

**Report of the 29th Session of the
Electric Vehicles and the Environment Informal Working Group (EVE IWG)**

Location: Geneva, Switzerland
Time / Date: 14h00-17h30 January 8th, 2019
Chair: Mr. Michael Olechiw (USA) [Not Present]
Vice-Chairs: Mr. Hajime Ishii [Present]
Ms. Chen Chunmei (China) [Not Present]
Secretary: Mr. Andrew Giallonardo (Canada) [Not Present]

1. Welcome, introductions (Agenda item 1)

Mr. Per Öhlund stepped in as EVE back-up chair for the session, as Mr. Mike Olechiw, the Chair, was unable to make it to the meeting. Ms. Kendelle Anstey stepped in as back-up EVE Secretary for the 29th EVE IWG meeting. Mr. Hajime Ishii was introduced to the EVE IWG as the new vice-chair. As back-up chair, Mr. Per Öhlund addressed the EVE IWG at the 29th session. A number of participants attended the meeting, including participants from OICA, JRC, Japan, Canada, Norway, and Austria amongst other countries and industries. Key areas of the meeting's agenda focused on system power determination, in-vehicle battery durability, and the status report.

2. Statement on the Swiss Roadmap Electro-mobility 2022 (Agenda item 2)

Mr. Giovanni D'Urbano presented on the 'Swiss Roadmap to Electro-mobility' by 2022 (Document EVE-29-06e). On December 18, the Swiss Federal Councilor and over 50 enterprises, industry associations and government agencies in Switzerland adopted the roadmap for electro-mobility. The roadmap aims to achieve 15% market share of electric vehicles (pure-electric vehicles, plug-in hybrid and electrified vehicles and range extenders) by 2022, up from the present day 2.7%. The roadmap includes 65 measures from market development, optimized charging infrastructure, incentives and framework conditions and federal measures. The measures do not include direct subsidies as it is meant to coordinate and enable initiatives by other stakeholders.

3. Report of 28th EVE meeting report (Agenda item 3)

Ms. Kendelle Anstey presented the meeting report of the 28th EVE meeting held in Ottawa in October, 2018(EVE-28-15e). Participants who had comments were asked to provide comments 30 days post 29th EVE meeting.

4. Updates from WLTP (Agenda item 4)

Mr. Matthias Nägeli provided a short verbal update from the WLTP.

The WLTP low temperature task force last met in November 2018 and is discussing a number of technical points and complex issues regarding a new WLTP low temperature test procedure. The scope of the new WLTP low temperature test procedure shall not only be limited to the measurement of criteria emissions but shall also be extended to CO₂, electric energy consumption, range, and whatever is applicable for the considered vehicle category (pure ICE, NOVC-HEV, OVC-HEV or PEV). To date, there have been no developments of low temperature requirements on

- CO₂ for pure ICE vehicles,
- range, energy consumption and CO₂ for OVC-HEV and
- range and energy consumption for PEVs.

Other proposals, discussed in November 2018, included changes to Annex 1 - drive cycles, Annex 6 - test procedure on road load increases, and Annex 5 - test procedure specifics. The discussion also included an introduction of a 'family' concept.

The WLTP SG EV group is planning to increase future testing on more vehicles to support the development of this new WLTP low temperature test procedure. Since the current results of EV testing have shown values different than those of ICE vehicles and have specific procedures associated with them, the WLTP SG EV is planning to do more testing on EVs. Given the considerable time required to work through the complex issues, the group is considering reducing testing in the low temperature task force to manage the work level. While considering this, the group is also working on solutions to limit the future testing burden to a manageable level, while still fulfilling the requirements of the legislator

to provide customer value information on electric energy consumption, CO₂ and/or range, and whatever else is applicable.

