

Electric Vehicles and the Environment (EVE IWG)

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REPORT TO GRPE 81ST SESSION

Original Mandate (Part B of 2nd Mandate)

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- **Hybrid power determination**
 - Targeted establishment of a power determination GTR by AC.3 in the Global Registry in November 2019 with flexibility to extend by up to 1 year based on results of validation testing
- **In-vehicle battery durability**
 - Continue research on EV battery performance and durability
 - Return to AC.3 with recommendation for next steps (such as GTR development) or conclusion of topic
- **Method of stating energy consumption**
 - Find another group within UNECE framework to assume leadership of the topic, with support of EVE IWG, with the *Group of Experts on Energy Efficiency (GEEE)* was identified as an initially promising option

Updates to Mandate and Current Status

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- **Hybrid power determination**
 - The initial mandate envisioned the GTR as an Annex to GTR No. 15, but in March 2019 AC.3 approved the decision to instead develop it as a standalone GTR
 - In November 2019, the mandate for the GTR was extended by one year to complete additional testing to address validation concerns with the first phase test results
 - The draft GTR was submitted in March 2020 and is available as formal document GRPE/2020/12.
 - An informal document has been issued that amends GRPE/2020/12.
- **In-vehicle battery durability**
 - The EVE IWG presented a timeline proposal at the January 2020 GRPE with recommendations to approve the new mandate at AC.3 in March
 - The EVE IWG is presenting the probable framework of a Phase 1 GTR and commenting on the timeline and open issues remaining
- **Method of stating energy consumption**
 - The *Group of Experts on Energy Efficiency (GEEE)* has committed in their most recent mandate to assume leadership of the work with a one year timeline.
 - ✦ Interaction with these groups is led by the Secretary of GRPE

Status of Power Determination GTR

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- The proposed GTR was submitted to the GRPE secretary in March 2020 (working document GRPE/2020/12)
- The drafting group has continued to resolve a few remaining open issues
- An informal document amends GRPE/2020/12 to account for these revisions

Current power determination GTR timeline

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- **Timeline for power determination GTR**
 - June 2020: Final working document for GRPE
 - November 2020: Approval by AC.3

Status of In-Vehicle Battery Durability

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- Review of general goals of a durability GTR:
 - Establish **minimum durability requirements**
 - **Prevent substandard products** from entering the market
 - Allow **continued development of the GTR** as the industry evolves
 - Implement a **data collection mechanism** for improving the GTR in the future

Status of In-Vehicle Battery Durability

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- The EVE IWG reported on a potential solution for a durability GTR at the January 2020 GRPE
- The future durability GTR was expected to include:
 1. Minimum performance requirement (PR)
 2. State of Health monitor (SOH)
 3. In service conformity checks (ISC)
 4. Adoption of vehicle normal usage indices (NUI)
- EVE leadership senses that the level of interest in this work is rapidly increasing, as evidenced by EVE attendance and new expressions of interest by manufacturer organizations
 - California Air Resources Board (CARB) has communicated to EPA that they are also considering in-vehicle durability requirements and they may begin participating in the EVE
 - Alliance for Automotive Innovation is now regularly participating in EVE meetings

