



Economic and Social Council

Distr.: General
13 December 2021

Original: English

Economic Commission for Europe
Inland Transport Committee
World Forum for Harmonization of Vehicle Regulations
Working Party on Pollution and Energy
Eighty-fourth session
 Geneva, 12 November 2021

**Report of the Working Party on Pollution and Energy
 (GRPE) on its eighty-fourth session**

Contents

	<i>Paragraphs</i>	<i>Page</i>
I. Attendance.....	1	3
II. Adoption of the agenda (agenda item 1)	2-5	3
III. Report on the last session of the World Forum for Harmonization of Vehicle Regulations (WP.29) (agenda item 2)	6-7	3
IV. Electric Vehicles and the Environment (EVE) (agenda item 3).....	8-14	4
A. UN GTR No. [XX] on in-vehicle battery durability	8-11	4
B. Other activities of IWG on EVE	12-14	4
V. Light vehicles: UN Regulation No. 154 (Worldwide harmonized Light vehicles Test Procedures (WLTP)) (agenda item 4)	15-18	4
VI. Motorcycles and mopeds: Update on officers for the IWG on EPPR (agenda item 5)	19-23	5
VII. Priority topics for GRPE activities (agenda item 6)	24-30	5
VIII. Election of Officers (agenda item 7)	31	6
IX. Any other business (agenda item 8)	32	6
X. Provisional agenda for the next session.....	33-36	6
A. Next GRPE session.....	33	6
B. Provisional agenda for the next proper GRPE session.....	34	6
C. Informal meetings scheduled to be held in conjunction with the next GRPE session.....	35-36	8

Annexes

I List of informal documents (GRPE-83-) distributed without an official symbol before and during the session	9
II Informal meetings held in conjunction with the GRPE session	10
III List of GRPE informal working groups, task forces and subgroups	11



IV Adopted amendments to GRPE-84-02 12

I. Attendance

1. The Working Party on Pollution and Energy (GRPE) held its eighty-fourth session on 12 November 2021, with André Rijnders (Netherlands) as Chair and Duncan Kay (United Kingdom of Great Britain and Northern Ireland) as Vice-Chair. Experts from the following countries participated in the work following Rule 1(a) of the Rules of Procedure of the World Forum for Harmonization of Vehicle Regulations (WP.29) (TRANS/WP.29/690, as amended): Australia, Canada, China, France, Germany, Hungary, India, Italy, Japan, Netherlands, Norway, Republic of Korea, Russian Federation, South Africa, Spain, Sweden, Switzerland, United Kingdom of Great Britain and Northern Ireland (UK), United States of America. Experts from the European Commission (EC) also participated. Experts from the following non-governmental organizations (NGOs) took part in the session: American Automotive Policy Council (AAPC), Association for Emissions Control by Catalyst (AECC), European Association for Electric Mobility (AVERE), European Association of Automobile Suppliers (CLEPA/MEMA/JAPIA), European Garage Equipment Association (EGEA), European Tyres and Rubber Manufacturers Association (ETRMA), Federation of European Manufacturers of Friction Materials (FEMFM), Fédération Internationale de l'Automobile (FIA), International Association for Natural Gas Vehicles (NGV Global), International Motorcycle Manufacturers Association (IMMA), and International Organization of Motor Vehicle Manufacturers (OICA).

II. Adoption of the agenda (agenda item 1)

Documentation: ECE/TRANS/WP.29/GRPE/2021/20
Informal documents GRPE-84-04-Rev.1 and GRPE-84-09-Rev.1

2. Mr. Rijnders, Chair of GRPE, opened the meeting, held as hybrid session, with all participants attending virtually because of the sanitary situation, and welcomed the participants.

3. GRPE adopted the provisional agenda of the eighty-fourth session (ECE/TRANS/WP.29/GRPE/2021/20), as updated and consolidated in GRPE-84-04-Rev.1.