Regarding low powered EVs, the question of whether or not low powered EVs are covered in GTR No. 15 and if so how, was raised in the IWG WLTP meeting in Tokyo (September 2018) for discussion in the WLTP SG EV meeting in Geneva in January 2019. In the WLTP SG EV discussion, it has become clear which cycles, procedures and driving modes those cars need to follow for testing. With more and more EV concepts coming into development, questions arise whether the current described tests take care of all the concepts adequately. Further discussions continue by the group on this topic.

The WLTP SG EV continues discussions on peripheral devices in MR2 and GTR No. 15, concerning different types of hybrid vehicles. The group met in November 2018 and will continue to discuss the topics, addressing any concerns.

Comments from WLTP to the EVE IWG's in-vehicle battery durability work and matrix are to evaluate durability for electrified vehicles from a complete vehicles perspective.

5. Review of status report (Agenda Item 5)

Ms. Kendelle Anstey went through details of the draft status report. The report outlines background and motivation of each of the EVE IWG's work on battery durability, power determination and method of stating energy consumption.

The report discusses initial research approaches considered for in-vehicle battery durability. It also discusses considerations and views from EVE IWG members on potential durability requirements for air pollutants, energy consumption/CO₂ and range requirements, as potential path forwards for regulating the durability and performance of electrified vehicle batteries. The sections on the battery durability research provide summaries of the research conducted by both the EU JRC and Canada. Suggested pathways in the draft status report suggested to continue research, stop research for a time, move forward with a GTR or another alternative that could be suggested by the EVE IWG.

Ms. Anstey sought feedback on alternatives for a path forward on durability. Some EVE IWG members suggested that a warranty alternative could be a path forward. This path forward was suggested in past EVE meetings as well. There was some discussion amongst EVE IWG members on how to implement such an alternative moving forward. Mr. Sigve Aasebø who represents Norway suggested that the EVE IWG could implement labelling with warranty, where an OEM could specify it within a certain year as one alternative path.

6. System Power Determination Updates (Agenda Item 6)

Concerning the work on the power determination GTR, validation-testing results had indicated a discrepancy between the two candidate testing procedures; test procedure 1 and 2, namely¹.

The EVE IWG at this meeting had not had the chance to discuss full details of the result discrepancies. Further discussion was scheduled the next day in Geneva. EVE IWG members at the 29th meeting in Geneva expressed concern about meeting the current timelines due to these discrepancies.

Japan raised these concerns in document EVE-29-05e presented by Dr. Hajime Ishii, the new vice chair. In this presentation, Japan recommended to revise the terms of reference and schedule of the mandate for power determination GTR drafting and battery durability. The results of the GTR validation testing, as Japan had indicated, are likely to influence the schedule in the terms of reference. Japan had recommended adjusting the schedule from section 9(iv) in the mandate² to the next GRPE meeting in May 2019. The schedule change would be to submit informal documents to GRPE by January 2020 instead of 12 weeks before June 2019.

¹ Test procedure 1 is based on the sum of the engine power and adjusted battery power. It is determined by using measured engine speed as an indicator of power output with reference to the methods described in ISO 1585 and UN regulation 85 engine test results. Test procedure 2 is based on determining power at the axle which is measured by means of axle (or wheel) torque and speed, and adjusted in calculations for losses in the gearbox (and the tires if applicable).

² ECE/TRANS/WP.29/2016/116

<https://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/gen2016.html>

After the presentation, there was discussion amongst the group regarding a decision on the terms of reference and the need for informal documents at the GRPE session. The group decided to postpone a decision on a timeline, since many of the contracting party members were not present at the 29th EVE meeting and detailed discussions of the test discrepancies were not yet discussed with time to reconvene with the entire group. The EVE IWG postponed the decision on a timeline so that they could hold further discussions before the next GRPE meeting in May 2019.

After the discussion on deciding to postpone a decision on the terms of reference, Mr. Nägeli advised that at the previous GRPE meeting, GRPE agreed that all three areas of work would be presented as a single package in January 2019. If the EVE IWG were to propose changing this, it would be important for the group to provide justification. Mr. Nägeli asked a question to the UNECE secretariat on whether there is a possible way forward on this. The UNECE secretariat noted that Mr. Aleksander Lazarevic, from the EU commission, would be able to share some of his experience.

