

DOCKETED

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Exploratory Scenario: Energy Impacts of MD-HD ZEV Populations to Meet Federal Ozone Standard in South Coast Air Basin in 2031

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Overview

- This scenario is called the “attainment scenario” for short
- Staff assessed the increase in electricity consumption from the number of zero-emission trucks needed in SCAB to meet the Federal ozone standard in 2031

Presentation Outline

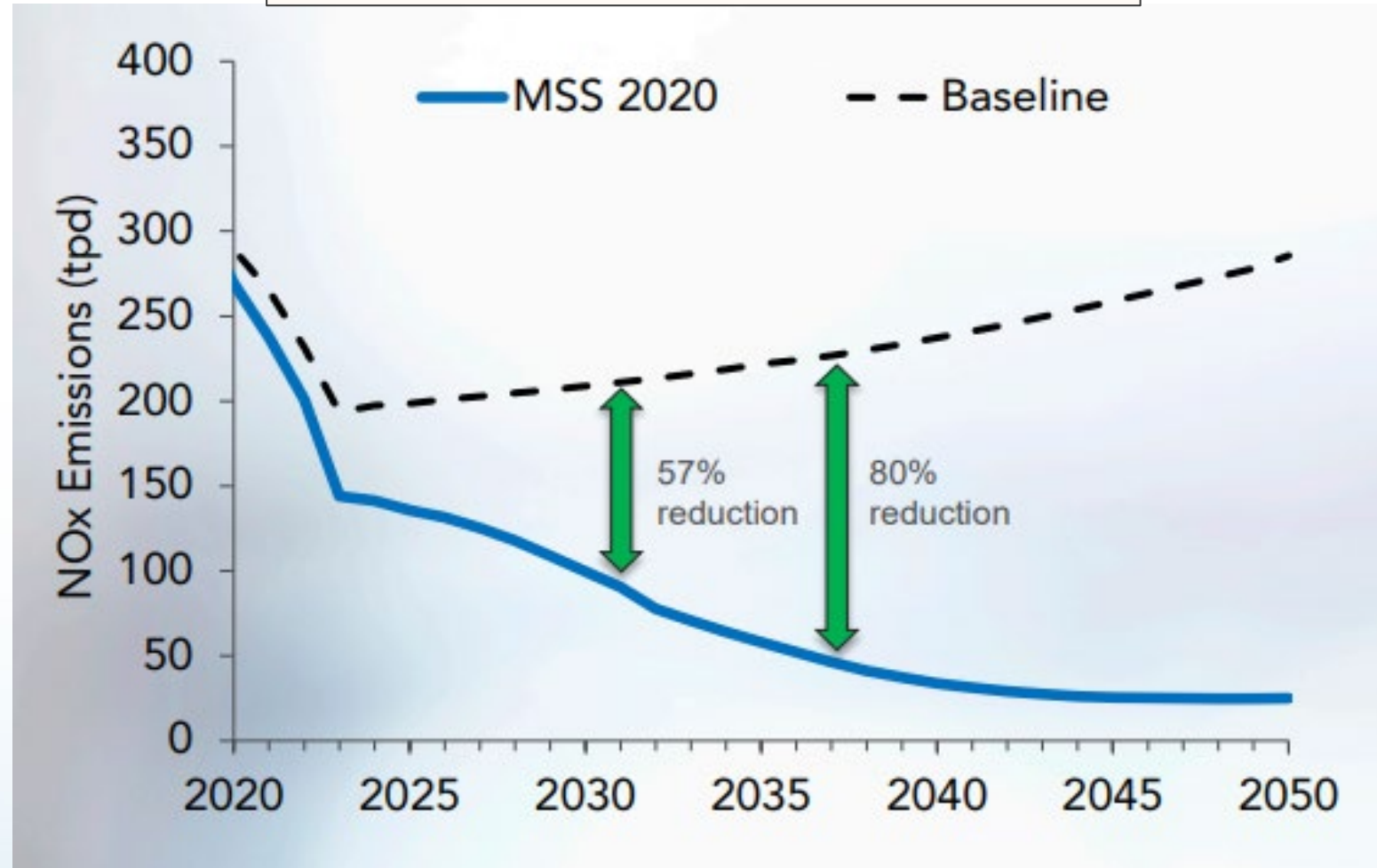
- Background and need for this scenario
- Methodology
 - Differences between CARB’s Mobile Emissions Toolkit for Analysis (META) used for the Mobile Source Strategy (MSS) and CEC’s IEPR 2020 transportation energy demand forecast
- Results
- Appendix with alternative scenario