Status of In-Vehicle Battery Durability

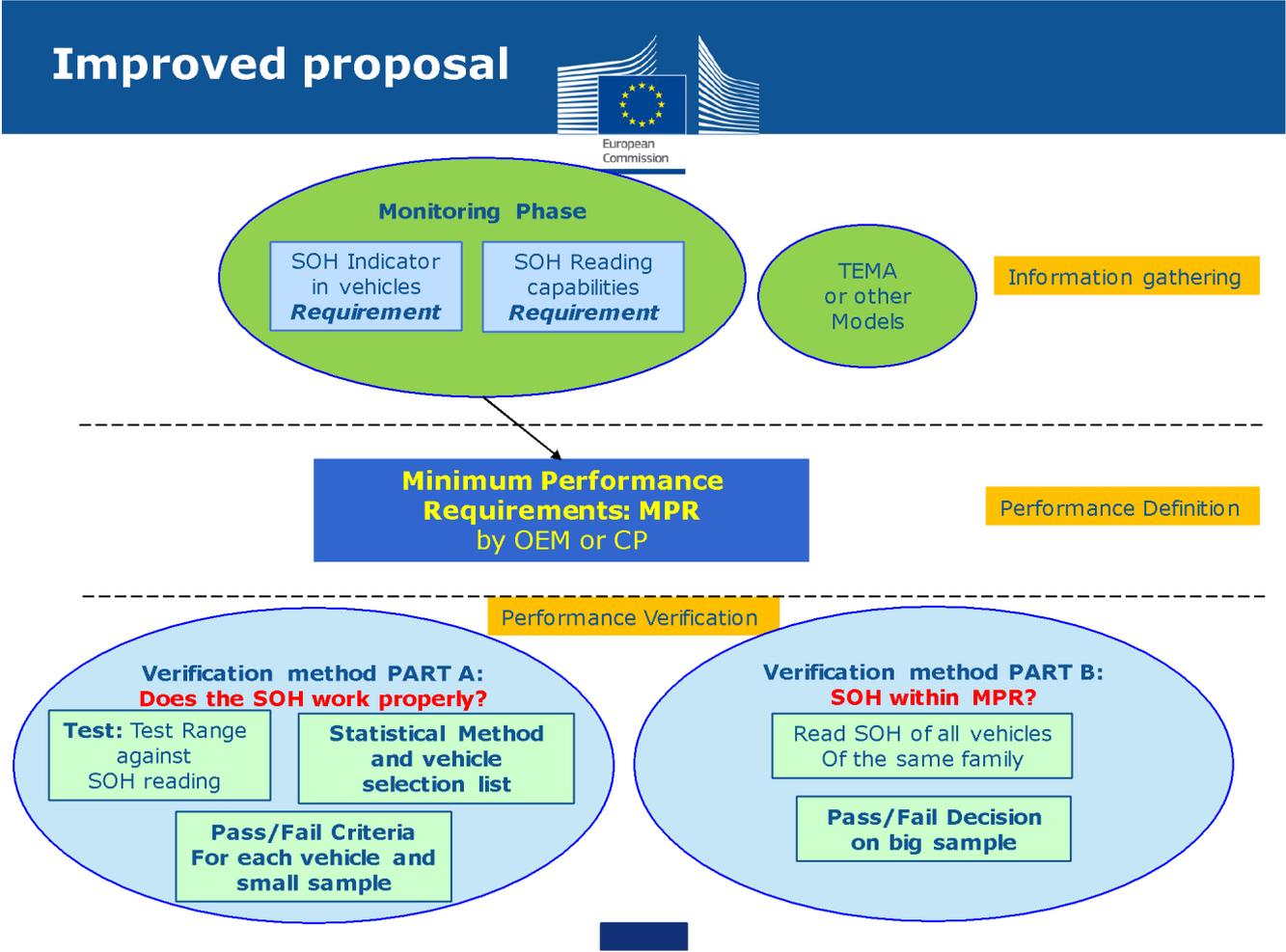
- The initial proposal included a multi-phase approach:
- Phase 1
 - Minimum performance requirement (PR) established by consensus
 - Require battery state of health (SOH) and normal usage indices (NUI) to be recorded by vehicle (e.g. on OBD)
 - In-service conformity (ISC) test which will include a way to consider usage of vehicle and a statistical method
 - SOH and NUI to be readable for ISC, and to provide source of data for improving GTR in the future
- Phase 2 *(refines PR and uses NUIs to evaluate usage at ISC)*
 - The performance requirement would be refined
 - The in-service conformity test would be refined by improving the statistical method and using NUI from vehicle to determine which vehicles are eligible to be in the sample
 - i.e. Vehicles with NUI that indicate non-“normal” usage are eliminated from ISC

Current DRAFT framework for Phase 1

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1. **Minimum performance requirement (MPR)**
 - Percentage retention of certified range [or capacity] “x” years and/or “y” distance
 - MPR is applicable to all manufacturers
 - Individual manufacturers can declare a better performance (declared PR, or DPR)
2. **Onboard battery state-of-health (SOH) metric**
 - Definition of SOH = (Remaining range / certified range) [or based on capacity?]
 - OEMs responsible for their own algorithm
 - Readable by responsible authority (via OBD or similar)
3. **In-service conformity (ISC) and data collection**
 - Part A: Establish reliability of SOH metric
 - ✦ Small sample of 3-10 vehicles via ISC
 - ✦ Use checklist/survey to exclude vehicles with abnormal usage
 - ✦ Measure range via range test used for type approval (commonly, WLTC)
 - ✦ Verify accuracy of SOH metric by comparing to measured range
 - Part B: Determine conformity with MPR / DPR
 - ✦ Large sample of unspecified number of vehicles (may remove need for NUIs)
 - ✦ Routine collection of SOH metric, e.g. at safety inspections or via telematics
 - ✦ Determine conformity by reference to collected SOH
4. **Establish mechanism for ongoing data collection to inform Phase 2**
 - Primarily SOH collection
 - Identify simple NUIs that can be implemented now, if any
 - Discussion may be started in Phase 1 under limited samples

