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Transportation Energy Demand Enhanced Policy Scenario

CEC Demand Scenarios Project

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Acronyms and Initialisms

CEC – California Energy Commission
DGE – Diesel Gallon Equivalent
EAD – Energy Assessments Division
EER – Energy Efficiency Ratio
EPS – Enhanced Policy Scenario
IEPR – Integrated Energy Policy Report
GHG – Greenhouse Gas (emissions)
H2 – Hydrogen
LD – Light-Duty (vehicles)
MPG – Miles per Gallon
MPGe – Miles per Gallon Equivalent
OGV – Ocean-Going Vessel
OOS – Out of State (aviation)
TRL – Technology Readiness Level
UN – United Nations
VMT – Vehicle Miles Traveled

Framework for Demand Scenarios in Transportation

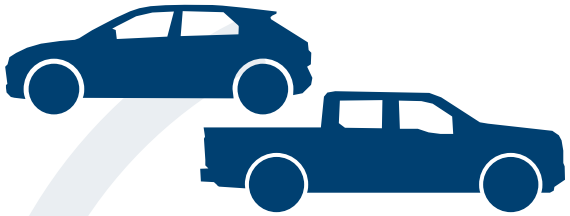
Existing Policies and Economic Drivers (mostly captured in the IEPR forecast)

Near-term policies recently or expected to be adopted

Goals with technological pathways informed by market and policy analysis

Transportation Energy Demand Scenarios

Modifications to the Policy Scenario for EPS



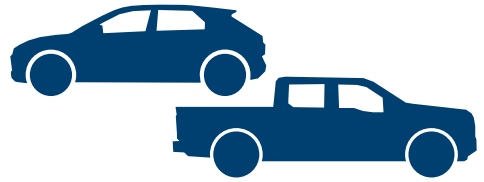
Reduction in LD VMT

Increased OOS Aviation Electricity and Hydrogen Use

Increased Electrification of Off-Road Vehicles

Additional H2 Demand for OGVs

EPS LD VMT Reduction



Major Description

- Per capita LD VMT ↓10% by 2030 and ↓15% by 2045 (vs. 2023)