Mobile Source Strategy

NOx Reductions to Reach Ozone Standards

Statewide Reductions in NOx



NOx is a precursor to ozone

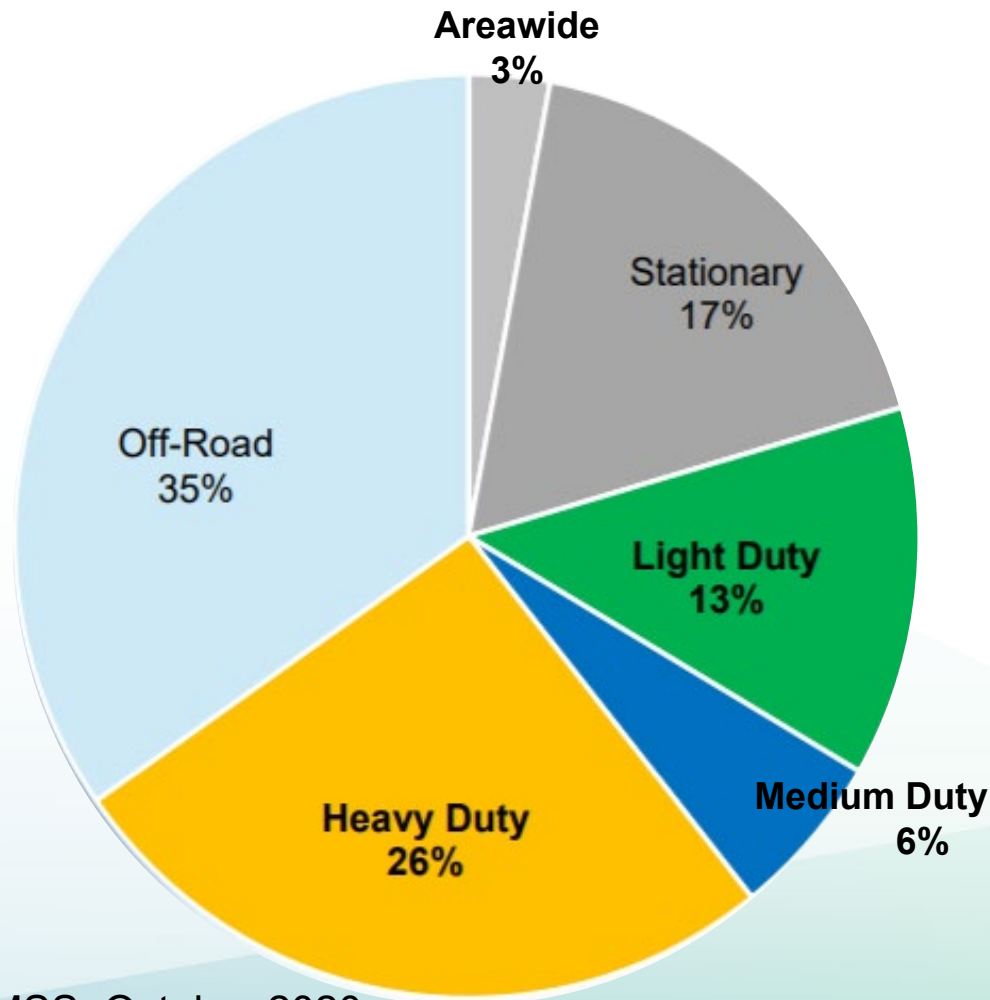
For SCAB to meet the 2031 Federal ozone standard, a 55% reduction in NOx emissions is needed