4. The informal documents distributed before and during the GRPE session are listed in Annex I. Annex II lists the informal meetings held in conjunction with this GRPE session. Annex III lists IWGs of GRPE, task forces and subgroups, giving details on their Chairs, Secretaries and the end of their mandates. The secretariat recalled GRPE to make sure not to breach copyrights when submitting documents to be uploaded on UNECE website.

5. The secretariat introduced GRPE-83-09-Rev.1, announcing that the next GRPE session would tentatively take place from 11 to 14 January 2022 and recalled the corresponding deadlines (19 October 2021) for the submission of official documents. He also briefly outlined the expected configuration and timetable for the next meeting in January 2022.

III. Report on the last session of the World Forum for Harmonization of Vehicle Regulations (WP.29) (agenda item 2)

Documentation: ECE/TRANS/WP.29/1159
Informal documents GRPE-84-03

6. The secretariat introduced GRPE-84-03 and reported on relevant items discussed during the 184th sessions of the World Forum for Harmonization of Vehicle Regulations (WP.29). He referred to ECE/TRANS/WP.29/1159 for further details.

7. GRPE agreed to request WP.29 for more time to consider ECE/TRANS/WP.29/2021/148 on a proposal for a draft framework document on whole-life compliance prepared by the Informal Working Group (IWG) on Periodic Technical Inspection (PTI).

IV. Electric Vehicles and the Environment (EVE) (agenda item 3)

A. UN GTR No. [XX] on in-vehicle battery durability

Documentation: ECE/TRANS/WP.29/GRPE/2021/18,
Informal documents GRPE-84-01, GRPE-84-02, GRPE-84-11 and
GRPE-84-14

8. The Chair of IWG on EVE introduced the latest draft of the UN GTR on In-vehicle Battery Durability for electrified vehicles, as developed by the members of the IWG on EVE over numerous meetings over the last weeks and months (ECE/TRANS/WP.29/GRPE/2021/18, as amended by GRPE-84-01). He also introduced the final status report that accompanies the draft UN GTR (GRPE-84-02). He detailed the main elements of the new UN GTR that contain new approaches to monitor, report and verify the durability of batteries in electrified vehicles (GRPE-84-11).

9. The representatives from Japan, Sweden, US, the EU and OICA supported the proposals. GRPE adopted ECE/TRANS/WP.29/GRPE/2021/18 and GRPE-84-01, as amended by Addendum 1 and GRPE-84-02, as amended by Annex IV.

10. GRPE requested the secretariat to submit Addendum 1 and Annex IV to WP.29 and AC.3 for consideration and vote at their March 2022 sessions as draft UN GTR on In-Vehicle Battery Durability for electrified vehicles and its final status report, respectively.

11. The representative from OICA introduced their position on heavy duty battery durability (GRPE-84-14). The Chair of the IWG on EVE thanked OICA for their continuous support on the whole process and looked forward to forthcoming collaboration. The Chair requested further analysis on the possibility to use the existing framework as defined in GRPE-84-01 or the need for a new approach to consider heavy duty vehicle battery durability. The Chair of the IWG on EVE confirmed this task was expected to be tackled as soon as the phase 2 activities were initiated, expected in January 2022.

B. Other activities of IWG on EVE

Documentation: Informal document GRPE-84-10.

12. The Chair of IWG on EVE presented updated Terms of Reference and Rules of Procedure (GRPE-84-10), introducing expected activities, timeline and updated leadership until January 2024.

13. The representative of China requested further clarification about the vice chair positions for the IWG on EVE. The Chair of the IWG on EVE welcomed the possibility for China to carry on as Vice Chair for the next term and invited China to notify its willingness so the ToR can be amended accordingly.

14. GRPE adopted GRPE-84-10 and congratulated the IWG on EVE for the progress made and acknowledged forthcoming activities as detailed in the updated ToR.

