Zero-Emission Powertrain and Vehicle Certification Requirements

2019 Truck and Engine Manufacturers Association

Compliance Workshop

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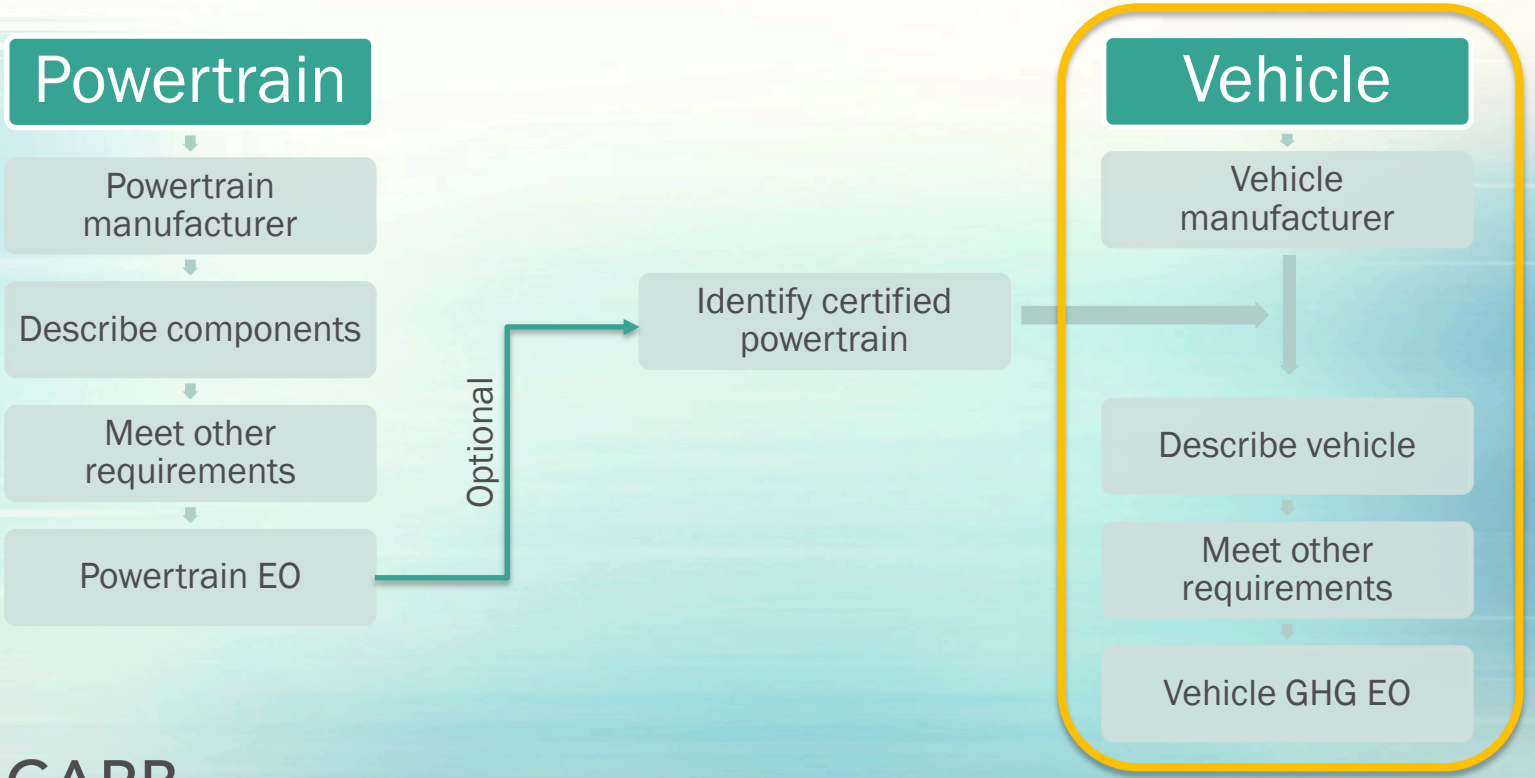
Optional Powertrain and Vehicle Certification Procedure



