Plug In Hybrid Electric Vehicle Test Procedures Amendments and Aftermarket Parts Certification Requirements

California Air Resources Board
Public Hearing
January 23, 2009

Outline

- Hybrid Vehicle Technology
- Emission Test Procedures Amendments
  - Exhaust
  - Evaporative
- Fuel Cell ZEV Range Determination
- Aftermarket Parts Certification Requirements
- Summary and Staff Recommendation

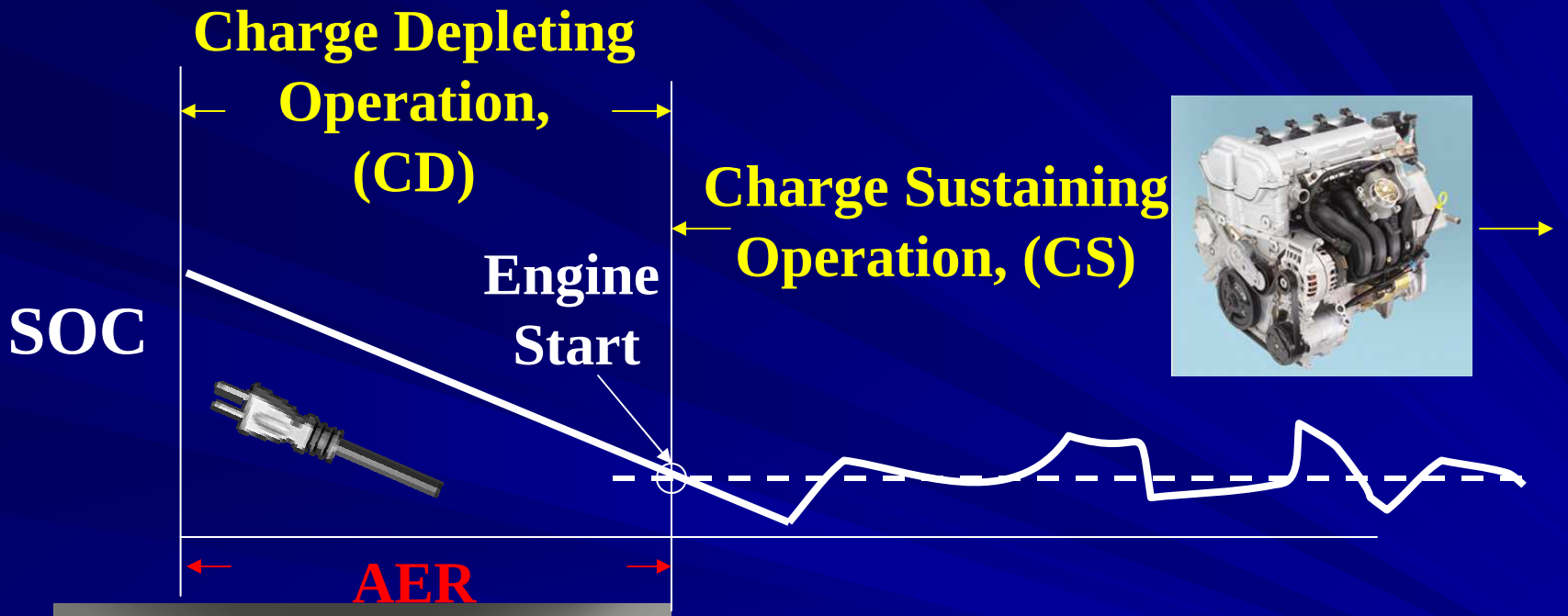
Conventional HEV

- Both internal combustion engine and electric motor operate simultaneously or independently to provide motive power
- Batteries charged by engine and braking
- No plug for external connection to electrical source
- Engine operates most of the time, catalyst warm, emission controls efficient
- Emissions from frequent start/stop of engine captured by existing test procedure

Plug In HEV (PHEV)

- Both internal combustion engine and electric motor operate simultaneously or independently to provide motive power
- Battery charged by engine, braking and external source of electricity
- Once battery depleted, engine provides energy to propel vehicle
- Two types
  - All electric range PHEV
  - Blended PHEV

All-Electric Range PHEV Operation



Vehicle Operation

PHEV with Blended Operation

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PHEV Amendments- General

- Align with SAE J1711 (in development)
- Similar to existing Hybrid Test Procedure
- Quantifies and evaluates criteria emissions under worst case operating scenarios
- Determine electric range contribution
- Determine ZEV credit qualifications

Specific Amendments

- Urban Charge Depleting Range Test, Highway Charge Depleting Range Test
  - Continue sampling until charge-sustaining range reached
- Minor conforming changes for conventional HEVs and ZEVs

Amendments necessary to determine ZEV Credit

- Zero Emission VMT Allowance
  - Equivalent All Electric Range Determination
  - Utility Factor
- Advanced Componentry
  - Minimum 10 mile All Electric Range
  - Type F – UDDS
  - Type G – US06

Evaporative/ORVR TPs PHEV Amendments

- Engine operation essential for canister purging
- Depending on owner habits, PHEV engine may operate infrequently
- Amendments simulate real world conditions, capture worst case emissions

Specific Amendments

- Definitions
- Preconditioning Revisions
- Test Procedure Revisions

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Fuel Cell Range Determination

- Needed for ZEV Regulation credit determination
- Current method developed for battery electric vehicles
- Current method may take 20+ hours of dynamometer time for long-range vehicles

Fuel Cell Vehicle ZEV Range Determination Method

- Incorporate SAE J2572 “Recommended Practice for Measuring Fuel Consumption and Range of Fuel Cell and Hybrid Fuel Cell Vehicles Fueled by Compressed Gaseous Hydrogen”
- Less testing time
- Range calculated from fuel consumption

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PHEV Conversion Systems

- Add rechargeable battery for supplemental electric energy and controller, or replace OEM battery with larger capacity battery
- Impacts engine operation, exhaust and evaporative emissions on extremely clean vehicles
- PHEV Conversion Systems subject to Aftermarket Parts requirements

Certification & Installation Procedures

- Similar to other Aftermarket Part Certification procedures
- Applies to installations on 2000 and subsequent MY HEVs
- Exhaust and Evaporative emissions testing
- Durability
- In-Use Testing
- OBD System Compatibility
- Warranty

OBD Requirements

- Proper OBD system operation for life of vehicle is critical to California's clean air goals
- PHEV Conversion Systems must comply with OBD requirements
- Flexibility for compliance through OBD regulation

PZEV Warranty Requirements

- Within 6 years of vehicle's initial purchase
  - 10 years/150,000 miles (zero emission energy storage devices used for traction power)
  - 15 years/150,000 miles (all other parts)
- After 6 years of vehicle's initial purchase
  - 5 years/75,000 miles (all parts)

Non PZEV Warranty Requirements

- Within 4 years of vehicle's initial purchase
  - 3 years/50,000 miles (low cost parts)
  - 7 years/70,000 miles (high cost parts)
- After 4 years of vehicle's initial purchase
  - 3 years/25,000 miles (low cost parts)
  - 3 years/35,000 miles (high cost parts)

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Summary and Staff Recommendation

- Test Procedures amendments provide
  - accurate assessment of emissions for PHEVs
  - ZEV credit determination for PHEVs
- Fuel Cell ZEV range determination eases testing time
- PHEV Conversion System certification requirements ensure emission benefits
- Staff recommends Board adoption