Transportation Forecasting: Light Duty Vehicle Model Inputs and Assumptions

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Overview of 2022 IEPR Updates

- Demand Forecasting Models
- Forecasting Inputs
- Light Duty Vehicle (LDV) Classes
- Plug-in Electric Vehicle (PEV) Scenarios

LDV Demand Forecasting Models

LDV Models

- Personal Vehicle Choice (PVC)
- Commercial (light duty) Vehicle Choice (CVC)
- Government
- Rental

LDV Attributes/Variables

Vehicle price, MPG, Range, Acceleration, Maintenance Cost, Refueling Time, Time to Station

ZEV Policy Incentives/variables for LDVs

State Clean Vehicle Rebate, State Clean Fuel Rewards, State HOV lane Access, Federal Tax Credit (IRA)

LDV Demand Models Remain the Same as Used in 2021 IEPR

- Differentiates between **luxury and standard** vehicle preferences
- High resolution of household income categories **(10 total)**
- **514 household types**
  - By household income, household size, and level of vehicle ownership (1, 2, 3+ vehicle household)
- Rebate incentives **by threshold income category**, more consistent with current CVRP practice
- All model parameters will remain the same, except for the following updates:
  - Consumer preferences for ZEVs
  - Higher preferences for BEVs compared to 2021 IEPR, reflecting the current market
- Models do not accommodate new IRA criteria for tax credit, so incentive amount was adjusted for qualification criteria.

LDV Classes Remain the Same as in 2021 IEPR

Car
- Subcompact (e.g. Nissan Versa)
- Compact (e.g. Honda Civic)
- Midsize (e.g. Tesla Model 3)
- Large (e.g. Mercedes E-Class)
- Sport (e.g. Ford Mustang)

SUV/Crossover
- Subcompact **(e.g. Hyundai Kona EV)**
- Compact (e.g. Toyota RAV4)
- Midsize (e.g. Toyota Highlander)
- Large (e.g. Chevy Traverse)

Van
- Compact (e.g. Dodge Grand Caravan)
- Large (e.g. Honda Odyssey)
- Heavy, 8,500-10,000 GVW (e.g. Ford Transit)

Pickup
- Compact (e.g. Toyota Tacoma)
- Standard (e.g. Ford F-150)
- Heavy, 8,500-10,000 GVW (e.g. Ford F-250)

Source: CEC staff

Input Updates

- Economic & Demographic Data
- Energy Prices
- Vehicle attribute (price, range, MPG …etc) forecasts **updating**:
  - Vehicle Price and MPG, set to actual values to 2022 MY, for all fuel types & classes
  - Range & selected other attributes
  - Differentiating between luxury and standard vehicle attributes
  - Technology introduction & elimination schedules
  - Should Light duty ZEVs be the only option in 2035?
- IRA tax credit incentives
- Forecasting Horizon: 2021-2035

2023 IRA Tax Credit

Up to $7500 tax credit, ending in 2032, applied at the point of sale, but comes with requirements and thresholds:

- Income Threshold similar to (not the same) what applies to California Rebate
- Vehicle Price Threshold at $55,000 for sedans & $80,000 for light Trucks to 14,000 GVWR
- Assembly location requirement: North America
- 7kWh minimum battery size (limits PHEVs)
- Battery manufacturing location requirement (starting in 2024)
- Battery material source requirement (starting in 2026)
- Hence the adjusted tax credit amount

$$Tax\ Credit = \left(1 - \frac{2022\ unqualified\ ZEV\ cars\ \&\ light\ trucks}{2022\ total\ ZEV\ sales}\right) * (1 - \%High\ Income\ Household) * \$7500$$

- Gradually increasing the tax credit over time by reducing the %unqualified vehicles to equate with % luxury vehicles in 2032
- 2022 tax credit will remain constant to 2024 and increases %qualified to the current % of standard (non-luxury) vehicles in total new vehicle sales, by 2032.