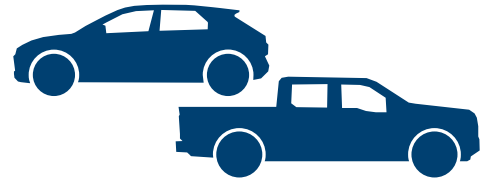
Context

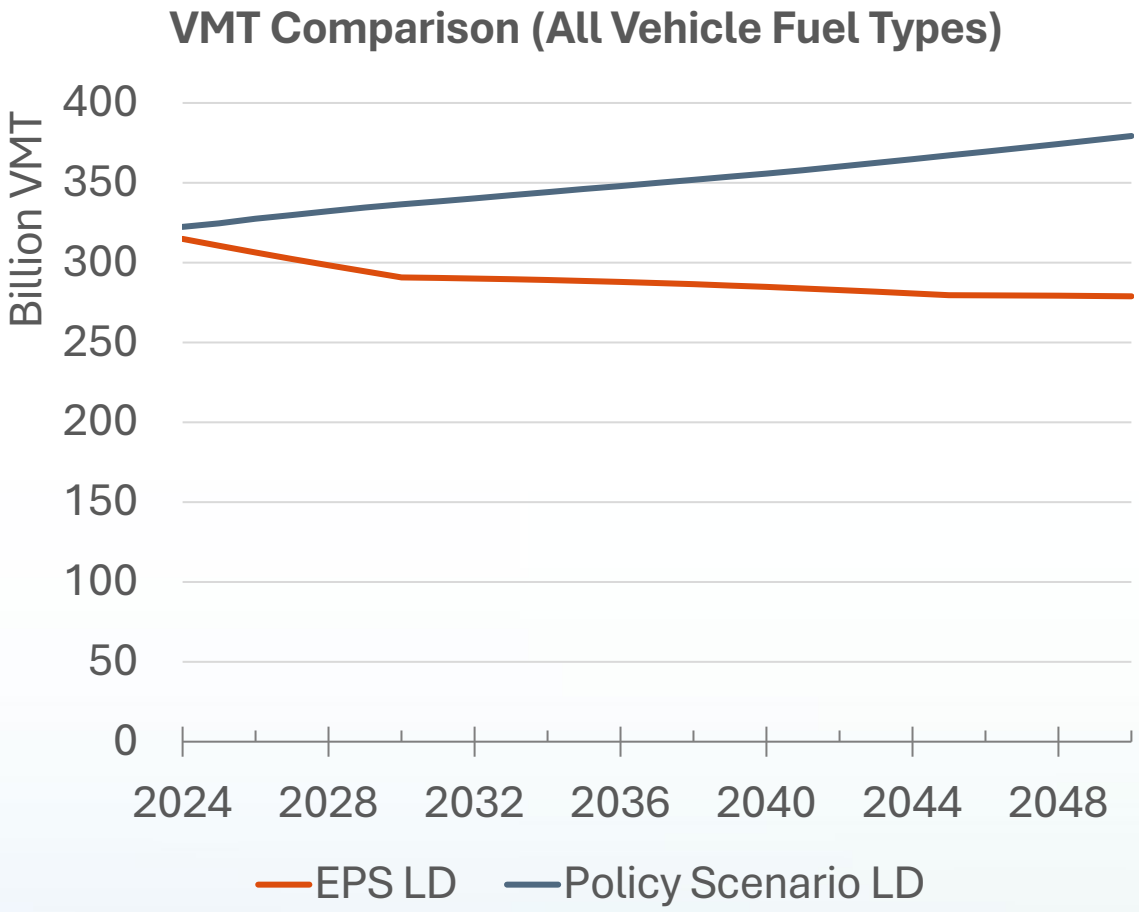
- Vehicle classes are not distributed geographically uniformly
- Vehicle classes have varying MPG/MPGe