Mr. Aleksander Lazarevic replied that it would be useful to inform GRPE during this session about how the EVE IWG is going to proceed if they would adopt or revise the terms of reference and what those changes would be. He noted that 2020 would be based on different terms of reference than the one EVE IWG is familiar with from the beginning of the mandate.

Mr. André Rijnders stated that there is pressure to have a separate GTR that can be used by the WLTP on power determination, as soon as possible. The EVE IWG would have to explain the delay to GRPE in the terms of reference. Terms of reference should follow the new forecast for this group.

7. Battery Durability Updates (Agenda Items 7)

Dr. Hajime Ishii presented Japan's input on battery durability (document EVE-29-04e) for discussion. Dr. Ishii highlighted that there are a few points which require further discussion from the EVE IWG. These include technical and statistical difficulties on setting representative conditions to evaluate battery degradation and difficulties confirming a direct correlation between vehicle performance and battery degradation. In the recent

draft of the status report/technical report on battery durability, four options were presented to decide a path forward on battery durability: to continue research, stop research for a time, move forward with a GTR or another alternative development of a battery durability GTR. At this time, the EVE IWG has not come to an agreement on a path forward.

Japan notes that technologies are catching up but that the EVE IWG needs further research consolidation for evaluating vehicle performance regarding battery degradation in order to facilitate further discussions and development of the GTR. Japan is of the opinion that the progression of a GTR should stop until the maturity of relevant EV battery research is forecasted. The restart of the issue could be decided by GRPE when sufficient technologies become available. Dr. Ishii notes that guidance by the ongoing durability task force in WLTP-IWG will be helpful for deciding a path forward.

Following Dr. Ishii's presentation, Ms. Elena Paffumi presented on the newest updates to the TEMA platform model³. She noted that the updates now have pie and flood shapes and different vehicle technology is incorporated, which can influence how people drive and park their cars. They also now have some duty cycle data incorporated, which is collected from conventional fuel data in Europe. Previous presentations have shown different driving behavior in other countries and their impact on battery aging. Temperature effects were also studied with Canadian data.

Ms. Paffumi discussed that JRC has to spend a lot of time assembling models that closely reflect different battery chemistries and vehicle architectures. On the charging side of the models, JRC has tried exploring three different charging and power scenarios. These scenarios look at frequency of charging at least once a day, different duty cycles and environmental temperature effects. Ms. Paffumi also noted that JRC implemented a battery cell test to compare with vehicle data. Some of the modeling discussed was still in progress.

Ms. Paffumi noted that the biggest influences in the models were the driving patterns and environmental temperatures, especially if the cars have been parked for an extended

³ The document is not posted on the EVE website as it contained sensitive information and could not be posted at this time

period of time in extreme temperatures. She noted that the models are sensitive and that is a problem to overcome in the work.

Discussions after Ms. Paffumi's presentation noted the sensitivity of the data and the reliance on manufacturer data to inform the model.

Ms. Annika Ahlberg-Tidblad noted the difficulties with the age of the data used for the modelling and that studies have shown this to be one of the challenges. She also expressed the importance to continue research.

Dr. Panagiota Dilara, a representative from the EU commission was in agreeance on a number of points from Ms. Paffumi's presentation. She noted that the work of the JRC is on the right path but that more research is needed. JRC continues to modify the model with more variables architectures and chemistries and is moving towards a stage to become a more generic model that will provide stabilities on the technologies that need to be developed.

The EU commission representative noted the importance of JRC's work for post Euro 6. She expressed the European Commission's need to follow a tight deadline and for the group to move quickly on the work, to agree on key information and express a willingness to develop a model that will find a technology neutral approach for post euro 6 regulations.

