

# **Electric Vehicles and the Environment (EVE IWG)**

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**REPORT TO GRPE 80<sup>TH</sup> SESSION**

# Original Mandate (Part B of 2<sup>nd</sup> 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**
  - Continuing 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

- **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 second phase of validation testing is completed. The EVE IWG is finalizing remaining open issues in the draft and waiting for a few analyzed results.
- **In-vehicle battery durability**
  - EVE IWG has completed the research phase of mandate and recommended to GRPE in May 2019 that sufficient information is available to begin a limited scope GTR with plans to improve the GTR in later phases
  - The EVE IWG is presenting a timeline proposal at this meeting with recommendations to approve the new mandate at AC.3 in March
- **Method of stating energy consumption**
  - The *Group of Experts on Energy Efficiency (GEEE)* and the *Group of Experts on Cleaner Electricity Production (CEP)* were contacted to request that they assume leadership of the work with the support of the EVE IWG as needed
  - The 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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- Results of phase two of the validation testing was completed by Canada and JRC, with some results available
- The current GTR work and further testing has
  - Shown that the method for operating the vehicle at its maximum power in a lab setting is reliable
  - That the differences in TP1 and TP2 can mainly be attributed to the need to account for differences in powertrain architectures and accuracy of measurements
  - TP1 and TP2 results should be similar if measurements are accurate and architecture is accounted for

# Status of Power Determination GTR

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- Next power determination steps
  - Receive pending test analyses which will provide additional comparison of the two test procedures (TP1 and TP2)
  - Summarize a case for validity of the procedure based on totality of experiences with the first and second phase of validation and good engineering judgement
  - Finalize remaining open draft issues with IWG
- Final changes to the GTR can be expected to be ready for formal submission by March 17, 2019
- Detailed examination and comments from stakeholders and contracting parties is strongly encouraged before this time
- *(Document EVE-33-05e) available here:*  
<https://wiki.unece.org/display/trans/EVE+33rd+Session>

# Current power determination GTR timeline

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- Timeline approved in November 2019 for power determination GTR
  - June – October 2019: complete additional validation testing
  - January 2020: Preliminary draft GTR available for GRPE
  - June 2020: Final working document for GRPE
  - November 2020: Approval by AC.3

# Status of In-Vehicle Battery Durability

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- The EVE IWG has identified a potential solution for a durability GTR and has a proposal and timeline available as document (EVE-33-03-Rev#)
- Building on a proposal from Japan to adopt a battery State of Health monitor and by EU to add in service conformity checks, the future durability GTR may include:
  1. Adoption of State of Health monitor (SOH)
  2. Minimum performance requirement (PR)
  3. In service conformity checks (ISC)
  4. Adoption of vehicle normal usage indices (NUI)

# Status of In-Vehicle Battery Durability

- The proposal includes a multi-phase approach where:
- Phase 1 (*By November 2021*)
  - Introduce a first version of a GTR with:
    - ✦ Minimum performance requirements established through consensus with vehicle manufacturers and all stakeholders
    - ✦ Adopt requirement for battery state of health (SOH) and normal usage indices (NUI) to be recorded by vehicle (e.g. on OBD)
    - ✦ Provisional 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 provides source of data for improving GTR in the future



# Status of In-Vehicle Battery Durability

- **Phase 2** (*tightens PR and considers usage at ISC*)
  - The performance requirement (PR) would be refined through modeling
  - 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

# Status of In-Vehicle Battery Durability

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- **Phase 3** (*allows incoming SOH and NUI data to further improve PR*)
  - Data-based Performance Requirements, derived from SOH and usage indices data from Phases 1 and 2
  - Vehicles with non-“normal” UI values either eliminated, or possibly adjusted to account for difference in usage

# Battery Durability 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.

# Next Steps For Electrified Vehicle Durability

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- Form a new drafting group and begin drafting a new GTR with elements agreed upon in the EVE's new mandate
- Start new validation testing during the summer of 2020 to facilitate the timeline of the new GTR

# 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 this week to discuss the roles of both groups and the areas of focus 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
- 10-11 April 2017 – Ann Arbor, USA
- 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 – Ann Arbor, USA
- Fall 2020 (Tentative) – Asia TBD
- Spring 2021 (Tentative) – Europe TBD