

Summary

The Alliance for Automotive Innovation (“Auto Innovators”) and our member companies do not oppose durability requirements. In fact, automakers, and environmental regulators from around the world worked for two years, under the leadership of the U.S. Environmental Protection Agency who chaired the workgroup, to develop very challenging, yet achievable, durability requirements.

We do oppose the durability requirements included in the proposed 13 CCR §1962.4 (“ZEV regulations”) and implemented in 13 CCR §1962.7 (“ZEV In-Use Requirements”). Instead, we recommend that CARB harmonize with the United Nations Economic Council of Europe (UNECE) Global Test Requirement (GTR) EV battery durability requirements at least through 2030MY and gather and analyze data to work with the UNECE in the long term to develop updated durability requirements that, ideally, align with global requirements.

Taken as a whole, the proposed ZEV regulations provide vastly more protection and transparency to EV consumers, and we support the overwhelming majority of these changes. For example, the regulations include a new battery warranty to protect consumers from defective EV batteries, and a new customer-facing state of health (SOH) battery monitor to ensure used vehicle consumers can make informed decisions. We support these.

Proposal

Adopting the UNECE GTR, at least through 2030MY, is the best path forward to accelerate EV adoption, lower emissions, and reduce fossil fuel dependence. Establishing unnecessarily overly stringent requirements may have negative environmental consequences and raise the costs for both manufacturers and consumers. Maximizing EV consumer options and reducing regulatory complexity will help to prevent those issues and accelerate EV adoption globally.

The current GTR establishes a Minimum Performance Requirement (MPR) that batteries must maintain at least 80% SOH after 5 years or 100,000km (62,000mi) and at least 70% SOH after 8 years or 160,000km (100,000mi).¹ These requirements were developed by considering the current and anticipated technological capabilities of traction Li-Ion batteries while still balancing the reliability needs of the consumer. Auto Innovators and its members consider this MPR to be a challenging yet realistic requirement.

The GTR has been finalized by its governing body and is now currently published in the global registry, allowing countries to adopt it within their own regulations. Additionally, it is expected that the

¹ Electric Vehicles and the Environment (EVE) Informal Workgroup (IWG), United Nations Economic Commission for Europe (UNECE). “Draft GTR EVE #52,” September 8, 2021.

European Union will include the GTR as part of their EURO 7 regulations in 2025 while other regions may adopt the regulations earlier.

Benefits to Global Market and Consumers

The UNECE has long recognized the value in international cooperation. Uniform international regulations drive investment at a greater scale than would be achieved with a patchwork of national (or sub-national) rules. Furthermore, international regulations are important tools that accelerate innovation by giving researchers and manufacturers a common, level playing field for their products to compete.² Establishing global standards that are consistent across the world's markets help facilitate deployment of cutting-edge technologies like electric vehicles.

Auto Innovators recognizes the leadership role California has played in helping to drive electric vehicle commercialization and focusing on battery durability to protect consumers and build confidence in the EV market. However, companies produce vehicles for the global market. Adhering to a global standard as it pertains to battery durability and reducing regulatory complexity will reduce production costs. This in turn will help compliment and support our goal to increase access to EV across all socio-economic backgrounds.

UNECE GTR Development

Government agencies and manufacturers across the world have collaborated as part of the UNECE Electric Vehicles & the Environment (EVE) Informal Working Group (IWG) to develop a robust and globally accepted EV battery durability global test requirement (GTR). The GTR is split into two phases: Phase 1 includes minimum performance requirements (MPR) for useable battery energy (UBE) state of health (SOH) and data collection for range, while Phase 2 will use the data collected in Phase 1 to evaluate if modifications are necessary, including potential addition of a MPR for range.

The IWG agreed to establish Usable Battery Energy (UBE) as the preferred metric to measure traction battery State of Health (SOH). In early discussions within the workgroup, establishing "range" as the preferred metric for SOH was first considered. However, due to the many external influences that contribute to accurately measuring range, the workgroup agreed to reconsider range as a metric in Phase 2 of the GTR, as more supporting data is gathered in Phase 1. While we do not agree on a range metric in Phase 1, we do recognize its potential value in the future. We request that CARB work with the UNECE group to collect and analyze data on range to help inform decisions regarding the SOH metric for Phase 2 of the GTR.