Source: MSS Webinar October 2020



Sources of Statewide NOx Emissions

MD-HD on-road vehicles make up 32% of NOx emissions in the state

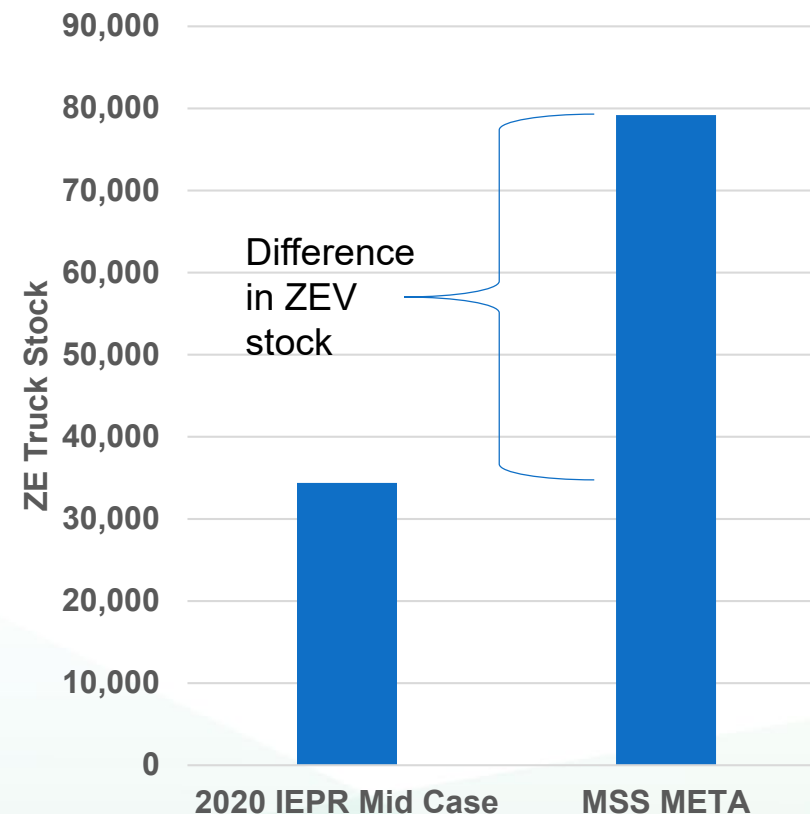




Need for the Attainment Scenario

- South Coast Air Quality Management District (SCAQMD) is pursuing strategies to encourage replacing internal combustion engine (ICE) MD-HD vehicles with zero emission vehicles (ZEVs) in the South Coast Air Basin (SCAB)
- In particular, aging Class 8 diesel tractors are targeted, since they are the largest onroad NOx generators
- The MSS target number of ZE Class 8 Tractors is substantially higher than the CEC forecast results; other classes CEC evaluates are closer to target
- If these strategies were put in place, SCE and other utilities in the region will need to plan for the impacts to electricity consumption

2031 ZE Truck Stock in SCAB





Attainment Scenario Methodology

- CARB and SCAQMD staff shared META results for SCAB for 2031, which included ICE and ZE vehicle populations and fuel consumption
- CEC staff started with the mid-case truck choice and freight forecast assumptions, then adjusted incentives and truck retirement age, using a combination of vehicle stock and ICE fuel consumption in META as the target*
 - Incentives differ between classes, from 25% of the purchase price for Class 3 to 65% for Class 8 Tractors
 - Retirement age is 13 years for Class 8 Tractors
 - Transformed model output by BEA/FAF regions to SCAB region
 - Calculated annual electricity consumption and attributed to utilities in the region; applied load shapes to determine the contribution to peak demand for SCE territory

* Staff could not use stock alone as the target because of differences in VMT

Note that an alternative scenario using a retirement age of 15 years for Class 8 Tractors and an incentive for Class 8 Tractors of 80% of the total ZEV purchase price provides a similar result in the Appendix and provides a similar result.



Methodology Differences

CEC Mid-case Forecast

- Total MD-HD stock is lower in the base year
 - MD-HD vehicles defined as gross vehicle weight 10,000 pounds or over
 - Economic growth is adjusted for COVID-19
- CEC able to evaluate ZEVs for four classes
- ZEV adoption is based on total cost of ownership, yielding more ZEVs in Classes 3 to 6, less ZE Class 8 Tractors, given the same incentive
- Uses CA-VIUS Survey (2017-18) VMT/vehicle
- Less new trucks are needed to meet demand as old trucks are replaced, since the VMT of new trucks is higher