OEM Electrification Plans

Domestic Brands

Chrysler	2028
Cadillac	2030
Chevy/GM/Buick	2035
Ford	2035

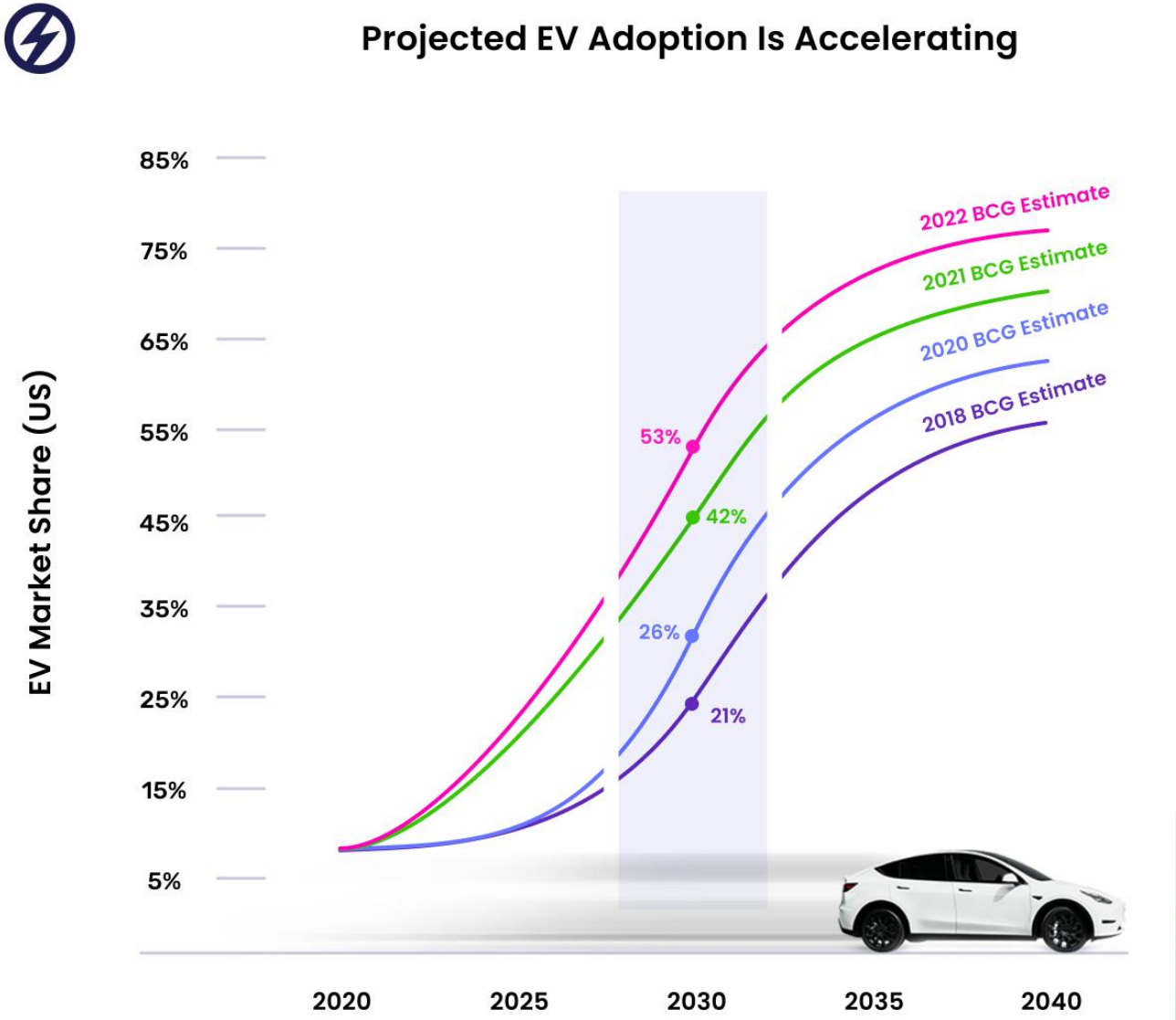
Foreign Brands

Jaguar	2025
Alfa Romeo	2027
Lotus	2028
Mercedes	2030
BMW	2030
Lexus	2030
Volvo	2030
Lexus	2030
Rolls Royce	2030
Bentley	2030
Volvo	2033
Toyota	2040
Honda	2040

Baseline Mid Case Forecast: PEV Inputs & Assumptions

INPUTS/Assumptions	Baseline Mid Case Forecast
ECON/DEMO	Mid
PREFERENCES	
Consumers' PEV Preference	Increase with PEV market growth
INCENTIVES/Regs	
Federal Tax Credit/IRA	Less than $7500 in 2023 & increasing afterward to 2032
Clean Fuel Rewards	To 2030
State Rebate	To 2025
HOV Lane Access	To 2025
100% ZEV New Vehicle Sales Target 2035?	?
ATTRIBUTES	
Availability of PEVs (2035)	PEV models available in **13** of 13 CEC's LDV classes, in Standard and/or luxury
Vehicle / Battery Price (by 2035)	PEV prices based on battery price declining to **~$71/kWh**
Max. Range (2030)	~300 miles for Standard, 500 Premium
Refuel Time (2030)	15 -21 min
Time to Station (2030)	Same as gasoline
Results	??

Boston Consulting Group's National EV Market Share Forecasts Over Time



Source: https://www.recurrentauto.com/research/ev-adoption-us

Questions/Comments?

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