V. Light vehicles: UN Regulation No. 154 (Worldwide harmonized Light vehicles Test Procedures (WLTP)) (agenda item 4)

Documentation: ECE/TRANS/WP.29/GRPE/2021/21,
ECE/TRANS/WP.29/GRPE/2021/22,
Informal documents GRPE-84-06, GRPE-84-07, GRPE-84-08,
GRPE-84-12 and GRPE-84-13

15. the representatives of Japan, The EU and OICA introduced GRPE-84-08, summarizing the amendments proposed to UN Regulation No. 154. They informed about the proposed modifications leading to proposals to new 02 (ECE/TRANS/WP.29/GRPE/2021/21 and GRPE-84-06 as amended by Addendum 2) and 03

(ECE/TRANS/WP.29/GRPE/2021/22 and GRPE-84-07 as amended by Addendum 3) series of amendments to UN Regulation No. 154.

16. GRPE adopted the proposals and requested the secretariat to submit Addendum 2 and Addendum 3 to WP.29 and AC.1 for consideration and vote at their March 2022 sessions as draft 02 and 03 series of amendments to UN Regulation No. 154 respectively.

17. The representative from OICA added that OICA was expected to submit proposals to amend the original version and 01 series of amendment to UN Regulation No. 154 to reflect some of the improvement made in the 02 and 03 series of amendments to UN Regulation No. 154 once those proposals adopted by GRPE.

18. The representative from OICA introduced GRPE-84-12 and GRPE-84-13 as a draft proposal for amendment to UN Regulation No. 154 with respect to Charge-depleting cycle range (RCDC). The representatives from Japan and the EU did not support this proposal. The representative from OICA agreed more time was needed to finalize the proposal and informed GRPE an updated proposal would be submitted to GRPE at its next sessions.

VI. Motorcycles and mopeds: Update on officers for the IWG on EPPR (agenda item 5)

Documentation: Informal document GRPE-84-15

19. The Secretary of IWG on EPPR presented a shortened update of the IWG on EPPR (GRPE-84-15), focusing on short term activities and objectives and calling for a new leadership team, with no Chair nor vice chair at the moment, potentially putting the IWG on EPPR activities on hold. The Chair called for volunteers within GRPE to allow IWG on EPPR to carry on with its activities in the months to come.

20. The representative from South Africa sought some further information about the role and responsibility on the leadership team, with respect to meeting frequency, physical presence, and expertise needed. The Secretary of EPPR clarified the IWG was meeting on a monthly or bi-monthly basis, virtually lately, with 2 or 3 physical meetings a year under normal circumstances and encouraged all newcomers to get engaged to start getting more familiar with the activities.

21. The Chair encouraged the implication of new parties in the activities of IWGs and invited more experienced stakeholders to assist ad-interim to help build capacity. The representative of the Netherlands proposed to join the leadership team of the IWG on EPPR to help finalize on-going activities and support other volunteers to supervise the activities of the IWG on EPPR. The Chair proposed an interim leadership from the Netherlands and South Africa to help the IWG on EPPR to move forward and deliver on expected activities.

22. GRPE designated the representative of the Netherlands, Niels den Ouden, and the representative of South Africa, Joseph Mashele, to be interim Co-Chairs of the IWG on EPPR until June 2022.

23. The representative from IMMA, as secretary of the IWG on EPPR, thanked GRPE for the productive solution and the representatives of the Netherlands and South Africa for the support in moving the IWG on EPPR forward.

VII. Priority topics for GRPE activities (agenda item 6)

Documentation: Informal documents GRPE-84-05-Rev.1 , GRPE-84-16 and GRPE-84-17

24. The representative of Japan introduced GRPE-84-05-Rev.1, submitted by Japan and Korea, proposing to introduce Life Cycle Assessment (LCA) of vehicles into the GRPE list of priorities. The representative of the Russian Federation acknowledged the proposal from Japan and Korea and added that this important topic should be looking at the impact of different technologies on greenhouse gas emissions, and also natural resources and economic expansion. He added that the Russian Federation has more than 15 years experience on the

topic of LCA of vehicles and the Russian Federation would be happy to participate in such activities if GRPE decided to add this topic to its priority. The representative of Sweden also supported the proposal.