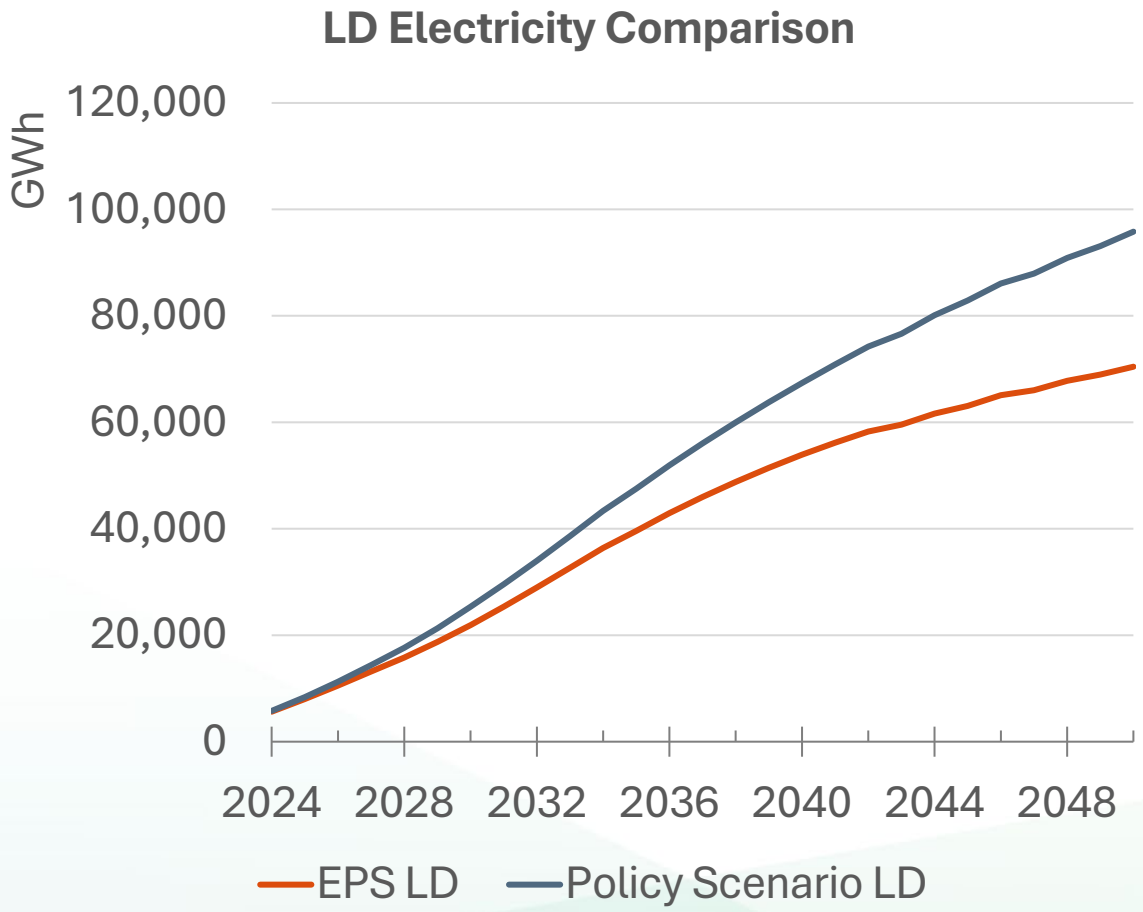
Method

- Calibrate per capita VMT to future VMT reductions (vs. 2023)
- Vehicle registration data for urban/rural proportions by county
- No VMT reduction assigned to Census-designated “rural” vehicles
- “Urban” VMT makes up the entire reduction requirement

EPS LD VMT Reduction Results







Reference Scenario has the same LD VMT and energy demand as the Policy Scenario

Source: CEC Staff

EPS for Aviation

Major Description

- Opportunities exist for zero-emission aviation, but there are limited use cases

