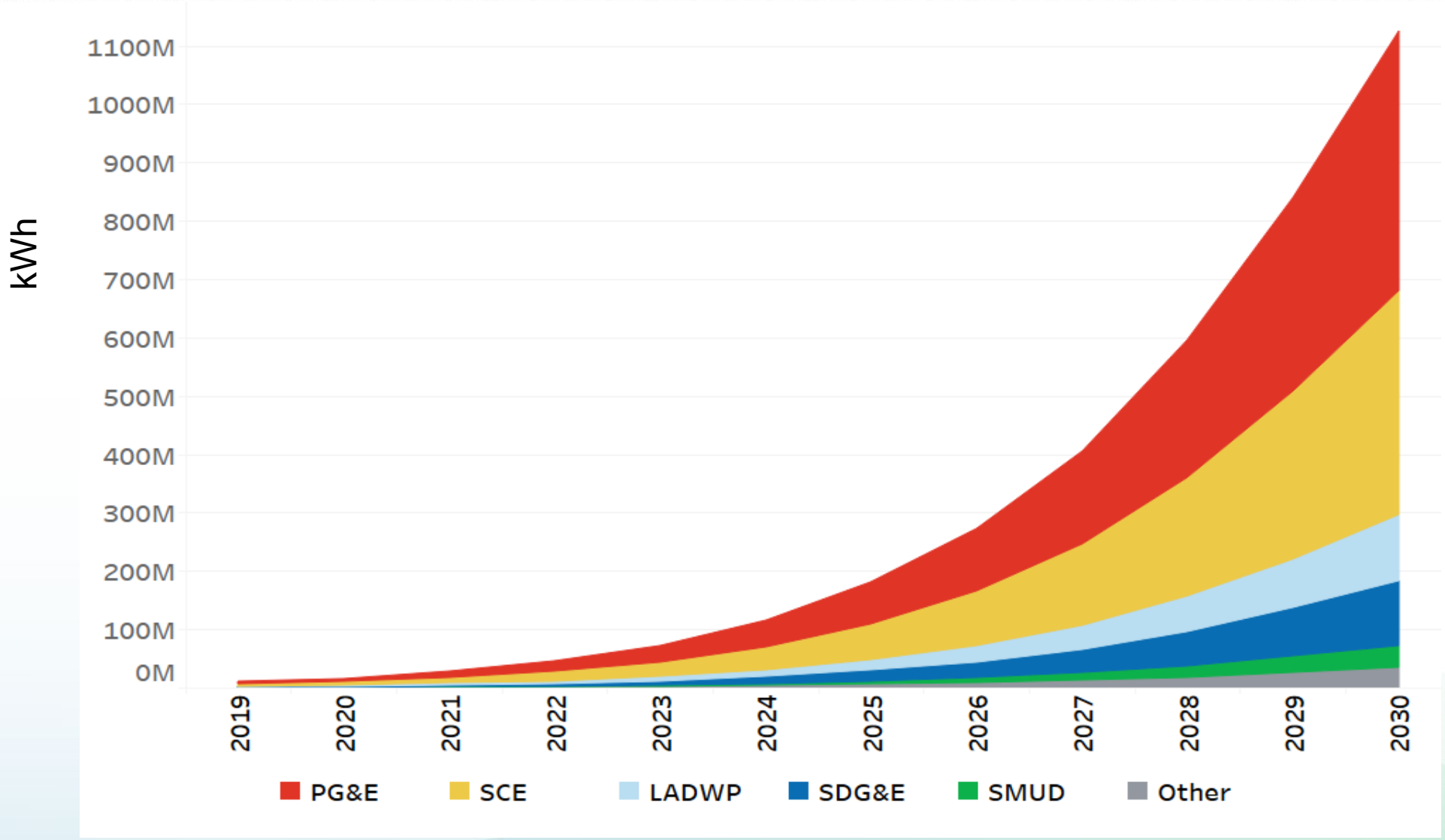


Using three distinct cases for retirement rate and for vehicle incentives created a larger range between Low demand and High Demand. Mid demand ZEV stock is similar in the two forecasts.