25. The representative of the US recognized the importance of LCA in the activities of GRPE, and highlighted that there might be similarities with the IWG on EVE activity on a “method for stating energy consumption” where the EVE group was faced with a scope going beyond the expertise and capabilities of their members. He asked for some measures to be taken before the LCA activity start, to make sure that the relevant experts would be involved in the activity. The Chair agreed with the need to widen the expertise present in GRPE to be able to tackle this subject in a relevant manner.

26. The representative from the European Commission (EC) required some time for an internal consultation with other services from the EC, informing GRPE that LCA was outside of the remit of experts from the EC attending GRPE. He therefore required to revisit this topic in the next session of GRPE in January 2022.

27. The secretariat informed GRPE about the recent interest from the latest Commission session on the topic of circularity and circular economy and welcomed activities related to this topic.

28. The Chair proposed to include this topic in the list of GRPE priorities given the support provided. The representative of the EC suggested to include the topic in square brackets. GRPE agreed to this proposal and to revisit the topic in forthcoming sessions of GRPE. The representative of OICA supported the initiative and to participate in future activities on the topic.

29. The representative of the EC introduced GRPE-84-16 providing the EC comments to the latest priority list. The Chair proposed to work during the session on an updated list of priorities (GRPE-84-17, as published as a post-session document) to have GRPE agree on an updated list of priorities to be shared with WP.29 and AC.2.

30. The Chair informed GRPE that the GRBP and GRPE Chairs were expected to hold a discussion on the topic of tyre wear emissions, following the request from the EC to shift the activity to GRBP. GRPE will be informed and consulted at the next session on this topic.

VIII. Election of officers (agenda item 7)

31. In compliance with Rule 37 of the Rules of Procedures (TRANS/WP.29/690, as amended) GRPE unanimously elected Mr. André Rijnders (Netherlands) as Chair of GRPE, and Mr. Duncan Kay (United Kingdom of Great Britain and Northern Ireland) as Vice-Chair for the sessions in the year 2022.

IX. Any other business (agenda item 8)

32. GRPE had not received any new proposals for discussion under this agenda item.

X. Provisional agenda for the next session

A. Next GRPE session

33. The next GRPE session, including IWG meetings, is scheduled to be held as a hybrid meeting, with physical and remote participation, from Tuesday 11 January 2022, 12.00 p.m. to Friday 14 January 2022 until 2.00 p.m. Interpretation services would be provided.