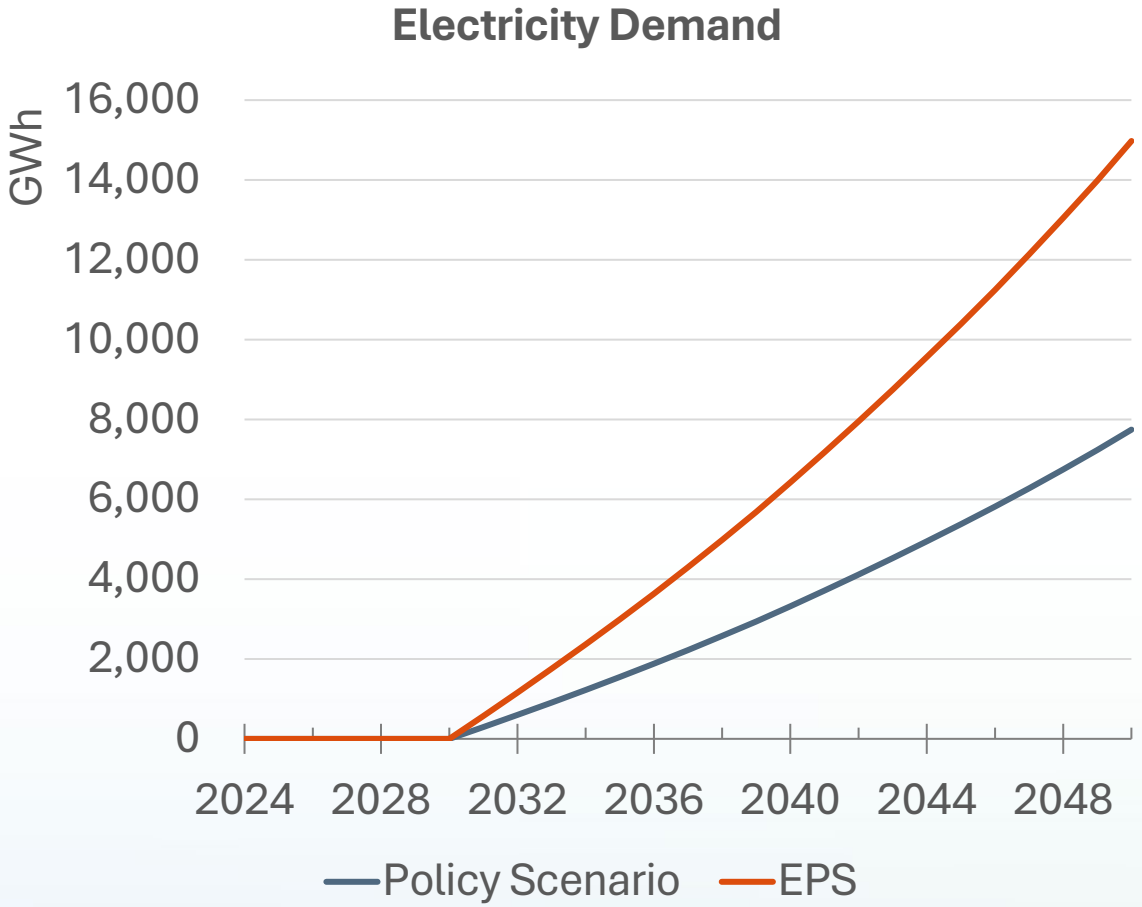
Context

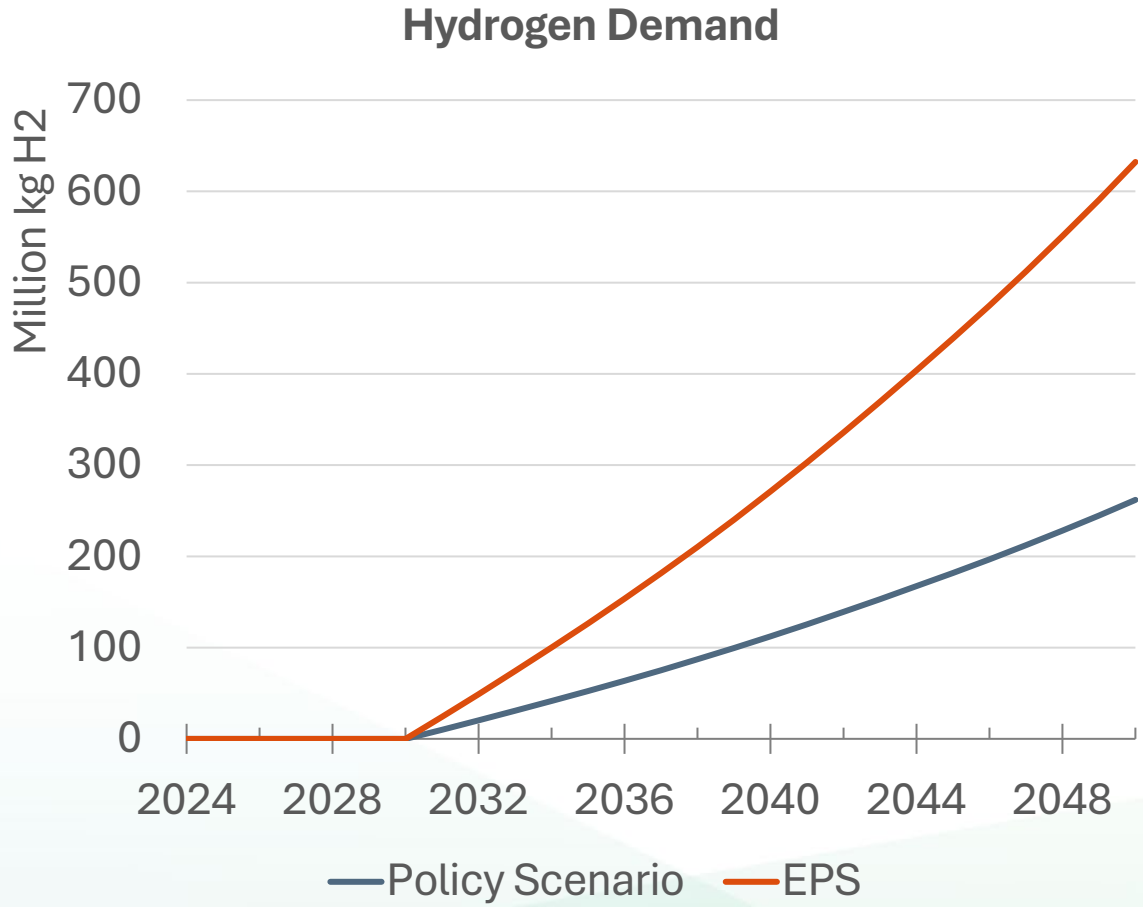
- TRL for battery-electric planes and fuel cell electric planes has increased in recent years (TRL 5-8, large prototypes and demonstration)
- Large investments by aviation industry

