

Online Workshop on Real-Time Upstream Emissions of Electric Vehicles During Recharge

Joint event by the Group of Experts on Energy Efficiency and the Informal Working Group on Electric Vehicles and the Environment

Online, 27 May 2021, from 10 a.m. to 2 p.m.

Report of the Workshop

Electric vehicle fleet has significantly increased worldwide over the last decade, alongside expansion of charging infrastructure. Coupled with technology advances and supported by favourable regulatory and fiscal measures, uptake of electric vehicles is expected to only accelerate in the future.

Powered solely by electric motors, EVs have zero tailpipe emissions. Yet, EVs virtually emit carbon when being charged, as electricity production generates greenhouse gas emissions. And despite most studies use average annual carbon content of the electricity mix to derive well-to-tank emissions from EVs, these may vary over time depending on multiple factors including the source of energy used for electricity production. A ‘well-to-wheel’ approach, considerate of time and location of EVs charging, is therefore thought to be expedient for assessing real environmental benefits of locally carbon-neutral EVs. Achievement of this target, however, is reliant on improved vehicle connectivity, real-time electricity mix and related carbon content data reporting of power generation, and decision-making support for more economically rational and environmentally favourable EVs recharging options – all enabled by ICT and digitalization, while keeping data privacy and security a must have to ensure end-user adoption.

The workshop on Real-Time Upstream Emissions of Electric Vehicles During Recharge aimed to assemble experts from the power generation and transmission side, and bring expertise from the ICT, recharging infrastructure, and vehicle sides. Through presentations and open discussion, it helped assess how digital technologies could enable more accurate measurement and reporting of real-time carbon emissions of electric vehicles, while giving due consideration to pathways for a balanced integration of electric mobility to ensure overall net benefit to energy system and its actors.

In total, the workshop was attended by 77 participants. Opening statement was delivered by Dr. Piyush Verma, Chair of the Task Force on Digitalization in Energy of the Group of Experts on Energy Efficiency. The speakers were representing International Organizations, national power grid operators, private sector organizations including innovative start-ups, industry associations, and academia. The presentations were followed by a discussion among participants and speakers, which was moderated by Dr. Alisa Freyre, Vice-Chair of the Group of Experts on Energy Efficiency, and Francois Cuenot of UNECE Secretariat. Concluding remarks were made by Mike Olechiw, Chair of the Informal Working Group on Electric Vehicles and the Environment. The workshop was moderated by Igor Litvinyuk (including technical moderation).

Key outcomes of the workshop are as follows:

- More transparent and harmonized data streams and calculation methodologies from both electricity providers and connected vehicle features make the quantification of real-time recharging emissions technically feasible, though with due consideration given to data privacy and security;
- Intelligent charging management systems and connected vehicles, coupled with hourly forecasts, market signals and consumer preference data, are key to minimise the upstream emissions of EVs and reap related benefits (such as reducing peak power generation capacity needs, integrating variable renewables and making EVs more attractive to end-users from a financial and environmental perspective). Harmonized communication protocols between countries and all the actors involved would ensure faster and sustainable success of low-carbon recharge procedure.
- A number of challenges still need to be addressed, especially related to regulations (e.g. implementing real-time electricity tariffs, including upstream emissions from all energy types used for mobility purposes), load management (e.g. through enhanced connectivity, or Artificial Intelligence algorithms) or consumer engagement (e.g. through infrastructure development and innovative business models that will make the case for sustainable charging practices).

All workshop materials, including presentations, are available at the dedicated [webpage](#).

The workshop contributed to implementation of the task of the Informal Working Group on Electric Vehicles and the Environment to determine a [“method to state energy consumption of EVs”](#), and as a topic of interest to the Working Party of Pollution and Energy ([GRPE-80-04-Rev.1](#)) and to implementation of the Work Plan of the Group of Experts on Energy Efficiency for 2020-2021 ([ECE/ENERGY/2019/8](#), section D).

As vehicle and energy supply sides need to work together to deliver on a potential measurement procedure (if deemed appropriate and useful), the Informal Working Group on Electric Vehicles and the Environment and the Group of Experts on Energy Efficiency and its Task Force on Digitalization in Energy agreed to further explore a way forward towards concrete collaboration.