B. Provisional agenda for the next proper GRPE session

34. GRPE agreed on the following provisional agenda for its next session:

1. Adoption of the agenda.
2. Report on the last sessions of the World Forum for Harmonization of Vehicle Regulations (WP.29).
3. Light vehicles:
 - (a) UN Regulations Nos. 68 (Measurement of the maximum speed, including electric vehicles), 83 (Emissions of M₁ and N₁ vehicles), 101 (CO₂ emissions/fuel consumption), 103 (Replacement pollution control devices) and 154 (WLTP);
 - (b) UN Global Technical Regulations Nos. 15 (Worldwide harmonized Light vehicles Test Procedures (WLTP)) and 19 (Evaporative emission test procedure for the Worldwide harmonized Light vehicle Test Procedure (WLTP EVAP));
 - (c) Worldwide harmonized Real Driving Emissions test procedure.
4. Heavy duty vehicles:
 - (a) UN Regulations Nos. 49 (Emissions of compression ignition and positive ignition (LPG and CNG) engines) and 132 (Retrofit Emissions Control devices (REC));
 - (b) UN Global Technical Regulations Nos. 4 (World-wide harmonized Heavy Duty Certification procedure (WHDC)), 5 (World-Wide harmonized Heavy Duty On-Board Diagnostic systems (WWH-OBD)) and 10 (Off-Cycle Emissions (OCE));
 - (c) Worldwide provisions for Heavy Duty vehicles Fuel Economy.
5. UN Regulations Nos. 24 (Visible pollutants, measurement of power of C.I. engines (Diesel smoke)), 85 (Measurement of the net power), 115 (LPG and CNG retrofit systems), 133 (Recyclability of motor vehicles) and 143 (Heavy Duty Dual-Fuel Engine Retrofit Systems (HDDF-ERS)).
6. Agricultural and forestry tractors, non-road mobile machinery:
 - (a) UN Regulations Nos. 96 (Diesel emission (agricultural tractors)) and 120 (Net power of tractors and non-road mobile machinery);
 - (b) UN Global Technical Regulation No. 11 (Non-road mobile machinery engines).
7. Particle Measurement Programme (PMP).
8. Motorcycles and mopeds:
 - (a) UN Regulations Nos. 40 (Emission of gaseous pollutants by motor cycles) and 47 (Emission of gaseous pollutants of mopeds);
 - (b) UN Global Technical Regulations Nos. 2 (World-wide Motorcycle emissions Test Cycle (WMTC)), 17 (Crankcase and evaporative emissions of L-category vehicles), 18 (On-Board Diagnostic (OBD) systems for L-category vehicles) and [XX] (Durability);
 - (c) Environmental and Propulsion Performance Requirements (EPPR) for L-category vehicles.
9. Electric Vehicles and the Environment (EVE);
 - (a) UN GTR No. 21 (DEVP) and [XX] on in-vehicle battery durability;
 - (b) other activities of IWG on EVE.
10. Mutual Resolution No. 2 (M.R.2).
11. International Whole Vehicle Type Approval (IWVTA).
12. Vehicles Interior Air Quality (VIAQ).

13. Lifetime Compliance.
14. Priority topics for GRPE activities.
15. Any other business.

C. Informal meetings scheduled to be held in conjunction with the next GRPE session

35. The informal meetings in conjunction with the next GRPE sessions are expected to be virtual (subject to change) and held in the days prior to GRPE, if need be.
36. The agendas of these meetings will be prepared by the respective Technical Secretaries and distributed to the members of each group prior to each meeting.

Annex I

List of informal documents (GRPE-84-) distributed without an official symbol before and during the session

<i>No.</i>	<i>(Author) Title</i>	<i>Follow-up</i>
1	(EVE) Proposed amendments to ECE/TRANS/WP.29/GRPE/2021/18	B
2	(EVE) Proposal for a technical report on the development of a new UN Global Technical Regulation on In-Vehicle Battery Durability for Electrified Vehicles	B
3	(Secretariat) Highlights of the WP.29 Session of June 2021	A
4r1	(Secretariat) Provisional annotated agenda	A
5r1	(Japan, Korea) Possibility to tackle the Life Cycle Assessment (LCA) in GRPE	A
6	(EU, Japan, OICA) Proposed amendments to ECE/TRANS/WP.29/GRPE/2021/21	B
7	(EU, Japan, OICA) Proposed amendments to ECE/TRANS/WP.29/GRPE/2021/22	B
8	(EU, Japan, OICA) Supplemental document for GRPE-84-06 and GRPE-84-07	A
9r1	(Secretariat) General information about the 85th session of GRPE	A
10	(EVE) Updated ToR for the IWG on EVE	B
11	(EVE) Report to the 84th Session of GRPE	A
12	(OICA) Draft proposal on RCDC rules - UN Regulation No. 154	C
13	(OICA) Explanation on RCDC rules	A
14	(OICA) position on HD Battery Durability	A
15	(EPPR) EPPR State of play	A
16	(EC) Proposal on GRPE list of priorities	A
17	(Chair) GRPE priorities (post-session)	A

Notes:

- A Consideration by GRPE completed or to be superseded;
- B Adopted;
- C Further consideration on the basis of a revised proposal;
- D Distribute at the June 2022 session with an official symbol.