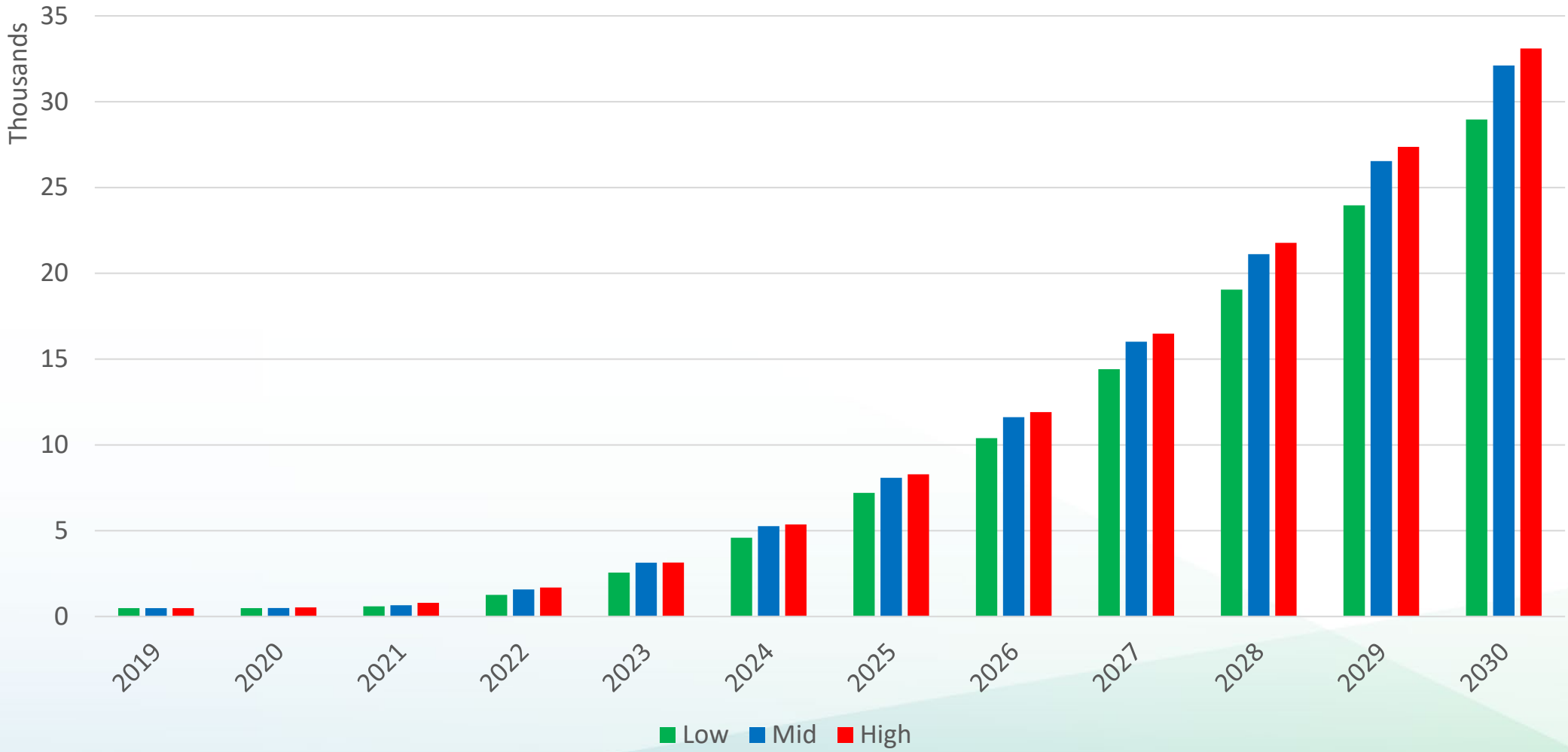
IEPR 2020 Medium and Heavy Duty ZETs and ZEBs (same data, stacked fuels)