Draft META October 2020

- Total MD-HD stock is higher in the base year
 - MD-HD vehicles defined in EMFAC 2017 as gross vehicle weight 8,500 pounds and over
 - Economic growth and total VMT is based on MPO forecasts
- ZEV adoption targets classes with highest NOx and has near-zero ZEVs in Classes 4, 5, and 6 and more ZEVs in Class 8
- VMT per vehicle based on EMFAC 2017



SCAB Ozone Attainment Results

based on modifying incentive levels and retirement age

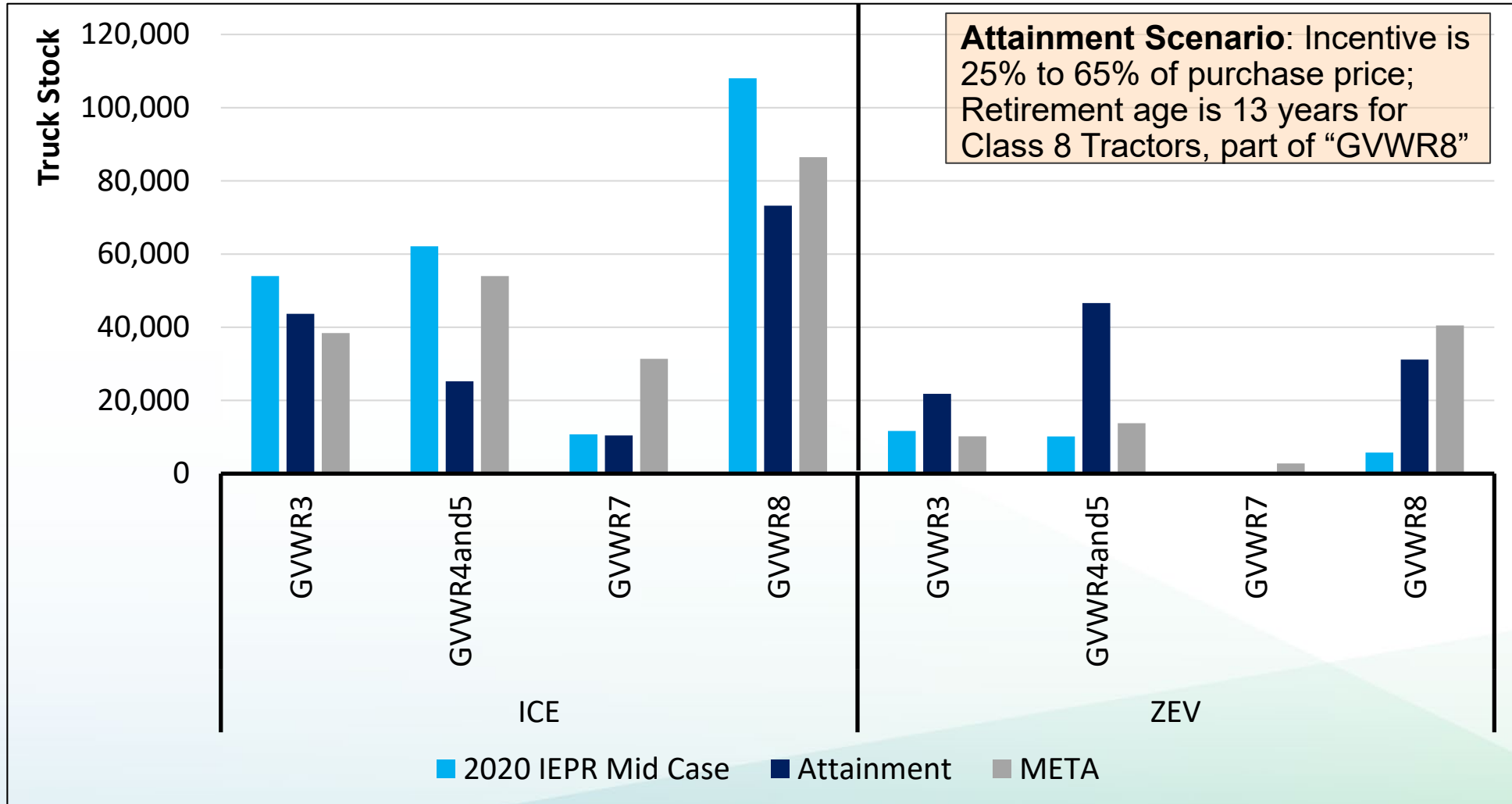


ICE and ZE Truck Counts in 2031

South Coast Air Basin

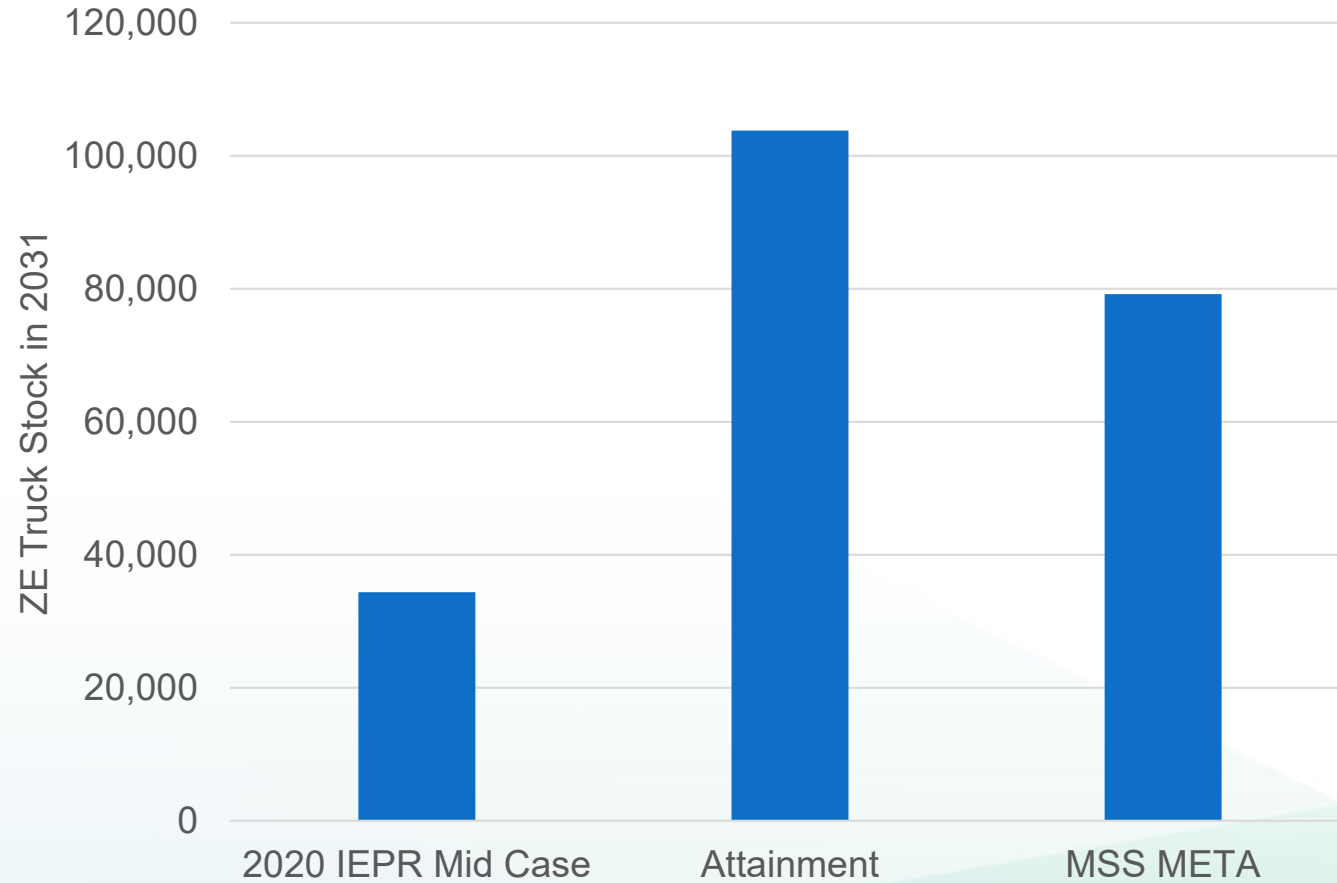
Internal Combustion Trucks

Zero-emission Trucks





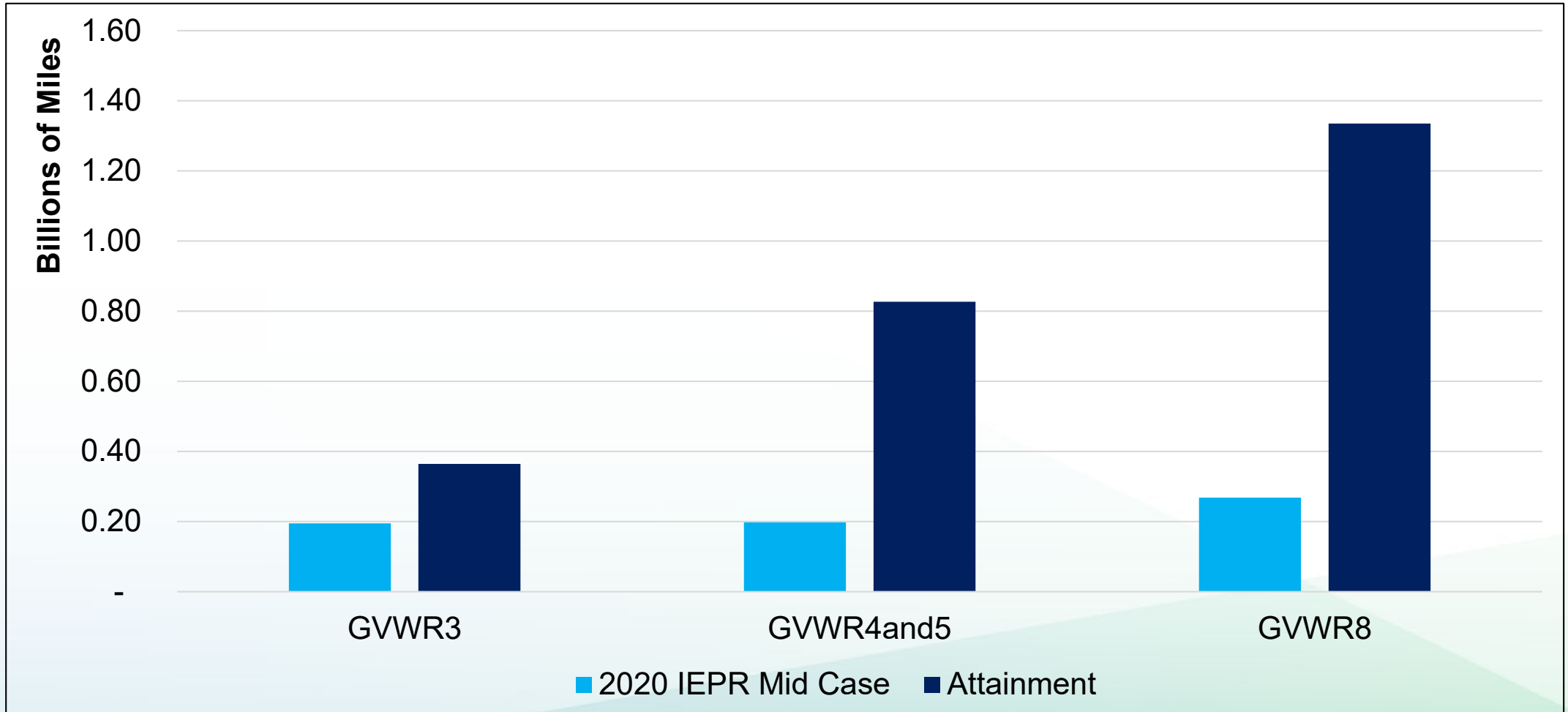