The development of the UBE metric entailed an extensive process within the IWG. Range and UBE were explored by both government and industry representatives. Their scientific models and data

² The United States is a signatory of the 1998 UN agreement that created the venue in which nations negotiate and develop international Global Technical Regulations.

analysis highlighted robust evidence supporting UBE as the more reliable metric when measuring the SOH of a traction battery. For starters, UBE is a general parameter which does not differ in definitions within regional legislation. This commonality facilitates an easier harmonization process across different governments, federal to local.

External Factors on Range

Major concerns have been raised across the industry regarding the ability of a range metric to accurately report the durability of a battery. The main concern is that there are too many external factors that can influence an EV's range: these uncertain variables may affect the degradation of range in a way that inhibits achieving an accurate and universal range measurement for a vehicle. For example, ambient temperature or aggressive driving may contribute to the degradation of an EV's range. Additionally, the GTR and CARB both conduct different testing methods to calculate range. OEMs and other members of the GTR working group have yet to see hard data indicating that there is an impact on range from the degradation of additional components. Therefore, we request additional data be collected as is mandated in Phase 1 of the GTR.

Instead of focusing on external factors outside of the battery, the calculation of a battery SOH based on UBE focuses solely on the battery itself. As a result of the singular focus on the battery, the workgroup agreed that it is possible to define tolerance and durability requirements for the battery SOH using UBE as its metric. A capacity measurement procedure can be defined independent from the driving cycle, which would be a big benefit in terms of harmonization.

Consequences of Current ACC2 Standards

The GTR requirements were established based on the outer envelope of current cell technology. The ISOR proposed requirements that go beyond the GTR profile can only be met by "simulating" the required degradation profile, meaning automakers may need to electronically limit the customer useable energy capacity, since the proposed durability requirement is misaligned with capability of existing/known battery technology. This will have negative consequences on EV consumers, since they won't have access to the battery capacity (and range) included in the vehicle price. The extra cost will impact the initial buyer, but the extra weight and extra consumed package space will impact all users of the vehicle throughout its life.

Moreover, there will be a wide statistical distribution of remaining-range in used EVs, and some 10-year-old vehicles will have a healthy level of remaining range and battery in any scenario. Adding extra "hidden" or "reserve" cell capacity to new vehicles will certainly skew that used-vehicle distribution, providing statistically more healthy vehicles at 10 years. But it will increase the cost and weight of every new EV, and at exactly the wrong time – when automakers, agencies, and governments are trying to transform the buying habits of every single vehicle customer in America.

A single global durability standard for vehicles that produce zero emissions throughout their life allows automakers to develop and implement global platforms, reducing costs and improving quality

compared to a patchwork of requirements around the world. A patchwork of requirements will not reduce emissions. Instead, it will add costs – substantial costs.

We share CARB's goal in working to ensure that clean and zero emission vehicles become accessible to all people and develop a robust and reliable second-hand market. In theory, this dependability will drive down costs of new vehicles, as well as produce a rich market of second-hand EVs, making them even more accessible for lower-income customers. However, the durability requirements in the ISOR may have the opposite effect.

Imposing an 80% range requirement at 10-years/150,000 miles on all EV traction batteries will have consequences that may hinder the EV adoption. EPA and other global regulators have concluded that more time is needed to develop robust durability requirements for range. As was recognized by the IWG, postponing the consideration of a range requirement until Phase 2 of the GTR in favor of a SOH metric is the best path forward. This allows the workgroup and regulatory bodies to gather and analyze sufficient data from Phase 1 to establish an appropriate battery durability standard moving forward.

Conclusion

Auto Innovators and our members share CARB's goal of robust and durable EVs that provide safe, reliable, and affordable personal mobility. We believe that CARB's proposed requirements take a dramatic step in that direction, and we support most of the requirements in the ISOR. However, the durability requirements proposed will increase regulatory complexity, create a patchwork of requirements, and prevent the deployment of global platforms that reduce cost for all customers around the world. We have been active participants in the UNECE's GTR workgroup and believe that adopting the UNECE's GTR is the best path forward to accelerate EV adoption, lower emissions, and reduce fossil fuel dependence.