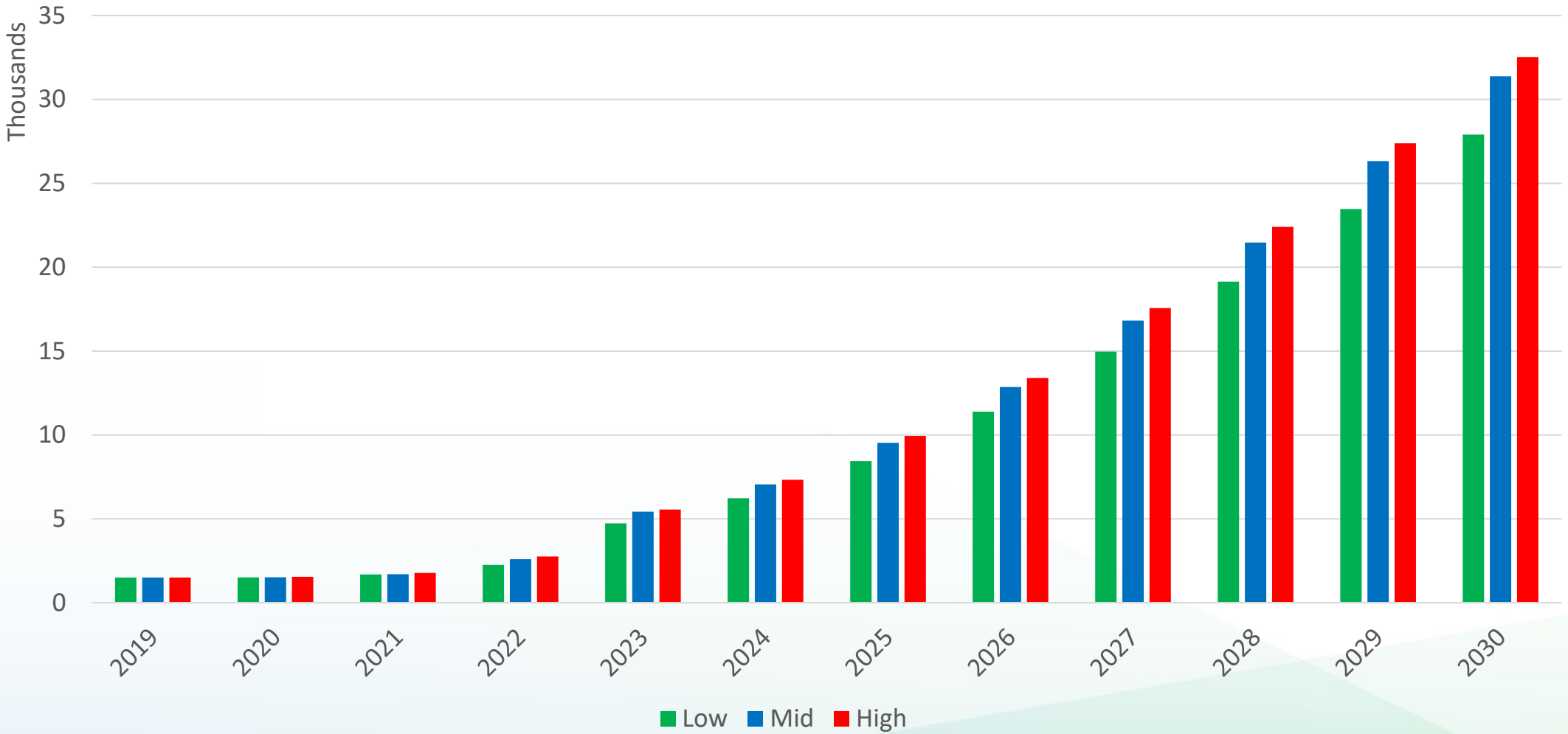
MD-HD Electricity Consumption
Mid case by Utility