Overall ZE Truck Counts in 2031





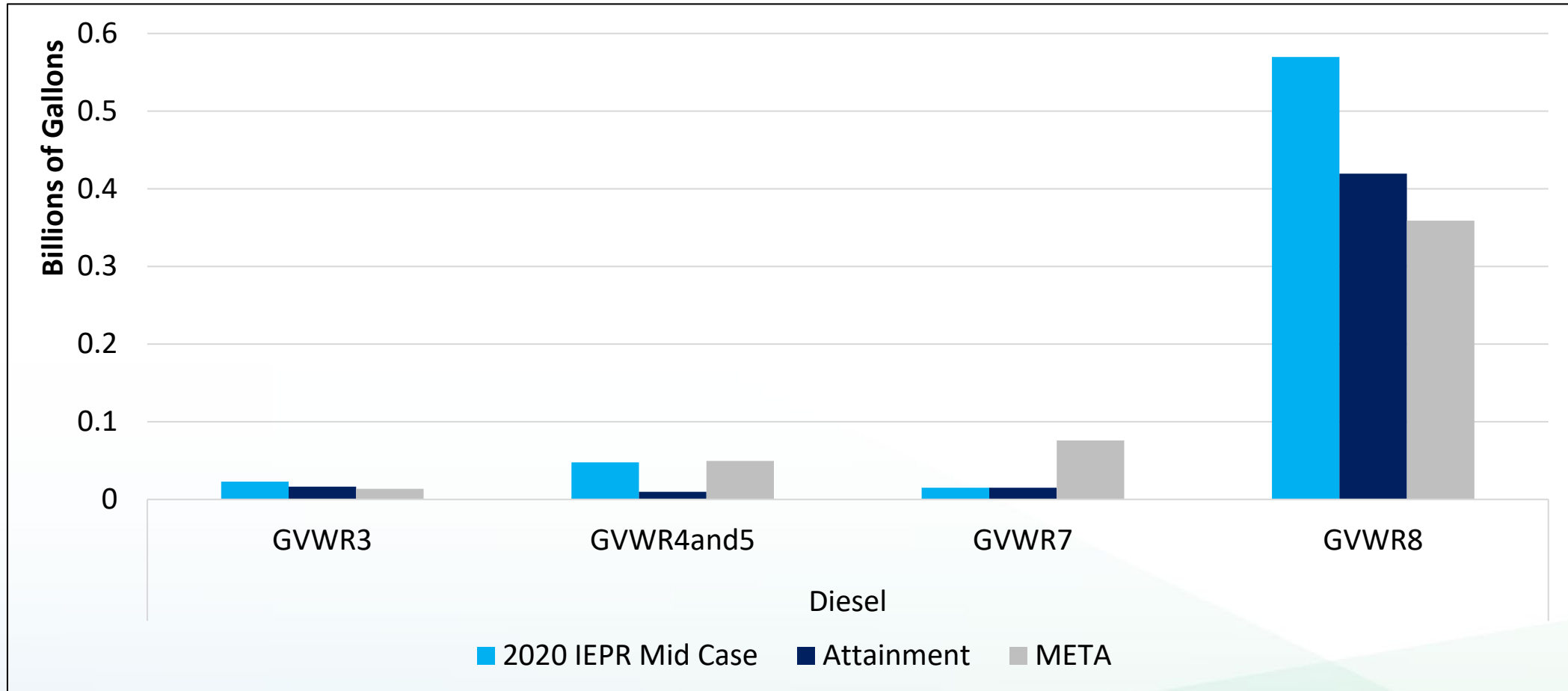
Battery Electric Truck 2031 Annual VMT in SCAB

More electric trucks in the attainment scenario result in higher annual VMT than the mid case.