Method

- Use existing policy scenario for in-state electricity and hydrogen penetration
- Double OOS electricity and hydrogen penetration (10% each by 2045)
- EERs applied to replace jet fuel (2 for electricity, 1.5 for hydrogen)

Results for Aviation EPS

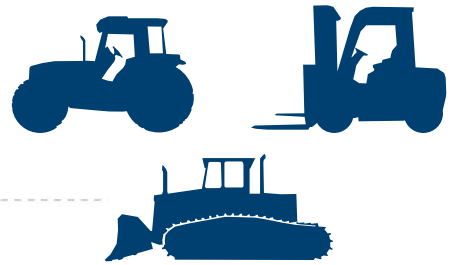


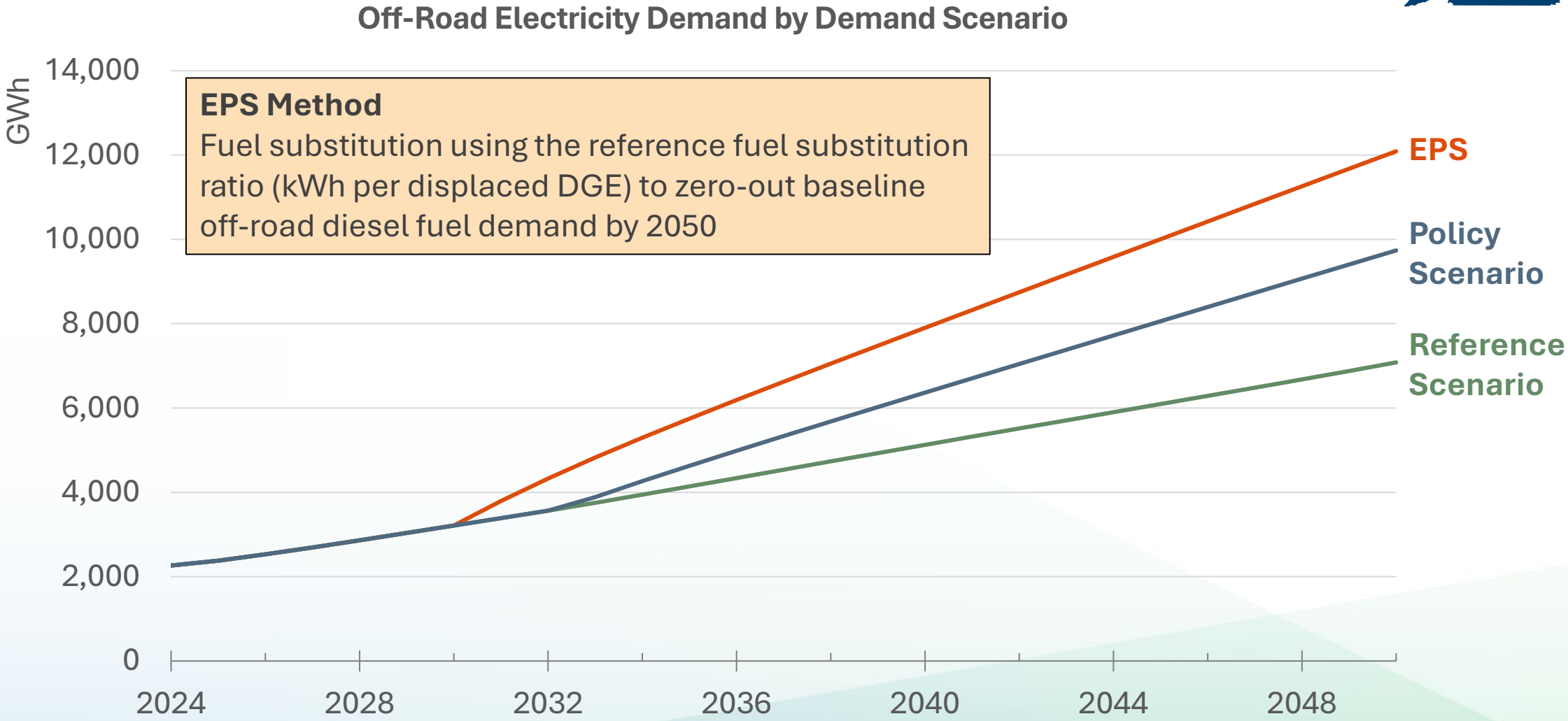


Reference Scenario has no electricity or hydrogen demand for aviation

Source: CEC Staff

EPS for Off-Road Electrification





Source: CEC Staff

EPS for OGV H2