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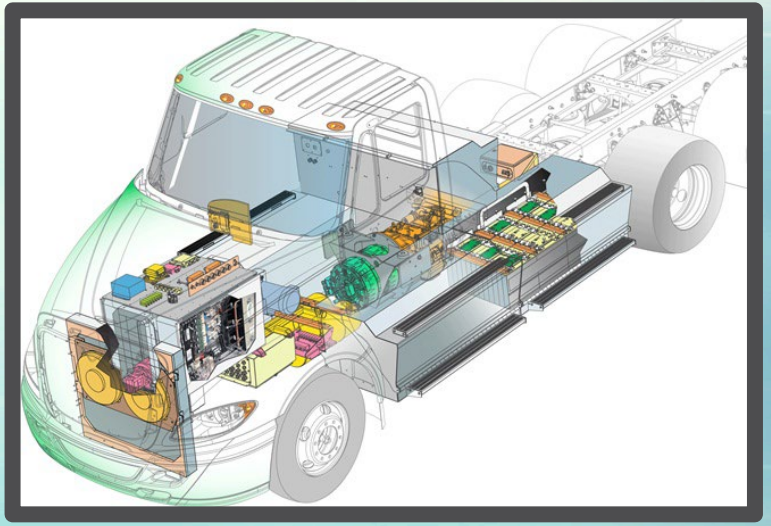
Optional Zero-Emission Powertrain Certification

Applicability of Zero-Emission Powertrain Certification

- Zero-Emission Powertrain (ZEP) certification starts with MY2021
- ZEP – HD battery electric and hydrogen fuel-cell
- Powertrains in HDV's and incomplete MDV’s

ZEP components

- Electric motor/generator
- Fuel-cell stack (if applicable)
- Energy storage system
- Battery/thermal management systems
- Interface to traditional mechanical components



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ZEP Certification Submission

- Applications submitted in DMS now
- Applications will be submitted to E-Cert
- Fuel cell stacks and battery packs are certified using powertrain families and subfamilies
- Criteria emissions and GHG certification levels are zero

Battery-Electric Powertrain Families

Substantially similar battery packs:

- Cell chemistry
- Module construction (e.g., cylindrical, prismatic, pouch)
- Battery management system
- Battery thermal management systems

Fuel-Cell Powertrain Families

Substantially similar fuel-cell stack type:

- Chemistry
- Hardware components of the stack

Different rated capacities may be grouped in one family:

- Identical components at a modular level
- Cell construction
- Thermal management strategies
- Battery management strategies

Fuel-Cell Powertrain Families

- Batteries integrated into the fuel-cell powertrain:
  - Plug-in chargeable: subject to requirements of battery-electric powertrains
  - Non-plug-in chargeable: no additional battery requirements

- Family naming convention

ZEP Application

- Letter of intent
- Description of powertrain configuration/components
- Battery capacity test results
  - SAE J1798 or
  - CARB approved alternative procedure
- Projected sales (US and CA)

ZEP Diagnostic Requirements

- Diagnostic connections and communication
  - Fault codes
  - On-board battery usage information
    - Cumulative battery throughput (energy usage)
    - Remaining battery capacity or vehicle range
    - Percentage rated battery energy capacity (battery state of health)
    - Resettable kilowatt-hour-per-mile meter (energy efficiency trip meter)

ZEP Diagnostic Requirements

- Generic scan tool compatibility or on-road display of information
  - Requires use of J1962 or J1939 diagnostic link connectors
  - Requires use of J1979 or J1939 communication protocols

Other ZEP Requirements

- Sample of powertrain family label
- Battery end-of-life plan
- Owner's manual
- Diagnostic and repair manual
- Warranty
- Third-party repair facility access to repair/diagnostic tools and service information
- Detailed application checklist to follow

ZEP Warranty & Recall

- Warranty requirement is 3 years or 50,000 miles, (design, materials, and workmanship)
- Recall at greater of 4% or 25 screened failures
- Notify fleets of recall and repair free of charge

CARB Certification of ZEP

- May be required by other zero-emission vehicle measures in the future (e.g., ZE Airport Shuttle Proposal)
- May be included in funding programs targeting more-mature zero-emission applications
- Manufacturers could use to show compliance as a selling feature

Optional Heavy-Duty Electric and Fuel-Cell Vehicle Certification

Applicability of HD Vehicle Certification Battery-Electric and Fuel-Cell

- Medium- and heavy-duty vehicles
- Vehicles can optionally use a certified ZEP

Heavy-Duty Electric and Fuel-Cell Vehicle Certification

- Applications submitted in DMS now
- Applications will be submitted to E-Cert
- Vehicle description
  - Driveshaft
  - Transmission
  - Axles
- Powertrain EO
- Detailed application checklist to follow

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Questions