Annex II

Informal meetings held in conjunction with the GRPE session

Virtual meetings had been held in the weeks prior to GRPE in order to accommodate the different time zones. The planning can be shown on the IWG wiki calendar available in:

<https://wiki.unece.org/pages/viewpage.action?pageId=917779>

Annex III

List of GRPE informal working groups, task forces and subgroups

<i>Name (Acronym) (Status)</i>	<i>Chair or Co-chairs</i>	<i>Secretaries</i>	<i>End of mandate</i>
Environmental and Propulsion Performance Requirements of L-category vehicles (EPPR) (group)	Niels den Ouden, NdenOuden@rdw.nl Joseph Mashele joseph.mashele@nracs.org.za	Daniela Leveratto, d.leveratto@immamotorcycles.org	June 2022
Electric Vehicles and the Environment (EVE) (group)	Michael Olechiw, Olechiw.Michael@epamail.epa.gov Pangiota Dilara, Panagiota.DILARA@ec.europa.eu Chen Chunmei (Vice-Chair), chencm@miit.gov.cn Hajime Ishii (Vice-Chair), ishii@ntsel.go.jp	Andrew Giallonardo, Andrew.Giallonardo@canada.ca	January 2024
Particle Measurement Programme (PMP) (group)	Barouch Giechaskiel, barouch.giechaskiel@ec.europa.eu	Rainer Vogt rvogt@ford.com	June 2023
Vehicle Interior Air Quality (VIAQ) (group)	Andrey Kozlov, a.kozlov@nami.ru Jong Soon Lim (Vice-Chair), jongsoon@ts2020.kr	Andreas Wehrmeier Andreas.Wehrmeier@bmw.de	November 2025
Global Real Driving Emissions (RDE) (group)	Panagiota Dilara, Panagiota.DILARA@ec.europa.eu Michael Olechiw, Olechiw.Michael@epamail.epa.gov Shinya Yamamura (Vice-Chair), yamamura-s2zh@mlit.go.jp Junhong Park (Vice-Chair) pjhy98@korea.kr	Noriyuki Ichikawa (co-Technical Secretary), noriyuki_ichikawa@mail.toyota.co.jp Giustino Manzo (co-Technical Secretary), giustino.manzo@cnhind.com	June 2023

Annex IV

Adopted amendments to GRPE-84-02

Final status report on the development of a new UN Global Technical Regulation on In-Vehicle Battery Durability for Electrified Vehicles

Proposal

I. Introduction

1. Owing to the pressing need to reduce emissions of greenhouse gases (GHG) and other air pollutants, the market share of electrified vehicles is expected to grow in the future. A key component of these vehicles is the traction battery that is used to store and deliver energy to power the movement of the vehicle and the systems within it. Improvements in the performance of batteries to deliver increased driving range, reduced charging times and greater affordability are a significant focus for manufacturers and technological developments in this area are expected to accelerate the uptake of electrified vehicles by consumers.
2. Despite the expected improvements in the performance of new electrified vehicles, the continued in-use performance of the battery over time is not currently regulated. The primary motivation for the development of a GTR on in-vehicle battery durability therefore stems from the recognition that the environmental performance of electrified vehicles may be affected by excess degradation of the battery system over time.
3. Loss of electric range and loss of vehicle energy efficiency are both primary concerns. Loss of electric range could lead to a loss of utility, meaning electric vehicles are driven less and therefore displace less distance travelled that might otherwise be driven in conventional vehicles. A loss in utility could also dampen consumer sentiment and curb the market growth necessary for electric vehicle sales to deliver on fleet emissions reductions. Loss of vehicle energy efficiency could impact the upstream emissions by increasing the amount of electricity needed per vehicle distance travelled. Both can affect not only the utility of the vehicle to the consumer, but also the environmental performance of the vehicle. Loss of environmental performance is important, in particular because governmental regulatory compliance programs often credit electrified vehicles with a certain level of expected environmental benefit, which might not be realized over the life of the vehicle if excess battery degradation occurs.
4. In addition to changes in range and energy consumption, hybrid electric vehicles are often equipped with both a conventional and electric powertrain, and for these vehicles the criteria pollutant emissions from the conventional powertrain could be impacted by the degradation of the battery over time.
5. The development of a GTR on in-vehicle battery durability therefore aims to provide a harmonized methodology to address these concerns by introducing a method by which the health of the battery can be monitored over time and by setting minimum performance requirements for the durability of the battery.

