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Progress on the development of new UN GTRs

and of amendments to established UN GTRs:

**Proposal for a draft UN GTR on in-vehicle battery
durability (Electric vehicles and the environment)**

Request for authorization to develop a new UN GTR on in-vehicle battery durability

Submitted by Working Party on Pollution and Energy *

The text reproduced below was adopted by the Working Party on Pollution and Energy (GRPE) at its eightieth session (ECE/TRANS/WP.29/GRPE/80, para. 59) and is based on Annex X of the session report. It is a request for authorization to develop a new UN GTR on in-vehicle battery durability. It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and Administrative Committee 3 (A.C.3) for consideration at its June 2020 sessions.

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* In accordance with the programme of work of the Inland Transport Committee for 2020 as outlined in proposed programme budget for 2020 (A/74/6 (part V sect. 20) para 20.37), the World Forum will develop, harmonize and update UN Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

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I. Mandate and Objectives

1. In the framework of the 1998 Agreement and under continued work by the informal working group (IWG) on Electric Vehicles and the Environment (EVE), the main objective of this proposal is to seek authorization for the EVE IWG to begin a new mandate, specifically to develop a new UN GTR on the topic of in-vehicle battery performance and durability.
2. The IWG on EVE and IWG on Worldwide harmonized Light vehicles Test Procedure (WLTP) will continue collaborating, to ensure each group's work is complimentary to the other, and avoids any duplication of effort.

II. Introduction

3. The IWG on EVE was set up in June 2012 following the approval by WP.29 of ECE/TRANS/WP.29/AC.3/32. This document established two distinct IWGs to examine environmental and safety issues related to EVs (IWGs on EVE, reporting to the Working Party on Pollution and Energy (GRPE) and the IWG on Electric Vehicle Safety (EVS), reporting to the Working Party on Passive Safety (GRSP)). As the two groups were formed at WP.29, they also reported to this forum directly. The proposal was supported by the European Commission, Directorate General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW), the National Highway Traffic Safety Administration (NHTSA) and the Environmental Protection Agency (EPA) of the United States of America, the Ministry of Industry and Information Technology (MIIT) of China, and Japan's Ministry of Land, Infrastructure, Transport and Tourism (MLIT).
4. During the first mandate of the IWG on EVE, the IWG aimed to accomplish the following objectives, which were successfully completed by November 2014:
 - (a) Develop a priority list of topics to address the most timely and significant considerations before the IWG on EVE;
 - (b) Understand and document the current considerations of Electric Vehicles (EVs) under the work of other established informal working groups: the IWGs on Electric Vehicle Safety (EVS), WLTP, Heavy Duty Hybrids (HDH), Environmental and Propulsion unit Performance Requirements (EPPR), and on Vehicle Propulsion System Definitions (VPSD);
 - (c) Establish a mechanism for sharing information and on-going research on topics related to EVs and the environment;
 - (d) Develop a reference guide for environmentally-related EV requirements already established or being considered by Contracting Parties (EV Regulatory Reference Guide (ECE/TRANS/WP.29/2014/81)).
5. The Guide¹ (ECE/TRANS/WP.29/2014/81), based on the information provided by the Contracting Parties and IWGs, presented the existing requirements relating to environmentally-related EV attributes at the time of the Guide's development (September 2013). As presented in Chapter 5 of the Guide, the analysis of such information led to the identification of gaps in requirements that could be addressed through the development of new GTR(s), and/or through supplementing the GTR(s) that are currently under development (i.e. WLTP, EPPR), and/or through other suitable efforts, like research.
6. Subsequently, a second mandate for the IWG on EVE, divided into Parts A and B was approved in November 2014 by AC.3 to conduct additional research to address the recommendations outlined in Chapter 5 of the Guide and EV power determination, and develop GTR(s), if appropriate. The second mandate was separate from the IWG on EVS. Parts A and B of the second mandate addressed the following:

¹ Available at: www.unece.org/trans/main/wp29/wp29wgs/wp29gen/gen2014.html

(a) Battery performance and durability (recommendation 5.3, ECE/TRANS/WP.29/2014/81);

(b) Determining the powertrain performance (maximum power and torque) of EVs.

Information-sharing issues addressed in Part A and B.

(a) Method of stating energy consumption (recommendation 5.2, ECE/TRANS/WP.29/2014/81);

(b) Battery recycling/recyclability (recommendation 5.4, ECE/TRANS/WP.29/2014/81).

7. In November 2016, Part A of the second mandate was completed. At the June 2016 GRPE meeting, the EVE IWG presented a technical document (GRPE-73-24) that indicated the areas of research to pursue on battery performance and durability. It indicated that there was sufficient information available to move forward with a UN GTR on determining the powertrain performance of electrified vehicles. The technical report also recommended that battery recycling or recyclability was not a topic suitable to pursue within the EVE IWG forum. The EVE IWG indicated that it was willing to support efforts to develop a method of stating energy consumption of electrified vehicles if another body within the UNECE framework led them, but that the EVE could not lead the work independently as it required the input of experts in the generation and distribution of electricity.