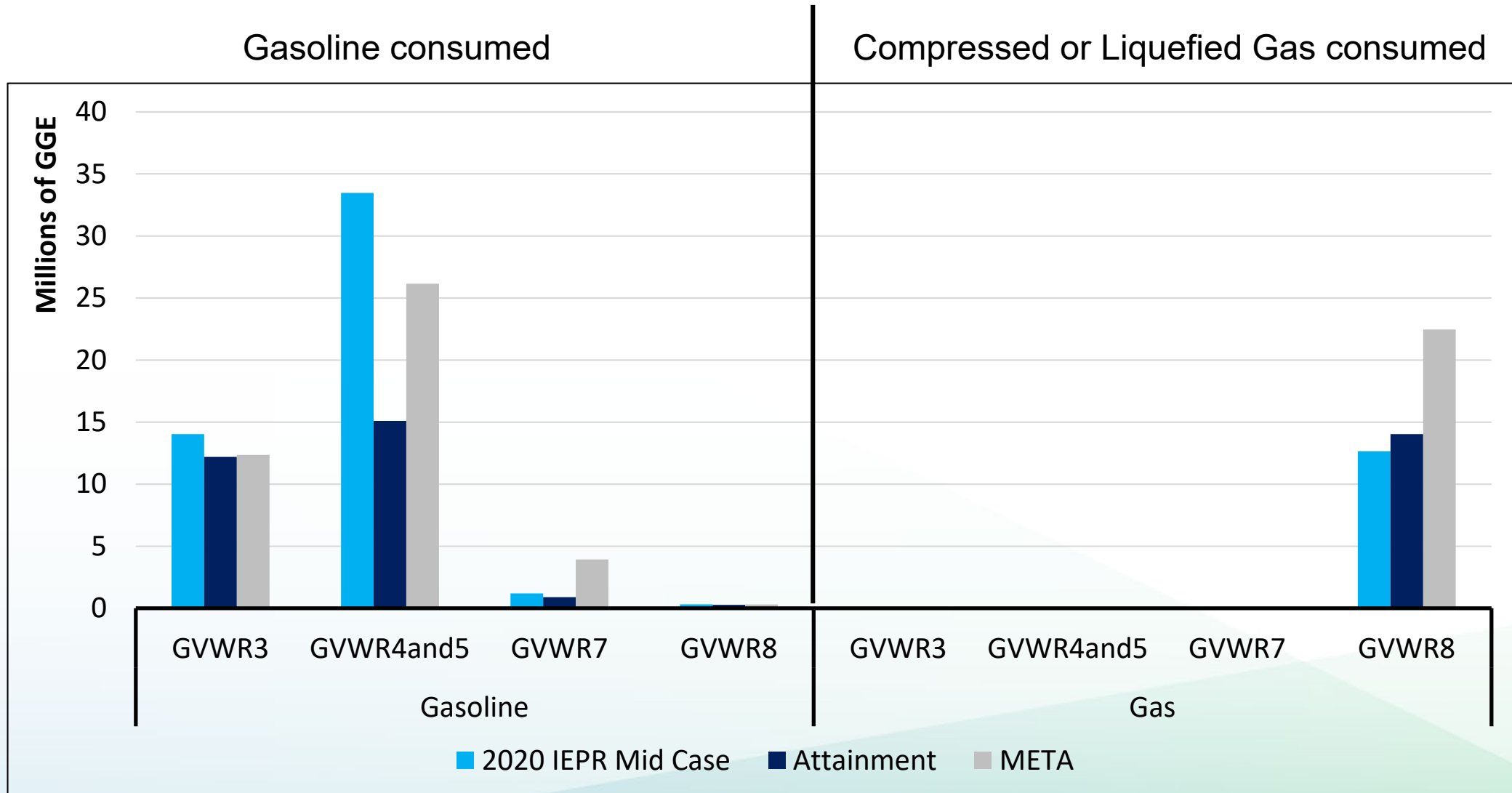


Diesel Consumption in 2031





Gasoline and Gas Consumption in 2031





Added Electricity Consumption from Charging Battery Electric Trucks

- Annual electricity consumption in 2031 is 1,684 GWh more than the mid case
 - Approximately 71% is in SCE territory, 27% is in LADWP, and 2% is in Burbank Water and Power*
- Adds 164 MW to SCE's summer peak (weekday hour 19) in 2031 (above the mid case)

*Forecast zones have different boundaries than air district regions, so this is a very rough approximation based on the distribution of forecasted electricity consumption in forecast zones 7, 11, 16, 17, and 18



Key Takeaways

- ZEV populations from different models should not be compared without also considering VMT and fuel consumption
- The intent of the state's ZEV goals is to reduce criteria pollutant emissions and GHG emissions, which are dependent on VMT and the portion of VMT driven by ZE versus ICE vehicles
- Staff recommend that ZEV goals and metrics be in terms of reducing emissions and fossil fuel use, in addition to a vehicle population target



Thank You! Questions? Comments?

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Appendix





Alternative Scenario: GVWR8 Combo Population Results

- Comparing the Attainment scenario with an Alternative Attainment scenario which accounts for the following:
 - Increased truck purchase price incentive from 65% to 80% for GVWR8 Combo
 - GVWR8 Tractor retirement age increased from 13 to 15 years
- Incentives and retirement age for all other classes remained the same