II. Procedural background

6. The Informal Working Group (IWG) on Electric Vehicle and the Environment (EVE) was set up in June 2012 following the approval by WP.29/AC.3 of ECE/TRANS/WP.29/AC.3/32. This document established two distinct IWGs to examine environmental and safety issues related to Electric Vehicles (EVs): the IWG 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). The

proposal was supported by the European Commission, the United States of America, China, and Japan.

7. 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 several recommendations that grew out of the first mandate, and develop UN GTR(s), if appropriate. The second mandate was separate from the IWG on EVS.

8. Part A of the second mandate of the IWG on EVE (ECE/TRANS/WP.29/AC.3/40) included “battery performance and durability” as one of the topics authorized for study and potential GTR development. Specifically, Part A authorized activity “to further develop the recommendations for future work outlined in the Electric Vehicle Regulatory Reference Guide by:

- (a) Conducting additional research to support the recommendations;
- (b) Identifying which recommendations are suitable for the development of Global Technical Regulation(s) (GTR(s)) by the World Forum for Harmonization of Vehicle Regulations (WP.29);
- (c) Developing a work plan.

9. The work of the IWG on EVE on battery performance and durability under Part A of the EVE mandate was reported to WP.29 in a status report as informal document WP.29-170-31 at the 170th meeting of WP.29, 15-18 November 2016.

10. At the close of Part A the IWG on EVE recommended that GRPE and WP.29 endorse the option of extending the mandate of the IWG on EVE to continue active research into the topic of battery performance and durability without committing to the development of a GTR at that time. This was endorsed and work continued on this topic within Part B of the mandate.

11. The IWG on EVE presented a draft status report to GRPE in May 2019 on the research on in-vehicle battery durability and performance. The status report indicated that there was sufficient information to allow a UN GTR for in-vehicle battery durability to be started. The IWG on EVE recommended at the 79th GRPE session in May 2019 that the UN GTR on in-vehicle battery durability be developed under a new mandate.

12. AC.3 subsequently approved document ECE/TRANS/WP.29/AC.3/57 authorizing the IWG on EVE to develop a new UN GTR on in-vehicle battery durability which will be developed in 2 phases:

- (a) Phase 1: 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;
 - (iii) A provisional in-service conformity test which will include generic usage criteria and a statistical method.
- (b) Phase 2: 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.

13. This report covers the development of the first version of the GTR under phase 1 of the mandate.

III Development of the GTR

14. Following several years of information gathering and deliberation among the IWG members on the feasibility of drafting a GTR, the GTR was developed over the course of around 20 IWG meetings over approximately two years, with 50 to 60 attendees participating in the meetings. The meetings and development process are transparent. Documents and reports generated for all of the IWG meetings are posted on the UN website:

<https://wiki.unece.org/pages/viewpage.action?pageId=2523151>

15. The governing committee of the IWG comprises of a Chairperson, two Vice-Chairs, and a Technical Secretary. A drafting coordinator is typically appointed for the drafting of specific GTRs. Chairperson is taken by the representatives of the United States and the Vice-Chairs are taken by the representatives of Japan and China. The Technical Secretary is taken by the representative(s) of Canada. For this GTR, the drafting coordinator was a representative of the European Commission.

16. Other members of the group who have contributed to the development of the GTR include representatives from many other Contracting Parties, automotive industry trade association groups, vehicle manufacturers, and technical experts.

17. The main discussions on the development of the GTR commenced at the 34th session of the IWG on EVE and focussed on the format and content of the GTR. A framework for the GTR was soon developed that centred around the concepts of a minimum performance requirement (MPR) for the in-vehicle battery, a readable on-board battery health monitor, an in-use verification procedure for assessment of the health monitor and a data collection process for assessment of durability against the MPR.