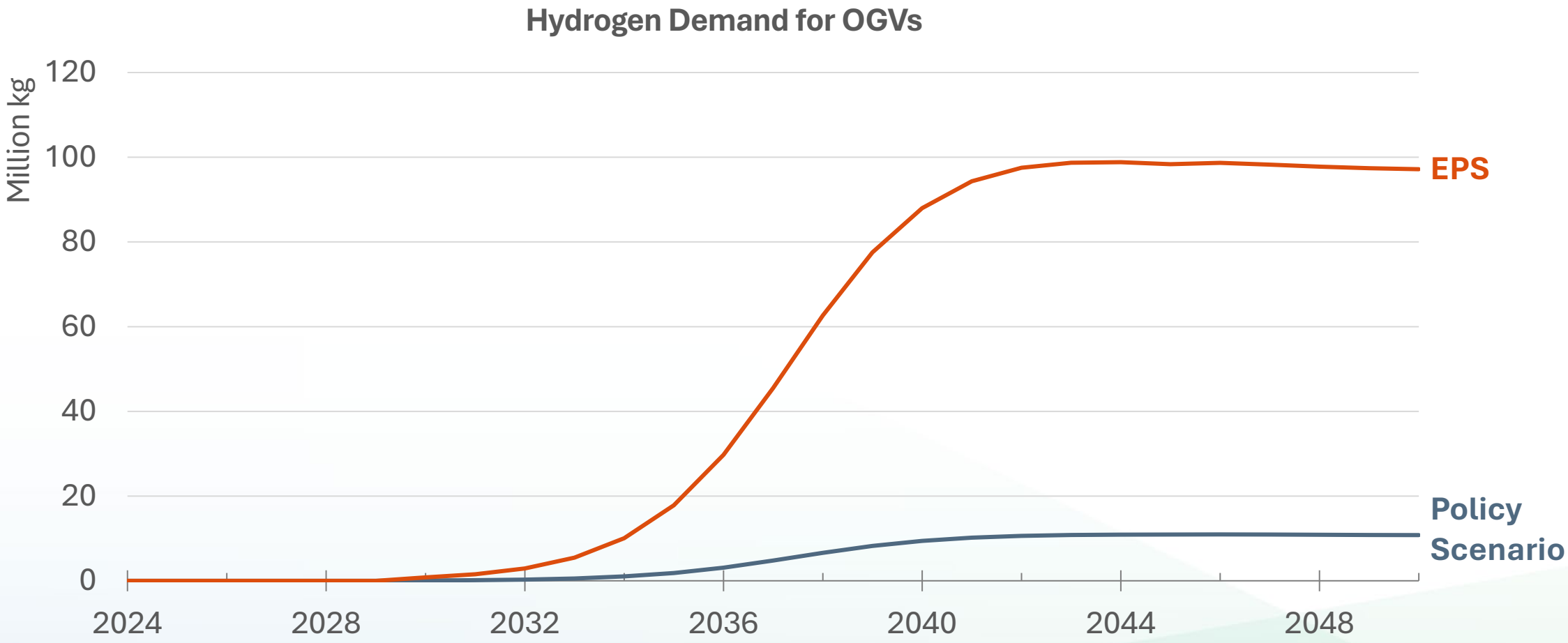
Context

- OGVs are challenging to regulate due to international and other OOS activity
- International actions will likely have a market impact in California
- UN International Maritime Organization Strategy (July 2023)
  - GHG reduction goal of 70% by 2040
  - No enforcement mechanisms, some proposals
  - Major shipping companies have 80+ methanol ships on order
- Hydrogen a potential fuel or an energy input into other low-carbon OGV fuels
  - Green Methanol
  - Green Ammonia