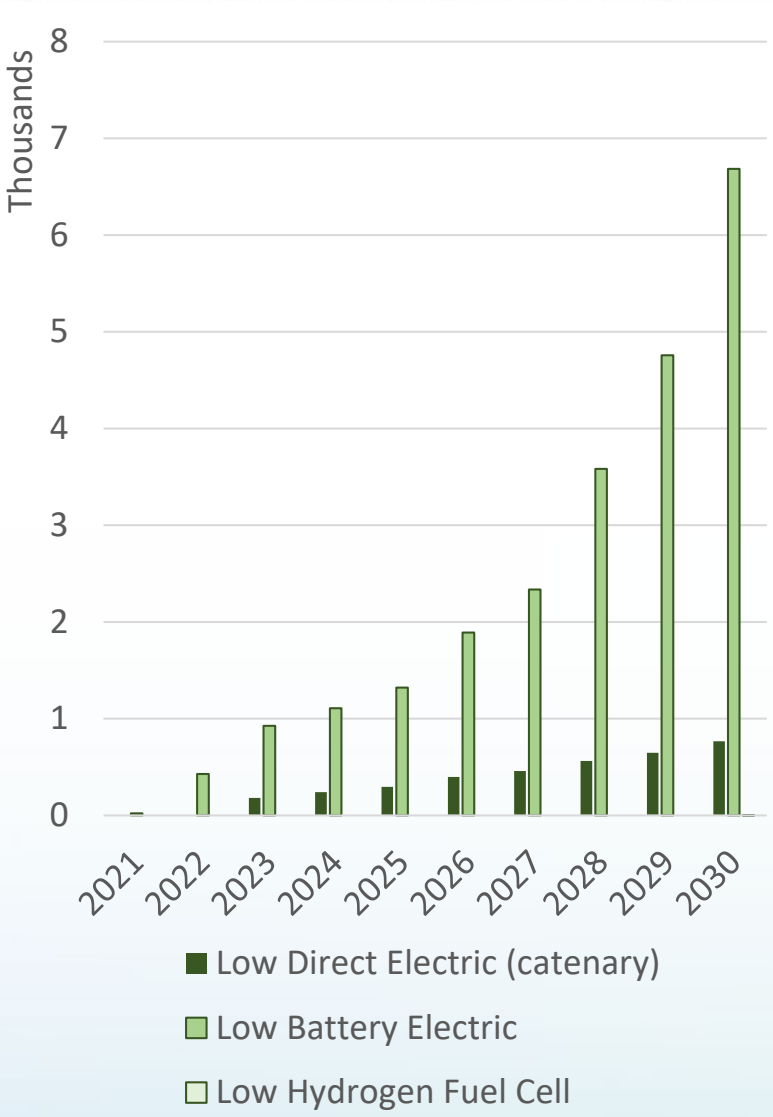
Battery Electric Truck Stock Forecast -- GVWR 3