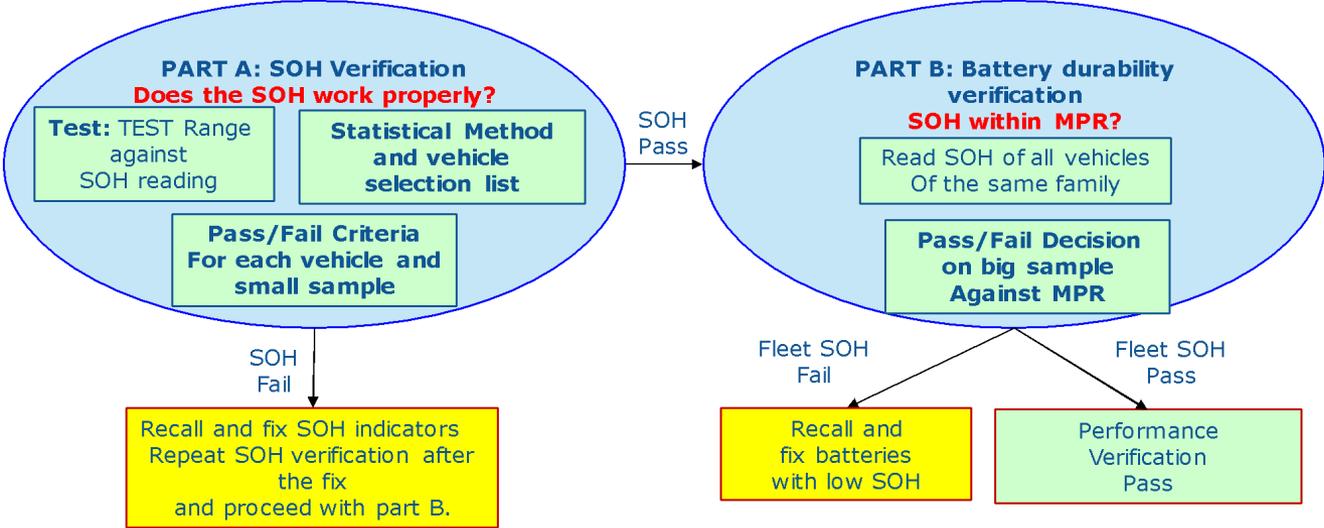
Durability Process for SOH and MPR



Durability Process for SOH and MPR



Battery Performance Verification



Original proposed mandate timeline

- (i) March 2020: Approval of mandate from AC.3
- (ii) January 2020 – June 2020: EVE IWG formulates new drafting group, and begins drafting GTR with elements agreed upon by EVE IWG
- (iii) **June 2020: EVE IWG provides update to GRPE outlining details of draft outline of GTR**
- (iv) June 2020 – December 2020: EVE begins validation testing of relevant aspects of the proposed procedure, assesses results and makes changes to GTR
- (v) January 2021: EVE IWG submits first draft proposal for the GTR as an informal document to January 2021 session of GRPE for further discussion and recommendation.
- (vi) January 2021- March 2021
 - a. EVE revises draft proposal based on recommendations from GRPE
 - b. Transmission of the draft GTR as an informal document twelve weeks before the June 2021 session of GRPE;
 - c. Endorsement of the draft GTR based on an informal document by GRPE.
- (vii) June 2021: EVE presents the final GTR to GRPE
- (viii) November 2021: establishment of the GTR by AC.3 in the Global Registry.
- (ix) January 2021-January 2024: EVE IWG continues information gathering on possible modifications to the GTR and develops amendments to the GTR for consideration by WP.29 and AC.3, as deemed appropriate.

Requirements to meet proposed schedule

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- The proposed schedule is very ambitious
- EVE IWG plans to increase cadence of meetings to improve the chances of meeting the schedule
- EVE feels that the proposed schedule may be achievable, conditional on many developments, including (most notably) the following:
 - Ability to reach consensus on the remaining details of Phase 1, among a growing group of stakeholders who have recently expressed interest in the work
 - Availability and suitability of any existing regulatory text (e.g., ISC statistical method and questionnaire/survey) that can be adapted to the GTR
 - No need to develop prescribed NUI algorithms
 - No need for a technical validation program
 - Any prior notice needed to establish outside services to support the program (e.g. application for any new OBD PIDs)
- Mandate request includes possibility of an additional year if necessary

Possible references for ISC development

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- **Criteria for vehicle selection (Part A):**
 - Could be modeled on existing survey such as “Selection of Vehicles for In Service Conformity Emissions Testing”, e.g. Appendix 1 of Commission Regulation (EU) 2018/1832
 - With added questions specific to vehicle and battery usage
 - Will require agreement on questions that adequately indicate potential for abnormal battery degradation
- **Statistical procedure:**
 - Could be modeled on practices and decision charts described in 5.10 of above

Next Steps For Electrified Vehicle Durability

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- Reach final consensus on the framework of Phase 1
- Finalize membership of drafting group and identify any needed task forces and their leaders
- Identify and adapt existing text that may be useful for the GTR
- Begin drafting GTR with elements agreed upon
- Many significant open issues remain, and more are likely to be identified as this process continues

Method of Stating Energy Consumption

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- Proposed path forward for method of stating energy consumption
 - EVE remain available as experts on EV performance to support this work under leadership of GEEE
- The EVE IWG and GEEE met at January 2020 GRPE to discuss the roles of both groups and the areas of focus for each group
- EVE IWG and the GEEE proposed to have a joint workshop depending on funding resources for further planning

EVE Meetings

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- Regular meetings concurrent with GRPE each January and June
- 24-25 October 2017 – Vienna, Austria
- 27-28 March 2018 – Tokyo, Japan
- 16-18 October 2018 – Ottawa, Canada
- 8-10 April 2019 – Stockholm, Sweden
- 8-9 October 2019 – Brussels, Belgium
- [23-24 March 2020 – USA \(teleconference due to COVID\)](#)
- [Monthly EVE teleconferences starting in late June 2020](#)
- Fall 2020 – TBD (Asia?)
- Spring 2021 – TBD (Europe?)