Transitions and Challenges Related to ARB ZEV Regulation

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ZEV Scenario

![Graph showing ZEV Sales Shares from 2010 to 2050 with different lines representing ZEV Transit Bus, ZEV Truck, ZEV LH, and ZEV LDVs.](image)
ARB and STEPS+ ZEV sales

Sales Shares

Sales Fraction

2020 2025 2030 2035 2040

ZEV Truck  ZEV LH  ARB Class 4-8 voc  ARB Class 7-8, 2b-3

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ZEV Mandate Project

• Transportation Transitions Model, Truck Choice Model
  – Focus on market penetration of ZEVs in trucking sector
• Interest in ARB ZEV truck mandate
• SF members suggested a deeper dive into mandate
• Talk to OEMs, fleets to understand their issues
• Hopefully find solutions or modifications to mandate to alleviate perceived issues
• Focus has been on BEVs rather than FCVs
• Send white paper to ARB in mid-June with suggestions to improve the mandate
  – Goal: Make mandate work for everyone
Three Legs of Stool

- OEMs
  - Must make ZEV trucks that meet fleets’ needs at affordable price
- Fleets
  - Must purchase ZEV trucks that OEMs make
- Infrastructure (Utilities)
  - Charging infrastructure must be available when ZEVs are purchased
  - Electricity price must not be excessive (demand charges) and ideally price will be known
  - Fleets should have as little uncertainty as possible
Cost Issues

• Range
  – Fleets: minimum 100 miles
  – Battery degradation over life
  – Minimum range every day (i.e. weather, auxiliary loads)
  – Actual range much larger (> 150 miles)

• LCFS credits
  – Uncertainty for fleets: credit value, use credits to lower electricity price (trade in market, own credits)

• ARB TCO comparison period (12 years)
  – Long for fleets

• Need for incentives for some period
Credit System

- PHEVs
  - Minimum range too short? (10-35 miles)
  - Incentivize longer all electric range
- Function of vehicle range
  - Make credits a function of vehicle range (e.g. < 100 miles = 1 credit, 100-150 miles = 1.25 credits, > 150 miles = 1.5 credits
  - Similar to LDV system
Infrastructure

- Infrastructure must be available, electricity should have defined, modest price
- No mandate for infrastructure (as for sales, purchase)
- Utilities may not continue to receive large $ for infrastructure installation
- Fleets may not own land
- Substantial upgrade for infrastructure
  - 1-2 years lead times
  - Fleets may need to wait for infrastructure
- Fleets must work with utilities as early as possible
Educate Fleets

• Transit bus issue
  – Transit agencies don’t view BEVs as significantly different from conventional vehicles
  – What range is needed for their routes (after degradation and in all weather conditions)?
• Fleets don’t know pros and cons of BEVs (or FCVs)
  – Range issues
  – Charging issues (what type, how many, how affect operations, lock in rates, etc.)
• Educate fleets before they make purchase decisions and before they install infrastructure
  – Who should do this?
Mismatch Between Sales and Fleet Use

- OEMs
  - Choose to produce ZEVs for particular applications based on their capabilities, their view of market, the credit system, other factors
- Fleets
  - Will be mandated to purchase or use ZEVs based on their reporting (fleet size, fleet vehicles, etc.)
- Potential for mismatch in vehicles OEMs produce and what fleets want to buy or use
- Difficult to match sales and purchase requirements exactly
Thank You