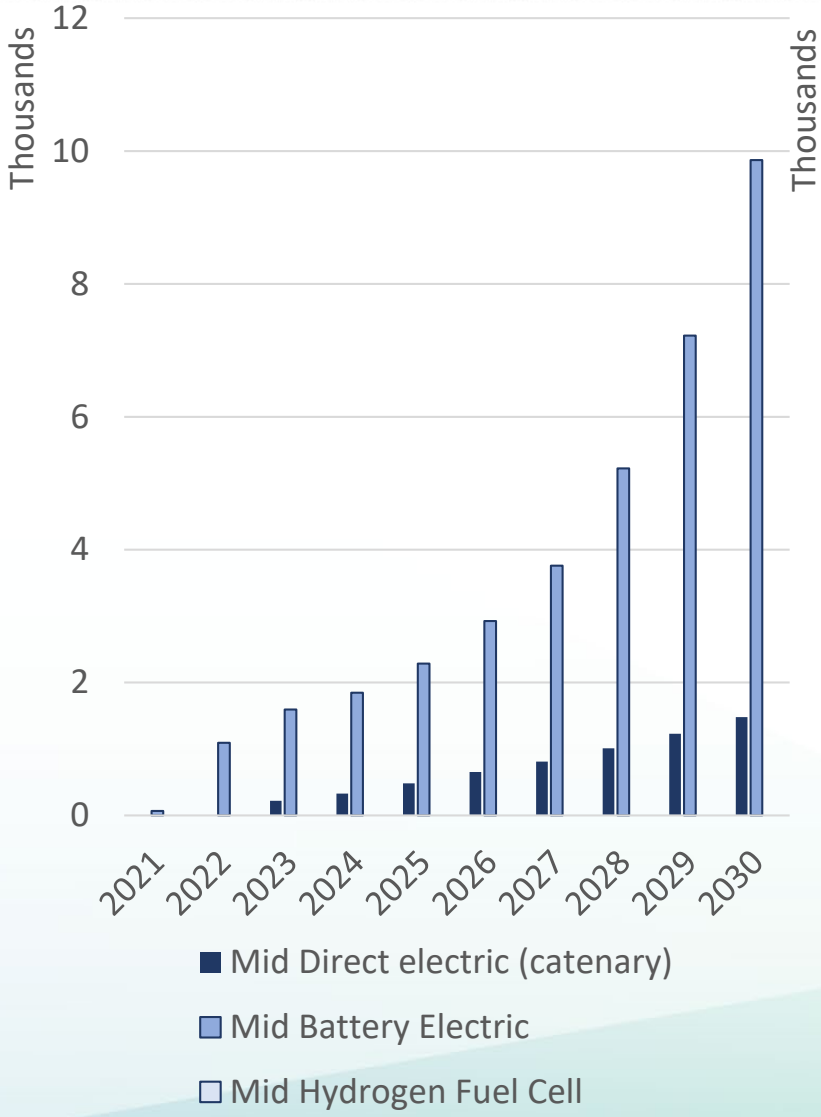


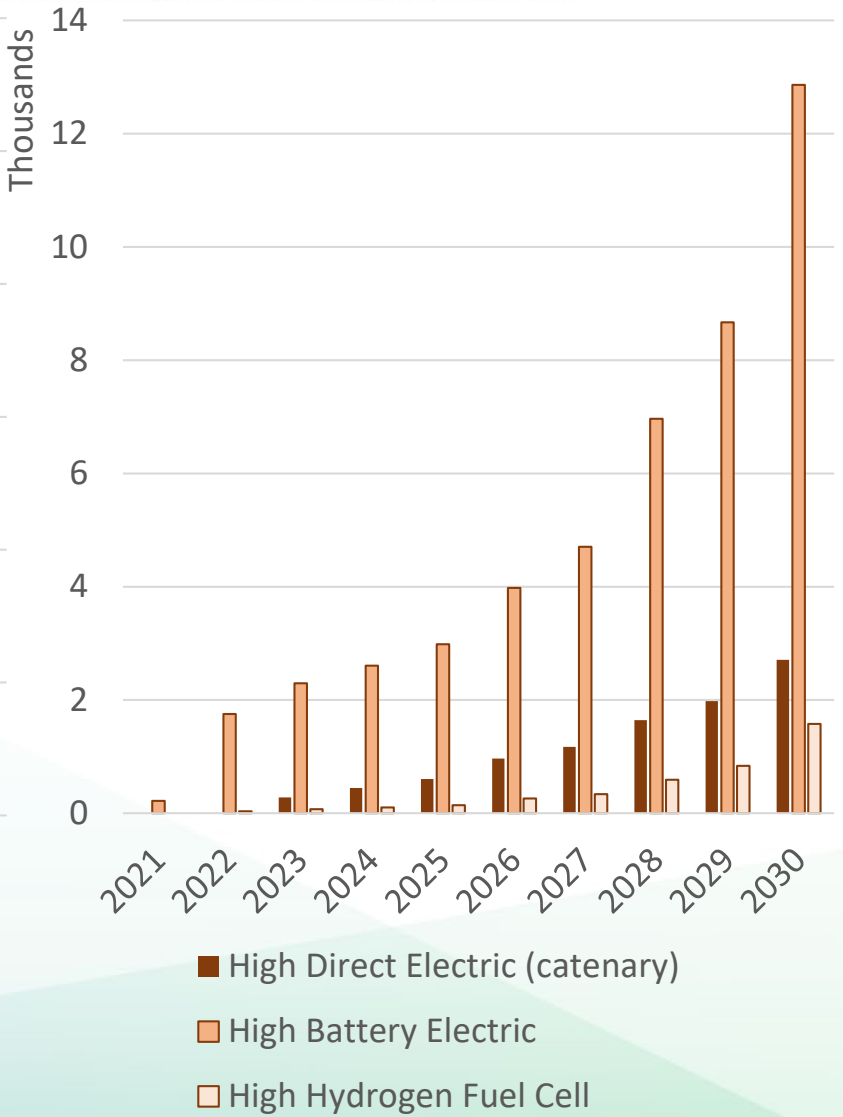
Battery Electric Truck Stock Forecast -- GVWR 4-6