Dr. Dilara expressed that the EU Commission's main goal is to have a regulation, as either a GTR or a European regulation. She said that pushing the research now would provide assurances that JRC could move onto the next stage, such as a generic model.

Mr. Norbert Klein, a representative from OICA commented on Dr. Dilara's points and Japan's position paper. He agreed with Japan's paper that it is too early to make a GTR for in-vehicle battery durability. Mr. Klein expressed that it is important to not put research on hold but to continue research that is important for customers and the market. He said that it would be helpful to define the durability criteria for a vehicle as it could help give the research better direction.

Mr. Abe Shinichi posed a question to the EU Commission to specify what the EU Commission is planning for regulation or range and if they have plans to regulate electricity consumption or air pollutants for these vehicles.

The response from the EU commission representatives, Dr. Dilara and Mr. Lazarevic -at this meeting, was that air pollutants and range rank higher than CO2 and energy consumption. The EU commission continues to have discussion on range for PEVs. Dr. Dilara noted that if the EU Commission wants to reach their targets in one-year then key elements identified need to proceed with the model being proposed by JRC.

Mr. Nägeli asked if the EVE IWG should focus on durability requirements or the implementation of a model.

Ms. Paffumi responded that the EU commission is still discussing and trying to summarize what research has been done so far. She noted some opinions are still draft views but highlighted that there are always the four approaches⁴ previously discussed such as the duration or deterioration factor that JRC could explore during the year.

Mr. Nägeli repeated that OICA has made past statements that battery ageing is complex and if there is a procedure put forth to fit the current technologies, then there is a preference for durability requirements.

The EU Commission noted that new technologies on the market could only go forward with duration factors. The EU Commission does not want to drop alternatives, but to remain open to solutions.

Ms. Ahlberg-Tidblad highlighted the excellence of JRC's modelling and noted that it clarified the complexity of the issue and that a lot of data is required to have something that can be trusted in the end. Ms. Ahlberg-Tidblad also brought the topic up of warranty as suggested from Norway earlier in the meeting as a solution that should be considered

⁴ These approaches are those discussed in the battery durability report draft, namely; pursue development of durability test profiles, seek to identify deterioration factors, investigate testing with age or age-emulated batteries and determine deterioration factors through simulation

by all parties. She noted that it is easy to go for regulation but that regulation has to bring an added benefit.

Mr. Aasebø added that the proposal that Norway suggests is for a warranty under some form of regulation.

8. Method of stating energy consumption update (Agenda Item 8)

After the discussion on in-vehicle battery durability, the topic on method of stating energy consumption was discussed as per the agenda. No new updates were presented from the EVE secretariat on the method of stating energy consumption work, only that the EVE IWG was waiting for responses from the group of experts already approached.

Mr. Cuenot, the UNECE secretariat, who has been contacting the group of experts on Clean Energy Production (CEP) and the group of experts on Energy Efficiency, noted that the group of experts on CEP are acquiring the right expertise to be able to take up the work on method of stating energy consumption. The group does not have the right expertise on the supply side or electricity side of the work. Mr. Cuenot said that there is a potential for people to join the group and room for collaboration going forward, if the right experts are in the group.

9. Final remarks, action items, schedule, next EVE meeting, closing of meeting (Agenda items 9 and 10)

Before the end of the meeting, the EVE IWG discussed adjusting the dates of the Sweden meeting in April, as some contracting party members had previously expressed concern that there were a few conflicts in travel. The proposal reached by the EVE IWG was to host it the week of April 8th.

The group discussed the previous action items from the last meeting. Remaining action items were the following.

- Find substitute for R85 engine data to perform TP1 in North America
- Look into providing a CT6 (Cadillac Sedan) vehicle for testing
- Find rolling resistance tire data and engine data

Follow-up action items for the group were, to continue discussion on finalizing the status report and to discuss a path forward on validation testing during a post EVE 29 teleconference and during the EVE 30 meeting in Stockholm.