EU-Commission JRC Contribution to EVE IWG: HDV in-vehicle battery durability

Web-Meeting

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In-vehicle battery durability: LDVs vs HDVs

• LDVs:
  ➢ TA of entire vehicle with specific driving cycle and test procedure
  ➢ Possibility to repeat the TA test assessing the whole vehicle, i.e., battery and power train
  ➢ Different usage profiles in different geographic areas for the MPR definition

• HDVs:
  ➢ TA of components
  ➢ Simulation tool determines fuel consumption and CO2 emissions of HDVs based on vehicle component (engine, air drag, gearbox, axles, tyres,...) input data
  ➢ Heavy-duty vehicles have a large number of different types of vehicles for a single powertrain.
  ➢ Different usage profiles, load and scope
  ➢ Assessment of the aged components
Full procedure

As Japanese proposal, same methodology as for LDV:

1. Different procedure for assessing the SOH indicators
2. Families definition is needed to be defined
3. Work is needed to define the acceptable MPR for HDV
HDV Battery Capacity Retention Assessment

• Different proposals:

  ➢ Removing the aged battery from the vehicle for component testing
    ➢ *Too expensive and ignores full vehicle losses*

  ➢ *Aged battery testing inside the vehicle applying a RTE*-like test at given mileage or years*

*RTE: Round Trip Efficiency*
HDV Battery Capacity Retention Test

• Possible RTE test:

Depleting completely the battery and fully charged it back while measuring the energy in and out at the battery to avoid combined battery-inverter efficiency and energy losses

➤ Fully deplete the battery according to a procedure to be defined:
  o Depleting by driving at defined C-rate/depleting current or by new available charging stations; assessment of the two methods accuracy needed (new systems and V2X standards under development to cover different charging mode and plugs)

➤ Fully recharge the battery according to a procedure to be defined:
  o Charging at full with a defined C-rate/charging current

➤ These two steps are performed on a new vehicle per family (at type approval) to get reference values

➤ The same procedure is performed on vehicles from the field to assess the SOCE indicator

➤ Test boundary conditions to be defined (see next slide)
HDV Battery Capacity Retention Test

- Test boundary conditions to be defined:
  - Power of charging/discharging, AC vs DC, temperature, SOC level and SOC swing…
  - Test repetitions, accuracy, distribution
  - OVC-HEV vs PEV
  - Families definition
  - Battery energy, capacity …
  - …
Thank you for the attention

Q&A

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