ZEV Truck Stock Forecast
GVWR 8 Tractors



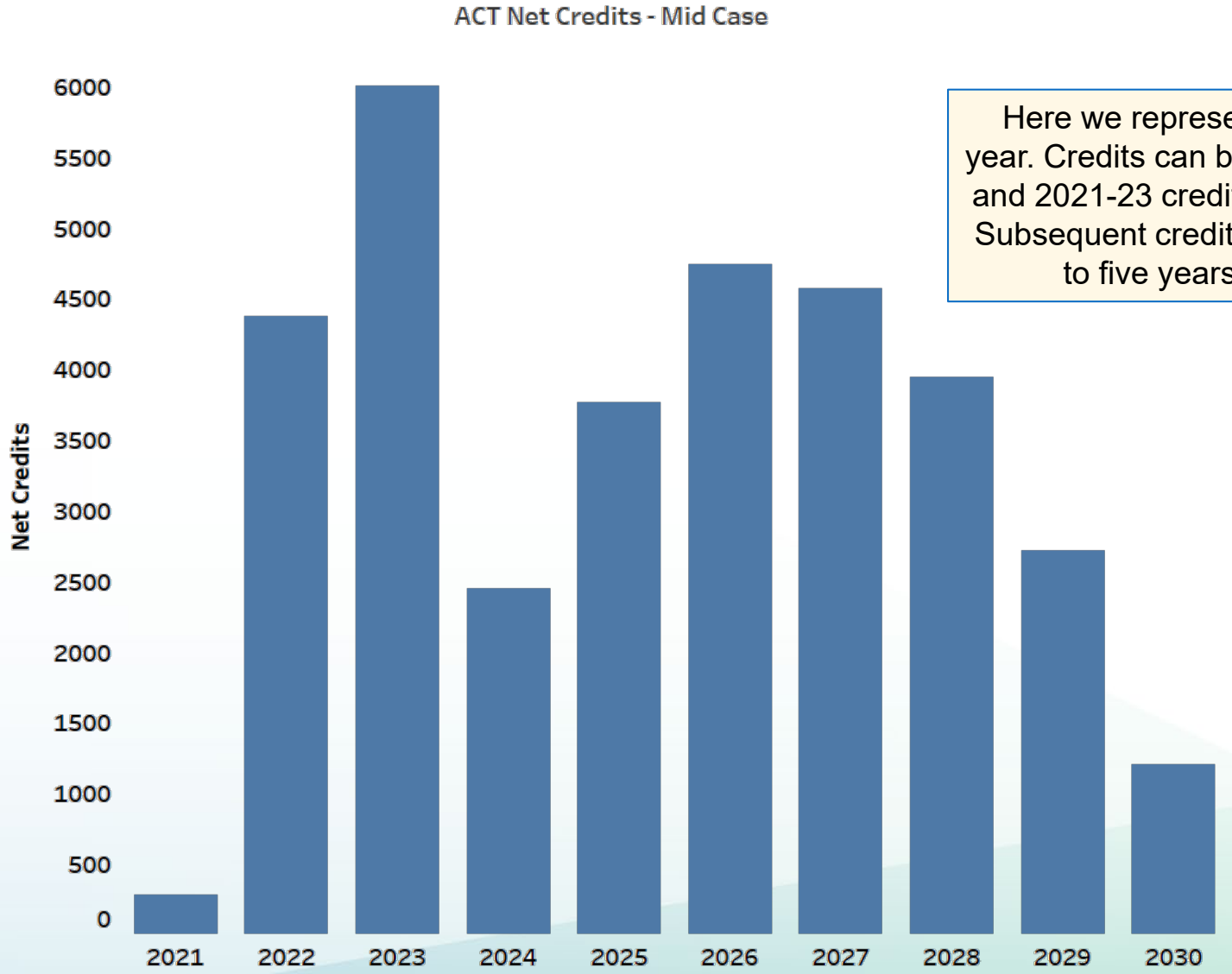




Advanced Clean Truck Rule

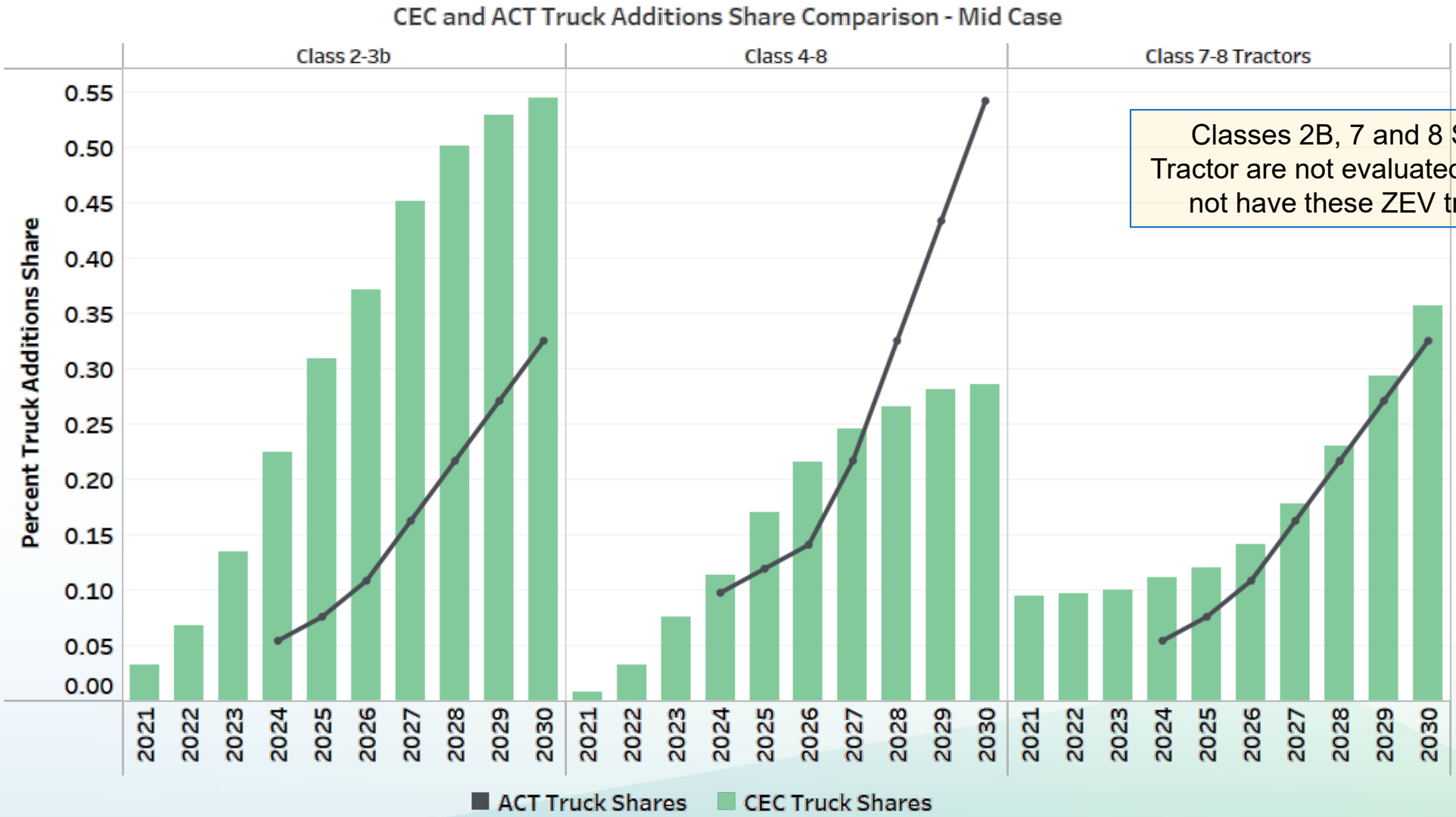
- Multiple compliance pathways depend on:
  - Fleet size and composition by weight class
  - Manufacturers must maintain positive net credits or buy credits
  - In this comparison, we look at the statewide fleet as a single manufacturer
- The total cost of ownership (TCO) staff used in ACT ISOR, etc., considers fewer fuel types than CEC's transportation forecast
- Each of eight truck classes are mapped to ACT classes
- Only the four classes with attributes for ZEV trucks are evaluated
- Statewide ACT credits and deficits are calculated using the ACT rule
- Mid and High demand cases are ACT compliant