Method

- Starting in 2030, hydrogen substitution of OGV energy by hydrogen, approaching 50% by 2045

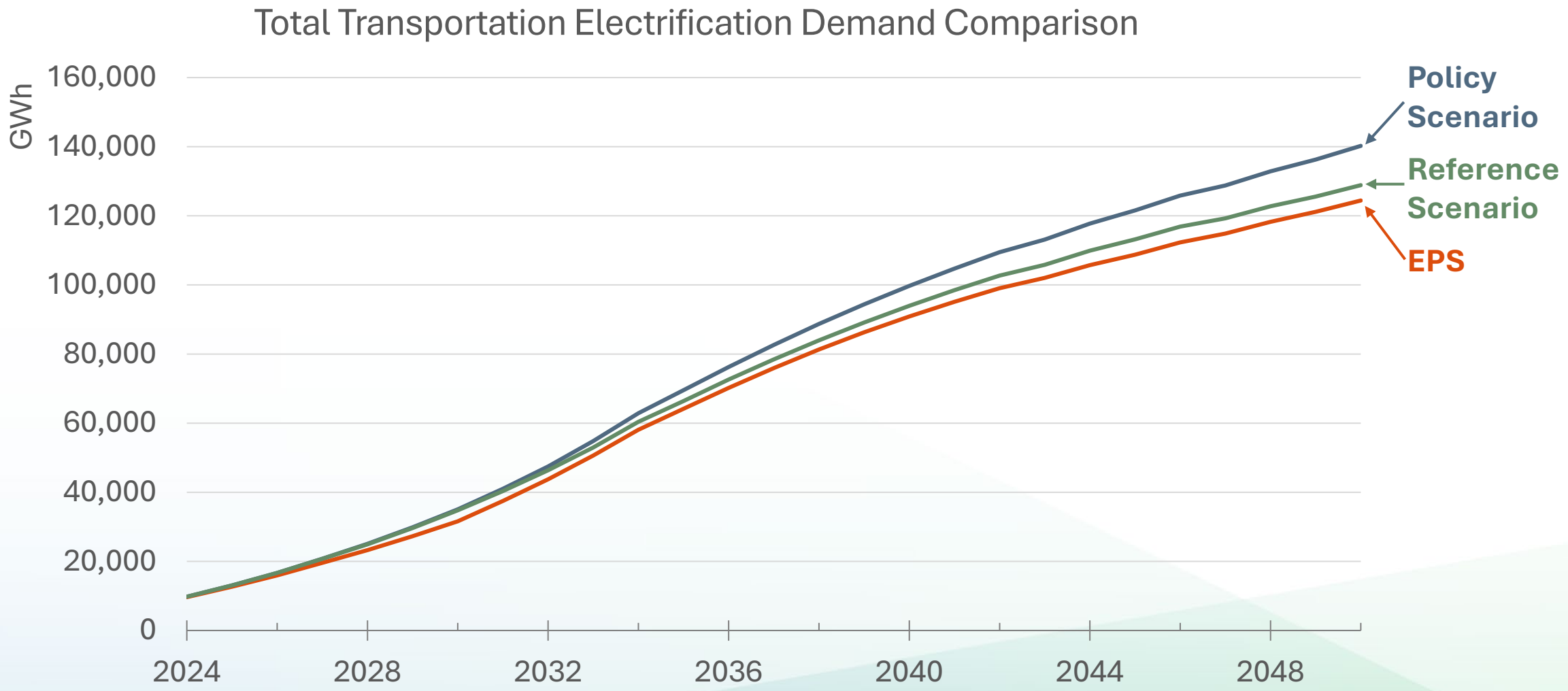
EPS for OGV H2 Results



Reference Scenario has no hydrogen demand for OGVs

Source: CEC Staff

Total Transportation Electrification Demand



Source: CEC Staff

Thank You!

Questions?

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