8. The EVE IWG pursued several topics in part B of the second mandate, based on the findings from part A in the technical report presented to GRPE in June 2016 (GRPE-73-24):

(a) Developing a UN GTR for powertrain performance

(b) Continuing research on in-vehicle battery durability and performance

(c) Finding new leadership for the previous method of stating energy consumption work

9. AC.3 approved document ECE/TRANS/WP.29/2019/33 in March 2019, which instructed the EVE IWG to develop the UN GTR for power determination of electrified vehicles as a standalone UN GTR, rather than an annex to UN GTR no. 15.

10. The EVE IWG presented a draft status report to GRPE in May 2019 on the work on the method of stating energy consumption and research on in-vehicle battery durability and performance. Based on the content of this status report, the EVE IWG requested authorization to continue work for one additional year on the UN GTR on power determination, which was subsequently endorsed by WP.29 in November 2019.

11. The status report indicated that there is sufficient information to allow a UN GTR for in-vehicle battery durability to be started, with the intent of achieving the following general goals:

(a) Establishing minimum durability performance criteria and developing guidelines for acceptable evidence that the requirements will be met;

(b) Establishing measures to prevent substandard products from entering the market;

(c) Allowing adequate room for continued development of the regulation as the industry continues to evolve; and

(d) Implementing a mechanism for the collection of data that could provide a basis for refining the UN GTR in the future.

12. Owing to the specific set of goals outlined above that place specific constraints on the possible scope of a UN GTR at this time, the EVE IWG recommended at the 79th GRPE in May 2019 that the UN GTR on in-vehicle battery durability be developed under a new mandate.

III. Areas of work

13. The EVE IWG seeks AC.3 the authorization to develop a new UN GTR on in-vehicle battery durability which will be developed in 2 phases:

Phase 1:

- (a) Deliver a first version of a UN GTR on in-vehicle battery durability to AC.3 by November 2021 with;
 - (i) Definition of and requirements for electrified vehicle battery performance criteria
 - (ii) Requirements for reading and/or displaying battery health information and usage data from the vehicle; and
 - (ii) A provisional in-service conformity test which will include generic usage criteria and a statistical method.

Phase 2:

- (b) Develop a second version of the UN GTR on in-vehicle battery durability with the following:
 - (i) The development of a methodology to define Normal Usage Indices (NUI) based on data read from vehicles
 - (ii) Refined performance criteria requirements for in-vehicle battery durability through assessment of further modelling and data collected from real vehicles and the use of NUIs

IV. Existing regulations

14. Battery durability as it affects the environmental or driving range performance of M- and N-class vehicles is not currently regulated by any UN GTR. It is known that electrically powered driving range of PEVs and OVC-HEVs can be reduced by battery degradation over time. It is also known that changes in environmental performance (pollutant emissions and energy consumption) can potentially occur in all electrified vehicle types as a result of battery degradation. The contracting parties sponsoring this activity agree to address that a UN GTR governing battery durability for these vehicles is necessary.

V. Timeline

15. The timelines proposed below for the new mandate are target timelines. The plan will be regularly reviewed and updated to reflect progress and feasibility of the timeline.

- (a) January 2020: EVE IWG presents timeline and framework for mandate request in GRPE.
- (b) June 2020: Request for authorization submitted to AC.3;
- (c) January 2020 – June 2020: EVE IWG formulates drafting group and begins drafting UN GTR with elements agreed upon
- (d) June 2020: EVE IWG provides an update to the June 2020 meeting of GRPE with the detailed elements and proposed timelines to be pursued;
- (e) June 2020 – December 2020: EVE IWG begins validation testing of relevant aspects of the proposed procedure, assesses test results and makes further UN GTR changes as necessary
- (f) January 2021: EVE IWG presents to GRPE
- (i) a status update of the first UN GTR validation results;

- (ii) first draft UN GTR proposal, both as informal documents for the January 2021 session of GRPE for further discussion and recommendation.
- (g) January 2021 – March 2021:
 - (i) EVE IWG revises draft proposal based on discussions and recommendations from GRPE and;
 - (ii) submits the draft UN GTR for transmission as a formal document for the June 2021 GRPE session
- (h) June 2021: EVE IWG presents Final UN GTR to GRPE at June 2021 meeting for endorsement.
- (i) November 2021: establishment of the UN GTR by AC.3 in the Global Registry.
- (j) June 2021-January 2024: EVE IWG continues information gathering on possible modifications to the UN GTR and develops amendments to the UN GTR for consideration by WP.29 and AC.3, as deemed appropriate.

Note: Owing to the lack of prior examples for regulating battery durability, the need to reach consensus among a diversity of parties, and the need to develop and validate new metrics such as usage indices and performance criteria, the EVE IWG is also asking AC.3 to allow up to 1 extra year beyond the timelines above for UN GTR development, if more time is needed to develop, validate, and/or reach consensus on solutions to these issues.
