GTR22b: Key priorities (high level)

February 28th, 2024

Summary on Heavy Duty Industry specifics

- Electric HDVs in the EU fleet is significantly lower than for LDV **(0.1% market share 2022).** To allow industry to be competitive (conventional drive-train) with battery technology on the EU HDV and move towards decarbonisation targets needs to be reflected in regulations.
- Commercial vehicle business has an **almost infinite number of tailor-made vehicles** that can be built using a number of building blocks
- Applying the same strategy for type approval testing as is used for GTR22a for light-duty/passenger vehicles would create an enormous testing burden for low volumes for all HDV manufacturers and must be avoided.
- **In principle, LDV manufacturers develop a few variants but manufacture them in very large volumes. HDV manufacturer, on the other hand, develop an enormous amount of variants but only sell a few per variant.**
- **Scalability(component-based TA and calculation/verification for vehicle** $UBC/E_{certified}$**) is of high importance for HDV industry, similar to the VECTO-type approval process**

- **The following slides shall show why we need a dedicated workshop to work out all the complex details on a feasible HDV Battery Durability GTR22b**

Procedure: Metrics and References

Challenges

Method 2: BIDI
- availability of in-vehicle technology; availability of testing equipment and facilities

Method 1a,b: on-road
- external equipment installation and accuracy

Alternative: Chassis-Dyno
- availability in cps like USA, JP and Europe (vehicles above 7,5t)

Pros

Method 2: BIDI
- controlled environment; easy on-board verification with calibrated external bidi-charger on defined testing environment (non-invasive)

Method 1a,b: on-road
- Suitable for all vehicles (Bidi criteria missing)

Alternative: Chassis-Dyno
- controlled environment; easy on-board verification with external equipment from test rig (non-invasive)

Solution

Method 2: BIDI
- alternative test methods 1a, 1b during phase of low market maturity

Method 1a,b: on-road
- Part A: accuracy determination based on type approval

Alternative: Chassis-Dyno
- alternative test method for 1a, 1b and 2

- OICA is still in favor of referring to UBC charged, as shown in our measurements and assessments
- However, if UBE will be the reference, scattered boundary conditions could lead to a fail decision
- With UBC as reference, charge and discharge are equal

Additional metric for MPR assessment

Installed system capacity must be considered for the lifetime requirements

Range criteria: 700,000 km

Assumption:
Energy consumption of vehicle 1 kWh/km
(flat test track, no hills!)

Total energy consumption of vehicle 700,000 kWh

Energy provided **per Pack**:

2 Pack conf.:
700,000kWh/ 2 = **350 MWh**

3 Pack conf.:
700,000kWh/ 3 = **233 MWh**

4 Pack conf.:
700,000kWh/ 4 = **175 MWh**

Battery Pack:
Nominal Voltage: 670 V
Nominal Capacity: 130 Ah
Nominal Energy: 87 kWh

Given same installed total kWh per vehicle, pack specific energy throughput and thus **aging decreases with amount of packs**

Vehicle range based counter index for in vehicle battery durability **leads to different durability criteria for identical battery packs.** This would lead to a decreasing number of customer options and would favor cost and resource intensive vehicle configurations (smaller and more packs).

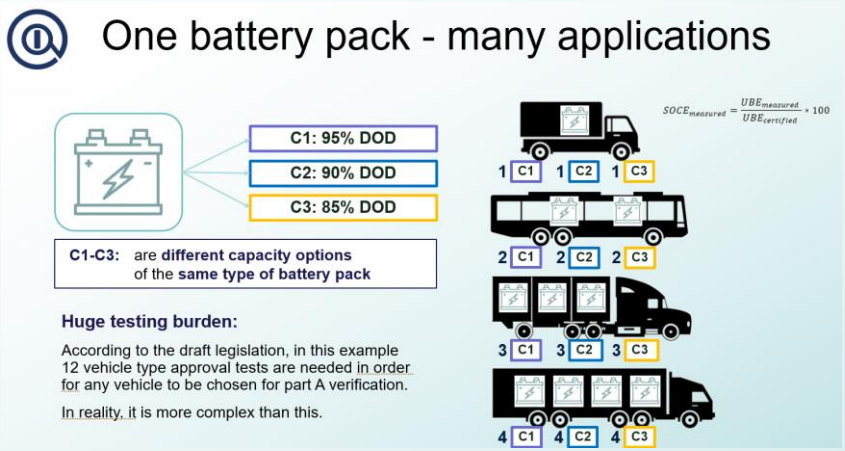
Capacity/Energy throughput based on installed battery energy or expressed by **Full Cycle Equivalent** shall be discussed within a technical workshop.

Key items

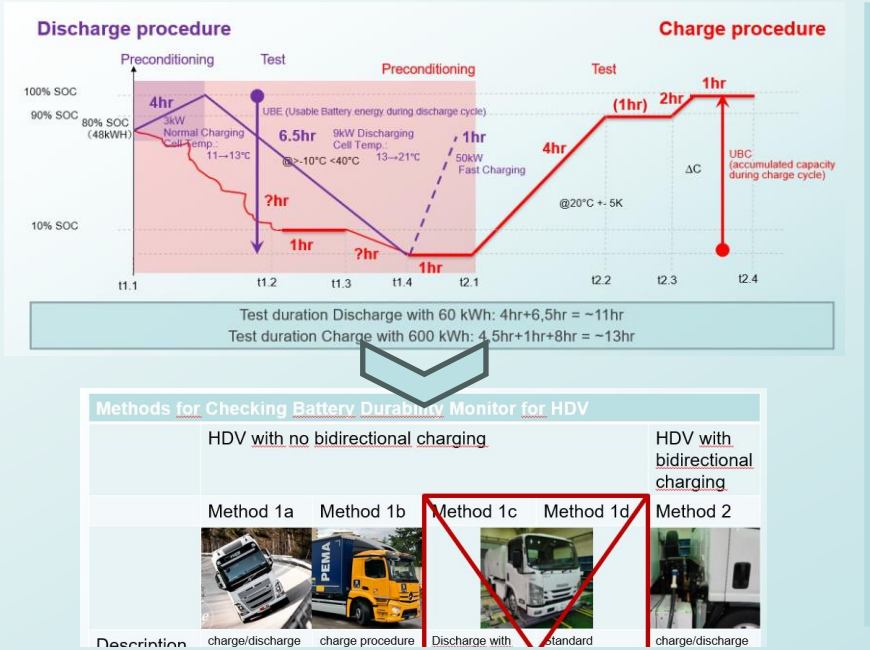
- For HDV applications, currently proposed MPR placeholders lack an important metric: energy throughput (5.2 Battery Performance Requirements)
- Other to LDV, HDV will have stand-still or vocational power out- and input
- Therefore OICA proposes to introduce this additional metric to verify the vehicle status

Workshop with drafting coordinator

Family Concepts



Procedure & Boundaries



Metrics‘ Effects

- OICA made measurements, assesed the draft GTR22b versions and evaluated potential effects of its elements
- **We are convinced, that such complex procedure for the highly ambitious HDV segment we will need an face-2-face deep dive technical exchange and disccusion with drafting coordinator. We are proposing a two day meeting after 69th EVE.**
- A second workshop might be neccessary to adress details on SOCC/E reporting and Monitoring phase