Total ACT Net Credits – Mid Case



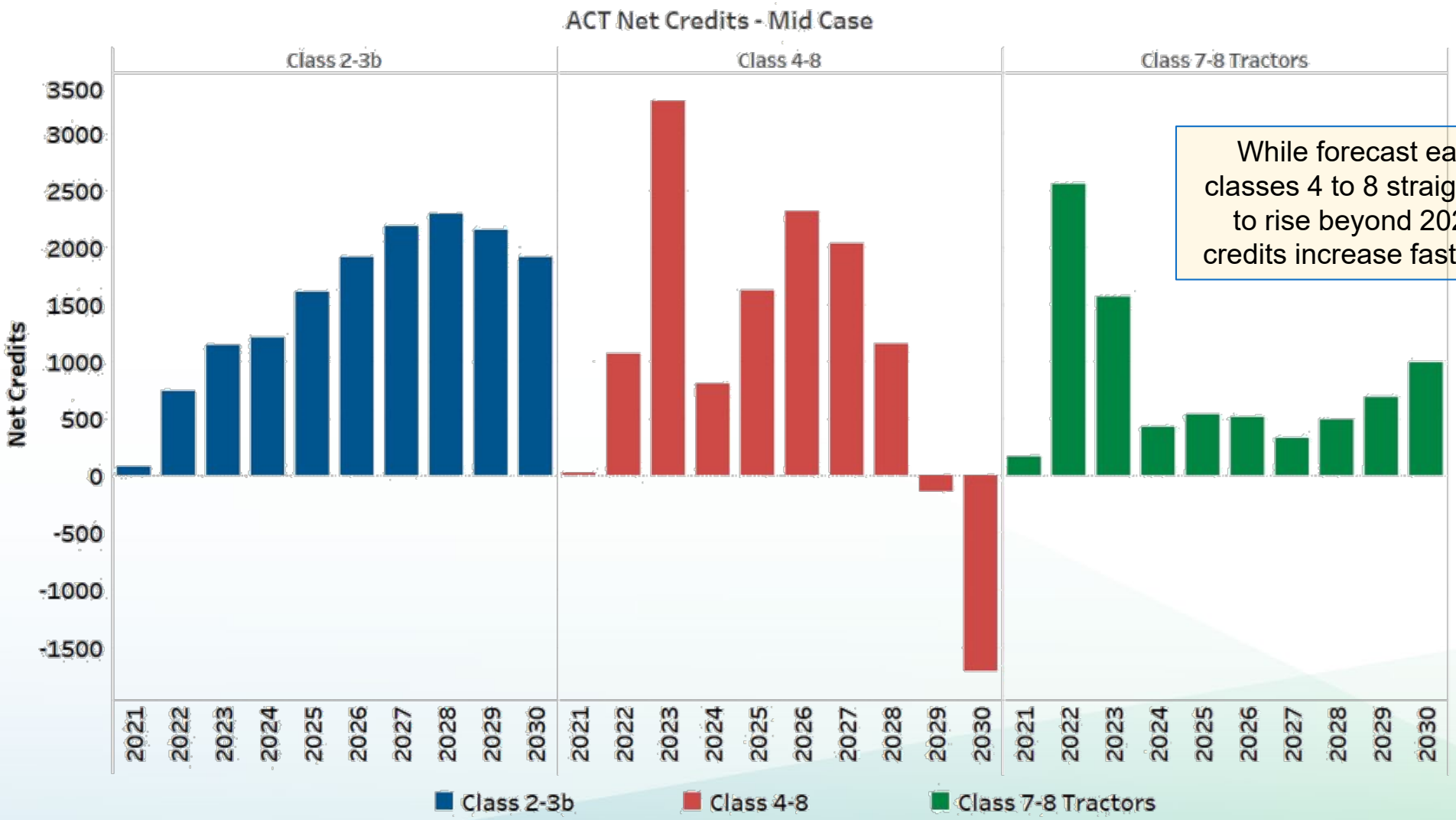
Here we represent credits year by year. Credits can be earned from 2021, and 2021-23 credits expire after 2030. Subsequent credits can be applied up to five years in the future.

Mid Case ZET Market Shares Comparison to ACT



Classes 2B, 7 and 8 Straight, and 7 Tractor are not evaluated, since staff does not have these ZEV truck attributes.

Net ACT Credits by Class – Mid Case



While forecast earned credits for classes 4 to 8 straight trucks continue to rise beyond 2027, required net credits increase faster at 5% per year.

Thank You! Questions? Comments?

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