18. The framework established also provided the means by which to collect data for ongoing development of the GTR in a phase 2, together with negating the need to conduct validation testing in the course of preparing the GTR.

19. Early agreement was reached that the GTR should not seek to dictate the algorithm used by the manufacturer in determination of on-board battery health metrics, but instead provide a means to ensure the accuracy of any values through in-use verification. Two metrics were created, named the state of certified energy (SOCE) and the state of certified range (SOCR), which would form the basis for assessment within the GTR.

20. Early agreement was also reached that the GTR would not seek to create new test methods for assessment of vehicle range and battery energy, but instead rely upon the test procedures already employed within a Contracting Party for those purposes.

21. Initial drafting of the GTR started in the 37th session of IWG on EVE and an increased frequency of meetings was commenced in recognition of the significant work required on drafting and the novel basis of this GTR.

22. The IWG spent a significant amount of time considering appropriate MPR values that would prevent underperforming products entering the market whilst still being technically feasible for manufacturers. A number of data sources were considered in order to try and understand the performance of electric vehicles within the current fleet. A consensus amongst Contracting Parties was eventually reached at the beginning of 2021, which resulted in the establishment of MPRs based upon SOCE that are included within this GTR. A view was taken that SOCR would be monitored but not subject to an MPR requirement in phase 1 of the GTR for potential inclusion of range-based MPRs in phase 2.

23. Other key areas that the IWG focussed on included: the creation of family definitions for both the verification of on-board monitors and the assessment of battery durability, the statistical procedure for assessment of accuracy requirements for the on-board monitors, the handling of vehicles that have been used atypically or for vehicle-to-grid, and the definition of usable battery energy for the purposes of this GTR.

24. IWG on EVE has kept GRPE up to date on the development of the GTR. This included sharing a first draft of the proposed GTR as an informal document at the 82nd session of GRPE in January 2021 (see informal document GRPE-82-27). A second draft was also

submitted as a working document (ECE/TRANS/WP.29/GRPE/2021/18) at the 83rd session of GRPE in June 2021, but it was necessary to defer consideration of the proposal pending agreement on the final provisions of the GTR within the IWG on EVE. A special November session of GRPE was therefore requested, in which a final draft would be presented.

25. Key outstanding issues that needed to be resolved in order to finalize the GTR included:

- (a) Agreement on handling of vehicles that had not been subject to normal use;
- (b) Allowances for vehicles that have been used for vehicle-to-grid;
- (c) Agreement on a statistical procedure for verification of on-board monitors; and
- (d) Finalization of usable battery energy definitions.

26. A breakout group was established to explore options for the statistical method used in Part A (Verification of Monitors). Representatives from the European Commission's Joint Research Centre used datasets from the 'Transport tEchnology and Mobility Assessment Platform' (TEMA) to evaluate various methods, comparing against simulations by industry experts, before presenting their findings to the IWG.

27. The subject of vehicle-to-grid was discussed, and how it could be considered in the GTR. An equation was devised to calculate a 'virtual distance' value for vehicles designed for vehicle-to-grid usage, which could be summed with the distance driven to establish a total distance.

28. Significant discussion was also held regarding the handling of vehicles that had been subject to abnormal use. Initial proposals included the use of monitor flags to identify abnormal use, however, consensus was eventually reached to simplify and improve robustness of the process by eliminating the flags and adjusting the processes accordingly.

29. A breakout group was also created to establish definitions for certified and measured values of usable battery energy. Representatives from the European Commission, Japan and industry experts worked together closely to determine a solution that also addressed regional regulations, ensuring the GTR is applicable to regions that do not apply GTR No. 15 or the WLTP procedure.

30. A finalized version of the GTR is to be presented by the IWG on EVE at the 84th session of GRPE.

31. More detailed discussion of the technical approaches considered by the IWG on EVE can be found in the Technical Background section of this UN GTR.
